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PEGASUS GLOBAL HOLDINGS, INC.

KEMPER COUNTY IGCC PROJECT

MAY 23, 2014

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ACRONYMS & ABBREVIATIONS

AACE........American Association of Cost Engineers
AACEI........Association for the Advancement of Cost Engineering International
AEP........American Electric Power
AGR........Acid Gas Removal
AIA........American Institute of Architects
ASCE........American Society of Civil Engineers
B&M........Burns & McDonnell
B&V........Black & Veatch
BOD........Board of Directors
BOP........Balance of Plant
BPC........Boston Pacific Company, Inc.
BREI........Burns and Roe Enterprises, Inc.
CC........Combined Cycle
CCPI........Clean Coal Power Initiative
CEP........Chemical Engineering Program
CFCC........Certified Forensic Claims Consultant
CFI........Contract Fabricators, Inc.
CII........Construction Industry Institute
CMAA........Construction Management Association of America
CO........Carbon Monoxide
CO_2........Carbon Dioxide
COD........Commercial Operation Date
CPCN........Certificate for Public Convenience and Necessity
CPM........Critical Path Method
CT........Combustion Turbine
C.V.........Curriculum Vita
DCNs........Design Change Notices
DEI........Duke Energy Indiana
DOE........U.S. Department of Energy
E&CS........SCS Engineering and Construction Services
E&Y........Ernst & Young
EAC........Estimate-at-Completion

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ECC .... Engineering & Construction Contracting Association

ENAA .... Engineering Advancement Association of Japan

EPRI .... Electric Power Research Institute

ERB .... Executive Review Board

EUEC .... Energy, Utility and Environment Conference

EVM .... Earned Value Management

FCC .... Fluid Catalytic Cracking

FDG .... Flue Gas Desulfurization “Scrubbers”

FEED .... Front End Engineering Design

FIDIC .... Fédération Internationale Des Ingénieurs Conseils

FOAK .... First-of-a-Kind

FP&L .... Florida Power & Light

G-3 .... Genoa #3 Station

GAAP .... Generally Accepted Accounting Principles

GE .... General Electric

GI .... Gasifier Island

H_2 .... Hydrogen

HMB .... Heat and Material Balance

HRSG .... Heat Recovery Steam Generator

ICE .... Institution of Civil Engineers

IFC .... Issued for Construction

IGCC .... Integrated Gasification Combined Cycle

IIA .... Institute of Internal Auditors

IMs .... Independent Monitors

ISO .... Isometric Drawing

ITC .... Investment Tax Credit

IURC .... Indiana Utility Regulatory Commission

KCP&L .... Kansas City Power & Light

LDs .... Liquid Damages

LF .... Linear Foot

Lisega .... Lisega, Inc.

LNTP .... Limited Notice to Proceed

LPI .... Labor Performance Indicator

LSTK .... Lump Sum Turnkey

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McAbee .... McAbee Construction, Inc.

MDOT .... Mississippi Department of Transportation

MOU .... Memorandum of Understanding

MPC .... Mississippi Power Company

MPSC .... Mississippi Public Service Commissions

MRB .... Management Review Board

MTO .... Material Take Off

NCCC .... National Carbon Capture Center

NO_x .... Nitrogen Oxide

O&M .... Operation & Maintenance

OUC .... Orlando Utilities Commission

OSBL .... Outside the Batter Limits

P&ID .... Piping & Instrument Diagram

PC .... Pulverized Coal

PCD .... Particulate Control Device

PCI .... Performance Contractors, Inc.

PDA .... Process Development Allowance

PDP .... Project Development Plan

PDR .... Preliminary Design Report

Pegasus-Global .... Pegasus Global Holdings, Inc.

PEP .... Project Execution Plan

PFD .... Process Flow Diagram

PMI .... Project Management Institute

PMP .... Project Management Plan

PMT .... Project Management Team

PPA .... Power Purchase Agreement

PRB .... Powder River Basin

Project .... Kemper IGCC Project

PSC .... Public Service Commission

PSC Report .... Public Service Commission Monthly Status Report

PSDF .... Power System Development Facility

RAM .... Reliability, Availability and Maintainability

ROD .... Record of Decision

SCM .... Supply Chain Management

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SCPC	Super Critical Pulverized Coal
SCR	Selective Catalytic Reduction
SCS	Southern Company Services
SLD	Single Line Diagram
SO_2	Sulfur Dioxide
SPI	Schedule Performance Indicator
Staff	Mississippi Public Utilities Staff
T&M	Time and Materials
TECO	Tampa Electric Company
URS	URS Corporation
USCPC	Ultra Supercritical Coal Plant
VEC	Vernon Electric Cooperative
VR	Variance Review Report
VRF	Vender Recommendation Form
WBS	Work Breakdown Structure
WIN	Workforce Investment Network

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I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Dr. Patricia D. Galloway. My business address is 1750 Emerick Road, Cle Elum, Washington 98922.

Q. What is your occupation?

A. I am the Chief Executive Officer of Pegasus Global Holdings, Inc. ("Pegasus-Global"), a management consulting firm that provides services to the energy and infrastructure industries globally. I am the Director of this engagement for Pegasus-Global.

Q. Are you the same Dr. Patricia Galloway that submitted Supplemental Direct Testimony in this proceeding on December 13, 2013?

A. Yes, I am.

Q. Are your qualifications, experience and educational background described in your Supplemental Direct Testimony?

A. Yes, pages 3-9 and Exhibits PG-1 through PG-6 of my Supplemental Direct Testimony contain a summary of my qualifications and experience including my C.V., my process/power plant experience and my prudence audit evaluation/testimony experience.

Q. Has anything changed relative to your qualifications and experience since the filing of your Supplemental Direct Testimony on December 13, 2013?

A. Yes. I have received my Mississippi Professional Engineer's license #25328 issued on March 25, 2014 and I have completed my Certificate in Dispute Resolution from Pepperdine Law School, Status Institute for Dispute Resolution. I was also asked by the University of Melbourne in Australia to kick off their 2014 Lecture Series with a lecture on "The Unique Aspects of Managing Megaprojects in Asia," which I delivered on March 19, 2014.

Q. What was Pegasus-Global requested to do?

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A. As noted in my Supplemental Direct Testimony[1], I was asked, along with the Pegasus-Global team, to conduct a prudence audit and evaluation of the decisions surrounding the Kemper Integrated Gasification Combined Cycle ("IGCC") Project up through March 31, 2013 and specifically, respond to the collective allegations of Sierra Club's witness Mr. David Schlissel, Mississippi Public Utilities Staff's ("Staff") witness Burns and Roe Enterprises, Inc. ("BREI"), and The Mississippi Public Service Commission ("MPSC") witness URS Corporation ("URS").

I, Dr. Patricia Galloway, am the "sponsor" of the Pegasus-Global analysis. I directed and actively participated in our evaluation, and I prepared this testimony. Whenever I use the term "I" in this testimony, it is based on the representation that the prudence review and response to the Sierra Club, Staff and MPSC witnesses' testimony was conducted under my direction and supervision of the Pegasus-Global team.

II. PURPOSE AND SUMMARY OF TESTIMONY

Q. What is the purpose of your Rebuttal Testimony?

A. Mississippi Power Company ("MPC") asked Pegasus-Global to respond to the prudence testimony of the Sierra Club, Staff and MPSC witnesses. In response to the Sierra Club, Staff and MPSC witnesses' allegations of imprudence, and potentially unreasonable actions, Pegasus-Global conducted an independent prudence audit and evaluation of whether the costs incurred for the Kemper IGCC Project (or "Project") were reasonably and prudently incurred.

Pegasus-Global's prudence audit and evaluation focused on the management processes employed by MPC to make decisions and compared them to generally accepted prudence standards for decision-making processes. This evaluation considered whether MPC management had an appropriate decision-making structure and processes in place to ensure that MPC management made informed decisions based on information reasonably available to or known at the time

[1] Supplemental Direct Testimony of Dr. Patricia D. Galloway, On Behalf of Mississippi Power Company, Docket No. 2013-UA-189, pages 2-3, December 13, 2013

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management made the decisions. The evaluation also considered whether MPC management reasonably and prudently implemented its decisions. This evaluation included:

- An assessment of the management processes used by MPC to plan, execute and control engineering, procurement, and construction activities, including those of its contractors;
- An identification of management strengths and positive actions which may have had an impact on cost and/or schedule;
- An identification of any management shortcomings which may have impacted cost and/or schedule; and
- A determination of the reasonableness of overall design, procurement and construction management practices and the extent to which these management practices avoided, mitigated or resulted in cost and/or schedule impacts.

Q. Dr. Galloway, have you given prior testimony to the MPSC on behalf of MPC?

A. Yes. I provided Supplemental Direct Testimony in this proceeding on behalf of MPC, regarding the fundamental concepts of prudence as those concepts apply to decision-making during the planning and execution of a power generation project, the qualifications and experience of the Kemper Project Management Team ("PMT"); the planning, managing, controlling and completing of a typical large and complex project; and the project control systems and tools used to manage and monitor the Kemper IGCC Project. As I describe more fully below, I have applied these concepts within this testimony.

Q. Dr. Galloway, what are your overall observations with respect to the findings and conclusions raised by the Sierra Club, the Staff and MPSC witnesses?

A. First, no witness of the Sierra Club, the Staff or the MPSC has rendered any conclusive findings on whether any decision or action of MPC was imprudent or unreasonable and has made no specific monetary disallowance findings of imprudence. Second, relative to the findings that have been made by these witnesses for MPSC's consideration, I have the following overall

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observations with respect to their conclusions regarding potential imprudence and recommended actions to be taken by the MPSC.

1. The Sierra Club's witness Mr. Schlissel does not make any specific determination of disallowance. Rather, Mr. Schlissel simply opines that the Kemper IGCC Project should have not been built or should have been cancelled. Many of Mr. Schlissel's arguments were rejected in the Certificate case, and both of his conclusions are reached in hindsight and are therefore inappropriate in this prudence review.
2. MPSC's witness URS has not calculated any disallowance noting that it "*will be done in a future report*." Further, URS's findings are more "observational" and qualified with the word "may"; thus no determination of imprudence has been made.
3. Staff's witness BREI has proposed a range of costs that equate to "*inefficiencies, shortcomings and inadequacies,*" but never states or provides an opinion as to whether these amounts are imprudent or unreasonable. BREI also makes no recommendation as to where these amounts should be taken, meaning whether the amounts would be taken from the approved capped amount or whether they would be above the capped amount. Further, the methodology used by BREI to determine the recommended range of "inefficiencies, shortcomings and inadequacies" is arbitrary and is not tied to cause and effect of cost increases.
4. Because MPC forecasts that the direct Project construction costs will be over the $2.88B construction hard cap, MPC has already absorbed any potentially unreasonable costs.
5. Because MPC has already absorbed any potential imprudent costs and other costs forecasted above the $2.88B cap, there should be no further disallowance.

Q. Dr. Galloway, based on your review of the imprudence allegations made by the Sierra Club, Staff and MPSC witnesses, do you have an overall opinion of MPC's management decision-making process and the decisions that MPC made relative to the costs incurred?

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A. Yes. Based upon Pegasus-Global's independent prudence review, which included an evaluation of MPC's management decisions and decision-making processes regarding the costs incurred on the Kemper IGCC Project through March 31, 2013, and in response to the allegations of imprudence made by the Sierra Club, Staff and MPSC witnesses, Pegasus-Global has concluded that MPC's management decisions as to the Kemper IGCC Project were reasonable and prudent. Generally, MPC made rational, deliberate and prudent decisions based on established processes. MPC used its processes to collect the best information available at the time; evaluated that information in light of the circumstances at the time; identified viable alternatives or options; and made reasonable decisions. There were, in my opinion, no imprudent decisions; rather, MPC prudently took steps to update information in light of evolving conditions and circumstances that affected decisions previously made, using the updated information that was not available at the time the decisions were originally made. MPC carefully considered the estimated costs and impacts, as well as potential benefits in the short and long term. MPC considered both its customers and the company interests when reviewing each alternative or option, including the decision to agree to capped costs for the Project at $2.88B with agreed exceptions. The decision to agree to cap the cost of the Project has resulted in a significant benefit to the ratepayers of Mississippi and protected MPC's customers from any additional costs incurred; regardless of the reasons such costs may arise. MPC's deliberate processes produced reasonable and prudent management decisions with respect to how and whether to proceed with the Kemper IGCC Project given the conditions and circumstances facing MPC at the time the decisions were made.

Q. Dr. Galloway, what are the central summary allegations raised by the Sierra Club, Staff and MPSC witnesses and what are Pegasus-Global's principal responses to those allegations?

A. The principal allegations and Pegasus-Global's responses to those allegations are:

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1. MPC did not fully understand, understated and underestimated the first-mover risks associated with a First-of-a-Kind ("FOAK") technology, which resulted in unreasonable additional costs to the Project.[2,3,4]

In response, Pegasus-Global found and concluded that:

FOAK Risks

- MPC took reasonable actions and conducted several evaluations to not only identify and quantify these FOAK risks, but also to implement measures to mitigate impacts that might arise from these risks.
- The FOAK issues raised by Mr. Schlissel were extensively documented in the Certificate case's more than 30,000 page record, were reviewed in the Phase II hearing; were considered by the MPSC; and incorporated in the Final Order and issuance of the Certificate for Public Convenience and Necessity ("CPCN"). Mr. Schlissel participated in those hearings and therefore should be well aware of MPC's positions and actions on these matters. Mr. Schlissel appears to have ignored the facts, does not understand them and how they relate to the issues or is attempting to create a red-herring.
- The risks of FOAK technology were known throughout the industry during the timeframe (2004-2009) in which MPC was considering and undertaking its Front End Engineering Design ("FEED") Study for the Kemper IGCC Project. However, what was not well known at the time was exactly what risks would present themselves or at what stage of construction issues might arise.
- Based on its extensive prior commercialization of FOAK power plant technology and emissions control systems and components, Southern Company, and MPC

[2] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, pages 2-4, March 14, 2014
[3] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, pages 5, 9, March 19, 2014
[4] URS Corporation, IM Prudence Report, page 15, March 7, 2014

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understood there were risks with development of the Kemper IGCC Project. MPC was clearly aware of the risks; identified the nature and potential impact of such risks; and took actions to mitigate the potential impact of these risks.

- MPC participated in Power Systems Development Facility ("PSDF") testing programs, which contributed to Southern Company Services' ("SCS's") understanding of gasifier operational parameters and allowed SCS to test and demonstrate TRIG™ technology, optimizing gasifier performance and developed other TRIG™ systems. From September 1999 through July 2008, the PSDF undertook four different gasification commissioning tests and twenty gasification test campaigns, for a total of approximately 11,500 hours of coal gasification operation.[5] Work at the PSDF involved collaboration with esteemed industry partner such as the Electric Power Research Institute ("EPRI"), KBR, the Lignite Energy Council, Siemens Power, Peabody Energy and the U.S. Department of Energy ("DOE").
- MPC timely undertook Technology Risk Assessments which were performed during, at completion and post-FEED to identify FOAK systems and equipment. By the time of the issuance of the Certification in June 2010, MPC had completed PSDF gasifier testing programs and completed numerous TRIG™ design reviews and risk assessments. Also by June 2010, MPC had undertaken programs, assessments and actions to identify and mitigate FOAK risks. These actions were reasonable, and the decision to proceed with the Kemper IGCC Project was prudent based on the information available to MPC by June 2010.
- The experience and information obtained from the PSDF testing programs, together with the risk assessments performed by or on behalf of MPC and SCS,

[5] Southern Company Services, Inc., Power Systems Development Facility – Final Project Report, page 1-6, April 2009

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provided a firm basis for the design of the transport gasifier and associated systems, thus ensuring the Kemper IGCC Project would meet its performance goals. SCS has appropriately recognized that the Kemper IGCC Project would not meet these performance goals on initial operation, and consistent with industry experience involving FOAK technology, SCS recognized that time would be required for tuning and integration of those systems. MPC and SCS anticipated reduced operational performance during the initial period of operation and incorporated this assumption into the economic analysis for the Kemper IGCC Project. This assumption was used in both the projection of rate setting and in the economic comparison of the Project with the other alternative generation sources considered. MPSC and its Independent Evaluator, the Boston Pacific Company, Inc. ("BPC"), also used this assumption of lower performance in early years in its economic analysis of Kemper IGCC Project.

TRIG™ Technology

- Relative to Mr. Schlissel's or URS's (Mr. McFadden's) concerns about "*the fact that Southern Company has a financial incentive in the TRIG™ technology,*"[6] neither Mr. Schlissel nor URS provide any references to internal documents that would support such an assertion, and in the thousands of documents Pegasus-Global reviewed, it was apparent that Southern Company's financial incentive was not a significant motivator for MPC's selection of TRIG™. The MPC Management Council considered many options in developing its strategy to meet its anticipated baseload need. The Management Council further investigated all available gasifier technologies, and compared and weighed advantages and disadvantages prior to finalizing selection of the TRIG™ gasifier.

[6] URS Corporation, IM Prudence Report, page 15, March 7, 2014

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- MPC's decision to rely on TRIG™ technology for the Kemper IGCC Project was reasonable and prudent. MPC based its decision to use TRIG™ technology on independent evaluations that concluded it was the best gasifier option available at the time that would meet the Project's needs. In addition, TRIG™ had been developed over an extended period by SCS in cooperation with others. As SCS was a technology holder and an affiliated company, MPC would have the support of the technology holder during project design development, plant start-up and plant operation.

FEED

- The Independent Monitors ("IMs") reviewed the Kemper FEED Study, and while they had observations and recommendations with respect to the FEED Study, generally they found that the FEED Study was appropriately conducted, and it included the appropriate information, fulfilling MPC's needs. In addition, the IMs found that the FEED Study served as a reasonable basis on which MPC could determine the viability of the Kemper IGCC Project. This was also the opinion of the MPSC which noted: [7]

  > *"…the Company's FEED Study efforts exceed the level of detail that is typically undertaken in certificate proceedings."*

- The Kemper FEED Study met the intent of a FEED study as defined within the process industry, for a large and complex project. In particular, the outputs of the FEED Study provided basic design documentation for design and procurement of the Project; detailed description of all major systems; component and equipment lists; and, an estimate of construction commodities. Together this provided MPC

[7] Mississippi Public Service Commission, Final Order on Remand Granting a Certificate of Public Convenience and Necessity, Authorizing Application of Baseload Act, and Approving Prudent Pre-Construction Costs, Docket No. 2009-UA-014, page 61, April 24, 2012

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with a reasonable basis to develop a Project scope, cost estimate and schedule, which, in turn, served as the basis for the CPCN estimate, detailed design, procurement and project execution.

2. <u>MPC did not understand the risks of a megaproject and the cost impacts of "fast-track" construction.</u>[8,9]

In response, Pegasus-Global found and concluded that:

- Mr. Schlissel argued that the Project was "*exposed to a mega-project risk because of its adoption of an expedited 'fast-track' design and construction schedule.*"[10] BREI similarly commented that the fast-track execution of the Project "*created additional challenges during the construction phase of the Project*".[11] Fast-tracked execution of a project the size and scope of the Kemper IGCC Project is simply the standard practice within the industry. If such an approach was not used, the Project's execution would be substantially extended leading to significant risks and uncertainties facing the Project.
- Given the timing of the issuance of the CPCN and the requirement to achieve the Commercial Operation Date ("COD") in May 2014 to secure the Investment Tax Credit ("ITC") Phase I funds and meet the generation demand forecasted at the time, it was simply not possible to execute the Project under a non-fast-tracked approach. As the MPSC noted in the CPCN Order, MPC was to demonstrate "*it has made best efforts to procure the incentive.*"[12]

[8] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, pages 2-4, March 14, 2014
[9] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, pages 6-7, March 19, 2014
[10] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, page 4, March 14, 2014
[11] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 6, March 19, 2014
[12] Mississippi Public Service Commission, Order Granting Certificate Upon Conditions, Docket No. 2009-UA-014, page 45, April 29, 2010

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The MPSC reiterated this point in the Order on Remand by stating:[13]

> *"The Commission finds that the Company should exercise all reasonable diligence to apply for and obtain all of the federal, state, and local financial benefits it has identified…"*

- The lengthy regulatory process during the Certificate filing added significant pressure to the schedule requirements. Although conceptual design post-FEED continued prior to the issuance of the Certificate, it was only when the Certificate was received that MPC could begin the detailed design and engineering of the Project. Black & Veatch ("B&V") supplied a similar observation in its Readiness Review to MPC when it explained:[14]

> *"To avoid doing work at risk on a project which has not been approved, SCS must have the PSC* [Public Service Commission] *permission to proceed on the Project. The need for this permission to proceed is delaying the start of the detailed design and procurement efforts to a point later in the Project than preparations for construction would normally dictate. On the other end, SCS must complete the Project by May 2014 in order to secure significant tax benefits."*

3. <u>MPC's contracting approach was considered potentially imprudent in a number of areas including: use of time and material vs. lump sum; decision to assign heavy haul utility and bridge crossings to equipment suppliers and heavy haul contractors; decision to procure some of the equipment from overseas suppliers; decision to award all of the</u>

[13] Mississippi Public Service Commission, Final Order on Remand Granting a Certificate of Public Convenience and Necessity, Authorizing Application of Baseload Act, and Approving Prudent Pre-Construction Costs, Docket No. 2009-UA-014, page 91, April 24, 2012

[14] Black & Veatch, Kemper County IGCC Project Readiness Review, Section 3.0 Project Information, page 3-5, February 26, 2010

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Balance of Plant ("BOP") and non-alloy steam pipe fabrication to a single supplier; and, the decision to construct the Heat Recovery Steam Generators ("HRSGs") under a Limited Notice to Proceed ("LNTP").[15]

In response, Pegasus-Global found and concluded that:

Contracting Strategy

- URS questioned the decision to use time and materials vs. lump sum contracting. At the same time, URS acknowledges that such action is *"not an uncommon practice"* and that *"final installed quantities were not completely defined at the time of award"*[16] limiting the possibility that a contractor would agree to a lump sum agreement without significant cost impacts.
- Where possible, MPC did use lump sum contracting. Where it was not possible, following its own guidelines, MPC made the best decisions it could, given the information and the schedule constraints it was under at the time. MPC's contracting process was consistent with good utility practice, and was even excellent according to URS.[17]
- MPC chose its contracting strategy for three primary reasons: to maintain schedule, manage costs, and to address risks. MPC's contracting, procurement and delivery approach for the Kemper County IGCC Project represents reasonable and prudent actions.
- MPC reasonably chose to use SCS Engineering and Construction Services ("E&CS") as its EPC contractor for the Kemper IGCC Project. In addition, MPC working together with SCS put together an integrated team to implement a flexible contract approach working with E&CS to implement the Project. The

[15] URS Corporation, IM Prudence Report, page 13, March 7, 2014
[16] URS Corporation, IM Prudence Report, page 37, March 7, 2014
[17] URS Corporation, Due Diligence Report, Kemper IGCC Project, Mississippi Public Service Commission, April 29, 2011

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team followed a reasonable process and made prudent decisions regarding contracting strategy.

Heavy Haul and Utility Crossings

- URS infers that MPC should not have assigned contractors the responsibility to address utility and bridge crossings. However, had MPC not done so, it would not have been following industry standards, its own processes and procedures, and MPC would have had to dictate the routes work of the contractors with which they were working. MPC's contracts were reasonably prepared and discussed MPC's role, explicitly outlining that neither it nor its agents would direct the work of independent contractors, and that the risk for the work performance stayed with the contractor. This is good utility practice as these are not risks that owners generally take. MPC is no exception; because SCS Engineering managed the coordination, the cost for MDOT permit coordination was negligible, and would have been included in the costs of the expediting function that SCS services provide in any case. The costs that MPC could have incurred had this extensive coordination work not been done is incalculable. To ignore the issue and not assist MDOT in the prioritization of permits, or not work with the haulers to ensure the permitting information was fully prepared and submitted to MDOT could have cost the Project months of schedule, perhaps more than a year.
- MPC engaged in appropriate planning, implemented highway and roadwork in locations that could be assessed as having problems, utilized standard industry practices and adjusted its efforts when it found issues with delivery were likely to arise.
- When MPC became aware of the utility and bridge crossing issues, it quickly mobilized to address the issue, adjusting to the revised circumstances before

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them, assisting MDOT with its resource issues, identifying with the contractors areas where utilities needed to be moved or utility owners coordinated with, and worked to recover costs from the contractors and vendors where possible.

- Pegasus-Global finds that both of MPC's decisions, to move utility lines and to coordinate MDOT permits, were reasonable and prudent. These two decisions worked in concert to minimize schedule slippage, and therefore cost. MPC weighed the relatively small monetary impacts against the potentially significant schedule risks and made prudent decisions.

HRSG Construction LNTP

- URS questions the prudence of continuing with construction of the HRSGs to 75 percent completion without having a finalized agreement in place with the HRSG contractor.
- MPC made a concerted effort to finalize the agreement with the HRSG contractor, but following months of negotiations was ultimately unsuccessful in these efforts. MPC then made the prudent decision to evaluate potential options to complete the remainder of the work, selecting to convert the work to labor broker based on its cost and schedule estimates compared to the other options evaluated.
- MPC's decision to use a LNTP to begin the HRSG construction was reasonable and followed standard practice within the utility industry.

Pipe Fabrication

- URS appears to rely on hindsight in its questioning of the prudence of the decision to award the pipe fabrication to a single vendor. Specifically, URS fails to identify the large piping increases that occurred after the pipe fabrication was awarded and impacted the vendor's ability to meet the Project's demands. URS

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offers no opinion as to whether it was reasonable for MPC to select the pipe fabrication vendor based on its lowest cost proposal, or if it was reasonable for MPC to depend on the selected vendor to meet the production schedule based on the assurances the vendor provided and as were verified by SCS. The award process for pipe fabrication was thorough and reflected reasonable decision-making on the part of MPC.

- BREI's concluded that, *"The coordination, oversight, expediting, extended fabrication duration, and other difficulties in managing multiple fabricators resulted in inefficiencies which added to the project cost."*[18] By reaching the conclusion that MPC suffered increased costs due to *"managing multiple fabricators,"* BREI entirely ignores the fact that multiple suppliers were necessary to keep up with the demand on the Project. This finding also contradicts what BREI reported when it noted that pipe fabrication was behind schedule and 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."*[19] Had additional fabricators not been added there would have potentially been even greater costs due to the resulting schedule impacts caused from late deliveries.
- McAbee Construction, Inc. ("McAbee") provided the potential for cost savings and was selected not only for pipe fabrication, but also for sourcing acquisition of pipe material. McAbee noted that it would be able to utilize subcontractors in order to meet the pipe fabrication requirements of the Kemper IGCC Project, and having a single source for the pipe fabrication work would allow MPC the

[18] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 74, March 19, 2014
[19] Burns and Roe Enterprises, Inc., Independent Monitor's Project Schedule and Cost Evaluation Report, page 36, November 15, 2012

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potential of improving efficiencies in a complex commodity that requires a substantial number of interfaces.

- When MPC determined that McAbee was not capable of meeting the pipe fabrication requirements as originally thought, it prudently divided the work, such that vendors already engaged with work on the Project could be utilized. For example, Performance Contractors, Inc. ("PCI") was awarded the gasifier construction scope and, after the pipe fabrication change decision, took over the fabrication of the KBR-designed large bore pipe used in this area. Additionally, adding an onsite fabrication shop allowed for revisions or corrections to pipe to be made in the field, rather than sending it back to the original fabrication shop.

Pipe Support Fabrication

- There are fundamental flaws in BREI's opinions regarding MPC's decision-making process and decisions on pipe support fabrication; BREI notes that there were 59,000 pipe supports on the Project, but fails to mention that at the time the contract was let, it was anticipated that the number of pipe supports would only be approximately 16,000, thus finding that the pipe fabrication was inadequate based on hindsight.[20] BREI also fails to account for the complexity inherent to pipe supports in which there are hundreds of varieties, some of which are required to be engineered for the Project. This complexity would suggest the need for a single pipe support vendor due to the benefit of having uniformity in the pipe supports utilized across the entire Project.
- The use of temporary pipe supports is a reasonable work-around when permanent supports are not available: productivity impacts need to be considered against the mitigation of delay to project completion. Based on the information and

[20] Mississippi Contract No. 17660 with Lisega, Inc., Schedule D – Company's Technical Specifications, pages 3-4, June 13, 2011

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considerations available to MPC at the time, it was a reasonable and prudent decision for the Kemper PMT to use temporary supports when permanent support delivery or other Project delays were experienced.

Contract Fabricators, Inc. ("CFI") Refractory

- Based on the results from the PSDF and KBR's other extensive experience, KBR, SCS, and MPC reasonably concluded the same refractory would serve the Kemper IGCC Project gasifier. MPC prudently ensured the refractory was tested and expectations were verified at the PSDF prior to finalizing the specifications and contracting of the Kemper IGCC Project gasifier supply. KBR has extensive experience with refractory specifications in this type of application, was abreast of current technology and was prudent in testing the material to be used prior to the fabrication of the Kemper transport gasifier.
- Though CFI had full responsibility under its Contract for the quality of the refractory lining on the components, MPC found it prudent to work with CFI to resolve problems and get the gasifier completed. Also, at the time, the cause of the problem, and hence who was responsible, was not clear.
- CFI and its consultant, Thorpe, were unable to identify root cause for the refractory issues experienced, and MPC worked with them to resolve the issue, including development of alternative application methods and release of CFI from the contract refractory materials. Notwithstanding this proactive and cooperative approach, MPC applied liquidated damages ("LDs") as allowed under the Contract.
- Based on Pegasus-Global's review, Pegasus-Global is of the opinion that MPC was proactive in responding to refractory issues and appropriately applied the CFI Contract provisions to the overall benefit of the Kemper IGCC Project.

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MPC was aware of the critical nature of the refractory to the performance of the gasifier and timely delivery of gasifier components was important to supporting the construction schedule.

4. <u>MPC's cost estimating and cost control policies were inadequate and the original estimate and Project contingency was insufficient and not reasonably managed.</u>

In response, Pegasus-Global found and concluded that:

Cost Estimate

- URS concluded that the original cost estimate was too low, in part due to the level of engineering completed at the time the estimate was prepared.[21] In reaching this conclusion, URS relies on hindsight and contradicts its earlier findings that, *"The cost estimate basis for the Certification Amount appears to be valid."*[22] BREI opined that the cost estimate reflected uncertainties that were not properly addressed by MPC,[23] although in its Baseline Report BREI noted that it, *"finds the estimate…to be complete and thorough."*[24]
- The methodologies employed for the development of the Kemper IGCC Project estimates met accepted industry standards as promulgated by the Association for the Advancement of Cost Engineering International ("AACEI"). Based on the techniques and methodologies employed to develop the two project estimates (combined cycle and gasification areas) and the combined total estimate, MPC and SCS management acted reasonably and prudently in their decisions to proceed with the Kemper IGCC Project in light of these estimates and had no reason not to be confident in the estimates.

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[21] URS Corporation, IM Prudence Report, page 13, March 7, 2014
[22] URS Corporation, Due Diligence Report, page 4, April 29, 2011
[23] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 28, March 19, 2014
[24] Burns and Roe Enterprises, Inc., Independent Monitor's Baseline Report, Final Report – Revision 1, page E-10, June 21, 2012

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- MPC reasonably and prudently prepared the estimates on the Project; set up a Project Control Budget based on the 2009 FEED Study estimate, and monitored costs against the current Control Budget. MPC's estimating procedures and practices met the generally accepted industry standards for estimating large, complex construction projects.

Contingency

- URS's conclusion that *"The forecast incorrectly assumed that remaining contingency would be adequate to cover any future changes, and resulted in late communication of the impacts.* [URS] *questions the prudency of this methodology for managing the project contingency, and has suggested that the contingency amount should be based on an independent monthly assessment of remaining risks and the forecast adjusted accordingly. This change in approach was in fact adopted by MPC later in the project and is currently in use,"* [25] is based on hindsight. In addition, this conclusion does not take into account what could have reasonably been known at the time the estimate and contingency were developed nor does URS take into account changes that occurred later in the Project that could not have reasonably been foreseen at the time of the Certification Estimate. URS acknowledges that MPC did change to the methodology that independently estimates the work required to be completed later in the Project. The change in its processes at that time was reasonable and prudent with regard to project management.

- BREI stated that while the estimate included approximately 7% for contingency, the Project should have had 30-35% contingency. Although, BREI does

[25] URS Corporation, IM Prudence Report, page 33, March 7, 2014

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acknowledge that during the Certification hearings a cost cap was established that effectively increased the level of contingency to over 20%.[26]

- MPC executive management reasonably assumed that the estimate contained embedded contingency and considered that assumption when reviewing and approving the certification estimate.
- The Kemper PMT reasonably used its own expertise and experience, and sought outside opinions to determine the amount of contingency necessary to Project completion.
- MPC used industry-accepted processes, procedures and practices to establish the contingency amount for the Kemper IGCC Project. MPC reasonably and appropriately established the contingency amount separately for the combined cycle plant, the gasifier plant and the interface points.

5. <u>MPC's policies and procedures were inadequate or not effectively implemented to establish the project controls necessary for the Kemper IGCC Project including insufficient risk management practices.</u>

In response, Pegasus-Global found and concluded that:

Policies and Procedures

- BREI's conclusion that SCS procedures for schedule, cost tracking and forecasting and cost estimating were *"either inadequate for the requirements of the Kemper Project or inadequately implemented by the Project Team"*[27] are not supported by the evidence. BREI showed no evidence that MPC experienced a failure of its project controls nor did BREI establish a connection between the alleged failed project controls and increases in quantities, cost or schedule. Without such evidence – which even then would not support a finding of

[26] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 9, March 19, 2014
[27] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 64, March 19, 2014

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imprudence – and a demonstration that MPC acted in reckless disregard of some industry standard or good utility management practice, these witnesses have failed to show that MPC mismanaged the Project as a result of failure of its project control tools.

- MPC's use of existing corporate procedures accompanied by Project-specific procedures allowed the Kemper PMT to have the appropriate tools in place to effectively manage the Project. The policies and procedures utilized on the Project met standard construction industry practices. Furthermore, the adequacy and use of the policies and procedures was prudently monitored by MPC throughout the Project by implementing internal audits.
- After the FEED Study was completed and the CPCN filed with MPSC, project controls became more formalized with SCS taking on the responsibility to provide controls and updates. SCS was able to use many MPC and Southern Company policies and procedures already in existence and in concert with MPC, others were developed specifically for use on the Kemper IGCC Project. MPC used internal and external audit assessments as an additional tool to improve project controls adequacy. Several of the recommendations made by the internal audit report were already being addressed by the time Project construction was initiated.
- MPC's management processes and project controls were consistent with reasonable and prudent utility practices.

Risk Management

- BREI concluded that, "*while they had a risk management process that was developed in general compliance with Southern Company procedures, the*

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effectiveness of its implementation restricted the Project team from seeing the long term risks…"[28]

- Throughout the execution of the Kemper IGCC Project tracking of risks and the reporting about risks has been comprehensive. Since 2009 there have been regular reports presented to various levels of management regarding Project risks. Some of these reports are informational and some of them are the basis for management decisions. These management decisions are recorded and the changes caused by such actions are recorded on subsequent updates to the risk reports.
- MPC and the Kemper PMT have taken reasonable and prudent actions regarding the management of risk on the Kemper IGCC Project in accordance with prudent utility practice and industry standards.

6. <u>MPC's trending and forecasting on the Project led to its inability to see quantity increases sooner and led to productivity impacts and cost and schedule increases or delays. The Project also did not have adequate earned value management, which led to an inability to accurately measure completed progress.</u>[29]

In response, Pegasus-Global found and concluded that:

Commodity Quantities

- BREI concluded that, *"The method of tracking commodity quantities (concrete, steel, piping, cable, etc.) created challenges in the ability to forecast their impacts…"*[30] BREI ignores that its own independent analysis of the commodity quantities in the summer of 2012 found nearly identical forecasted quantity

[28] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 10, March 19, 2014
[29] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, pages 9-11, 15, March 19, 2014
[30] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, pages 9-11, 15, March 19, 2014

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amounts to what MPC was reporting at the time.[31] Despite the independent verification of these quantities being effectively the same as what MPC was reporting, as detailed design continued, the reported quantities continued to fluctuate based on the status of the design at the given time.

- In its monthly reports, URS commented on the commodity quantities, focusing typically on the delay between when a quantity increase was forecast and when a cost increase is correspondingly forecast.[32] However, the Kemper PMT reasonably vetted the new quantities prior to going to management for approval and incorporation into the Project forecast.
- As detailed design continued to develop across the Kemper IGCC Project, the commodity quantities reported monthly in the Production Team Meetings were updated to reflect the known commodities in the latest design. With detailed design at various stages of completion, the impact to commodities would be reflective of this, for instance early increases in steel or concrete would not have a relation to the later completion of detailed design that identified the increases in piping. As each stage of development revealed different commodity impacts, MPC Management reviewed these impacts to ensure the information being reported was accurate and based on current information.
- Most of the increase in commodity quantities occurred in the gasifier and gas cleanup areas of the Kemper IGCC Project, while the combined cycle area was more closely aligned with the initial commodity quantities estimate. The initial estimated quantities were reasonable and based on the best information available to MPC at the time during the execution of the Project; the quantities were

[31] Burns and Roe Enterprises, Inc., Independent Monitor's Project Schedule and Cost Evaluation Report, page 10, November 15, 2012

[32] URS Corporation, Project Cost and Schedule Review, pages 2-3, March 7, 2012 (part of the March 2012 URS Monthly Report)

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regularly updated based on the new information becoming available; specifically through the completion of design, leading to the overall conclusion that MPC's management of the quantities was both reasonable and prudent.

- SCS had the appropriate processes in place to update the commodity quantities, as new information was available, leading to updated cost, schedule (manhours) and performance impacts. As more information on the Project was developed, MPC prudently adapted its commodity tracking to reflect actual Project conditions.
- MPC appropriately identified construction and commodity costs in risk assessments conducted on the Project as well as scope change/growth in engineering. In certain cases the commodity increases were the subject of special presentations that were prepared to further discuss specific commodity quantities.
- With the initial quantities based on what was developed during the FEED Study, MPC had an appropriate basis from which to estimate commodity quantities. As the detailed design progressed on the Project, commodity quantities were appropriately updated based on what was known at the time. MPC received regular and complete information regarding the development of the commodity quantities. In the event of a more significant increase, the quantities in question were verified and estimated and reviewed by the Kemper PMT prior to being reported, this ensured that the data being reported was as accurate as possible.

Earned Value

- BREI's finding that *"there were no written instruction or procedures on the EVM system,"*[33] implies that SCS was seemingly in the dark when it came to earned value management ("EVM"), which is categorically untrue. By March

[33] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 46, March 19, 2014

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2010, SCS had issued Rev. 0 of its Project Controls Standards for E&CS Capital Projects, which included procedures for percent complete progress curves and installed quantity progress curves. Each progress curve included a budget line and an actual earned percent complete line. In addition, this procedure included a specific section dedicated to earned value analysis, which included such detail as how to determine progress for a particular commodity.

- BREI's finding that the *"earned value performance measurement for engineering was more of a level of effort task rather than a deliverable based task"* and that *"engineering progress…was not measured against a baseline planned percentage,"*[34] seemingly ignores the metrics being measured and reported by the Kemper PMT over the course of the Project. The "percent complete" method used by the Kemper PMT on the Kemper IGCC Project showed an estimate of the percentage of work that is complete at the end of each measurement period.
- Beginning in the November 2010 Production Report, Labor Performance Indicators ("LPI") and Schedule Performance Indicators ("SPI"), two industry standard EVM metrics, were reported for the total EPC value, engineering value and construction and start-up value. Over the course of the Project's execution, these metrics were refined to reflect the current needs for the Kemper PMT, refocusing on the appropriate information needed to monitor the Project at any given time. The EVM system on the Project met common industry standards as used within the construction industry and provided the Kemper PMT with appropriate information with which to monitor the Project.

[34] Burns and Roe Enterprises Inc., Prudency Evaluation Report, page 46, March 19, 2014

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- The management and control systems established for the Kemper IGCC Project met the established industry standards. Likewise, Kemper Project and Corporate Management initiated, implemented and followed those cost management and control systems during the execution of the Kemper IGCC Project.

7. <u>The schedule management of the Kemper IGCC Project, including use of schedule controls, late development of a fully integrated baseline schedule, decision not to resource-load the Master Schedule in P6, and decision to maintain the May 2014 COD caused inefficiencies on the Project.</u>

In response, Pegasus-Global found and concluded that:

Schedule Controls

- MPC's Kemper IGCC Project scheduling process, reporting and decision-making methods were appropriate, consistent with industry practices and evolved as the Kemper IGCC Project and the Kemper PMT's needs evolved. MPC utilized Primavera-scheduling software, widely used in the industry, to plan and manage the Kemper IGCC Project design, procurement and construction schedule. MPC used Primavera software version P6, which is consistent with what other utilities in the industry were using in this time-period. In addition, in contracts of substantial value, or where the equipment to be provided by the contractor was unique, or had to be produced and on site within a certain sequence with other equipment, MPC required those contractors to provide a schedule with specific parameters that could be entered into the Master Schedule.
- It is not appropriate to simply conclude that a schedule is delayed simply because project management did not use a specific project control tool. Rather, per the definition of prudency, one must look at the decisions made by the utility based on the information known to it or reasonably should have been known to it at the time the decision was made.

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- There is absolutely no evidence that any scheduling issue caused any delay or inefficiency. Inefficiencies were caused, in part, by commodity quantity increases discovered as the detailed design developed, and these increases had to be absorbed into the schedule, and were dealt with by the respective contractors and project schedulers.
- The Kemper PMT effectively used these schedule controls, as they were able to accomplish the primary objectives of schedule controls; their use allowed for monitoring and tracking of schedule progress, allowed project management to identify schedule inefficiencies, and allowed for the implementation of corrective measures as appropriate.

Fully Integrated Baseline Schedule Development

- BREI's finding with alleged inadequacy of MPC's Schedule Procedure is tied to its view of the vagueness with respect to issuance of the first baseline schedule. [35] However, the timing of developing a baseline schedule depends on actual project conditions. Since contracts were not even let at the point in time that BREI notes SCS should have developed a fully integrated baseline schedule, it is unreasonable to expect a baseline schedule could have been created at the level BREI suggests, as this information was not even available to the Kemper PMT.
- BREI fails to understand the iterative process a utility undertakes in a baseload power plant in a regulated utility environment. As the Kemper IGCC Project developed, MPC took appropriate steps, consistent with good construction management practice, to increase the detail in the Master Schedule to reflect the increased level of information available, as design packages were released, and as new contractors were brought onto the Project.

[35] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 44, March 19, 2014

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- The initial Master Schedule that was prepared on August 1, 2009, included the general and engineering progress, site preparation, construction activities and startup, and integrated in accordance with SCS Procedure PC-02. The Master Schedule evolved as the Project progressed, and as more information became available to MPC and SCS. As the Project evolved and more detailed information was developed, schedule detail was increased allowing for the development of a fully integrated Level 3 schedule. As of September 24, 2011, the Kemper IGCC Project not only had an integrated schedule, but schedulers were also working to fully update it as project contracts were being let.
- MPC evaluated and assessed how the various contractor schedules integrated with the overall Master Schedule and provided the oversight one would expect from an owner, ensuring that all contractors were progressing toward the COD. The workaround plans were a key component in allowing MPC to maintain the COD in the face of unforeseen events.

Decision Not to Resource Load the Master Schedule in Primavera

- 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.
- The fact that BREI may have managed and monitored resources on the Kemper IGCC Project differently than that MPC has done does not make MPC/SCS's decisions and actions unreasonable or imprudent. Further, the fact that URS did not come to the same conclusions relative to MPC/SCS's development and

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management of the schedule further illustrates how two experienced, but different companies, can arrive at different conclusions based on the same information.

- SCS took reasonable and prudent actions to use other project control tools to manage its resources, providing for a more accurate critical path for schedule monitoring and more accurate resource monitoring. SCS used both control tools to reasonably monitor cost and schedule for the Kemper IGCC Project and it reported this information to Kemper management allowing for more informed decisions to be made.

Decision to Maintain the May 2014 COD

- URS questioned the decision by MPC to maintain the May 2014 COD in the face of pressures due to increased quantities, late deliveries of equipment, decreased productivity and other issues.[36] While BREI did not attempt to evaluate the prudency of decisions to maintain the original May 2014 COD[37], BREI *"is of the opinion that if MPCo had recognized the need to extend the schedule to reflect a 4Q2014 COD at that time* [3rd quarter 2012], *then the 2012 projected labor rates and productivity factors could have been maintained..."*[38]
- There are fundamental flaws in these conclusions reached by BREI and URS; for instance, the IMs mention productivity issues brought about by the decision to maintain the May 2014 COD; however, neither URS or BREI attempted to quantify either the costs of maintaining the May 2014 COD (specifically the cost impacts of lower productivity), nor do they take into account the costs of

[36] URS Corporation, IM Prudence Report, page 37, March 7, 2014
[37] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, pages 4, 20, March 19, 2014
[38] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 75, March 19, 2014

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extending the COD beyond May 2014, including loss of the §48A Phase I ITC and additional construction overhead costs.

- MPC engaged in several activities in the form of workaround plans to maintain the May 2014 COD. The workaround plans established by project management and tested with the project schedulers were put into place to minimize the impact to other Project activities.
- Workarounds to recover delay are standard industry practice, and MPC made reasonable and prudent decisions in developing workarounds that still reasonably predicted that the May 2014 COD date was achievable. The costs incurred to accelerate a project are usually substantially less than the delay costs that would otherwise would be experienced. It is true that additional costs are incurred through overtime wages and lost productivity, but this must be weighed against the costs of keeping a construction site active for a longer period of time.

8. MPC did not reasonably apply lessons learned from its visits to Duke Energy Indiana's ("DEI") Edwardsport IGCC Project to the Kemper IGCC Project which would have avoided schedule and cost impacts.[39,40]

In response, Pegasus-Global found and concluded that:

- There were significant differences between the Kemper IGCC Project and the Edwardsport IGCC Project, including different technologies, different EPC contractors and different levels of design following the completion of the FEED studies. In fact, the Edwardsport IGCC Project was purported by GE and Bechtel to have been based on a reference plant design that was completed at the time DEI received its FEED study. In addition, based on information conveyed to

[39] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, page 3, March 14, 2014
[40] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 8, March 19, 2014

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DEI at the time of the FEED Study for the Edwardsport IGCC Project, American Electric Power ("AEP"), not DEI, was the "first mover" for the GE/Bechtel Alliance design.

- Unlike the Edwardsport IGCC Project, the Kemper IGCC Project represents a FOAK project, having no reference plant completed. However, SCS had the unique opportunity to utilize its nearly two decades of experience with this technology acquired from the testing and development done at the PSDF Facility.
- With regard to the impact of commodities quantity growth experienced at the Edwardsport IGCC Project, MPC was aware of the potential risks involved in the Kemper IGCC Project. As such, the Kemper PMT had appropriate project control tools in place to continually monitor the refinement of commodity quantities as the detailed design progressed.
- MPC had the benefit of using SCS and its intimate experience with the TRIG™ technology to manage the EPC portion of the work, whereas DEI had to rely on the information being presented to it by its contractors GE and Bechtel.
- The Kemper PMT took prudent action in its evaluation of the Edwardsport IGCC Project and took its findings as another source of information used in the completion of the Kemper IGCC Project, further, by the time many of the issues surfaced at the Edwardsport IGCC Project, the Kemper IGCC Project was well underway.

III. KEMPER IGCC PROJECT PRUDENCE EVALUATION PRINCIPLES

A. PRUDENCE STANDARDS

Q. In conducting your independent prudence review and evaluation of the Kemper IGCC Project as it relates to MPSCs' allegations, did you apply certain generally recognized

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prudence standards, which you have also described in your Supplemental Direct Testimony?

A. Yes. The standards that I applied in my prudence review and evaluation of the Kemper IGCC Project in response to the Sierra Club, Staff, and MPSC witnesses are discussed on pages 10-16 of my Supplemental Direct Testimony filed on December 13, 2013. In summary, I applied the following definition:

> *"Decisions are prudent if made in a reasonable manner in light of conditions and circumstances which were known or reasonably should have been known when the decision was made."*

This definition is consistent with the prudence standard Pegasus-Global has applied and which has been accepted and used by regulators in other jurisdictions, such as the Indiana Utility Regulatory Commission ("IURC") in 2012 relating to the Edwardsport IGCC Project; the Kansas Commission in 2010; the Missouri Commission in 2011, relating to construction of the Iatan 1 and 2 super critical pulverized coal ("SCPC") plant; the Florida Public Service Commission, relating to the Levy 1 and 2 Nuclear Plant; and with the standard used in other jurisdictions across the country where Pegasus-Global has participated in prudence evaluations, as detailed in Exhibit PG-4 of my December 13, 2013 Supplemental Direct Testimony. This prudence definition is also consistent with the prudence standard in numerous publications on the subject of prudent management decisions.[41] In essence, decisions are considered prudent when management makes an informed decision under the circumstances and information available at the time the decision is made.

[41] "Cost-Recovery for Pre-Approved Projects – Uncertainties remain, but recent cases provide guidance." Dr. Patricia D. Galloway and David L. Cousineau, *Public Utilities Fortnightly*, June 2013; "New Day for Prudence", Kris R. Nielsen, Patricia D. Galloway and Charles W. Whitney, *Public Utilities Fortnightly*, December 2009; "Nuclear Prudence in an Age of Uncertainty", Laurence Skinner, *Infrastructure*, ABA Section of Public Utility, Communication and Transportation Law, Vol. 45, No. 2, Winter 2006; "The Prudency Management Audit – A New Challenge for the Civil Engineer", Kris Nielsen and Pat Galloway, Transition in the Nuclear Industry, Proceedings of the Symposium Sponsored by the Construction and Energy Divisions of the American Society of Civil Engineers ("ASCE") in Conjunction with the ASCE Convention in Denver, Colorado, April 29 – 30, 1985

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Q. Should prudence be judged with hindsight?

A. No. Prudence cannot and should not be judged from a hindsight perspective. As noted in certain orders issued by other utility Commissions, only those circumstances that were known or that reasonably should have been known at the time the decision is made, should be considered.

The IURC has found:[42]

> "[We] *do not review actions with such hindsight analysis. Rather, we review the circumstances as they existed considering what was known or should reasonably have been known at the time of the actions."*

The Kansas Corporation Commission noted:[43]

> "*…the common usage of the term 'prudence' has been established by our Supreme Court as carefulness, precaution, attentiveness and good judgment. The Court, and the Commission in the Wolf Creek Order, both implicitly rejected using 'hindsight,' or in other words, 'the perception of the nature and import of events after they have occurred …this claim hinges on a hindsight analysis, which is clearly prohibited*."

These decisions are consistent with the MPSC's October 15, 2013 Order where MPSC cited a 1989 Mississippi Supreme Court decision for its support that *"costs should be allowed unless managerial decisions are found to have been imprudent when evaluated in the light of the circumstances existing at the time the decisions were made, without the benefit of hindsight."*[44] MPC's conduct should be judged by asking whether the conduct was reasonable at the time, considering all circumstances, known or reasonably known, and with the understanding that MPC has to solve its problems prospectively without the benefit of hindsight. In effect, a prudence

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[42] October 21, 2009 Indiana Public Utilities Regulatory Commission, Cause No. 38707 FAC76 S1, 2009 Ind. PUC LEXIS 400[*26] at *46 (October 21, 2009)
[43] The State Corporation Commission of the State of Kansas, Docket No. 10-KCPE-415-RTS, Order 1) Addressing Prudence; 2) Approving Application, in part; & 3) Ruling of Pending Requests, page 15, November 22, 2010
[44] Mississippi Public Service Commission, Order, Docket No. 2013-UA-0189, October 15, 2013

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review asks how reasonable people would have performed the tasks that confronted MPC at the time the decisions were made.

Q. Does the prudence standard require perfection?

A. No. The reasonable care standard does not demand perfection. Perfection would require an entirely trouble-free project[45] or would rely impermissibly on hindsight because the outcome of an action can only be known in hindsight. In hindsight, the course to avoid or minimize an adverse outcome would be obvious, but of course, hindsight was unavailable to the project manager at the time the relevant decision was made. Instead, in evaluating the reasonableness of decision-making at the time, relevant factors to consider are the manner and timeliness in which problems were recognized and addressed by MPC.

Q. Is prudence judged by substituting another person's assessment of a preferred decision?

A. No. The appropriate question is whether MPC's management considered factual circumstances and conditions known or that could reasonably have been known in making its decision, not whether someone else would have made a different decision under the same circumstances and conditions. Management decisions are seldom black and white; rather, more than one decision can prudently be made based on the same circumstances and conditions. The fact that someone else may make a different decision does not mean that MPC's management decisions were imprudent. Moreover and more importantly, differences in opinion or judgment do not render MPC's management decisions imprudent. There is a "zone of reasonableness" within which decisions are reasonable and prudent. Although Pegasus-Global concluded that MPC's decisions fell within that zone of reasonableness and are therefore prudent, Pegasus-Global has drawn no conclusion as to whether there were other reasonable courses of conduct which would have resulted in different consequences or costs had such decisions been made by someone else. It is

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[45] 1982 Missouri Public Service Commission, *Union Electric*, 27 Mo. PSC (N.S.) 183, 194 (quoting Consolidated Edison Co. of New York, 45 P.U.R. 4th 331 (internal quotations omitted)), full quote from "New Day for Prudence", co-authored by P. Galloway, K. Nielsen and C.W. Whitney, *Public Utilities Fortnightly*, December 2009 edition

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improper in a prudence review to substitute a prudence reviewer's judgment for that of MPC's management.

Q. Does prudence require that a decision be optimal?

A. No. Prudence is not a test of optimality.

Q. What is the proper standard for determining whether costs should be disallowed?

A. Disallowance recommendations for imprudence must be founded on a direct causal link between an imprudent decision(s) or action(s) and the specific cost associated with that imprudent decision(s) or action(s). However, one must take into account the factors described above as the foundation as to whether a decision or action was imprudent. Simply arguing that a cost or action in hindsight seems unreasonable, irrational, inefficient, or outside the forecasted budget does not on its face make the decision imprudent and should not be considered as the foundation for disallowing costs.

Q. Dr. Galloway, have you read and are you familiar with the testimony filed by Sierra Club witness Schlissel in the MPSC regulatory proceeding on behalf of the Sierra Club relating to the Kemper IGCC Project?

A. Yes, I have and am.

Q. In that Kemper IGCC Project testimony, did Mr. Schlissel set out the prudence standard that he was using to measure management's actions?

A. Yes, he did. According to Mr. Schlissel, the following prudence standard applies:[46]

> *"This standard requires that the utility's decisions and actions be evaluated in light of the information that was available to it in the pertinent time frame. Information which is available only through hindsight is given no weight. This standard is based on judgments concerning how reasonable people, with the skill and knowledge attributed to reasonable utility managers should have been*

[46] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, page 5, March 14, 2014

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> *expected to cope with the circumstances and problems facing Mississippi Power concerning the Kemper IGCC Project."*

Q. Is this prudence standard the same as the standard you used?

A. Generally, yes, except with respect to his use of the word "judgment." As I noted previously, it is improper in a prudence review to substitute a reviewer's judgment for that of management. In other words, management's decisions must fall into a "zone of reasonableness," and thus, are not subject to a comparison based on a judgment that someone else would make under the same circumstances. To the extent that Schlissel's definition of prudence relies on the reviewer's judgment, it deviates from the accepted definition and from the definition that I used in my evaluation.

Q. Dr. Galloway, have you read and are you familiar with the testimony filed by MPSC witness URS in the MPSC regulatory proceeding on behalf of the MPSC relating to the Kemper IGCC Project?

A. Yes, I have and I am.

Q. In that Kemper IGCC Project testimony, did URS set out the prudence standard that it was using to measure management's actions?

A. Yes. According to URS, the following general statement for prudency assessment was noted:[47]

> "*Actions taken or not taken, management policy followed or not followed, project execution work processes and procedures applied or not applied, etc. are all considered to be the result of decisions made by individuals or organizations. A decision is considered prudent if the appropriate industry equivalent individual or organization, under similar circumstances and based on all information that is reasonably available at time, would have made the same decision. A utility must show that it went through a reasonable decision making process to arrive at a*

[47] URS Corporation, IM Prudence Report, page 5, March 7, 2014

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> *course of action and, given the facts as they were or should have been known at the time, responded in a reasonable manner. A prudent decision at the time it is made is still considered prudent even if the resulting consequence is later deemed to be unfavorable, except where the opportunity to change the decision or avert or mitigate the consequence negatively impacts usefulness to the rate payer. That is, the focus of whether the process leading up to the decision was a logical one, and whether the utility company relied on information and planning techniques known or knowable at the time."*

Q. Is this prudence standard the same as the standard you used?

A. Generally yes, except with respect to URS's references to "individuals," "*would have made the same decision*," "*opportunity to change the decision or avert or mitigate the consequence is not taken*," and "*whether the utility company reasonably relied on …planning techniques known or knowable at the time*." Utility prudence assessment is conducted by considering the information on which the utility's decisions were ultimate based, typically the result of input from multiple individuals. One person's actions may or may not reflect the ultimate decision taken by management. Thus, isolated actions cannot be judged for reasonableness, but rather one has to review the utility's decisions based on information known or reasonably should have been known at the time the decision was made. A prudence reviewer cannot judge a decision based on what someone else would do given the same set of circumstances or information; there is a zone of reasonableness for which a multitude of possible acceptable and prudent decisions can be made. Reasonable decision-makers may make different decisions based on the same set of information. Thus, prudency is judged whether the decision made was within this zone of reasonableness. Prudency does not look at "opportunities" to change a decision, but rather the reviews the specific decisions made at the time, based on information available to the utility at the time the decisions were made. If new information becomes available, management may make a different decision. However, to suggest that management should have changed a decision would require using

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hindsight, allowing for reflection on a prior decision, which would require one to look back on that decision. Finally, prudency is not evaluated on "planning techniques," but rather is an assessment that includes information generated from various project management techniques and tools, analyses undertaken from that information, and other information known or reasonably should have been known to management at the time, in addition to information generated from project management system at the time the decision was made.

Q. Did the definition of prudence used by URS above, in your opinion, result in unreasonable assessments that under a more typical prudency definition as applied by other utility commissions and FERC would have been deemed reasonable?

A. Yes, which I will explain systematically throughout this testimony.

Q. Dr. Galloway, have you read and are you familiar with the testimony filed by Staff witness BREI in the MPSC regulatory proceeding on behalf of the Staff relating to the Kemper IGCC Project?

A. Yes, I have and I am.

Q. In that Kemper IGCC Project testimony, did BREI set out the prudence standard that it was using to measure management's actions?

A. Yes. According to BREI, the following general statement for prudency assessment was noted:[48]

> *"…the consideration of what a reasonable and informed manager at the appropriate level within a project team in the electric power industry would have done, in light of the conditions and circumstances which were known, or should have been known, <u>at the time the decision was made or action taken.</u> BREI did not simply base its findings upon whether or not the Project's costs were exceeded or were below MPCo's original estimates or expectations.*

[48] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 4, March 19, 2014

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> *BREI examined the major decisions/actions taken by MPCo and SCS* [Southern Company Services] *(who provided engineering, procurement and construction services to MPCo) in the execution of the Project to determine whether their decisions/actions fell outside the bounds of reasonability.*
>
> *Under no circumstances did BREI evaluate actions or decisions based on "hindsight" in our prudence assessments and evaluations. The decisions/actions were judged purely upon what was known at the time or should have been known by the Project team at the time the decision was made or the action was implemented."*

Q. Is this prudence standard the same as the standard you used?

A. Generally, yes, except with respect to BREI's references to "appropriate level within a project team." The prudency of a utility's decision is based on what the utility reasonably knew or should have known at the time the decision was made. The actions, decisions, and/or recommendations of the project team constitutes only one piece of information that management possesses at the time it makes a decision. Thus, looking at only the actions, decisions and/or recommendations made by the project team would not constitute a prudency review of a utility's decision-making process as contemplated by definitions of prudency used in the utility industry and as has been applied by other jurisdictions.

Q. Did BREI's review of only the Kemper PMT's actions and decisions result in findings of imprudence and/or unreasonableness that if taken with the context of what MPC management did as a result, would have otherwise been deemed reasonable and prudent?

A. Yes. As I discuss in more detail in this Rebuttal Testimony, MPC management considered the recommendations and information obtained by the Kemper PMT as only one piece of the information known or reasonably known to it before making decisions. To have only looked at the actions, decisions and recommendations of the PMT would not complete the prudence review to assist the MPSC in rendering a decision on prudence.

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Q. In over 30 years of conducting prudence evaluations, have you ever encountered a prudence review based solely on the actions and decisions of project management?

A. No.

B. ANALYZING THE STRUCTURE OF THE MANAGEMENT DECISION MAKING PROCESS

Q. Is there a management decision-making structure that one must evaluate when reviewing and examining the prudence of a utility's actions and decisions?

A. Yes. When conducting a prudence review and evaluation, the reviewer must focus on the management processes employed by the utility as it makes decisions. This evaluation looks to whether management follows a rational and deliberate process in making the decisions with respect to a capital project. There must be a structure in place to make decisions and a process to ensure that the decisions follow that structure. Management makes an informed decision if, at the time the decision is made, management considers the factors it should reasonably consider based on information that was known or should have been known at the time the decision was made, not in hindsight. An informed decision includes the identification of risks that might arise and an evaluation of those risks before reaching the decision. To the extent circumstances change, so does the assessment of risks. Once management has made an informed decision, the prudence reviewer evaluates whether that decision fell within the zone of reasonable business judgment considering what information was known at the time. Most, if not all, management decisions do not involve right or wrong answers. Typically, multiple decisions are equally reasonable and prudent under the circumstances. And so long as management's decisions fall within the zone of reasonableness, the decisions are reasonable and prudent.

Q. Did you describe and explain the "structure of the management decision-making process" in your Supplemental Direct Testimony filed in this Docket on December 13, 2013?

A. Yes. I described and discussed the structure of the management decision-making process in detail on pages 17-19 of my Supplemental Direct Testimony.

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Q. Are there different levels of management within a large complex project that a reviewer evaluates in a prudence review?

A. Yes. In a large, complex project, there are typically three levels of management: 1) the *project management* level which consists of the Project Management Team responsible for day-to-day management of the project; 2) *senior management* within the utility which oversees large complex projects and other capital projects being executed throughout the organization; and 3) the *governance/oversight* which is external to the project management and often consists of the Board of Directors, which reviews strategic planning, and approves overall capital budgets and, typically, individual total costs of projects relative to MPC's forecasts to ensure the projects align with the interests of all of its stakeholders, including its customers long term needs and stability and sustainability of MPC's operations. Thus, the information available at the time decisions are made is different at each of these levels of management, but all levels must be considered when determining whether decisions are considered reasonable and prudent.

Q. Are audits an important part of the structure of the management decision-making process?

A. Yes. As I discussed on page 19 of my Supplemental Direct Testimony, and more fully in response to allegations by witnesses for the Sierra Club, Staff and MPSC, Pegasus-Global's prudence review included the review of various independent third-party audit reports that have been prepared over the course of the Kemper IGCC Project. It is Pegasus-Global's experience that management typically will retain outside consultants and/or assign a group of internal auditors to review, audit, and make recommendations relative to performance of the project based upon the governance structure of the organization. Conducting, using, and reviewing audits is prudent management practice and is essentially a form of ongoing, real-time prudence review. In the case of the Kemper IGCC Project, BREI and URS provided a form of audit via their roles as IMs for the Staff and MPSC, respectively, on a regular basis which was considered as part of the prudence review.

Q. Did Pegasus-Global review any audit reports of the Kemper IGCC Project?

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A. Yes. MPC used both internal and external audits on the Kemper IGCC Project, which is a prudent management practice. These audits combined with the BREI and URS oversight represents a higher level of transparency than Pegasus-Global typically encounters in the industry.

Q. Should individual audit findings be used to draw conclusions about imprudent project management?

A. No. Audits are not intended to determine prudence, nor should they be, as they are governed by different standards. Financial audits are conducted in accordance with Generally Accepted Accounting Principles ("GAAP") and internal audits are conducted in accordance with those principles developed and approved by the Institute of Internal Auditors ("IIA"). BREI and URS each have their own standards upon which real time reviews/audits were performed that do not necessarily comply with GAAP or the IIA standards. It should also be noted that while each of these "audit" reports is considered a relevant element of information that is considered by management, each report is written with the benefit of hindsight, providing only recommendations for process changes going forward and the information contained in the audit is not generally available at the time the decisions are being made. It is prudent for management to evaluate its processes during the course of a project and to correct any deficiencies or make any improvements or adjustments as the project continues. To use audit findings, which are generally self-critical, against management not only discourages the improvements that result from this tool, but also the transparency associated with it. That being said, audits are not automatically conclusive of prudency either. Audits are conducted for many purposes, ranging from providing "reasonable assurance" of accounting practices, financial reporting, engineering quality practices, and project management performance and construction execution to such matters as welds and potential risks. Thus, not all audits focus on decision-making and/or may focus on other aspects that do not relate directly to prudency. Audits are merely one of a selection of sources of information that a utility should and does take into account in making decisions.

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Q. In evaluating management decision-making, is it appropriate to look at the outcome of the decision?

A. No. The prudence review focuses not on the outcome but rather on whether management engaged in reasonable risk management at the time. Risk management is an important element of prudent decision-making. It is *not* a study in after-the-fact outcomes. It is a study of the way decisions are made that assigns, allocates, raises or reduces project or corporate (enterprise) risk. It is not an evaluation of whether the outcome successfully avoided all risk (again, an impermissible use of hindsight). Project Risk is defined as *"any activity, event or action which tends to cause a negative impact to the planned goals of project scope, quality, performance, execution time or cost.*[49] Project Risk Management is a systematic process by which *"risk elements or conditions may be identified, evaluated and avoided, mitigated or eliminated, in order to preserve the achievement of project cost schedule and quality goals..."* Project Risk Mitigation requires:[50]

(1) "The *identification* of potential or actual risks;

(2) *Management action review* to accomplish project risk minimization and control;

(3) *Execution reviews* on a regular basis to assure project management responsiveness; and

(4) *Adjusting management* to account for project dynamics."

These efforts can be applied to a project as a whole, a specific portion of the project, or the operations of one or more parties but cannot ever eliminate all risks. Risk management by its very nature is a process, which most programs and projects employ to properly assess and respond to potential or emerging risks that evolves as new risks are identified.

[49] Nielsen, K.R. "International Construction Projects – Managing Risk in the Field," World Congress on Construction Risk, Paris, France, April, 1994; Nielsen, K.R., "Execution Risk Management in Design-Build Infrastructure Projects," Proceedings of the Construction Institute Atlantic Coast Construction Conference, Tysons Corner, VA 2004

[50] Nielsen, K.R. and Galloway, P.D. "Anticipating Problems: Project Risk Assessment and Project Risk Management, Collaboration Management: New Project and Partnering Techniques," edited by H. Shaughnessy, John Wiley & Sons, 1994

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Q. Has Pegasus-Global, in evaluating the Kemper IGCC Project for purposes of rebutting the Sierra Club, Staff and MPSC's allegations, also studied MPC's risk management effort?

A. Yes. Pegasus-Global has reviewed and determined that MPC had appropriate project risk management processes in place. This is not the same, however, as determining that MPC accurately predicted or will always accurately predict every future outcome.

IV. PRUDENCE EVALUATION PROCESS

Q. How did Pegasus-Global approach the prudence review of the Kemper IGCC Project as it relates to the allegations of Sierra Club, Staff and MPSC?

A. Pegasus-Global used the same qualitative approach already described above with respect to evaluating the decisions for the costs incurred on the Kemper IGCC Project up to March 31, 2013.

Q. Did Pegasus-Global request and review Project documents as part of the prudence review?

A. Yes. Pegasus-Global requested, obtained and reviewed sufficient project documentation to reasonably ensure that the conclusions reached are supported by the facts. Pegasus-Global reviewed thousands of documents, including:

- Technical Service Agreements, Term Sheets and Contracts and their Amendments;
- Studies prepared for the Kemper IGCC Project;
- FEED documents;
- Monthly Progress Reports;
- Communications among and between MPC and others;
- Audit reports;
- Project Execution Plans;
- Risk registers;
- Project schedules;
- Meeting minutes/notes;

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- Cost estimates and reforecasts;
- Budgets and cost reports;
- Contractor/Vendor proposals;
- Change Orders;
- Purchase Orders;
- Commodity curves and commodity information;
- MPC Board of Director information, including but not limited to:
  - Meeting Minutes; and,
  - Presentations to the MPC Board of Directors and Board Committees.
- Industry data, presentations and reports;
- MPC filed petitions with the MPSC;
- Testimony filed in IGCC related proceedings;
- MPSC Orders; and
- Data Requests and corresponding responses submitted by the IMs and various Intervenors.

Q. Why is the review of Project documentation important in responding to whether the decisions of the Kemper IGCC Project management relative to costs incurred were prudent?

A. As I noted in my Supplemental Direct Testimony on page 22, the documentation developed over the life of the project conveys a number of individual snapshots in time, as well as more complete picture of project issues, concerns, problems, policies, changes, responses, and practices, both positive and negative in impact. While not completely definitive, the documentation can provide valuable insight into the larger pattern of events, which can be indicative of underlying conditions and what was known or should reasonably have been known at particular points in time from the viewpoint of numerous individuals. Review of project documentation gives the reviewer a basis

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to analyze and understand what happened, why it happened, when it happened, when it was known, its effect and the responses employed. Such a review is a key component in developing an assessment of project performance – both effective and ineffective. By reviewing a vast number of documents, Pegasus-Global was able to capture the flow of information from a broad spectrum of Project and utility industry information to produce a significantly more comprehensive prudence analysis upon which to present testimony.

Q. Can a prudence evaluation rely entirely on documentation?

A. No. Documentation does not provide a complete or entirely accurate picture of events that have transpired. For instance, not every decision is meticulously documented, and this is consistent with prudent practice, since meticulous documentation of every decision would often waste valuable project resources and would be unnecessarily costly. On the other hand, documents can also be taken out of context and be improperly isolated from the "universe" of documents that provide the necessary context. While documents may suggest a larger pattern or recurring condition, any individual – or even collective documents – can be influenced by events that are not always identified in documentation. Consequently, documentation must be accompanied by personal interviews to facilitate a broader and deeper appreciation of the project background and provide additional insight into historical events and conditions, which can also be influenced by change in personnel.

Interviews serve as part of fact collection and fill in gaps in documentation. The combination of both document review and personal interviews aids in "rounding out" the clearest possible picture of project history and management performance. Interviews establish the factors which precipitated a condition, resulted in resolution of a condition or provided the framework for future management execution.

Q. Did Pegasus-Global conduct such interviews of MPC and MPC corporate personnel?

A. Yes. Interviews were performed by myself and the Pegasus-Global team including interviews of several key members of the Kemper PMT and MPC corporate personnel.

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Q. Who did Pegasus-Global interview?

A. In alphabetic order, Pegasus-Global interviewed the individuals listed below. Over the long duration of a project such as the Kemper IGCC Project, personnel may hold several different positions as project management needs change and individuals gain experience; therefore Pegasus-Global identified each individual by either their current title or the title they held during their tenure on the Kemper IGCC Project over the course of Pegasus-Global's prudence review.

- Aaron Abramovitz – Project Manager, AFT and Regulatory, MPC
- Thomas Anderson – (Former) Vice President, Generation Development, MPC
- Tracy Ash – Project Engineering, SCS
- Ashley Baker – Vice President Project Construction, SCS
- Ernie Barton – EPC, SCS
- Brad Cates – Project Analyst, MPC
- Chris Coggin – Cost Analyst
- Craig Copham – Assistant Site Manager, SCS
- Edward Day – Former CEO, MPC
- Brad Delcambre – Project Controls Supervisor, SCS
- Dave Empfield – Construction Site General Manager, SCS
- Kevin Gammill, Construction Manager, SCS
- John Huggins – Vice President, Generation Development, MPC
- Chesley Hughes – Project Manager, SCS
- Debbie Ladner – Project Manager, MPC
- Joe Eiland – Consulting Engineer, SCS
- Jay McFarland – Plant Operations, MPC
- Stacey Miles – Project Manager, MPC
- Joe Miller – Start-Up General Manager, SCS

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- Steve Owen – Kemper Project Director, SCS
- Tim Pinkston – Project Manager, Gasification Technologies, SCS
- Randall Rush – Director, Power Systems Development Facility, and General Manager Gasification Technology, SCS
- Babar Suleman – Scheduler, SCS
- Carl Toner – Project Manager, SCS
- Brett Wingard – Design Manager, SCS
- Prassad Koneru – Project Manager, KBR
- Ahsan Siddiqui – Project Manager, KBR

Q. Did you personally interview these individuals?

A. Yes, I interviewed almost all of the persons identified above myself. Follow-up interviews were conducted by my team in some instances without my presence.

Q. Did Pegasus-Global also review testimony presented in this matter?

A. Yes, we reviewed all of the testimony in all the Kemper IGCC Project MPSC proceedings.

Q. Did Pegasus-Global also tour the Kemper IGCC Project site?

A. Yes, to gain a full understanding of the scope of the Project and its complexity, key members of the Pegasus-Global team, including myself, toured the Kemper IGCC Project.

Q. Did you discuss the importance of touring the site as part of your prudence evaluation and review in your Supplemental Direct Testimony?

A. Yes. I discussed the importance of touring the Project site on pages 23-25 of my Supplemental Direct Testimony.

Q. Dr. Galloway, did you encounter any difficulties or problems in gathering information that you needed from MPC or SCS?

A. No.

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Q. Are you aware that MPC also provided information concerning the Kemper IGCC Project to Sierra Club, Staff and MPSC?

A. Yes. I am aware that certain Project information has been provided to the Sierra Club, Staff and MPSC IMs on an on-going basis. Likewise, Staff and MPSC have asked for and received thousands of documents. I have no personal knowledge as to the documentation specifically used to formulate their testimony that may be outside the scope of what Pegasus-Global reviewed. Likewise, I have no personal knowledge as to whether the documentation reviewed was as comprehensive as the review undertaken by Pegasus-Global in formulating my Rebuttal Testimony. In some instances, documents taken out of context leave the impression that the review conducted by Sierra Club, Staff and MPSC may have been less comprehensive or conducted through a different lens or with a different focus than that conducted by Pegasus-Global.

Q. Has Pegasus-Global reviewed that information as well?

A. Yes. Pegasus-Global has reviewed questions asked by the Sierra Club and the Staff and MPSC IMs; answers provided by MPC; and all material requested and sent to the Sierra Club, Staff and MPSC in these proceedings.

Q. Was the information that you gathered in a format that was understandable and of use to Pegasus-Global in conducting its prudence review?

A. Yes. However, as in most prudence reviews, the reviewer has to evaluate data from many sources, including project controls sources, which may not present data in the form that is most familiar to the particular reviewer. For example, in the case of the cost variance reporting used on the Kemper IGCC Project, Pegasus-Global had to evaluate the data gathered from different documents available at the time the decisions were made. Likewise, as is typical in complex capital construction projects, project control systems evolved over time, and with changes in the project conditions, Pegasus-Global had to review all of those systems and documents.

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Q. Was the information provided to Pegasus-Global sufficient to allow Pegasus-Global to evaluate the prudence of MPC's decision-making with respect to the costs incurred through March 31, 2013?

A. Yes. The documentation produced was voluminous and consisted of every type of project record one would expect to see for a project of this size, scope, cost and duration, including formal progress reports, meeting minutes, independent audit reports, correspondence, contract documents, purchase orders, payment records, schedules, etc. For almost any decision one might wish to examine, it is possible to develop a document record of the Kemper IGCC Project as it existed at that point in time of the Project. It is possible – and we did – to identify exact information that project management had at its disposal in seeking alternatives and making decisions. It is also possible – and we did – follow the thought processes by which MPC reached its decisions. With hindsight, one may argue that the decisions did not turn out to be the least expensive or the most efficient; however, if one confines oneself to the contemporaneous records and information available at the time the decision was reached, it is possible to evaluate whether the decision was prudently made.

Q. How did you determine the areas to focus on for your review?

A. Pegasus-Global initially conducted a broad prudence audit and evaluation of MPC's decision-making process. I and the Pegasus-Global team then read and reviewed the testimony of the Sierra Club, Staff and MPSC witnesses identified earlier; identified a number of areas that those witnesses criticized and focused our analysis on those areas outlined in **Section II** of my Rebuttal Testimony earlier.

Q. Have you, in this testimony, addressed the issues raised by the Sierra Club, Staff and MPSC's witnesses?

A. Yes. Pegasus-Global has analyzed allegations raised by the Sierra Club, Staff and MPSC (through the IMs), reviewed management's actions and provided conclusions regarding prudence as to those allegations, together with the factual basis for those conclusions.

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V. RESPONSE AND REBUTTAL TO SPECIFIC ALLEGATIONS MADE BY SIERRA CLUB, STAFF AND MPSC WITNESSES REGARDING THE COSTS INCURRED UP TO MARCH 31, 2013

Q. Dr. Galloway, do you have any general observations relative to findings and conclusions rendered by the Sierra Club, Staff and MPSC witnesses?

A. Yes.

1. Collectively the Staff and MPSC's witnesses' findings and opinions are conclusory and are unsupported by concrete evidence significant enough to raise an issue about prudence. Despite the Staff and MPSC witnesses being intimately familiar with the Project through an onsite presence and monthly meetings, the witnesses generally referenced a small collection of documents from what is an immense project document record. The Sierra Club witness consistently relied primarily on excerpts without considering the context in which the information was made or other project and industry information that was known or should have been known at the time. For example, Mr. Schlissel addresses MPC's management of the Kemper IGCC Project using only a very small selection of Project documents and MPC's responses to discovery requests. Data available for Mr. Schlissel's review included large sets of Sierra Club Data Requests, which sought tens of thousands of Project documents, and for which responses included documents which directly addressed execution of the Kemper IGCC Project, including:[51]

- Project schedules;
- Cash flow reports;
- Meeting documentation, including:
    - MPC Board of Directors;
    - Southern Company Board of Directors;

[51] Sierra Club Data Request Set 1, August 22, 2013; Sierra Club Data Request Set 2, October 3, 2013; Sierra Club Data Request Set 3, December 23, 2013

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  - Southern Company Management Council;
  - Kemper Mine Overview Board;
  - Customer Forum Presentations;
  - Executive Review Board ("ERB");
  - Management Review Board ("MRB");
  - Production Reports; and,
  - Core Team.
- Kemper IGCC Project Risk Book;
- Nitrogen Supply Evaluation;
- Technical Risk Assessments of Coal Preparation Systems;
- Reports by outside consultants, including:
  - 2007 Risk Analysis;
  - 2008 Technology Risk Assessment;
  - Black & Veatch Readiness Review; and,
  - Construction Advisory Board reports.
- Meetings notes and presentations for all IM meetings with MPC, including:
  - 2011 and 2013 IM Risk presentations.
- Sample of Completed Southern Company Contractor Evaluation Forms;
- Kemper reforecasting reports;
- MPC's coal and natural gas fuel prices forecasts;
- MPC's earnings calls and rating agencies reports;
- Redacted versions of carbon dioxide ("CO_2") offtake agreements and by-product revenue projections;
- MPC Integrated Resource Plan;

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- Overviews of Beneficial Capital, Process Development Allowance ("PDA"), and Force Majeure;
- List of prime contractors for the Project;
- Kemper County IGCC Project application for DOE Clean Coal Power Initiative ("CCPI"); and,
- Documentation relating to the §48A Phase I, II, and III ITCs.

2. The Sierra Club's witness, Mr. Schlissel, sets forth allegations that were general and sensationalized and without sourcing from where the allegations originated (*i.e.*, Coal plant construction costs were "*skyrocketing*" beginning in 2002).[52] The reader might believe that such testimony has greater weight even though it lacks any detailed analysis to accurately portray the facts as they existed at that point in time. For instance, Mr. Schlissel's 2009 testimony states, "*There is a significant risk that the actual cost of constructing the proposed Kemper County IGCC plant could be substantially higher than Mississippi Power Company's current estimate.*"[53] However, Mr. Schlissel provided no substantiated facts to support his broad opinion, yet could easily now say "I told you so" as the foundation to support his current testimony which could possibly lead one to believe his allegations of imprudence are factually accurate when Pegasus-Global's exhaustive review and factual evidence does not support such a conclusion.

3. The Sierra Club, Staff and MPSC's witnesses disallowance recommendations are vague and unsupported. Staff witness BREI's testimony indicated that it only considered the prudency as to the project management—not executive decisions. URS, the witness for MPSC indicated that its testimony was intended to be qualitative in nature and not quantitative and

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[52] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, page 3, March 14, 2014

[53] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2009-UA-014, page 4, December 7, 2009

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would be required to file additional testimony to address the specific amount. Finally, Mr. Schlissel, the witness for the Sierra Club, indicated that the entire Project should never have gone forward and thus the entire $5B should somehow be disallowed, an issue that was already addressed during the CPCN proceeding. These proposed disallowances do not meet the criteria I described earlier for imposing a cost disallowance, *i.e.*, that the disallowance must be founded on a direct causal link between an imprudent decision or action and the specific cost associated with that imprudent decision or action.

Q. How have you organized the testimony you are giving in response to allegations of imprudence made by the Sierra Club, Staff and MPSC witnesses?

A. In responding to the Sierra Club, Staff and MPSC witness testimony, my Rebuttal Testimony is organized as follows:

- First, I have identified, evaluated and addressed those issues which, more or less, were common across the Sierra Club, Staff and MPSC witnesses.
- Second, I have identified, evaluated and addressed issues which were limited to a single witness; and
- Third, once I identified the allegations, I provide my testimony in response.

A. MEGAPROJECTS

Q. Have you reviewed Mr. Schlissel's testimony regarding his conclusions that *"Kemper…was exposed to a mega-project risk because of its adoption of an expedited 'fast-track' design and construction schedule"*?[54]

A. Yes. In my opinion as an expert not only in mega but gigaprojects,[55] Mr. Schlissel oversimplifies the risks associated with megaprojects, which the Kemper IGCC Project would be considered.

[54] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, page 4, March 14, 2014

[55] As a general note, gigaprojects are effectively larger megaprojects that typically have project costs in excess of $10B; "Managing Gigaprojects: Advice from Those Who've Been There, Done That," co-edited and co-authored

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Being a megaproject is about more than adding significantly to the cost and schedule uncertainty. Megaprojects are not only dynamic, their scale and scope requires a unique approach to managing and governance to meet the expectations of all of the stakeholders who share a common interest in completing the megaproject within the goals of time, quality and cost.[56]

Q. **Some of the MPSC and Staff witnesses criticize MPC's Project Construction Management, including by way of example, the use of overlapping engineering and construction (*e.g.*, Staff witness BREI[57] says that design should have been completed before construction began). Is it important in assessing such criticisms to understand the characteristics of a megaproject?**

A. Yes. I will address specific criticisms in my Rebuttal Testimony that follows, but it is quite important to assess the MPC decision-making process in the context of a megaproject. As Mr. Schlissel has correctly noted in his testimony with respect to my definition of megaprojects,[58] and to which he agrees, megaprojects are defined as very large-capital investment projects that attract a high level of public attention or political interest because of substantial direct and indirect impacts on the community, environment, and companies that undertake such projects. They are generally defined as major projects that cost more than $1B (USD). Other attributes of megaprojects include: execution of an engineered facility or structure which is complex or unusual, an extended execution schedule (greater than three to four years measured from initial concept development to final completion), performing multiple stages of the project (*e.g.*, engineering and construction) concurrently, multiple equipment and material suppliers, multiple

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by Patricia D. Galloway, Ph.D., P.E.; Kris R. Nielsen, Ph.D., J.D., and Jack Dignum, American Society of Civil Engineers, 2013

[56] "Managing Gigaprojects: Advice from Those Who've Been There, Done That," co-edited and co-authored by Patricia D. Galloway, Ph.D., P.E.; Kris R. Nielsen, Ph.D., J.D., and Jack Dignum, page 5, American Society of Civil Engineers, 2013

[57] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 6, March 19, 2014

[58] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, pages 31-32, March 14, 2014

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specialty trade contractors, multiple project stakeholders/investors, and multi-national party involvement.[59]

Q. Is the Kemper IGCC Project a megaproject as defined within the industry?

A. Yes. The Kemper IGCC Project has the following attributes of a megaproject:

- Total Project cost at the CPCN was capped at $2.88B;
- The power plant is complex from both an engineering and construction perspective;
- Total execution duration from the MPSC's May 26, 2010 CPCN Order approving the Kemper IGCC Project until its projected COD, is approximately four years;
- Engineering and construction must be conducted concurrently to meet the projected completion schedule;
- There are multiple specialty equipment and material suppliers;
- There are multiple specialty trade contractors;
- There are multiple project stakeholders at both the ownership and the consumer levels;
- There is much public and political interest; and
- There are off-shore (from the U.S.) engineered equipment and material suppliers.

By every measure generally used in the industry, the Kemper IGCC Project is classified as a megaproject.

Q. Please describe the Pegasus-Global experience with megaprojects.

A. Yes. I and/or Pegasus-Global have provided services on several power generation megaprojects:

- Alto Maipo Hydroelectric Power Plant, Chile
- Guri Dam & Hydroelectric Complex, Venezuela
- Xiaolangdi Dam, China
- Edwardsport IGCC Project

[59] "Managing Gigaprojects: Advice from Those Who've Been There Done That," co-edited and co-authored by Patricia D. Galloway, Ph.D., P.E.; Kris R. Nielsen, Ph.D., J.D.; and Jack Dignum, page 1, American Society of Civil Engineers, 2013

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- Iatan Super-critical Pulverized Coal Plant, Units 1 & 2
- Scherer Fossil (4 Unit Coal) Power Plant
- Vogtle Nuclear Power Plant, Units 3 & 4
- Vogtle Nuclear Power Plant, Units 1 & 2
- Bellefonte Nuclear Power Plant
- Levy Nuclear Power Plant
- South Texas Nuclear Power Plant
- Clinton Nuclear Power Station
- Wolf Creek Nuclear Power Plant
- Millstone Nuclear Power Plant, Units 1,2 &3
- Cooper Nuclear Power Plant
- Shoreham Nuclear Power Plant
- Seabrook Nuclear Power Plant
- Perry Nuclear Power Plant
- Indian Point Nuclear Power Plant, Unit 3
- Diablo Canyon Nuclear 1 Power Plant, Units 1 & 2
- Salem Nuclear Power Plant
- Maine Yankee Nuclear Power Plant
- Calvert Cliffs Nuclear Power Plant
- Turkey Point Nuclear Power Station, Units 3 & 4
- Palo Verde Nuclear Power Plant
- Pleasant Prairie Nuclear Generating Station Unit 2
- Zimmer Nuclear Power Station
- Comanche Peak Nuclear Power Station
- Waterford 3 Nuclear Power Plant

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- Trojan Nuclear Power Project
- Connecticut Yankee Nuclear Power Plant
- Pilgrim Nuclear Power Plant

In other industry sectors, I and/or Pegasus-Global have provided services regarding the following megaprojects:

- Alaskan Way Viaduct Replacement Program, Washington
- London Crossrail Project, UK
- Venice Lagoon Floodgate Project, Italy
- Columbia River Crossing Bridge, Washington/Oregon
- BASF Fina Steam Cracker, TX
- Casecnan Multi-Purpose Project, Philippines
- Melbourne City Link, Australia
- Vancouver Island Highway Project, Canada
- Tsing Ma Bridge, Hong Kong
- Kuala Lumpur International Airport, Malaysia
- Regional Fast Rail Project, Australia
- Parramatta Rail Link, Australia
- Milwaukee Water Pollution Abatement Program ,WI
- PET Production Plants Program, Holland, Spain and Argentina
- Combisa Cantarell EPC 22, Mexico
- Panama Canal, Panama
- Sakhalin Island Pipeline Project, Russia
- HBJ Gas Pipeline, India
- Oman LNG Project, Oman
- Murrin Murrin Nickel – Cobalt Refinery, Australia

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Q. Do megaprojects require different project management systems than other construction projects?

A. Megaprojects require the same types of systems; however the form of those systems may differ from those of a conventional project due to the unique and complex aspects of a megaproject. The primary difference between a megaproject and a typical project, beyond their total cost and duration, is the difference in the megaproject risk profile, complexity of the megaproject, extended duration of the megaproject, and the overlapping execution staging.

Q. What do you mean by "overlapping execution staging?"

A. "Overlapping execution staging" means that project tasks are not performed sequentially, but rather parts of some tasks are performed concurrently. Megaprojects would be much more costly if each stage of the project had to be completed before the next stage began, and in doing so would create delays that would increase risk. For that reason, megaprojects are typically scheduled so that precedential activities are completed just before they are needed. For instance, rather than completing all of the detailed engineering before beginning construction, the engineering is scheduled so that the designs for the first construction activities are completed so that that work can commence. Other activities are similarly scheduled so that the time for completing the entire project can be compressed, thereby saving costs.

Q. Given the unique circumstances of a megaproject and recognizing the stresses that accompany those circumstances, how does the management of a megaproject differ from that of typical construction projects?

A. The greatest difference in managing a megaproject from a typical construction project lies in management's willingness to understand and accept that conditions will change. Management and control approaches, processes, procedures and systems must be flexible and adaptable to changing conditions. Megaproject management is based not so much on meeting a preset plan, but on adjusting repeatedly to a myriad of competing forces to maintain the greatest possible control over the project environment as it evolves. On a megaproject, management never gets the

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opportunity to sit back and say "everything is going according to plan," because the plan may, and often does, change every day and with those changes, new information is presented upon which decisions have to be made. The nature of what is deemed prudent changes as a result.

Q. How do these differences in megaproject management affect the prudence review of the Kemper IGCC Project?

A. Because the Kemper IGCC Project is a megaproject, management was and is faced with constant decision-making. Based on Pegasus-Global's review, it is clear that MPC management understood that both project management and executive management would have to be on constant vigil. This involved the use of consulting expertise, coupled with regular management questioning and evaluation of decisions already made and implemented, as well as looking at decisions that would have to be made going forward. MPC Project and executive management also understood that MPC management decisions would require flexibility when resulting conditions, circumstances or performances turned out differently than anticipated after a decision had been made. MPC's constant performance evaluation of all parties involved in the Kemper IGCC Project, including itself, was innovative and consistent with the changes that are part of all megaprojects. MPC, over the course of the Kemper IGCC Project, demonstrated its ability to adjust management and performance as conditions and circumstances changed.

Q. Do the Sierra Club, Staff or the MPSC witnesses take into account the evolving nature of a megaproject in making their allegations?

A. No. Although Mr. Schlissel does include a section discussing megaproject risk, the explanation provided does not fully capture the true nature of the risks associated with a megaproject, saying it is an "*expensive project expected to cost more than $1 billion that involves an extended construction schedule, a fast-track schedule and the involvement of multiple suppliers and*

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contractors."[60] Furthermore, by simply stating that *"being a megaproject added significantly to the cost and schedule uncertainty surrounding the Kemper IGCC Project"*[61] indicates a lack of understanding by Mr. Schlissel as to the true nature of the risks, which were well understood at the time of the CPCN and heavily absorbed by MPC as a result of the agreed upon cost cap. Attempting to review the prudence of a megaproject requires far greater understanding than simply implying the project costs significantly more and schedules are likely to be uncertain. Rather, over the life of any megaproject, as decisions are made and implemented, adjustments must be made to the execution plans and budgets depending on the circumstances surrounding the project at any given point in time. Neither of the witnesses for either the Staff or MPSC mentions the nature of megaprojects within their direct testimony, also discounting the necessity for megaprojects to be executed on a fast-track schedule in order to compress the project's duration to a manageable time in order to mitigate additional financing costs and changing market conditions that occur over longer durations.

Q. Does the nature of a megaproject make it even more inappropriate to consider hindsight consequences in reviewing the prudence of management conduct?

A. Yes. The complex nature of megaprojects, even when independent monitoring activities, such as those conducted by BREI and URS, detect a problem or issue that arises despite the reasonable decisions made by project management, it is sometimes too late to completely mitigate or avoid its effects, which can ripple and impact other areas of the project, including costs or schedule impacts that were unanticipated at the commencement of the project, despite commencing the project with appropriate contingencies in place.

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[60] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, page 30, March 14, 2014

[61] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, page 30, March 14, 2014

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B. IGCC "FIRST MOVER" RISKS

Q. Have you reviewed and are you familiar with Mr. Schlissel's, BREI's, and URS's testimony and reports with respect to FOAK and first-mover risks?

A. Yes. I have and am.

Q. Do you have any observations regarding FOAK and first-mover risks?

Yes. Mr. Schlissel alleges that MPC knew that it was exposed to "*first mover*" and "*megaproject*" risks as well as "*significant technology risks*".[62] The risks of FOAK technology were known throughout the industry during the 2004-2009 time period that Mr. Schlissel refers. However, what was not well known at the time was exactly what risks would present themselves at what stage of construction. I disagree with Mr. Schlissel's conclusion that MPC failed to fully disclose "*first mover*" risks and "*significant technology*" risks to the MPSC or that the MPSC was unaware of such risks. MPC did disclose FOAK risks to the MPSC at the time of its CPCN filing and continued to meet monthly with the IMs hired by both MPSC and the Staff to ensure the greatest level of transparency.

Mr. Schlissel uses only a few industry-related documents in support of his conclusion and even then, quotes only a few words or select text from 2004 and 2007. In my Rebuttal Testimony immediately below, I have evaluated the information from those documents that Mr. Schlissel did use in the context of other industry documents and information readily available during the 2005-2009 time period leading up to MPC's initiation of its FEED Study and its FEED Study Report in August 2009.

Q. Did MPC update the MPSC relative to its evaluation of IGCC technology?

A. Yes. Throughout the testimony, representatives from MPC discussed the ongoing evaluations that were made with respect to the IGCC technology as part of its due diligence.

[62] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, pages 16-25, March 14, 2014

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On January 16, 2009, Ms. Kimberly Flowers filed testimony in docket number 2009-UA-014 before the MPSC noting the numerous evaluations that had been conducted with respect to the IGCC technology and, *"[a]s explained in the testimony of Mr. Rozier and Mr. Brazzel, MPC's evaluation and analysis clearly indicate that the proposed Kemper County IGCC Project is the best generation resource alternative to meet MPC's identified need and is in the overall best interest of customers."* (At pg. 6) *"Several gasification technologies were studied and compared before a decision was made to further evaluate TRIG™ technology. These included the Shell coal gasification process, the GE (formerly Chevron-Texaco) process, Conoco-Phillips and Sasol-Lurgi."* (At pg. 38)

On September 30, 2009, MPC in its DOE Informational Filing with the MPSC, (reference Docket No. 2009-UA-014) noted, *"DOE also indicated they were 'confident that the TRIG™ technology is ready for full-scale commercial application.'"* Additionally, each month the IMs for MPSC and Staff were provided with updates.

On January 5, 2010, Mr. Thomas Anderson testified in Docket No. 2009-UA-014 before the MPSC noting, *"[b]ecause TRIG™ is a newer technology, MPC recognizes that it will take some time to achieve operational excellence comparable to other Mississippi Power generating units."* (At. Pg. 9)

Q. Mr. Schlissel refers to a March 2004 NARUC Final Report titled *An Analysis of the Institutional Challenges to Commercialization and Deployment of IGCC Technologies in the U.S. Electric Industry; Recommended Policy, Regulatory, Executive and Legislative Initiatives* (p.5). Are you familiar with this report?

A. Yes.

Q. Is it your opinion that Mr. Schlissel misrepresented the 2004 NARUC Report by his selective use of quotations?

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A. Yes. The NARUC Report described IGCC technology as the "*most successful method of producing electric power with coal gasification.*"[63] The NARUC Report recommended a "*number of regulatory, legislative, executive and policy initiatives, at both the federal and state levels for achieving those objectives*."[64] Specific findings of the NARUC Report included:[65]

- ***"Increased utilization of coal gasification power plants offers affordable and high-efficiency electricity production from an abundant, readily available source of energy with superior environmental performance compared to other coal-based technologies."*** **[Bold emphasis added]**
- ***"The U.S. Department of Energy ("DOE") is currently conducting extensive research on technological improvements that will increase the efficiency and cost effectiveness of commercial-sized IGCC power plants, making them fully competitive with other power generation technologies****….These efforts are expected to yield commercially viable technologies within the next few years that can be deployed in a new generation of IGCC power plants."* **[Bold emphasis added]**
- ***"Accelerated IGCC deployment in the U.S. power sector will provide critical benefits in four key areas: environmental; technology advancement; economic; and energy and national security."*** **[Bold emphasis added]**

[63] The National Association of Regulatory Utility Commissioners, DOE/NARUC Partnership for Advances Clean Coal Technology, *An Analysis of the Institutional Challenges to Commercialization and Deployment of IGCC Technology in the U.S. Electric Industry: Recommended Policy, Regulatory, Executive and Legislative Initiatives*, Final Report, Prepared by Global Change Associates, page 2, March 2004

[64] The National Association of Regulatory Utility Commissioners, DOE/NARUC Partnership for Advances Clean Coal Technology, *An Analysis of the Institutional Challenges to Commercialization and Deployment of IGCC Technology in the U.S. Electric Industry: Recommended Policy, Regulatory, Executive and Legislative Initiatives*, Final Report, Prepared by Global Change Associates, page ES-1, March 2004

[65] The National Association of Regulatory Utility Commissioners, DOE/NARUC Partnership for Advances Clean Coal Technology, *An Analysis of the Institutional Challenges to Commercialization and Deployment of IGCC Technology in the U.S. Electric Industry: Recommended Policy, Regulatory, Executive and Legislative Initiatives*, Final Report, Prepared by Global Change Associates, pages ES-1 and 20, March 2004

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- *"Since coal is predominately a domestic fuel source, expending its use in electricity production will have the effect of increasing U.S. employment. With coal reserves in 38 states, this benefit will be experienced in most parts of the nation."*
- *"Previously, one of the main challenges to the development and deployment of IGCC power plants was that the capital costs of such facilities were significantly higher than the capital costs of natural gas-fired generating units, thereby negating the fuel cost savings that could be realized from IGCC facilities. That will most likely not be the case if natural gas prices remain substantially above $4.00 per MMBtu.* ***Moreover, the per unit capital costs of IGCC power plants are likely to decline considerably as more of these facilities are built, standard designs are developed, and economies of scale are realized. As a result, the economic development advantages of increased utilization of coal in electricity production will become more significant."*** **[Bold emphasis added]**

This is consistent with what MPC submitted in connection with its CPCN filing.

Q. Did the NARUC Report reflect information that was also known in the industry and in the Public Utility Regulatory community?

A. Yes. As I previously testified, in 2006 when MPC first began considering an IGCC baseload plant, the status of IGCC technology and its benefits to the power industry were well known to the utility industry. MPC already had experience, through its DOE test facility, the PSDF, and lessons learned from the PSDF facility. Additionally, as noted in the NARUC Report, it was also widely discussed within the industry that the regulatory environment was not uniform, despite the Energy Act of 2005, from state to state. Likewise, the regulatory environment in the U.S. had not yet fully stabilized its approach to Clean Coal Technology and the incentives being offered by the federal government.

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Q. Was B&V, whom MPC retained to conduct a risk readiness review, also touting the benefits of IGCC technology during the time that MPC was considering an IGCC project?

A. Yes. B&V was and remains a leader in the IGCC technology. B&V was an active participant in the IGCC industry during the entire period of MPC's planning and execution of the Kemper IGCC Project and held itself out, and continues to do so, as an expert in IGCC projects. The information that B&V disseminated to the industry over the period from the inception of the Kemper IGCC Project to date, regarding the availability and employment of IGCC technology, is consistent with other available information in the industry, and is also consistent with actions and information MPC provided to the MPSC.

In fact, in November 2004, B&V actually announced the formation of an alliance with Uhde GmbH to *"address the growing demands for coal gasification in the United States."*[66] As noted, IGCC applications were *"yielding significantly lower emissions that conventional pulverized coal-fired power plants."* Uhde, at the time had *"built over 100 gasifiers based on its own and licensed gasification technologies."* Dr. Wolfgang Essig, Uhde's Chairman of the Executive Board specifically stated, *"These are exciting times for the U.S. energy industry…As the nation continues to grow, coal will remain a vital resource in our energy future…."* Rich Chapman, B&V Strategic Projects Director noted clean coal technologies stated, *"In order to fully leverage this valuable resource going forward, organizations must consider coal gasification and other clean coal technologies to meet environmental demands."* Clearly, B&V was not of the opinion or certainly did not express such an opinion that IGCC prices were going to 'skyrocket.'

In January 2005, *Electric Energy Magazine* published an article written by Rich Chapman of B&V, entitled, "*Fossil Future: Coal's Clean Appeal*."[67] The following comments were made regarding IGCC technology:

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[66] Black & Veatch and Uhde Press Release, *B&V and Uhde announce alliance to pursue clean coal projects,* November 29, 2004

[67] *Electric Energy Magazine*, "Fossil Future: Coal's Clean Appeal," R. Chapman, Black & Veatch, January 2005

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- *"Gasification, in particular integrated gasification combined-cycle (IGCC), is a promising solution that yields significantly lower emissions than conventional pulverized coal-fueled power plants. The technology is not cheap, yet it will become more cost-competitive as it matures."*
- *"Although modern pulverized coal, or PC, plants have dramatically lower emissions than the plants of just a few years ago, IGCC has significant years ago, IGCC has significant environmental advantages over a traditional coal-fueled power plant. IGCC uses far less water and produces far less waste. Most importantly, it offers much lower emissions than conventional fuel combustion."*
- *"Thanks to the potential of clean coal technology, people are once again seriously considering coal. Coal is the world's most abundant fossil fuel. There are enough coal reserves to last for centuries, so it's inexpensive and, unlike natural gas, the costs aren't likely to destabilize anytime soon. Coal deposits are widely dispersed all over the world, and of course it is plentiful here in the United States."*
- *"There are four commercial-sized coal-fueled IGCC plants operating in the world right now: two in Europe and two in the United States. The first commercial-sized coal-fueled IGCC plant started up in 1993 in Buggenum, Netherlands, and its electrical output is 250 megawatts. A similar plant in Puertollano, Spain, uses a mixture of coal and petroleum coke. Its output is 300 megawatts."*
- *"Here in the United States, Polk Power Station in Polk County, Florida, operates a gasifier that originally used only coal, but now uses a blend of coal and petroleum coke, like the Puertollano plant. Its output is 250 megawatts. And the*

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Wabash River plant in Terre Haute, Indiana, also uses both coal and petroleum coke, with an output of 262 megawatts."

- *"IGCC operators are exploring other kinds of opportunities to increase overall efficiency."*
- *"Capital costs are currently higher than conventional plants with emissions-control technology."*

Q. Did this article note disadvantages too?

A. Yes. Specifically, B&V made the following comment:

"Like the cost issue, they're primarily related to the fact that this approach to generating power is still an emerging technology. The engineering, procurement and construction contractor pool is very limited, for example. Few companies have strong in-house gasification expertise. B&V is one of a handful to offer this expertise alongside the company's complete design, consulting, engineering, procurement and construction capabilities in power generation."

Q. Was B&V making similar comments about IGCC technology in its own literature during this time?

A. Yes. In the B&V January 2005 *Solutions Magazine*, B&V published an article entitled "*IGCC: A Promising Clean Coal Technology*."[68] B&V discussed multiple engagements with clients on IGCC technology, including a technology evaluation of coal-based IGCC for the next generation of coal plants for the Wisconsin Public Service Commission, which addressed the potential benefits and complexities with IGCC. B&V further discussed the tightening of the regulatory landscape.

[68] Black & Veatch *Solutions Magazine* , "IGCC: A Promising Clean Coal Technology", January 2005

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Q. In 2006, was B&V promoting IGCC technology and the need for establishment of a stable regulatory environment to make the financial risk more predictable for developers of IGCC?

A. Yes. In a 2006 *World Energy* interview with Ron Wood, President and CEO of B&V's energy business, Mr. Wood made the following statements: [69]

- *"…if the country intends to maintain its standard of reliable and affordable electricity while addressing the goal of energy independence, we'll need to develop a new generation of commercially viable, environmentally conscious and advanced coal-fueled power plants.*
- *Coal comprises 90 percent of our domestic fossil fuel reserve. At current recovery and usage rates, we have enough of it to last around 200 years. To make the most of this resource, a number of things need to happen. We must collectively recognize that many of our U.S. coal plants are becoming outdated. These aging facilities need to be replaced with new ones that utilize advanced technologies that offer significantly better fuel efficiency and greatly reduced emissions. This requires the federal government, in particular, to serve as a backstop. In some ways, government is helping to lead the change with the recent passing of the clean-coal provisions of the Energy Act of 2005.*
- *…when people say "clean coal" they are typically referring to a basket of advanced technologies, including supercritical cycles, which are very-high-temperature versions of a conventional pulverized coal plant. Another clean-coal initiative receiving much interest is integrated gasification combined cycle, or IGCC technology. The potential of IGCC to help meet U.S. energy demand*

[69] *World Energy* Interview with Ron Wood, President and CEO of Black & Veatch, 2006

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has prompted many companies, such as B&V, to invest significant resources in developing viable applications for the technology.

- *Again, there is no silver bullet. Because coal has varying properties, depending on its geological origin, each technology deserves careful consideration. IGCC, for example, works well with bituminous coals plus petroleum coke. IGCC systems produce the cleanest power available from coal, approaching the low emissions of gas turbine power plants. A disadvantage of IGCC, however, is its high capital cost".*

It should also be noted that Sierra Club's witness Mr. Schlissel alleged that while MPC hired B&V on or around July 23, 2009, to prepare a readiness review, Mr. Schlissel stated that, *"…'technology review' was excluded from the scope of B&V's review. Consequently, Mississippi Power appears to have specifically not asked for B&V's opinion on IGCC technology."*[70] However, this does not accurately reflect MPC's intentions or B&V's opinion of IGCC technology. B&V had published numerous technical studies on IGCC, including its January 2007 report for Florida Power & Light ("FP&L") that was in the public domain, therefore MPC had access to such information. Taken out of context, Mr. Schlissel seems to imply that MPC had been deliberate in not asking B&V for a technical analysis of IGCC technology when in actuality there was no need to request such a study.

Q. Does Pegasus-Global concur with Mr. Schlissel's conclusion that MPC *"as an early adopter of IGCC technology (also called a "First Mover"),"* should have expected that the Kemper IGCC Project would be exposed to the risks of rising construction costs and should have waited and learned from *"the experience of other IGCC projects"*?

A. No. Mr. Schlissel has failed to put into context MPC's decision to proceed with the Project, whereby it explored in its FEED Study whether to proceed with the Kemper IGCC Project, given

[70] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, page 20, March 14, 2014

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(1) the regulatory environment and incentives both the state and federal government were offering to those utilities that were willing to embark on building a new IGCC project; (2) the desire to use U.S. fuel sources; (3) volatile gas prices at the time; and, (4) pending environmental regulations. For example, in March 2005, EPRI prepared a working paper for the Senate Committee on Energy & Natural Resources entitled *"Financial Incentives for Deployment of IGCC: A CoalFleet Working Paper."*[71] The paper focused on IGCC deployment incentives and presented an analysis of the effectiveness of eight alternative federal financial incentives to mitigate IGCC's higher costs and risks. The intent of the incentives was to lessen the cost differential between IGCC and Pulverized Coal ("PC") technologies to make IGCC commercially viable.

The paper included the following findings:

- The analysis indicates that without incentives, the cost of electricity for IGCC units significantly exceeds the cost for conventional coal units;
- IGCC provides higher thermal efficiency than current PC plants, lower emissions, and the potential for carbon capture and sequestration;
- Potential benefits of IGCC technology include improved thermal efficiency, energy security and fuel diversity with the use of coal versus natural gas, low pollutant emissions, and potential climate change benefits;
- IGCC units that are initially deployed will have higher efficiency and lower emissions than PC units. Sulfur dioxide ("SO_2") and nitrogen oxide ("NO_x") emissions from IGCC will be less than 20% of PC unit levels. Mercury reductions and efficiency gains would be significant. IGCC units would emit less CO_2 and provide less expensive carbon capture than PC units;
- Identified potential risks included:

[71] EPRI Working Paper for Senate Committee on Energy & Natural Resources, "Financial Incentives for Deployment of IGCC: A CoalFleet Working Paper", March 2005

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- Technological risks that may impact the reliability and availability of the unit; and
- Higher costs compared to construction of a traditional PC facility of approximately 14%.

- To facilitate deployment of IGCC projects, the paper suggested that federal financial incentives could include:
  - Federal loan guarantees;
  - Direct loans;
  - Federal cost sharing;
  - Investment tax credit;
  - Production tax credit;
  - Tax-exempt financing;
  - Accelerated depreciation; and
  - Federal availability insurance.

Q. Was MPC eligible for federal tax credits for the Kemper IGCC Project?

A. Yes. As a result of the Energy Policy Act of 2005, Section 1307 authorized $1.65B in tax credits for clean coal projects.

- $800M for IGCC projects for electricity generation, allocated in equal amounts among IGCC projects that use 3 types of coal including lignite.
- $500M for coal electricity projects other than IGCC.
- $350M for gasification projects that supported activities other than electricity generation such as the production of gasses used in chemical production.

Nine planned facilities took advantage of the $1.65B in awards. In 2006, $1B was awarded with the other $650M was to be awarded in 2007. MPC was eligible for federal tax credits of $133M which was comparative to Edwardsport ($133.5M); Polk ($133.5M); Cliffside ($125M); Bedford

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($125M).[72] Section 48A of the Internal Revenue Code specifically provided for the first phase of the qualifying advanced coal project program and authorized $1.3B of credits. Under the Energy Improvement and Extension Act of 2008, a second phase of the Section 48A tax incentives were offered to qualifying advanced coal projects. Qualifying advanced coal projects were generally defined as:

- Using an advanced coal-based generation technology to power a new electric generation unit;
- Having fuel input of at least 75% coal; and,
- Having a nameplate generating capacity of at least 400MW.[73]

The Phase I Section 48A tax credits required the chosen plant to be operational within five years of receiving certification by the IRS.

Q. Was the State of Mississippi also offering incentives to encourage deployment of IGCC technology and did the MPSC have broad authority to approve IGCC projects?

A. Yes. There were tax incentives available to states from the federal government as well as state tax incentives such as ad valorem taxes.

Q. Why were the incentives and tax credits necessary?

A. As the NARUC Report and other early articles noted, incentives and tax credits would be an important element in the decision to build IGCC plants to cover the costs of the known risks and the expected initial incrementally higher IGCC plant costs in order to encourage utilities to deploy IGCC.

Q. Have these incentives and tax credits been included in the price increases submitted to the MPSC?

[72] http://energy.gov/sites/prod/files/edg/media/CleanCoalTaxCreditFactSheet.pdf
[73] "Gasification Incentives" presentation, Lynn Schloesser, Eastman Chemical Company, Workshop on Gasification Technologies, June 28-29, 2006

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A. No. The cost benefit of some of the incentives and tax credits would come at a negative cost as it pertains to debt to equity ratios which would not be in the best interest of all stakeholders. Some of the incentives and tax credits available at the time required resource deployment would have had a negative impact on MPC's ability to remain focused on the task at hand – completing Kemper IGCC plant. The incentives and tax credits that remain available have not been deducted from the current approved Kemper IGCC Project cost estimate or the submitted increase for the Project. However, it is my understanding that MPC has committed that customers will get the full benefit of any remaining tax incentives through the ratemaking process and has reflected the benefit of the tax incentives to customers in its rate analysis in the IGCC proceedings.

Q. Did other consultants from Synapse, where Mr. Schlissel worked from 2000-2009, describe the benefits of IGCC technology in the 2006-2007 period?

A. Yes. Ms. Anna Sommer of Synapse gave a presentation in January 2006 at an Energy, Utility and Environment Conference ("EUEC") noting that Synapse advises on IGCC and was involved in several IGCC-related studies. She gave the following argument for IGCC:[74]

- Energy prices are skyrocketing;
- Matter of national security;
- GHG regulation is coming;
- U.S. Carbon emissions on upward trajectory; and
- Coal is cheapest, most plentiful, domestic fuel.

Q. Did the interest in IGCC technology continue in 2006 with consideration of lifecycle costs?

A. Yes. A Chemical Engineering Program ("CEP") Magazine article entitled "*Update, Coal Gasification Comes of Age*," noted that the price of oil and natural gas had skyrocketed in recent years and that IGCC technology has significant environmental and lifecycle cost advantages over

[74] "*IGCC-A Public Interest Perspective*" presentation to EUEC 2006 by Anna Sommer of Synapse Energy Economics, Inc., Tucson, Arizona, January 2006

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conventional oil and natural gas based processes for producing power. David Denton, business development director for Eastman Gasification Services in Tennessee was quoted as saying:[75]

> "*While the capital costs of IGCC plants are currently referenced as being 10-15% higher than comparably sized coal-combustion plants, this widely accepted cost gap becomes more of a myth than a reality when overall lifecycle costs are compared," …In particular, conventional coal-fired power plants face the risk of considerable additional capital costs and long-term operating expenses to meet tightening control requirements related to SO_2, NO_x, particulate and mercury emissions that are produced when coal is combusted. By comparison, in an IGCC facility, these pollutants are removed much more cost effectively from the concentrated, high-pressure (400-1,200 psig) syngas stream produced by coal gasification – before it is combusted in the gas turbine*."

The article Mr. Schlissel uses in support of his conclusion, "*Utilities split on readiness of IGCC*" appeared in *Power Magazine* on October 15, 2006.[76] As an example, of statements being taken out of context, Mr. Schlissel says *"the technology was generally considered to be 'unproven,' 'immature,' and 'still in its infancy.'"* While the article does point out that conventional wisdom puts a premium on the cost of building an IGCC plant to "15% to 20%" above that of mainstream PC combustion, it discusses "both sides of the divide." The article noted that, *"after changing to metallic filters and making improvements, Wabash River saw its production and availability numbers rise during its second and third years."* And that, *"Since 2000, the plant has operated with minimal problems and significantly improved on-stream performance while meeting all of its environmental targets."* Meanwhile even John Cogan, senior VP for global energy investment banking at Credit Suisse First Boston LLC said at the time, *"American Electric Power or Cinergy*

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[75] CEP Magazine article entitled "*Update, Coal Gasification Comes of Age*," Suzanne Shelley, Contributing Editor, June 2006

[76] "Utilities split on readiness of IGCC", John Javetski , *Power Magazine*, October 15, 2006

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will have to build an IGCC plant and put it into commercial service to determine how much it really costs to build." As Joseph Esteves, managing director of LS Power Development LLC said that one of the unproven factors relates more to financing, *"Project finance is not designed for new technology"* and that bankers typically wanted to see a five-year track record for a particular technology before committing to financing. That did not exist in 2006 for IGCC.

It is true that the Kemper IGCC Project was a FOAK, and therefore it was laying the groundwork for advancements, which means that it did not have a blueprint for exactly how the project would unfold. However, the fact that MPC was willing to build such a facility does not mean that the decisions it made at the time were imprudent. In fact, MPC proved that under the circumstances the decision-making was prudent based upon the unavailability of uniform data at the time the Project was started. The full article that Mr. Schlissel quotes discusses many of the costs, risks and benefits of IGCC technology, including the learning processes and success of the Wabash Project since going commercial in 1995. The article neither advocates for or against IGCC, but simply observes it is prudent to conduct a FEED study as a precursor to an IGCC investment.

Q. Did B&V and other engineering firms continue to discuss the benefits of IGCC technology from late 2006 through early 2009?

A. Yes. For example, in an October 2, 2006 presentation by AEP at the 2006 Gasification Technologies Conference, AEP outlined its process in deciding to go forward with an IGCC project and the GE/Bechtel Alliance, including minimizing project risks through progressive stages of project definition, including a Feasibility and FEED Study. It also presented its regulatory activity which included filing for IGCC rate recovery in March 2005, in a three-phase approach, an application for a CPCN made to the Ohio Power Siting Board in March 2006, and West Virginia Public Service Commission in January 2006, with a supplemental package filed in May 2006.[77]

[77] "AEP's IGCC Initiatives", presentation by AEP at the Gasification Technologies Conference, October 2, 2006

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In a November 16, 2006 article by B&V entitled "*Gasification/IGCC, An Alternate Solution for Power Generation*,"[78] it noted that IGCC offered both performance and environmental advantages and a flexible alternative to conventional technologies. B&V noted that gasification had been in commercial use for more than 60 years and that B&V had the proven major project execution capabilities from detailed engineering through complex EPC projects to leverage alliances with industry leaders to execute IGCC projects worldwide.

The DOE made a presentation at the Wyoming Coal Gasification Symposium in February 2007, in which it discussed the interest in gasification, its commercial reality, operating IGCC plants, who is proceeding with IGCC plants, and a summary of why IGCC is important to the nation.[79]

Between 2006 and 2010, Capital Power Corporation performed a FEED Study for an IGCC facility with carbon sequestration approximately 50 kilometers west of Edmonton. Notably, the FEED Study identified that the, "*aggressive schedule pursued through the FEED Study would have resulted in the facility being the first of its kind in Canada and potentially North America and the world.*"[80]

In 2009, the Black Coal IGCC Scoping study was undertaken in Australia. Five plants were analyzed for comparison: Nuon, Buggenum (Netherlands); Nakoso (Japan); Puertollano (Spain); and Wabash and Polk (U.S.). The Scoping Study concluded:[81]

> "*Integrated Gasification Combined Cycle (IGCC) is one of the cleanest, most efficient and effective ways of converting coal, and other hydrocarbon feedstocks, into synthesis gas (syngas) to produce commercially-viable electricity as well as other products such as synfuels.*"

[78] Black & Veatch article, "Gasification/IGCC, An Alternate Solution for Power Generation", November 16, 2006

[79] "Gasification and IGCC: Status and Readiness" presentation by Elaine Everitt, Project Manager, Gasification and Fuels Division, NETL, US DOE, at the Wyoming Coal Gasification Symposium in Casper, Wyoming, February 28, 2007

[80] Capital Power Corporation, FEED for Genesee IGCC Facility with CO_2 Capture, Final Report Executive Summary, Appendix E, page E07

[81] ANLECR&D Scoping Study: Black Coal IGCC, David Harris and Daniel Roberts, CSIRO Report No.: EP103810, page v, July 2010

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Q. Were MPC's actions and decisions made with respect to the CPCN filing consistent with industry practice and what other utilities were doing in 2006-2009?

A. Yes. In any case, MPC conducted a FEED, as recommended in the 2007 article quoted by Mr. Schlissel.

Q. How do you respond to Mr. Schlissel's testimony quoting from FP&L's February 2007 testimony regarding its decision to build a new Ultra Supercritical Coal Plant ("USCPC") instead of an IGCC unit based on *"[t]he next generation IGCC plants expected to be operational in the 2011-2015 period will be in the 600 MW range. None of the next generation IGCC units have been built; therefore such units have not been proven to be cost-effective, reliable, and to deliver environmental performance. For all these reasons, both the current and next generation of IGCC plants are insufficient to meet the fuel diversity goals of FPL for its customers."*[82]

A. It is important to note that FPL did not say it would never use IGCC. As stated in FPL's Report on Clean Coal Generation, provided to the Florida Public Service Commission on March 10, 2005, and attached to Mr. Hick's February 2007 testimony, "*IGCC may become a competitive coal generation technology sometime in the future, but not in a time frame necessary to compete as a diversity generation resource to meet the capacity need in 2012-2013.*"[83]

Q. Did Mr. Schlissel note these particular differences in FPL's decision-making process in his testimony?

A. No, he did not.

Q. Does FPL's decision not to choose IGCC technology mean that MPC's decision was the result of unreasonable action?

[82] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, pages 17-18, March 14, 2014; citing Direct Testimony & Exhibit of David N. Hicks on behalf of Florida Power & Light in Florida Public Service Commission docket No. 07-0098-EI, at page 11, lines 5-22

[83] Direct Testimony of David N. Hicks before the Florida Public Service Commission, Docket 07-0098-EI, Document DNH-1, page 43, February 1, 2007

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A. No. As I have testified earlier, MPC went through the detailed steps in its decision-making process consistent with other utilities' decision-making process at that time. One utility's decision not to choose a particular technology cannot be directly compared with another utility's decision to choose that particular technology as each utility must look to its own needs and requirements within the regulatory environment in which it is making those decisions.

Q. Do you agree with Mr. Schlissel's conclusions on page 3 of his testimony that there were risks and challenges for a company investing in the first wave of new IGCC plants and that MPC was aware of the risks, challenges and uncertainties?[84]

A. Yes, as I have previously testified, MPSC and the industry as a whole were aware of the risks and challenges. While Mr. Schlissel testified on page 4 that, *"It was widely accepted in the industry by 2009 that coal plant construction costs had, in fact, skyrocketed and were likely to continue to rise in the future. Therefore, Kemper would have been exposed to the risk of higher capital costs even if it had not included a first-of-kind IGCC technology at commercial power scale;"* such was not the case as I discuss throughout my Rebuttal Testimony.

Q. Have you reviewed Mr. Schlissel's testimony as to industry assessments after 2007 that continued to express concerns about the unproven state of IGCC technology and can you comment?

A. Yes. Mr. Schlissel in his testimony regarding industry concerns about the immaturity of the IGCC technology that continued after 2007, relies primarily on upon a September 2008 IGCC *Technology Overview and Site Feasibility* evaluation of gasification technology by the Dairyland Power Cooperative in Wisconsin and a June 2010 "*Coal Technology Study Update*" prepared by B&V for the Tri-State Generation and Transmission Association and the Sunflower Electric Power Corporation. Mr. Schlissel again mischaracterizes the reasons for and the conclusions reached in both of these documents.

[84] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, page 17, March 14, 2014

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The September 3, 2008 document is a Dairyland Power Cooperative response to a March 29, 2008 Vernon Electric Cooperative ("VEC") Resolution passed at the VEC annual meeting that stated, "*Dairyland Power Cooperative should convert the Genoa pulverized coal plant to Integrated Gasification Combined Cycle (IGCC) technology in order to meet EPA emission standards*." [85] In response to this resolution, Dairyland listed six major issues that prevented Dairyland from **converting** the Genoa #3 Station ("G-3") plant to a gasification facility or tearing down the current plant and replacing it with new gasification or IGCC equipment, including: *reliability; space limitations; boiler and turbine design; replacement power costs;* and, *economic.* It was noted that the current plant "has 20 or more years of remaining useful life," and one of the findings of the report was that the expenditure could not be justified. Once again Mr. Schlissel has taken this reference out of context.

Mr. Schlissel only lists one of the six issues, reliability. However, Mr. Schlissel failed to list the other five which included:[86]

- Space limitation: insufficient area for a laydown yard and construction and not enough land to accommodate the IGCC facility;
- Boiler and Turbine design: the existing boiler was not compatible with IGCC technology which would use a HRSG and would have to be totally replaced;
- Replacement Power Costs: while the new equipment was erected over several years, the Dairyland system would be in need of replacement electricity. "*This very significant capacity and energy purchase would have to be made in a very volatile market with extraordinary unacceptable pricing risks;*"
- Economic: The G-3 plant was noted to have a 20 or more year remaining useful life and had an estimated replacement value of $1 billon. The estimate of demolishing and

[85] Dairyland Power Cooperative, "IGCC Technology Overview & Genoa Site Feasibility", Reponses to March 29, 2008, Vernon Electric Cooperative Resolution, Executive Summary, page 1, September 3, 2008

[86] Dairyland Power Cooperative IGCC Technology Overview and Genoa Site Feasibility, Reponses to March 29, 2008, Vernon Electric Cooperative Resolution, Executive Summary, page 1 – 2, September 3, 2008

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replacing the G-3 plant with a new gasification or IGCC equipment was more than $1.5 billion which did not justify the expenditure versus the benefits to be gained; and

- Permitting: It was noted that permits for a major project would be difficult to obtain.

The document also discussed the advantages of IGCC noting: "*IGCC is an advanced technology that represents the cleanest of currently available coal technologies*."[87] Mr. Schlissel has not provided any evidence that the document demonstrates that MPC made an unreasonable decision based on what was known or reasonably should have been known at the time.

In addition, Mr. Schlissel refers to a June 2010 *Coal Technology Selection Study Update* prepared by B&V for the Tri-State Generation and Transmission Association and the Sunflower Electric Power Corporation. Mr. Schlissel quotes one paragraph from a document that is over 75 pages in length. Mr. Schlissel fails to point out the differences between the coal that would be used for the Holcomb Expansion Project—Powder River Basin ("PRB") coal[88] versus Mississippi lignite coal, as well as the fact that the Holcomb Project is at a higher altitude than the Kemper IGCC Project—both factors which according to the B&V report, affect the type of gasification technology to be employed and costs.

Mr. Schlissel also fails to note in his testimony that B&V continues to have a positive outlook towards IGCC as a viable technology. B&V's *Energy Market Perspective Outlook* overview to the NARUC in a presentation entitled "Adapting to the 'New Normal,' emerging trends in 2012 and beyond" reaffirms the expectation that natural gas prices will continue to go up while coal prices are expected to remain stable. Natural gas that traded at $3.70 per MMBtu in 2013 is expected to increase to $6.50 in 2022 as the global demand for natural gas increases.[89]

[87] Dairyland Power Cooperative IGCC Technology Overview and Genoa Site Feasibility, Reponses to March 29, 2008, Vernon Electric Cooperative Resolution, page 5, September 3, 2008

[88] Black & Veatch, Final Report Tri-State Generation and Transmission Association, Inc. and Sunflower Electric Power Corporation, Holcomb Expansion Project, Coal Technology Selection Study Update, page 1-4, June 18, 2010

[89] Black & Veatch, *Energy Market Perspective Outlook*; "Overview of the National Association Regulatory Utility Commissioners Adapting to the 'New Norma'", page 22, February 24, 2012

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Additionally, the expectation is that more than 61,500 MW of coal facilities will be retired by 2020 with closures of 28,000 MW already having been announced. IGCC is expected to continue to grow over the next 25 years as part of a multi-prong power industry strategy.[90]

Q. Did other Commissions recognize the risk of increased costs yet still approve CPCNs for IGCC projects in recognition of the IGCC benefits?

A. Yes. As stated in the March 6, 2008 Public Service Commission of West Virginia Order regarding AEP's proposed IGCC plant, which Mr. Schlissel uses on page 21 of his Direct Testimony, the PSC stated:[91]

> *"CAD witness Schlissel brought to the Commission's attention a number of coal-fired projects cancelled within the past year because of increasing construction costs or the potential for federal regulation of GHG emissions…The Commission is aware of the groundbreaking nature of the Project and that some IGCC projects proposed around the country have been terminated for various reasons. By the same token, other IGCC projects are proceeding as planned and have obtained regulatory approval. This Commission, as do most regulatory bodies, has imperfect foresight, and 20/20 hindsight. It is impossible to anticipate every possible risk involved in a project of this scale. The Commission can only perform the assessment and evaluation requirement imposed on it by law. The Commission has done that, and it appears to the Commission's satisfaction that APCo has adequately considered the risks associated with the Project as demonstrated by its detailed analyses."*

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[90] Black & Veatch, *Energy Market Perspective Outlook*; "Overview of the National Association Regulatory Utility Commissioners Adapting to the 'New Normal'", page 10, February 24, 2012

[91] Public Service Commission of West Virginia Charleston, Case No. 06-0033-E-CN, Appalachian Power Company, dba American Electric Power, Commission Order on the Application for a Certificate of Public Convenience and Necessity for a 629 Megawatt Integrated Gasification Combined Cycle Electric Generating Station in Mason County, pages 24-25, March 6, 2008

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Q. Mr. Schlissel cites the cancellation of other proposed IGCC plant projects as evidence that IGCC was not a viable option in 2009, when MPC was planning the Kemper IGCC Project. He particularly cites four examples: Tampa Electric's Polk IGCC plant, Orlando Utilities Commission IGCC plant at Stanton, Excel Energy's IGCC plant in Colorado, and Tondu Corporation's plant in Texas.[92] **Are you familiar with these cancellations?**

A. Yes.

Q. Do you agree with Mr. Schlissel's assertion that MPC was imprudent in its decision to proceed with plans to construct an IGCC plant, despite the decisions by those other utilities to cancel their IGCC plants?

A. No. Pegasus-Global disagrees with Mr. Schlissel's assertion that MPC was imprudent either in being unaware of the reasons for those cancellations, many of which were cancelled simply out of an abundance of caution for environmental concerns or stringent regulatory requirements, or in pursuing construction of an IGCC plant in spite of cancellations of other plants. The assertions regarding plant cancellations made by Mr. Schlissel are ill-founded and lack an appreciation of the facts in the given situation, which it would appear he has chosen not to include in his assertion. Thus, though Mr. Schlissel references a number of IGCC plants that were cancelled, he does not explain the reasons why each plant was cancelled. He does not discuss the experience of the potential developer, whether the proposed plant was to be regulated and if regulated, whether there were any specific requirements that might affect the decision to go forward with the facilities. All of these aspects of plant cancellations would need to be investigated to determine if there is any relevance to the Southern Company/MPC Kemper IGCC Project circumstances. Mr. Schlissel failed to do this. MPC was clearly aware of the cancellations and the reasons behind them, and determined those reasons were not applicable to the Kemper IGCC Project.

[92] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket 2013-UA-189, page 23, March 14, 2014

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Q. In his testimony, Mr. Schlissel notes, *"The Orlando Utilities Commission announced in November 2007 that it was cancelling the coal gasification portion of a 285-megawatt IGCC plant at the Stanton Energy Center…The commission cited the impact of possible federal and state regulations related to future emissions restrictions in the state of Florida as the primary reason for terminating construction."*[93] Are you familiar with this issue?

A. Yes.

Q. What was the background to this cancellation and how did it relate to Southern Company?

A. First I should clarify, the Orlando Utilities Commission ("OUC") is not a Utility Regulator in the sense of the MPSC but rather is the second largest municipal utility in Florida serving 190,000 electric customers.[94] SCS entered into a joint venture agreement with OUC to build the Stanton IGCC Plant.[95] However, as Mr. Schlissel notes, the plant was cancelled in November 2007 due to uncertainty of the building of coal plants in Florida without CO_2 sequestration. The Stanton IGCC Plant would not have included CO_2 sequestration due to the lack of opportunity for disposal of the CO_2. Therefore, the plant did not go forward due to uncertainty with regard to environmental regulation, and the cancellation was not related to technology risk.

The Polk IGCC plant was most likely cancelled for the same reasons, being also located in Florida,[96] which placed it under the same regulatory conditions and similar lack of carbon sequestration options. Since SCS was in partnership with the utility constructing the Orlando gasification plant, MPC was of course keenly aware of the situation and considered those circumstances carefully in its planning of the Kemper power generation facility.[97] In response to the Florida situation, MPC was assured that it was feasible to incorporate CO_2 capture, and in the

[93] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, page 23, March 14, 2014
[94] http://www.ouc.com/about-ouc/facts-facilities
[95] MIT Carbon Sequestration Initiative, "Orlando Gasification Project Demonstration of a 285 MW Coal-Based Transport Gasifier", November 1, 2006
[96] Reuters, "Southern Co. scraps Fla. advanced clean-coal plant", November 14, 2007
[97] Southern Company Generation Presentation, "Kemper IGCC Update", pages 4-5, 9, April 1, 2008

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Kemper case there were viable disposal possibilities for disposal of CO_2 found during the FEED Study, prior to requesting certification. MPC's efforts during the FEED stage included investigating local geological storage as well as selling the CO_2 for use in deep oil extraction. This was a prudent tactic by MPC in its planning of the Kemper IGCC Project.

Q. Do you agree with Mr. Schlissel's view of importance of the cancellation of the Xcel and Tondu's IGCC Plants?

A. No, I do not. Mr. Schlissel attributes cancellations of the Xcel Colorado IGCC plant and the Tondu Texas IGCC plant to the higher than expected costs, and in the Tondu case, other concerns related to technology and construction risks. However, this is not supported by Mr. Schlissel's references. The source for the Tondu plant cancellation cited by Mr. Schlissel[98] makes no reference to technology or construction risks as the fundamental reasons for the cancellations and states only that the cancellation is based on the economics of Tondu's market. The article Mr. Schlissel references with regard to the Xcel Colorado plant[99] states the plant in Colorado was not cancelled, only deferred for several years. Further, the article states that there were several reasons the project was deferred including that costs that were higher than expected, and that the plant would provide more power than Xcel needed at that time. Moreover, the article quotes Xcel's CEO who states that after two years of studying IGCC technology, [Xcel] *is comfortable that what it found will work in the real world.*[100] Additionally, Mr. Schlissel fails to distinguish that MPC had the benefit of an in-house EPC firm that allowed for construction of the Kemper IGCC Project without the risk premium that would be faced by other utilities, such as Xcel.

Note that all the IGCC cancellations cited by Mr. Schlissel occurred in 2007. By late 2008 and 2009, when plans were proceeding for the Kemper IGCC Project, construction prices had

[98] http://www.reuters.com/article/2007/06/15/utilities-tondu-igcc-idUSN1526955320070615
[99] http://www.bizjournals.com/denver/stories/2007/10/29/daily26.html
[100] http://www.bizjournals.com/denver/stories/2007/10/29/daily26.html

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decreased.[101] MPC planned and estimated the Kemper IGCC Project based on then current construction prices and those costs were incorporated into its 2009 decision to proceed with an IGCC plant. MPC prudently considered the issues other entities had as reasons for cancellation, planned for them, and incorporated the costs into its decision-making.

1. TRIG™ TECHNOLOGY

Q. Have you reviewed and are you familiar with the testimony of the Sierra club's witness Mr. Schlissel, the Staff's witness BREI, and the MPSC's witness URS with respect to MPC's decision to use TRIG™ technology for the Kemper IGCC Project?

A. I have and I am.

Q. Do you agree with the general conclusions of those witnesses that MPC understated the cost risk associated with the TRIG™ technology decision and that MPC understated the risk associated with ramping up TRIG™ technology in a FOAK commercial power plant, and as a consequence failed to understand its complexities and how this combined with a fast-track project execution led to increased costs and delays to the Project[102,103,104]?

A. No. In response to these witnesses' conclusions, I have chosen to respond systematically, providing my Rebuttal Testimony as follows:

- TRIG™ Technology;
- FEED Study;
- Decision for CO_2 Capture on the Project; and
- FOAK Technology

To the extent specific allegations have been made by Mr. Schlissel in these areas, I have noted the specific allegation and provided my response thereto.

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[101] http://www.power-eng.com/articles/print/volume-113/issue-8/departments/startup/power-plant-construction-costs-fall-index-shows.html
[102] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, pages 2-4, March 14, 2014
[103] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, pages 5, 9, March 19, 2014
[104] URS Corporation, IM Prudence Report, page 15, March 7, 2014

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Q. Was MPC's decision to rely on TRIG™ Technology for the Kemper IGCC Project reasonable and prudent?

A. Yes. MPC's decision to rely on TRIG™ technology for the Kemper IGCC Project was reasonable and prudent. MPC based its decision to use TRIG™ technology on independent evaluations that concluded it was the best gasifier option available at the time. In addition, TRIG™ had been developed over an extended period by SCS in cooperation with others. As SCS was a technology holder and an affiliated company, MPC would have the support of the technology holder during project design development, plant start-up and plant operation.

Q. Please provide a brief description of TRIG™ and its application to the Kemper IGCC Project.

A. Coal gasification has a long history, starting as early as the early 1800s in England and the U.S., primarily for the conversion of coal to town gas for lighting and home heating. The gasification process produces "synthesis" gas, referred to as "syngas," which is mainly hydrogen ("H_2") and carbon monoxide ("CO"). In addition to heating and lighting uses, syngas can be burned to generate electricity in a conventional power plant, which is what IGCC is.

There are two primary elements to the Kemper IGCC Project, the Gasifier Island ("GI") and the Combined Cycle Island ("CC"). The purpose of the CC Island is to convert syngas from the GI into electricity. The primary components of the CC Island are two combustion turbines designed specifically to operate on the syngas produced in the GI, two HRSGs and a conventional steam turbine. The purpose of the GI is to produce syngas from locally mined lignite coal. The heart of the Kemper GI is the TRIG™ technology. The TRIG system consists of two Transport Gasifiers and the associated coal feed and ash handling systems.[105] The GI also contains the gas clean up system, compressed air system, CO_2 capture system, and the systems to separate other saleable byproducts (*e.g.* sulfuric acid and ammonia).

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[105] Southern Company Generation, Front End Engineering Design Report for the Kemper County Integrated Gasification Combined Cycle, pages 8-10, August 26, 2009

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The TRIG™ technology[106] relies on the Transport Gasifier, which is based on well-established Fluid Catalytic Cracking ("FCC") technology utilized in the petroleum industry for nearly 70-years. The TRIG™ technology was developed by SCS in cooperation with the DOE and KBR over more than a decade at the PSDF in Wilsonville, Alabama.

Q. Why was the TRIG™ technology chosen for the Kemper IGCC Project?

A. As discussed and debated extensively in prior proceedings, MPC's decision to build Kemper as an IGCC plant was based on a number of considerations, including the need for additional generation capacity; new generation located away from the gulf coast; and to align with the industry recommendation of a pronged approach to diversify fuel source away from natural gas and the associated volatile pricing. [107] MPSC agreed with this decision in its Final Order on Remand of April 2012.[108]

Having made the decision to build Kemper as an IGCC plant, TRIG™ technology was selected as MPC determined it was the best alternative gasifier for power generation, particularly when fueled with Mississippi lignite. The primary benefit of the TRIG™ design is its unique capability to economically and effectively use low rank, abundant, high-moisture, and stable priced fuels such as lignite.[109] The ability to fuel the plant with the large quantity of locally available Mississippi lignite was an important factor in the decision to use TRIG™ as it fulfilled MPC's goal to diversify its power generation fuel source portfolio.

Also, whereas most coal gasifiers are based on oxygen blown technologies, the TRIG™ technology is based on an air blown gasifier, which provides many advantages over the oxygen

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[106] Southern Company Generation, Front End Engineering Design Report for the Kemper County Integrated Gasification Combined Cycle, pages 8-10, August 26, 2009

[107] Mississippi Power Company, Testimony, Docket No. 2009-UA-014, Petition for Facility Certificate, January 16, 2009

[108] Mississippi Public Service Commission, Final Order on Remand Granting a Certificate of Public Convenience and Necessity, Authorizing Application of Baseload Act, and Approving Prudent Pre-Construction Costs, Docket No. 2009-UA-014, page 131, April 24, 2012

[109] Phase 2 Direct Testimony of Larry S. Monroe and Randall E. Rush, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, page 5, December 7, 2009

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blown gasifier for power generation. In particular, due to the low gasifier operating temperature, the ash does not melt and slag as happens in other gasifier technologies that operate at higher temperatures.[110] The result of slagging is that the interior of the gasifier becomes coated with vitrified coal ash and must be replaced at frequent intervals. The refractory in the TRIG™ gasifier, on the other hand, remains slag-free and can be replaced at much longer intervals, reducing the plant down time as well as the costs associated with refractory replacement.

Q. Were other IGCC alternatives evaluated?

A. Yes. In 2006, SCS performed "commercial design studies" in collaboration with EPRI, National Energy Technology Center and KBR to investigate the relative costs and benefits of oxygen-blown versus air-blown gasification and other aspects of gasification.[111] In addition, the 2007 ScottMadden Kemper County IGCC Project Risk Analysis compared the TRIG™ technology with five other commercially available gasifiers, which identified the advantages of the TRIG™ gasifier.[112] The results of these studies showed that for the production of power and with gas clean up and carbon capture, the air-blown system provided lower capital and operations and maintenance ("O&M") cost.

Q. Can you provide background on SCS's experience with the development of TRIG™ technology?

A. SCS has been working jointly with DOE and KBR on the development of the TRIG™ technology since the mid-1990s, initially supported under the Energy Policy Act of 1992.[113] The primary efforts on the development of the TRIG™ technology for a wide range of applications have been the testing programs at the PSDF in Wilsonville, Alabama.[114] The PSDF was established in 1990

[110] Presentation to the Southern Company Board of Directors, "Overview of Coal Gasification and TRIG™ Technology Risk and Management at Plant Ratcliffe", February 15, 2011
[111] International Pittsburgh Coal Conference, Update of Six TRIG™ Studies, September 25-28, 2006
[112] ScottMadden, Kemper County IGCC Project Risk Analysis, July 19, 2007
[113] 102nd Congress H.R. 776 – Energy Policy Act of 1992
[114] http://www.nationalcarboncapturecenter.com/PSDF/research.html

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to lead the United States' effort to develop cost-competitive, environmentally acceptable, coal-based power plant technologies. The PSDF has been supported by the DOE since 1990.[115]

The PSDF is an engineering scale demonstration facility, and includes key components of a TRIG™ system including a KBR Transport Gasifier, a Siemens Particulate Control Device ("PCD"), syngas cooling and high pressure solids handling systems. These components are designed at sufficient size to provide data for commercial scale-up of the transport reactor and the integrated systems including the coal feed, ash handling, and gas clean-up systems.[116] Work at the PSDF focuses specifically on identifying ways to reduce capital cost, enhance equipment reliability and increase efficiency while meeting strict environmental standards. Testing at the PSDF has involved investigation of pressurized feed systems, coal gasifier optimization using a variety of fuels, sensor development, hot ash particulate removal and syngas cleanup. The reliable operation of the integrated components allows the PSDF to support additional testing of advanced gas cleanup, including low-cost CO_2 capture.

Development of the TRIG™ technology was based on a series of PSDF test programs that began in 1996. The initial PSDF testing program was in combustion mode, meaning it burnt the fuel (coal), and included commissioning of the Transport reactor and the study of filtration of the exhaust gases.

In 1999, the Transport Reactor was reconfigured for gasification operation, that is, the generation of gas from the fuel for combustion in a combustion turbine for electricity generation. Gasifier operation began in September 1999 in air blown mode.[117] Through July 2008, the PSDF completed four different gasification commissioning tests,[118] each lasting nominally 250 hours

[115] DOE Project ID: DEPFC21-90MC25140
[116] Power Systems Development Facility Presentation, January 26, 2000
[117] "Development Status of the Transport Gasifier at the PSDF", Gasification Technologies 2001, October 7-10, 2001
[118] PSDF Technical Progress Report Gasification Test Run GCT1, September 9-December 15, 1999; PSDF Technical Progress Report Gasification Test Run GCT2, April 10-27, 2000; PSDF Technical Progress Report

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and twenty gasification test campaigns, for a total of approximately 11,500 hours of coal gasification operation.[119] The work and testing at the PSDF was undertaken through collaborations with well-regarded industry partners, such as EPRI, KBR, the Lignite Energy Council, Siemens Power, Peabody Energy and the DOE.

In early 2006, changes to the gasifier design were made. These changes provided a new, more robust solids separation system, a larger diameter riser in the gasifier, and replacement of approximately 85% of the gasifier refractory liner. The primary goals of these changes were to improve solids collection efficiency, increase the residence time in the gasifier to increase the carbon conversion and syngas heating value, and to test a solids collection system better suited for commercial operation.[120] Following these gasifier changes the testing program continued through to mid-2008, with the final test in this period, Test Campaign 25, completed in July and August 2008. [121]

Since 2008 the facility has been operating as the National Carbon Capture Center ("NCCC") focusing on the investigation of carbon capture.[122]

Q. Did SCS and MPC reasonably use the PSDF testing program in its decision to pursue the Kemper IGCC Project?

A. Yes. The PSDF testing program, from the commissioning of the gasifier to the completion of the testing program in August 2008, was the primary basis for the design of the Kemper gasifier and associated systems and in particular the coal feed systems and ash handling system. Following the gasifier changes of early 2006 and the initial commissioning test campaign, all of the test campaigns were in the air-blown mode (*i.e.* the Kemper mode). Additionally, two tests were

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Gasification Test Run GCT3, December 1, 2000-February 1, 2001; PSDF Technical Progress Report Gasification Test Run GCT4, March 7-30, 2001

[119] Southern Company Services, Inc., Power Systems Development Facility – Final Project Report, page 1-6, April 2009

[120] "Development Status of the Transport Gasifier at the PSDF", Gasifier Technologies 2001, October 7-10, 2001

[121] Southern Company Services, Inc., Power Systems Development Facility – Final Project Report, page 1-7, April 2009

[122] National Carbon Capture Center at the PSDF, DE-NT0000749Topical Report Budget Period One, October 1, 2008 - November 30, 2009

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fueled with Mississippi lignite coal, the Kemper fuel. Other tests in this series used a variety of coals including PRB coal, Utah subbituminous coal, biomass and other sources of lignite coal. It is the success of this PSDF testing campaign, on which SCS developed confidence in the reliability of the Kemper gasifier and associated gasifier systems.

Though the PSDF Kemper-focused testing program was completed in August 2008, and the PSDF shifted focus to the NCCC study on capture of CO_2, the PSDF testing programs continued to benefit the Kemper IGCC Project design through the continued operation of the coal feed and ash handling systems.

Q. In addition to the PSDF testing program did SCS undertake other studies performed based on the PSDF experience in order to understand the risks of the FOAK technology?

A. Yes. In September 2006, SCS in conjunction with EPRI, NETC and KBR developed six conceptual commercial plant designs based on a Transport Gasifier combined cycle plant using PRB coal, the purpose of which was to guide future tests and commercialization of the technologies at the PSDF and investigate the relative costs and benefits of oxygen-blown versus air-blown gasification, of stack gas or syngas cleanup, as well as the impact of CO_2 capture.[123] This analysis confirmed the optimal configuration for power production without carbon dioxide capture included air-blown gasification and cold syngas cleanup. Air blown gasification was also shown to be preferable when carbon dioxide is captured in a TRIG™ combined cycle system. Thus, prior to MPC's decision to consider a TRIG™ based IGCC plant for its future generation program, the PSDF test program and commercial design studies had demonstrated the technical and commercial viability of the TRIG™ based Kemper IGCC Power Plant.

2. FEED STUDY

Q. At page 44 of his testimony Mr. Schlissel raises the question, "*Shouldn't the fact that Mississippi Power had prepared a detailed FEED Study for the Kemper IGCC Project have*

[123] Power Systems Development Facility Update on Six TRIG™ Studies, International Pittsburgh Coal Conference 2006, page 3, September 25-28 2006

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***given MPC the confidence a reasonable utility would require that the Project would not experience any significant capital cost increases?”* In response, Mr. Schlissel opines, *“No. Duke Energy Indiana prepared a FEED Study for the Edwardsport Project before it sought certification from the Indiana Utility Regulatory Commission. Yet that Company, which also had an excellent track record and reputation in building new power plants, ran into unanticipated problems that led to a 26 percent increase in the estimated cost of the Edwardsport IGCC Project in less than two years of construction.”* Would you agree with Mr. Schlissel’s observations regarding the Edwardsport FEED Study and the subsequent Kemper IGCC Project cost increase?**

A. I do agree with Mr. Schlissel’s general comments that there were cost increases on the Edwardsport IGCC Project, however he is incorrect in stating that DEI prepared the FEED study for the Edwardsport IGCC Project, it was in fact prepared by GE and Bechtel. Additionally, I do not know why Mr. Schlissel introduced such a discussion in his Kemper IGCC Project testimony. As I discuss later in my Rebuttal Testimony in **Section VII**, the two plants are quite different and the circumstances surrounding the two plants are quite different.

Q. Mr. Schlissel responds to *“Did the fact that Duke Energy Indiana had prepared a detailed FEED study protect that Company against significant increases at Edwardsport?”* with *“No.”* What do you understand to be the point of this part of his testimony?

A. As I previously stated, DEI did not prepare the FEED study for the Edwardsport IGCC Project, this was completed by GE and Bechtel. Although I do not understand the point Mr. Schlissel attempted to make by raising this point, it is my experience and opinion that no experienced organization, committee or company would consider implementing a project even half the cost of Kemper or Edwardsport without first performing a FEED evaluation, conceptual design or something similar upon which it could develop a cost estimate, determine its viability, and

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evaluate the economics of alternatives. As I have testified earlier in my Supplemental Direct Testimony,[124] this a fundamental purpose of the FEED.

Q. Has Pegasus-Global formed any general opinions in response to the assertions or theories asserted by URS and Mr. Schlissel relative to the FEED Study?

A. Yes. After a review and evaluation of the report testimony submitted by URS and Mr. Schlissel, respectively, within the context of the full Kemper IGCC Project, Pegasus-Global concluded that:

1. The Project Development Plan ("PDP") and basic design were completed as contemplated under the FEED agreement;
2. MPC did not mismanage the FEED process;
3. The level of design completed at the end of the FEED was within industry practice and served as a reasonable basis upon which MPC made decisions to move forward;
4. The post-FEED work was performed as would be expected in the industry to prepare for detailed design; and
5. MPC acted consistent with good utility practice in its review of the KBR and SCS estimates and in its development of the CPCN estimate for the Kemper IGCC Project.

Q. What is the purpose of a FEED study?

A. FEED programs are generally intended to define the work required to produce process and engineering documentation of sufficient quality and depth to adequately define the project requirements, establishing a basis for detailed engineering and design, procurement, and the construction phases of the project, and to support a project cost estimate and summary project schedule. This process is focused on developing a conceptual design and a FEED study is not intended to be used to award construction contracts for the project, nor would a FEED study have sufficient detail for the purchase of equipment or materials. The purpose of a FEED study is to provide the basis for these activities and address the requisite steps once the project is approved.

[124] Supplemental Direct Testimony of Dr. Patricia D. Galloway, On Behalf of Mississippi Power Company, Docket 2013-UA-189, page 33, December 14, 2013

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A prime driver for this approach with major projects is to minimize expenditures prior to project feasibility demonstration and project approval.

The key components of a FEED study are the development of: conceptual Process Flow Diagrams ("PFDs"); plant layout and General Arrangement drawings; Piping & Instrument Diagrams ("P&IDs"); design specifications; Heat and Material Balance ("HMB") calculations; Major Equipment Lists; Line Lists; instrument lists and other necessary documentation required to define the basis of the project execution; estimated quantities of construction commodities including excavation, concrete, steel, piping, electrical cables, etc.; and instrumentation requirements for the control and monitoring of the functioning project. Collectively, these data provide a basis to determine the cost of the project and allows for the development of an implementation schedule and project execution approach. Additionally, a FEED study includes data on the O&M of the project and efficiencies of the facility, all of which contributes to the development of the O&M costs for the life of the project. The output from a FEED study contributes to the owner's ability to determine the economic viability of the project prior to significant expenditures.

Q. Was the FEED Study performed under an Agreement with SCS and KBR?

A. Yes. In support of the Kemper IGCC Project SCS entered in to a FEED Agreement with KBR, effective May 9, 2007. KBR had been cooperating with SCS in the development of TRIG™ technology since the early 1990s.[125] KBR is an experienced technology-based engineering and construction contractor with extensive experience in synthesis gas production and, along with SCS, it designed the Transport Gasifier Technology. KBR worked with SCS at the PSDF to advance its development, providing process analysis and equipment design services. The SCS-

[125] Front End Engineering and Design Services Agreement between Southern Company Services, Inc. and Kellogg Brown & Root LLC, Exhibit D, Memorandum of Agreement, May, 9 2007

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KBR FEED Agreement defined the role and scope of services KBR was to provide.[126] Specifically, KBR was to act as an independent contractor with the responsibility for design of the GI with input from SCS including: coal preparation; particulate filter systems; solids removal designs; gas analysis; and control system philosophy.

Exhibit D to the SCS-KBR FEED Agreement is a Memorandum of Understanding ("MOU") dated June 2004, states that:[127]

> *"…provided for delivery to SCS of KBR know how and technology for use and evaluation in Hot Gas Cleanup Test Facilities at Wilsonville, Alabama ('the Project') which was subsequently expanded and renamed 'The Power System Development Facility' ('PSDF') under cooperative Agreement No. DE-FC21-90MC25140 (hereinafter referred to as the 'Contract') between SCS and the U.S. Department of Energy ('DOE')."*

SCS's Kemper FEED responsibilities included the design of the CC and the BOP, overall responsibility for project management and design basis, and input to the design of the GI.

Within SCS, the Gas Technology group served as both owner and engineer for the FEED of the GI, representing MPC's "owner" interest in obtaining a successfully integrated process design while also acting as "engineer" through daily, on–going oversight of KBR's design activities. It was Gasification Technology's role to "ensure a consistent design throughout" by taking the lead in developing the design basis for each system while verifying the operating requirements were accurately captured in the equipment load sheets.[128]

The FEED was developed in two phases:[129]

[126] Front End Engineering and Design Services Agreement between Southern Company Services, Inc. and Kellogg Brown & Root LLC, Exhibit A, FEED Scope of Work, May, 9 2007
[127] Front End Engineering and Design Services Agreement between Southern Company Services, Inc. and Kellogg Brown & Root LLC, Exhibit D, Memorandum of Agreement, page 1, May, 9 2007
[128] Mississippi Power Company, Response to URS RFI 2-135, April 25, 2012
[129] Front End Engineering and Design Services Agreement between Southern Company Services, Inc. and Kellogg Brown & Root LLC, Exhibit A – Scope of Work, May, 9 2007

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- Phase I involved the development of process configuration, including PFDs and base case HMB.
- Phase II was to complete the FEED and cost estimate, which included all major equipment, estimated bulk materials, direct material adders, subcontracts, construction contracts, engineering and indirects.

The nature and intent of a FEED study is that design will invariably evolve as the study progresses and the Kemper FEED Study was no different in this respect. The FEED progress was impacted by a number of evolving issues. In March 2008, SCS approved the KBR FEED Agreement Letter Change Order No. 1 for additional work due to an update in coal composition and to incorporate sulfuric acid extraction and collection into the process.[130] In December 2008, Change Order No. 2 was issued which extended the term of the Agreement to terminate February 27, 2009,[131] and on February 23, 2009 Change Order No. 3 modified the term completion to June 30, 2009, and set the "not to exceed" amount at $13,512,000.00.[132]

Q. What was the starting point for the FEED Study?

A. The starting point for the FEED Study, in addition to the PSDF facility, was the work performed for the Orlando gasification project. SCS, the OUC and KBR were committed to the construction of a 285 megawatt coal gasification facility near Orlando, Florida, also based on TRIG™ technology. The Orlando gasification project was in part to be funded as a DOE Clean Coal Power Initiative.[133] This project, based on the KBR proprietary Transport Coal Gasifier and TRIG™ Technology, was to use PRB coal.[134] While there are many differences between the

[130] Southern Company Services, Inc. and Kellogg Brown & Root LLC, Change Order Number One for the FEED Agreement, March 13, 2008
[131] Southern Company Services, Inc. and Kellogg Brown & Root LLC, Change Order Number Two for the FEED Agreement, December 9, 2008
[132] Southern Company Services, Inc. and Kellogg Brown & Root LLC, Change Order Number Three for the FEED Agreement, February 23, 2009
[133] "Demonstration of a Coal-Based Transport Gasifier", April 2009
[134] Process Description (Gasifier Island) for the Southern Company Services Orlando Gasification Project, January 23, 2007

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Kemper IGCC Project and the Orlando gasification project, including the type of coal, plant power capacity, and the lack of CO_2 capture, the Orlando FEED Study, completed by SCS prior to the start of the Kemper FEED Study, provided a sound basis for the Kemper FEED Study, which MPC reasonably used as part of its planning for the Kemper IGCC Project.

Q. What aspects did the Kemper FEED Study include?

A. The FEED Study provided preliminary plant data for a 2x1 Integrated Gasification Combined Cycle facility, including the BOP equipment and the cost estimate of approximately $2.4B ($2,342,300.00). A major portion of the FEED Study was related to plant process descriptions, design basis and design specifications. Other major aspects of the report included: EPC Strategy (6.0); Construction (6.3 and Appendix S); Major EPC Milestones (6.6 and Appendix T); EPC Cost Estimate (7.0 and Appendix V); O&M (8.0); and a Project Risk Assessment (9.0 and Appendix AB). Appendices to the FEED Study include PFDs, P&IDs, plant layout and general arrangement drawings, MHB, equipment and line lists.

Q. What was the purpose of the Phase I of the FEED Study?

A. Phase 1 involved the development of the process configuration including PFDs, base case HMBs, but did not include the P&IDs as Phase I did not include a cost estimate.

Q. What was the purpose of the Phase II of the FEED Study?

A. Phase II of the FEED Study further developed the conceptual design established during Phase I, and addressed major design issues brought about by such issues as change in coal properties, the addition of carbon capture, and the change in the combustion turbine ("CT"). Another issue significantly impacting the FEED design was the variability of the lignite heating value, moisture content, sulfur and ash content, which created design challenges throughout the plant, but

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particularly in the coal preparation and feed, particulate collection and ash removal, sulfuric acid and sour water systems.[135]

More detailed engineering drawings and documents were developed which resulted in P&IDs. The P&IDs were the cornerstone of the engineering drawing set and defined the overall design of the facility. The key drawings and document deliverables generated and reviewed during Phase II included:

- Update of PFDs and HMBs
- Process Design Packages
  - Design Data
  - Process Description
  - Battery Limit Conditions
  - Update PFDs
  - Update MHB
  - Emissions/Effluent Summary
- System and Control Packages
  - Process P&IDs
  - Piping Specialty Data Summary
  - Relief Valve Data
  - Index of Piping Material Classes
  - Instrument Data Summary
  - Piping Line List
- Engineering Package
  - Equipment List
  - Process Engineering Datasheets

[135] Department of Energy, "Kemper County IGCC™ Project Preliminary Public Design Report", page 6, June 30, 2012

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  - Preliminary Layout
  - Preliminary 3 D model
  - Electric Motor List
  - Electrical Single Line Diagrams ("SLDs")
  - Preliminary Utility Summary
  - Chemicals and Catalyst Summary
- Cost Estimating and Procurement
  - Long Lead Item List
  - Equipment Purchase Payment Schedule
  - Cost Estimate

Other FEED deliverables included a Project Execution Plan ("PEP"), a preliminary project schedule. The engineering drawings served as the basis from which the CPCN estimate was developed.

Q. Did the Kemper FEED Study meet the generally accepted definition and objectives of a FEED for a large, complex project such as the Kemper IGCC Project?

A. Yes. The Kemper FEED Study met the intent of a FEED study as defined within the process industry, for a large and complex project. In particular, the outputs of the FEED Study, as discussed above, provided basic design documentation for design and procurement of the Project; detailed description of all major systems; component and equipment lists; and an estimate of construction commodities, which together provided a basis for development of the estimated cost for construction of the Project. In addition, a basis for estimating the O&M costs for the life of the Project was provided and a calculated Plant MW output to the grid. All of these provided MPC with the bases to evaluate the viability of the Kemper IGCC Project and the economics of the Project in comparison to alternative generation sources.

Specifically the FEED Study provided:

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- Section 2.0 – Location and Site Layout defined the site layout, overall site parameter and location of major structure and facilities;
- Section 3.0 – Process Description Summary, described the various systems (24 plant systems);
- Section 4.0 – Design Basis and System Design Specifications, which established the design basis for plant design;
- Appendix A included General Arrangements of the major structures and equipment;
- Appendix K (Process Flow Diagrams);
- Appendix L (Piping and Instrumentation Diagrams);
- Appendix M (Equipment List—major equipment);
- Appendix N (Line Lists—major pipe line, with pipe type size etc.); and,
- Appendix O – (Piping Specifications).

These FEED Sections and Appendices defined the plant and the bases for development of construction commodity quantities on which the plant capital cost estimate, schedule and execution approach were determined.

In addition to the basic engineering and conceptual designs, the Kemper FEED Study also included other documentation of studies that were completed during the FEED, which, in many cases are the basis for Kemper engineering and conceptual designs of the FEED. Other important FEED Appendices included: Appendix G (Plant Performance); Appendix S (Construction); Appendix T (Schedule, for the engineering, procurement, construction and start-up of the project); Appendix U (Permits, which provided a summary of permits required and status); Appendix V (EPC Cost Estimate); and Appendix Z (Technology Risk Assessment, in recognition that certain aspects of the Kemper plant are new technology. In addition, this Risk Assessment addressed many aspects of the plant.)

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Q. Was MPC's reliance on the FEED Study for its use in its CPCN application to the MPSC and its recommendation to the MPC Board consistent with good utility practice?

A. Yes. The FEED Study built on the work that had been conducted at the PSDF and the Orlando project. SCS was directly involved with the FEED Study and MPC monitored and managed the FEED Study through monthly meetings and review of monthly reports prepared by KBR. The detail included in the calculations and drawings of the FEED Study were sufficiently comprehensive and complete for the intended purpose, which was to establish a basis to develop a Project scope, cost estimate and schedule, which, in turn, served as the basis for the CPCN estimate. Based on the information and knowledge that MPC had at the time of the CPCN filing, MPC exhibited good utility practices in its reliance on the FEED Study, and it served as a reasonable basis for detailed design, procurement and project execution. In addition, it provided information upon which MPC reasonably relied in order to evaluate the viability of the Kemper IGCC Project in conducting its economic viability analyses. The Kemper FEED Study appendices included the various analyses and studies performed in support of the FEED design, schedule, cost estimates and other important aspects of the Project such as construction and risk assessments performed.

Q. Have other independent entities reviewed the Kemper FEED Study?

A. Yes. The August 2009 Kemper FEED Study has been reviewed by a number of independent organizations. B&V performed a Readiness Review in February 2010, on behalf of SCS.[136] The IMs have also reviewed the FEED study. URS commented on the FEED Study in its Due Diligence Report, April 29, 2011,[137] and BREI commented on the FEED Study in its Independent Engineer Due Diligence Report, January 6 2012.[138]

[136] Black & Veatch, Kemper County IGCC Project Readiness Review, pages 5-6, February 26, 2010
[137] URS Corporation, Kemper IGCC Project Due Diligence Report, page 2, April 29, 2011
[138] Burns and Roe Enterprises, Inc., Independent Engineering Due Diligence Report, page 250, January 23, 2012

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Q. Did the IMs and others that reviewed the Kemper IGCC FEED Study express opinions that the FEED met the generally accepted industry standards for a FEED study?

A. Yes. The IMs reviewed the Kemper FEED Study, and while they had observations and recommendations with respect to the FEED Study, generally they found that the study was appropriate conducted, and it included the appropriate information, fulfilling MPC's needs. In addition, the IMs found that the FEED Study served as a reasonable basis on which MPC could determine the viability of the Kemper IGCC Project. This was also the opinion of the MPSC which noted:[139]

> *"…the Company's FEED Study efforts exceed the level of detail that is typically undertaken in certificate proceedings."*

BREI issued its January 6, 2012 due diligence report three years after the FEED was complete in November 2008 and 28 months after the FEED Study Report was issued in August 2009. It therefore had the benefit of hindsight as engineering was approaching 70% and construction was 17% complete. In its report to the Staff, BREI noted: *The Project, as configured, has been thoroughly conceived and planned.*[140] As such, the FEED Study provided MPC a reasonable basis on which to proceed with the detailed design, provided a sound basis for development of the cost estimate, and outlined the Project execution approach. BREI also noted, *Development, engineering, procurement activities and permitting have progressed to a degree of completeness consistent with a project at this stage of development.*[141]

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[139] Mississippi Public Service Commission, Final Order on Remand Granting a Certificate of Public Convenience and Necessity, Authorizing Application of Baseload Act, and Approving Prudent Pre-Construction Costs, Docket No. 2009-UA-014, page 61, April 24, 2012

[140] Burns and Roe Enterprises, Inc., Independent Monitor's Baseline Report, Final Report-Revision 1, page E-7, June 21, 2012

[141] Burns and Roe Enterprises, Inc., Independent Monitor's Baseline Report, Final Report-Revision 1, page E-7, June 21, 2012

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Finally, in its February 2010 Kemper County IGCC Project Readiness Review, commissioned by SCS, B&V stated:[142]

> *"B&V finds that SCS has completed significant effort in preparing for the execution of the Kemper County Project and as a consequence is well prepared to begin the detailed design phase of the project. SCS also has the requisite procurement processes and procedures in place to carry out and manage the procurement phase of the Project."*

In this same section of the report B&V further opined:[143]

> *"In general, the review indicated that the engineering necessary for this stage of the Project is complete. The engineering activities completed to date well support SCS's ability to proceed promptly into subsequent stages of design. At this time, the conceptual design is essentially complete and the necessary documents and design criteria which affect the Project and will guide the design process in order to allow the Project to proceed into detail design are substantially in place. …The engineering activities and deliverables that are particularly well advanced for this stage of the project include the following:*
>
> - *The Front End Engineering Development Study (FEED)*
> - *The Piping & Instrumentation Diagrams (P&IDs)*
> - *The Process Flow Diagrams*
> - *The Electrical ONE-LINE Diagrams*
> - *Control system preparation*
> - *3-D model for space control"*

B&V also offered opinions on other aspects of the Project's readiness including procurement, cost estimating, schedule development and project controls.

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[142] Black & Veatch, Kemper County IGCC Project Readiness Review, page 1-3, February 26, 2010
[143] Black & Veatch, Kemper County IGCC Project Readiness Review, pages 1-3, 1-4, February 26, 2010

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In addition to the opinions of these international engineering contractors on the adequacy of the FEED Study, it was a topic of debate during the Phase I and II testimony and hearing in the Final Order on Remand granting a CPCN:[144]

> "*By way of example, the FEED included conceptual design for the gasification island and other items such as the cooling towers and coal handling equipment, process flow diagrams, equipment specifications and foundation designs and layouts. The FEED study represents comprehensive effort by the Company, utilizing expertise in numerous specialty areas such as chemical, mechanical, electrical, and civil engineering as well as construction layout and process design…As stated earlier, the quality of the estimate based on a FEED Study is higher than that normally presented at the certification stage*"
>
> *The Company was the only party that produced detailed evidence as to the cost of the Project…The cost estimate was developed through the FEED study, through various bid solicitations for major components of the Plant and through the experience of the Company and SCS. …Other parties questioned the level of accuracy of that can be expected from a FEED Study in general, but no party presented any evidence to suggest the Company's FEED Study was flawed.*
>
> *…Given the limited activities that a utility is authorized to do prior to receiving a certificate, it is generally unreasonable to expect the Company to produce, at this stage, a more detailed or accurate estimate.*"

Q. Do these additional third party reports confirm Pegasus-Global's finding that the FEED Study provided a reasonable basis upon which MPC could reasonably prepare its CPCN estimate and proceed with the Project?

[144] Mississippi Public Service Commission, Final Order on Remand Granting a Certificate of Public Convenience and Necessity, Authorizing Application of Baseload Act, and Approving Prudent Pre-Construction Costs, Docket No. 2009-UA-014, pages 61, 116-117, April 24, 2012

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A. Yes. Pegasus-Global concluded from its review of these BREI and B&V reports discussed above, that these experienced international engineering contractors are also of the opinion that the Kemper FEED met normal industry standards and provided the basis for the development of detailed design, procurement, project execution strategies and project cost estimate, and therefore, provided MPC with a sound basis for evaluating the viability of the Kemper IGCC Project.

Q. Were FEED expenditures authorized for recovery through the rate structure prior to being incurred?

A. Yes, MPC authorized the Kemper FEED after MPSC authorized MPC recovery of certain pre-construction costs related to the evaluation of new generation. Ultimately, the MPSC found that $46M of the pre-construction costs, including those related to the Kemper FEED Study, were reasonable and prudent and allowed for recovery.[145]

3. DECISION FOR CO_2 CAPTURE ON THE PROJECT

Q. Can you discuss the evolution of CO_2 Capture on the Project?

A. Yes. The first phase of the FEED, completed in November 2007, incorporated no CO_2 capture into the design. Because of the changing environmental regulations in the U.S. at the time, MPC made the decision to incorporate carbon capture into the Kemper design. A primary driver to MPC's decision to study the opportunities for CO_2 capture at Kemper was the cancellation of the Orlando Stanton IGCC Project as the result of uncertainty about the State of Florida's regulations on greenhouse gas emissions and the lack of opportunity to sequester CO_2. Unlike the Kemper IGCC Project, where there is a market for CO_2 in enhanced oil recovery, similar opportunities did not exist in Orlando. The Stanton Plant was the fourth coal plant in Florida to be cancelled in 2007.[146] The situation in the State of Florida was illustrative of the changing regulatory attitude to coal plant CO_2 emissions. Some of the CO_2 legislative proposals going through Congress at

[145] Mississippi Public Service Commission, Final Order on Remand Granting a Certificate of Public Convenience and Necessity, Authorizing Application of Baseload Act, and Approving Prudent Pre-Construction Costs, Docket No. 2009-UA-014, page 125, April 24, 2012

[146] Reuters, "Southern Co. scraps Fla. advanced clean-coal plant", November 14, 2007

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that time included the Lieberman-McCain, Feinstein, Sanders-Boxer, Kerry-Snow, Bingaman-Specter, Oliver-Gilchrist and Waxman proposals, all with differing conditions and varying requirements.[147]

Once MPC made the decision to include carbon capture in its design, MPC conducted a study to evaluate technologies for removal of CO_2 from syngas. As discussed in Appendix D to the Kemper FEED Study, initially 25% CO_2 capture was investigated, which was based on removing the inherent CO_2 in the syngas. From late 2007 to early 2008, SCS/KBR studied the viability of removing greater percentages of CO_2, from 25% to 50%, to match the California standard which was considered at the time to be the most probable level of future nation-wide regulation.[148] Increasing CO_2 capture to 65% was then investigated, which would allow MPC to obtain DOE funding and IRS Tax credits along with a desire to minimize the carbon footprint of the plant to be similar to a natural gas fired facility. At the 65% level, it would also be viable for MPC to take advantage of the sale of CO_2.[149]

Q. Did MPC make a decision to increase the level of carbon capture from 25% to 65%?

A. Yes. Ultimately, MPC decided to include 65% CO_2 capture in the base Kemper IGCC Project design, which was outlined in MPC's Record of Decision ("ROD") 8, dated June 18, 2009, noting:[150]

- Natural Gas Equivalent (greenhouse gases)
- Better economics (compared to 50%) in \$10-\$20 carbon taxes scenarios
- Allows retention of Phase I ITC and pursuit of Phase II ITC
- Recognizing some engineering rework to go to 65%; 2-3 months if decision made today.

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[147] ScottMadden, Kemper County IGCC Project Risk Analysis, page 8, July 19, 2007

[148] The California Standard was the only standard on CO_2 capture in 2008 and therefore considered a reasonable basis for future Federal CO_2 capture regulation

[149] Mississippi Power Company, Record of Decision ROD-8, Phase II ITC Presentation Final, page 22, June 18, 2009

[150] Mississippi Power Company, Record of Decision ROD-8, Phase II ITC Presentation Final, page 21, June 18, 2009

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Q. Were there effects of increasing the level of carbon capture from 25% to 65%?

A. Yes. The primary effects of the change from 25% to 65% Carbon Capture included:

- Addition of the Water Gas Shift Reaction Phase;[151]
- Addition of UOP's Selexol technology for acid gas removal as the most economical;
- Changes to the Kemper IGCC Project design;
- Impact to CT operational parameters including mass flow to and from the CT; and
- To make up for the loss of gas to the CO_2 extraction, the overall coal and mass flow rate into the gasifier had to be increased.

Q. How were the Project design changes required to capture 65% CO_2 managed?

Removal of 65% CO_2 significantly increased the concentration of the hydrogen in the syngas, which impacted combustion turbine performance, requiring changes to the turbine. A major focus of the FEED Phase II effort was to modify the Phase I design to incorporate the increased carbon capture and related changes. To maintain the schedule, during the period beginning from late 2008, parallel process designs were being managed encompassing varying levels of CO_2 capture and alternative GE and Siemens CT designs.

Though work had begun on incorporating CO_2 capture in early 2008, the decision to go to 65% capture was not finalized until June 2009,[152] and the decision to select Siemens as the CT vendor was made in August 2009.[153] Both of these changes significantly impacted the overall plant design. This meant that, cost estimates for plant systems impacted by the decision to go to 65% CO_2 capture could not be developed to the same detail as the rest of the plant, and relied on factored estimates.

[151] Water Gas Shift Reactor: Following the removal of chlorides and fluorides in the syngas scrubbers the syngas stream is saturated with water prior to entering the gas shift reactors where the various carbon containing compounds are reacted with water to produce carbon dioxide and hydrogen, which facilitates the later removal of CO_2 in the Acid Gas Removal ("AGR") area.
[152] Mississippi Power Company, Record of Decision ROD-8, Phase II ITC Presentation Final, page 29, June 18, 2009
[153] Mississippi Power Company, Record of Decision ROD-11, Gas Turbine Presentation Final, page 20, August 19, 2009

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Q. Was it reasonable for MPC to make the decision in June 2009 to incorporate 65% CO_2 capture into the Kemper design?

A. Yes. Based on Pegasus-Global's review of the FEED process, it was reasonable for MPC to incorporate 65% Carbon Capture into the design. The MPC decision to incorporate 65% CO_2 capture into the Kemper design was made together with the decision to delay the COD until May 2014, which was intended to provide additional time for design, procurement and construction of the additional facilities flowing from this design change, although as I discuss later in my Rebuttal Testimony, the delay in receiving the CPCN led to some of this additional time being lost. Additionally, the Kemper FEED team had been working simultaneously on the 50% Carbon Capture case and the 65% Carbon Capture case since late 2007, so the design process had been progressing for both options. Furthermore, while the economics were favorable, and the regulatory landscape uncertain, there was increasing pressure for increasing the amount of CO_2 capture at coal plants.

4. FOAK TECHNOLOGY

Q. Have you read and are you familiar with the testimony of Mr. Schlissel regarding the FOAK aspects of the Kemper IGCC Project?

A. I have and I am.

Q. In his testimony, Mr. Schlissel opines that MPC "*…knew that the Kemper IGCC Project would be a first-of-kind IGCC plant, and, therefore would clearly be exposed to significant risks and uncertainties.*"[154] How do you respond to Mr. Schlissel's allegations?

A. I would agree that MPC knew that the Kemper IGCC Project would be subject to FOAK risks, which was discussed in the Phase II hearing.[155] MPC took reasonable actions and evaluations to not only identify and quantify these risks, but also implement measures to mitigate impacts that

[154] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, page 15, March 14, 2014
[155] Transcript of Proceedings Phase II, Docket No. 2009-UA-014, page 1359, line 29, February 1, 2010

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might arise from these FOAK risks. The first level of risk identification and risk mitigation was the extensive PSDF testing program, which not only confirmed the reliable operation of the gasifier on a wide range of fuels, including Mississippi lignite, but also provided the basis for the development and testing of coal feed and ash handling system equipment. In parallel with the ongoing PSDF testing program, MPC performed, or had performed by outside independent experienced organizations, TRIG™ risk assessments that identified FOAK systems, quantified the level of the FOAK risks and suggested actions to mitigate risk impacts.[156]

Q. Do you agree with Mr. Schlissel's opinion that, "… *there was no serious disagreement in the industry after about 2004 that a company that chose to be a first mover in building a new IGCC unit would face significant technology-related cost and performance risks and uncertainties.*" [157]?

A. As a general matter I would say that any technology development or evolution, as is the situation with the Kemper IGCC Project, would include some risk. The magnitude and nature of the risk will depend on a wide range of circumstances, each of which will require different solutions. As I have discussed above and earlier in my Rebuttal Testimony, both SCS and MPC were aware the development of the TRIG™ technology would present engineering challenges and had programs in place to identify the risks, including the extensive PSDF testing program which continued from 2002 through 2008. In addition to this program on TRIG™ technology development, Southern Company had extensive and successful experience in the commercialization of coal plant emissions control technologies, including Flue Gas Desulfurization ("FDG" or Scrubbers), and Selective Catalytic Reduction ("SCR").[158] Southern Company had also pioneered the evolution in FOAK coal and natural gas fired power generation, including supercritical coal plants and

[156] Southern Company Board of Directors Presentation, "Overview of Coal Gasification and TRIG™ IGCC Technology Risk Management at Plant Ratcliffe, page 8, February 15, 2011
[157] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, page 16, March 14, 2014
[158] Direct Testimony of Larry S. Monroe and Randall E. Rush, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, pages 6-7, December 7, 2009

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combined cycle plants. Mr. Schlissel may not be familiar with Southern Company's experience, but it is well known within the power industry.

Q. What are your overall opinions of Mr. Schlissel's conclusions regarding the new technology and FOAK aspects of the Project?

A. In general, I found that:

- All of the issues raised by Mr. Schlissel were extensively reviewed in the Phase II hearing; were considered by the Commission; and incorporated in the Final Ruling and issuance of the CNPC.
- Mr. Schlissel participated in these hearings and therefore should be well aware of MPC's positions and action on these matters. Mr. Schlissel appears to have ignored the facts, does not understand them and how they relate to the issues or is attempting to create a red-herring.
- Mr. Schlissel fails to provide any factual basis or analysis for the conclusions presented in his testimony.

I would agree that the FOAK aspect of the Project is a risk that was faced by MPC. Based on its extensive prior commercialization of power plant and emissions control systems and components, Southern Company and MPC understood there would be risks with development of the Kemper IGCC Project. MPC was clearly aware of the risks; identified the nature and potential impact of such risks; and took actions to mitigate the potential impact of these risks.

Q. Did MPC take reasonable actions to understand what FOAK aspects of the Kemper IGCC Project might exist?

A. Yes. SCS, together with the DOE and KBR has been developing the TRIG™ technology at the PSDF for more than 10 years. The PSDF installation was an engineering-scale facility that allowed for the operation, study and development of the technology on which the Kemper IGCC Project gasifier is based. However, the Project installation required significant scale-up of the PSDF design and application by vendors of new technology, including Combustion Turbines

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operating on CO_2 reduced syngas. MPC took reasonable actions to understand the impact of such a scale-up and application of new technology would have on the Kemper IGCC Project.

In addition to the experience gained at the PSDF prior to the start of the Project, SCS had experience in the development of similar gasification units at the Orlando gasification project, the Dongguan plant in China (Dongguan project), and had completed a number of commercial plant designs. All of these experiences contributed to MPC's confidence in understanding the nature of the FOAK issues at the Kemper IGCC Project and how to approach the design of the plant to minimize FOAK risks.

SCS had committed to the design construction and operation of the 285 MW coal based Transport Gasifier project in Orlando, Florida. Prior to the Orlando project being cancelled in 2007 for environmental concerns, SCS had completed a FEED Study for the project,[159] and initiated detailed design, procurement activities and site construction activities.[160] Similarly, SCS had a contract for the engineering package for TRIG™ at the Dongguan Project. Each of these projects required that SCS perform sufficient design development of the GI to ensure the identified risks were minimized and actions were in place to mitigate impacts should there be issues with the plant's final design or operation. As noted earlier, this experience provided the fundamental expertise necessary for the Kemper FEED.

Prior to committing to the design and construction of the Kemper IGCC Project, SCS was familiar with the nature of the FOAK issues on major projects. In addition to its experience discussed above, SCS had extensive experience with the design of coal-fired plants; combustion turbine plant; and the retrofit of gas cleanup on large coal-fired plants, many of which had FOAK issues.[161]

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[159] Process Description (Gasifier Island) for the Southern Company Services Orlando Gasification Project, January 23, 2007

[160] Reuters, "Southern Co. scraps Fla. advanced clean-coal plant", November 14, 2007

[161] Direct Testimony of Larry S. Monroe and Randall E. Rush, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, pages 6-7, December 7, 2009

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Thus, with this extensive FOAK experience not only with IGCC but other projects, SCS was well equipped to address Kemper FOAK issues, including scale-up of the gasifier and any other FOAK issues associated with design, procurement and construction of commercial sized TRIG™ gasifier and the integration of the gasifier with the combined cycle plant.

Q. Did MPC and SCS reasonably utilize the PSDF test programs to identify FOAK issues and mitigate any potential risks?

A. Yes. The PSDF was designed at a demonstration-scale so that advanced power system components and the DOE Clean Coal Roadmap program elements could be tested in an integrated fashion to provide data for commercial scale-up. Integrated operation allows the effects of system interactions, typically missed in non-integrated pilot-scale testing. The PSDF is large enough to produce industrial-scale data, yet small enough to be cost effective and adaptable to a variety of technology research needs.[162]

As discussed earlier, prior to completion of the FEED Study, PSDF gasification testing had been ongoing for approximately seven years and thousands of hours of operation in gasification mode. During this extensive testing program MPC and SCS had the opportunity to observe gasification operation; take measurements and evaluate gasification operating data using a variety of coal blends and parameters, which was the basis for gasifier scale-up.

For example, there were significant coal feeder problems with the handling of the lignite used in the initial testing of the high moisture lignite taken from the Red Hill mine located in Ackerman, Mississippi. Although previous coal preparations system modifications enabled effective processing of subbituminous and other lignite coals tested at the PSDF, the coal preparation system was not capable of decreasing the moisture content in the Mississippi lignite to a sufficiently low content for reliable handling. The second test used high moisture lignite coal

[162] Section 48A Application for Certification, Phase III, Kemper County IGCC Project, pages 29-30, October 2012

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from the Red Hills mine as the feedstock in the modified Transport Gasifier configuration to effectively compare results.

In the period between the two tests, SCS developed and installed a fluid bed coal dryer system in the coal feed preparation structure. The fluid bed dryer functions to improve coal feed operation with high moisture fuels. The fluid bed dryer successfully reduced the lignite moisture, which increased the heating value while reducing the lignite moisture content enough for reliable coal feeding after having been first processed in a crusher and finally pulverized prior to being conveyed to the coal feed systems.

The tests demonstrated steady operation with high carbon conversion and optimized performance of the coal handling and gasifier systems, which also provided the opportunity for further testing of instrumentation enhancements; hot gas filter materials; and advanced syngas cleanup technologies.

It is the opinion of Pegasus-Global that the extensive PSDF gasification operating and testing contributed to SCS's ability to timely address the gasifier operations, thus providing invaluable insights to the gasifier scale-up. Additionally, testing programs to address coal feed systems allowed for mitigation of associated risk. Similarly, the PSDF test programs provided SCS with the opportunity to optimize and improve the gasifier reliability, thus reducing potential and costly gasifier outages.

Thus, the PSDF test programs contributed to SCS's ability to identify and address GI FOAK issues and provided an opportunity for MPC and SCS to test the technology at the PSDF. Such extensive testing is not typically conducted in the process industry, which normally does not have a facility like the PSDF available and depends on limited testing. Hence, many of the "industry" comments and/or experiences presented by Mr. Schlissel simply do not translate to a lack of understanding as to the FOAK risks he would lead you to believe existed at the Kemper IGCC Project.

Q. Did MPC take additional measures to assess FOAK risks and mitigation strategies?

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A. Yes. The PSDF testing programs were important to SCS's ability to study the gasifier; optimize performance; evaluate and enhance TRIG™ systems; and mitigate potential issues arising from FOAK. However, in addition to those tests, MPC and SCS also commissioned a number of risk assessments addressing the design and integration of the Kemper IGCC, the GI systems and the Combined Cycle Plant. The focus of these studies was to identify the systems and components that would be considered exposed to FOAK risks; assess the technology risks that they present; and identify risk mitigation actions.

At the initiation of the FEED in early 2007, a risk assessment was completed, *"to determine the major risks and mitigation strategies for the IGCC process in Orlando and Mississippi power plants."*[163] Again, in 2008, MPC had another FEED Technology Risk Assessment performed at the end of the Kemper FEED Study.[164]

The scope of this October 2008 Technology Risk Assessment was an Independent Review of the Current Status of the Technology Systems of the IGCC System with regard to its Commercial Status. Thus, this Risk Assessment considered the FEED engineering and design, with the exception of the final percentage CO_2 capture, and selected CT vendor, neither of which had been finalized at that time.

The purpose of this Technology Risk Assessment was to assess the technology risks of the processes and equipment as defined in the FEED for the Kemper IGCC Project. The authors of this Assessment were senior technology experts employed by SCS, but who had not worked on the Kemper IGCC Project or on the ongoing gasification research effort, and therefore were independent, though internal to the Company. Both authors had prior experience in the chemical industry and were engaged in technology efforts at emissions control for SCS's conventional coal fleet. As the authors of this risk assessment noted:[165]

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[163] IGCC Technical Risk Assessment, page 3, April 21, 2007
[164] Technology Risk Assessment of the Kemper County IGCC Plant Design, October 29, 2008
[165] Technology Risk Assessment of the Kemper County IGCC Plant Design, page 5, October 29, 2008

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> *"This internal effort looked at the risks associated with the implementation of the various proposed technology blocks that make up the TRIG^{TM} Kemper County design. Each block was evaluated for the basis of the design, whether the equipment is a first-of-a-kind, and if similar equipment is in commercial service in other industries."*

The approach to the risk assessment was to evaluate the technology risk in reference to SCS's conventional power generating facilities. A technology risk score was assigned to each system or sub-system of the GI and primary CC plant and considered both the probability of a technology problem and the impact that a technology problem would have on the total plant operation. Furthermore, the authors compared that system risk to what would be expected from similar process systems with both a conventional coal power plant and a natural gas CC plant. Thus, the risk score was the incremental risk above that expected from conventional power technology.

The Risk Assessment reviewed each system, identified whether the system would be a FOAK, and listed an overall technology risk score for each process.

The risk assessment concluded there were three systems considered FOAK: Coal Feeding, Transport Gasifier and Ash removal system, summarizing that:[166]

> *"Overall, there appears to be only slight increased technology risks from the proposed technology as compared to conventional power plant technologies.*
>
> *…the detailed design has not been completed and therefore it is difficult to evaluate the interactions of all of the individual systems connected to each other. Secondly, there may be issues of operational flexibility caused by the integration of the systems, and thus causing unintended operational limits. However, careful planning and structure of the control systems plus attention to system*

[166] Technology Risk Assessment of the Kemper County IGCC Plant Design, pages 3-4, October 29, 2008

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> *interactions in detailed design are powerful mitigation approaches to this elevated risk."*

Additionally, several systems were considered to have a low incremental risk, such as coal feeding, the transport gasifier; ash removal from the gasifier and particulate control device; the operation of combustion turbines on hydrogen-rich syngas; and the heat recovery steam generator with a SCR system installed. However, it is the opinion of Pegasus-Global that the experience SCS gained in the development and operation of these systems during the PSDF test campaigns, and development work it did along with the fundamental technical understanding gained through that operation, contributed to risk mitigation for the Project. Similarly, the authors concluded overall, the incremental risks identified were manageable and should not deter the Project from moving forward.

Q. Do you agree with Mr. Schlissel's assertion that the October 2008 Technology Risk Assessment of the Kemper County IGCC plant design was not truly "independent"?

A. While it is true that "*both authors worked for Southern Company*," it should first be noted that the paper is titled "*Technology Risk Assessment of the Kemper County IGCC Plant Design: An* ***Internal****, Independent review of the Current status of the Technology Systems of the IGCC System with Regards to Their Commercial Status"*[167] **[Bold emphasis added]**. It is thus quite clear that this is "*An Internal*" report to SCS, as the Executive Summary notes:[168]

> "*The authors are senior technology experts employed by Southern Company, but who have not been, and are not currently, working on the Kemper County project or on the ongoing gasification research effort."*

Secondly, one of the primary reasons the decision was made to use internal SCS personnel instead of outside independent consultants was because of the highly proprietary nature of the

[167] Technology Risk Assessment of the Kemper County IGCC Plant Design, October 29, 2008
[168] Technology Risk Assessment of the Kemper County IGCC Plant Design, page 2, October 29, 2008

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technology being evaluated. In addition, there was no reason for these SCS employees to ignore risks or have a pro-Kemper bias before MPC had even filed for its CPCN.

It is also worth noting that this Risk Assessment was updated in October 2011 with a larger evaluation team, again with independent SCS personnel. The fact that the personnel performing these evaluations were SCS employees does not diminish the value of the analysis. It is the experience, expertise and knowledge of the SCS review team that is important, and Mr. Schlissel does not express an opinion on this aspect of the analysis, nor does he appear to have any specific opinions as to the quality of work product.

Q. Mr. Schlissel also comments on the conclusions of this October 2008 *Technology Risk Assessment of the Kemper county IGCC Plant Design,* noting "*…their conclusion that there were only 'slight increased technology risks from the proposed technology' that would be used at Kemper is contrary to general industry view . . .*"[169] Do you agree with Mr. Schlissel's view of this report's findings?

A. No. Mr. Schlissel is taking an overarching "*contrary to general industry view*" and incorrectly applying it to the Kemper IGCC Project as a "one-size-fits-all" approach. It is unlikely that the *general industry view* he claims to be relying upon would have included the detailed analysis necessary to come to a conclusion as to either TRIG™ technology or its application to the Kemper IGCC Project; certainly Mr. Schlissel does not offer any basis to think they may have.

As is discussed later in my Rebuttal Testimony, Pegasus-Global has performed a detailed review and evaluation of this 2008 Technology Risk Assessment report and found it to be extensive and in depth, with the primary objective to identify those systems and components considered to be FOAK. The FOAK components were analyzed to determine if they had been in commercial use in similar applications, and many of these components are in fact used in the power and petrochemical industries. As can be imagined, while a system or application may be a FOAK, in

[169] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, page 26, March 14, 2014

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this application it is highly probable that the component has been in common use in other applications and therefore the incremental risk in an IGCC application is negligible. The evaluation did identify that some of the FOAK systems and components which had a higher risk factor. Overall though the increased risk, over a conventional plant, was relatively low. Pegasus-Global concurred with these conclusions that components within a FOAK application with previous industry usage are less likely to have technological risks than are components which themselves are truly FOAK.

Q. Was it reasonable for MPC and SCS to rely on the findings of these risk assessments?

A. Yes. As I have discussed earlier, the careful coordination and integration of the all GI and CC systems and equipment was a particular focus of the SCS Gasification Technologies. As the group responsible for the operation and evolution of the PSDF, SCS Gasification Technologies was therefore intimately familiar with the TRIG™ technology and potential issues, particularly the integration of systems.

As the Internal Technical Review study authors noted:[170]

> *"Due to Kemper County being a first-of-a-kind gasification project, the authors focused on each unit operation within the overall plant design in a stand-alone manner. While most of these individual unit operations have some type of operating history and/or experience (some extrapolated from other industries), operation of all the steps together in a single, integrated plant is not well-demonstrated. It is anticipated that integration issues will surface; especially if and/or when future performance changes are required or desired."*

Additionally, SCS's E&CS engineering organization had overall responsibility for Project engineering and design with Gasification Technologies being directly responsible for GI design

[170] Technology Risk Assessment of the Kemper County IGCC Plant Design, page 25, October 29, 2008

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basis and integration of all related systems.[171] Specifically, Gasification Technologies served as both the owner and the engineer for FEED of the GI, representing MPC's "owner" interest in obtaining a successful integrated process design, while also acting as "engineer" through daily, ongoing oversight of KBR's design activities. It was Gasification Technologies' role to "ensure a consistent design throughout," by taking the lead in developing the design basis for each system while verifying the operating requirements were accurately captured in the equipment load sheets. The SCS organization had experience with the engineering and design for SCS new coal plants; new natural gas combined cycle generating plants; and retrofitted environmental control equipment on existing power plants, many of which included FOAK systems and components.[172] This experience and the resultant operational performance of the SCS fleet is a sound basis upon which to consider whether the same results will be achieved in the current design for the Kemper IGCC Project. Also of importance is that SCS Gasification Technology personnel responsible for the design and operation of PSDF were also intimately involved in the Kemper IGCC Project design and the completion, startup and operation of the Project which together with KBR's gasifier expertise, all contributed to the Kemper IGCC Project's technology risk mitigation.

Q. Did MPC and SCS continue to take actions to update the risk assessment once additional information was known about the design of the Project?

A. Yes. The 2008 Technology Risk Assessment study was updated in October 2011, and consisted of five individuals from SCS. As noted in the Executive Summary:[173]

> *"The purpose of this document is to assess the risk of the technology of the particular processes and equipment for Plant Radcliffe, using the gasification technology jointly developed by Southern, KBR and DOE.*

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[171] Mississippi Power Company, Response to URS RFI 2-135, April 25, 2012
[172] Direct Testimony of Larry S. Monroe and Randall E. Rush, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, pages 6-7, December 7, 2009
[173] Technology Risk Assessment Update for Plant Ratcliffe, A Review of the Technology System of the IGCC Plant, pages Executive Summary, 9, October 14, 2011

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> …
>
> *This evaluation is an update to an earlier review by two of the authors of this report's team. That report, issued in October 2008, was titled 'Technology Risk Assessment of Kemper County IGCC Plant Design'. Many of the sub-systems that make up the process blocks of the Radcliffe plant were nor designed in the previous report, so the current effort has been able to perform a more in-depth analysis of the process design."*

Pegasus-Global notes that engineering would have been approximately 54% complete at the time this report was issued and additional PSDF tests had been completed.

The approach of this update to the 2008 Risk Assessment was the same as that of the earlier study including:[174]

> *"The IGCC plant can be broken down into individual process and/or component blocks for deeper analysis. Each of these blocks was evaluated for the risks associated with the following questions:*
>
> - *Is this a first-if-a-kind system?*
> - *Has this system been used commercially and at the size or scale of the proposed design?*
> - *What are the risks from poor performance of the system?*
> - *Is the technology available from multiple commercial vendors?*
> - *How does the design accommodate the needs for maintaining the equipment?"*

Of the 29 Sub-Systems evaluated, five were considered to be a FOAK system:

- Coal Feeding

[174] Technology Risk Assessment Update for Plant Ratcliffe, A Review of the Technology System of the IGCC Plant, Executive Summary, October 14, 2011

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- Transport Gasifier process
- Transport Gasifier- Thermal/mechanical design
- Coarse Ash Removal from the Gasifier
- Fine Ash Removal from PCD

All of these subsystems were given an "Overall relative risk assessment" of "1." Three other systems were also given an "Overall relative risk rating" of "1" – Sulfuric Acid Plant; Heat Integration of the Gas Cleanup System; and Total Process Integration. All other Systems evaluated were given an "Overall relative risk rating" of "0," meaning these systems had a "no higher risk rating" than conventional coal or natural gas CC plant.

In the November 2008 study, there were three systems considered to be FOAK, whereas in the October 2011 update, five systems were considered to be FOAK. The previous study evaluated the primary 16 systems, the updated study evaluated the same 16 systems, but broke them into 29 subsystems. For example, in the November 2008 study the gasifier was one system but in the October 2011 study, the gasifier was listed as two sub-systems – Transport Gasifier Process and Transport Gasifier Mechanical/Thermal Design – with a Risk reduction status included. For example:[175]

- Coal Feeding (rated First-of-a-kind in ES-1): "*Continued testing and refinement of actual design appear to have improved control and thus help to mitigate the probability of a problem, additionally, the contingency of system redundancy of the design helps reduce the impact.*"
- Transport Gasifier – Process: "*Continued operations at PSDF, including the redesign of the particle-gas separation cyclones has aided in reducing the probability of operational issues.*"

[175] Technology Risk Assessment Update for Plant Ratcliffe, A Review of the Technology System of the IGCC Plant, Table ES-2, October 14, 2011

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- Transport Gasifier – Thermal/Mechanical Design: "*Mechanical design by experienced designers at KBR, who developed the mechanical design of the PSDF (and other) gasifier, plus the in-depth scenarios of temperature and load inequities reduces the probability of mechanical issues.*"

Specifically with respect to the gasifier size, the authors noted:[176]

> *"Although there are currently no operating coal gasifiers with this design, the transport reactor gasifier is an adaptation of a standard process in oil refineries called fluid catalytic cracking (FCC) which dates back to World War II. …there are many circulating fluid catalytic crackers in operation all over the world that are physically as big or bigger than the Ratcliffe gasifier design. …the operating principle is the same."*

The authors' noted there were two scale-up issues with the Kemper gasifier;

- The larger size of the Kemper gasifier compared with that at PSDF; and,
- The higher working pressure of the Kemper gasifier compared to the FCC.

And they opined that:[177]

> *"The scale-up of the transport reactor gasifier poses low technology risk in progressing from the experience with FCC systems to PSDF pilot-scale experience, and ultimately to the Plant Ratcliffe commercial design. The size scale-up – moving from 14 inches to 5 feet 11 inches is only a factor of 5.1 times, which is well-below an informal maximum scale-up step size of a factor of 10. A second aspect of the size scale-up is the vertical height of the gasifiers. The*

[176] Technology Risk Assessment Update for Plant Ratcliffe, A Review of the Technology System of the IGCC Plant, pages 19-20, October 14, 2011
[177] Technology Risk Assessment Update for Plant Ratcliffe, A Review of the Technology System of the IGCC Plant, page 20, October 14, 2011

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> *pilot-scale gasifier at the PSDF is roughly 100 feet tall, where the Ratcliffe gasifier will be 150 feet tall – only 1.5 times taller…*
>
> *Based on the demonstrated experience of the transport gasifier design from the fluid catalytic cracker application in the oil refinery business. The pilot development experience and improved geometry at the PSDF appear to be adequate to enable a reasonable scale-up design for Plant Ratcliffe. Therefore, based on these considerations the authors consider the transport gasifier to have a* ***low*** *incremental risk (risk scale = 1) when compared to conventional coal-fired power plant. The increased risk is mainly due to transport gasifier being a first-of-a-kind for this IGCC application."*

In Section 5.0 of the updated risk assessment the authors concluded:[178]

> *"There are technology risks associated with building the TRIG™ system at the Plant Ratcliffe IGCC, but as the analysis above suggests, those risks are manageable."*

As in the November 2008, the authors of the October 2011 study also concluded that, *"there appears to be only slightly increased technology risk from the proposed technology as compared to conventional power plant technologies."*[179] As identified in the 2008 study, though many systems are new, for the most part, the individual components are commonly used in various applications in either conventional coal power plants; natural gas combined cycle plants; or in oil refineries; chemical plants; and ammonia manufacturing operations. In addition, as an example, the coal feed and ash handling systems have the benefit of being developed from experience of the PSDF testing programs, and the experience of their operation at PSDF.

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[178] Technology Risk Assessment Update for Plant Ratcliffe, A Review of the Technology System of the IGCC Plant, page 52, October 14, 2011

[179] Technology Risk Assessment Update for Plant Ratcliffe, A Review of the Technology System of the IGCC Plant, page 52, October 14, 2011

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Q. Did MPC and SCS reasonably use the results of the PSDF testing programs and risk assessments to identify potential FOAK issues and actions to mitigate these potential issues?

A. Yes. SCS's extensive testing programs at the PSDF were reasonable and appropriate and provided a sound basis for design of a commercial size gasifier. The involvement of SCS Gasification Technology personnel in the PSDF program represents good utility practice given and their experience gained in the design, development, operation and trouble shooting at PSDF will be invaluable in the design, startup and operation of the Kemper IGCC Project.

The Kemper Risk Assessments that were performed were timely and in support of the design of the Kemper IGCC Project, have contributed to mitigating risks through both testing reliability of selected equipment, and provide a basis for sparing in the design of TRIG™ systems and components.

Q. Were there other studies performed which have contributed to the Kemper IGCC Project design reliability and enhanced plant performance?

A. Yes, in particular, in mid-2008, SCS commissioned EPRI to undertake the Reliability, Availability and Maintainability ("RAM") study of the Kemper IGCC Project. This was an appropriate and opportune time to have EPRI perform the RAM study on the Kemper IGCC Project design, just as the FEED Study was being completed. The Kemper RAM study built on the RAM study performed for the Orlando gasification project. As noted in the RAM Study:[180]

> *"With a continuing involvement in advanced coal technology and participation in the Power System Development Facility, Southern Company continues to be a primary driver for bringing full-scale IGCC into the power generation mix. With a very limited operational history on many of the newly developed sub-systems included in both the Orlando Gasification Project (OGP) plant design and Kemper County design, Southern Company was looking to create a realistic*

[180] Electric Power Research Institute, "TRIG RAM Study", pages 3-1, 22, Winter/Spring 2008

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> *model for the planned plants RAM performances. …This report documents the process and findings from the RAM assessment of both OGP and the Kemper plant…*
>
> …
>
> *Most notable change from the OGP estimates is the significant higher plant reliability and plant availability. From the OGP default to Kemper default model the plant reliability increases a full 4.0%. …it is not surprising to see this increase when jumping from a single train to a two-train design* [in Kemper]. *In the Kemper model a failure that brings down one train but not the other does not impact the total plant reliability…"*

RAM studies are particularly important for new facilities as they can provide the engineer insights regarding optimization of plant system configuration, sharing philosophy, and overall plant reliability and availability, which can significantly impact on the plants' economic viability. As the RAM Study states:[181]

> "[RAM] *metrics are critical performance indicators for the power generation energy producer. Aside from using RAM data as performance indicators and benchmarking tools… RAM assessments are important factors in power generation asset planning. With increasingly volatile petroleum fuel prices and dramatic increase in construction cost levels, plant profitability assessments get even more dependent on accurate performance predictions."*

SCS requested that EPRI provide a software package that would allow SCS engineers and operations personnel to evaluate sub-system RAM characteristics, as the design was proceeding or during plant startup and operations. This allowed for the ability to optimize the system and component configuration. It was appropriate and timely to have EPRI, with expertise in these

[181] Electric Power Research Institute, "TRIG RAM Study", page 3-1, Winter/Spring 2008

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studies and with a purpose to develop computer simulation programs specifically for power plant RAM studies. As noted in the Results and Review of the RAM Study:[182]

> *"…the RAM study commissioned as part of the Kemper County IGCC plant's FEED effort, contracted to EPRI for development of common reference data sources, has not only validated the results from earlier studies but also contributed to the plant's design optimization process without impacting its future reliability and availability… Using the templates developed as part of the contracted scope for this study, we are able to quickly analyze sparing and technology alternatives being considered as the plant's requirements are changing, to further improve the plant's performance or, at least, to minimize the impact of those requirements."*

While RAM analysis is not focused on risk assessment and mitigation, the process and results assist the designer in determining the benefit of design options, effectively assisting in optimization of plant design and operation.

Q. Mr. Schlissel notes that MPC *"appears to have specifically not asked for Black & Veatch's opinion on IGCC technology*" when commissioning its project management readiness review in 2009.[183] Do you agree with Mr. Schlissel's implication that it was unreasonable for MPC to not include a review of IGCC technology in the project management readiness review?

A. No. The purpose of the B&V readiness review was to assess MPC's preparation to implement the Project. As I stated earlier in my Rebuttal Testimony, there already existed reports on the status of IGCC technology in the public domain, including by B&V. As demonstrated here, MPC had also already had several studies of its IGCC technology conducted by industry technology

[182] "Results and Review of 2x1 Lignite Fired TRIG Unit RAM Study"

[183] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UA-189, page 20, March 14, 2014

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experts[184,185,186] and continued to have the Kemper IGCC Project technology risks evaluated by other parties.[187] It was entirely reasonable for MPC to limit the scope for B&V's work on the readiness review to project management and implementation readiness after the FEED Study completion as the other information was already available.

Q. Mr. Schlissel asserts that MPC neglected to consider *"the potential that the Project would not operate as well as being forecast at the time."*[188] Do you agree MPC failed to consider uncertainty in the future operating performance?

A. No. MPC appropriately considered the future operating performance of the Kemper IGCC Project. In fact, during the Phase II hearings, Mr. Thomas Anderson discussed potential operational uncertainty of the Project. Mr. Anderson specifically stated:[189]

> *"Because TRIG™ is a new technology, MPC recognizes that it will take some time to achieve operational excellence comparable to other Mississippi Power generating units. Therefore, MPC included an availability ramp for Kemper IGCC Project, where the availability to start at 59% in 2014 and ramp up to 80% in 2021."* See Appendix M of Exhibit (TOA-1)[190]

MPC did not assume that the Kemper IGCC Project would operate as a mature plant in the first year of operation, but allowed that full plant availability would not be achieved until approximately five years of operation. This ramping of availability is consistent with historical data available on other plants of the same nature as the Kemper IGCC Project.[191] This was

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184 Electric Power Research Institute, "TRIG RAM Study", Winter/Spring 2008
185 Technology Risk Assessment of Orlando TRIG™, January 2007
186 Technology Risk Assessment of the Kemper County IGCC Plant Design, October 20, 2008
187 Technology Risk Assessment Update for Plant Ratcliffe, A Review of the Technology System of the IGCC Plant, October 14, 2011
188 Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, page 12, March 14, 2014
189 Phase II Rebuttal Testimony of Thomas O. Anderson, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, pages 9-10, January 5, 2010
190 Phase II Rebuttal Testimony of Thomas O. Anderson, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, Appendix M Exhibit (TOA-1), January 5, 2010
191 Transcript of Proceedings Phase II, Docket No. 2009-UA-014, pages 1207-1208, February 1, 2010

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appropriate and Mr. Schlissel, having participated in the Phase II hearing, should therefore be familiar with MPC's approach to the Kemper IGCC Project's "future performance."

Q. Was MPC's decision-making process to undertake various studies and risk assessments regarding the Kemper IGCC Project design reasonable and prudent?

A. Yes. The PSDF testing programs, internal risk assessments performed and the EPRI RAM studies for the Project were timely and appropriate actions in identifying risk and assisting MPC/SCS in the development of the Kemper IGCC Project design as well as mitigating Project risks.

Specifically, Pegasus-Global concludes it was timely and prudent to have:

- Participated in PSDF testing programs which contributed to SCS's understanding of gasifier operational parameters and allowed SCS to test and demonstrate TRIG™ technology, optimize gasifier performance and developed other TRIG™ systems.
- Initiated the PSDF testing program in 1996, refocused the gasification in 2001 and implemented a testing program to specifically utilize Red Hills' lignite at the PSDF.
- Timely identified issues with the coal feed system when handling the high moisture content lignite, which permitted SCS to modify the coal handling system and demonstrate the reliability of the new system prior to the completion of Kemper FEED.
- Timely undertook technology risk assessments performed during, at completion and post-FEED to identify FOAK systems and equipment, and thus, verified the adequacy of FEED designs and ensuring that final designs utilized equipment with operational experience to the maximum extent possible, thus ensuring those systems and equipment would operate reliably.
- Retained EPRI to undertake Kemper RAM studies that not only provided MPC with a sound basis for assessing and predicting the Kemper IGCC Project reliability and

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availability, but also provided MPC/SCS with a tool to optimize reliability/availability of systems during the detail design phase.

It is the opinion of Pegasus-Global that the experience and information obtained from these PSDF testing programs, together with the risk assessments performed by or on behalf of MPC and SCS, provided a firm basis for the design of the transport gasifier and associated systems, thus ensuring the Kemper IGCC Project would meet its performance goals. SCS has appropriately recognized that the Kemper IGCC Project would not meet these performance goals on initial operation, consistent with industry experience involving FOAK technology on major projects, SCS recognized that time will be required for tuning of systems and integration of those systems. Anticipated reduction in operational performance during the initial period of operation was anticipated by MPC and SCS and incorporated in the economic analysis for the Kemper IGCC Project, both in projection of rate setting and in the economic comparison of the Project with the alternative generation sources considered. MPSC and its Independent Evaluator, BPC, also recognized and incorporated this initial period of Kemper IGCC Project operation in its economic analysis.

Q. Knowing that there were FOAK risks at the time of the Certification, in your opinion, was it reasonable that MPC proceeded with the Kemper IGCC Project?

A. Yes. At the time of the issuance of the Certification in June 2010, MPC had completed PSDF gasifier testing programs, completed numerous TRIG™ design reviews and risk assessments, and the design and procurement of much of the TRIG™ equipment. The programs, assessments and actions MPC had undertaken by June 2010 to identify and mitigate FOAK risks were reasonable, and the decision to proceed with Kemper IGCC Project was prudent based on the information available by June 2010.

Q. Mr. Schlissel opines that, "…*Mississippi Power acted as an aggressive advocate for building Kemper as an IGCC Project, actively downplaying the risk of the cost overruns and ignored the*

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potential for poorer long term operation performance."[192] **How would you respond to Mr. Schlissel's conclusive statement of MPC's attitude?**

A. First, I would note that Mr. Schlissel has provided no basis for this assertion. As I have explained here, and discussed in more detail elsewhere in my Rebuttal Testimony, MPC:

- Through the extensive PSDF testing program, technology risk assessments, and independent design reviews identified potential FOAK risks and took actions to mitigate those risks.
- Included a contingency in the Certification estimate to account for potential cost overruns.
- Evaluated the potential for less than optimal performance in the Kemper IGCC Project's early operating years and built the anticipated inefficiencies into the viability analysis, setting realistic expectations.

Q. Do you agree with Mr. Schlissel's assertion that MPC, "…*rejected the potential for significant increases in the cost of building the Kemper IGCC Project by arguing in its 2009 testimony in Docket No. 2009-UA-014 that the risks of installing new technology and the risk of capital cost escalation were 'unlikely and comparatively insignificant.'*"?[193]

A. No, I do not. MPC undertook a number of different approaches to identify risks associated with FOAK and put into place processes to mitigate the impacts of those risks, including the PSDF testing programs that studied and confirmed the reliability of the gasifier, and that identified issues with coal feeder and ash handling system and components. These tests provided the basis for improved and reliable designs. MPC performed, or had performed, a number of risk assessments of the TRIG™ technology, with the specific focus of identifying FOAK systems and components, and identified actions taken to mitigate potential risks that might arise from the

[192] Direct Testimony of David A. Schlissel, On Behalf of Mississippi Power Company, Docket No. 2013-UN-189, page 3, March 14, 2014
[193] Direct Testimony of David A. Schlissel, On Behalf of Mississippi Power Company, Docket No. 2013-UN-189, pages 2-3, March 14, 2014

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FOAK systems and components. Initially, MPC had internal and outside entities review the designs of the Kemper IGCC Project. Thus, it is clear that MPC was aware of and understood the risks associated with the Kemper IGCC Project as a FOAK, all of which was included in MPC's Phase II filings and reviewed at the Phase II hearings. For example, MPC presented the July 2007 ScottMadden risk assessment which, as Mr. Schlissel states in his FN 27 (page 25) *"First of a kind technology development is always difficult…"*[194] This entire section of the transcript relates to questions regarding the ScottMadden risk assessment of July 2007. This risk assessment was an extensive risk analysis by Scott Madden himself, on behalf of MPC as to all of the potential Kemper IGCC Project risks, including technology risks. So clearly, by the time of the Phase II hearing in early 2010, MPC and the MPSC was well acquainted with the known potential Kemper IGCC Project risks, including the potential technology risks.

Having undertaken these extensive and focused actions to determine and understand the FOAK risks at the Kemper IGCC Project, it would be reasonable for MPC, based on the data gathered by that date to opine that cost escalation, arising from these risks were "unlikely and comparatively insignificant."

Additionally, I have not seen anywhere in Mr. Schlissel's testimony where he provides analysis or basis for his assertions that the FOAK cost increases experienced on the Kemper IGCC Project were directly related to "new technology" or FOAK. Therefore, without the appropriate analysis and/or fact basis for the direct cause of the Kemper IGCC Project "capital cost escalation," Mr. Schlissel is in no position to determine if MPC was or was not prudent.

Q. Mr. Schlissel then opines "... *A prudent utility would have considered the potential for future Kemper capital cost increases.*"[195] Would you agree with this?

[194] Transcript of Proceedings Phase II, Docket No. 2009-UA-014, at page 1359, February 2, 2010
[195] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UN-189, page3, March 14, 2014

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A. Not only would I agree with this, but this issue is discussed further in this Rebuttal Testimony, and was discussed extensively in the Phase II hearing. MPC did consider the potential of cost increases with the inclusion of contingency in its Certification cost estimate, which I would expect Mr. Schlissel would agree MPC was prudent to do.

5. DECISION TO BUILD THE KEMPER IGCC PROJECT

Q. Have you reviewed Sierra Club witness Mr. Schlissel's testimony on page 12, lines 17 through 20, where he opines that internal MPC documents suggest one motivation was to demonstrate the commercial viability of Southern Company's TRIG™ gasification technology so that, "*… it could profit by selling that technology to other plants around the world.*"[196] And URS's (through its subcontractor McFadden) findings relative to its concerns about *"the fact that Southern Company has a financial incentive in the TRIG™ technology"*[197]?

A. Yes.

Q. Do you agree with Mr. Schlissel's and URS's (McFadden's) assertions?

A. No, I do not. Neither Mr. Schlissel nor URS (Mr. McFadden) provide any references to the internal documents that would support such assertions, and in the thousands of documents Pegasus-Global reviewed, it was apparent that Southern Company's financial incentive was not a motivator for MPC's selection of TRIG™. The MPC Management Council considered many options in developing its strategy for meeting anticipated baseload need.[198,199] Then, as noted above, the Management Council further investigated all available gasifier technologies, and compared and weighed advantages and disadvantages prior to finalizing selection of the TRIG™

[196] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UA-189, page 12, March 14, 2014
[197] URS Corporation, IM Prudence Report, page 15, March 7, 2014
[198] Management Council Meeting, page 6, January 9, 2006
[199] Management Council Meeting, March 22, 2006

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gasifier.[200] The TRIG™ had several advantages, including the ability to gasify Mississippi lignite.[201] This was an important advantage for MPC in that one of MPC's objectives in constructing the new plant was to diversify its power generation fuel sources.[202] Another advantage of the TRIG™ technology over other gasifiers was the lower operational temperatures, which leads to a less frequent need to replace the refractory liner in the gasifier.[203] The fact that SCS had demonstrated many years of reliable operation of the TRIG™ gasifier at the PSDF and had first-hand experience operating it provided additional benefits.[204] Furthermore, having the PSDF gasifier and facility meant operators would be able to train in an operational environment prior to operating the Kemper IGCC Project gasifier.[205]

Q. Was MPC prudent in its decision to build the Kemper IGCC Project as an IGCC plant?

A. Yes. MPC's decision to build the Kemper IGCC Project as an IGCC plant was prudent. In making this decision MPC evaluated the generation needs through the MPC IRP analysis and having determined the generation need, considered alternative options to meet that need. These options included IGCC, upgrading existing coal plants, self-build natural gas fired plants, and solicitations for Power Purchase Agreements ("PPAs"). MPSC's Independent Evaluator, Dr. Roach of BPC, when evaluating all of these options, concluded and recommended Kemper IGCC as the most beneficial option for MPC's customers.

MPC in selecting the TRIG™ based IGCC option relied extensively on SCS's experience with PSDF; the Orlando project's FEED Study and preliminary detailed design; and the Kemper FEED Study. In addition to the Kemper FEED Study, MPC relied on the lignite based PSDF

[200] Phase II Direct Testimony of Kimberly D. Flowers, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, pages 6-7, December 7, 2009
[201] Phase II Direct Testimony of Larry S. Monroe and Randall E. Rush, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, page 5, December 7, 2009
[202] Mississippi Power Company, Board of Directors Meeting, April 12, 2006
[203] Phase II Direct Testimony of Larry S. Monroe and Randall E. Rush, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, page 6, December 7, 2009
[204] Phase II Direct Testimony of Larry S. Monroe and Randall E. Rush, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, page 7, December 7, 2009
[205] Southern Company, "Overview of Coal Gasification and TRIG™ IGCC Technology Risk Management at Plant Ratcliffe", Board of Directors Meeting, February 15, 2011

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testing programs to demonstrate gasifier performance on the Kemper lignite fuel and development of coal feed systems suited to handling the high moisture content lignite.

It is Pegasus-Global's conclusion that the actions taken by MPC in making the decision to proceed with the Kemper IGCC Project were reasonable and prudent when considering all reasonable options to meet its forecast generation needs and the greater need to create robust generation away from the gulf coast. The MPSC also concurred with this decision in issuing the CPCN.

D. ESTIMATING

Q. Have you reviewed and are you familiar with the testimony by the Sierra Club's witness Mr. Schlissel, the Staff's witness BREI and MPSC's witness URS in regards to MPC's decisions in respect to its original estimate and its estimating process, including contingency for the Kemper IGCC Project?

A. I have and I am.

Q. In responding to the findings and conclusions of Mr. Schlissel, BREI and URS, did Pegasus-Global review the cost estimates prepared for Kemper IGCC Project as part of its prudence audit and evaluation?

A. Yes.

Q. Can you summarize the opinions provided in the testimony provided by Mr. Schlissel?

A. Yes. In the testimony filed by Mr. Schlissel the basis of his assertions are centered on the economics of the Project that are important to the "prudence of economics." There are no substantive assertions about the reasonableness or prudence of the methodology of the construction cost estimating methods and procedures used by MPC. Instead, Mr. Schlissel's testimony offers anecdotal observations about economic issues associated with the Project. In his

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testimony, Mr. Schlissel comments on the *"rather small six percent contingency"*.[206] I will address the development of the contingency later in my Rebuttal testimony.

Q. Can you summarize the opinions provided in the testimony provided by URS?

A. Yes. URS opines in its Prudence Report that engineering is typically between 25-30 percent complete for the development of funding level estimates and that the Kemper IGCC Project engineering was not sufficiently complete to support the FEED estimate. Further, URS attempts to corroborate this opinion with a comparison of the Kemper Project Definition Rating Index ("PDRI"), a process established by the Construction Industry Institute ("CII") that URS states "*evaluates the level of development of the FEED process, and assigns a quantitative measure or index as an indication of the reliability of the results and associated risks*."[207] URS suggests that the Kemper IGCC Project PDRI score of 219 is representative of a score higher than reflective of where a score should be for a FEED estimate noting, "*Generally recommended industry practice is to achieve a score of less than 100 for a funding level decision...*"[208]

Based on these observations URS in its Prudence Report states that:[209]

> *"…the IM questions the prudence of the decision to proceed with the original estimate at the time it was submitted to the Commission with the request for Certificate in December, 2009."*

In reaching that conclusion, URS contradicts its earlier opinion that, *"The cost estimate basis for the Certification Amount appears to be valid."*[210] URS also does not consider the context of the overall schedule for the Kemper IGCC Project and the requirements for filing with the MPSC. This is explained further in my Rebuttal Testimony that follows.

Q. Can you summarize the opinions provided in that testimony provided by BREI?

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[206] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UA-189, page 13, March 14, 2014
[207] URS Corporation, IM Prudence Report, page 32, March 7, 2014
[208] URS Corporation, IM Prudence Report, page 32, March 7, 2014
[209] URS Corporation, IM Prudence Report, page 32, March 7, 2014
[210] URS Corporation, Due Diligence Report, page 4, April 29, 2011

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A. Yes. In BREI's Prudence Report, it finds:

- The FEED estimate level of accuracy is within 20% to 40%. BREI attributed this to AACEI, which is incorrect. [211] Furthermore, there are two different Recommended Practices applicable for the Kemper IGCC Project from AACEI, which I will explain later in my Rebuttal Testimony.
- The contingency for small diameter piping (2-inch to 6-inch) was too low. This assertion can only be made in hindsight, which is not a valid technique to determine prudence. [212]
- *"The ultimate decision concerning the contingency provision to be included in the cost estimate* *__appeared__* *to follow a 'top down' management decision."* BREI continues to express its opinion about the contingency used.[213] I will address the development of the contingency used for the Kemper IGCC Project later in my Rebuttal Testimony.
- The Basis of Estimate was created in 2008 and adjusted for scope changes through August 2009. [214] 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.
- The estimate *"may not have fully benefited from engineering development"*[215] which added uncertainty to the estimate. This contradicts what BREI earlier found in its Baseline Report that it *"finds the estimate…to be complete and thorough."*[216]

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[211] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 24, March 19, 2014
[212] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 26, March 19, 2014
[213] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 27, March 19, 2014
[214] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 28, March 19, 2014
[215] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 28, March 19, 2014
[216] Burns and Roe Enterprises, Inc., Independent Monitor's Baseline Report, Final Report – Revision 1, page E-10, June 21, 2012

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Q. Do you have any observations relative to the "conclusions" reached by Mr. Schlissel, BREI and URS?

A. Yes. In a broad sense, the witnesses tend to base their opinions on the MPC estimates without regard for some fundamental industry accepted estimating principles. For example:

- An *estimate* is just that, an *estimate* of the final cost of a project which has neither been fully designed nor constructed at the time the estimate is prepared. It would be *highly unlikely* that any project, and in particular a large, complex process project, would actually cost exactly the amount estimated six years prior to the actual completion of the project. In short, the final total cost seldom matches the earlier estimates made by the responsible party.
- No process based project the size and complexity of the Kemper IGCC Project is completed *exactly* to the original concepts and assumptions which were established for the purpose of developing an estimated cost. There are simply too many variables which arise during the extended life cycle of a large complex project and it is not reasonable to expect the utility undertaking the estimate to accurately foresee which of those variables will impact the cost of the project. Every variable which arises can result in some change to the cost of a project, including the contingency forecast.
- The allegations concerning apparent flaws in the MPC estimating procedures and processes *appear* to be based on the fact that the current estimated cost at completion has increased by approximately $1.85B[217] over the original CPCN estimate. However, the fact that the cost of the Project has increased does not mean that the estimating processes and procedures developed and followed by MPC during the Kemper IGCC Project were in any way flawed. Estimates are developed on the basis of the best information and data known at the time an estimate is developed. Any element of any estimate is, in part,

[217] Based on the Current View as reported in the February 2014 MPSC Monthly Status Report

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based on assumptions and predictions as to future conditions and events. No estimator has perfect precognition of the future; it is simply not possible to predict such events economic recessions, dramatic cost increases in materials or labor, or changes in governmental regulatory requirements.

As with any management decision, including decisions made relative to the development of a project cost estimate, they are judged to be prudent if those decisions were reasonable and made on the basis of the information which was known, or should have been known by management at the time the decision was made.

In responding to the findings and conclusions raised by Mr. Schlissel, BREI and URS, I have organized my Rebuttal Testimony as follows:

- Estimating Overview
- Kemper IGCC Project Cost Estimating History
- Certification Estimate – Applicable Estimating Standards of Care
- Certification Estimate Contingency
- Estimate Summary Findings

1. ESTIMATING OVERVIEW

Q. Why are power project cost estimates important to utilities?

A. Cost estimates are important for any power project because they are a primary basis for the decisions made during the planning and execution of the project. Utilities use cost estimates as one element in its decision as to whether or not to build a power plant or purchase the power needed to fulfill its obligations to its customers. Utilities use cost estimates to compare and ultimately select the power generation technology from among various choices that it can construct to meet its forecast power needs. Utilities use cost estimates to obtain public utility commission approval of the project for inclusion in the customer rate base. And ultimately

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utilities use cost estimates to plan, manage and control the execution of the approved power project.

Q. How did MPC develop cost estimates for the power production alternatives under consideration?

A. MPC relied on both SCS and its own historical project cost data from past power projects, and publically available current cost estimates. Once MPC determined that the most reasonable alternative was to construct a new base load power plant, MPC used the estimated cost of a variety of generation technologies as one factor to decide which among those generation technologies provided a reasonable choice for the generation of that forecast power need. In this case, MPC determined that an IGCC power plant provided a reasonable technology for meeting that forecast power need.

Q. How did MPC prepare a cost estimate for a technology which had never been constructed to a base load order of magnitude of that contemplated by the Kemper IGCC Project?

A. MPC used readily available public industry sources to develop a set of estimates for each of the possible alternatives to contrast the per kW hours cost for each of the viable technologies (*i.e.* super critical pulverized coal, natural gas fired combined cycle, etc.). While the IGCC technology did not have the historical cost to complete metrics that other technologies had built up over years of construction and operation, there were reputable sources of data upon which MPC could reasonably rely, such as the EPRI studies of IGCC and its own involvement in the PSDF gasification test facility. Using that cost study data, and considering other factors (beyond the cost of the IGCC construction including tax incentives, use of Mississippi lignite reserves, environmental advantages, etc.) MPC decided to pursue an IGCC alternative.

Q. After MPC made the decision to select an IGCC alternative, what did MPC do to further develop the cost estimate for the Kemper IGCC Project?

A. Once the decision was made to move forward with the Project, MPC moved to develop a significantly more detailed estimate of the cost to execute the Project. As a regulated utility,

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MPC had to apply to the MPSC to execute the Kemper IGCC Project. To develop a reasonable estimate of costs to complete the Project, MPC engaged SCS and KBR to undertake and complete a FEED Study to advance the Project definition (engineering and design). One element of the FEED Study was to produce a much more detailed estimate of the cost to complete the Project for submittal to the MPSC (2007 - 2008).

Q. Did the MPSC review the FEED Study and estimate submitted by MPC?

A. Yes. Both the Kemper IGCC Project estimate and schedule were reviewed by the MPSC as demonstrated with the issuance of the CPCN by the MPSC Commission Order in 2010. The CPCN identified two financing amounts: the Certification Estimate requested by MPC of $2.4B; and the MPSC CPCN total financing amount of $2.88B, however the CPCN financing of $2.88B was set as a hard cap on total Project costs with exceptions noted.

Q. Were there any reforecasts of the costs produced for the Kemper IGCC Project after the award of the CPCN?

A. Yes. Between the 2010 CPCN and April 2013, MPC produced one adjustment to the Certification estimate from $2.4B to $2.88B and one additional reforecast, of $3.42B in April 2013, which ultimately pushed the total estimated cost of the Project above the initial estimate approved by the MPSC in the CPCN.[218]

Q. What is the difference between a reforecast and a re-estimate?

A. At a summary level, a re-estimate entails conducting a completely new estimate for a project, starting with a completely new basis of estimate, new scope of work definitions and new cost assumptions and predictions. In effect, the estimator starts the project estimate at $0 and develops an entirely new estimate for the project to arrive at the final estimated total cost of the project.

[218] Although the focus of the Prudence Audit conducted by Pegasus-Global covered up to March 31, 2013; Pegasus-Global is aware that as of the February 2014 MPSC Report, the total capped-portion forecast for the Kemper IGCC Project was $4.2B.

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A reforecast entails examination of specific cost elements or line items within the established project estimate and, when necessary, adjusting the final cost estimated for that line item to address the final forecast cost of completing the scope of work addressed within that line item. Once the cost reforecast of a line item is complete and the revised cost estimated, an adjustment (increase or decrease) is made to the original total project estimate at completion. Ultimately, in a reforecast only those line items which appear to be deviating from the original cost estimate set for that line item are adjusted; the rest of the original estimate line item are not adjusted or changed.

The Certification Estimate is converted into the project line item budget, against which expended costs are measured, trended and forecast. A reforecast is essentially an update of the original estimate using actual cost data throughout the execution of the project; a reforecast is not a new estimate. Unless there is a cost trend which results in a forecast cost overrun for a line item, the estimated cost at completion set in the Certification Estimate is not changed during the course of the project.

As is discussed in my Rebuttal Testimony, over time trends experienced in specific line item costs led MPC to reforecast the final cost of certain specific budget line items. Once the reforecast for those line items was completed, the line item budgets for those line item costs were adjusted (up or down) to reflect the results of the reforecast. When those line item cost reforecasts were complete, the total cost of the Kemper IGCC Project at completion was adjusted to account for the change in the line item forecast cost at completion.

Q. Can you summarize the reforecast which was done on the Kemper IGCC Project?

A. Yes. By spring of 2012 the Kemper PMT detected trends in certain cost line items which suggested that those line items might overrun the original estimated cost (budget) of the line items; specifically those line items which involved commodities such as piping, cable, steel, etc. Once those trends were identified, MPC completed a reforecast of those line items based on the past cost trends and the predicted cost conditions still to be faced by each of those cost line items.

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Based on the cost reforecast results, each of the line items where the Certification Estimate cost for that line item changed was adjusted to reflect the revised cost estimate at completion. Once the reforecast cost amounts had been added to the Certification Estimate line items the budget was re-calculated to include those line item budgets increases. As a result, the estimated total cost of the Kemper IGCC Project was increased from $2.4B to $2.76B in April 2012.

Q. Were any other adjustments made to the Certification Estimate?

A. Through April and into May, as the quantity increases became clearer, MPC adjusted its estimate to $2.88B, the total amount approved as a hard cap by the MPSC in its award of the CPCN, the thought being that the difference between $2.76 and $2.88 would be used as a contingency amount to allow for other potential adjustments in quantities.

Q. When MPC made the adjustment to $2.76B, did the IMs conduct reviews to assess the rigor of that reforecast estimate?

A. Yes, both IMs addressed the reforecast to $2.76B. In September 2012, URS noted that in its review of MPC's estimate of $2.76B that in its view there was a 72% probability of the total costs being less than or equal to the $2.88B.[219] In November 2012, BREI reported its findings regarding the MPC's reforecast. BREI conducted a full evaluation and found that at the 90% percentile, MPC's Project would cost between $3.0B and $3.15B, a variance of approximately seven to eight percent above MPC's $2.88B hard cap.[220]

Q. Did MPC conduct additional reforecasts?

A. On April 23, 2013, MPC revised its cost estimate for the IGCC Project from $2.88B to approximately $3.42B. The revised estimate reflected additional cost pressures including labor costs, piping and material costs, and additional engineering and support costs. In its filing, MPC

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[219] Kemper County IGCC Project, June 2012 Cost Risk Assessment, Memo, September 19, 2012

[220] Burns and Roe Enterprises, Inc., Independent Monitor's Project Schedule and Cost Evaluation for the Kemper County IGCC Project, pages 4-5, November 15, 2012

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did not seek any joint owner contributions or rate recovery for any costs that exceed the $2.88B, except for amounts subject to the Cost Cap Exceptions.[221]

Q. Did Pegasus-Global conduct an examination of the MPC estimating procedures and processes during its prudence audit and evaluation review?

A. Yes. Pegasus-Global examined the procedures and processes developed and followed during MPC's various project estimates, comparing those project specific estimating procedures and processes against generally accepted industry estimating standards and practices.

Q. Did Pegasus-Global reach any conclusion as to whether or not MPC met those accepted industry estimating standards for the Kemper IGCC Project?

A. Yes. Pegasus-Global's comparative examination found that the MPC estimating procedures and practices met the generally accepted industry standards and practices for estimating large, complex construction projects.

2. KEMPER IGCC PROJECT COST ESTIMATING HISTORY

Q. What was the earliest Kemper IGCC Project Cost Estimate prepared by MPC?

A. A feasibility estimate was submitted in June 2006 to the IRS as part of MPC's Application for § 48A Certification. This estimate showed an order of magnitude total project estimate cost of $1.49B (including AFUDC and Capitalized Ad Valorem Taxes during Construction).[222] At this early stage in the Project's development, CO_2 capture was *not* part of the proposed plant, but space was allowed in the early design to accommodate the potential for future CO_2 capture equipment. The feasibility estimate was based on the cancelled Orlando Gasification Project but updated to reflect site specific adjustments and changing from a 1x1 to a 2x1 facility.[223]

Q. What was the next Kemper IGCC Project Cost Estimate prepared by MPC?

[221] Mississippi Power Company, Kemper County IGCC Project, Monthly Status Report through March 2013
[222] Section 48A Application for DOE Certification, Project Information Memorandum, page 52, June 26, 2006
[223] Black & Veatch, "Kemper County IGCC Project Readiness Review", page 10-4, February 26, 2010

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A. The FEED Study estimate was the first detailed estimate developed by MPC. As I discussed previously in my Rebuttal Testimony, on May 9, 2007 KBR and SCS executed an Agreement to jointly conduct the Kemper Project FEED Study.[224] Under that Agreement KBR was responsible for the gasifier scope of the FEED Study, with SCS having a consulting role (project management) and some direct responsibilities for the development of various intersection points between the gasifier and the combined cycle plants. Included within the Agreement was a provision concerning the Project cost estimate:[225]

> *"As part of the conceptual design task, KBR will provide an updated cost estimate for the Gasification Island. The cost estimate will include the cost for all major equipment, and estimates of bulk materials, direct material adders, subcontracts, construction, engineering, and indirects."*

From the outset of the FEED Study it was established that KBR would estimate the cost to complete the GI and SCS would be responsible for estimating the cost to complete the CC of the Kemper IGCC Project.

On July 16, 2008, the Management Council was informed that the Kemper IGCC Project would be over a $2 billion dollar capital investment.[226]

On January 16, 2009, MPC filed for a CPCN to build the Kemper IGCC Project. In that filing MPC submitted a description of the Project to the MPSC which included a table that showed a total Project estimated cost of $2,210,600,000.[227]

In August 2009, the FEED Study report was finalized and approved by SCS and E&CS. Appendix V of the final FEED Study contained a summary of the estimate to completion which

[224] Front End Engineering and Design Services Agreement between Southern Company Services, Inc. and Kellogg Brown & Root LLC, May, 9 2007
[225] Front End Engineering and Design Services Agreement between Southern Company Services, Inc. and Kellogg Brown & Root LLC, Exhibit A – Scope of Work for KBR-SCS FEED Agreement, page 10, May, 9 2007
[226] Management Council Meeting, July 16, 2008
[227] Mississippi Power Company, Kemper County IGCC Project Description, Docket No. 2009-UA-014, Exhibit KDF-2, page 6, January 16, 2009

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reported an EPC total project cost of $2,342,373,000.[228] The summary Certification Estimate included the following major line items:

Line Item	Estimated Cost
Engineering	$189,199,000
Major Equipment	$585,732,000
Materials (including bulk commodities)	$534,731,000
Construction	$731,161,000
Fuels	$ 12,371,000
Pre-COD O&M	$ 56,265,000
Corporate Development/Legal	$23,867,000
Project Contingency	$136,854,000
Incentives (Sales Tax IGCC)	$50,809,000
EPC Total	**$2,342,373,000**
EPC (Excluding Development/Legal)	$2,318,506,000

Q. You testified earlier that it was normal within the industry to rely in part on predictions and assumptions when developing an estimate for a large complex project. Did MPC establish assumptions and predictions in the development of the FEED Study estimate?

A. Yes. For example, the FEED Study noted that the following assumptions were used during the development of the detailed project estimate:[229]

- *Southern Company's combined cycle reference plant was used with site specific adjustments and updated major equipment costs. The base reference plant costs are in 2008 dollars and the major equipment costs are in nominal dollars.*
- *The gasification island cost estimate is based on the FEED as of the second quarter of 2008.*

[228] Front End Engineering Design Report for the Kemper County Integrated Gasification Combined Cycle in Liberty, Mississippi, Mississippi Power Company, Volume 4, Appendix V.1, August 26, 2009
[229] Front End Engineering Design Report for the Kemper County Integrated Gasification Combined Cycle in Liberty, Mississippi, Mississippi Power Company, Volume 1, page 62, August 26, 2009

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- *Gasification balance of plant costs are based on the FEED as of the second quarter of 2008.*
- *Costs for major equipment was obtained from formal inquiries, budget costs from vendors or estimated equipment costs of recently procured equipment of comparable sizes.*
- *A cost estimate for capture and compression of approximately 65 percent (3 million tons per year) of the total CO_2 is included. All equipment required to capture and compress the CO_2 so that it is ready for injection into a pipeline is included in the estimate. It should be reiterated that CO_2 plans remain in an evaluation phase.*
- *Startup costs are based on Southern Company IGCC Operating & Maintenance model with site-specific fuel pricing.*
- *Projected escalation was applied to the base 2008/2009 dollars to the projected point of expenditure.*

Q. Were there any estimates prepared after the original FEED Study estimate and prior to the MPSC's approval of the CPCN.

A. Yes. In an update submitted to MPSC on December 7, 2009, MPC reported the estimated total cost to complete of the Kemper IGCC Project was $2,399,700,000.[230] The updated cost to complete included $161,600,000 in project contingency (increased by $24,746,000). The differences between the January 2009 filing and the December 2009 filing are summarized in the following table:

	Jan. 16, 2009 Filing	Dec. 7, 2009 Filing	Delta
Land	$20.2M	$29.5M	$9.3M
Project Development	$27.2M	$38.5M	$11.3M

[230] Mississippi Power Company Updated Design, Description, and Cost of Kemper County IGCC Project, Exhibit TOA-1, page 6, December 7, 2009

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	Jan. 16, 2009 Filing	Dec. 7, 2009 Filing	Delta
EPC and Gas Lateral	$2,034.3M	$2,156.6M	$122.3M
Fuel Handling Capital	$75.0M	$87.1M	$12.1M
Transmission	$89.2M	$111.3M	$22.1M
Pre-COD O&M	$68.0M	$56.3M	($11.7M)
Start Up Fuel Costs	$14.4M	$41.8M	$27.4M
Total Before Incentives	$2,328.4M	$2,521.1M	$192.7M
Incentives	($254.6M)	($296.0M)	($41.4M)
Ad Valorem Tax	$4.9M	$14.0M	$9.1M
Project Contingency	$132.0M	$161.6M	$29.6M
Total In-Service Amount	$2,210.6M	$2,399.7M	$189.1M

Q. Did MPC provide any explanation for the estimated cost increases?

A. Yes. The changes in the estimate from the January 2009 filing to the December 2009 filing were described in the testimony of Mr. Thomas Anderson, who explained the following:[231]

1. *Change in COD. Moving the COD from November 2013 to May 2014 adds approximately six months of additional escalation for equipment, labor and commodities, which is expected to increase the capital cost of the Project by approximately $30.1 million.*
2. *Meridian Graywater. Utilizing Meridian graywater for the Project's cooling and process water needs will require additional pumping, piping and storage facilities, which is expected to increase the capital cost of the Project by approximately $35 million.*
3. *65% CO2 Capture. Increasing the Project's carbon capture capability from 50% to 65% is expected to increase the capital cost of the Project by approximately $35 million.*

[231] Phase Two Direct Testimony of Thomas O. Anderson, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, pages 15-16, December 7, 2009

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4. *Transmission Upgrades. As described in Mr. Cochran's Phase Two direct testimony, the Company enhanced its transmission and substation design to increase reliability, which is expected to increase the capital cost of the Project by approximately $22.1 million.*
5. *Lignite Handling Facilities. North American Coal (NAC), the Project's lignite miner, in collaboration with the Company, has performed a more detailed design of the lignite handling facilities needed to convey the lignite from the mine to the Plant, which is expected to increase the capital cost of the Project by approximately $12.2 million.*
6. *Project Contingency. The Company increased its Project contingency from $132.6 million to $161.6 million. The Company felt that its capital contingency of $132.6 million, coupled with the various other contingencies embedded in the specific elements of the Project costs was adequate. However, based upon comments offered by the Commission's independent consultant during Phase One, the Company has determined that an additional capital contingency would be prudent and beneficial.*

The post-incentive $2,399.7M figure filed in December 2009, served as the amount that was approved in the CPCN Order by the MPSC on May 26, 2010. In the CPCN Order, the MPSC refers to the estimate as $2.4B, which is just rounding up from $2,399.7M. As noted previously, the CPCN also established a hard cost cap of $2.88B, twenty percent in excess of the $2.4B FEED Study estimate (net of incentives, not including items such as land and facilities for ash storage, lignite mine cost, gas pipeline cost and CO_2 pipeline cost – to the extent they are not in the $2.4B estimate).[232]

[232] Mississippi Public Service Commission, Order, Docket No. 2009-UA-014, page 12, May 26, 2010

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3. CERTIFICATION ESTIMATE – APPLICABLE ESTIMATING STANDARDS OF CARE

Q. Would you please explain what the Applicable Standards of Care are for cost estimating?

A. Yes. The reasonableness and prudence of management decisions are in part measured against the applicable industry standards of care appropriate to the issue under examination. Within the construction industry the most widely recognized and accepted cost estimating standards are those promulgated by AACEI. As a matter of industry practice, regulated utility companies requesting a CPCN from a public utility commission must submit at least a summary of the estimated cost for the execution of the proposed new power facility. The accepted utility industry standard of care is to develop a detailed estimate of the total cost to execute the project up to the point at which a facility is turned over to operations.

Typically, estimating a standard power plant such as a two-on-one combined cycle power plant is fairly straight forward. However, the Kemper IGCC Project, as an IGCC power generation plant, is more complex than a combined cycle power plant. The Project actually has two distinct project elements:

- A syngas refinery process plant; and
- A combined cycle power generation plant.

Because of that fact, two different AACEI Recommended Practices address project cost estimating applicable to the Kemper IGCC Project:

- Recommended Practice No. 17R-97 – *Cost Estimate Classification System*[233]
- Recommended Practice No. 18R-97 – *Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries*[234]

[233] AACEI Recommended Practice No. 17R-97, "Cost Estimate Classification System", November 29, 2011
[234] AACEI Recommended Practice No. 18R- 97, "Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries", November 29, 2011

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Because the estimating process and best practice industry standards for process plants differ from those established for more typical construction projects, including combined cycle power projects, the reasonableness of the process plant cost estimate should not be judged using the more generic estimating industry standards. Likewise, one should not judge the reasonableness of a combined cycle plant cost estimate using the more specialized estimating industry standards. MPC recognized the difference in the two industry standards of care and followed those standards of care in the development of the Kemper IGCC Project CPCN estimate.

Q. How did the Kemper PMT provide a complete cost estimate for a chemical/petroleum process plant and a combined cycle power plant?

A. MPC developed two separate estimates, one for each of the two plants, and then combined the two into a single Kemper IGCC Project estimate as follows:[235]

- Gasification Island – *"Original estimate created by KBR March 2008"*
- Combined Cycle and Integration – *"Original estimate created by SCS estimating and design engineering, using Combined Cycle reference plant as basis for Combined Cycle portion."*

The final, integrated estimate was finalized in the FEED Study and submitted as a total integrated package to the MPSC in support of MPC's CPCN application.

a. GASIFICATION CERTIFICATION ESTIMATE – APPLICABLE INDUSTRY STANDARD OF CARE

Q. Can you briefly summarize the applicable standard of care for process industry estimating?

A. Yes. The reason there are different recommended practices for the process industry is that, unlike typical construction projects, *every process project* is a *one of a kind* project. For example; every oil refinery plant is a process facility which delivers essentially the same end products (oil, gas and byproduct chemicals). The fact that the end products are identical leads one to conclude that

[235] Black & Veatch, "Kemper County IGCC Project Readiness Review", pages 10-2, 10-3, February 26, 2010

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all oil refineries are identical. However, process projects are not just defined by their end products; they are also defined by the processes and stages through which specific combinations of feed stocks must pass to achieve those end products. Because of the nature of crude oil, each refinery's feed stock is different; crude oil's viscosity, chemical components, etc. are all unique depending on the source of the crude oil. As a result, unique processes must be employed to create the exact same end products as every other oil refinery.

All IGCC plants produce the same end product: synthetic combustible gas. However, even though the end product is the same, the feed stocks used are unique, which means that the processes and stages through which the ultimate end product, synthetic gas, is produced are unique. For example: the Edwardsport IGCC Power Plant feed stock is local Indiana high sulfur hard coal. As a result, the processes and stages through which that coal feed stock must pass are unique to the physical and chemical attributes of that coal feed stock. In the case of the Kemper IGCC Project, the feed stock is Mississippi lignite, a feedstock that is completely different from Indiana high sulfur hard coal, which, in turn, requires different processes and stages to achieve the same end result, synthetic combustible gas.

Ultimately, process engineering is a complex task which is done with the knowledge that:

- Every process plant must be customized to address a unique set of circumstances relative to such things as feedstock, product, capacity and environment.
- Process plants are built around purpose built equipment, much of which is proprietary. Every piece of process equipment must work exactly as needed and exactly as necessary to meet the operational requirements of subsequent process equipment along the multiple process stages.
- The interfaces between every piece of process specific equipment cannot be finalized until the equipment vendors have been fully engaged (under contract) and those equipment vendors have engineered, designed, and submitted the detailed designs for those process specific pieces of equipment to the project's process engineers.

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- Process engineering requires the use of highly specialized professional engineers; all whom must interact with one another at literally thousands of process interface points, often having to rework those interface points to accommodate the final attributes of a specific piece of equipment. From a practical perspective, nothing concerning any process support elements (foundations, steel, pipe, and electrical) can be finalized until the equipment has been engineered, designed and, in some critical instances, delivered and installed.
- Process engineering takes place from the inside out; each stage of the process and its purpose built equipment must be defined before the structural envelop (foundations and steel) and process support elements (pipe, cable, instruments) can be designed. Ultimately, the structures and support systems are engineered and designed around the process equipment; the process equipment cannot be forced to fit into a predetermined structure or around typical set of support system designs.
- Construction of a complex process facility must be adaptable and fluid as the detailed process design progresses. Due to the issues summarized above, there is never the luxury of having a *finalized detailed design* prior to issuing purchase orders or initiating construction on the process project.
- Process projects have a relatively high change rate simply because there are no stand-alone changes; any change in a process flow or stage has a high probability of requiring changes in subsequent process stages and, ultimately in the support elements.

All of those unique attributes mean that the estimating processes and practices are different for a process plant than those which are applicable to a typical combined cycle power plant.

Q. Can you explain the details of the development of the Gasification Island Estimate?

A. Yes. As noted previously the gasification component of the Project is a process plant and, as such, the appropriate AACEI Recommended Practice is No. 18R-97. That recommended process

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project estimating practice differs from the standard AACEI estimating recommended estimating practice as follows:

- *provides … a section that further defines classification concepts as they apply to the process industries*;
- *contains … charts that compare existing classification practices in the process industry; and*
- *contains … a chart that maps the extent and maturity of estimate input information (project definition deliverables) against the class of estimate*.

The common element of a process project estimate is its reliance on PFDs and P&IDs as primary scope definition documents. Neither PFDs nor P&IDs are considered detailed design, as is evident by the fact that they consist of diagrams, and not engineered designs. However, the completion status of the PFDs and P&IDs are the primary deliverables in the determination of the level of project definition completed, which establishes the extent and maturity of the estimate input information. It is understood within the process industry that it is normal for a process estimate to be developed on the basis of incomplete project definitions ("final" PFDs and P&IDs). There are several practical reasons for this, including:

- Process projects contain equipment, piping, instrumentation, and control system commodity amounts which are much higher than more typical projects. That has a ripple effect impact on every other commodity which constitutes the whole process project (concrete, steel, electrical, etc.).
- Engineering on a process plant continues throughout the execution of the project. Even the smallest change in a process specification, assumption or design can have significant effect on the project, and in particular the various commodities required to execute the project.

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- Process engineering begins with and centers on mechanical and chemical process equipment. The final plant configuration depends on the detailed equipment designs and specifications, which generally are a collaborative effort between the project engineer and the equipment vendor. The project engineer sets a specification for what the piece of equipment must do, and the vendor designing the equipment must meet that specification. The critical point is that the project engineer does not design the actual piece of equipment and as a result must eventually "fit" the equipment designed and manufactured by the vendor into the project at the appropriate process point.
- Process engineering requires that process systems and subsystems operate in balance to achieve the desired end product. Because of that the work to calculate pressures, temperatures, dynamic flows, timing, etc. does not end until the plant essentially goes into full service. Changes in the process balance can impact the plant from a cost, schedule and physical construction perspective.

AACEI's recommended estimating practices for process projects recognize all of those unique factors in the development of a cost estimate, and has adjusted its standard project cost estimating best practice recommendations to account for those differences. The data applied to estimating process projects are cited in the table directly below, which was also referenced by BREI in its Prudence Report:[236]

Estimate Class	Project Definition	Process Project[237]	
		Methodology	**Accuracy[238]**
Class 5	0% - 2%	Capacity Factored/Modeled	L -20% to -50% H +30% to +100%

[236] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, pages 24-25, March 19, 2014
[237] AACEI Recommended Practice 18R-97, "Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction", November 29, 2011
[238] The accuracy of an estimate is established on a combination of the level of the project definition and the methodology used to execute the estimate. For process projects that accuracy is express in both a low range (actual cost may be lower than estimated) and a high range (actual cost may be higher than estimated). This detailed dual ranging is necessary given the inherent complexity of a process project when measured against a more typical project (where the accuracy ranges are more easily established from available documented project data already experienced).

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Class 4	1% - 15%	Equipment Factored	L -15% to -30% H +20% to +50%
Class 3	10% - 40%	Semi-Detailed Unit	L -10% to -20% H +10% to +30%
Class 2	30% - 70%	Detailed Unit/Forced Takeoff	L -5% to -15% H +5% to +20%
Class 1	50% to 100%	Detailed Unit/Detailed Takeoff	L – 3% to -10% H +3% to +15%

In the process industry factor-based estimates are commonplace. A factored estimate is founded on a set of known costs, normally the primary process equipment. To increase the confidence in the estimate, equipment prices are generally solicited from vendors responding to a set of *envelope specifications*[239] established for that equipment. From those representative equipment costs, the estimator and process engineer will apply a number of factors to estimate the amount of other commodities which will be needed to support that piece of equipment and/or the process stage within which the equipment will operate.

Q. Are there different classifications of process estimates?

A. Yes. However, the classification label attached to an estimate (*e.g.* Class 3 or 5) can be used by some to assert that the estimate was incomplete, inaccurate, and/or flawed in some way. However, as accepted within the process industry:[240]

> *"The 'accuracy' of an estimate is a widely misused and misunderstood term. Mathematically, accuracy can be expressed by the limits of a range of values within which the correct figure lies. … However, life is not so simple for the* [process] *plant cost-estimator. His estimate is made up of a large number of cost elements, none of which is certain, even as to the absolute limit of the range of*

[239] An envelope specification is one which establishes a range of inputs, outputs and operating conditions. Envelope specifications are necessary as they enable the vendor to price a piece of process equipment prior to the completion of the full process definition, which cyclically occurs during the engineering and detailed design of the process plant.

[240] Peter Watermeyer, *Handbook for Process Plant Engineers*, page 99, 2002

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> *possible cost. There is no certainty in his life, only probability and confidence. Certainty only exists when the project is over!"*

Determining the absolute *accuracy* of any estimate can only be done in hindsight. At the point in time that a complex process estimate is developed, the estimator attempts to prepare an estimate which enables him to be *as confident as possible* in the results of the estimate. According to the May 2007 Agreement between SCS and KBR:[241]

> *"… KBR will provide an updated cost estimate for the Gasification Island. The cost estimate will include the cost for all major equipment, and estimates of bulk materials, direct material adders, subcontracts, construction, engineering and indirects."*

A review of the detailed Certification Estimate revealed specific cost line items for the gasifier island, including equipment costs based on indicative quotes from equipment suppliers including line items which estimated costs for bulk materials and material adders which would be installed to support and/or connect the process equipment. Other line items revealed estimates for specialty subcontractors, construction of the process equipment, detailed engineering and process scope indirects.

According to SCS personnel interviewed during my examination of the Kemper IGCC Project, the KBR process estimate was based on a 3-D engineering model within which the major equipment was shown, along with the necessary pipe and cable runs, steel support requirements, etc. However, at the time the Certification Estimate was developed engineering was estimated to be 10% complete, which means that KBR had to develop and employ a number of assumptions concerning quantities and costs based on a 10% process engineering design.

Referencing the AACEI process classification table presented earlier in my Rebuttal Testimony, all the documents and other indicators I found and examined lead to the conclusion that the

[241] Front End Engineering and Design Services Agreement between Southern Company Services, Inc. and Kellogg Brown & Root LLC, Exhibit A – Scope of Work for KBR-SCS FEED Agreement, page 10, May, 9 2007

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estimated cost to complete developed by KBR/SCS for the gasification island portion of the Certification Estimate met the definition of a Class 3 – Semi-Detailed estimate. According to AACEI the attributes of a Class 3 estimate include:

- ***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.

According to AACEI:[242]

> *"Class 3 estimates are generally prepared to form the basis for budget authorization, appropriation and/or funding. As such, they typically form the initial control estimate against which all actual costs and resources will be monitored. Typically, engineering … would comprise at a minimum the following: process flow diagrams, utility flow diagrams, preliminary piping and instrumentation diagrams, plot plan, developed layout drawings, and essentially complete engineered process and utility equipment lists."*

Q. Do you agree with URS's opinion that funding level estimates require engineering to be between 25-30 percent complete?

A. No. Per AACEI Recommended Practice No. 18R-97, Class 3 estimates are used for Budget Authorization and reflect engineering percent complete between 10-40 percent.[243] The Kemper

[242] AACEI Recommended Practice No. 18R-97, "Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction", November 29, 2011

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IGCC Project engineering complete was just over 10 percent complete, which is consistent for a regulated utility CPCN estimate, and thus was appropriate for a funding level estimate as defined by industry practice.

Q. Are you familiar with the PDRI index so referred to by URS in its Prudence Report?

A. Yes. My prior employer The Nielsen-Wurster Group and my current employer Pegasus Global Holdings were both members of CII that developed the PDRI index. I was the company representative to CII and have co-chaired research teams with CII. The PDRI was discussed at several meetings that I attended.

Q. Would you agree with URS's statement that the PDRI is an indicator of the reliability of the results of the FEED and its associated risks?

A. Not entirely. The purpose of the PDRI as defined by CII "*is a checklist scoring system that provides users a numerical score that reflects how well a project's scope has been defined…*"[244] "*…PDRI, is a tool designed to measure the degree of scope definition in a project*."[245] The primary purpose of the PDRI score is for the user to evaluate the scope completeness during the Front End Planning ("FEP") or in the case of the Kemper IGCC Project, the FEED.

Q. Do you agree with URS's opinion that a FEED funding level estimate should have a PDRI score of 100 or less?

A. No. As so stated by CII, the score which is a target at FEP is 200. From the project sampling that was conducted in the CII research, scores of 200 or less typically outperformed projects with a scope above 200. However, the projects that were sampled typically also had approximately 20 percent design completed.

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[243] AACEI Recommended Practice No. 18R-97, "Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction", November 29, 2011

[244] *Front End Planning: Break the Rules, Pay the Price*, Construction Industry Institute, Research Summary 213-1, page v, November 2006.

[245] *Front End Planning: Break the Rules, Pay the Price*, Construction Industry Institute, Research Summary 213-1, page 7, November 2006.

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Q. Does the Kemper PDRI score of 219 mean that MPC's decision to proceed with the FEED Estimate was unreasonable?

A. No. AACEI, in its 2011 International Transactions contains a peer-reviewed paper entitled, "Document Project Readiness by Estimate Class Using PDRI." This article specifically notes that owners sanction projects with PDRI scores greater than 200 and further states that the PDRI score of 200 is "optimum". As I have previously testified in my Rebuttal Testimony, prudence is not a test of "optimality". Rather, decisions are deemed to be prudent if they fall within a zone of reasonableness. The AACEI article by Syed Zaheer and Craig Fallows developed a 'Project Readiness Indicator' curve based on a completed study that correlates the PDRI scores to estimate classifications by AACEI. Their study conclusions found that a Class 3 estimate as defined by AACEI for process plant projects, is based on engineering completion between 10-40 percent with a corresponding PDRI score of 145-552. Even a Class 2 estimate, which I define later as the AACEI level of estimate completion for the combined cycle portion of the Kemper IGCC Project, is shown to have a PDRI score between 71 and 240.[246] The maximum PDRI score for the three subsections and 80 elements that make up the PDRI evaluation is 1000. Thus, the Kemper PDRI score of 219 is very close to the "optimal" score of 200 and is nearer the "optimum" end of the range of PDRI scores for the Kemper Class 3 FEED estimate as defined by AACEI. Thus, the Kemper PDRI score of 219 further confirms MPC's decision to proceed with the FEED estimate in its CPCN filing.

Q. Did you reach any conclusions relative to the estimate of the Kemper IGCC Project gasification island?

A. Yes. I determined that the gasification process elements of the Certification Estimate met all of the attributes of an AACEI Class 3 Process Estimate. This conclusion is further supported by the

[246] Syed Zaheer and Craig Fallows, "Document Project Readiness by Estimate Class Using PDRI", *2011 AACE International Transactions*, EST. 604, page EST.604.17

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amount and level of detail contained in the 57,000 line item detailed Certification Estimate reviewed by Pegasus-Global.

Q. Did other entities involved in the Kemper IGCC Project review and opine on the appropriateness of MPC's estimate of the gasification process project?

A. Yes. As noted by B&V, MPC followed common and accepted industry estimating practices:[247]

> *"The cost estimate was prepared using typical estimating techniques, and the steps taken are the correct ones. The material quantities have been derived from a variety of sources including the 3D model for the GI, SCS's reference plant for the combined cycle unit, historical data and cost factoring."*

B&V addressed the KBR methodology in its Readiness Review of February 2010:[248]

> *"The cost estimate is based on equipment pricing that is, in some cases, nearly two years old. The commodities were not fully estimated in the original estimate, but some commodities were included as factors. If there is time to revise the estimate with updated equipment pricing and more complete definition of commodity quantities prior to fixing the Project cost, the project would likely benefit from the anticipated accuracy improvement. If the cost of the project must be fixed prior to the ability to complete an estimate update, then this effort is probably not justified or may not be feasible."*

The request for a CPCN had already been submitted to the MPSC that included a total Project cost estimate of $2.4B [the Certification Estimate] at the time of the B&V review; as a result the cost was fixed as of the date of that filing, and as B&V concluded revision of the cost estimate at was *not justified or may not be feasible*. Although the accuracy of the gasification estimate was impossible to judge by looking into the future, KBR/SCS did express a high level of confidence

[247] Black & Veatch, Kemper County IGCC Readiness Review, page 10-5, February 26, 2010
[248] Black & Veatch, Kemper County IGCC Readiness Review, page 1-11, February 26, 2010

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in the Certification Estimate on the basis of how that estimate was developed. This was a confidence that B&V shared at the time of its Readiness Review:[249]

> *"Cost Estimating* SCS has applied many of the techniques in the development of their cost estimate that are consistent with world-class standards."

The "world-class" standards B&V cited to include items such as: development of a commodity-based estimate; solicitation of equipment pricing from suppliers based on the preliminary specifications; and, an assessment of escalation utilizing alternative escalation models.

b. COMBINED CYCLE CERTIFICATION ESTIMATE – APPLICABLE INDUSTRY STANDARD OF CARE

Q. Can you summarize how MPC developed the Combined Cycle Power Plant estimate?

A. Yes. Unlike a process project, a combined cycle power plant is not considered a unique project. While there may be some element of the project which is unique (*i.e.* the turbine used or the HRSG used), the basic elements of a combined cycle power plant are the same across all combined cycle power plants. As result, there are few, if any, gaps in the definition of that power project. Given the increased definition which exists for a combined cycle power plant one would expect the estimator developing the estimated total cost for a combined cycle power project to have a much higher level of confidence in the ultimate accuracy of that estimate. If the owner of the combined cycle project has previously engineered and constructed combined cycle power plants the confidence in the estimate would increase. SCS had engineered and constructed several combined cycle power projects and had accumulated a significant experience based cost database from those projects. For an experienced owner/constructor, basic engineering for a

[249] Black & Veatch, Kemper County IGCC Readiness Review, page 1-4, February 26, 2010

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combined cycle project is in effect complete even before work on the cost estimate has been initiated.

The AACEI recommended practice for a *typical project* – which would include a power project – is summarized in the table directly below:

Estimate Class	Project Definition	Combined Cycle Project[250]	
		Methodology	**Accuracy[251]**
Class 5	0% - 2%	Stochastic / Judgment	4 to 20
Class 4	1% - 15%	Stochastic Model	3 to 12
Class 3	10% - 40%	Stochastic / Deterministic	2 to 6
Class 2	30% - 70%	Primarily Deterministic	1 to 3
Class 1	50% to 100%	Deterministic	1

Stochastic (statistical) estimating primarily depends on set of general project cost data from past projects which are then worked into a probabilistic model to estimate the cost for a subsequent project to be estimated. For example, there is a significant amount of public cost data on constructed combined cycle power projects. By application of various known probabilities against actual data of constructed plants, an estimator can obtain a Class 5 or 4 estimate with a reasonably high confidence level.

Deterministic estimates are based on a specific reference project(s) and adjusted to account for new conditions or factors which would impact the planned project. The difference between the Class 1 and Class 2 Deterministic estimates is primarily one of the extent to which a reference plant is used to set the estimate. SCS used a reference plant as the basis for its cost estimate of the combined cycle power portion of the Kemper IGCC Project.[252] During my review, I found that SCS maintained a detailed database of all of its numerous combined cycle power projects

[250] AACEI Recommended Practice 17R-97, "Cost Estimate Classification System", November 29, 2011
[251] According to AACEI, *"if the range index value of "1" represents a +10/-5%, then the index value of 10 represents +100/-50%."* Ultimately the Accuracy of any class estimate is measured against the accuracy of the other class estimates. Simplistically a 4 (estimate higher than actual spend) to 20 (estimate lower than the actual spend) improves to 3 and 12, respectively as the project definition increases and the methodology changes.
[252] Black & Veatch, Kemper County IGCC Readiness Review, page 10-3, February 26, 2010

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which it used to estimate the cost of any new combined cycle project. The database was constructed in such a way as to enable SCS to identify and select equipment or elements from any given past combined cycle project to best match the specific equipment and elements which exist in the planned combined cycle project; using that past data SCS was able to set a tailored reference plant from which the basic cost estimate was derived for the new power project.

Once the basic cost estimate was established, SCS adjusted the Kemper IGCC Project estimate to account for any differences between the reference plant and the new project. For example: certain pieces of equipment selected for the Kemper IGCC Project were unique to the Project. Thus, SCS used specific price quotes for these unique pieces of equipment from which it then factored in an estimate of the support/supply costs unique to those pieces of equipment.

The use of the reference plant as the basis of estimate, then adjusting that estimate to take the unique elements of the Kemper IGCC Project would reasonably result in an estimate which AACEI would fit the definition of a Class 2 estimate; which would provide a high level of confidence in the estimate. During interviews, SCS management stated that the company had consistently under-run the estimated cost of its combined cycle power projects through a combination of using its reference plant database and its extensive experience in building combined cycle power facilities.

Referencing the AACEI classification table presented earlier above, all the documents and other indicators that were found and examined lead me to the conclusion that the estimated cost to complete developed by SCS for the combined cycle and intersection portions of the Certification Estimate met the definition of a Class 2 – Primarily Deterministic – estimate. According to AACEI the attributes of a Class 2 estimate include:

- ***Project definition of 30% to 70%***. SCS's use of a reference model – coupled with primary equipment indicative price quotes would place the combined cycle Certification Estimate at the high end of that project definition range.

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- ***Typically is used as a Control or Bid/Tender estimate***. The Certification Estimate was used as an Authorization Estimate as presented to the MPSC with the request for a CPCN. Review of the Kemper IGCC Project procurement records indicated that many of the more important pieces of major equipment were bid at lower prices than estimated by SCS using its reference plant data.

SCS's access to a very large database of completed combined cycle power plants ensured that the estimate input information was both extensive and mature. The access to and direct knowledge of the state of combined cycle technology in combined cycle engineering and construction, coupled with SCS's direct experience in contemporaneous project cost estimating and the actual cost of completed combined cycle projects would enhance the accuracy of the combined cycle estimate elements of the Certification Estimate submitted to the MPSC.

Q. Did other entities involved in the Kemper IGCC Project review and opine on the appropriateness of MPC's estimate of the combined cycle project?

A. Yes. B&V opined that: [253]

> *"SCS has applied many of the techniques in the development of their estimate that are consistent with world-class standards."*

And

> *"The cost estimate was prepared using typical estimating techniques, and the steps taken are the correct ones."*

I determined that the combined cycle elements of the Certification Estimate met all of the attributes of an AACEI Class 2 Estimate. This conclusion is further supported by the amount and level of detail contained in the 57,000 line item detailed Certification Estimate reviewed by Pegasus-Global.

4. CERTIFICATION ESTIMATE SUMMARY

[253] Black & Veatch, Kemper County IGCC Readiness Review, pages 10-2 and 10-5, February 26, 2010

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Q. Are the AACEI estimate classification standards in general use within the power industry?

A. Yes**.** It would be unusual to find a large, complex power project that did not utilize the AACEI estimate classification standards, and other AACEI estimating standards, during its development of a project estimate.

Q. Do you know why the AACEI developed and issued the estimate classification standards?

A. Yes. The American Association of Cost Engineers ("AACE") which is the former name of AACEI, was founded in 1956. One of the early pioneers and former President of AACE established the first standards for classification of cost estimates around 1958. The more recently adopted AACEI estimate classification standards were primarily developed in order to provide a tool which estimators, project management and corporate management could use to establish a "range of accuracy" for the estimates developed. And, as I have previously testified, there are two specific standards from AACEI used for the development of the Kemper IGCC Project. According to AACEI:[254]

> *"The accuracy range of an estimate is dependent upon risk. A number of characteristics of the estimate input information and the estimating process are systemic risks. The extent and maturity of the input information is a highly important determinant of accuracy. However, there are systemic risk factors besides the available input information that also greatly affect estimate accuracy measures. Primary among these are the state of technology in the project and the quality of reference cost estimating data."*

The AACEI estimate classification standards were intended to give estimators, project management, and corporate management a method by which they could establish the levels of confidence in the estimate developed. For example, the level of confidence reflected by the

[254] AACEI Recommended Practice No. 17R-97, "Cost Estimate Classification System", November 29, 2011

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classification of the gasification scope of work would have been less (Class 3) than the level of confidence reflected the classification of the combined cycle (Class 2) scope of work.

Q. Did you reach at any overall opinions concerning MPC's Certification Estimate of the Kemper IGCC Project costs?

A. Yes. From my review and evaluation of the contemporaneous documentation and the statements made during interviews of the SCS and MPC management, at the time the certification cost estimates were completed, KBR and SCS had ample reason to feel confident in the accuracy of each of the certification estimates (gasification and combined cycle).

I found that the methodologies employed to develop the two estimates were, as noted by B&V, *world-class*. A review of all the relevant documentation and interviews with MPC/SCS project personnel confirmed the fact that the methodologies employed met all accepted industry standards as promulgated by AACEI for both the gasification process plant and the combined cycle plant. The confidence expressed by MPC and SCS in those estimates was in great part founded on the knowledge that they had followed those accepted standards in the development of each estimate. This basis of confidence was later confirmed by B&V in its independent assessment of the estimating processes employed to estimate the cost of the Kemper IGCC Project.

As noted earlier, the issue has been raised as to the completeness and accuracy of the original FEED Study estimate prepared by MPC and submitted to the MPSC. The first weakness in the way that issue has been presented by the witnesses concerning the Kemper IGCC Project estimate is that it treats the Kemper IGCC Project estimate as an integrated whole, not as two separate plant estimates, and then judges the completeness and its accuracy of the final, integrated estimate against a single industry estimating standard. In fact, the Kemper IGCC Project is both a chemical/petroleum process plant and a combined cycle power plant.

Q. How would you summarize the conclusions that you have drawn from Pegasus-Global's review and evaluation of the Kemper IGCC Project Certification Cost Estimate?

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A. As noted earlier in my Rebuttal Testimony above, the January 19, 2009 filing to the MPSC cited the total estimated cost as $2,210,600,000. As the Project continued to be refined, the estimate was subsequently updated in a December 2009 filing with a total estimated cost of $2,399,700,000 [This number was rounded to $2.4B in subsequent documents]. During a Core Team Meeting dated February 23, 2010, it was stated that, *"…the decision case (tracked as 'Certification Case') that was filed in December 2009 is locked down, and will be used to benchmark actual costs."*[255] The MPSC eventually approved the $2.4B total Project cost, but established a hard cap at $2.88B total Project cost. The MPSC noted that some items would be considered outside the $2.88B cost cap, specifically: [256]

> *"…land and facilities for ash storage, lignite mine cost, gas pipeline cost and CO_2 pipeline construction costs, all of which shall be excluded from the caps described herein to the extent not already included in the $2.4 billion number."*

In a subsequent filing to the MPSC, MPC detailed the amount each of those items were included in the $2.4B estimate. The amounts are as follows:[257]

- Ash Storage Facilities: $7M included in the $2.4B estimate.
- Lignite Mine Cost: Properly excluded from the $2.4B estimate.
- Natural Gas Pipeline Cost: $13M for natural gas pipelines construction and related right-of-way acquisition included in the $2.4B estimate.
- CO_2 Pipeline Construction Cost: Not included in the $2.4B estimate.

In previous sections of my Rebuttal Testimony, I have demonstrated that KBR and SCS followed recommended industry practices and standards in the development of the two project estimates:

[255] Core Team Meeting, Meeting Minutes, February 23, 2010
[256] Mississippi Public Service Commission, Order, Docket No. 2009-UA-014, page 12, May 26, 2010
[257] Mississippi Power Company, Supplement to Mississippi Power Company's Motion for Commission to Accept Petition, Docket No. 2009-UA-014, June 1, 2010

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the gasification island process estimate and Combined Cycle power estimate. According to B&V:[258]

> *"The cost estimate was prepared using typical estimating techniques, and the steps taken are the correct ones. The material quantities have been derived from a variety of sources including the 3D model for the GI, SCS's reference plant for the combined cycle unit, historical data and cost factoring."*

The Project record confirmed the appropriateness of methodologies employed by KBR and SCS in the preparation of the individual estimates and the combined Certification Estimate. MPC and SCS's confidence in the two individual estimates and the combined Certification Estimate was not unreasonable given the standard industry recommended practices that were followed during the development of those estimates.

In *hindsight* the accuracy of the Certification Estimate is certainly open to question; however, hindsight is inappropriate in a prudence review. Rather, in review of the Certification Estimate at the time when it was developed and how it was developed met the industry standards of care from both a methodological and results perspective. Confidence in an estimate is based in the methods by which the estimate was developed and the goal is always to have an estimate which provides the highest level of confidence in that estimate. Based on the techniques and methodologies employed to develop the two project estimates and the combined estimate, MPC and SCS management acted reasonably and prudently in their decisions to proceed with the Kemper IGCC Project in light of these estimates and had no reason not to be confident in the estimates derived from those techniques and methodologies.

Once the Certification Estimate was complete, and prior to the MPC filing for the CPCN the estimate was reviewed by both SCS, KBR and MPC management. Those point-in-time reviews of the Certification Estimate were typically conducted in conjunction with a review of the

[258] Black & Veatch, Kemper County IGCC Readiness Review, page 10-5, February 26, 2010

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Kemper IGCC Project risk profile, which would address the issue of cost risk to the successful completion of the Kemper IGCC Project.

Once the CPCN request had been filed along with the FEED Study and the Certification Estimate, and while still under consideration by the MPSC, private parties also had an opportunity to review the Certification Estimate. One of those reviewers (Dr. Craig R. Roach) actually suggested that:[259]

> *"To mitigate the risk of capital cost overruns, a fixed or fixed-formula capacity payment or capital revenue requirement would be required."*

Ultimately, several parties, from B&V, to Dr. Roach, to the Sierra Club, to the senior management of both MPC and Southern Company, and ultimately the MPSC, reviewed and questioned the Certification Estimate prior to the granting of the CPCN by the MPSC. Out of all those reviews the outcome was that no one, including the MPSC questioned the base estimate of the Kemper IGCC Project. Aligning with Dr. Roach's suggested hard cap as a means to protect MPC's customers from cost overruns, the MPSC was able to address both Dr. Roach's concern and its own questions as to the adequacy of the Certification Estimate contingency.

5. CERTIFICATION ESTIMATE CONTINGENCY

Q. Have Mr. Schlissel, BREI and URS also opined on the contingency included in the Certification Estimate?

A. Yes.

Q. As part of your prudency audit and evaluation and in response to the witnesses' findings and conclusions with respect to the Project's contingency, did you review the procedures and processes under which MPC set the Certification Estimate contingency amount?

A. Yes.

[259] Phase II Direct Testimony of Craig R. Roach, On Behalf of Boston Pacific Company, Inc. as a Consultant to the Mississippi Public Service Commission, Docket No. 2009-UA-014, page 5, December 7, 2009

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Q. URS asserts that MPC used an inadequate methodology for contingency management. Do you have an opinion about this assertion?

A. Yes. URS stated that:[260]

> "[URS] *has found the forecasting methodology used by MPC was based on known changes that were quantified either by contract awards or recommendations to award. Only known changes were included in the forecast. Pending changes or adverse trends, even when anticipated, were not included. When changes were quantified, the additional cost was offset by an equal allocation from remaining project contingency. The forecast incorrectly assumed that remaining contingency would be adequate to cover any future changes, and resulted in late communication of the impacts.* [URS] *questions the prudency of this methodology for managing the project contingency, and has suggested that the contingency amount should be based on an independent monthly assessment of remaining risks and the forecast adjusted accordingly. This change in approach was in fact adopted by MPC later in the project and is currently in use."*

Early in the development phase of a project it is not always possible to predict what, if any changes in the quantities of commodities, equipment and/or labor may occur due to a pending change or trend that is forecast. It is not uncommon to simply allocate an equal amount from a contingency to offset the potential change. Later in the evolution of a project, engineering is more advanced and construction is underway. Then it is more reasonable to recognize the amount of work in place and independently estimate the amount of work in commodities, equipment and/or labor that will be necessary to complete that particular portion of the project. URS acknowledges that MPC did change to the methodology that independently estimates the

[260] URS Corporation, IM Prudence Report, page 33, March 7, 2014

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work required to be completed later in the Project. The change in its processes at that time was reasonable and prudent with regard to project management.

Q. BREI is of the opinion that a contingency of 30-35% would have been more appropriate, do you agree with this opinion?

A. The 30-35% figure that BREI refers to in its Prudency Evaluation Report appears to rely on hindsight. In addition, BREI had previously noted in its IM Baseline Report that while it considered contingency to be low, it also noted that:[261]

> *"When compared to other projects of this magnitude and complexity, the ultimate capital cost cap of $2.88 billion would appear to include a more customary and reasonable level of project contingency."*

Taking into consideration the cost cap of $2.88B, this effectively provided for an additional contingency, a total of approximately 29% with the line item contingency included in the $2.4B estimate. It was reasonable for MPC to establish the approximate 7% contingency within its estimate and manage the Project to that amount, while still having additional contingency (effectively a management reserve) in the amount between the $2.4B estimate and $2.88B cost cap.

Q. Did MPC follow a reasonable and prudent process for the analysis of contingency during the execution of the Kemper IGCC Project?

A. Yes. As I discussed in my Supplemental Direct Testimony, MPC had project control procedures for cost tracking and estimating that followed good utility practice and industry standards. MPC followed the process for developing contingency as defined in E&CS Project Controls Procedure PC-03 *Project Cost Tracking and Forecasting* and PC-05 *Project Cost* Estimating. These procedures describe two methodologies to be employed for estimating contingency, 1) using a percentage of the total estimated project cost and 2) using a risk model. Both the KBR model for

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[261] Burns and Roe Enterprises, Inc., Independent Monitor's Baseline Report, Final Report – Revision 1, page E-10, June 21, 2012

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the gasifier island and the percentage as derived from the estimate process by SCS were utilized in the development of the Kemper IGCC Project estimate.

From a budget perspective, contingency is a separate project cost element or line item in the budget. As a discrete line item contingency is subject to the same processes as any other cost element as I outlined directly above, with one exception; unlike most cost elements, the contingency amount may increase or decrease from month-to-month depending on how and when contingency is allocated to some other project cost element. In addition, contingency as an unallocated amount cannot be linked directly to a specific scope of work contained within the project budget.

During the execution of the Kemper IGCC Project, to establish contingency allocation trends, the contingency was subjected to an additional specific process that involved analyzing the contingency used during the month, as well as over the Project to date. Using those trends, the Kemper PMT developed a set of assumptions concerning the future use of contingency during the remainder of the Kemper IGCC Project. The Kemper PMT also used its own expertise and experience, and sought outside opinions to determine the amount of contingency necessary to Project completion. Using all of that data and information, the Kemper PMT would make recommendations as to the estimated contingency needed from the current point in time to the completion of the Kemper IGCC Project.

Q. Are there any industry standards of care which establish how an appropriate level project contingency should be set?

A. Yes. The most widely accepted technical definition of contingency is that set by AACEI: [262]

> *"An amount added to an estimate to allow for items, conditions, or events for which the state, occurrence and/or effect is uncertain and that experience shows will likely result, in aggregate, in additional costs.* [Contingency is] *Typically*

[262] AACEI Recommended Practice No. 10-90, "Cost Engineering Terminology", page 23, January 14, 2014

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estimated using a statistical analysis or judgment based on past asset or project experience."

There are some elements of that summary definition which require more explanation:

- Contingency is an *allowance* added to a project estimate, it is not in and of itself part of the actual cost to complete the project. As an allowance, the expenditure of contingency is not treated as a direct cost of completing a project but it is expected that it will be spent at some time during the execution of the project.
- There is no standard contingency amount or percentage established for any project or type of project within the industry. Contingency is project specific: every project has elements that are unique to that project and there has never been a one size fits all contingency amount or percentage in the industry.
- Contingency is by definition estimated on the unknown (or at least uncertain). It is similar to proving a negative (*it may not ever happen but if it does*), for that reason all contingency is based on experience and judgment, not on any specific rule which ties a certain percentage of contingency to a specific unknown.
- Statistical analysis is actually an attempt to rationalize a judgment decision: what are the *odds* that I am right in my judgment on a particular risk element I have identified by experience or judgment. A statistical analysis does not - on the basis of its own result - set a particular contingent amount for any specific risk element. The amount of contingency is still set by experience and judgment, with the statistical analysis providing a confirmation of an amount based on a set of predetermined probabilities.
- Whether or not the estimated contingency was sufficient is pure hindsight and egregious as it not only second guesses the dollar amount, it second guesses the process by which the contingency was set and the risks that were identified as the root cause for setting a contingent amount in the first place.

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- Finally, the breadth of contingency is misunderstood as:[263]

  *"Contingency usually **excludes**: 1) Major scope changes …2) Extraordinary events such as major strikes and natural disasters …3) Management reserves… and 4) Escalation…"*

The tendency of non-estimators is to assume that contingency is inaccurate if it does not cover all of cost overruns experienced by a project during execution. To accurately determine (but still in hindsight) how accurate a contingency amount was one must first eliminate every cost overrun which was never intended to be included in the contingency amount (such as those listed in the quote directly above).

In practice there are actually three types of contingency which are generally found in any estimate of a large complex project:

1. Below the line contingency that is usually cited as a single, total amount without any link to any specific estimated line item amount, event or condition. This is the contingency that most individuals cite to when addressing a project's contingency.
2. Above the line contingency is an amount which has been embedded in a specific project cost line item. Embedded line item contingency is entered into the detailed project cost estimate in one of three ways, all of which involve the known bias that estimators have to establish the most reasonable ***conservative assumptions*** possible when constructing the estimate.[264] Below are three examples of how conservative assumptions are used to establish embedded contingency:
   a. *The assumed labor cost per unit of work is established at a higher level than would be expected for that unit of work.* For example; if local labor productivity

[263] AACEI Recommended Practice No. 10-90, "Cost Engineering Terminology", page 23, January 14, 2014
[264] Note: estimators learn by experience to use the most conservative assumptions reasonable in the development of any cost estimate for a large complex project. This is done in reaction to project management's tendency to assume perfect, or near perfect performance across the entire project life cycle. As the baseline estimate is the first place management looks for errors when actual costs exceed the original estimated cost, an estimator's natural reaction (based on experience) is to build an estimate to the most conservative amounts possible.

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rates indicate that a linear foot ("LF") of 10' pipe costs $25 (on average) to install the estimator may set an assumed labor productivity cost per linear foot of 10' pipe at $25.75 (on average). Although the amount appears to be an insignificant if one is talking about 20,000 LF of 10' pipe that 75 cents would result in an embedded contingency of $15,000 for that work.

b. *The assumed cost per unit of material (pipe, cable, etc.) is established at a higher unit rate than would be expected for that unit of material*. For example: if the cost of a LF of 10' carbon pipe is known to be $54 per lf, the estimator may set an assumed price per LF of 10' carbon pipe at $56.00.[265] Again, while not seeming a significant amount if one is talking about 20,000 LF of 10' carbon pipe that $2.00 would result in an embedded contingency of $40,000.

c. *The assumed amount of consumables (welding rod, lag bolts, small tools, etc.) which are needed for each unit of work is established at a higher level that would be expected for that unit of work*. For example: if the expected amount of welding rod needed to join two spools of 10' carbon pipe is five rods at $2.00 per rod the estimator may set an assumed number of rods at seven rods per weld. The 2 additional rods would result in a $4 contingency per weld.

3. Management embedded contingency is not as typical as embedded line item contingency but it can be found on very large projects, complex projects, and especially on such projects which involve more than a single estimating organization and/or more than one major executing contractor. Management embedded contingency is very difficult to detect as it is generally built into a management labor or staffing estimate or an indirect amount. Like embedded contingency, management contingency is set on the most conservative assumptions reasonable. For example: the project management staff is

[265] This additional amount is not *escalation* – an escalation factor is added to this base amount set by the estimator.

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originally estimated at nine individuals by project management; the estimator will not challenge that assumption and will simply estimate the cost using that assumption as one of the basis of the estimated project management line item. Once that estimate is returned to the project (or even corporate) management to review and vet, management may alter assumption to add positions to the project management group, then return that assumption to the estimators to cost and recalculate. Such contingency is typically encountered when two primary contractors have a point of intersection for their respective scopes of work and want to ensure that if the other contractor is unable to execute its scope of work at the intersection point there is sufficient money to cover the cost impact of that intersection problem.[266]

Q. Is the practice of embedding contingency in line item cost estimates a common practice within the industry?

A. Yes. The fact that estimators are conservative by nature and tend to embed contingency in above the line project costs is not a secret within the industry:[267]

> *"All project managers (and other performers) like to have some extra contingency, often hidden in various innocent-looking expenditure items. Clients and managers are wise to this and try to eliminate such items from the budget or reduce their value …This is a valid and necessary aspect of management, of promoting efficiency…"*

Senior management within a project or corporation assumes that there is contingency embedded within the above the line estimated costs elements. However, even knowing that (or believing

[266] Multi-party claims and disputes on a large complex project may involve significant amounts of money which will not be "awarded" to the impacted contractor for years after the project is complete. As each party to such a dispute will assert their innocence and point to the other party as responsible, the ultimate resolution of the dispute may be unsatisfactory to both parties. Adding management contingency does not eliminate the dispute or resolve the dispute but the impact that the disputed amount might have on a contractor while awaiting resolution can to some extent be lessened during that period of time.

[267] Peter Watermeyer, *Handbook for Process Plant Engineers*, page 102, 2002

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that) fact is that management will normally be unable to identify that embedded contingency, leaving them with one method for reducing the contingency amount to what to them appears a reasonable level: lower the below the line contingency amount set within the estimate.

The competing pressures between the conservative estimator and project management, and the senior management of a project or corporation in determining how much contingency should be applied to a project is further complicated by the fact that contingency is directly impacted such issues as type of project, local conditions, political drivers, and human error. Then there is the fact that contingency is not developed following any industry standard method:[268]

> *"The contingency reserve may be a percentage of the estimated costs, a fixed number, or may be developed by using quantitative analysis methods."*

The Kemper IGCC Project estimate originally contained specific below the line contingency of $132M.[269] In the December 2009 MPC update to the CPCN certification request, its original filing reported a total project contingency of $161,600,000.[270] As Mr. Thomas Anderson noted in his December 2009 testimony:[271]

> *"The Company felt that its capital contingency of $132.6 million, coupled with the various other contingencies embedded in the specific elements of the Project costs was adequate. However, based upon comments offered by the Commission's independent consultant during Phase One, the Company has determined that an additional capital contingency would be prudent and beneficial."*

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[268] Project Management Institute, *A Guide to the Project Management Body of Knowledge (PMBOK) – Fifth Edition*, Chapter 5, Section 7.2.2.6, page 206, 2013

[269] Mississippi Power Company, Kemper County IGCC Project Description, Docket No. 2009-UA-014, Exhibit KDF-2, page 6, January 16, 2009

[270] Updated Design, Description and Cost to MPSC, Submitted to MPSC on December 7, 2009, Exhibit TOA-1.

[271] Phase II Direct Testimony of Thomas Anderson, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, page 16, December 7, 2009

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Q. Was contingency on the Kemper IGCC Project developed as a single all-encompassing amount derived from the total estimated cost of the Project?

A. No. In rebuttal testimony filed in January 2010, Mr. Thomas Anderson explained that the $161,600,000 – also commonly referred to as $162M – was the result of separating the Project's major areas (combined cycle, gasifier integration and gasifier island) and applying a specific contingency rate to each based on MPC's experience. The contingency applied to each of these major areas is outlined in the following table.

Plant Area	Contingency Rate[272]
Combined Cycle	2%
Gasifier Island	8%
Gasifier Integration	11%

As one would expect, the lowest contingency amounts were set for those elements of the total Project about which MPC and SCS were most familiar and with which they had the most direct experience; the combined cycle scope of work. Meanwhile, the higher contingency amounts were set for those elements of the total Project that MPC and SCS had the least amount of direct experience; the gasification island and the gasifier integration scopes of work.

Taken as a percentage of the total project budget (before incentives), the contingency amount on the $2.4B estimate is 6.4%, or approximately 6% when rounded.

Q. Did MPC explain its reasons for setting the below the line contingency at 6.4% of the total project estimated cost during the execution of the Kemper IGCC Project?

A. Yes. During a March 2011 BREI Project Review meeting the $162M below the line total contingency was divided between the two project plants and the interface work between those plants:[273]

[272] Phase II Rebuttal Testimony of Thomas Anderson, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, page 7, January 5, 2010

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- *"For the Combined Cycle portion of the estimate, a 2% contingency was utilized because of* [sic] *this is an "F" class installation. …for "F" class combined cycles, the Company has extensive knowledge of design, equipment, weight, quantities, interferences, labor requirements, construction management, project management, and start up. … To date, the bids received on the major equipment … have come in at $7M (3%) under budget, this being an indicator of the companies confidence in projecting the costs for the combined cycle."*
- *"Because the Gasifier and Integration portions of the project do not have an installation history similar to those used for combined cycles, the Company used a contingency rate of 8% for the gasifier island, and 11% for the integration of the gasifier island and the combined cycle."*

At that same meeting SCS stated that:

> *"It should also be noted that it is the Company's goal not to use the contingency. The contingency is to deal with the unknown and unexpected, and whatever portion is unspent would be given back to customers and not included in the Project cost."*

Q. Is there any link between contingency amounts and the AACEI estimate classification standards?

A. Yes. As I testified earlier, the AACEI estimate classification standards exist primarily to enable estimators and management to establish a range of accuracy of an estimate by classifying an estimate using those standards. The range of accuracy established then enables estimators and management to determine the level of confidence that can be placed in the estimate. An

[273] Burns & Roe Enterprises, Inc., Project Review Meeting, Attachment Contingency Calculation, March 22-23, 2011

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estimator's or management's level of confidence in an estimate is a major factor in the amount of contingency which is added to the base project estimate.

Q. Did you find any indication that MPC set its contingency in part based on its level of confidence in its Project estimate?

A. Yes. As noted above, MPC did not set a single contingency amount based on the total estimated cost of the plant. Rather, MPC set separate contingency amounts for each of the estimates that had been developed for those three primary scopes of work:

- Combined Cycle Scope = 2% of that estimated cost
- Gasifier Island = 8% of that estimated cost
- Gasification Integration = 11% of that estimated cost

As discussed earlier in my Rebuttal Testimony, one of the primary purposes of the classification standards set by AACEI is to enable estimators and management set the level of confidence it has in an estimate. The higher the estimate classification the more confident estimators and management would have in that estimate and as a result there would be less contingency applied against which would be set for that scope of work.

As previously discussed, the gasification estimate met the definition of a Class 3 estimate while the combined cycle estimate met the definition of a Class 2 estimate. Based on those estimate classifications for the respective scopes of work MPC had a higher level of confidence in its estimate of the combined cycle than it had in the estimate of the gasification scope of work. Those respective levels of confidence are directly reflected in the fact that MPC set the contingency amount for both of the gasification scopes of work (gasification island = 8% and gasification interface = 11%) at a higher level than MPC set for the combined cycle scope of work (2%).

Q. Were there any other factors which influenced the amount of project contingency set by MPC?

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A. Yes. There was a decision by MPSC within its CPCN Order that had a direct bearing on the entire issue of contingency which had not been anticipated by MPC. A post-hearing Order issued by the MPSC on February 11, 2010 requested that MPC, and other parties in Docket 2009-UA-014, *Please provide proposed mechanisms for setting a cost cap or caps…*[274] On March 12, 2010, MPC filed its post-hearing brief with a proposed "Original Project Cost Cap" defined as follows:[275]

> *"Original Project Cost Cap – "Original Project Cost Cap" (OPCC) shall be defined as the maximum construction cost amount pre-approved by the Commission in its Order for the IGCC Certificate. The OPCC includes a margin for future uncertainty. This margin is based on the capital amount which results in a break-even with the next best alternative (as set forth in MPC's evaluation of alternatives presented in Phase II testimony). Basing the cap amount on a break-even scenario (Rather than an estimate plus contingency and escalation) takes the subjectivity out of the cap-setting process…The Original Project Cost Cap is $3.2 billion, calculated as follows:*
>
> *Calculation of $3.2 billion –*

Approved Estimate –	*$2.4 billion*
Estimation Margin of 30% –	*$<u>0.8 billion</u>*
OPCC	*$3.2 billion"*

Following the briefs filed in response to the post-hearing Order, the MPSC established a cost cap equal to the $2.4B estimate, explaining that:[276]

[274] Mississippi Public Service Commission Order for Post-Hearing Information, Docket No. 2009-UA-014, February 11, 2010
[275] Mississippi Power Company, Response to February 11, 2010 Order, Docket No. 2009-UA-014, page 25, March 12, 2010
[276] Mississippi Public Service Commission Order, Docket No. 2009-UA-014, April 29, 2010

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> *"There is no persuasive basis in the record for the Commission to impose this additional $1 billion risk on ratepayers; no evidence supporting a higher cost estimate. (In particular there is no evidence to indicate that the construction will be thirty-three percent (33%) higher than the figure of which the Company's expert witnesses said they were "confident.")"*

In response to this April 29, 2010 Order, MPC filed a motion on May 10, 2010 which explained that, *"The cap implemented by the Commission places undue risk on the Company."*[277] MPC added that since the testimony was filed and hearings conducted, there had been advancements in the Project to the point that approximately 20% of the Project's costs were "known", up from 10% at the time of the hearings. This was reflected in MPC's updated cost cap proposal:[278]

> *"All of these updates allow MPC to propose a hard cap equal to 20% above the Commission-approved estimate of the Project, net of incentives, or $2.88 billion."*

The MPSC in its issuance of the CPCN on May 26, 2010, agreed with MPC's May 10, 2010 motion, and allowed a variance of 20% above the $2.4B cost estimate (net of incentives) or $2.88B. The MPSC explained:[279]

> *"This modification is based upon the Phase Two hearing testimony of Dr. Craig Roach, the Commission's Independent Evaluator, that a twenty percent (20%) cost cap would be on the high end of the acceptable range of cost caps that this Commission could expect to be possible on a Project like Kemper, but would still make Kemper the best overall choice for customers."*

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[277] Mississippi Power Company, Motion in Response to Commission Order, Docket No. 2009-UA-014, page 25, May10, 2010

[278] Mississippi Power Company, Motion in Response to Commission Order, Docket No. 2009-UA-014, page 26, May 10, 2010

[279] Mississippi Public Service Commission, Order, Docket No. 2009-UA-014, page 9, May 26, 2010

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As noted in earlier testimony above, when MPSC issued the CPCN Order it actually approved two different costs to completion amounts:

- The $2.4B requested by MPC which was presented in the Certified Cost Estimate of the request for the CPCN; and
- A $2.88B total cost to completion hard cap.

In effect, the MPSC approved the total cost of executing the Kemper IGCC Project at an amount $400,000,000 dollars higher than MPC had estimated the Project would cost, but lower than the cap proposed by MPC. As that additional financing had not be looked for or expected, and as that additional financing had not been included in any cost to completion estimate of the Kemper IGCC Project, it became, in effect, as second contingency line item. As noted above, the contingency of $161,600,000 which was included in the Certification Estimate, and which had been approved within the CPCN Order represented a total project contingency of approximately 6%. By increasing the total Project cost to complete by $400,000,000 the total project contingency was raised by approximately 20%. That level of contingency would be considered very robust for any project that had such a high level of confidence that MPC and SCS had in their Certification Estimate.

Ultimately, regardless of who is setting the contingency or the methodology used, judgment is the underlying factor in estimating a reasonable amount of contingency for a project. In instances such as the Kemper IGCC Project, that judgment has to span two different projects. One of the projects is extremely well defined through direct experience reference plants (combined cycle); while the other is well defined through test projects and basic design and operating conditions (gasifier and interface) and the methodologies used to calculate the cost to complete. MPC/SCS did not treat those two projects as one, it correctly assumed two separate projects and set the contingency amounts separately for those projects, and based on the information it had on each of those two projects at the time the estimate was developed; in both cases the ultimate contingencies were based on MPC and SCS's judgment. That judgment was in part based on the

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confidence it had in each of the estimates, which in turn reflect the ACCEI estimate classifications for the each of those scopes of work.

However, the MPSC through the CPCN process also was entitled to exercise its own judgment, which it did in setting a hard project cost to completion cap of $2.88B, which in effect, added a significantly higher level of contingency to the Certification Estimate requested by MPC.

As stated previously, the *accuracy* of an estimate can only be determined at the end of a project; this is also true of the contingency established within that estimate. However, the confidence that management will have in an estimate and the estimate contingency is based on the methods used, and experience and judgment employed by the estimators, project and corporate management, and in this instance the MPSC.

6. ESTIMATE SUMMARY FINDINGS

Q. What conclusion can be drawn from the analysis that Pegasus-Global conducted regarding MPC's decision-making processes and actions with respect to the Certification Estimate?

A. In summary, MPC used accepted estimating processes, procedures and practices during the development of the Kemper IGCC Project process cost estimate. Specifically I found that:

- MPC used industry accepted processes, procedures and practices to establish the contingency amount for the Kemper IGCC Project combined cycle cost estimate.
- The Certification Estimate was very detailed and addressed all of the primary cost elements of the Project.
- The accuracy of any estimate can only be judged in hindsight.
- The appropriateness of any contingency amount can only be judged in hindsight.
- Independent expert examination of the Kemper IGCC Project estimate concluded that the estimate was developed following *world-class* processes, procedures and practices.

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- MPC reasonably divided the total Project estimating process into two separate development tracks: one for the combined cycle plant (and interface) and one for the gasifier plant.
- MPC reasonably established the contingency amount separately for the combined cycle plant, the gasifier plant and the interface points.
- MPC senior management reasonably assumed that the estimate contained embedded contingency and took that assumption into account when reviewing and approving the certification estimate.
- The MPSC exercised its judgment to increase the cost to completion of the Kemper IGCC Project by adding a hard cap total cost of $2.88B and, in doing so, effectively increased the Certification Estimate contingency amount.

E. MPC CONTRACTING APPROACH AND DELIVERY METHODOLOGY

1. CONTRACTING APPROACH AND DELIVERY METHODOLOGY BACKGROUND

Q. Have you read and are you familiar with MPSC's witness URS and its Prudence Report regarding MPC's decision to use Time and Materials ("T&M") contracts instead of Lump Sum contracting?

A. Yes, I have and I am.

Q. What observations do you have regarding the issues URS has posed related to MPC's contracting approach?

A. URS noted in its report that the decisions to use T&M versus Lump Sum contracts may have been imprudent and require additional explanation. Specifically, URS noted that:[280]

> *"Several construction contracts were awarded on a Time and Materials basis because final installed quantities were not completely defined at the time of*

[280] URS Corporation, IM Prudence Report, page 37, March 7, 2014

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award. While this is not an uncommon practice, it may be argued that a Lump Sum (firm Fixed Price) strategy with established unit rates for quantity increases would have at least shifted some of the productivity risk from MPC, and the rate payer, to the contractor."

I discuss in detail below the contracting strategy MPC has employed and its process for coming to its decisions in using the appropriate contract for the type of work being procured.

MPC chose its contracting strategy for three primary reasons: to maintain schedule, manage costs, and to address risks.[281]

I have discussed the importance of maintaining schedule and the context of the decisions made to address this issue as well as the cost management strategies employed in **Section V.F.2** of my Rebuttal Testimony, and therefore I will not repeat that information here. It is correct that at the time of the Certification Estimate, MPC recognized that it would be advantageous to have the Project bid on a lump-sum basis and performed by an independent contractor.[282] Within the FEED Study, the question of the contracting approach and delivery method was discussed.[283] In the FEED Study, it was noted that it would be ideal if the Project was bid on a lump-sum basis and performed by an independent contractor, and the study noted that this contract arrangement would place the least amount of risk on MPC and Southern Company. Even at this early stage, however, the FEED Study noted:[284]

"The ability to contract the work in this manner, however, requires that the engineering for the work included in the inquiry package be substantially complete in conjunction with providing enough time for the materials or equipment to be manufactured and/or allowing enough time for the construction

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[281] Management Review Board, Meeting Minutes, August 19, 2009
[282] Mississippi Power Company, Kemper County IGCC Project Description, Docket No. 2009-UA-014, Exhibit KDF-2, page 6, January 16, 2009
[283] Kemper County IGCC Project FEED Document, Sections 6.1, 6.2, and Appendix S, August 2009
[284] Kemper County IGCC Project FEED Document, page 59, August 2009

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> *activities to occur within the given schedule. If the engineering cannot be completed and/or if the available time frame to complete the project is short, then alternative contracting methods, which place more risk on MPC and Southern Company, will be utilized*."

MPC recognized that to be able to employ such a strategy would require that the engineering be substantially complete; an inquiry package could not be put forward without it. The conservative approach would have been to sequence the completion of design before bidding each of the scheduled construction packages. This was not possible given MPC's schedule whereby the Project was to be operationally complete by May 2014 in order to meet the projected electricity demands and tax credit requirements. These circumstances were known at the time the decision was made regarding the contracting approach and delivery methods used by MPC. MPC knew it would have to prepare packages to bid the work as the design progressed, and in its experience, this was the best way to reduce cost increases that can occur when potential rework causes change orders, schedule compression and overtime.[285]

It its own report, URS says that of the review it conducted for procurement processes used by MPC:[286]

> *"In summary, we found no significant issues with MPC's procurement processes…The IM has found the procurement process is fairly and consistently applied, and appears to be focused on obtaining the lowest technically acceptable cost. Most awards were competitively bid (91%), and most of these were awarded to the lowest bidder or lowest qualified bidder (87%). Exceptions to these criteria were adequately explained or justified. In addition, there are many examples shown in the Exhibits where MPC has chosen to split many*

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[285] Phase II Direct Testimony of Thomas O. Anderson, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, pages 18-19, December 7, 2009
[286] URS Corporation, IM Prudence Report, page 34, March 7, 2014

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> *contract awards among multiple low bidders to optimize the total cost to the ratepayers."*

Further, in posing this question in this way, URS is engaging in hindsight review, something it explicitly explains early in its Prudence Review Report it will not do based on the definition they outline below:[287]

> *"A decision is considered prudent if the appropriate industry equivalent individual or organization, under similar circumstances and based on all information available at the time, would have made the same decision. A utility must show that it went through a reasonable decision making process to arrive at a course of action and, given the facts as they were or should have been known at the time, responded in a reasonable manner. A prudent decision at the time it is made is still considered prudent even if the resulting consequence is later determined to be unfavorable…"*

Using its own definition and URS's words of praise for MPC regarding its procurement process, it is difficult to reconcile URS's criticism. Where possible, MPC did use lump sum contracting. Where it was not possible, following its own guidelines, MPC made the best decisions it could, given the information and the schedule constraints it was under at the time. MPC's contracting process was consistent with good utility practice, and was even excellent according to URS.[288] Pegasus-Global finds that MPC's decisions to use lump sum contracting where possible and appropriate, and MPC's decisions to use time and materials contracting when lump sum contracting was not possible or appropriate were reasonable and prudent.

Q. Did Staff witness BREI also review MPC's contracting strategy and provide any observations in its March 19, 2014 Prudence Report?

[287] URS Corporation, IM Prudence Report, page 17, March 7, 2014
[288] URS Corporation, Due Diligence Report, Kemper IGCC Project, Mississippi Public Service Commission, page 124, April 29, 2011

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A. Yes. BREI concluded with respect to MPC's contracting approach that:[289]

> *"Given the schedule constraints for the Project and the Commission's protective measures for ratepayers, this was a reasonable approach. After the idea of an overall lump sum EPC contract was abandoned, it is unlikely that a different overall contract strategy would have improved the situation since the late start and just-in-time engineering process would still have impacted the Project. Once the decision was made to compress the schedule to meet the May 2014 COD, SCS had little choice but to adopt the strategy described above due to the FOAK nature of the Project."*

Q. Is BREI's conclusion relative to MPC's contracting approach consistent with the conclusion of Pegasus-Global?

A. Yes.

Q. In responding to URS's conclusions with respect to MPC's decisions in regard to its contracting approach, did Pegasus-Global review and evaluate the prudence of MPC's contracting approach and delivery methodology?

A. Yes. I led the review of MPC's contracting approach and delivery methodology, reviewing contracts, procedures, work flow, organization, meeting minutes, and various reports generated both by MPC's project management and outside reviewers. In addition, I conducted interviews of key personnel. Using the information gathered, I have evaluated the reasonableness and prudency of the decisions MPC made in pursuing its contracting approach and delivery methodology.

Through this section of testimony, I will discuss in detail the areas upon which Pegasus-Global focused to determine the reasonableness and prudence of MPC's contracting approach and delivery methodology. Pegasus-Global evaluated:

[289] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 44, March 19, 2014

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- The contract processes and procedures;
- The decision-making process associated with the type of contracts pursued with associated liability and damages clauses;
- The types of clauses employed within contracts;
- The delivery methodology for the Project; and
- The decision to use SCS E&CS as the EPC contractor for this Project.

Q. What are Pegasus-Global's overall conclusions about MPC's contracting approach and delivery methodology for the Kemper County IGCC Project?

A. Throughout my Rebuttal Testimony, I will describe in detail my views regarding the elements outlined above. However, in short, MPC's contracting, procurement and delivery approach for the Kemper County IGCC Project represents reasonable and prudent actions. MPC worked with Southern Company, of which MPC is an affiliate, from the earliest stages of the Project. MPC found that within its own corporate family is an organization with an excellent engineering and construction delivery record. MPC reasonably chose to use E&CS as its EPC contractor for the Kemper IGCC Project. In addition, MPC working together with SCS put together an integrated team to implement a flexible contract approach working with E&CS to implement the Project. The team followed a reasonable process and made prudent decisions regarding contracting strategy. Again, I will discuss these views in depth through the course of this testimony.

Q. What other types of strategies could have been employed?

A. There are many types of strategies that can be employed when constructing a Project of this size and complexity, and usually one will see several methods used within each project. I have provided a glossary of words and phrases based on industry standards and practices related to contracting approaches and delivery methodologies to ensure that there is a clear understanding of what is being discussed in my Rebuttal Testimony:

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- Contract Approach – describes the legal terms and conditions that bind an owner and contractor to execute an engineering or construction scope of work. The most common descriptors involve payment method and/or schedule and include the following types of contracts:
  - In a **Lump Sum** or **Fixed Price** contract (generally used interchangeably) *"the parties have agreed to the specific amount the contractor will be paid for performing a defined scope of work; the all-inclusive lump sum includes labor, equipment, materials, overhead and profit."*[290] Under this contract approach, the price is fixed regardless of the difficulties the contractor may experience during the implementation of the work, even though the total cost of the work may turn out to be greater than the contract price. Under this contract type, the contractor usually assumes all the risk associated with cost and performance, and the contractors' estimated cost of that risk will be included in their price. Remedies contained in the contract are the only relief for which the contractor can apply. This means that the use of this contracting mechanism is most often applied *"when there is a well-defined scope of work, scope changes are unlikely and there are few unknowns."*[291]
  - **Unit price** contracts *"typically involve a fixed price for the supply and/or installation of a particular unit or element of quantity ($/unit, $/linear foot or $/cubic yard, etc.). The unit rate is all-inclusive and includes labor, equipment, materials, overhead and profit."*[292] The total amount paid to the contractor remains open until completion of the project, because the payment is made to the contractor based on units of work actually done.

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[290] Southern Company – Supply Chain Management, Procurement Policies & Procedures, Chapter II – Contract Development, Section D, page II-7, May 2013

[291] Southern Company – Supply Chain Management, Procurement Policies & Procedures, Chapter II – Contract Development, Section D, page II-7, May 2013

[292] Southern Company – Supply Chain Management, Procurement Policies & Procedures, Chapter II – Contract Development, Section D, page II-7, May 2013

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- A **Labor Broker** contract is an arrangement where the owner has *"control and responsibility for directing the workers, schedule, budget and project quality. A 'labor broker' arrangement may, in certain circumstances, provide cost savings…because we avoid paying the supervision costs of the independent contractor."*[293] It also gives the owner control over the work to be done, allowing for flexibility. These contracts identify the craft labor and skills needed, the costs are established for those craft and other items such as adders, and the scope of the work.
- A **Time and Materials** contract is an arrangement under which, *"the contractor is paid a pre-determined hourly rate for labor (by defined categories of labor or sometimes on a composite crew basis) and equipment is charged at hourly rates; each of these rates incorporate all benefits, management, overhead and profit."*[294]
- In a **Cost Plus** contract, *"the contractor is paid its actual labor expense (the hourly rate paid to its employees) plus an adder, usually a percentage, to cover benefits, management overhead and profit. Equipment rates (per hour or per hour used) are determined…Cost plus allows for greater variety of labor types and rates without additional contract negotiation."*[295] A cost plus contract is often, *"based on the contractor's cost to perform the work plus a fixed fee or cost plus a percentage of the project cost. Based on preliminary design and project specifications, the contractor arrives at a project target estimate…Fee arrangements include fixed amounts, monthly fees, percentage of total cost, or fee plus incentives that may be based on*

[293] Southern Company – Supply Chain Management, Procurement Policies & Procedures, Chapter II – Contract Development, Section D, page II-6, May 2013
[294] Southern Company – Supply Chain Management, Procurement Policies & Procedures, Chapter II – Contract Development, Section D, page II-8, May 2013
[295] Southern Company – Supply Chain Management, Procurement Policies & Procedures, Chapter II – Contract Development, Section D, page II-8, May 2013

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schedule, productivity, and total project cost."[296] Often cost plus contracts will contain a **Guaranteed Maximum** amount, whereby a contractor agrees to perform all services as defined in the contract document guaranteeing that the total cost to the client will not exceed a stipulated maximum figure. These provisions will often contain special share-of-the-saving arrangements to provide incentive to the contractor to minimize costs below the stipulated maximum.

- **Bonus Penalty** arrangements can be found in several types of contracts wherein the contractor is guaranteed a bonus (often in the form of a fixed sum of money) for each day the project is completed ahead of a specified schedule and/or below a specified cost, and agrees to pay a similar penalty for each day of completion after the schedule date or over a specified cost up to a specified maximum either way. Additionally, owners may require strict specifications, quality measures, delivery requirements or safety guarantees. Each of these can be the subject of bonus or penalty provisions in the contract. Liquidated damages are also common in contracts, which is very similar to the penalty provisions without the bonus provision.

• <u>Delivery Method</u> – describes how the scope of work will be executed. The delivery methodology can describe the full scope of work on the project, the design processes of the project, the organization of the project, or the construction management authority of the project, or many aspects using one method. The most common delivery methodologies include:

- **Design-Bid-Build** – known as the "traditional" construction methodology the term denotes a linear stepped sequence which begins with the owner contracting for the complete design of the facility. The owner would then send that design out to be competitively bid by qualified construction contractors, and the winning bidder

[296] Southern Company – Supply Chain Management, Procurement Policies & Procedures, Attachment III-4, page 1, January 2009

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would construct the facility. Under this methodology, the owner holds separate contracts with the designer and the contractor and either manages those contracts internally or has the options to 1) contract with the designer to manage the construction contractor or 2) engage a third contractor to manage the construction contractor (the "Construction Management" methodology).[297]

- **Design-Build** – generally denotes a delivery methodology under which a single contractor (or joint venture of an engineering firm and a construction contractor) will design and construct the project. This is the one of the single- point-of-responsibility delivery methodologies in industry use.[298]
- **Turnkey** – is a delivery methodology which refers to "*…a special case of design-build in which the contractor performs a complete construction service for the owner. This would be the concept when the contractor obtains project financing, procures the land, designs and constructs the project, and hands it over to the owner ready for occupancy.*"[299]
- **EPC** – literally means Engineer, Procure and Construct, describing the fact that a single entity will do the necessary engineering and prepare the required designs, procure the equipment and material identified within those designs and construct the facility specified by the design. Within the industry, an "EPC" delivery methodology is analogous to a "turnkey" delivery methodology. They both are single point of responsibility delivery systems, which simply means that rather than having one firm responsible for design and another responsible for construction, the owner has a

[297] Construction Management Association of America, *Capstone, The History of Construction Management Practice and Procedures*, Chapter 2, page 17 – 20, 2003
[298] Construction Management Association of America, *Capstone, The History of Construction Management Practice and Procedures*, Chapter 2, page 26 – 29, 2003
[299] *Construction Contracting*, Richard H. Clough, et al, Chapter 1, pages 14-15, 2005

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single firm responsible for the full or a well-defined portion of the scope throughout the execution of the project.

- **EPCM** – This term means Engineer, Procure and Construction Manage, which means that a single contractor will perform the same engineering and procurement functions as an EPC contractor, but will not provide its own direct-hire construction workers. Instead, the EPCM contractor will manage construction contractors who will be responsible for providing the actual direct labor to build the project.

When describing a project in the industry, one usually combines the two aspects of the project by first citing the contract approach and then citing the delivery methodology – for example "Lump Sum (contract approach) Turnkey (delivery methodology)".

Q. What was the contract approach and delivery methodology utilized for the Kemper IGCC Project?

A. MPC used a flexible contracting approach and chose an EPC delivery method, using SCS E&CS as its EPC contractor, whereby E&CS has participated in and managed design, procurement, and construction for MPC. Later in my Rebuttal Testimony, I will describe in detail the processes and procedures MPC used in implementing these methods.

Q. Why is the selection of a contract approach and delivery methodology so important?

A. Every construction project has a unique context in which it is being contemplated and constructed, and a risk profile that will reflect that context; there is a portfolio of risk elements that may arise at certain points during execution of the full project scope of work. Ideally, the owner's goal should be to apportion the risk elements in that portfolio among the participants involved in the planning and execution of the project to the party in the best position to manage, control, or mitigate the impact of those risks. The contract approaches and delivery methodologies used on a project should be specifically formulated by the owner to match context of the project and the risk profile in order to give each project participant the optimal structure within which to manage, control, and complete their scopes of work while minimizing the impact

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of the risk elements that are present in each of those scopes of work. I say ideally because the ability to secure a particular contract approach or delivery methodology depends on the availability in the market, as I discuss below in more detail.

It is a construction industry maxim that the more risk an owner sheds the greater the cost of the contract. This maxim has been proven to be true repeatedly because a contractor bidding a fixed price for the total risk of project's cost is going to not only cover the direct cost of that project, but must also include in its fixed price a contingent amount to cover any and all potential cost impacts, including both realistic and remote risks. Finally, they will also include a hefty profit as compensation for assuming all of the risk.[300] Even if the project is executed to perfection and none of the contingency is used, under those contract conditions, the owner must pay the contractor that total sum agreed upon at the execution of the contract.

Q. Would it not have been better for the rate payers of Mississippi to have had a lump sum turnkey ("LSTK") contract approach/delivery method employed for the Kemper IGCC Project? Would not such an approach be "risk free"?

A. No. Regardless of which contracting approach/delivery methodology is chosen, an owner can never shed all of the risk that accompanies any capital construction project, and in fact by agreeing to the cost cap, MPC protected its customers through cost overruns even better than a LSTK would have provided. The idea that an owner can sign a contract then simply come back five years later, pay the original contracted amount and in return for that originally agreed payment "pick up the keys," is simply not realistic. In practice, LSTK contracts for any large and complex project—and certainly any utility generation project--contain terms and conditions that ensure the contractor does not assume all project risk. Examples include change order rights,

[300] *A Contract Clause for Allocating Risks*, Dr. George F. Jergeas P. Eng. and Dr. Francis T. Hartman, P. Eng., American Association for the Advancement of Cost Engineering, 1996 AACE Transactions, D&RM1.1; "*Risk Sharing – Good Concept, Bad Name*", James G. Zack Jr., American Association for the Advancement of Cost Engineering, 1995 AACE Transactions, D&RM.6.1; "Coal-Fired Power Plant Construction Costs", Synapse Energy Economics, Inc., July 2008, David Schlissel, Allison Smith and Rachel Wilson

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force majeure provisions, etc. As is evidenced in review of projects that used LSTK, they too have experienced thousands of claims, disputes and litigation actions between contractors and owners who entered into those contracts. Every contract is intended to allocate various risks among the contracting parties, including contracts which set a "lump sum" price. It has been my experience that often a false sense of security is placed in LSTK contracts by owners and other stakeholders that are not familiar with standard practice within the construction industry.

Industry literature is replete with examples that debunk the notion that using a fixed price contract approach enables the owner to shed all of the cost risk on a project. For example:

- *"While the fixed price or* [Guaranteed Maximum Price] *is supposed to address the remaining unfinished aspects of the design, this can in fact increase disputes over assumptions of what remaining design features could have been anticipated at the time of the negotiated bid."*[301]
- *"Recent years have witnessed a tremendous increase in the number of claims and disputes arising from construction operations. The teamwork that has been traditional in the industry has degraded to a process of fault finding and defensiveness. The tenor of the industry has become increasingly adversarial, and costs have soared because of excessive lawsuits. Litigation, as the standard means of settling construction disputes, has reached epic proportions in the United States."*[302]

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[301] Construction Management Association of America, *Capstone: The History of Construction Management Practices and Procedures*, Chapter 2, page 26, 2003,

[302] *Construction Contracting* by Richard H. Clough, Glenn A. Sears and S. Keoki Sears, 7th edition, John Wiley & Sons, Section 10.27, page 304, 2005

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- *Construction Contracting* reports that the use of fixed price contracts significantly increases the risk that the contractor will submit claims, enter disputes and initiate litigation against an owner for cost increases.[303]
- Entire volumes are devoted to contractor claims and disputes, three which were all written and/or edited by Robert F. Cushman (et al):
  - *Proving and Pricing Construction Claims*, Coopers & Lybrand;[304]
  - *Construction Disputes: Representing the Contractor*, Wolters Kluwer;[305] and
  - *Construction Law Handbook*, Price, Waterhouse, Coopers.[306]
- Contract clauses specifically designed to overcome limits on a contractor's recovery under fixed price contract approaches include: (1) directed change in design, (2) constructive change in design, (3) impossibility of performance as designed, (4) differing site conditions, (5) defective design, (6) conflicting specifications and designs, and (7) owner interference with means and methods. The bases for entitlement under the contract's terms or drawn from outside the contract continue to evolve as new claims, disputes, and litigations arise.

Even should an owner prevail in a dispute over the contractor's fixed fee, there are impacts to the cost of the project that the owner must bear, including the cost of managing and processing claims, dispute resolution costs and, most expensive of all, possible litigation costs.

Finally, there are costs that cannot be calculated but that nevertheless impact the cost of the project, such as productivity impacts when contractors focus on claims instead of executing the project, schedule delays when contractors refuse to move forward with an element of work until a claim or dispute is resolved, and the owner's costs to manage and resolve claims and disputes.

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303 *Construction Contracting* by Richard H. Clough, Glenn A. Sears and S. Keoki Sears, 7th edition, John Wiley & Sons, Section 6.1, Figure 6.1, page 142, 2005
304 *Proving and Pricing Construction Claims*, Robert F. Cushman, et al, John Wiley & Sons, Inc., 1996
305 *Construction Disputes: Representing the Contractor*, Robert F. Cushman, et al, Wolsters Kluwer Law and Business, 2001
306 *Construction Law Handbook*, Robert F. Cushman, et al, Aspen Law & Business, 1999 (and updates)

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Q. What is the selection of contract approaches and project delivery methodologies dependent upon?

A. The selection of contract approaches and project delivery methodologies is dependent upon a number of project-specific factors that are taken into account during the development of the project plans, including:[307]

- The specific project risk profile;
- Project size and complexity;
- Project cost, schedule and quality goals;
- Ownership risk tolerance;
- Local, state and federal laws and regulations;
- Industry conditions;
- Market conditions;
- Financing structure; and
- Various other factors that should be known to management at the time the project delivery methodology and contracting approach are developed.

In short, myriad separate yet interrelated factors generally dictate the project delivery methodology (or combination of methodologies) and contracting approach (or combination of contract approaches) which best aligns with those factors.

Q. Are there any additional considerations on large and complex projects such as the Kemper IGCC Project?

A. Yes. As I discussed in my December 13, 2013 Supplemental Direct Testimony, large and complex projects like the Kemper County IGCC Project have additional characteristics that influence the choice of contract approaches and delivery methodologies. A large and complex

[307] *Construction Project Management*, Frederick Gould and Nancy Joyce, Chapter 4, Project Delivery Methods, pages 72-73, 2009

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project is generally defined as a construction project with a total execution cost of $1 billion or more, requiring several years to execute from initial planning to final operations, and involving complex technologies and/or physical conditions. Certain risk elements in these types of projects assume heightened importance in the examination and formulation of execution plans and strategies. For example, the distribution of cost risk may become more difficult because few contracting firms can assume the cost risk of one, let alone multiple, large and complex projects simultaneously.

The distribution of schedule risk may also be problematic because the extended time period required to execute such large projects requires forecasting future of market and the industry conditions, as well as the general local, regional and international economic conditions (*e.g.*, the impacts to various critical equipment being manufactured offshore). For example, regional conditions in China or Japan may impact the delivery of critical material or engineered equipment, thereby delaying a project schedule.

The choice of a contracting approach and delivery methodology should be tailored to the project's particular circumstances and context. Within the industry, it is generally considered unreasonable to attempt to force fit any project – but in particular large and complex projects – into a specific contracting approach and delivery methodology chosen before a thorough evaluation has been done to address unique project factors. In the end, the contracting approach and delivery methodology should align with the project risk factors because the project risk factors cannot be altered to fit a desired project delivery methodology or a preferred contracting approach.

Q. How would you define a more "*flexible contract approach and delivery method*" for a construction project?

A. The phrase "flexible contract approach and delivery method" – another term of art also sometimes called a "hybrid" or "multi-prime" approach – is used to describe alternatives to more linear contract approaches and delivery methodologies. These linear contract approaches and delivery methodologies are sometimes referred to as "standard form" or "template" contract

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approaches and delivery methodologies. Internationally, various organizations such as the American Institute of Architects ("AIA"), Engineering Advancement Association of Japan ("ENAA"), Institution of Civil Engineers ("ICE"), Engineering & Construction Contracting Association ("ECC") and the Fédération Internationale Des Ingénieurs Conseils ("FIDIC") have developed standards and even specific rigid templates for the traditional contract approaches and delivery methodologies, including LSTK, Cost Plus, Design-Build, Design-Bid-Build, etc. Those traditional contract approach and delivery method templates are well established and accepted within the broader construction industry internationally.

However, industry experience has shown that such template contract approaches and delivery methodologies do not always fit the needs of particular projects. There simply is no "one-size-fits-all" contract approach or delivery methodology that can be used in every project situation: [308]

> *"Because no two projects are exactly alike, an owner looks at each one and chooses the delivery method and contract type to match the project. Each method … has advantages and disadvantages. It is the owner's task to decide which method, given the project, maximizes the advantages and minimizes the disadvantages."*

Q. Are more flexible contracting approaches and project delivery methods widely used in the industry?

A. Yes, and in particular for large and complex projects.

Q. Why is it more common to see flexible contracting approaches and delivery methodologies used for large and complex projects?

A. For a number of reasons. Today, it is nearly impossible to find a single engineering/construction firm that can accept the full risk profile of large and complex projects. Few firms are financially able to take on the cost risk exposure in excess of $1B. Even if they are willing to deliver the

[308] *Construction Project Management*, Frederick Gould and Nancy Joyce, Chapter 4, page 97, 2009

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entire scope of work under an EPC delivery methodology, they will not accept the full cost or schedule risk under any sort of fixed-price or lump-sum contracting approach. Even more often, the engineering/construction firm will not take on the total EPC delivery when they would bear the full responsibility of the total execution of a large and complex project.

In addition, large and complex projects often involve multiple facilities or significant and distinct project elements, each of which has a unique risk profile, and it is extremely difficult for a single engineering/construction firm to take on these multiple facilities.

Further, it is normal for such large and complex projects to involve separate and overlapping engineering and construction sequences. Projects of Kemper-size and complexity will have multiple scopes of work underway at any one time, but each at a different phase in its particular life cycle.

Finally, large and complex projects will often require several designers or contractors that specialize in specific systems, such as control systems or wastewater treatment. Such firms are generally in high demand, which means they are less willing to accept risk beyond the warranty that what is supplied will work to the specified tolerances. In such situations, even though the scope of work may involve engineering and construction, the actual contract arrangement and delivery methodology will be more like an equipment purchase order than a true construction project contract approach or delivery methodology.

As this description demonstrates, ultimately, there is no "one-size-fits-all" contract approach or delivery methodology for any large and complex project. Thus, it is unreasonable to conclude that one contract approach or delivery method is the right answer. It therefore follows that it is unreasonable to conclude that the failure to use one contract approach or delivery method versus another would constitute imprudence.

Q. Do you have any specific examples of more flexible contracting approaches and delivery methodologies that are relevant to the approaches and methodologies that MPC employed on the Kemper IGCC Project?

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A. Yes. Kansas City Power and Light ("KCP&L") used a flexible contracting approach on the Iatan Unit 2 Project, which was named *Power* magazine's Plant of the Year for 2011.[309] As noted in the article describing the reasons for the award:[310]

> *"Once the long-lead equipment purchases were completed (over $1 billion by August 2006), KCP&L made inquiries with experienced industry contractors to assume the project lead but found little interest in constructing the plant on a turnkey basis. The challenge for contractors at the time was the rapidly increasing cost of commodities such as copper and steel plus nationwide high demand for limited journeyman construction talent for constructing new coal plants and retrofit* [Air Quality Control Systems]. *KCP&L decided to proceed with the project using a multi-prime approach combined with aggressive purchasing processes to limit the risk of future price increases. In essence, KCP&L would assume the responsibility and risk of the general contractor by using seven or eight smaller contractors to complete the balance-of-plant work on Iatan 2."*

The article also noted that KCP&L's boiler island was done under a fixed price contract approach and Engineer-Construct delivery methodology with Alstom Power; an equipment purchase contract approach to purchase the steam turbine, and a separate contract with Burns & McDonnell ("B&M") to provide all the engineering design services for the Iatan 2 Project (cost reimbursable contract approach).[311] The two projects, Iatan 2 and the Kemper County IGCC Project share many similarities:

- Both are large base load power generating plants;
- Both are large and complex projects;

[309] *Power* magazine article, "Plant of the Year: KCP&L's Iatan 2 Earns Power's Highest Honor", August 1, 2011
[310] *Power* magazine article, "Plant of the Year: KCP&L's Iatan 2 Earns Power's Highest Honor", August 1, 2011
[311] *Power* magazine article, "Plant of the Year: KCP&L's Iatan 2 Earns Power's Highest Honor", August 1, 2011

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- Both are technologically complex;
- Both were faced with similar market conditions during planning, engineering and construction; and
- Finding industry interest in accepting a LSTK contracting approach or delivery methodology was likely not going to happen.

Finally, both used a more flexible contracting approach and delivery methodology purposely fitted to the risk profiles of their respective projects.

Q. Was Pegasus-Global involved with the Iatan 2 Project?

A. Yes. Pegasus-Global was engaged by KCP&L to conduct an independent prudence audit of the management of KCP&L during the execution of the Iatan 2 Project, ultimately filing testimony with both the Kansas and Missouri utility regulatory bodies.

Q. Was the issue of the contract approach and delivery methodology addressed by either the Kansas or Missouri Commissions?

A. Yes. The Missouri Commission found that:[312]

> *"There are significant portions of Mr. Drabinski's* [Intervenor Expert Witness] *testimony on behalf of the* [Missouri Retailers Association] *that are not only flawed from a factual and analytical standpoint, but they do not factor in any way in Mr. Drabinski's actual recommendation for the disallowance of $219 million. These include Mr. Drabinski's allegations that*:
>
> …
>
> *Mr. Drabinski's hindsight based allegation that KCP&L's decision related to the Iatan Projects Contracting methodology, i.e. to perform the Iatan Project on a multiple prime and not an EPC basis, increases the Project's costs (i.e., EPC vs. Multi-Prime) or was in and of itself imprudent."*

[312] Report and Order, Before the Public Service Commission of the State of Missouri, Docket No. ER-2010-0355, page 63 – 64, April 12, 2011

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The Kansas Corporation Commission found that:[313]

> *"Moreover, much of Mr. Drabinski's analysis builds upon his perception that there was an imprudent decision to contract using a multi-prime rather than an EPC approach. As established elsewhere, we found that KCP&L did not have that option. Therefore, the Commission concludes that the 'holistic' approach used by Staff's expert … is prone to being speculative and arbitrary.*
>
> …
>
> *After considering all of the factors … we conclude that there was a lack of prudence only with respect to those amounts identified by* [Pegasus-Global's] *Dr. Nielsen. We also concluded that Staff's and* [Citizens' Utility Ratepayer Board's] *respective cases alleging a lack of prudence by KCPL were incomplete and irrelevant. As such they failed to carry their burden of proof, failed to support their conclusions, and therefore we have a right to reject this evidence* …"

It stands to reason that if a flexible delivery methodology and contracting approach was prudent on the Iatan Unit 2 Project, it could not have been an imprudent decision to choose the same type of delivery method and contracting approach for the Kemper County IGCC Project.

Q. Do you have any other recent examples of the use of flexible contract approaches and delivery methodologies by owners?

A. Yes. In July 2007, Tampa Electric Company ("TECO") was preparing to execute an IGCC unit at its Polk Generating Station Unit 6.[314] That proposed unit was to provide 647 MW of electricity

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[313] State Corporation Commission of the State of Kansas Order: 1) Addressing Prudence; 2) Approving Application in part: & 3) Ruling on Pending Requests, Docket No. 10-KCPE-415-RTS, page 32 – 33, November 22, 2010

[314] Testimony and Exhibit of Michael R. Rivers, Tampa Electric Company before the Florida Public Service Commission, page 4, July 20, 2007

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using General Electric ("GE")'s IGCC technology.[315] In his testimony seeking a CPCN for that project before the Florida Public Service Commission, Mr. Rivers noted the following:[316]

> *"Tampa Electric is planning to competitively bid the use of multiple prime contractors to execute the construction of Polk Unit 6. A construction management team will oversee and coordinate the multiple prime contractors. Tampa Electric believes this approach is more cost-effective than an Engineer, Procure and Construct ('EPC') contract, considering the size of the project as well as the current market conditions. Very few EPC contractors have the ability to handle a project of this scope and dollar value."*

Rivers also testified that TECO construction staff would serve as the construction manager for the project.[317]

Q. Are there any other project that you can cite that have used flexible contracting approaches and delivery methodologies that have elements in common with those employed on the Kemper IGCC Project?

A. Yes. The Edwardsport IGCC Project is another good example of a project that used a flexible contracting approach and delivery method. This project also has several relevant similarities to the Kemper IGCC Project. Both are large base load power generating plants; large and complex projects; technologically complex; and both were faced with similar market conditions during planning, engineering and construction during a similar time period. Most important to this discussion, both used a flexible contracting approach and delivery methodology fitted to the then known risk profiles and specific circumstances unique to their respective projects.

Q. Was Pegasus-Global involved with the Edwardsport IGCC Project?

[315] Testimony and Exhibit of Michael R. Rivers, Tampa Electric Company before the Florida Public Service Commission, pages 5-6, July 20, 2007
[316] Testimony and Exhibit of Michael R. Rivers, Tampa Electric Company before the Florida Public Service Commission, page 22 – 23, July 20, 2007
[317] Testimony and Exhibit of Michael R. Rivers, Tampa Electric Company before the Florida Public Service Commission, page 18, July 20, 2007

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A. Yes. Pegasus-Global was engaged by DEI to conduct an independent prudence audit and evaluation of the management decision-making during the execution of the Edwardsport IGCC Project. Pegasus-Global filed testimony with the IURC in that case as well.

Q. Did Pegasus-Global provide testimony regarding the prudence of DEI using a flexible contract approach and delivery methodology for implementation of that Project?

A. Yes. When asked whether DEI's use of a more flexible contracting approach and delivery method was consistent with good utility management practices I testified:[318]

> *"Yes, DEI's actions were consistent with good utility practices…conditions in the EPC contractor market did not favor DEI securing a LSTK contract from the Alliance* [GE and Bechtel] *because contractors were generally unwilling to accept any significant amount of cost or schedule risk in the late 2006/2007 period. This refusal stems from several factors, including:*
>
> - *There are a limited number of contractors that can successfully execute a megaproject as a LSTK/EPC contractor. When the qualified LSTK/EPC contractor pool is saturated with work, as it was in 2006 and 2007, it would be difficult to find a contractor willing to bid additional work on a LSTK basis given the significant level of risk which accompanies every megaproject. An article written in November 2007 summarizes the prevailing conditions:*
>
>   > *'This change of emphasis away from lump sum turnkey perhaps reflects the bargaining position of many EPC contractors in today's market and, to some extent, the increasing size and complexity of projects being tendered internationally. … Equally, with so few major EPC contractors with the know how, resources and experience to undertake*

[318] Responsive Testimony of Dr. Patricia Galloway, Indiana Utility and Regulatory Commission, Cause No. 43114 IGCC-4S1, pages 223-225, September 9, 2011

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> *such projects, funders have had to open their minds to other procurement routes (and greater risks) in the face of rising lump sum EPC prices.'*[319]

One of the original authors of the article updated his review of the construction market conditions as of May 2009:

> "*Throughout the 1990s, and early in this decade, fixed price, lump sum turnkey was the most common approach to the procurement of a major infrastructure project. However, during the boom years in construction (2002-2008), and particularly so in the overheated Middle Eastern market, a traditional fixed price EPC contract had become increasingly difficult to obtain.* ***During this period, some of the well-known and biggest EPC contractors, scarred from huge loss making ventures and expensive arbitrations on high profile projects, made a dramatic move away from fixed price turnkey, and focused on an engineering and project management based approach, where some or all of the construction risk was taken by others. … this was largely dictated by market conditions and the fact that, increasingly, the world's largest and best EPC contractors were no longer prepared to take, and given the plethora of available major projects did not need to take the traditional risks associated with contracting on a fixed price, EPC basis."***[320] **[Bold emphasis added]**

There are a limited number of megaprojects that any one EPC contractor can undertake at a time given the extremely high risk which accompanies fixed price

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[319] "Worlds Apart: EPC and EPCM Contracts: Risk Issues and allocation, P. Loots and N. Henchie, Mayer Brown, page 2, November 2007

[320] "Shifting Sands in the Economy and International Procurement Market", N. Henchie, Mayer-Brown, page 1, May 2009

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megaprojects. Even a large company like Bechtel has a limit on the amount of risk the corporation can place under contract and successfully execute.

Ultimately the choice of employing more flexible contracting approaches and delivery methodologies evolved for two primary reasons: 1) there was no interest in the market (including by GE/Bechtel) to take on the risk of offering a LSTK for the Edwardsport IGCC Project; and, 2) the risk profile of the Edwardsport IGCC Project, as a megaproject, aligned better with more flexible contract approaches and delivery methodologies."

When asked whether a LSTK contract approach and delivery methodology would have reduced risk and eventual costs on the Edwardsport IGCC Project compared to the flexible/hybrid contract delivery approach that DEI took, I responded:[321]

"No. First, Pegasus-Global knows of no industry study supporting the contention that an LSTK/EPC delivery methodology reduces costs when compared with a hybrid, flexible or multi-prime delivery approach. The OUCC and Intervenor witnesses provide no documented support for this central, underlying premise for their opinions, and in fact that statement conflicts with the combined personal experience of the Pegasus-Global team and with what Pegasus-Global has observed as accepted practice in the construction industry. The LSTK/EPC contract approach and delivery methodology is primarily a way to shift cost and schedule risk to a contractor, and in return for accepting that risk, a contractor will bid a higher cost to cover every possible impact of that risk should costs increase or schedule lengthen. Second, the ability to shift that risk is only true if the contractor agrees to accept that risk under the LSTK contract

[321] Testimony of Dr. Patricia Galloway, Indiana Utility and Regulatory Commission, Cause No. 43114 IGCC-4S1, page 225-226, September 9, 2011

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approach and delivery method. In November 2007 Mayer-Brown reported that:[322]

> *…the major EPC contractors have seen their negotiating position significantly improve in recent times. This has arguable led to a correction in market prices (profit level for EPC contractors have increased) and* ***levels of risk being transferred back to project sponsors and lenders***. [**Bold emphasis added**][323]

A turnkey (or EPC) delivery methodology that leaves the cost unfixed and the scheduled completion date floating until sometime in the future has not shifted any of the cost or schedule risk from the owner. Moreover…it would be naïve to assume that a contractor with a LSTK contract would necessarily accept responsibility for all cost increases incurred."

Q. Did DEI attempt to elicit interest in a LSTK contract approach/delivery method for its Edwardsport IGCC Project?

A. When DEI entered into a FEED Study agreement with GE and Bechtel, it engaged in parallel effort to evaluate competing IGCC alliances' offerings to ensure that DEI understood the available IGCC market from a technology, cost and operational perspective, all to be applied to future decision-making and negotiation for plant construction. As the Project progressed, DEI signed a Technical Services Agreement with the GE/Bechtel Alliance,[324] with an understanding

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[322] "Worlds Apart: EPC and EPCM Contracts: Risk Issues and allocation, P. Loots and N. Henchie, Mayer Brown, page 2, November 2007

[323] As noted earlier there is a tendency even within the industry to blur the distinction between a contract approach and a delivery methodology. An EPC contractor is one who performs all of the functions to complete a project under a "turnkey" delivery methodology. In the article the point was that EPC contractors negotiating contracts with owners had to increase leverage in the market place, enabling those EPC contractors to transfer risk which had been allocated to the EPC contractors previously, back to the owner.

[324] Testimony of Dr. Patricia Galloway, Indiana Utility and Regulatory Commission, Cause No. 43114 IGCC-4S1, page 75, September 9, 2011

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that the GE/Bechtel Alliance LSTK would provide a LSTK price.[325] Before the end of that FEED, however, the GE/Bechtel Alliance, would not take on a LSTK contract approach/delivery method for Edwardsport. In fact, it was Bechtel that suggested a more flexible contract approach and delivery methodology.[326]

MPC was investigating its options within the same timeframe. And it stands to reason, if, in the case of Edwardsport, one of the largest EPC contractors was not willing to offer this large and complex project on a LSTK basis, MPC would fare no better in the market.

It appears Southern Company chose to invest internally to assist in managing such a risk, and MPC, as one of its affiliates was the intended recipients of that foresight.

Q. Does Pegasus-Global conclude that employing more flexible contract approaches and delivery methods were reasonable and prudent decisions by MPC?

A. Yes. As the above projects described demonstrate, each project has its own set of circumstances, its own challenges and its own risks. In addition, market conditions play a significant role in what an owner's contracting and delivery options might actually be. While more flexible contracting approaches and delivery methodologies are continuing to evolve and have not yet been reduced to specific, rigid standard templates by any industry body, as is evidenced through the above examples, more flexible contracting approaches and delivery methodologies are being used to an ever-increasing degree throughout the construction industry to allow for tailoring to specific project situations, and to adjust demands in the market.[327] It is for these reasons that I

[325] February 2007 "Integrated Gasification Combined-Cycle Technology: Costs, Benefits, and Prospects for Future Use in Wisconsin," a Joint Study by the Wisconsin Department of Natural Resources and the Public Service Commission of Wisconsin, referring to what alliances can bring, which suggest a LSTK type approach: *"These alliances provide a "one-stop-shop" for utilities offering both technology and construction expertise in one package. Additionally, these partnerships are beginning to offer a project "wrap" that includes a firm price for engineering, procurement and construction, and guarantees the construction schedule, plant output, heat rate and air emissions."* (page 9)

[326] Testimony of Dr. Patricia Galloway to the Indiana Utility and Regulatory Commission, Cause No. 43114 IGCC-4S1, pages 291-292, September 9, 2011

[327] "Worlds Apart: EPC and EPCM Contracts: Risk Issues and Allocation", P. Loots and N. Henchie, Mayer Brown, November 2007

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conclude that MPC also made a reasonable and prudent decision to use a flexible contracting approach in its approach to the Kemper IGCC Project.

Q. What type of project delivery method did MPC choose?

A. As discussed earlier, MPC chose an EPC delivery method, using SCS E&CS as its EPC contractor, whereby E&CS has participated in and managed design, procurement, and construction for MPC.

At the earliest stages of the project strategy, MPC worked with Southern Company to pursue this Project. MPC knew that Southern Company had been actively investing in an internal organization with an excellent engineering and construction delivery record.[328] SCS E&CS's industry delivery record for engineering and construction of its power facilities leads the utility industry, delivering on time, and under industry cost levels.[329] E&CS has completed fifteen 2-on-1 combined cycle units for Southern Company since 2000. Southern Company has extensive experience in the construction of new power generation, including sub-critical pulverized coal, super-critical pulverized coal, nuclear, and gas-fired combined cycle and simple cycle technologies. Based on its market research, E&CS's delivery record and the fact that E&CS would do this work at cost, MPC chose to use SCS's services and create an integrated MPS and SCS team. In doing so, MPC evaluated its options and chose a multi-prime delivery methodology, with E&CS as the EPC contractor, using a mix of contracting approaches (including lump sum, fixed price, labor broker, and cost reimbursable) – an approach that SCS had used successfully on prior large construction projects, and which, as I have demonstrated earlier, is becoming common in the industry for large and complex projects.[330]

Q. What did it cost MPC to use SCS's E&CS group as its EPC contractor?

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[328] Mississippi Power Company, Kemper County IGCC, Volume 1 of 5, Transcript of Proceedings, Phase II, MPSC Docket No. 2009-UA-014, Exhibit TOA-2, February 1, 2010

[329] Mississippi Power Company, Kemper County IGCC, Volume 1 of 5, Transcript of Proceedings, Phase II, MPSC Docket No. 2009-UA-014, page 1065, February 1, 2010

[330] Mississippi Power Company, Kemper County IGCC, Volume 1 of 5, Transcript of Proceedings, Phase II, MPSC Docket No. 2009-UA-014, pages 1313-1314, February 1, 2010

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A. There have been a host of questions regarding issues around the cost to MPC to use SCS's services. To be clear: MPC is Southern Company, and Southern Company is MPC. If you go to Southern Company's web site, you will find a list of all of Southern Company's utilities – Alabama Power, Georgia Power, Gulf Power and Mississippi Power, are all on that list, and under each logo, which matches the Southern Company logo, is the phrase, "A Southern Company."[331] Understanding this point is important: Southern Company has nothing to gain from charging MPC overhead fees, charging additional hours, or otherwise being anything but efficient, supportive and helpful – if it did, it would only negatively affect its own bottom line.

Southern Company has been growing steadily, and it prides itself in being a "reliable and rewarding long-term investment."[332] For several years running, Fortune Magazine has also put Southern Company in the top five on its "World's Most Admired Companies" list in the category of electric and gas companies.[333]

With this as a backdrop, it would make sense that Southern Company works to identify opportunities to lower its costs and at the same time both lowering the cost to its customers while maximizing its profits for its shareholders, and for the company as a whole, a whole that includes MPC.[334] This relationship and these larger corporate objectives are the main reasons that Southern Company utilizes SCS E&SC to provide engineering, procurement and construction services to all of the Southern Company's operating companies, including MPC.[335] Under the Amended and Restated Agreement between SCS and MPC, SCS provides a host of services at cost to MPC.[336]

[331] See http://www.southerncompany.com/about-us/leadership/home.cshtml
[332] See http://www.southerncompany.com/about-us/facts-figures/home.cshtml
[333] Fortune Magazine, *World's Most Admired Companies*, March 22, 2010; March 21, 2011; March 19, 2012
[334] MPC has been a member of the Southern Company family since its creation in 1947, http://www.southerncompany.com/about-us/history/home.cshtml.
[335] Testimony of Thomas Anderson, On Behalf of Mississippi Power Company, Mississippi Public Service Commission, Docket No. 2009-UA-014, page 16, December 7, 2009
[336] Amended and Restated Agreement between Southern Company Services, Inc. and Mississippi Power Company, January 1, 1984

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As one of the largest power companies in the nation, Southern Company has been building power plants for many years. It has worked to find the most efficient, cost effective, and organized way to do this, and found that investing in a group, which is E&CS, whereby lessons learned would be accumulated by a group of people that deliver power projects as their primary focus, was the surest way to do this.[337] Again, E&CS provides its services to its affiliates <u>at cost</u>.

Q. Does MPC and Southern Company have experience designing, constructing and operating large-scale electric generation projects?

A. Southern Company was established in 1924 and was established as the holding company for four utilities including MPC since 1947.[338] As a power generating company that has been in business over 90 years, Pegasus-Global found that MPC and Southern Company both have vast experience in designing, constructing and operating large-scale electric generation projects. As noted by Ms. Kimberly Flowers in her testimony: [339]

> *"The Southern Company is one of the largest electric generation operators in the world, owning and operating 37 fossil fuel plants, 33 hydroelectric plants and three nuclear plants representing over 40,000 MW in total that provide electricity to over 4.3 million customers spanning over 120,000 square miles. MPC constructed, owns and operates five of those plants and has been in the electric generation business over 82 years.*
>
> *MPC also has a track record of excellence in building and operating generating plants, and our customers have received the benefit of those skills. Most recently, MPC's Plant Daniel Units 3 and 4, were constructed in 2000 and comprise two of the fifteen natural gas combined cycle units that the Southern*

[337] Testimony of Thomas Anderson, On Behalf of Mississippi Power Company, Mississippi Public Service Commission, Docket No. 2009-UA-014, page 7, December 7, 2009.

[338] www.mississippipower.com Mississippi Power established "at midnight on December 31, 1924"; In 1947 "Southern Company established as the holding company for four utilities including Mississippi Power"

[339] Direct Testimony of Kimberly D. Flowers, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, pages 52-53, January 16, 2009

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Company has designed, built and operating since 2000. These Daniel units were the 'first generation' of combined cycle technology, when this technology was relatively new in the United States. Nonetheless, the Company constructed the Daniel Units 3 and 4 combined cycle units significantly under budget when compared to the estimates provided in the initial certificate filing, saving our customers approximately $30 million in capital expenditures."

The testimony of Mr. Thomas Anderson added the following: [340]

"From 2000-2007, the Company built fifteen combined cycle units and eleven simple cycle units across four states. Every one of these projects met the scheduled commercial service date, and all were under budget with the exception of two combined cycle units that were 1% over budget. The Company is keenly aware of the need to provide thoroughly developed and accurate cost estimates to this Commission for this Project."

Q. How is construction of the Project being managed?

A. As indicated above, E&CS is the EPC for the Kemper IGCC Project and it provides engineering, procurement and construction support services. Ms. Kimberly Flowers explained in her testimony that:[341]

"SCS E&CS provides engineering, procurement and construction (EPC) service to all of the Southern Company operating companies including MPC… ensuring that factors such as land, the site, infrastructure, training, and future operations are accounted for when undertaking the Project.

Upon review of the conceptual design drawings and documentation and preparation of the preliminary schedule for the Project, E&CS will develop an

[340] Phase II Rebuttal Testimony of Thomas O. Anderson, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, pages 3-4, January 5, 2010

[341] Direct Testimony of Kimberly D. Flowers, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, pages 54-55, January 16, 2009

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overall construction strategy. This strategy will include a crane and rigging plan; a site-use plan; and a plan for contracting the work. E&CS will then divide the work into various labor inquiry packages in order to obtain bids from various, qualified installation contractors. Examples of these packages include: survey, communications and data cable installation, access road, lay-down yard and parking lot construction, road construction, building construction, deep foundations, concrete, prime erection contractor, and substation work."

Q. Is the E&CS group really qualified to act as an EPC Contractor?

A. Yes. In my December 13, 2013 Supplemental Direct Testimony, I testified extensively and in detail about the qualifications of the staff of both MPC and SCS. I found that the team delivering the Kemper IGCC Project working for both MPC and SCS are highly qualified individuals. To summarize from my earlier testimony:[342]

- **Thomas Anderson** – Vice President, Generation Development for MPC had the necessary qualifications to oversee the management of the Kemper IGCC Project. Mr. Anderson is an electrical engineer with over 30 years with Southern Company. He continued with SCS in its nuclear development and became the Engineering General Manager of Georgia Power Company's Plant Hatch in 1983. Mr. Anderson's tenure with Southern Company has essentially allowed him to become involved in every aspect of power plant construction and utility marketing, finance and operations as well as working with the Southern Company's holding companies, including GPC and MPC. As Mr. Anderson indicated in his testimony, "*I have personally been involved with the twenty-six units Southern Company has designed and constructed from 2000 through 2007. I have*

[342] Supplemental Direct Testimony of Dr. Patricia D. Galloway, On Behalf of Mississippi Power Company, Docket No. 2013-UA-189, pages 42-46, December 13, 2013

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had direct accountability for nineteen of them."[343] Mr. Anderson's experience and expertise provided a reasonable foundation to manage the Kemper IGCC Project.

- **John Huggins** – Startup General Manager, SCS (now Vice President, Generation Development and MPC) is qualified and had the necessary background and experience to oversee the Kemper IGCC Project in its current phases as well as his role as the Startup General Manager. Mr. Huggins has over 38 years of experience, is a mechanical engineer. In addition to his many other responsibilities over his career, Mr. Huggins was the Engineering Project Manager for Miller Unit 2, a 660 MW coal fired generating unit for APC, and had responsibilities for the design and procurement activities.
- **Debbie Ladner** – Project Manager, MPC. Ms. Ladner is responsible for ensuring all Project commercial, regulatory and technical interfaces are managed and manages the Project office. Pegasus-Global found Ms. Ladner's previous experience as an IT Business Analyst with both MPC and Southern Company to set technology strategy and implement technology solutions pertinent and complimentary to her role on the Project.
- **Aaron Abramovitz –** Project Manager, MPC. Mr. Abramovitz is responsible for asset management across accounting, finance, planning and regulatory functions. In the past, his experience and expertise as a Financial Analyst for SCS in the cost, finance and strategic planning areas provides a reasonable foundation for the necessary experience and expertise for his role as a MPC Project Manager.
- **Stacey Miles –** Generation Development Manager, MPC. Ms. Miles is responsible for the overall management and coordination across engineering, procurement and construction, transmission and environmental areas. This includes managing budget and schedule metrics and meeting the needs of internal and external stakeholders.

[343] Phase II Rebuttal Testimony of Thomas O. Anderson, On Behalf of Mississippi Power Company, page 14, January 5, 2010

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- **Kelli Williams –** Site Manager, SCS. Kelli Williams is specifically responsible for the construction of the combined cycle and balance of plant for the Project. Previously, Kelli Williams was the Assistant Site Manager on the Barry Environmental Project and also served as Manager for the Construction Contracts Strategy Group.

And, as Mr. Thomas Anderson summarized in his testimony:[344]

> *"SCS is the service company created to provide at cost services to all Southern Company affiliates, including MPC. E&CS is the organization within SCS charged with providing engineering, procurement and construction support services. Under this structure, SCS does not charge a profit or risk premiums in providing EPC services to MPC, and, as presented on my Exhibit___(TOA-4), filed confidentially, our studies have shown that SCS provides these services at a cost below that of comparable third-party engineering firms. This model has been in use for decades, and was the same model used to build Southern Company's fifteen combined cycle units and eleven simple cycle units between 2000 and 2007. This model has consistently led to installed costs per kW of new generation that are significantly below national averages. The relationship between MPC and SCS is governed by operating agreements, copies of which were provided in the Company's response to Entegra Data Request 1-12."*

In other words, not only is the E&SC group qualified to do this work, Southern Company has successfully used this group for years to design, procure and construct facilities for Southern Company and its affiliates. Southern Company made a reasonable and prudent decision to invest in a delivery-focused group where lessons learned can be accumulated and applied to new situations for Southern Company and its affiliates such as MPC.

Again, in Mr. Thomas Anderson's own words:[345]

[344] Phase II Rebuttal Testimony of Thomas O. Anderson, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, page 5, January 5, 2010

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> *"This is not our "'first rodeo.' We are well aware of the issues affecting successful construction of large generation projects, and as discussed in our filed testimonies in this proceeding, have included significant risk mitigation and protection measures in the Project's development. The Project, including its cost, schedule, design and construction estimates, is well developed and has been conducted by engineers, analysts and managers with significant experience and expertise. That being said, we will continue to assess the Project, its risks and methods to optimize the schedule, cost and performance, but to improve on them, and to do so without any sacrifice to safety, quality and reliability. Based on this philosophy and on our proven record, we are confident the Project can be successfully executed as proposed."*

i. PROJECT CONTRACTING METHOD

Q. Can you describe the contracting method that MPC employed?

A. As mentioned earlier, MPC used a flexible contracting methodology. MPC employed a team approach to identify packages and to procure contracts. This team consisted of MPC's Contracts and Accounting Research Departments, SCS's Contracts Department, and engineering support and recommendations from the E&CS, and the IGCC Project Team. The team worked from a set of procedures standard at SCS, and modified these to meet the requirements of the Kemper IGCC Project.[346]

IM URS reviewed the Southern Company Contract Guidance Manual, and had this to say:

> *"Southern Company's Contract Guidance Manual provides an excellent and comprehensive set of instructions for contract development, and administration.*

[345] Phase II Rebuttal Testimony of Thomas O. Anderson, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, page 14, January 5, 2010

[346] Supply Chain Management, Procurement Policies & Procedures, Contracts Manual, Issued January 2007, Revised May 2013

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> *It is one of the best presentations of this material URS has seen and exceeds the general accepted procurement best practices."*[347]

The team crafted workflows and conducted training, ensuring that each of their roles and responsibilities were clearly understood.[348] This team worked together to recommend the contracting strategy, which was presented to the MRB. The team identified the type of contract to use; they based their recommendations on the type of scope that was needed to be procured, and they used all the various contract types at their disposal to ensure risks were properly allocated. In addition, they used contract provisions appropriate to the scope to be procured (many contracts were lump sum with bonus penalty clauses or liquidated damages, others unit price, T&M, and vendor contracts). Whenever possible and wherever appropriate, the team worked to shift risk to their contractors. The recommendations regarding the choice of contract type and contract provisions to be included in those contracts was determined through collaboration with the team outlined above and, for contracts of significant magnitude, these recommendations were brought forward to MRB meetings for discussion and decision.[349]

It is E&CS that identifies a need for a specific scope of work to be implemented. Below is a general outline of the contracting process steps that follow E&CS's identification of need, though the process is often iterative given the need to determine the appropriate type of contract for the service to be provided, the specific provisions to ensure quality and/or on-time delivery, the pool of contractors for a particular service, and need to determine internally the risks associated with the work and identification of the appropriate risk sharing within the terms of the contract. Within its workflows, checks and balances are imbedded in the contract decision-making process.

- After the scope is determined, a bid list is created and reviewed by the Kemper PMT.

[347] URS Corporation, Due Diligence Report, Kemper IGCC Project, Mississippi Public Service Commission, page 124, April 29, 2011

[348] Kemper PO/Contract Process; Kemper Procurement Process for Engineered Items (Undated)

[349] See, Management Review Board Meeting Presentations for May 19, 2010 and April 18, 2012 for examples.

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- The SCS Contracts Department identifies an appropriate procurement method (vendor contract, contractor bids, labor broker, etc.), and runs the bidding process.
- E&CS performs the engineering and construction evaluation of bid proposals, and documents the contractor selection justification.
- The Kemper Project Manager coordinates approval of the contractor/vendor selection with appropriate management (the Vice President for MPC, the Kemper PMT and others).
- The MPC Contracts Department retains all documentation executed by MPC, and coordinates with SCS Contracts in the follow-on work.
- The SCS Contracts Department prepares a draft contract and coordinates reviews from the Kemper PMT, MPC Contracts and Accounting Research Departments, and their attorneys; it then schedules and manages negotiations with the contractor, and takes the lead on contract draft revisions.
- During contract drafting, the Kemper PMT, working with the Contracts Departments, secures appropriate MPC approvals, which, depending on the contract value may require Board of Directors review and approval. Each and every contract over $1M is signed on behalf of MPC by the MPC Chairman of the Board, President, Vice President, Comptroller, Treasurer or Secretary and countersigned by an Assistant Secretary or an Assistant Treasurer.
- The Construction Manager Designee ensures the scope of work, technical specifications, drawings, etc. are correct, and that the latest agreed terms are present prior to execution.
- MPC Accounting Research then reviews the final contract, and sends a pre-signature accounting review to MPC Contracts and the Kemper PMT.
- MPC Contracts then reviews the final contract for compliance and notifies all parties when all of the reviews are complete.

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- SCS Contract coordinates the execution of the contract, and MPC Contracts ensure the appropriate documentation has been completed, while MPC Accounting Research takes over the accounting functions working with E&CS to manage the contract during payment for execution.

Each group is tasked with the work most appropriate for it, allowing MPC to make good use of the resources available to it, while maintaining a strong hand in the work and decisions that were moving forward.

Q. Was the contracting method examined as part of the Project's Internal Readiness Review?

A. Yes it was. As noted within the Internal Readiness Review:[350]

- *"**MPC Contract Development:** Consistent requirements had not been developed to be included with all contracts covering such areas as reporting, performance metrics, invoice documentation, etc…Furthermore, MPC has not finalized a documentation strategy to facilitate efficient and effective retention of filings and contracts.*

  ***Management Response:** Project management is ensuring that standard Southern Company contract language is included in all contracts related to the IGCC project. Additions to the standard contract verbiage will be addressed by the Supply Chain organization. Project management retains a copy of all contracts pertinent to the IGCC project, regardless of whether the contract is developed by MPC or by SCS. Management will work with the Contract Administration group in Supply Chain to ensure that they are aware of all contracts."*

Q. Is MPC actually involved in the contract decision-making? At what level?

[350] Mississippi Power Company, Kemper County IGCC Readiness Review, Report No. GEN2010-02, page 7, December 17, 2010

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A. Yes, MPC is extensively involved in all of the contract decisions for the Kemper IGCC Project. As outlined above, MPC's Contracting and Accounting Research Departments were both integrally involved in the contract processing and administration. But more importantly, risk and contract strategy was regularly discussed and decisions were made at MRB meetings with regard to contracts of significant complexity, risk or magnitude. As I discussed in my Supplemental Direct Testimony, the MRB is a senior management review board that provide oversight and guidance to the Project. The MRB is chaired by the President and CEO of MPC and membership includes senior management from MPC as well as certain key senior management from SCS (Vice Presidents from E&CS, Research and Environmental Affairs, and Finance).

While recommendations were made by the contracting team, final decisions concerning the Project's significant contracts were not made by them, but were presented review at Production Team meetings, and taken to the MRB where they were extensively reviewed and approved or authority granted to and recommendations made to the MPC, Vice President of Generation Development.

MPC senior management, executive management, and the Board of Directors were engaged in important Kemper IGCC Project contracts, particularly in strategic contract decisions.

Also, as noted above in the discussion of contracting process, each and every contract with a value of over $1M was signed and countersigned by a member of MPC's executive management (President, VP, Secretary, etc.)

Q. Does MPC include any unique contract provisions that are not standard in the industry?

A. Although not unique, MPC does include some provisions that have only recently been seen with regularity in construction contracts. Included in appropriate contracts (design, fabrication and delivery of equipment, for example) are requirements for schedule, progress and mitigation

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reporting. This is something not seen throughout the industry, though the industry is beginning to move in this direction. An example of such requirements is shown below:[351]

> *"12.5.1.3 The Contractor shall submit by 10:00 AM each Tuesday, an electronic and hard copy of the entire updated Critical Path Method ('CPM') schedule (P3 3.1 or P6 Format). The CPM schedule shall be **resource loaded**, activity numbering and code structure shall be consistent with the Purchaser's Work Breakdown Structure ('WBS'), coding structure, commodity code list and field name selection. Appropriate activities in the schedule shall be resource loaded with both man-hours and quantities.*
>
> *12.5.1.4 A weekly progress report shall be submitted no later than 10:00 AM each Monday morning. The Contractor shall provide one (1) hard copy and one (1) electronic copy (Microsoft Office format) of this report. The report shall include the following:*
>
> *a. A written synopsis of the Work performed since the previous report date, the issues encountered and the resolutions recommended or implemented, and the planned Work for the following week;*
> *b. Name and craft of each employee currently working on the site…;*
> *c. Actual Progress completed versus planned graph by area;*
> *d. Quantity progress curves and Work measurement reports;*
> *e. Material delivery status;*
> *f. Two-week look ahead schedule;*
> *g. Actual man-hours worked…;*
> *h. Safety statistics;*

[351] Siemens Contract No. 17847 for Generator Step-up Transformers at Kemper County IGCC, Section C, pages 14-15, January 18, 2011

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i. Updated monthly cash flow chart for the remainder of the entire job …;

j. Copy of Contractors weekly safety meeting minutes with attendance sheet;

k. Schedule of major construction equipment;

l. Craft labor…turnover rates;

m. Current personnel list…;

n. Mississippi labor, materials and equipment dollars broken down by zip code for the portion of Work performed during the month…

…

12.5.1.8 The Contractor shall submit reports of unexpected variations in Work conditions or discovery of variances in planned installation.

…

12.5.1.13 The Contractor and the Purchaser's field representative, prior to the start of the Work, shall agree upon the format of these reports. Failure to reach an agreement shall be grounds for termination of the Contract."

This comprehensive requirement ensured that E&CS would have the information it needed to manage the work, make adjustments if there were delays, oversee each of the contractors and make informed decisions about actions that might need to be taken.

Q. Does MPC use liquidated damages clauses?

A. Yes. In appropriate contracts, penalty bonus or liquidated damages clauses were used. An example of one of these clauses follows: [352]

"41.0 LIQUIDATED DAMAGES FOR SUPPLIER'S LATE DELIVERY

[352] Performance Contractors, Inc., Contract No. 31277 for KBR Designed Large Bore Piping at Kemper County IGCC, Schedule B, pages 18-19, November 20, 2012

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> *41.1 Time is of the essence for all schedules stated in the Contract. The Parties agree that the Company will suffer large financial losses if all Equipment is not delivered to the Destination Point on or before the Contract Delivery Dates(s)…Therefore, it is agreed that the Supplier will pay…liquidated damages…"*

In this particular contract, damages were to be calculated from percent of spools delivered by the Contract Delivery Date, as well as the number of spools delivered later than that date, increasing damages as the number of days late increase.[353]

Each contract has specially crafted bonus and penalty provisions or liquidated damages clauses to match the scope and risk associated with that particular work. Liquidated damage clauses have been tied to a variety of requirements including but not limited to:

- Schedule – many types of schedule milestones were employed, specific to each contract (quantities, percent complete, delivery dates, successful startup dates);
- Meeting identified specifications; and
- Meeting safety goals and standards.

Q. Did MPC conduct audits of the contracting process and procedures used on the Kemper IGCC Project?

A. Yes. Regular audits were conducted to ensure compliance was maintained in the management of the contracts on the Project.

Q. Can you summarize some of the findings identified in Project audits on the contracting of the Kemper IGCC Project?

A. Yes. As an example, a Contract Strategy and Development Audit was conducted from January 1, 2010 through May 31, 2011 to examine the compliance of contract strategy and development

[353] Performance Contractors, Inc., Contract No. 31277 for KBR Designed Large Bore Piping at Kemper County IGCC, Schedule B, pages 18-19, November 20, 2012

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activities with applicable company policies and procedures, including the Project Procurement Plan. The only reportable finding identified by the audit team was:[354]

> *"Files used for storing bid documents submitted by suppliers on the shared drive are accessible by individuals outside of SCS Supply Chain."*

MPC's management response was communication and retaining addressing the proper processes for bid transmittal, as well as the establishment of a secure electronic folder to transmit engineering equipment bids to the appropriate Project Engineers.

In another example, a Time and Materials Invoice Audit was conducted from March 1, 2011 through October 31, 2011, and was performed to assess the potential for inaccurate billings and the potential that time and material invoices may not conform to contract terms. The results of this audit found:[355]

> *"…nothing was noted that would indicate applicable processes and internal controls are not adequately designed and operating effectively to provide reasonable assurance of achieving related business objectives."*

Q. It appears that there are a large number of contracts on this Project. Why is this?

A. Having control of contract packages gave MPC a distinct advantage in its ability to ensure that work would go to Mississippi labor, businesses and service providers as requested by the MPSC.[356] The preparation of packages internal to the Kemper PMT made it possible to have packages of work that could be bid locally.

MPC appears to have made giving work to locals a core value in its contracting strategy, though MPC continued to follow its procedures, awarding to the lowest bidder that could demonstrate the highest quality. MPC reported regularly on the total amount of contracts awarded to Mississippi

[354] Mississippi Power Company, Kemper Project Contract Strategy and Development Audit, Report No. GEN2011-23, October 7, 2011

[355] Mississippi Power Company, Kemper Project Time and Materials Invoice Audit, Report No. GEN2011-37, March 21, 2012

[356] Mississippi Public Service Commission, Order, Docket No. 2009-UA-014, page 23, May 26, 2010

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companies as well as amount of craft labor employed that called Mississippi home.[357] As of the March 2013 MPSC Status Report, it was reported that $777M in contracts had been awarded to 323 Mississippi companies.[358] Even more impressive, in the month of February 2013, 1,603 laborers working on the Project were Mississippians, representing a significant amount of the total work force.[359]

To achieve these remarkable numbers, MPC employed a strategy of connecting with the community, working with local businesses and adding provisions to its contracts to encourage them to use local workforce and suppliers whenever possible. An example of these contract provisions follows:[360]

> *"1.1.3 In recognition of the Mississippi Public Service Commission's order approving the Project, the Contractor is encouraged whenever possible to utilize Mississippi labor, resources and services during its performance of its obligations under this Contract…*
>
> *…*
>
> *1.1.5 The Workforce Investment Network ("WIN") in Mississippi is an innovative strategy designed to provide convenient, one-stop employment and training services to employers and job seekers. MPC and Southern Company Services, Inc. are supportive of this strategy and strongly encourage the Contractor to utilize this approach. More information is available at this link: http://www.wininmississippi.org/index.html"*

Q. Did MPC develop a Project-specific procedure to assist in managing the large number of contracts on the Project?

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[357] See, Management Review Board Meeting Presentations for October 6, 2010 (page 13), June 23, 2011 (page 26), February 16, 2012 (page 14), and March 14, 2013 (page 15) for examples.
[358] Mississippi Power Company, Kemper IGCC Project Monthly Status Report, Through March 2013
[359] EPC Status Production Report, page 291, March 19, 2013
[360] Siemens Contract No. 17847 for Generator Step-up Transformers at Kemper County IGCC, Section C, page 2, January 18, 2011

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A. As I discuss in **Section V.F.1.** of my Rebuttal Testimony, initially procurement was addressed within the Project Management Plan ("PMP"). As the Project developed, MPC recognized that the procurement itself was complex enough that dedicating a separate Project-specific policy to procurement would be beneficial in executing the Project and as a result the Project Procurement Plan was implemented.

Q. How is the Project Procurement Plan distinguished from the PMP and what does it include?

A. The Project Procurement Plan defines its purpose as follows:[361]

> *"This instruction provides specific oversight, controls and guidance for Kemper related procurement activities. This Instruction supplements Kemper Desktop Instruction 1.0 – Project Management Plan, as it relates to procurement activities."*

As noted earlier, the original PMP included a detailed section covering procurement activities which was segregated into this separate procedure as part of the revision to the PMP. The Project Procurement Plan is laid out in a manner similar to the PMP and includes sections on the background of the Project and the purpose of the document. It goes on to define the roles and responsibilities of project management personnel as it pertains to procurement activities, noting that MPC Generation Development has responsibility for the overall procurement process on the Project and also establishing specific roles and responsibilities for both MPC Supply Chain Management ("SCM") and SCS SCM. MPC SCM was specifically noted to manage and maintain the procurement processes for MPC Transmission, MPC Corporate and Liberty Fuels. SCS SCM was noted as being, *"responsible for the procurement of equipment, materials, and*

[361] Mississippi Power Company, Kemper County IGCC Project, Project Procurement Plan, Desktop Instructions, Rev. 0, page 2, August 12, 2011

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services related to design, construction, and commissioning of the Kemper Project."[362] Also noting that, *"SCS SCM will leverage their Southern Company system-wide experience in support of Kemper procurement activities."*[363] The Project Procurement Plan also explains the procurement roles and responsibilities of E&CS, MPC Transmission and MPC Fuel Services.

MPC SCM serves as the official department of record for all MPC contracts related to the Kemper IGCC Project, while SCS SCM serves a similar role for all SCS contracts related to the Project. MPC SCM maintains a log of pertinent information related to all contracts and any corresponding amendments/change orders which serves as the source to track and report data related to Mississippi awarded contracts.

The Project Procurement Plan also provides a section dedicated to contracts and contract administration guidance. This section noted that:[364]

> *"In some instances, after the completion of the competitive bidding process (completion and approval of a vendor recommendation), but before final contract terms and conditions are finalized, it may be necessary to allow suppliers to begin certain activities in order for them to meet required Project deadlines. In order to facilitate this process, an LNTP* [Limited Notice to Proceed], *Notice to Proceed (NTP), Award Letter, or similar document can be utilized to provide limited dollar authorization to a supplier."*

As noted by this procedure, the majority of contracts are executed with a MPC contract, unless such services fall under E&CS's scope; examples of these contracts include the KBR engineering services contract which is highly specialized for the GI design, and for contracts under $100,000 associated with construction management activities (*e.g.* local utilities, fencing, temporary

[362] Mississippi Power Company, Kemper County IGCC Project, Project Procurement Plan, Desktop Instructions, Rev. 0, page 6, August 12, 2011

[363] Mississippi Power Company, Kemper County IGCC Project, Project Procurement Plan, Desktop Instructions, Rev. 0, page 6, August 12, 2011

[364] Mississippi Power Company, Kemper County IGCC Project, Project Procurement Plan, Desktop Instructions, Rev. 0, page 13, August 12, 2011

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structures, etc.). Such contracts may be executed on a SCS contract in accordance with SCS SCM procedures.

The Project Procurement Plan also includes the processes for contract and purchase order revisions and change order approval requirements. An example of a potential change is provided which notes:[365]

> *"A piling contract covers the installation of both 18" by 30' and 24" by 30' concrete pilings. Field conditions and detailed design information determine that several of the 24" by 30' pilings must now be 30" by 50'. This change is to the same equipment and subject to the same material specifications in the contract, and is due to the actual field conditions of the project. As such, it does affect price and scope of the contract, but it does not materially change the goods being provided under the contract, nor does it change the contractual business obligations of MPC, so this change would be approved within SCS approval requirements as a FWA* [Field Work Authorization] *at the Project site."*

Q. Was it a prudent decision to separate the Project Procurement Plan from the PMP?

A. Separating the Project Procurement Plan from the PMP into its own procedure was a prudent decision based on the actual circumstances observed on the Project, notably the large number of contracts necessary to complete the work. As the Project Management Institute ("PMI") notes,

> *"A procurement management plan can be formal or informal, can be highly detailed or broadly framed, and is based upon the needs of each project."*[366]

In addition, the Project Procurement Plan is still supplementary to the revised PMP, and as such provides added benefit to the Kemper PMT in executing the Project.

2. HEAVY HAUL UTILITY AND BRIDGE CROSSINGS

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[365] Mississippi Power Company, Kemper County IGCC Project, Project Procurement Plan, Desktop Instructions, Rev. 0, page 15, August 12, 2011

[366] Project Management Institute, *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fifth Edition*, page 367, 2013

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Q. Have you read and are you familiar with MPSC's witness URS and its conclusions contained in its March 7, 2014 Prudence Report regarding MPC's decision-making in regard to heavy haul utility and bridge crossings[367]?

A. Yes, I am.

Q. Can you explain the issue URS had regarding this decision?

A. Yes, URS noted in its report that the decision to assign responsibility for utility and bridge crossings may have been imprudent and required additional explanation. Specifically, URS noted that:[368]

> *"The end result of this decision was that the vendors failed to identify many utility interferences (inadequate road clearances) and did not properly coordinate the required bridge crossing approvals with the local authorities having jurisdiction. MPC was forced to intervene on behalf of its supplier to resolve these issues, which added additional project costs and resulted in delayed delivery of some critical equipment requiring implementation of schedule work arounds."*

Q. Do you have any overall observations regarding MPC's decision-making process and the decisions to intervene on behalf of its suppliers to resolve the issue of utility interference and coordination of required bridge crossing approvals to ensure delivery of oversized equipment to the Kemper IGCC Project job site?

A. Yes. There are two sets of decisions that Pegasus-Global investigated in this regard: 1) MPC's decision to move the utility lines necessary to allow oversized equipment to be transported to the job site; and, 2) MPC's decision to coordinate with the Mississippi Department of Transportation ("MDOT") and haulers to expedite MDOT-required oversized load permits. In Pegasus-Global's review of MPC's documentation, Pegasus-Global found that both of MPC's decisions, to move

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[367] URS Corporation, IM Prudence Report, page 35, March 7, 2014
[368] URS Corporation, IM Prudence Report, page 35, March 7, 2014

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utility lines and to coordinate MDOT permits, reasonable and prudent. I will explain these conclusions in detail in the discussion that follows.

Q. Have you evaluated any of the technical detail regarding these decisions, such as the height or load requirements or the execution of the construction work to allow for delivery to the Kemper IGCC Project?

A. No, Pegasus-Global has focused its analysis on the reasonableness of the decision-making process and the management decisions MPC made.

Q. When did MPC know that there were utilities that would have to be moved to allow oversized equipment to be transported to the Kemper IGCC Project site?

A. Early in the Kemper IGCC Project planning, during the FEED Study, MPC studied the transportation network that would be necessary to get materials to the job site.[369] The transportation study that was conducted identified the alternatives available to MPC's contractors for transportation routes and noted the issues and benefits associated with each of the alternatives. The report recommended that, to accommodate heavy/oversized equipment, "*the project focus on maximum utilization of the US inland waterways system in the greater Mississippi basin,*"[370] which the Kemper PMT did do. The report also recommended that this route be taken to so that permits would only have to be obtained in Mississippi for oversized loads. Though the report mentions that in a few locations it was possible that road signs or overhead utilities and heavy loads might need to be taken into consideration, there were no fatal flaws to this route plan.[371] Further, during the transportation study, MPC conducted interviews with several well-known equipment haulers and handlers to get their views on the issues of moving large equipment to the Project site, contractors such as Barnhart Crane and Burkhalter Rigging.[372]

[369] Kemper County IGCC Project FEED Document, Appendix S.5 Traffic Study, August 2009
[370] Kemper County IGCC Project FEED Document, Appendix S.5 Traffic Study, page 5, August 2009
[371] Kemper County IGCC Project FEED Document, Appendix S.5 Traffic Study, August 2009
[372] Kemper County IGCC Project FEED Document, Appendix S.5 Traffic Study, pages 3-4 and 12, August 2009

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Based on the study, MPC undertook several projects along the major transportation route into the Kemper IGCC Project site to enhance equipment and materials movements including reconstructing a substandard intersection, making turn lane modifications and adjusting signs and utility lines along sections of Highway 16 and Highway 493.

It is standard contracting protocol to have contractors retain responsibility for getting equipment to the job site, though the cost of shipment is paid by the owner, and from the outset, this Project was no exception. This approach is also reflective of good utility practice as it appropriately places the risk of delivery on the entity best able to manage that risk, the supplier, while the cost of transportation rests with the owner. However, several contractors that were providing oversized equipment to the job site negotiated exclusions in their contracts specifically for utility line remediation.[373]

As part of MPC's contracting, procurement and construction delivery protocols, it assigns an "Expeditor" to each contract. One of the roles of the Expeditor is to stay connected with the contractor, identifying the status of designs and/or materials, and to determine if products are going to be delivered in the time frame needed and contractually required to meet the Project's schedule. These Expeditors began to hear from some contractors that they were worried about utility lines and MDOT permit requirements late in 2011.

Q. How did MPC make the decision to move the utility lines?

A. MPC looked at the number of delivery items that would be affected by the utilities that would have to be moved, and the number of contractors that would be affected. MPC found that it had more than 40 equipment deliveries that were higher than 21 feet tall that were to be delivered between April and November of 2012. This equipment would affect more than 400 crossings, and effect five utilities (4 County, AT&T, TVA, Cable TV – Starkville, and EMEPA).[374] When the costs were estimated, MPC found that the total relocations were in the range of $4M. MPC

[373] EPC Status Production Meeting Final, pages 146-147, February 23, 2012
[374] EPC Status Production Meeting, pages 143-147, February 23, 2012

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believed that the costs associated with not taking the lead on these relocations would potentially cost the Kemper IGCC Project many more millions, and significant schedule slippage. Rather than experience the potential costs of schedule slippage and contractor conflicts, MPC made the decision to move forward to coordinate the utility moves.

Q. Was it reasonable for MPC to move the utility lines in light of other alternatives?

A. Yes. Once the magnitude of the coordination issue was understood, MPC had to move quickly to limit the impact on schedule, and began working with the utility companies as soon as it understood the need.[375] By February 2012, MPC had made payment to 4-County and AT&T to begin studies to prepare for utility moves, made payment to EMEPA for construction to address their utilities, and determined it would communicate the cost sharing arrangements to their vendors after all the costs were determined, and cost sharing was calculated. E&CS also determined that contractors would need to have storage near the barge site, so that equipment that was too large to make the journey until lines were relocated could be efficiently and safely stored until the transportation route was prepared.[376] In light of the need to maintain schedule, there were no other viable options for consideration or time to do so.

Q. Was it reasonable for MPC to assume some of the costs for the utility relocation versus the contractors?

A. Yes. MPC estimated that the cost of moving all utility lines necessary to transport all equipment to the job site was approximately $4M. By December 2012, all utility relocations and heavy hauls had been completed at an actual cost of and MPC had identified a plan for sharing these costs with vendors. Negotiations with vendors are ongoing, but with successful completion of these negotiations. As stated earlier, at the time E&CS made the decision to move the lines, it appeared that to not do so would have cost the project months of schedule loss, equating to potentially many more millions of dollars.

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[375] EPC Status Production Meeting, page 130, January 24, 2012
[376] EPC Status Production Meeting, page 147, February 23, 2012

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Q. Were bridge crossing approvals required via permit with MDOT?

A. Yes. In November 2011, MPC issued letters to all of its vendors and contractors, reminding them of the need to contact MDOT early to obtain heavy haul permits.[377] The letters were effective: MDOT received a deluge of calls and requests from MPC's contractors, prompting MDOT to request that MPC assist them in coordinating the requests.

Q. Were the contractors responsible for getting these permits themselves?

A. Yes. In each of the contracts that MPC has with its contractors and vendors, there are provisions outlining the responsibility each has for procuring any permits needed to perform the work outlined in the contract. As mentioned above, the issue of coordination came to the forefront when MPC, as part of good utility practice, sent letters reminding its contractors and vendors of MDOT's requirements and the requirement of their individual contracts to obtain the heavy haul/oversized permits. It was not an issue of the contractors not fulfilling their contractual obligation, but one of MDOT not having the staff or resources to address the permit requests all made in a short span of time.

Q. Was it reasonable for MPC to take on the responsibility for permit coordination?

A. Yes. As MPC's agent, SCS Engineering began to discussing the permit coordination with vendors shortly after it sent letters to them. By May 2012, SCS Engineering had begun to coordinate with MDOT intensively; assisting them by identifying which permits the Kemper IGCC Project needed to have delivered first, and expediting information gathering to make sure permits were completed.[378] By June 2012, most of the permits had been received from MDOT, and SCS Engineering was participating in weekly calls with MDOT to keep things on track, notifying MDOT of changes in the delivery schedule and checking in on the status of pending permits.

[377] EPC Production Meeting Presentation, page 197, November 18, 2011
[378] EPC Status Production Meeting, page 72, May 24, 2012

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There were a few permits needed from MDOT that were particularly complicated, requiring bridge pre-inspections that had to be reviewed by MDOT, and extensive coordination with utilities. For example, the H2S Absorbers were the tallest equipment to be delivered at over 28 feet. There were four locations where the equipment would have to pass under high voltage electrical lines, and the lines were within ten feet of the top of the equipment. Because of safety concerns, TVA, the owner of the lines, would not allow such movements under its energized lines. SCS Engineering coordinated with TVA, and ultimately TVA agreed to take the four lines out of service to allow a convoy to move all the absorbers at once, transporting them to the site on October 29, 2012.[379] In addition to this coordination, the hauler had to work with MDOT to provide bridge loading analysis, and a traffic plan in order to receive the MDOT permit.[380] By December 2012, all heavy hauls were completed for the Kemper IGCC Project.[381]

Q. Was it reasonable for MPC to absorb the cost of coordinating these permits?

A. Yes. Because SCS Engineering did the coordination, the cost for MDOT permit coordination was negligible, and would have been included in the costs of the Expediting function that SCS services provide in any case. The cost that MPC could have incurred had this extensive coordination work not been done is incalculable. To ignore the issue and not assist MDOT in the prioritization of permits, or not work with the haulers to ensure the permitting information was fully prepared and submitted to MDOT could have cost the Project months of schedule, perhaps more than a year. As demonstrated above, the issues were complex, and made more so by the number of haulers, the amount of equipment, and the remoteness of the site. It was reasonable for SCS Engineering to assist in this way, and it is prudent that SCS has such an expediting process and procedure to address these issues.

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[379] EPC Status Production Meeting, page 170, September 21, 2012; EPC Status Production Meeting, page 196, October 18, 2012
[380] EPC Status Production Meeting, page 196, October 18, 2012; EPC Status Production Meeting, page 176, November 19, 2012
[381] EPC Status Production Meeting, page 226, January 31, 2013

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The URS IM Monthly Report for January 2013 noted that the efforts that had been taken had positive results.[382]

Q. Do you agree with the URS's finding that MPC may have been imprudent in initially choosing to have the contractors be responsible for utility and bridge crossings?

A. No. As discussed above, MPC engaged in appropriate planning, implemented highway and roadwork in locations that could be assessed as having problems, utilized standard industry practices and adjusted its efforts when it found issues with delivery were likely to arise.

As noted above, upon completion of the Kemper facility traffic study, MPC found there were several locations were there could be delivery issues for oversized loads. In response to this study, MPC undertook several projects along the major transportation route into the Kemper IGCC Project site to enhance equipment and materials movements.

URS infers that MPC should not have assigned contractors the responsibility to address utility and bridge crossings. However, had MPC not done so, it would not have been following industry standards, its own processes and procedures, and MPC would have had to dictate the routes work of the contractors with which they were working. As discussed above, it is standard construction protocol to have contractors retain responsibility for getting equipment to the job site. This is a good contracting practice as it appropriately places the risk of delivery on the entity best able to manage that risk, the supplier.

MPC's contracts have provisions outlining the responsibility the contractor has for procuring any permits needed to perform the work outlined in the contract. These provisions are standard and MPC had no reason to believe these provisions should be changed. However, when MPC became aware of the utility and bridge crossing issues, it quickly mobilized to address the issue, adjusting to the revised circumstances before them, assisting MDOT with its resource issues, and

[382] URS Corporation, January 2013 IM Monthly Report, Appendix D – Project Cost and Schedule Review

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identifying with the contractors areas where utilities needed to be moved or utility owners coordinated with, and worked to recover costs from the contractors and vendors where possible.

Q. Why didn't MPC make the decision to move the lines sooner?

A. The conundrum of EPC contracting is this: EPC contracts allow for the overlapping of design and construction tasks, saving a significant amount of time, equating to significant amounts of money for very large projects. At the same time, it is common during execution of an EPC project for the specifics of the equipment to be received late in the process, as the equipment reaches final design, and in some cases during or even after fabrication. This was the case with the largest equipment coming to the Kemper IGCC Project site. MPC could not have reasonably known what the size the equipment was going to be when it began this process, and the exact size and haul routes were known only as the fabricators were finalizing their work.

In addition, the means and methods used by independent contractors to execute their work, including delivery, is not to be dictated by the owner. When an owner dictates to an independent contractor how it will execute its work, it takes on the risk of doing so. If, after giving direction, something goes wrong, the owner will likely assume the cost for the issue. MPC's contracts were reasonably prepared and clear on this point; each appropriate contract discusses MPC's role, explicitly outlining that neither it nor its agents will direct the work of independent contractors, and that the risk for the work performance stays with the contractor. This is good utility practice as these are not risks that owners generally take. MPC is no exception.

Q. Did Pegasus-Global find that MPC's decisions regarding moving of the utility lines and coordinating MDOT permits for its contractors reasonable and prudent?

A. Yes. Pegasus-Global finds that both of MPC's decisions, to move utility lines and to coordinate MDOT permits were reasonable and prudent. These two decisions worked in concert to minimize schedule slippage, and therefore cost. MPC weighed the relatively small financial risks against the potentially significant schedule risks and made prudent decisions.

3. DECISION TO CONTINUE WITH CONSTRUCTION OF HRSGS UNDER LNTP

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Q. Have you read and are you familiar with MPSC's witness URS's Prudence Report regarding MPC's decisions regarding the construction of the HRSGs under a LNTP on the Kemper IGCC Project?

A. I have, and I am.

Q. Can you explain the issue URS had regarding the use of the LNTP with the HRSG contractor identified in its evaluation of MPC's decision-making process and decisions regarding the construction of the HRSGs?

A. Yes, URS noted in its report that the decision to continue with construction of the HRSGs under a LNTP may be considered imprudent and required additional explanation. Specifically, URS noted that:[383]

> *"This work was originally intended to be completed under a Lump Sum (Firm Fixed Price) contract and was started under a Limited Notice to Proceed agreement while the final terms of the Contract were negotiated. While this is not an uncommon practice, in this case the negotiations continued unsuccessfully until construction was about 75% complete, at which time the parties acknowledged failure to reach agreement. This resulted in a decision to award the remaining work to a labor broker on a Time and Material basis, effectively resulting in all the work being done on a Time and Material basis, and associated delays and efficiency losses. The IM is not questioning the decision on how to complete the work, but rather, the prudence of continuing with 75% of the work without a final signed contract."*

Q. What was MPC's decision-making process in awarding the HRSGs construction?

A. MPC followed its standard decision-making process. It is important to note that per MPC's contracting strategy, this contract was bid as a lump sum contract.

[383] URS Corporation, IM Prudence Report, pages 37-38, March 7, 2014

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As part of its process, MPC filed a vendor recommendation form for the HRSG construction, issued on September 21, 2011, showing the results of the eleven bids received, demonstrating that selected vendor submitted the lowest acceptable bid at [redacted]. And, as a Mississippi contractor, this amount was also was 100% Mississippi Spend.[384] The proposed lump sum bid by the HRSG contractor was approximately $7M below the Certification amount estimated for this work of [redacted].[385]

On October 12, 2011, MPC formally issued a letter of intent to award the HRSG construction work and, as is standard procedure, it issued a LNTP to proceed with that scope of work. This letter noted that:[386]

> *"The Contractor has raised certain exceptions and clarifications to the proposed Contract terms and the Purchaser and Contractor are continuing to negotiate in a good faith effort to resolve any impediments to the finalization of the Work Contract Documents."*

This October 2011 letter explained that the LNTP would expire no later than January 31, 2012, however the option was available to extend the LNTP should MPC deem it necessary for continuation of the work.[387]

Q. Was the LNTP for the HRSGs construction extended?

A. Yes. On December 19, 2011, MPC extended the LNTP six months so that it would expire no later than June 30, 2012.[388] And on June 29, 2012, MPC further extended the LNTP by two months so that it would expire no later than August 31, 2012.[389]

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[384] Kemper County IGCC Project, Heat Recovery Steam Generator (HRSG) Construction Contractor Recommendation, September 21, 2011

[385] EPC Status Production Meeting, page 42, October 19, 2011

[386] Mississippi Power Company, Letter of Intent to Award Contract and Limited Notice to Proceed, Inquiry No. 5285 for HRSG Construction, October 12, 2011

[387] Mississippi Power Company, Letter of Intent to Award Contract and Limited Notice to Proceed, Inquiry No. 5285 for HRSG Construction, pages 2-3, October 12, 2011

[388] Mississippi Power Company, Letter of Intent to Award Contract and Limited Notice to Proceed, Inquiry No. 5285 for HRSG Construction, December 19, 2011

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Q. What was the status of the HRSGs construction over the period under which the LNTP was carried out?

A. Progress on the HRSGs construction largely progress as anticipated, though initially it was reported that the HRSG contractor was late to mobilize.[390] However, in the January 28, 2012 schedule update, which integrated the HRSG contractor's schedule to the overall construction schedule, there was no negative float was generated, suggesting that the contractor's schedule supported the overall Project schedule.[391] In the February 23, 2012 Production meeting, when HRSG construction was reported as being 5% complete, it following was reported regarding the HRSG contract:[392]

- *All contractor exceptions resolved*
- *Contract assembled and in stage 1 review*

This provided MPC with the assurance that indications were the agreement would be finalized shortly, and in fact by the April 25, 2012 Production meeting it was reported that progress had now advanced to 38% completion, and the agreement was now with the HRSG contractor for signature.[393]

Completion of the HRSG was a critical schedule milestone, potentially affecting other areas of plant construction, and therefore it was essential that work continue toward its completion. Because of this schedule issue, work had to continue even while the agreement remained unexecuted.

By May 2012, it appeared that the HRSG contractor was struggling to execute all of the work it has taken on at the Kemper IGCC Project site. Not only was the HRSG contractor constructing the HRSGs, but it was also constructing other aspects of the Project, including the Administration

[389] Mississippi Power Company, Letter of Intent to Award Contract and Limited Notice to Proceed, Inquiry No. 5285 for HRSG Construction, June 29, 2012
[390] EPC Status Production Meeting, page 73, November 18, 2011
[391] EPC Status Production Meeting, pages 83, 129, March 21, 2012
[392] EPC Status Production Meeting, pages 62, 137, February 23, 2012
[393] EPS Status Production Meeting, pages 53, 197, April 25, 2012

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and Control buildings (74% complete, and behind schedule), and DCS electrical, domestic water, and HVAC duct work.[394] In the May ERB meeting, it was noted that the HRSG contractor was "*adding a second shift to improve the completion date*," and the contract was still with the HRSG contractor for signature.[395]

By June 2012, the HRSG contractor was submitting change orders to the HRSG work.[396] Over the next several months, from the information gleaned from the EPC Production Meetings, it appeared that the HRSG contractor had concluded that it would not be able to perform the HRSG work for the amount it stated in its original bid nor on the original schedule. This realization appeared to be the reason why the HRSG contractor would not sign the contract, putting MPC in a difficult position. If MPC were to terminate the contract, precious time would be lost, and the cost of that lost time was a factor in allowing the LNTP to be extended as it worked to identify a solution for this.

As work on the HRSG construction continued into the summer of 2012, notification to terminate HRSG work was made by the HRSG contractor[397] due to it not agreeing to SCS terms and conditions related to cost and schedule.[398] At this time, progress on the HRSG construction had just reached 75% completion.[399]

Q. What was the resulting action taken by MPC to complete the HRSG construction?

A. MPC evaluated four possible options for completing the HRSG construction, these options included:

- Option 1: Move work to labor broker contract with the HRSG contractor to complete;
- Option 2: Bid completion of work at firm price;

[394] EPC Status Production Meeting, page 73, May 24, 2012
[395] EPC Status Production Meeting, pages 100 and 173, May 24, 2012
[396] EPC Status Production Meeting, page 49, June 28, 2012
[397] Mississippi Power Company, Response to URS 2-706, July 25, 2013
[398] EPC Status Production Meeting, page 72, September 21, 2012
[399] EPC Status Production Meeting, page 83, August 21, 2012

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- Option 3: Complete work under existing contractors onsite with a time and materials contract; and
- Option 4: Revise the contract with a firm price, and allow the HRSG contractor to complete the work.

Cost and schedule impacts were evaluated for each of the above options, which showed that the most favorable approach, both from a cost and a schedule perspective, was to utilize Option 1 above and complete the work using a labor broker contract with the HRSG contractor.

Q. Is it normal within the construction industry for work to begin under a LNTP prior to the execution of the final agreement?

A. As URS noted in its Prudence Report, it is not an unusual activity for this to take place, in fact it is a typical practice in the construction industry for contractors to be given a LNTP while the precise details of the final agreement are still under negotiations between the owner and contractor.

Q. Did any delay to the Kemper IGCC Project result from failing to reach an agreement with the contractor on the HRSGs construction?

A. No. From review of the Project record, it does not appear that there was delay due to a change in contract. Movement of the HRSGs construction from the originally selected HRSG contractor to labor broker was made immediately, and there is no indication in the documents that the HRSG contractor ever stopped working, therefore, there would have been no impact to production time.

Q. Did MPC incur any additional cost as a result of this incident?

A. The original fixed price contract with the HRSG contractor was [redacted], but the Labor Broker contract was set at [redacted]. Further, the HRSG contractor submitted change orders in the in the range of approximately [redacted], bringing the potential total cost to [redacted], creating a

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difference of [redacted] over the originally quoted fixed price from the HRSG contractor.[400] These appear to be "additional costs."

However, Pegasus-Global opines that had MPC made the decision to terminate the contract earlier due to the inability for the HRSG contractor to agree to MPC's terms, the costs may have been substantially higher. However, such an analysis would involve hindsight, which is inappropriate for a prudence review. Given MPC's decision at the time based on the information known to MPC, it was reasonable for MPC to award the contract to recommended HRSG contractor as the lowest bidder, it was reasonable to go forward with a LNTP while contract details were being discussed, and it was reasonable for MPC to be very concerned about what could happen to its schedule if the HRSG contractor was terminated. The costs associated with going out to bid again and losing significant time would have likely added substantially more cost than the [redacted] MPC agreed to pay.

Q. Did, in your opinion, MPC act reasonably in its response to the construction of the HRSGs?

A. MPC's decision to use a LNTP to begin the HRSG construction was reasonable and followed standard practice within the utility industry. MPC made a concerted effort to finalize the agreement with the HRSG contractor, but following months of negotiations was ultimately unsuccessful in these efforts. MPC then made the prudent decision to evaluate potential options to complete the remainder of the work, selecting to convert the work to labor broker based on its cost and schedule estimates compared to the other options evaluated.

4. PIPE AND PIPE SUPPORT FABRICATION

i. PIPE FABRICATION

Q. Have you read and are you familiar with the MPSC's witness URS's Prudence Report, specifically regarding MPC's decisions relative to pipe fabrication on the Kemper IGCC Project?

[400] EPC Status Production Meeting, page 41, February 26, 2013

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A. I have, and I am.

Q. Did you have any overall observations regarding URS's evaluation of MPC's decision-making process and decisions regarding pipe fabrication?

A. Yes. URS questioned the prudence of the decision to award the entire BOP and non-alloy steam pipe to a single supplier. URS notes in its Prudence Report that the decision to award this scope to a single pipe fabrication vendor was, "*based upon assurance from the supplier that they could meet the production schedule.*"[401] URS only devotes a single paragraph in its Prudence Report to discuss the vendor selection for pipe fabrication, but its general finding is that: 1) the original recommendation was to split the award amongst four vendors; 2) the decision was changed to award all of the scope to the lowest bidder; and, 3) the result was that the supplier failed to meet delivering schedule leading to the remaining work being split among three additional fabricators.

Q. Does Pegasus-Global agree with URS's overall conclusion on the pipe fabrication?

A. No. URS appears to rely on hindsight in its questioning of the prudence of the decision to award the pipe fabrication to a single vendor. URS offers no opinion as to if it was reasonable for MPC to select the pipe fabrication vendor based on its lowest cost proposal, if it was reasonable for MPC to source the pipe fabrication based on the quantities anticipated at the time the award for this scope was issued, or if it was reasonable for MPC to depend on the selected vendor to meet the production schedule based on the assurances the vendor provided and as were verified by SCS. As I discuss below, the award process for pipe fabrication was thorough and reflected reasonable decision-making on the part of MPC.

Q. BREI concluded that, *"The coordination, oversight, expediting, extended fabrication duration, and other difficulties in managing multiple fabricators resulted in inefficiencies which added to the project cost."*[402] Do you agree with this assessment?

[401] URS Corporation, IM Prudence Report, page 35, March 7, 2014
[402] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, pages 74, March 19, 2014

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A. No. This conclusion by BREI also contradicts what BREI reported when it noted that pipe fabrication was behind schedule and 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."*[403]

By reaching the conclusion that MPC suffered increased costs due to *"managing multiple fabricators,"* BREI entirely ignores the fact that multiple suppliers were necessary to keep up with the demand on the Project, and had additional fabricators not been added there would have potentially been even greater costs due to the resulting schedule impacts caused from late deliveries.

Q. How was the pipe fabrication initially awarded on the Kemper IGCC Project?

A. Bids were received on January 11, 2011, for the material supply and shop fabrication of BOP and non-alloy steam pipe required for both the SCS and KBR designed piping systems. Due to the compressed schedule for the Kemper IGCC Project, MPC initially made the decision to award the scope of pipe fabrication to multiple vendors in order to ensure sufficient capacity of pipe. This decision and reason therefore was reflected in the procurement recommendation by Supply Chain Management and approved by the Kemper PMT:[404]

> *"Due to a compressed schedule there is a requirement for the BOP and Non Alloy Steam Pipe to be fabricated and shipped to the field as the design is completed. Due to scope of the piping quantities and the construction schedule it is anticipated that multiple Fabricators will be required. In order to select a supplier prior to the issuance of any final design documents, a 'typical' scope package* [noted in the Addendum as ~600,000 LF] *was put together and sent out for pricing solely for evaluation purposes and the subsequent placement of unit price contracts. The bid scope package was made up of similar sizes and*

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[403] Burns and Roe Enterprises, Inc., IM's Project Schedule and Cost Evaluation Report, page 36, November 15, 2012

[404] Kemper County IGCC Project, Material Supply and Shop Fabrication of BOP and Non Alloy Steam Pipe Procurement Recommendation, page 2, February 8, 2011

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> *quantities that are to be installed on the Kemper Project. Even though the final scope of the Kemper BOP and Non Alloy Steam Pipe will not be exactly as shown on the bid documents the method is adequate to establish contracts based on the unit pricing used to build up the quotes shown above."*

Once MPC made the decision to use multiple pipe fabrication vendors, the Supply Chain Management initial recommendation was for the award going to four vendors: Controls Southeast, Inc.; McAbee; PCI; and, Fabricated Pipe, Inc. based on these four vendors having the four lowest bids received. Following the initial receipt of vendor proposals, Supply Chain Management received an alternative proposal from McAbee that indicated McAbee had the capacity to perform the entire scope of work that entailed it taking on the full scope of the material supply and scope fabrication of BOP and non-alloy steam pipe.[405] Based on McAbee's alternative proposal, Supply Chain Management created an addendum to this procurement recommendation that was issued on March 15, 2011. Before making a decision as to whether to sole source the supply, which would save money having one vendor, Supply Chain Management contacted the other fabricators to see if each could prepare a similar sole-source proposal.[406] After review, Supply Chain Management determined that McAbee was the only capable vendor of managing the entire scope on its own. Comparing the first case of awarding the scope to four vendors to the second case of awarding the full scope to McAbee only, the cost savings to the Kemper IGCC Project were as follows:

<u>Award the scope evenly among the four fabricators</u>:[407]

[405] Kemper County IGCC Project, Material Supply and Shop Fabrication of BOP and Non Alloy Steam Pipe Procurement Recommendation Addendum, page 5, March 15, 2011
[406] Kemper County IGCC Project, Material Supply and Shop Fabrication of BOP and Non Alloy Steam Pipe Procurement Recommendation Addendum, page 5, March 15, 2011
[407] Kemper County IGCC Project, Material Supply and Shop Fabrication of BOP and Non Alloy Steam Pipe Procurement Recommendation Addendum, page 6, March 15, 2011

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Fabricator	25% of Scope	Expeditor (average cost used)	Total
Controls Southeast, Inc.	[redacted]	$200,000	[redacted]
McAbee Construction Inc.	[redacted]	$200,000	[redacted]
Performance Contractors, Inc.	[redacted]	$200,000	[redacted]
Fabricated Pipe, Inc.	[redacted]	$200,000	[redacted]
Total			**$22,043,427**

Award the scope solely to McAbee:[408]

Fabricator	100% of Scope	Expeditor (average cost used)	Total
McAbee Construction Inc.	[redacted]	$200,000	[redacted]
Total			[redacted]

The recommendation by Supply Chain Management that McAbee be awarded the total scope of the material supply and shop fabrication of BOP and non-alloy steam pipe was confirmed by the Kemper PMT.[409] This recommendation was authorized by E&CS, SCS Supply Chain Management and MPC Kemper Management between March 28, 2011 and May 23, 2011 that allowed Supply Chain to begin negotiations with McAbee.[410] MPC made the decision to award the total scope of fabrication and supply to McAbee as the sole fabricator based on: a savings of approximately [redacted] for going with one fabricator as identified in the tables above; simplified reporting; cost structures and expediting; scheduling and sequencing of pipe fabrication; and, the potential to lower fabrication costs by taking advantage of economies of scale.

[408] Kemper County IGCC Project, Material Supply and Shop Fabrication of BOP and Non Alloy Steam Pipe Procurement Recommendation Addendum, page 6, March 15, 2011
[409] Kemper County IGCC Project, Material Supply and Shop Fabrication of BOP and Non Alloy Steam Pipe Procurement Recommendation Addendum, page 8, March 15, 2011
[410] Kemper County IGCC Project, Material Supply and Shop Fabrication of BOP and Non Alloy Steam Pipe Procurement Recommendation Addendum, page 8, March 15, 2011

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Q. How does MPC's decision regarding selection of the pipe fabrication vendor compare to the process used for steel vendor selection?

A. First, it is important to note that although both pipe and steel are major commodities on the construction of any power plant, they serve entirely different functions and are inherently different in their respective variations and complexities. For instance, piping requires different specifications based on the ranges of pressure and temperature for the various process fluids, some requiring specific materials or coatings to protect against corrosion.

Similar to MPC's decision to initially award the pipe fabrication to four pipe fabrication vendors, MPC was concerned that there was sufficient capacity to supply the needed commodities to meet the compressed schedule. MPC made the decision to split the steel procurement between two suppliers to mitigate potential risk from a single vendor experiencing issues with providing the required quantity of structural steel (34,630 tons at the time of the bid).[411] Given that the Kemper IGCC Project has two distinct areas of the plant, the work was divided such that the structural steel for the gasifier (20,640 tons) was awarded to one vendor, with the balance of the work being awarded to a separate vendor.

As discussed above, MPC's decision to ultimately award the pipe fabrication to one pipe fabricator vendor was based on new information MPC received from McAbee noting its ability to fabricate and supply the needed capacity within the required schedule.[412] The proposal offered by McAbee entailed taking on the total responsibility of material supply and shop fabrication of BOP and non-alloy steam pipe. MPC evaluated this additional information and determined there was an opportunity to award to a sole vendor given the complexity of the numerous piping interfaces. Utilizing a single source for supply and fabrication would allow for improved efficiencies and

[411] Kemper County IGCC Project, Structural Steel Inquiry 0000925110, December 20, 2010
[412] McAbee Construction Inc., Response to Inquiry No. 2095 – Material Supply & Shop Fabrication of Plant Piping Systems, April 27, 2012

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reduced costs, including the ability to prioritize, schedule and sequence the pipe fabrication work based on the needs of construction.

Piping is exceptionally complex with many variations such as size, material or coating. Having one vendor responsible for the numerous variations and interfaces of piping was an opportunity for increased efficiency and provided a greater assurance to MPC for consistency while minimizing any impacts due to coordination issue of prioritization and sequencing in order to meet construction need dates.

Steel, on the other hand, is a relatively simple commodity which does not lend itself to the same coordination issues associated with pipe fabrication and delivery. Thus, by awarding the steel fabrication and delivery to two vendors for two different distinct areas of the Project, MPC could have confidence in the steel commodity meeting the construction needs according to the compressed schedule need dates.

Q. Did MPC have a pipe fabrication plan for the Kemper IGCC Project?

A. Yes. The *Piping Fabrication, Installation and Tracking Plan* is a Kemper-specific procedure developed by SCS in order to manage the fabrication, installation and tracking of above-ground pipe on the Kemper IGCC Project. This procedure noted that the pipe fabrication process was as follows,

> *"The fabricator receives Isometric drawings from SCS Engineering and Procurement Project Manager's group (both SCS and KBR designed drawings), and is responsible for determining field weld locations, along with generation of spool drawings and spool fabrication."*[413]

The pipe fabrication plan also provided that the pipe fabricator would be required to subcontract with other fabricators if necessary to meet the schedule and scope demands of the Project. In the

[413] Southern Company Services, *Piping Fabrication, Installation, and Tracking Plan*, page 4

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event the fabricator was not able to meet demand on the Project, the scope was set up such that it allows for division to separate fabricators if needed.

Q. Can you elaborate on the pipe fabrication process, including how it was used on the Kemper IGCC Project?

A. Yes. Effectively the initial step in the pipe fabrication process is the development of a plot plan (sometimes called a site plan) that shows the overview of the entire facility, including location of buildings, tanks, roads, etc. From the plot plan, locations for piping systems, valves, fittings and equipment are located on piping arrangement drawings which are often revised during the refinement of design to allow for the most efficient route for the piping. Next, P&IDs are created to provide a schematic representation of the piping, process control and instrumentation to show the functional relationships among the systems components. On the Kemper IGCC Project, both KBR and SCS Engineering groups completed P&IDs for their respective scopes with the work coordinated under the SCS Design Manager. Following the P&IDs, isometric drawings ("ISOs") are created that show the details of the piping systems, including length, width and depth along with any fittings, valves or flanges that may be necessary. At the Kemper IGCC Project, the ISOs were also created by both KBR and SCS Engineering, under the oversight of the SCS Design Manager.[414] Completed ISOs are then sent to the pipe fabrication vendor which develops pipe spool drawings from which to fabricate the pipe spools, (pipe spools are essentially the assimilation of the piping components, such as, raw pipe, fittings, valves, flanges, etc.) that are fabricated in order to facilitate connection to other pipe spools. On the Kemper IGCC Project, fabricated pipe spools were stored by the fabricating vendor until they were requested on site.[415] When the pipe spools were delivered to the Project site, each was labeled to identify where it belonged at the plant location and whether it was part of a multi-spool system of pipe.

[414] Southern Company Services, *Piping Fabrication, Installation, and Tracking Plan*, Appendix A
[415] Southern Company Services, *Piping Fabrication, Installation, and Tracking Plan*, Appendix A

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Q. Why did MPC make the decision to add more pipe fabricators for the Kemper IGCC Project in addition to McAbee?

A. MPC determined that McAbee did not have the shop capacity to meet the delivery schedule, including the increase in quantities required. The release of ISOs to McAbee and the delivery of fabricated spools were regularly tracked on the Project. In the February 2012 Production Team Meeting, it was noted that 70% of the gasifier ISOs were issued with the remaining waiting on in-line instrument details from the instrument vendors, which was being expedited.[416] This meeting also provided current above ground piping status and actions to be taken for Engineering, Procurement and Construction; actions to be taken included such things as:[417]

- *Pre-order material (KBR & SCS person to assist McAbee);*
- *Ensure current ISO release dates meet construction priorities;* and
- *Weekly coordination meeting McAbee, Engineering, Construction.*

The following month's Production Team Meeting showed the results of some of this action including a McAbee Expediting Summary and Piping Spool Status Report. At this time, 2,683 spools had been delivered onsite, with another 931 being stored at McAbee's shop; it also showed that the spools delivered per week were up to 176 spools from the 100-150 that was reported in February 2012.[418] McAbee's pipe spool production continued to be closely tracked and reported in the monthly Production Team Meetings through the summer of 2012. When MPC, through its trend analysis, realized that McAbee's production was not satisfying the Project's requirements, especially with the additional quantities required,[419] oversight of McAbee continued, including McAbee's utilization of subcontractors. In the fall of 2012, it became apparent to MPC that

[416] EPC Status Production Team Meeting, page 91, February 23, 2012
[417] EPC Status Production Team Meeting, page 173, February 23, 2012
[418] EPC Status Production Team Meeting, page 183, March 21, 2012
[419] From the date the pipe fabrication work was awarded to McAbee to when the pipe fabrication was revised to add additional vendors, the plant pipe quantity increased 115,847 LF, additionally as the final design was completed, another increase of 124,464 LF was reported after the additional pipe fabrication vendors were added to the Project.

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McAbee alone would not be able to meet the required delivery schedule, even with the use of subcontractors. This decision was confirmed by a SCS Construction Manager in his September 2012 site visit to McAbee's fabrication shops, at which time MPC had sufficient information to modify the pipe fabrication strategy for the Kemper IGCC Project.[420]

Q. How much pipe remained to be fabricated at the time MPC made the decision to add additional pipe fabrication vendors?

A. There was approximately 460,000 LF remaining to be fabricated when the decision was made to add additional pipe fabricators to the Project. The full amount of pipe needed on the Project was not confirmed until January 2013.

Q. What was MPC's resultant decision and strategy in regard to the pipe fabrication on the Kemper IGCC Project?

A. In the October 2012 Production Team Meeting it was discussed that in order to meet Project schedule constraints, additional pipe fabricators would be used with the strategy to be finalized by October 24th, with implementation beginning immediately.[421] The pipe fabrication strategy was finalized in November 2012, which revised the pipe fabrication work plan as follows:[422]

Vendor	**McAbee**	**PCI**	**Shaw**	**Onsite Labor Broker**
Scope	SCS Large Bore	KBR Large Bore	2" KBR & SCS	Less than 2" KBR & SCS
Estimate to Complete	87,000 LF	107,000 LF	111,000 LF	148,000 LF

Effectively, the pipe fabrication was completed with the use of seven pipe fabrication shops to meet the demand, including: PCI; Shaw; an onsite labor broker fabricator; and, McAbee with its

[420] Pegasus-Global Project Control & Execution Interview with MPC and SCS personnel, noting Kevin Gammill – SCS Construction Manager conducted the site visit, February 5, 2014
[421] EPC Status Production Team Meeting, page 86, October 18, 2012
[422] EPC Status Production Team Meeting, page 67, November 19, 2012; page 74, EPC Status Production Team Meeting, page 74, December 19, 2012

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subcontractor Dixie). By February 2013, it was reported that the, "[p]*ipe fabrication plan* [was] *approved and is moving forward quickly.*"[423]

Q. Did MPC reasonably monitor the pipe fabrication on the Kemper IGCC Project?

A. Yes. As discussed above, pipe fabrication was regularly monitored and reported by MPC during the Production Team Meetings. For example, a status was provided in the February 2012 Production Team Meeting which noted that the ISOs to McAbee were at 5,178 spools at a rate of approximately 1,000 per week (600 KBR, 400 SCS), and spool delivery, which started in November 2011, was at 1,925 with 100-150 spools delivered per week, under the reported goal of 200-250.[424] One of the actions reported in the Production Team Meeting in response to the lower than planned spool delivery was that weekly coordination meetings were taking place between McAbee, Engineering and Construction to devise strategies as to how to expedite deliveries.[425] Beginning in March 2012, the Production Team Meeting provided a summary on the McAbee pipe fabrication expediting; this McAbee Expediting Summary again appeared in the months that followed (April through December 2012). In early 2013, following the change in pipe fabrication strategy, progress was accordingly adjusted to track the progress of the additional pipe fabricators that were now engaged on the Project.

Q. Was it prudent of MPC to originally award the pipe fabrication solely to McAbee even though it was later determined there was a need for additional pipe fabricators?

A. Yes. McAbee provided the potential for cost savings and was selected not only for pipe fabrication, but also for sourcing acquisition of pipe material. McAbee noted that it would be able to utilize subcontractors in order to meet the pipe fabrication requirements of the Kemper IGCC Project, and having a single source for the pipe fabrication work would allow MPC the

[423] EPC Status Production Team Meeting, page 252, February 26, 2013
[424] EPC Status Production Team Meeting, page 173, February 23, 2012
[425] EPC Status Production Team Meeting, page 173, February 23, 2012

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potential of improving efficiencies in a complex commodity that requires a substantial number of interfaces.

When MPC determined that McAbee was not capable of meeting the pipe fabrication requirements as originally thought, it prudently was able to divide the work, such that vendors already engaged with work on the Project could be utilized, such as PCI who was awarded the gasifier pipe fabrication scope and, after the pipe fabrication change decision, took the KBR-designed large bore pipe used in this area. Additionally, adding an onsite fabrication shop allowed for revisions or corrections to pipe to be made in the field, rather than sending it back to the original fabrication shop.

ii. PIPE SUPPORTS

Q. Have you read and are you familiar with the Staff's witness BREI's Prudence Report, specifically regarding MPC's decisions relative to the fabrication of pipe supports on the Kemper IGCC Project?

A. I have, and I am.

Q. Do you have any overall observations of BREI's evaluation of MPC's decision-making process and decisions regarding pipe support fabrication?

A. Yes. There are fundamental flaws in BREI's Prudence Report which, in turn, render its opinions regarding MPC's decision-making process and decisions on pipe support fabrication incorrect; BREI notes that there were 59,000 pipe supports on the Project, but fails to mention that at the time the contract was let, it was anticipated that the number of pipe supports would be approximately 16,000.[426] BREI also fails to account for the complexity inherent to pipe supports in which there are hundreds of varieties, some of which are required to be engineered for the Project. This complexity lends to the support of a single pipe support vendor due to the benefit of having uniformity in the pipe supports utilized across the entire Project.

[426] Mississippi Contract No. 17660 with Lisega, Inc., Schedule D – Company's Technical Specifications, pages 3-4, June 13, 2011

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Q. Does Pegasus-Global agree with BREI's overall conclusion on pipe support fabrication?

A. No. BREI bases this conclusion that the pipe support fabrication was inadequate on hindsight by using the final amount of approximately 59,000 pipe supports on the Kemper IGCC Project, when at the time the pipe support fabrication was awarded it was estimated that the number would be 16,000.

Q. How was the pipe support fabrication awarded on the Kemper IGCC Project?

A. On October 29, 2010, the SCS Mechanical Design group recommended to the Kemper PMT that Lisega Inc. ("Lisega") be awarded the work for supply and fabrication of all pipe supports required for both the SCS and KBR designed piping systems.[427] The reasons for MPC's decision consideration for selection of Lisega included: 1) Lisega was the low bidder on the evaluation package; 2) equipment quality was noted to be among the best in the industry; 3) past SCS experience with Lisega showed Lisega's willingness to tailor the communication/drawing process to reflect mutual benefits; and, 4) Lisega had engineering capabilities that had proven valuable on past Southern Company projects.

Lisega's experience working with Southern Company included being the successful bidder on HRSG pipe supports supplied by the most recent boiler vendors on Southern Company's Stanton B and McDonough 4, 5 and 6 plants as well as the provider for the BOP pipe supports for the general contractor on Southern Company's McDonough 4, 5 and 6.[428]

Q. Was it reasonable for MPC to rely on a single vendor for the fabrication of pipe supports?

A. Yes.

iii. USE OF TEMPORARY PIPE SUPPORTS

Q. Was there a need to use temporary pipe supports on the Kemper IGCC Project?

A. Yes. There are a number of different types of pipe supports utilized on a project like the Kemper IGCC Project. As discussed in greater detail below, the sequence in which particular pipe

[427] Procurement Recommendation for Supply of BOP and Critical System Pipe Supports, October 29, 2010
[428] Procurement Recommendation for Supply of BOP and Critical System Pipe Supports, October 29, 2010

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supports were required to be delivered to the site resulted in a need for temporary pipe supports in order for work to continue.

Q. How is the term "temporary pipe supports" used in this context on the Kemper IGCC Project?

A. In the context of the Kemper IGCC Project, the term "temporary pipe supports" refers to the supporting of pipe with the use of temporary supports prior to the final installation of pipes and the associated permanent pipe supports, or supports.

Q. How are temporary supports different from permanent supports?

A. Permanent supports are designed to support, and in some instances to restrain, the pipe in a fixed position under all postulated conditions of operation for the life of the plant, including dead and dynamic loads.[429] Temporary supports only required to hold the pipe in position until the permanent supports are installed. During the time the temporary supports are in place the pipe is empty, that is, there is no fluid in the pipe, but more importantly, the pipe is not heated or cooled beyond the existing ambient temperature or subjected to additional dynamic loads such as water hammer,[430] etc. which minimizes the requirements of the supports, since they do not have support fully operational loads or variations in ambient temperatures. The temporary supports can be much simpler and less robust than the permanent supports, which support the pipe when fully loaded (with liquids/gases) and restrain the pipe under all postulated dynamic loads. Consequently, the permanent supports are designed and engineered, whereas the temporary supports can be field engineered.[431]

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[429] Dead loads are loads that are relatively constant over time, also known as permanent loads. Whereas dynamic loads changes quickly, such as with the startup or shutdown of certain equipment.
[430] Flow rate changes, and resulting pressure surges that can potentially damage piping.
[431] Meaning that the temporary supports can be created in the field, onsite, from a raw material.

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On the Kemper IGCC Project the temporary supports which held the large bore pipe were wire rope and the temporary small bore pipe supports to hold the small bore pipe (less than 2.5'' diameter) were a single #9 wire.[432]

Q. Explain why such temporary supports or supports were used on the Kemper IGCC Project.

A. As has been discussed elsewhere in my Rebuttal Testimony due to the impacts of unforeseen late delivery of equipment, materials and components, MPC had to develop a strategy to maintain the aggressive schedule since in some instances pieces of fabricated pipe (spools) would be available for installation when some, or all of the permanent supports for that spool were not available. The Kemper PMT was faced with the option of not installing the pipe piece and waiting for receipt of the permanent pipe supports, or to progress the work by installing the pipe piece on temporary supports and replacing them with the permanent supports when available.

Q. What is the basis of the BREI's assertion?

A. The general opinion of BREI is that the use of temporary supports impacts piping productivity due to the need to revisit the installation twice; once to install the temporary support, and then to replace with the permanent support.

Q. Does Pegasus-Global agree with BREI's opinion that the use of temporary supports impacts overall piping installation productivity?

A. As a general matter, yes, Pegasus-Global would agree that piping installation productivity will be impacted. However, as use of temporary pipe supports is a work-around when permanent supports are not available, productivity impacts need to be considered against the mitigation of delay to project completion. It is a reasonable and prudent decision based on all the information and considerations available to MPC at the time for the Kemper PMT to make the decision to use temporary supports and the extent of that use when permanent support delivery or other Project delays were experienced.

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[432] Performance Contractors, Inc., Lashing Using #9 Wire, Version 2.0, October 24, 2013

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Q. Do you consider the use of temporary supports on the Kemper IGCC Project to have been a prudent management decision?

A. Yes. It is good utility practice to use temporary supports for the initial piping installation when equipment, piping materials and/or supports are not available as a way to mitigate delays to project completion date, or milestone dates.

5. OVERSEAS SUPPLY OF EQUIPMENT

Q. Are you familiar with the issue outlined in MPSC's witness URS's Prudence Report regarding MPC's decision to procure much of the equipment from overseas suppliers for the Kemper IGCC Project?

A. Yes, I have and I am.

Q. Can you explain the issue URS had regarding this decision?

A. Yes, URS noted in its Prudence Report that the decision to procure much of the equipment from overseas suppliers may have been imprudent and required additional explanation. Specifically, URS noted that:[433]

> *"The end result of this decision was additional project costs for source inspection and expediting, overall coordination, and increased delivery and project integration risks. Based on review of the* [Vendor Recommendation Forms] *for these purchases, it is apparent that the initial capital costs for these items were lower than domestic alternatives; however, a cost/benefit assessment should be provided justifying the additional costs in terms of reduced capital costs."*

Q. Do you agree with URS's finding that MPC may have been imprudent in choosing to have much of the equipment provided by overseas suppliers?

[433] URS Corporation, IM Prudence Report, pages 35, March 7, 2014

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A. No. Frankly, this is a surprising conclusion. In this global economy, it is prudent to look world-wide for the best priced equipment.

That said Pegasus-Global reviewed a representative number of Vendor Recommendation Forms ("VRFs") to assess the issue put forth by URS. The VRFs are MPC's way of doing a cost/benefit analysis for each and every contract it lets.

MPC's VRF process is well-defined and it is used to assist MPC in making prudent vendor choices that supply equipment for Project execution. MPC's overall contracting process is fully detailed in **Section E.1**. of my Rebuttal Testimony.

As part of its vender selection process, MPC identifies contractors that are likely to have the expertise to implement the work, puts forth a request for proposals to the contracting community and reviews the proposals that are submitted. The process for identifying the chosen proposer is outlined in VRFs for each piece of equipment or work scope.

These VRFs have great deal of summarized information such as: a brief outline of the work to be performed; a list of bidders that were invited to bid; which of the companies invited actually submitted proposals; and, relevant details about the bids. Bid costs are often broken down price of equipment, shipping and commissioning. Cash flow is also often including. For example, a Waste Heat Steam Generator was needed for the Project, and the Kemper PMT invited numerous companies to bid:[434]

- MCE Machine und Apparatebau
- Olmi, Spokane, Washington
- Babcock & Wilcox, Charlotte NC
- Babcock Power (Struther Wells, TEI) Several locations in the US
- Alstom
- Belleli Energy, Italy

[434] Vendor Recommendation Form, Kemper County IGCC Project, Waste Heat Steam Generator, Inquiry 83916A, November 8, 2010

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- KochHeat Transfer
- FBM Hudson
- Hughes Anderson
- Yuba Heat Transfer
- Borsig

Several of the companies listed above are domestic including: Olmi (Spokane, Washington), Babcock & Wilson (Charlotte, North Carolina) and Struther Wells (various locations around the U.S.). Of the companies invited to bid, only three actually did: FBM Hudson, Struthers Wells and Belleli. FBM Hudson and Struthers Wells are foreign, Struthers Wells being the only domestic bidder.

As was seen in the substantial majority of VRFs reviewed, MPC awarded the contract to the lowest bidder that had the technical expertise to accomplish the work. In the case of the Waste Heat Steam Generator, FBM Hudson was the lowest bidder, but, as one can see from the review MPC did to determine whether to award to FBM Hudson, MPC considered the location of the company, the location of manufacture, the costs of shipping, and ranked the bids by overall value. MPC also investigates the history it has with the company for which they plan to give the award. Even after analyzing the financials, MPC determines internally the work history they have with the potential winner. In the case of FBM Hudson, MPC notes, "*FBM Hudson has been a very good vendor or KBR in the past. Due to the recent ownership changes with FBM, it is recommended the SCM perform a financial analysis to verify financial stability.*"[435] MPC did not just blindly award with disregard to the location of the manufacture, nor did it just accept the lowest bid, though award to the lowest bidder was by far the norm. MPC considered many factors in determining bid award, and followed its established processes, processes which are reasonable and prudent.

[435] Vendor Recommendation Form, Kemper County IGCC Project, Waste Heat Steam Generator, Inquiry 83916A, November 8, 2010

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Q. Do you agree with the URS report that MPC should provide a cost/benefit analysis to justify any additional costs in terms of reduced capital costs?

A. In the view of Pegasus-Global, this does not appear to be necessary, as the VRFs serve this function.

Q. Is it common in the utility industry to purchase equipment from overseas companies?

A. Yes, of course it is.

F. MPC'S ALLEGED MISMANAGEMENT OF PROJECT MANAGEMENT AND CONTROL

1. POLICIES AND PROCEDURES

Q. Have you read and are you familiar with Staff's witness BREI's Prudence Report's conclusions regarding MPC's schedule, cost tracking and forecasting and cost estimating procedures used on the Kemper IGCC Project?

A. Yes, I have and I am.

Q. Does Pegasus-Global agree with BREI's conclusion that SCS procedures for schedule, cost tracking and forecasting and cost estimating were *"either inadequate for the requirements of the Kemper Project or inadequately implemented by the Project Team"*[436]?

A. No. BREI's conclusions are not supported by the evidence of either failed project controls or a connection between such alleged failed project controls and increases in quantities, cost or schedule. Without such evidence – which would not even support a finding of imprudence – and the demonstration that MPC acted in reckless disregard of some industry standard or good utility management practice, these witnesses have failed to show that MPC mismanaged the Project as a result of improper or improper use of its project control tools.

[436] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, pages 63-64, March 19, 2014

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Q. In responding to the allegations of Staff witness BREI, did Pegasus-Global evaluate the Project Control Systems for schedule, cost tracking and forecasting and cost estimating used on the Kemper IGCC Project?

A. Yes. Pegasus-Global's review of MPC's Project Control Systems are discussed in my Supplemental Direct Testimony on pages 26-75, which defined project controls, noted the primary types of project controls and what control tools were used to manage the Kemper IGCC Project , and generally how MPC developed and implemented its Project Control Systems.[437]

Q. Did MPC take any actions to determine the readiness of its Kemper PMT and Project Controls Systems including the procedures for schedule, cost tracking and forecasting and cost estimating for undertaking the Project?

A. Yes, as I discussed in my December 13, 2013 Supplemental Direct Testimony in this docket, MPC requested its Internal Auditing team to perform a readiness assessment of the Project, which included a focus on several areas including project management. Internal Audit utilized the resources of Ernst & Young ("E&Y") to assist in the assessment based on E&Y's knowledge of good utility management of project controls and its extensive prior experience with other utilities.[438] This review was conducted from February to March 2010, with an ongoing dialogue between the Internal Auditing team and the Kemper PMT as observations from the initial review were addressed. MPC undertook this review after it had made its CPCN filing and before receipt of the CPCN from the MPSC in order to ensure it was prepared to move forward with a reasonable project controls process prior to embarking on the next stage of the Kemper IGCC Project.

In addition to its Internal Audit assessment, MPC also retained B&V to perform an independent assessment of SCS's readiness to execute the Project since SCS would be undertaking the

[437] Supplemental Direct Testimony of Dr. Patricia D. Galloway, On Behalf of Mississippi Power Company, Docket No. 2013-UA-189, pages 26-75, December 13, 2013

[438] Core Team Meeting Minutes, February 23, 2010

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responsibility of project controls. This review began in November 2009 with a final report issued on February 26, 2010.

Q. Did the B&V Readiness Review provide MPC with an understanding of its project control tools that were in place at the time of the CPCN filing?

A. Yes, B&V's assessment included observations regarding MPC's policies and procedures, cost estimating and schedule detail and project controls including:[439]

- Engineering: *"SCS has policies, procedures, and standards in place to support and define subsequent activities which will be required as part of the execution of the design on the Project."*
- Procurement: *"SCS has significant procurement experience as a result of the execution of many combined cycle and scrubber/SCR projects, has an established procurement group, and has procedures and policies in place to support the procurement effort for the Kemper County Project."*
- Cost Estimating: *"SCS has applied many of the techniques in the development of their cost estimate that are consistent with world-class standards."*
- Schedule Detail & Project Controls: *"The project schedule contains sufficient detail for engineering and procurement activities to satisfactorily begin Project execution. Currently, the construction detail is at a summary level of development, as is normally the case at this stage of the Project…*

  SCS has implemented project controls procedures, for cost reporting and change management to support and define the methods and activities to be followed during the execution of the Project."

[439] Black and Veatch, Kemper County IGCC Readiness Review, Findings Summary 1.2, pages 1-3 to 1-5, February 26, 2010

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- Construction & Startup: *"At this early stage of the construction process, it is clear that SCS has approached the Project with construction needs in mind. SCS has integrated their construction and engineering activities and have stressed good communications now and throughout the life of the Project."*

Q. Did the findings identified in MPC's internal Kemper County IGCC Readiness Review assist MPC in setting up its management organization and project controls to manage the Project?

A. Yes. As noted in the Kemper County IGCC Readiness Review report, this assessment identified key process risks that could have the potential to impact the Project's overall readiness in terms of governance and/or project management. The areas examined for this assessment included: organization and approach; scope and change management; cost management; schedule management; risk management; communications and reporting; design management; contract risk and administration; and, procurement and supply chain management.

Q. Did MPC take any actions with regard to the observations in the Internal Readiness Review?

A. Yes, the readiness review identified several observations with management actions taken, some of which are addressed in other sections of my Rebuttal Testimony. Observations included topics such as the Project schedule and MPC's adaptation of SCS practices; as noted in the report:[440]

- ***Project Schedule:*** *The project schedule is largely driven by the risk of losing the IRS Investment Tax Credits by missing the operating date of May 2014. This deadline has pushed MPC and SCS towards an aggressive scheduling approach.*

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[440] Mississippi Power Company, Kemper County IGCC Readiness Review, Report No. GEN2010-02, pages 6-7, December 17, 2010

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Management Response: *E&CS personnel recognize the aggressiveness of the schedule and are in the process of reviewing the detailed schedule to identify ways of creating schedule float ("float" is the "extra" time in a schedule that may be used without causing a delay to the completion date).*

- ***MPC Adaptation of SCS Practices:*** *SCS has developed practices and policies around EPC reporting and project level guidance. We noted that, although these practices exist, they have not been adapted or adopted for the IGCC project.*

  Management Response: *E&CS personnel are developing Kemper specific guidelines where needed and will continue to do so as the project implementation progresses.*

Q. In your Supplemental Direct Testimony, you discussed "stages" of the Project and mentioned that the project controls on the Kemper IGCC Project have evolved over the course of the Project.[441] Can you describe what those stages were and why it is important to know what stage of the Project you are evaluating when reviewing MPC's actions it took from a prudence perspective?

A. When a publically regulated utility undertakes a large and complex project, it must do so in stages in order to reasonably evaluate what project control tools are necessary to assist the utility in its decision-making process. The first stage is typically a feasibility stage, or in the case of the Kemper IGCC Project, the FEED stage, where enough information is gathered to determine whether a project should proceed to the next stage. Should the decision be made to move forward, the utility files for a CPCN in order to gain approval from the Public Service Commission ("PSC") prior to the expenditure of future monies. At this stage of the project,

[441] Supplemental Direct Testimony of Dr. Patricia D. Galloway, On Behalf of Mississippi Power Company, Docket No. 2013-UA-189, page 30, December 13, 2013

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minimal project specific control tools would be in place since it is unclear as to whether the project will move forward to the next stage.

Following approval by the PSC, a utility moves into the next stage of final design which is initiated prior to the start of construction in order to provide sufficient detail for the preparation of construction packages to be bid. At this stage, project control tools are developed and implemented with the level of detail of those tools geared towards the monitoring of the design work and less detail for the construction work until such time that information from those performing the construction is received at which time the project control tools go through another evolution to best meet the needs of construction monitoring. In many large complex projects like the Kemper IGCC Project, there is an overlap of the design and construction phases. The last stage before commercial operation would be start-up and commissioning which involves yet another evolution of the project control systems in order to best monitor the start-up and commissioning activities.

Relative to determining whether certain project control tools are reasonable and prudent, it is important to understand the work history before opining on project controls. It is not proper, for example, to describe project controls as inadequate in 2009 or 2010, using standards that one would <u>not</u> expect to see for early levels of work. For example, BREI is incorrect to suggest that the lack of an early integrated schedule meant the schedule at that time was inadequate. The FEED Study schedule could have been fully integrated, since contracts had not been "let" and there were no contractor schedules to integrate. In fact, there were no construction contracts signed at the time of the Certification. MPC did not want to imprudently enter into contracts committing itself to any undertaking until approval was confirmed. It is essential to view project controls through the historical lens of what was actually occurring on the Project, and the work that was underway in the specific time frame the controls are being assessed; necessarily, control systems will change throughout the life of the Project.

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Q. Given that the Kemper IGCC Project went through various stages, and given the type of work MPC was undertaking, would MPC have been required to have full project controls in place at the onset of the Project?

A. No. As was the case with many utilities in the country, MPC did not perform significant baseload generation construction for a number of years. As a result, MPC did not maintain an advanced and mature project control system for complex projects.

Not only did MPC have initial controls that were consistent with the types of initial controls Pegasus-Global has seen in the industry on other large complex projects, but these controls do not violate any industry standards and do not rise to the level of unreasonable and imprudent actions. After the FEED Study was completed and the CPCN filed with MPSC, project controls became more formalized with SCS taking on the responsibility to provide controls and updates. SCS was able to use many MPC and Southern Company policies and procedures already in existence and in concert with MPC, others were developed specifically for use on the Kemper IGCC Project.

Q. Did MPC take reasonable and prudent actions in its internal and external assessments of the Kemper IGCC Project in reviewing its project controls at this stage of the Project?

A. Yes. As explained in my Supplemental Direct Testimony, self-evaluations, such as the B&V Readiness Review and other MPC/SCS sponsored internal audits and reviews, are beneficial in that they offer an independent determination of the status of a project's activities and can offer recommended improvement actions as necessary.[442] This provides project management with an additional tool that can be used to improve project controls adequacy. As noted in the management responses above, several of the recommendations made by the internal audit report were already being addressed as of the late 2010 time period of the report.

Q. Can you explain why some policies and procedures were developed specifically for the Kemper IGCC Project, while others are existing corporate policies and procedures?

[442] Supplemental Direct Testimony of Dr. Patricia D. Galloway, On Behalf of Mississippi Power Company, Docket No. 2013-UA-189, page 34, December 13, 2013

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A. For companies such as MPC and Southern Company, with substantial experience in the construction and management of new generation power plants, it would be expected that there are a number of existing corporate policies and procedures in place that can be used uniformly from project to project which are regularly updated, incorporating lessons learned or changes in company policy. A benefit to this approach is that there is a consistency in the policies and procedures in use, so that the project team does not have to relearn the common and typical practices (*e.g.* scheduling, estimating, forecasting, etc.) for each project. In instances where a project has special requirements or unique features, the project-specific policies and procedures can enhance the existing corporate policies and procedures to provide any additional direction that may be needed.

Q. Were the procedures for schedule, cost tracking and forecasting and cost estimating examples of types of 'existing' corporate policies and procedures that were used on the Kemper IGCC Project?

A. Yes, the *Project Controls Standards for E&CS Capital Construction Projects* provided the project control methodology and processes for budgeting, estimating and scheduling.[443] This policy was supported by additional E&CS project controls procedures, including:

- PC-01 – Change Management;
- PC-02 – Project Schedules;
- PC-03 – Project Cost Tracking and Forecasting;
- PC-04 – Updating the E&CS Work Breakdown Structure (WBS); and
- PC-05 – Project Cost Estimating.

Q. Did BREI assess other policies and procedures used on the Project?

A. Yes. BREI had an overall positive assessment of the policies and procedures, noting that:[444]

[443] SCS Engineering & Construction Services, *Project Controls Standards For E&CS Capital Construction Projects*, March 2010
[444] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 62, March 19, 2014

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> *"…BREI finds the procedures to be reasonable and adequate to support the Kemper Project."*

BREI also stated that:[445]

> *"It is BREI's opinion that generally, the implementation and use of SCS Corporate procedures for the Kemper Project is in line with other SCS project where those projects were executed by SCS."*

Q. Why do you disagree with BREI that the procedures PC-02 Project Scheduling, PC-03 Project Cost Tracking and Forecasting, and PC-05 Project Cost Estimating were either "inadequate" or "inadequately implemented"?

A. BREI's issue with PC-02 Project Scheduling is tied to the vagueness with respect to issuance of the first baseline schedule. As discussed in detail **Section V.F.2.** of my Rebuttal Testimony, the timing of developing a baseline schedule is depends on actual project conditions, and to create the type of schedule BREI suggests was necessary, MPC would have had to have detailed information from the contractors performing the work. Since contracts were not even let at that point, it is unreasonable to expect a baseline schedule could have been created at the level BREI suggests, as this information was not even available to the Kemper PMT.

Regarding PC-03 Project Cost Tracking and Forecasting and PC-05 Project Cost Estimating, BREI does not specifically identify how these procedures or their implementation were "inadequate." BREI does, however, have general observations about the cost tracking and forecasting which are addressed in **Section V.F.3.** of my Rebuttal Testimony and general observations about the estimate which are addressed in **Section V.D.** of my Rebuttal Testimony.

Q. Do the project controls procedures you mentioned above meet typical industry standards?

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[445] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 62, March 19, 2014

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A. Yes. The E&CS project controls procedures are thorough and describe the purpose, responsibility and procedures associated with each specific topic. For instance, PC-01 – Change Management notes:[446]

> *"The change management system separates true **scope changes** from **project variances**. New or removed scope changes are resolved and documented through the project scope change management systems recorded in PIMS. Scope changes above a pre-determined project threshold shall be approved by the responsible leadership.*
>
> *The quality of the information is supported by the additional requirement of an internal estimate and a project risk assessment. This analysis shall consider the entire project impacted by the proposed scope change.*
>
> *The timeliness is designed to capture and approve these scope changes as they occur throughout the project. The project manager shall ensure the documentation is not delayed until the end of the project."*

This falls in line with what AACEI explains should be considered in the project controls for change management, noting specifically that:[447]

> *"The project control plan should address the methodology and processes for managing changes (whether internal and/or external to the business plan, project or contract) throughout the project regarding scope, quality cost and time. The plan will address both the various types of changes and/or trends, as well as the desired approval process."*

Procedure PC-02 – Project Schedules explains the roles and responsibilities of the personnel involved in schedule development. It also provides for the process of schedule development from

[446] Southern Company Services, Engineering & Construction Services, *PC-01 Change Management*, Rev. 3, page 6, September 13, 2010
[447] AACEI, Recommended Practice No. 60R-10, page 14, December 21, 2011

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formulating the baseline project schedule and the detailed Level 3 project schedule, and includes to how to re-baseline the project schedule and report on schedule progress. This also meets typical industry standards, as AACEI explains:[448]

> *"The project controls plan will address the integration of the schedule development, basis of schedule and schedule validation process. The plan will identify the level of detail required for the various schedules that are prepared during the project, including resource loading and leveling (i.e. the schedule must be detailed enough to show the effect of a changed condition to an activity sequence as well as to accrue costs associated with scheduled work activities based on the estimate and/or budget)."*

The project controls procedure, PC-03 – Project Cost Tracking and Forecasting, explains how the cost analyst responsible for project cost tracking and forecasting works with the estimate and the schedule to establish direct and indirect costs leading to the formation of the baseline budget. This procedure also ties in with PC-01 – Change Management to address how changes can impact the budget, also providing examples of what the changes may be based on (*e.g.* performance, quantity trends, hourly rate trends, etc.) and the process for updating and reporting on project costs. The procedure calls for a monthly report to be issued that provides updated values associated with the project, including the estimate-at-completion ("EAC"). As the PMI notes:[449]

> *"Forecasting the EAC involves making projections of conditions and events in the project's future based on current performance information and other knowledge available at the time of the forecast. Forecasts are generated, updated and reissued based on work performance data…that is provided as the project is executed."*

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[448] AACEI, Recommended Practice No. 60R-10, page 8, December 21, 2011

[449] Project Management Institute, *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fifth Edition*, page 220, 2013

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The *Project Controls Standards for E&CS Capital Projects* explains that the WBS:[450]

> *"…defines the hierarchical breakdown of the work scope in a project. Major projects are broken down to Level V of the WBS. At this level, all materials and/or equipment for a project have a specific code for identification. This is also the level at which activities are created in the project schedule."*

Comparatively, PC-05 – Project Cost Estimating notes that:[451]

> *"The estimating information should include applicable items, such as the* [scope of work], *drawings, quantities, equipment list, and if available, line list, cable schedule, instrument list, valve list, and materials and equipment pricing and engineering man-hours."*

Adding that during the cost estimate development process:[452]

> *"…the project estimator may be required to supplement the information provided by the project team. This additional information may include quantity take-offs, material pricing, labor production and productivity units, subcontract pricing, and constructability reviews."*

Q. Will you explain the role of the policies and procedures that are "project-specific"?

A. Project-specific procedures are those that are necessary to carry out an individual project to completion. While existing policies and procedures can provide the processes to carry out certain aspects of work related to a given project, the use of project-specific procedures can, as needed, bridge those existing policies and procedures to the specific scope of work necessary for a

[450] Southern Company Services, Engineering & Construction Services, *Project Controls Standards For E&CS Capital Construction Projects*, Scheduling Rev. 2, page 5, February 2013

[451] Southern Company Services, Engineering & Construction Services, PC-05 – Project Cost Estimating, page 9, March 4, 2010

[452] Southern Company Services, Engineering & Construction Services, PC-05 – Project Cost Estimating, page 10, March 4, 2010

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project's completion. At the heart of the project-specific policies and procedures is the PMP, which as PMI notes serves as a …*central document that defines the basis of all project work.*[453]

Q. You noted above and in your Supplemental Direct Testimony that the PMP typically serves as the base procedure on most projects, can you expand on what the PMP provides?

A. As explained by the Construction Management Association of America ("CMAA"), the PMP, *"defines the vision, implementation strategy, schedule and budget criteria, and the policies, procedures and standards for a program."*[454] CMAA also notes that:

> *"The PMP is the master reference document for the Program Management team and provides guidance to the consultants engaged throughout the life of the program, from inception through planning, design and construction. The PMP provides a level of continuity and standardization across the program to facilitate time and cost effective communications and decision making. It serves as an organization's formal process for reviewing, evaluating, prioritizing, documenting, approving, implementing and maintaining all of its projects within the program."*[455]

The Kemper IGCC Project's original PMP was issued in September 2010 and included Project-specific information pertaining to:

- Project Description;
- Governance;
- Risk Management;
- Organization;
- Roles and Responsibilities;

[453] Project Management Institute, *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fifth Edition*, page 72, 2013
[454] Construction Management Association of America, *Construction Management Standards of Practice*, 2010 Edition, page 78
[455] Construction Management Association of America, *Construction Management Standards of Practice*, 2010 Edition, page 78

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- Budget and Schedule;
- Compliance and Controls; and
- Reporting.

Q. Did the Kemper PMP also provide guidance relative to schedule, cost tracking and forecasting and cost estimating and can you expand on what the Kemper PMP provided for each of those sections?

A. Yes, in general each of those topics had a description of how it was joined to the Kemper IGCC Project which was bolstered through the use of many links to other internal and external documents. A more detailed discussion is as follows:

- <u>Project Description</u>: This section explained the general nature of the Project, a 580 MW IGCC plant with an expected in-service date of May 2014. It explained the Project would provide MPC with needed baseload generation while providing energy and technology diversity to benefit MPC's customers. This section provided links to a MPC internal Project website and an MPC external website which provided assorted Project information available to the public, including quarterly status reports. A brief summary of the regulatory history of the Project was also provided and was accompanied by a link to the Final Certificate Order.
- <u>Governance</u>: This section noted that MPC's Vice President of Generation Development had overall responsibility for the Project, including accountability to the MRB for Project execution, reporting and change control. The MRB, as well as the ERB, were also identified in this section as their oversight roles were identified, this is supplemented with links to the charter for both the MRB and the ERB. In addition, the long term Project goals were identified, specifically as they relate to safety, cost, schedule, compliance and performance.

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- Risk Management: This section provided a summary of the risk evaluations the Kemper IGCC Project has undergone since its inception, including: the ScottMadden Kemper County IGCC Risk Analysis; PSDF Mississippi Lignite Test Runs; Test Campaign TC-22; Test Campaign TC-25; Run R-1; two technology risk assessments; and two Project readiness reviews. Links were provided for the majority of these evaluations, in addition it was noted that:[456]

  > *"…the* [Project] *utilizes the Company's established risk management process, which documents project risks and responsibilities for management and mitigation."*

  A link to the Project's risk program and profile was also provided.

- Organization: This section briefly explained the relation between MPC and SCS, also providing a link to the Project and construction organizational charts.

- Roles and Responsibilities: This section defined the key roles and responsibilities for MPC Generation Development, E&CS, MPC Accounting and Finance, MPC Transmission and MPC Regulatory Affairs. This included the identification of key Project stakeholders as well as the division of responsibility within each group. This section also explained the Project-specific Core Team and Production Team established to manage, coordinate and report on the progress of the Project.

  Lastly, the Kemper County Community Plan was discussed which noted that:[457]

  > *"The purpose of the Community Plan is to serve as the foundation for allowing the Company to introduce itself into the community as a good corporate citizen, and to participate in the economic development and well-being of the area."*

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[456] Mississippi Power Company, Kemper County IGCC Project, Project Management Plan, Desktop Instructions, Rev. 0, page 6, September 7, 2010

[457] Mississippi Power Company, Kemper County IGCC Project, Project Management Plan, Desktop Instructions, Rev. 0, page 14, September 7, 2010

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- Budget and Schedule: This sections explained that how Project costs were captured for accounting purposes and identified that the Project's Certification Estimate, as filed in December 2009, was $2.4 billion. The PMP noted that:

  > *"Cost estimates will be updated throughout the Project's construction timeline, as the project develops and contracts are executed. Revised estimates will be reported as the Current View."*[458]

  In discussion of the schedule, the PMP noted that the Project will use an overall Master Schedule, EPC schedules, Transmission schedules and other schedules as required. It also established the process owner for each type of schedule, noting that MPC Generation Development was the process owner for the Master Schedule and would review and approve any key changes in the Master and MRB Milestone schedules.

- Compliance and Controls: This section provided that MPC Generation Development had the responsibility for ensuring the Project adhered to MPC compliance and controls. This section also provided discussion on the procurement process to be utilized on the Project, including several links to related documents such as specific MPC Corporate Guidelines. A significant portion of this section was dedicated to the ROD process utilized by MPC and SCS on the Project to document significant or material decisions with the information used and available at the time the decision was made. It was noted that the ROD documentation includes: identification of the issue; alternatives considered; decision made; names and titles of responsible parties; rationale for the decision; scope of the decision (single or reoccurring action); reference materials; and, management sign-off. Lastly, the PMP in this section identified that MPC Generation Development has the responsibility of ensuring appropriate document retention was maintained to support the integrity of the Project.

[458] Mississippi Power Company, Kemper County IGCC Project, Project Management Plan, Desktop Instructions, Rev. 0, page 15, September 7, 2010

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- <u>Reporting</u>: This section explained that there were a number of coordinated and integrated reports used on the Project that were designed to meet the specific informational needs of the target audiences. For example, EPC Production Reports were provided monthly to project management and contain information provided for review during MRB and ERB meetings. In addition, a monthly PSC Report which included a cost summary was provided to the MPSC, MPUS, IMs as well as MPC management.

Q. You also mentioned in your Supplemental Direct Testimony that there was an update made to the PMP, can you explain what revisions were made in this update?

A. First, it is important to recognize that updating a PMP is a standard practice to take place over the course of a project; CMAA plainly stated, "[the PMP] *is a living document that must be updated periodically*."[459] And, as noted by PMI:

> *"The project management strategy needs to be carefully monitored to ensure that it remains pertinent to the work practices adopted (and vice versa), and equally important, that is remains applicable to the prevailing conditions (economic, social, etc.) which can change as a project progresses."*[460]

The bulk of the changes made in the revision to the PMP were fairly minor. For instance, the long term goals for the Project were refined, while the general topics of safety, cost, schedule, compliance and performance remained consistent. Further goals such as: "*Communicate and execute the Project seamlessly as one organization*", and, "*Implement and/or revise the necessary processes to allow compliance and optimization of the Project (knock down barriers)*"[461] were defined.

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[459] Construction Management Association of America, *Standards of Practice*, 2010 Edition, page 78

[460] Project Management Institute, *Construction Extension to The PMBOK® Guide Third Edition*, Second Edition, page 30, 2007

[461] Mississippi Power Company, Kemper County IGCC Project, Project Management Plan, Desktop Instructions, Rev. 1, page 3, August 12, 2011

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Another notable update to the PMP was the addition of a "Compliance Matrix" which had a purpose *"…to document Project compliance obligations and responsibilities, responsible party, compliance timeline, current status, and status to maintain compliance."*[462] The Compliance Matrix was maintained by MPC Generation Development and was discussed as part of Core Team meetings.

However, the biggest change to the revised PMP was the separation of the procurement section to its own separate Project procedure which I discuss in **Section V.E.1.** of my Rebuttal Testimony.

Q. Was MPC's use of policies and procedures on the Project reasonable and prudent?

A. Yes. MPC's use of existing corporate procedures accompanied by project-specific procedures allowed the Kemper PMT to have the appropriate tools in place to effectively manage the Project. As demonstrated above, the policies and procedures utilized on the Project met standard construction industry practices. Furthermore, the adequacy and use of the policies and procedures was prudently monitored by MPC throughout the Project by implementing internal audits.

2. KEMPER IGCC PROJECT SCHEDULE MANAGEMENT AND COD EVOLUTION

Q. Have you read and are you familiar with the conclusions made by Staff's witness BREI regarding MPC's scheduling of the Kemper IGCC Project?

A. Yes, I have and am.

Q. Do you agree with BREI's conclusions that, *"SCS's inability to gauge project progress against a meaningful project baseline schedule was a particular area of weakness for the Project"*, due to its failure to develop a fully integrated, baseline schedule until August 2011 and that *"[t]he inadequacy of the resource loading method used by SCS was that it impaired the Project team's ability to 'see' increases in commodity quantities and craft labor*

[462] Mississippi Power Company, Kemper County IGCC Project, Project Management Plan, Desktop Instructions, Rev. 1, page 17, August 12, 2011

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requirements and to adjust both the labor requirements and construction sequencing/planning accordingly"[463] **that led to construction management inefficiencies which further delayed the Project and made it more difficult to meet schedule and cost targets during the period of 2010, 2011 and 2012?**

A. No, I do not agree, as I will discuss in more detail in my Rebuttal Testimony below.

Q. In responding to the conclusions of Staff's witness BREI, did Pegasus-Global evaluate MPC's use of the schedule used on the Kemper IGCC Project?

A. Yes, Pegasus-Global examined the information surrounding the schedule development, including policies and procedures, as well as how the schedule information was monitored and communicated to key project stakeholders. In addition, Pegasus-Global evaluated the re-baselining of the schedule and the change in COD.

Q. What industry standards did you use in your review of the BREI prudence report in regards to its opinions regarding MPC's decisions relative to the Kemper IGCC Project schedule?

A. I utilized the industry standards from PMI, AACEI and CMAA.

Q. Are you a members of PMI, AACEI and CMAA?

A. Yes. I am a member of and am a certified Project Management Professional by PMI, a fellow of the AACEI and a Certified Forensic Claims Consultant ("CFCC") of AACEI, and a member of the CMAA. I also held the position of Chairman of the Board of PMI's College of Scheduling from 2003-2006. During my tenure as Chairman of the Board of the College of Scheduling, the board set an initiative to develop PMI Recommended Practices for Scheduling. These standards were issued in 2011.

Q. Does your membership in these organizations plus your roles in these organizations give you any familiarity with industry scheduling standards and their use?

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[463] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 49, March 19, 2014

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A. Yes. Given my certifications and active memberships in the industry's program and project management professional organizations I have intimate familiarity with industry standards regarding scheduling.

Q. Do you have personal hands-on scheduling experience and analyses of schedules on megaprojects and large complex utility projects similar to the Kemper IGCC Project?

A. Yes. My personal experience with Critical Path Method ("CPM") scheduling dates back to the late 1970s when I obtained a civil engineering degree from Purdue University with a double major in structures and construction management. In 1978, I was employed by CH2M Hill where I was part of the Project Controls Department on the $1.2B Milwaukee Waste Water Treatment Project where I eventually held the title of Master Program Scheduler, responsible for the Program Master Schedule for the entire program. When I joined The Nielsen-Wurster Group in 1981, I was responsible for scheduling large complex projects and was also actively engaged in the evaluation of schedules on large complex projects as both a prudence auditor and an expert witness. I have continued to be involved in hands-on schedule development as well as evaluations of schedules, including rendering decisions as an arbitrator regarding their development and use during project execution and for analysis of delay.

Q. When did your experience begin relative to the review and evaluation of schedules and use thereof on large complex power projects?

A. I began reviewing schedules of large complex power projects, including those being constructed by regulated utilities, in the early 1980s beginning with an evaluation of the Seabrook Nuclear Plant and whether it could be constructed for the then current cost and schedule proposed by the utility.

Q. Did you continue to review and evaluate schedules and scheduling procedures and processes used by regulated utilities?

A. Yes. As I have testified earlier in my Rebuttal Testimony and as outlined in my Supplemental Direct Testimony, I have continuously evaluated and testified in public utility rate hearings

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regarding the schedules for large complex power plant projects from the mid-1980s through to the present including nuclear, coal, wind, transmission and IGCC projects.

Q. Have your reviews and evaluations of the utility schedule management practices and decision-making been based on industry standards at the time?

A. Yes.

Q. Based on your familiarity with industry standards and your personal experience with regulated utility scheduling practice, do you agree with the findings of BREI with respect to MPC and SCS decisions regarding the Kemper IGCC Project schedule development and its use on the Project?

A. No. Based on my familiarity with industry standards and my personal experience and knowledge of regulated utility industry practice regarding scheduling large complex projects, I do not agree with the findings and conclusions by BREI with respect to how MPC developed the Project Master Schedule and its use thereof on the Kemper IGCC Project.

a. SCHEDULE CONTROLS

Q. Do you agree with BREI's finding extracted from its November 2012 cost and schedule report that *"BREI has determined that SCS, in the execution of the Kemper Project, is not utilizing some basic management and project control tools and techniques that are available and customarily used in the industry for a project of this magnitude. Although SCS has such tools available within its corporate tool kit of Project Management Procedures, SCS has advised that it has opted not to utilize several of its standard corporate procedures for the Kemper Project. In addition, these early project decisions appear to have made it difficult at the present stage of the Project for SCS to effectively monitor, track and manage the logistics of complex tasks such as pipe spool fabrication, and installation"*?[464]

[464] Burns and Roe Enterprises, Inc. , Prudency Evaluation Report, page 42, March 19, 2014

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A. No. BREI's conclusions are not supported by any evidence of either failed project controls or a connection between such alleged failed project controls and increases in quantities, cost or schedule. Without such evidence – which would not even support a finding of imprudence – and a demonstration that MPC acted in disregard of some industry standard or good utility management practice, imprudence cannot be found.

Q. What is the general objective of scheduling controls?

A. As noted in my Supplemental Direct Testimony:[465]

> *"The general objectives of schedule controls are to identify what activities are of a critical nature (and the relationship those activities have to one another), how the various vendors' or contractors' activities relate to the critical path, and to track progress to ensure the project meets certain key milestones, including overall completion. As noted within the PMBOK®,*
>
> > *Control Schedule is the process of monitoring the status of project activities to update project progress and manage changes to the schedule baseline to achieve the plan. The key benefit of this process is that it provides the means to recognize deviation from the plan and take corrective and preventive actions and thus minimize risk."*[466]

Q. Does the fact that there may be changes to project milestones which result in a change in or re-baselining of the schedule indicate that schedule controls are deficient?

A. No. The scheduling tool is used to coordinate activities and provide anticipated durations. Unexpected events do occur on large and complex projects, resulting in milestones being pushed farther out in time. The scheduling process does not cause those events, but instead allows for a

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[465] Direct Supplemental Testimony of Dr. Patricia D. Galloway, On Behalf of Mississippi Power Company, Docket No. 2013-UA-189, page 47, December 13, 2013

[466] Project Management Institute, *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* – Fifth Edition, page 185, 2013

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way to absorb them, report them and assist the project team to readjust the other activities in the schedule, which then allows them to use their scheduling tool to predict new milestone dates. Events cause changes in the schedule; the scheduling tool provides those whose responsibility it is to manage those events the means to do so efficiently. That is, even with the most advanced scheduling controls, unanticipated changes will affect and perhaps prolong the schedule.

Q. In Pegasus-Global's review of the Kemper IGCC Project did you find any evidence of inadequate schedule controls that caused inefficiencies and further delayed the Project?

A. No. The 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. Further, the MPSC approved a cap of $2.88 billion based on the FEED Study Estimate and Schedule, making no finding that MPC's decisions or decision-making process regarding the schedule was imprudent or that costs incurred were the result of an imprudent scheduling mechanism.

In any case, there is absolutely no evidence that any scheduling issue caused any delay or inefficiency. Inefficiencies were caused, in part, by commodity quantity increases discovered as the detailed design developed, and these increases had to be absorbed into the schedule, and were dealt with by the respective contractors and project schedulers.

Q. How was the scheduling performed by SCS on the Kemper IGCC Project?

A. MPC's schedule management concept was to set contractor and project milestones based on the critical path schedule "early dates," thereby ensuring float was in the schedule and available as a contingency for the inevitable issues that arise on large and complex projects. In addition, the schedule was based on a single work shift/five-day work week plan which allowed for essentially a buffer in the schedule to potentially add a second shift or weekend work as needed. As the Kemper IGCC Project progressed, SCS initiated meetings where schedule issues were reviewed

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and actions were explored and coordinated with contractors and other parties.[467] Throughout the Project, schedule status reports were discussed at all of the Production Meetings, Core Team meetings, and senior management meetings (as appropriate), keeping the whole organization informed about the timing of important Project events and milestones.

The contractors were required to provide their weekly schedule to project management[468] which then was incorporated into an integrated Master Schedule. This integrated Master Schedule facilitated overall management of the Project, including development of "workaround" plans that inevitably are required on a project of this complexity.

Q. Did MPC's project schedule management result in the construction management inefficiencies and difficulty in meeting cost and schedule targets as so opined by BREI?

A. No. To the contrary, MPC's Kemper IGCC Project scheduling process, reporting and decision-making methods were appropriate, consistent with industry practices and evolved as the Kemper IGCC Project and the Kemper PMT's needs evolved. MPC utilized Primavera® scheduling software, widely used in the industry, to plan and manage the Kemper IGCC Project design, procurement and construction schedule. MPC used Primavera software version P6 which is consistent with what other utilities in the industry were using in this time period. In addition, in contracts of substantial value, or where the equipment to be provided by the contractor was unique, or had to be produced and on site within a certain sequence with other equipment, MPC required those contractors to provide a schedule with specific parameters that could be entered into the Master Schedule. For an example of the type of clause used to implement this contractor requirement, see my Rebuttal Testimony at **Section V.E.1**.

b. SCHEDULE PLANNING

[467] Agreed upon resolutions were noted in the EPC Status Production Meetings, for example see EPC Status Production Meeting, page 78, December 15, 2011

[468] See for example, MPC Contract No. 24183 for Construction of Gas Clean Up and By Products Area for Kemper County Unit 1 IGCC of Mississippi Power Company, Exhibit 2, Articles 12.5.1.3, 12.5.1.4, January 10, 2012

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Q. Do large and complex projects, such as the Kemper IGCC Project, require different schedule techniques than a conventional construction project?

A. Yes and no. The essence of a project schedule on a large and complex project is similar to that of a conventional project, in that it establishes the start, duration and completion dates of the activities that compose the project as well as the integration and sequencing of such activities. A major difference when scheduling a large complex project is that, due to the long duration of large and complex projects, it is often necessary to utilize overlapping execution staging on the project as way to mitigate the time impact conventional sequential staging would have to a project's already long duration (or "fast-tracking" the project). The use of conventional sequential staging can lead to such significant time impacts on a large and complex project that it will have a significant effect on the total project cost, as finance charges and associated costs begin to mount due to the extended project duration. In addition, the longer the project's duration, the less likely it is to be able to accurately forecast market conditions that will potentially impact equipment, commodities and labor costs.

Q. What do you mean by "overlapping execution staging"?

A. "Overlapping execution staging" also referred to as "fast-track scheduling" means that project tasks are not performed sequentially, where each stage of the project has to be entirely completed before the next stage begins, but that parts of some tasks are performed concurrently. As noted above, large and complex projects, such as the Kemper IGCC Project, would be much more costly and doing the work sequentially would have extended out the construction time and in the Kemper IGCC Project's case, would have made it impossible to have a COD in time to meet the anticipated demand. For these reasons, large and complex projects are typically scheduled so that precedential activities are completed just before they are needed. For instance, rather than completing all of the detailed engineering before construction, the engineering is scheduled so that design for the first construction activities (*e.g.* civil and site work) are completed allowing construction to commence, while the remaining detailed engineering continues concurrently.

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Other activities are similarly scheduled so that the time for completing the entire project can be compressed, thereby saving time, and therefore cost.

Q. Have you read and are you familiar with the BREI Prudence Report and its issue regarding MPC's decision implement a fast-track schedule?

A. Yes, I have and I am.

Q. Can you explain the issues BREI had regarding this decision?

A. BREI is critical of MPC's decision to implement the Project on a fast-track schedule noting in its report:[469]

> *"…SCS started the detailed engineering and design and procurement processes in parallel with the start of construction. With the construction/installation processes beginning at such an early phase and occurring in parallel, difficulties were encountered in issuing and receiving construction ready drawings in sufficient quantities including those specifically required to support the normal construction installation sequence."*

Q. Do you agree with BREI that fast-track schedule led to unnecessary challenges for the Project?

A. No. It was simply not possible to execute the Project under a non-fast-tracked approach given the requirement to achieve COD in May 2014 to secure the ITC Phase I funds and meet the generation demand needs forecasted at the time. As the MPSC noted in the CPCN Order, MPC was to demonstrate *"it has made best efforts to procure the incentive…"*[470] The MPSC reiterated this point in its Order on Remand:[471]

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[469] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 58, March 19, 2014

[470] Mississippi Public Service Commission, Order Granting Certificate Upon Conditions, Docket No. 2009-UA-014, page 45, April 29, 2010

[471] Mississippi Public Service Commission, Final Order on Remand Granting a Certificate of Public Convenience and Necessity, Authorizing Application of Baseload Act, and Approving Prudent Pre-Construction Costs, Docket No. 2009-UA-014, page 91, April 24, 2012

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> *"The Commission finds that the Company should exercise all reasonable diligence to apply for any obtain all of the federal, state, and local financial benefits identified…"*

In order for MPC to secure the ITC Phase I funds, the Project had to be executed under a fast-track approach.

The lengthy regulatory process during the Certificate filing also added significant pressure to the schedule requirements. Although conceptual design post-FEED continued prior to the issuance of the Certificate, it was only when the Certificate was received that MPC could begin the detailed design and engineering of the Project. B&V noted a similar observation in its Readiness Review when it explained:[472]

> *"To avoid doing work at risk on a project which has not been approved, SCS must have the PSC permission to proceed on the Project. The need for this permission to proceed is delaying the start of the detailed design and procurement efforts to a point later in the Project than preparations for construction would normally dictate. On the other end, SCS must complete the Project by May 2014 in order to secure significant tax benefits."*

Fast-tracking has been a long used and accepted practice within the construction industry, for example, construction of the Empire State Building in 1930 was implemented under a fast-track methodology, where construction of the building's foundations were underway before the structural steel was detailed and before completion of the design of the mechanical and electrical systems.[473]

Q. Can the absence of a schedule or an inadequate schedule cause delays?

[472] Black & Veatch, Kemper County IGCC Project Readiness Review, Section 3.0 Project Information, page 3-5, February 26, 2010
[473] Gould, F. and Joyce, N., *Construction Project Management*, Third Edition, page 179, 2009

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A. Yes, without an adequate project schedule in place, project management will be unable to effectively plan, monitor and control the successful prosecution of the work needed to complete the project. A well-prepared schedule allows one to identify potential and actual causes of delay. In addition, without an appropriate schedule in place, contractors may be unclear as to how and when they must complete their respective scopes of work, causing conflicts on the job site and with the integration of the various scopes of work.

Q. What types of delays might a project such as the Kemper IGCC Project encounter over the course of its execution?

A. There are a number of events outside of a company's control that can have an impact on the project schedule. Some of these potential events may include: procurement issues (equipment delivery delay); construction issues (lower than expected productivity, subcontractor non-performance; inclement weather); or, regulatory issues (permit delays, regulatory changes).

Q. How do you plan for these potential schedule delays?

A. When developing the schedule, in addition to providing float for specific activities, it is common to allow for schedule contingency to allow for schedule risks that cannot be quantified (such as those noted above). This may not always be included within individual activity durations, where extra time may lead to lower productivity rates as the crews pace their work to the longer duration.

Q. Do you agree with BREI's opinion that "*SCS intentionally included no float in the Project schedule due to its compressed nature*"[474]?

A. No. SCS incorporated schedule contingency within various activities in the Master Schedule as so noted in response to a MPSC data request:[475]

> *"Schedule contingency has been accounted for in the Kemper Project. However, it is not a time duration that is specifically identified within the Project schedule.*

[474] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 49, March 19, 2014
[475] Mississippi Power Company, Response to MPSC-MPC-1-1B, June 1, 2009

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> *Based on the schedule included in the Company's filing, we estimate there are two to three months of schedule contingency in the Kemper Project schedule."*

Mr. Thomas Anderson explained the Project's utilization of float during the Phase II Certificate Hearings:[476]

> *"We don't anticipate a slippage in the* [completion] *date, and our schedule has what they call "float" in it.*
>
> …
>
> *…schedule slippage could occur for weather, mother nature, things outside your control, late delivery of equipment from vendors, some of our equipment is sourced overseas. There could be conditions overseas that affect that delivery. Again, those – those have been factored into our schedule…"*

Additionally, the schedule was developed based upon a single-shift, five-day work week. This allowed management the flexibility to add a second shift or weekend work to address schedule delays or productivity issues.

Q. Have other regulated utilities that you have evaluated in recent years as part of your prudence audits and reviews employed similar concepts with respect to "float" and schedule contingency?

A. Yes. For example, in Pegasus-Global's prudence review of the Iatan Unit 1 environmental upgrade project, Dr. Nielsen's testimony indicated with respect to KCP&L's float contained in its Master Schedule that:

> *"KCP&L's schedule management concept was to set contractor and project milestones based on the* [critical path] *early dates, thereby ensuring the float in the schedule was available as contingency for the inevitable issues that arise on complex projects."*[477]

[476] Phase II Proceedings before the Mississippi Public Service Commission, Docket No. 2009-UA-014, pages 1168-1169, February 1, 2010

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In Pegasus-Global' prudence audit and evaluation of Iatan Unit 2, KCP&L applied the same philosophy of float contingency in its planning and execution of its Iatan Unit 2 SCPC Project.

Q. Did DEI follow this same process in its schedule development and management of the Edwardsport IGCC Project Schedule?

A. Yes. DEI applied the same approach as was used by KCP&L for the Iatan Unit 2 Project and as has been done by MPC for the Kemper IGCC Project.

Q. Do MPC and SCS have the experience to effectively manage project schedules?

A. Yes, both MPC and SCS have a history of managing project schedules exceptionally well. As noted in Mr. Thomas Anderson's Rebuttal Testimony:[478]

> *"From 2000-2007, the Company built fifteen combined cycle units and eleven simple cycle units across four states. Every one of those projects met the scheduled commercial service date…"*

E&CS has procedures to be used in the scheduling of projects. E&CS has standards and guidelines which are documented in its "Project Control Standards for E&CS Capital Construction Projects"[479] as well as the Project Controls Procedures "PC-02 Project Schedules"[480] and the Kemper IGCC Project Controls Execution Plan[481] which provided detailed instruction regarding the expected management and control of the schedule.

Q. Are the guidelines provided by the E&CS consistent with good practices in the industry for large complex projects?

A. Yes, E&CS assigns personnel from the home office for the early engineering scheduling; as projects move into construction, field personnel are assigned for construction scheduling, and

[477] Direct Testimony of Dr. Kris R. Nielsen on behalf of Kansas City Power & Light, Docket No. 09-KCPE-246-RTS, page 47, February 23, 2009
[478] Phase II Rebuttal Testimony of Thomas O. Anderson, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, page 3, January 5, 2010
[479] Southern Company, *Project Controls Standards For E&CS Capital Construction Projects,* March 2010
[480] Southern Company Generation, Engineering & Construction Services, Project Controls Procedures, PC-02 Project Schedules, Rev. 2, January 11, 2010
[481] Kemper IGCC Project Controls Execution Plan [undated]

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these personnel integrate schedule information from many sources throughout the life of the project. All of these procedures are considered good practices. As I discuss later below with respect to the development of the initial schedules leading up to the integrated Master Schedule, another good practice employed by E&CS was to create Level 3 schedules as the Project evolved and matured and there was enough information available to properly complete such a detailed schedule.

Q. What types of schedule controls were in place on the Project?

A. The Project PMP explained that the Kemper PMT was to use the necessary schedules to effectively manage the Project, including an overall Master Schedule, EPC schedules, and other schedules as needed (*e.g.* transmission schedule). The PMP explained that:

> *"The process owner for the EPC schedule process is the E&CS Kemper Project. MPC Generation Development is the process owner for the Master Schedule and the MRB Milestone Schedule. MPC Generation Development will necessarily work closely with the E&CS to produce the necessary schedules.*
>
> *MPC Generation Development will review and approve any key changes in the content, frequency, distribution and formatting of the Master and MRB Milestone schedules."*[482]

As explained in **Section V.F.1.** of my Rebuttal Testimony, SCS E&CS "Procedure PC-02 – Project Schedules" is consistent with good utility practice and industry standards and provided the procedure for developing a project schedule. The procedure outlined how to prepare a baseline project schedule, develop a fully detailed Level 3 schedule, as well as how to re-baseline a project schedule and report on schedule progress. This procedure is in addition to what is provided in the SCS E&CS Project Controls Standards.

c. SCHEDULE DEVELOPMENT

[482] Kemper County IGCC Project, Project Management Plan – Desktop Instruction 1.0, Rev. 0, page 16, September 7, 2010

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Q. Do you agree with BREI that SCS failed to develop a fully integrated baseline schedule in a timely manner and in accordance with SCS Procedure PC-02[483]?

A. No. BREI fails to understand the different phases a utility undertakes in a baseload power plant in a regulated utility environment. The schedule process on a major capital project is to start with a summary schedule at the beginning of the project. As more detail is available in terms of engineering, procurement, construction and startup activities, the schedule becomes larger and larger in terms of the lines of detailed activities. As this process proceeds, the schedule becomes increasingly integrated between the various activities and any schedule mismatches that are discovered are then addressed. Thus, the term "integrated project schedule."

In a regulated utility environment, a utility must first obtain approval from the Public Utility Commission or PSC with a CPCN prior to proceeding with the execution of a project. In preparation of its CPCN application, a utility typically prepares a Feasibility Study, or in the case of the Edwardsport IGCC Project and the Kemper IGCC Project, both a Feasibility and a FEED study, in which the latter contained an initial baseline schedule developed in conjunction with the project's CPCN estimate (or baseline estimate) that provides the overall estimated duration for the project. As I have previously discussed in my Rebuttal Testimony, these baseline schedules and estimates are prepared from only 10-30% design completion since the purpose is for funding authorization and thus the schedule are not likely to be integrated and may or may not contain the detail that is included later once a CPCN has been granted, the contracting approach has been determined and construction contracts executed.

Q. What do you mean by the term "baseline schedule"?

A. A baseline schedule organizes what is known at the time of the baseline schedule preparation, and incorporates activities to be monitored throughout the duration of a project, including the durations of those activities and the logic and sequencing of those activities. Baseline schedules

[483] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 44, March 19, 2014

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may be developed at a summary Level 1, or a Level 2 or a more detailed Level 3, or some combination thereof depending on the phase of the project and the information known at the time. For example, it is not uncommon in the industry for a baseline project schedule, especially where overlapping phases of the project occur, to have a detailed Level 3 for the engineering activities and a summary Level 2 for the construction activities until such time when more information is obtained from the contractors actually constructing the project to have developed detailed Level 3 schedules. These more detailed contractor prepared schedules are then incorporated into the overall baseline schedule. A good schedule control system records when the "actual" activities, start, what their anticipated durations are, and when they are to be completed. In addition, the baseline schedule will record activities that have been added due to changes that have occurred during the implementation of the project, events that were not anticipated and therefore were not included in the baseline schedule. Typically, in utility scheduling practice, the baseline schedule is also often referred to as the Master Schedule, as it was referred to in the Kemper IGCC Project.

Q. Did MPC/SCS develop a baseline schedule in its FEED Study that was presented to the MPSC?

A. Yes. MPC developed an integrated Master Schedule, or baseline schedule, with a data date of August 1, 2009 that was included in its FEED Study which contained activities for: the KBR Gasifier Island FEED, SCS Engineering, Procurement, Contracting, Construction and Checkout/Startup.

Q. What did the FEED Study provide for the Project's schedule?

A. The FEED Study noted that:[484]

> *"As MPC's agent, SCS will provide project management services during the development phases of the project, including providing oversight of budgets and schedules."*

[484] Kemper County IGCC Project FEED Document, Volume 1, page 1, August 2009

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The major EPC milestones for the Project were listed as:

- Begin detailed engineering.
- Major equipment procurement.
- Construction on site – begin site work.
- Begin piling installation.
- Begin underground and concrete.
- Begin aboveground work.
- Gasifier completion.
- CC completion.
- Startup.
- Commercial operation.

In addition, Appendix T to the FEED Study provided a summary schedule and a SCS detailed EPC schedule based on a May 2014 COD.

Q. Was this Baseline Schedule that was included in MPC's FEED Study similar to the Baseline Schedule prepared by Bechtel in DEI's Edwardsport FEED Study?

A. Generally yes. The Edwardsport IGCC Baseline Schedule included in the FEED Study was not a fully integrated schedule and consisted of four different schedules for engineering/procurement, construction, start-up for the gasification and startup for the power block. While the construction schedule contained more detail than that of the construction section of MPC's integrated baseline schedule, this was because at the time of the baseline schedule development, DEI had anticipated that Bechtel would serve as the EPC contractor for the project and thus would have sufficient knowledge regarding the construction activities and sequencing to be performed.

DEI relied upon Bechtel, in the first instance, to develop the high-level Edwardsport IGCC Project Master Schedule consisting of a Level 3 schedule. This Master Schedule included the general and engineering progress, site preparation, construction activities and startup.

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Q. Was the Kemper FEED schedule a CPM with an identified critical path?

A. Yes. As I explained in my Supplemental Direct Testimony:[485]

> *"With large complex projects it is not uncommon for there to be more than one critical path for the project, this was also the case of the Kemper IGCC Project. As noted within the E&CS Project Controls Standards,*
>
> > *All schedules will use critical path method (CPM) scheduling techniques and philosophy. Schedules will be logic-driven and the critical path will be identified. Schedule activities must be tied logically and use of open-ended logic strings should be minimized (if possible) in an effort to eliminate excessive total float numbers and ensure the integrity of the schedule network. The critical path will be identified as the longest duration path through the activity logic chain.*[486]
>
> *The critical path schedule identified the critical path on the Project as predominantly flowing through the construction in the gasifier area as well as the interface between the transmission lines and the power generation units."*

Q. Did the Kemper FEED Baseline Schedule serve as the Project Master Schedule and did it evolve over time?

A. Yes. As I indicated above, the initial Master Schedule was prepared on August 1, 2009 and included the general and engineering progress, site preparation, construction activities and startup and was integrated in accordance with SCS Procedure PC-02. The Master Schedule evolved as the Project progressed, and as more information became available to MPC and SCS.

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[485] Supplemental Direct Testimony of Dr. Patricia D. Galloway, On Behalf of Mississippi Power Company, Docket No. 2013-UA-189, page 52, December 13, 2013

[486] Southern Company, *Project Controls Standards For E&CS Capital Construction Projects*, Scheduling, page 9, March 2010

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As the Kemper IGCC Project developed, MPC took appropriate steps, consistent with good construction management practice, to increase the detail in the Master Schedule to reflect the level of information available increased, design packages were released, and as new contractors were brought onto the Project. Early in the evolution of this Project, Level 1, Level 2 and Level 3 schedules were produced based on information that was known at the time, for instance as of February 2010, a detailed Level 3 SCS Engineering schedule was produced. As the Project evolved and more detailed information was developed, schedule detail was increased allowing for the development of a fully integrated Level 3 schedule. It would have been impossible for MPC to produce a fully integrated Level 3 schedule for the Project before receiving detailed schedules and work plans from the contractors brought on to perform the various scopes of work. Level 3 schedules were developed by each major contractor for their respective scope of work and MPC used these schedules to update the overall Kemper IGCC Project Master Project Schedule. As of September 24, 2011, the Kemper IGCC Project not only had an integrated schedule, but was working to fully update it as project contracts were being let. In the October 2011 Production Report, MPC reported that the fully integrated schedule was complete and that several areas critical to the May 2014 COD were identified.[487] MPC evaluated and assessed how the various contractor schedules integrated with the overall Master Schedule and provided the oversight one would expect from an owner, ensuring that all contractors were progressing toward the COD. The workaround plans, as discussed later in my Rebuttal Testimony, were a key component in allowing MPC to maintain the COD in the face of unforeseen events. I have addressed the issue of resource loading of the Master Schedule later in this Section of my rebuttal testimony.

Q. Did DEI have a fully integrated schedule at the beginning of the Edwardsport IGCC Project as BREI opined should have been done by MPC on the Kemper IGCC Project?

[487] EPC Status Production Report, page 92, October 19, 2011

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A. No. As I indicated in my prudence testimony regarding the Edwardsport Master Schedule:[488]

> *"As the Edwardsport IGCC Project evolved, DEI took appropriate steps, consistent with good utility management practice, to increase the detail in the Master Schedule to reflect information as new contractors were brought onto the Project. Level 3 schedules were developed by each major contractor for their respective scope of work, including GE, Bechtel and* [Sargent & Lundy] *and later* [Burns & McDonnell]. *DEI used these schedules to update the overall Edwardsport IGCC Project Master Project Schedule. DEI evaluated and assessed how the various stakeholder schedules integrated with the overall Master Schedule and provided the expected oversight required to ensure that all stakeholders were progressing toward the Provisional Acceptance date. In March/April 2009 before major contracts were let, DEI requested that Bechtel supply additional scheduling assistance to insure that the schedule was maintained properly. In June 2009, as site work began, DEI took steps to add scheduling expertise to the PMT to integrate the various vendors' schedules. By August 2009 the Edwardsport IGCC Project integrated schedule was finalized. The schedule would require additional detail for the start-up phase, but that would not be necessary for several months in the future."*

Q. Was this the same approach taken by KCP&L in its development of its Master Schedule and timing relative to completing a fully integrated Master Schedule for the Iatan Unit 2 Project?

A. Yes. In KCP&L, only a Level 1 summary schedule was included in the Preliminary Design Report ("PDR") completed in 2004. The preparation of the Project Master Schedule continued through 2006 with development of Level 2 and 3 schedules culminating in an initial integrated

[488] Phase II Responsive Testimony of Dr. Patricia D. Galloway, Cause No. 43114-IGCC-4S1 on behalf of Duke Energy Indiana before the Indiana Utility Regulatory Commission, page 392, September 9, 2011

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baseline schedule in April 2007. KCP&L's approach was to wait until its contracting strategy was completed, including execution of construction contracts, before freezing the baseline schedule. KCP&L continued to integrate and add information as it was received. The Level 3 integrated baseline schedule could not be complete until all of the contractor schedules had been obtained. Finalization of the Iatan Unit 2 fully baselined schedule included incorporation of the engineering/procurement schedule, contractor schedules, and a placeholder for startup and commissioning, the later which still needed to be detailed based on planning still underway at that time with respect to startup and commission. Construction contracts continued to be let in June 2007 with the BOP contract and the fall of 2007 with another construction contract in the fall of 2007, both which were incorporated into the Master Schedule.[489]

Q. Are there other large complex projects on which you have worked where the development of the Master Schedule has evolved before it became a fully integrated baseline schedule?

A. Yes. I was the prudence auditor on the Levy Nuclear Power project in Florida on behalf of Progress Energy. The approach to the development of the integrated baseline schedule is the same approach as employed by the Kemper PMT for the Kemper IGCC Project. The development of the fully integrated baseline schedule occurred over a period of time and could not be completed until the detailed schedules were received by the contractors who would be performing the construction for various areas of the Levy Nuclear project. Mr. Gary Doughty, President and CEO of Janus Consulting, also presented testimony on behalf of Progress Energy regarding the Levy Master Schedule. Mr. Doughty's testimony regarding the Levy Master Schedule noted:[490]

> *"The overall approach to scheduling the* [Levy Nuclear Project] *is to utilize an Integrated Master Plan (IMP) process to ensure that the project activities*

[489] Rebuttal Testimony of Dr. Kris R. Nielsen on behalf of Kansas City Power & Light before the Kansas Corporation Commission, Docket No. 10-KCPE-415-RTS, pages 167-168, July 26, 2010

[490] Direct Testimony of Gary R. Doughty before the Florida Public Service Commission, Docket No. 090009, pages 35-38, March 2, 2009

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support the key project goals and milestones established by management. The IMP is summarized as a one page barchart schedule showing major projects or other activities and the supporting milestones. …

The IMP scheduling database includes all activities required from [Combined Operating License Application] *development and* [Nuclear Regulatory Commission] *review, engineering, procurement, fabrication, construction, staffing, training, and startup activities leading to commercial operation. It is being developed directly from the detailed project schedules required for the individual Levy Project contractors including* [Westinghouse Electric Corporation]/[Shaw, Stone, & Webster]. *It also contains schedule information from various other sources including the various* [Progress Energy Florida] *business units. …*

…

This approach is consistent with my experience and industry standards for project schedules for projects of similar size and scope.

…

Initial efforts to develop an IMP focused on corporate milestones and…the development of an appropriate WBS and interface with [Shaw, Stone, & Webster] *and* [Westinghouse Electric Corporation] *detailed schedules. …*

The IMP development continued using Primavera scheduling software, a generally recognized and accepted electric utility scheduling tool. The IMP schedule linked to data from the [Westinghouse Electric Corporation] *and* [Shaw, Stone, & Webster] *that contains approximately ten individual schedules… In addition schedule information from other contractors such as* [Sargent & Lundy] *was also imported. …*

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> *With the exception of the EPC at the end of 2008,* [Nuclear Plant Development] *anticipates that Rev. 3 of the IMP schedule will be issued shortly and that a baseline IMP schedule will also be developed. …"*

In addition, I serve as the Chair of the Independent Expert Review Panel for the $3.2 billion Alaskan Way Viaduct Project in Seattle, Washington where our panel reviews the management, project controls, financing plan and risk management plan for the Program reporting our findings annual to the State Legislature. In the initial year of the Program, the integrated Master Schedule for the Program was under development but could not be finalized until the detailed schedule had been received from the Contractor Consortium that would be building the largest portion of the Program - the tunnel. The approach taken by the Washington Department of Transportation for this large complex public works program was similar to that taken by the Kemper PMT for the Kemper IGCC Project.

Q. Does the method by which MPC developed the Kemper IGCC Project Master Schedule violate any industry standard or rise to the level of unreasonable behavior?

A. No. MPC's actions in developing the integrated Kemper IGCC Project Master Schedule, including discussions that were held between the stakeholders and parties completing the Project, are typical of what Pegasus-Global has seen on projects of the size and complexity of the Kemper IGCC Project and are consistent with industry practice. MPC determined that it needed to finish the contracting process before freezing the Project Baseline Schedule. In my experience, this decision is consistent with the need to have contractor schedules that describe how each contractor plans to do their scope of work, allowing for contractor interfaces to be known, understood and managed to allow project management to have the appropriate information to finalize a Master Schedule. MPC continued to review and update the Master Schedule in conjunction with its cost revalidation in the monthly Production meetings with summary information also being reviewed in the Core Team and MRB meetings, involving all the Project stakeholders in the process, which exhibited good project management practice.

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Q. How is the Master Schedule used on a project?

A. The Master Schedule is a critical tool that is used in the industry to allow project management to monitor project execution, report overall project progress, and to assist in making good project decisions. As noted in *Mega Projects Challenges and Recommended Practices*:[491]

> *"In its first iteration the master schedule might be little more than a series of logical activities, considering milestones, relationships, and constraints, with a rough timeline. As planning and preliminary design advances, definitions and logical relationships between activities and milestones become more specific. As the specifics become more detailed, the feasibility of completing the project on the projected completion date can be better assessed."*

As alluded to in that statement, the Master Schedule is updated as a project advances. *Mega Projects Challenges and Recommendations* explains that:[492]

> *"Updates to the project master schedule should be carried out at regular intervals or when it is most appropriate to do so in terms of phases, milestones, management need, payment and cash-flow determination, and public process information. Typically updates to the program schedule will take place on a monthly basis, with significant review and changes perhaps on a quarterly basis or in preparation for public and funding decisions."*

MPC and E&CS have procedures that require the type of updating outlined above. Further, as can be seen in their monthly EPC Status Production Meetings, and monthly Core Team Meetings, the project schedule was always a subject, and the Kemper PMT was constantly adjusting to deal with the realities of the complex, overlapping construction work going on, where, for many months, thousands of workers were on site doing a huge variety of tasks – all at the same time.

[491] *Mega Projects Challenges and Recommended Practices*, Edited by David J. Hatem and David H. Corkum, Chapter 5 Cost and Schedule Control, page 87, 2010

[492] *Mega Projects Challenges and Recommended Practices*, Edited by David J. Hatem and David H. Corkum, Chapter 5 Cost and Schedule Control, page 87, 2010

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Q. What did reviews or audits of the Kemper IGCC Project identify in regards to the schedule?

A. The B&V Readiness Review noted that:[493]

> *"In general, the review indicated that the project schedule contains adequate detail for engineering and procurement to begin the project execution. Currently, the construction detail is at a summarized level, as would normally be the case at this stage of the Project. However, SCS is proceeding with the development of the construction detail prior to the initial mobilization in the field, which is appropriate."*

B&V also noted the following concerning the duration of the schedule:[494]

> *"The duration review of the overall EPC schedule indicated that the schedule was very aggressive when compared to the B&V reference plant of a similar size. The B&V reference plant required an additional 4-5 months without including the margin between target completion and required completion. The Kemper IGCC schedule reflects 48 months from approximate start of detail design to commercial operation. Other areas that appear aggressive are the early mobilization to start piling at month 7, and 5 months to commercial operation for gasifier substantial completion. B&V recognizes and has implemented aggressive schedules for piling, but note the appropriate contracting structure must be utilized when doing this.*
>
> *In support of the SCS schedule, it is understood that the Kemper IGCC schedule is executing their Project inside a window constraint; and therefore SCS does not have the opportunity to extend the schedule."*

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[493] Black & Veatch, Kemper County IGCC Readiness Review, Section 9.0 Scheduling and Project Controls, page 9-1, February 26, 2010

[494] Black & Veatch, Kemper County IGCC Readiness Review, Section 9.0 Scheduling and Project Controls, page 9-13, February 26, 2010

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Additionally, the Construction Advisory Board also examined the schedule during its review of the Project; a summary of their observations is as follows:

- Report No. 1 – February 2012: *"Based on discussions during the visit and analysis of the data provided on schedule and current design and construction staffing and percents complete, we believe the current overall schedule to be very challenging. In fact there appears to be very little 'float' and a strict 'no change' policy should be enforced. Compared to schedule metrics, project progress is not quite where it would be expected to have advanced in some areas (foundations, underground piping, structural, etc.) It is not to the 'alarming' state, but must be managed with rigor and attention to detail."*[495]
- Report No. 2 – April 2012: *"While the schedule continues to be challenging, appropriate 'work-arounds' are being developed to maximize productivity when disruptions like equipment delivery slips occur."*[496]
- Report No. 3 – June 2012: *"The review team did not note any negative effects from the re-baselining exercise…The current project team is comprised of seasoned veterans who understand the importance of following proven techniques and practices in a very disciplined manner to achieve optimal results, so we do not expect there to be any significant issues."*[497]
- Report No. 5 – December 2012: *"While there continue to be cost and schedule pressures on the project, the workarounds, planning and decision making appear to be consistent with that expected on a well-managed project at this stage of completeness."*[498]

Q. Did BREI offer any evidence that the alleged lack of a fully integrated schedule earlier in the Kemper IGCC Project or the need to further update it caused any delay?

A. No. There is no such evidence because it did not happen earlier.

[495] Kemper County IGCC Project, Construction Advisory Board Report No. 1, pages 8-9, December 12-14, 2011
[496] Kemper County IGCC Project, Construction Advisory Board Report No. 2, page 5, March 12-14, 2012
[497] Kemper County IGCC Project, Construction Advisory Board Report No. 3, page 4, June 11-14, 2012
[498] Kemper County IGCC Project, Construction Advisory Board Report No. 5, page 4, December 17-18, 2012

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d. SCHEDULE MONITORING

Q. How was the schedule monitored on the Kemper IGCC Project?

A. At the outset, each discipline created a specific schedule for its scope of work that was compiled and linked together with predecessors and successors. The following demonstrates the schedule scope for each of the specific disciplines on the Project:

- SCS Engineering:
  - SCS Design
  - Procurement
  - Overall Schedule Responsibility
- KBR:
  - KBR Design
  - KBR Specifications
  - Vendor Data Reviews
- SCS Construction:
  - Detailed construction for those contractors without scheduling capability
  - Overall responsibility for Construction
- Construction Contractors:
  - Detailed construction schedule for individual scope of work
- Start-Up:
  - Start-Up and Turnover activities

SCS Engineering and KBR updated its schedules on a bi-weekly basis, where schedulers met with Design Leads, Project Engineers and Supply Chain, updating the schedule accordingly; construction and Start-Up schedules were updated weekly.[499]

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[499] Southern Company Generation, Engineering & Construction Services, Project Controls Procedures, PC-02 Project Schedules, Rev. 2, page 11, January 11, 2010

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As noted above, the Project schedule, including the critical path, was a regular and important discussion in the various monthly meetings on the Project (*e.g.* Production, Core Team and MRB). Part of this discussion included identifying schedule impacts, planning of corrective actions, and reporting the status of ongoing correction action implementation.

Q. Does Pegasus-Global agree with BREI's assertion that SCS's *"failure to develop fully integrated, baseline schedule until August 2011"* led to difficulties in meeting schedule targets and that *"SCS's inability to gauge project progress against a meaningful project baseline schedule was a particular weakness for the Project"*?[500]

A. No, there is no causal connection between the schedule control functions and the schedule delay experienced on the Project; furthermore, BREI has not demonstrated that such a connection exists.

Through June 2010, the primary Project activities involved engineering, procurement and some limited construction. There had been no major mobilization to the site for construction through that period. That work which was underway, primarily procurement and engineering executed in support of that procurement, was managed under SCS's corporate process and systems. By June 26, 2010, a detailed Level 3 EPC Schedule was produced and included engineering, procurement, contracting, construction and start-up activities. Pegasus-Global found these efforts and processes adequate for management and control of those efforts.

A project management team's focus early in any project is not on documenting what it has accomplished; it is on developing, installing and refining those systems and processes it intends to follow throughout the project. 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 affectively with those systems which were in place in the 2007-2011 time period.

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[500] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 49, March 19, 2014

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e. MPC USE OF SCHEDULING SOFTWARE PRIMAVERA P6 AND ITS LIMITATIONS

Q. Please discuss the scheduling software utilized by MPC for the Kemper IGCC Project.

A. MPC utilized Primavera software version P6 to develop the schedule for the Kemper IGCC Project. For many years the utility industry utilized a scheduling program called P3. This scheduling software was used throughout the utility industry for scheduling power plants. However, when Primavera Systems sold its company to Oracle in 2008, soon after, Oracle no longer offered support for P3 users and did not offer P3 for purchase. Instead, Oracle promoted a newer version of scheduling software called P6. Thus, utilities that were designing and building power plant projects in this time period were only able to purchase P6 software. It is my experience with large and complex projects, and power plants in particular, that P6 was the primary scheduling software tool in the utility industry and as such, it was reasonable for MPC and SCS to have made the decision to use P6 for the scheduling of the Kemper IGCC Project.

Q. Do you agree with BREI's conclusion that "[*t]he inadequacy of the resource loading method used by SCS was that it impaired the Project team's ability to timely 'see' increases in commodity quantities and craft labor requirements and to adjust both the labor requirements and construction sequencing/planning accordingly*" that led to construction management inefficiencies which further delayed the Project and made it more difficult to meet schedule and cost targets during the period of 2010, 2011 and 2012?[501]

A. No. The Kemper PMT's use of industry standard project management tools to track the use of labor and commodity resources on the Project was reasonable.

Q. Do industry standards require CPM schedules to be resource loaded?

A. No. While the PMI 2011 Practice Standard for Scheduling, recommends and provides guidance for resource loading of the schedules, the practice of resource loading is not required.

[501] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 49, March 19, 2014

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Specifically the PMI Practice Standard notes "if required" and under Section 3.9 Resource Planning notes, "*If the schedule model is to include resources of any type…Although resource loading of the schedule model is not required…*"[502] Further, regarding "good practice," PMI's Practice Standard notes: "*Good practice does not mean that the knowledge described should always be applied uniformly on all projects. The project management team is responsible for determining what is appropriate for any given project*."[503] Thus, MPC/SCS took actions it deemed necessary to manage and monitor the Project's progress, including labor and commodity resources when it discovered the significant issues with labor resource loading in P6.

Q. Is it typical for large complex utility construction project schedules to be resource loaded?

A. It depends. There are certainly requirements for resource loading for projects in which I have been involved and it is done, however, in other large complex power projects there has not been any requirement for resource loading. It is thus important to evaluate why management makes the decision not to resource load and to evaluate the circumstances at the time, including determining what other project control tools may have been used to monitor and manage resources. In my experience, including my recent experience with several large complex baseload construction projects which I have been involved in the past few years, the majority of these projects, which had their genesis of the baseline schedule development in the approximate same time period as the Kemper IGCC Project, have not required the integrated baseline schedules to be resource loaded. The labor resource allocation and monitoring and cost control function has also been performed outside P6 using a wide variety of software, which is also a reasonable and prudent project control methodology.

Q. Were the integrated Master Schedules developed for the Edwardsport IGCC Project, Levy Nuclear Project, the Iatan Unit 2 Project, or the Alaskan Way Viaduct Project resource loaded?

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502 Project Management Institute, *Practice Standard for Scheduling – Second Edition*, page 25, 2011
503 Project Management Institute, *Practice Standard for Scheduling – Second Edition*, page 43, 2011

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A. No they were not.

Q. Are you aware of issues that arose with the use of P6, especially for large complex projects?

A. Yes, as is typical with any new software, growing pains are common. As can be seen in a researched paper by Ron Winter, a highly respected project scheduler in the industry, P6 experienced a series of serious problems since its release, and according to Mr. Winter, it continues to have issues even as of the latest documented fixes. As Mr. Winter explains, Oracle continues to issue newer versions of P6 to "fix" the multiple of problems that have arisen since its release.[504] Looking at the overall flavor of the history of P6, it shows how "unstable and error ridden" P6 has been since its debut in 2001/2002. All the Service Packs and new Versions released with all the fixes shows how badly P6 was introduced to the market after P3 3.1 was so stable and widely used by industry. As noted by Ron Winter in his White Paper, resource-related errors in P6 is specifically noted in April 2009 when it indicates that P6 version 5, service pack 7 included fixes like, "leveling not prioritizing the activities correctly."[505]

Q. Are you aware of whether MPC and SCS experienced any of these problems that are so identified by Mr. Winter in his researched paper?

A. Yes, interviews with Project personnel specifically noted that they continued to experience multiple problems with P6, such as disappearing data and slow response times which were not revealed in early system testing and which hampered the PMT in getting the Master Schedule fully developed in the time period anticipated and further prevented them from using some of the features which they may have otherwise so chosen to utilize, such as resource loading.

Q. What are the reasons the utility industry does not typically use P6 for resource monitoring on large and complex power plant construction projects?

[504] "The History of Primavera Scheduling Software", Copyright December 16, 2013, by Ron Winter, PSP Ron Winter Consulting, LLC

[505] Primavera has always incorrectly used the term "leveling" when referring to "resource-constrained scheduling (RCS)"

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A. Resource loading had been an issue in Primavera for some time from the point that P3 evolved into P6 until at least early 2012 when the resource loading issues were finally beginning to be worked out. The issue is that when using a resource constrained schedule there would be created "phantom float" on the critical path of a project when in reality, the activity had no additional time for the work to be completed. Furthermore, the critical path is broken as a result of the phantom float that has been introduced. Thus, anyone using the schedule might not be able to use the schedule to determine what may truly be driving any delays to an interim milestone or the project completion date, as P6 would not accurately depict the critical path if resource constrained schedule had been applied. This is more fully described in a peer-reviewed journal paper by Dr. Jesus de la Garza, a well-respected professor in the industry teaching CPM scheduling.[506]

Q. Did P6 during the time period that MPC/SCS was developing its integrated baseline schedule have the same problems when resource loading was applied to the schedule?

A. Yes. In fact, according to Dr. de la Garza, the problems with P6 relative to resource constrained scheduling became worse. In addition to the phantom float that was created with the critical path activities, P6 did not always accurately distribute the manpower resources, in some cases over allocating resources that were either not available or could not be assigned due to other constraints, such as space limitations, etc. Dr. de la Garza, who is a civil engineering professor at Virginia Tech, specifically identifies these deficiencies in the P6 scheduling software when teaching CPM scheduling and has illustrated these deficiencies in class problems.[507]

Q. Are there other prudence consultants with whom you have worked that share the same opinion as you regarding the resource loading issues with P6 during the 2007-2012 time period and the reasonableness for utilities to use other project management tools to manage project resources?

[506] de la Garza, Dr. J.M., and Kyunghwan, Kim. "Phantom Float," *Journal of Construction Engineering and Management,* ASCE, October 2003

[507] de la Garza, Dr. J.M., (2009). "Class notes for CEE4024 Construction Control Techniques," Virginia Tech, Department of Civil and Environmental Engineering, Blacksburg, VA, Fall Semester

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A. Yes. Mr. Doughty, who I referred to previously in my Rebuttal Testimony as part of the prudence team on the Levy Nuclear Project, and who has been in the utility industry for over 40 years including the Project Manager for the Millstone Nuclear Plant as an employee of Northeast Utilities, agrees that P6 has limited users' ability to resource load schedules. He also agrees that there are several approaches to managing the schedule and manpower and commodity installation rates. As I have discussed earlier in my Rebuttal Testimony, the Levy Master Schedule was not resource loaded. Mr. Doughty noted that it is the contractor that decides how much manpower it needs to complete the work. A contractor may add extra resources to meet milestones or shift manpower to limit congestion, etc. The owner monitors the contractor's performance and requires them to develop recovery plans, etc. With respect to commodities, the most straightforward way to manage installation rates is to use the planned versus actual comparisons over time to determine contractor performance and if the contractor will finish on schedule. Mr. Doughty and I agree; there are a number of ways a utility can manage manpower and commodities, all of which may be prudent.

Q. Did MPC and SCS reasonably manage labor resources on the Kemper IGCC Project?

A. Yes. SCS managed the labor resources within Excel, a project management tool which can effectively manage labor resources. Pegasus-Global found SCS reasonably undertook and effectively used this tool to manage labor resources on the Kemper IGCC Project.

Q. Do you agree with BREI's assertion that "*[t]he longer a project is executed without this tool* [integrated resource loaded schedule]*and the information that it provides, the less ability the project team has to make informed decisions based on the project's status and progress, measured both on an absolute basis and against the baseline schedule*"?[508]

A. No. Project Management has many project control tools from which to choose to manage a project. It is not appropriate to simply conclude that a schedule is delayed simply because project

[508] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 44, March 19, 2014

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management did not use a specific project control tool. Rather, per the definition of prudency, one must look at the decisions made by the utility based on the information known to it or reasonably should have been known to it at the time the decision was made. Further, as I have testified earlier, there is not just one decision that is reasonable, rather there may be a number of decisions that may be made that are within a zone of reasonableness. First, MPC could not have resource loaded any schedule until it obtained the detailed schedules and resource information from the contractors that would be performing the work. Second, MPC made a reasonable decision to utilize other project management control tools (*i.e.* Excel) to monitor and manage the commodity and labor resources on the Kemper IGCC Project consistent with good utility practice, and as I have seen on other large complex projects on which I have worked.

SCS used the schedule as one project management tool along with the manpower charts created in Excel as another project management tool, allowing SCS to have appropriate and accurate information available to it to determine the Project's status. With these tools, SCS was able to assess if additional actions were required, such as hiring additional staff, extending work hours, or effect a change in process. The Excel charts maintained by SCS included actuals and forecasted manhours for the total Project, and broke out hours by Combined Cycle, Gasification Island and Gas Clean-Up areas of the plant. In addition, each of the major commodities was tracked with regard to the quantity, earned and required manhours for installation. The management tools utilized by MPC and SCS in execution of this Project are discussed in greater detail in **Section V.F.3.** of my Rebuttal Testimony.

Q. Was it unreasonable for SCS to use Excel to monitor resources instead of resource loading the integrated schedule in P6 as implied by BREI?[509]

A. No. SCS used both control tools to reasonably monitor cost and schedule for the Kemper IGCC Project and it reported this information to Kemper management allowing for more informed

[509] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 45, March 19, 2014

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decisions to be made. As I have testified earlier in my Rebuttal Testimony, prudence is not based on a "right" decision or an "optimal" decision, but rather it is based on whether the decision made was within a zone of reasonableness based on what was known at the time the decision was made. As I have also indicated, two different people may make different decisions based on the same information and both of those decisions may be reasonable and prudent, again because the decisions fall within a zone of reasonableness. The fact that BREI may have managed and monitored resources on the Kemper IGCC Project differently than that MPC has done does not make MPC/SCS's decisions and actions unreasonable or imprudent. Further, the fact that URS did not come to the same conclusions relative to MPC/SCS's development and management of the schedule would further illustrate how two experienced, but different companies, can arrive at different conclusions based on the same information.

Q. What are Pegasus-Global's conclusions regarding MPC's management and tracking of scheduling on this Project?

A. Pegasus-Global found that the process which MPC followed in the managing and tracking project schedules of the Kemper IGCC Project to be consistent with good construction management practice.

f. SCHEDULE WORK-AROUNDS

Q. Do you agree with BREI's conclusion that, "*While work-arounds are common in all construction projects, this just-in-time approach resulted in a significant increase in the number of work-arounds and creative steps were required during construction by the Project team as they continued to try to meet the scheduled COD date of May. In BREI's opinion, the lack of a more user-friendly project schedule with integrated resource loading severely restricted the site supervision personnel in their ability to manage the Project effectively. It also restricted the ability of senior management to establish credible methods to measure productivity of the work being performed and to be able to make necessary adjustments to the Project to achieve project goals or to mitigate greater impacts to those goals. The lack of a*

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fully integrated and resource loaded schedule prevented the supervision and management personnel from recognizing earlier in the construction period that they would be facing the 'stacking of trades' and 'congestion' in numerous work areas creating losses of productivity and efficiencies"?[510]

A. No. As I have discussed earlier in my Rebuttal Testimony, MPC effectively managed the labor and commodity resources with other project control tools which are commonly used in the utility industry for managing the monitoring project progress. Further, workarounds, as noted by BREI, are common in any construction project and were an integral part of the management process used by MPC and SCS on the Kemper IGCC Project.

Q. Has MPC defined workarounds as it used them on the Kemper IGCC Project?

A. Yes. In MPC's response to BREI's DR request, MPC defined workarounds as:[511]

> *"A workaround is a change in plans responsive to either a realized risk which was identified through the risk review process, or to a previously unforeseen risk with the potential to impact project cost, schedule, or both. As with any project, schedule modifications, or workarounds, resulting from unanticipated or realized issues that inevitably occur are a normal part of project execution and evolution. The objective when determining and implementing a work-around is to minimize the impact, avoiding as much schedule delay and/or cost increase as possible. Often, workarounds do not generate cost savings, but rather, are implemented to avoid cost increases or schedule delays that would otherwise occur. For this reason, the evaluation and implementation of workarounds is a necessary and prudent practice to ensure that cost and schedule impacts are minimized."*

Q. Was this process that MPC described in its response to BREI the workaround philosophy used on the Kemper IGCC Project?

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[510] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, pages 60-61, March 19, 2014
[511] Mississippi Power Company Response to MPUS (BREI) Data Request No. 13-1, April 7, 2014

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A. Yes. As PMI explains:[512]

> "[A work-around is] *A response to a negative risk that has occurred. Distinguished from contingency plan in that a workaround is not planned in advance of the occurrence of the risk event."*

The use of workarounds is a normal part of managing a large and complex project, given that unknown and unexpected events always present themselves during a project's execution. On the Kemper IGCC Project, MPC discussed workarounds during Production Meetings as part of the regular schedule review dialogue. Examples of schedule workarounds on the Project include:[513]

- <u>CO_2 Absorber</u> – "*In July 2012 during delivery, one of the CO2 absorbers rolled off the transport vehicle 5 miles north of the Kemper site. The absorber hit the pavement and rolled into a roadside ditch. The supplier's sub-contractor responsible for delivery recovered the absorber and delivered it to the site approximately one month after schedule delivery. The required repairs were minor and were performed at the job site. This vessel, CL1261, was the first of six to be delivered.*

  As reported in July 23rd Production Report the delivery of the CO2 Absorbers was causing a projected -61 days late installation. A work around plan was needed to minimize overall project impact and to lessen productivity impacts due to out of sequence work. The lack of timely delivery the dressing out activity which was to occur upon arrival at the job site and prior to the erection of each vessel (total of six). Following are specific workarounds that were implemented:

  - *Modify LTL-1500 crane moves and crane pad work, north and south of Gasifier structure.*
  - *Re-build and re-compact crane pads and heavy haul access roads.*

[512] Project Management Institute, *Practice Standard for Scheduling – Second Edition*, page 135, 2011
[513] Mississippi Power Company, Response to RFI No. BREI-Issue List-21, October 1, 2013

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- *Delay dress out and insulation work of large (170 ft. to 210 ft. long) cylinders until after erection.*
- *Delay concrete work in 130 – 230 common area until heavy haul road removal.*

After setting the six (6) CO2 Absorbers the LTL-1500 crane was relocated to the gasifier 150 area to complete the next phase of the gasifier components. Then, the LTL-1500 crane was moved back to the north side and jib section of the boom was removed in preparation to set the H2S absorbers. Upon completion, the LTL-1500 crane was again available for Gasifier work."

- CFI Refractory – *"During the high temperature curing process of the refractory in the first gasifier components, the refractory began failing. The project team immediately started working with the gasifier designer, the refractory producer, the gasifier component manufacturer, construction management, consultants, and all vested partners to determine the cause of the failures as well as the best path forward with respect to quality, budget and schedule. Workaround Plans included:*
  - *Modification of refractory work methods and materials.*
  - *Increased crew size and shift hours.*
  - *Contractor shifted some work to CFI-Kemper location.*
  - *Initiated daily inspections and weekly status phone calls on refractory progress.*

  The gasifier component contract delivery dates were from April 2012 through September 2012. However, the actual delivery dates ranged from August 2012 through January 2013. These gasifier component delays were in large part due to refractory issues. Although later than initially scheduled, all were completed, delivered to the site and successfully installed."

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- Pipe Fabrication – *"As the piping design evolved, it became apparent that the piping quantities were at risk to increase. Additionally, late piping deliveries were beginning to cause schedule constraints. The piping contractor did not have the shop capacity to meet the required delivery schedule given increased quantities. Although a revised piping fabrication plan was implemented, there were late deliveries that required schedule adjustments.*

  The project team reviewed each issue independently and made necessary adjustments including revising crane plans, craft re-assignments, etc. as described above. Ultimately, the schedule was re-base lined. The cumulative effect of the schedule adjustments and the re-base line was to work 6 ten hour day shifts and a night shift in gas clean-up areas 130', 170', and 230'."

The workarounds were led and developed by construction managers working with project schedulers to test any potential downstream impacts a given workaround plan may have had on other areas of the Project. This process allowed the construction managers to receive input from the contractors involved in specific scopes of work that may be affected, which was then brought back to be tested with the schedulers attempting to minimize the impact on the overall execution of the Project.

Q. Can you explain how the schedule analysis and workarounds were discussed in the Production Meetings?

A. The schedule was a regular topic of discussion during the Production Meetings; specific attention was paid to the critical path activities. The critical path was a featured part of the Production Meetings, both in discussion of critical path analysis and the inclusion of a critical path schedule in the Production Reports. The schedule review included discussion of progress completed since the prior meeting and also featured a schedule variance summary. Regarding workaround plans, the activities involved were summarized by area including a summary of the proposed resolution, this was then updated in following periods. For example, the March 2012 Production Meeting

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summarized the results of the January 28, 2012 schedule update and the resulting action that was taken in response to the negative float identified.[514]

Q. Did the Kemper PMT use other schedule tools to assist the project managers and project control specialists?

A. Yes. As part of the work-around approach, the Kemper PMT proactively monitored the schedule's negative float. The term negative float is used to identify the recording of sequential events on a baseline schedule that have a precedent/successor relationship that has been shown to be impacted as the project control specialists record the actual events in the project. For instance, an activity such as "obtain permits" may have a predecessor activity called "complete permit application" with a direct connection that the "obtain permits" activity will start the day after the "complete permit application" activity is completed. If the activity called "complete permit application" is delayed, then the difference in the actual control schedule is shown as negative float. So a delay of five days between these two activities would cause a negative float of minus five days. It is the job of the project control specialists to examine the control schedules, allowing them to anticipate delays caused by negative float. Then management must develop workaround schedules to reduce or preferably eliminate the negative float.

Q. Do you have examples of how the Kemper PMT used this tool on the Kemper IGCC Project?

A. Yes. For example, the March 2012 Production Meeting summarized the results of the January 28, 2012 schedule update and the resulting action that was taken in response to the negative float identified in four areas:[515]

- *"Areas 150, 150A, 250, 250A, 510 and 520 Critical Path Schedule was not generated this month due to the schedule being integrate*[d] *with new files from Yates/BE&K for both the Gasifier Structure and the Combined Cycle – HRSG.*

[514] EPC Status Production Meeting, page 129, March 21, 2012
[515] EPC Status Production Meeting, page 129, March 21, 2012

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The effort to make new logic ties and delete old activities ties is very complex and is anticipated to be completed next period. ***[Schedules from Gasifier and HRGS* [sic] *contractors were integrated into the project schedule. No negative float was generated]*** *"*

- *"Area170 A1 – Pipe Bridge (-37 days TF) Piping Level 3 of Pipe Bridge causing negative float and generating a critical path through Areas 550 Aux. Boiler and Area 570 Waste Water Treatment affects startup in these areas. We are working with Design on releases, Delivery and Construction logic to eliminate negative float.* ***[Revised logic to reduce negative float to -16 days for the Pipe Bridge and eliminated negative float in Area 570 Water Treatment.]*** *"*
- *"Area 550 Auxiliary Boiler Fire Off – (-4 days TF) The negative float is because of late completion of Utility Bridge 170C-1 and 170B-2. This affects the completion of the piping and electrical to auxiliary boiler. This ultimately will affect the Startup activities associated with Waste Water Treatment Plant. Reviewing Construction logic and durations eliminate negative float.* ***[No resolution – latest update of deliveries caused negative float to increase to (-25 days TF)*** *"*
- *"Area 600 Admin/Control Room – (-19 days TF) Construction Complete affect the DCS equipment Turnovers which impact the Checkout and Commissioning activities. Reviewing Construction logic and durations to eliminate negative float* ***[Reworked logic and durations with Admin/Control Bldg contractor to eliminate negative float.]*** *"* **[Bold emphasis added]**

Another example is the July 2012 Production Meeting, where activities were summarized related to resolution of the previous month's critical activities:[516]

[516] EPC Status Production Meeting, page 51, July 23, 2012

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"The results of the June 01, 2012 schedule update identified negative float in three areas:

1. *The first two areas with negative float are Areas 150 (-119 days) and 250 (-117 days) driven by the delivery and installation of the Gasifier refractory lined components and piping drawing releases for small bore. Late deliveries impact the steel erection and equipment installations above elevation 605' for the Gasifier structure which will affect the de-mobilization of the heavy lift crane. De-mobilization of the crane impacts start of the foundation work for the LDF No. 2 transfer tower (-16 days), First Heat-up of the Gasifier (-54 days), Acid Gas Cleanup (-15 days), Reliable Syngas (-117 days), commissioning of the Nitrogen – PSA System (-44 days) and pushes the COD date to June 28, 2014 (-58 days).*

   The 5/17 Workaround plan brings the COD back to May 7, 2014 (-6 days).

2. *The third area is in Area 550 driven by the late delivery of the condenser components due to transportation issues related to load size. The later delivery generates (-69 days) of total float on installation of the condenser. This affects the erection of the pipe bridge steel between HRSG's A and B, natural gas piping to the existing auxiliary boiler, and startup at the wastewater treatment area. The fire off auxiliary boiler milestone is delayed 69 days, but does not impact COD.*

   The 5/17 Workaround plan reduces the negative float to -27 days. This is in relation to the contractor's contractual finish date for this area, and does not affect COD." **[Bold emphasis added]**

Q. Was MPC successful in developing and implementing workaround plans?

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A. As demonstrated in the examples above, and as evidenced elsewhere in the Project record, MPC was very active in its monitoring of the schedule and was highly engaged in developing appropriate workaround activities to maintain the COD. Pegasus-Global found that MPC took reasonable and prudent actions in its management of the schedule and the results of these workarounds allowed the Project to continue towards its planned completion date in the face of unexpected and unforeseen developments.

Q. In Pegasus-Global's review of the Kemper IGCC Project did you find any evidence of inadequate schedule controls that caused inefficiencies?

A. No. As discussed earlier in my Rebuttal Testimony in **Section V.F.1.**, the schedule controls used and implemented on the Kemper IGCC Project align with industry standards. The effectiveness of the Kemper PMT's use of these controls were well demonstrated as they were able to accomplish the primary objectives of schedule controls: their use allowed for monitoring and tracking of schedule progress, allowed project management to identify schedule inefficiencies, and allowed for the implementation of corrective measures as appropriate. As noted in *Construction Project Scheduling and Control*:[517]

> *"Construction projects rarely—if ever—go as planned. Thus, we expect some deviation from the baseline. We need to know where, how much, and why; then take corrective action whenever and wherever needed."*

This is precisely what the project controls in place on the Kemper IGCC Project have allowed the Kemper PMT to perform, and although the schedule has changed from the original plan, it was not due to a lack of schedule controls; MPC and its agents schedule control practices were demonstrated to be reasonable and prudent.

g. SCHEDULE RE-BASELINING

Q. How is a project baseline schedule used?

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[517] Saleh Mubarak, *Construction Project Scheduling and Control*, Second Edition, page 140, 2010

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A. A baseline schedule is the schedule from which a project's progress and performance is measured and compared against. It is an important tool in the monitoring of a project as it allows project management to identify deviations from the original plan, allows for an analysis of the deviation from plan and allows for management to decide what corrective action might be taken to maintain the original plan or baseline.

Q. When was the schedule initially baselined?

A. Although there were Level 1 and 2 schedules created earlier, the official baseline schedule for the Project was the integrated Level 3 schedule dated September 24, 2011. A baseline critical activities schedule was also created on this date that showed each of the activities that had less than two weeks of float, allowing the Kemper PMT to be fully aware of these critical activities.

Q. You noted the initial schedule baseline was the September 2011 integrated schedule, was there a need to re-baseline the schedule subsequent to that time?

A. Yes. As the Project advanced, the schedule was re-baselined in August 2012, May 2013, and recently in November 2013. The scope of Pegasus-Global's prudence evaluation excludes the November 2013 re-baseline, and is limited to schedule management and progress up to March 31, 2013.

Q. Were the schedule targets in the initial Master Schedule delayed due to any alleged failure to develop a fully integrated schedule prior to August 2011?

A. No.

Q. What was the impact to the Key Project Critical Milestones from the August 2012 re-baseline?

A. The schedule was re-baselined in August 2012 to account for new quantity projections of the major commodities and the impact late material deliveries were having on the Project.

The affect the re-baseline had on the Key Project Critical Milestones is demonstrated in the following table:

Milestone	Baseline Date	August 2012	Change in

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		Baseline	Days
Admin/Control Bldg DCS Control System Functional	7/1/2012	9/10/2012	+71
Start to Fill Treated Effluent Reservoir	10/1/2012	9/29/2012	-2
Station Service Energization	11/8/2012	11/8/2012	0
Water Treatment Plant Commissioning Completion	1/31/2013	3/20/2013	+48
Cooling Tower Completion	3/31/2013	3/31/2013	0
Fire Off Auxiliary Boiler	12/31/2012	4/16/2013	+106
First Fire Combustion Turbine – B	6/8/2013	6/17/2013	+9
First Gasifier Heatup	10/14/2013	12/16/2013	+63
Reliable Syngas to Combustion Turbines	12/14/2013	2/6/2014	+54
COD	5/1/2014	5/1/2014	0

Q. Does the fact that there may be changes to project milestones which result in a change or re-baselining of the schedule indicate that schedule controls and schedule management are inefficient?

A. No. Unexpected events are inherent in large and complex projects such as the Kemper IGCC Project. Although the Project had appropriate schedule controls and tools in place, and project management repeatedly took prudent courses of action in monitoring and managing the project, unexpected and unforeseen events and circumstances arose which could not have been reasonably known at the time of the baseline.

h. COMMERCIAL OPERATION DATE EVOLUTION

Q. Have you reviewed and are you familiar with the MPSC's witness URS testimony and Staff's witness BREI regarding its findings on MPC's decision to maintain the original COD of May 1, 2014?

A. Yes, I have and am.

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Q. Do you agree with URS's finding that "*Many subsequent decisions were made to maintain the COD date that resulted in additional project costs associated with productivity losses and efficiency losses due to required workarounds and work installed out of normal sequence*"?[518]

A. No. As is discussed below in detail, maintaining the COD date of May 1, 2014 was mandatory in order to receive the §48A Phase I ITC of $133M. It is not unusual for Project delays to occur on large complex projects and to suggest that a project such as the Kemper IGCC Project should be able to avoid all delays is not rational.

Q. Do you have any general observations about BREI's findings regarding the COD?

A. Yes, BREI notes that it did not attempt *"to evaluate the prudency of executive management decisions after construction began to incur additional costs in order to maintain the original COD and compressed schedule…"*[519] However, BREI is also *"of the opinion that if MPCo had recognized the need to extend the schedule to reflect a 4Q2014 COD at that time* [3rd quarter 2012], *then the 2012 projected labor rates and productivity factors could have been maintained…"*[520] There are fundamental flaws in the conclusions reached by both BREI and URS in that neither has made an effort to quantify the costs of maintaining the May 2014 COD, nor do they take into account the costs of extending the COD beyond May 2014, including loss of the § 48A Phase I ITC of $133M and additional construction overhead costs.

Q. Did Pegasus-Global evaluate the COD date for the Project?

A. Yes, Pegasus-Global evaluated the initial COD date (November 2013) as well as MPC's decision to change to the May 2014 COD date. Although Pegasus-Global is aware of the November 2013 decision to extend the COD to October 2014, this change occurred after the evaluation period of the prudence audit.

Q. What is MPC's definition of COD for the Kemper IGCC Project?

[518] URS Corporation, IM Prudence Report, page 37, March 7, 2014
[519] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, pages 4, 20, March 19, 2014
[520] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 75, March 19, 2014

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A. MPC explained its definition of COD in response to a BREI RFI as follows:[521]

> *"MPC's and Southern Company's declarations of commercial operation have been made after management is satisfied that the generating facility is ready to be made available for its intended use. These declarations have depended upon a variety of non-exhaustive factors, which include, but are not limited to, the following:*
>
> 1. *Permitting is complete and the facility has met EPA's definition for commercial operation;*
> 2. *Any applicable requirements of the Southern Company Interconnection Agreement have been completed and approval to begin commercial operation has been received from Southern Company's Bulk Power Operations organization;*
> 3. *Control of the facility has been transferred from Southern Company's Engineering and Construction Services organization to the MPC plant operations organization; and*
> 4. *The facility is, based upon the experience and informed professional judgment of MPC's management, ready and available to reliably serve MPC's customers."*

Q. How was the initial November 2013 COD determined on the Kemper IGCC Project?

A. There were several factors that drove the original November 2013 COD. One of the major factors was MPC's identified need for additional generation capacity in its fleet projected for 2014, which it found would steadily increase the following years. As such, MPC assumed a November 2013 COD in its initial Certificate application, which would maximize the federal,

[521] Mississippi Power Company, Response to BREI-Issue List-36, October 21, 2013

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state and local benefits available to reduce the cost of the Project while having the additional capacity available for the summer peak of 2014. However, the application noted that:[522]

> *"…the Company is preserving options for a later commercial operation date should it be determined that a later in-service date is in the overall best interest of the Company and its customers."*

Q. Based on the November 2013 COD date, what were the critical drivers to the Kemper IGCC Project schedule at the time of the Certificate application?

A. As noted by Ms. Kimberly Flowers in her Direct Testimony, the current market activity as reflected by budgetary inquiries from major equipment suppliers indicated that some of the major equipment (*e.g.* steam turbine, gas turbine, syngas cooler) had very long lead times of thirty months or greater. Due to the long lead times, MPC would have to commit to the equipment vendors as early as the middle of 2009 to meet the November 2013 COD date.[523] MPC's ability to commit to equipment vendors as well as initiate other Project activities was entirely contingent upon receiving the CPCN approval, which at the time of the filing was expected to be received in late 2009.

Q. When was the change in COD date from November 2013 initially discussed by MPC?

A. During an April 2009 MRB meeting, the COD date was discussed including the following points:[524]

- *"2014 allows schedule comfort, but with cost, and potential impact to credibility*
- *2013 fits current filing, cost projections, and schedule, with some increase in construction and NEPA risk*

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[522] Mississippi Power Company, Petition for Facilities Certificate for the Kemper County IGCC Project, page 5, January 16, 2009
[523] Direct Testimony of Kimberly D. Flowers, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, page 51, January 16, 2009
[524] Managing Review Board Presentation, page 14, April 23, 2009

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- o *Requires Certificate and purchase of major equipment beginning November 1, 2009"*

Further discussion occurred in May 2009, discussing the benefits of pursuing Phase II ITC, which required 65% CO_2 capture.[525] In June 2009, the MRB presented the recommendation to move the COD date to May 11, 2014 based on the five year time frame from the ITC Certification ending on May 11, 2014, instead of November 29, 2013 that was initially planned. One of the benefits to moving the COD date was that it allowed for the opportunity to include 65% CO_2 capture in the initial plant design, avoiding the retrofit costs of adding it later while also allowing MPC to pursue §48A Phase II ITC while preserving the Phase I ITC of $133M.[526] The approval of the COD change to May 2014 was noted in the meeting minutes recorded for this June 2009 MRB meeting.[527]

Q. What were the costs impacts associated with moving the COD to May 2014?

A. As explained by Mr. Thomas Anderson in his Phase II Direct Testimony:[528]

> *"Moving the COD from November 2013 to May 2014 adds approximately six months of additional escalation for equipment, labor and commodities, which is expected to increase the capital cost of the Project by approximately $30.1 million."*

However, as noted above, the May 2014 COD allowed MPC to maintain the $133M Phase I ITC, which required that the Project be placed in-service no more than five years from the date the IRS formally certified MPC's application (May 11, 2009) as well as to pursue the Phase II ITC.

Q. What did the Kemper PMT do to maintain the May 2014 COD?

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[525] Managing Review Board Meeting Minutes, page 1, May 14, 2009
[526] Managing Review Board Presentation, page 17, June 18, 2009
[527] Managing Review Board Meeting Minutes, page 1, June 18, 2009
[528] Phase II Direct Testimony of Thomas O. Anderson, On Behalf of Mississippi Power Company, Docket No. 2009-UA-014, page 15, December 7, 2009

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A. MPC engaged in several activities in the form of workaround plans, explained in detail above, to maintain the May 2014 COD. The workaround plans established by project management and tested with the project schedulers were put into place to minimize the impact to other Project activities and accomplish the May 2014 COD. As discussed in several locations in this testimony, these plans involved re-sequencing of work, concurrent work, and adding labor (extra shifts or weekend work).

Q. Did MPC analyze the costs and benefits of maintaining the May 2014 COD?

A. MPC was continually monitoring the Kemper IGCC Project and reasonably developed workarounds to recover schedule in order to maintain the May 2014 COD.

In August 2012, MCP analyzed the costs and benefits of meeting the May 2014 in-service date. In its review, MPC noted:[529]

> *"A delay of at least six months would have an economic cost to our customers of $130 million 2014 Net Present Value of Revenue Requirement (NPVRR). These additional costs are driven by:*
>
> 1. *The loss of $133 million 48A Phase I Investment Tax Credits - $35 million NPVRR*
> 2. *The cost of replacing Kemper in dispatch with more expensive generation – average $95 million NPVRR over 9 scenarios"*

In this calculation, MPC appears conservative in its estimation. In this same memo, MPC also reported the estimated costs of workarounds, calculating its cost at around $30M.[530] MPC's analysis led them to continue to employ workarounds, and to continue to focus on achieving the May 2014 COD date.

Workarounds to recover delay are standard industry practice, and MPC made reasonable and prudent decisions in developing workarounds that still reasonably predicted that the May 2014

[529] Internal Memo: Cost/Benefit Analysis Associated with Meeting May 2014 In-Service Date, August 31, 2012
[530] Internal Memo: Cost/Benefit Analysis Associated with Meeting May 2014 In-Service Date, August 31, 2012

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COD date was achievable. The costs incurred to accelerate a project are usually substantially less than the delay costs that would otherwise would be experienced. It is true that additional costs are incurred through overtime wages and lost productivity, but this must be weighed against the costs of keeping a construction site active for a longer period of time. Just one month of "incidental costs" can be significant (construction management, trailers, road maintenance, scaffolding, etc.).

MPC revisited this subject again in June 2013. The June 2013 Production report documented the discussion of moving the COD seven months (to December 2014) and identified the following potential costs:[531]

- Construction Indirects: 4 months @ $20M; 3 months @ $6M
- Construction Management: 4 months @ $3M; 3 months @ $1.5M
- Startup Indirects/Labor: $20M

Resulting in an expected $135M additional EPC costs for extending the COD seven months, in addition to the loss of the $133M Phase I §48A ITC, for a total anticipated cost of $170M. With these data in mind, MPC continued to employ workarounds to meet the May 2014 COD date while also considering a re-baselined schedule.

Q. At what point did MPC determine that it could not achieve the May 2014 COD date?

A. MPC gave official notice to the SCC of the change in COD on October 2, 2013. In the October 2013 Production Meeting, the new COD date is given as October 21, 2014.[532] MPC began to consider that the May 2014 COD date could not be achieved in July 2013, as reported in the July Production Team Meeting.[533] However, MPC was unwilling to move the date until it was certain that it could not be achieved, and it continued to consider schedule workarounds and other options up to the time it announced the change of the COD to the fourth quarter of 2014.

[531] EPC Status Production Meeting, page 83, June 20, 2013
[532] EPC Status Production Meeting, page 22, October 2013
[533] EPC Status Production Meeting, page 83, July 2013

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Q. Do you agree with BREI's analysis to determine a most probable completion date as it so describes on page 41 of its Prudence Report?

A. No I do not. Prudency, as I have defined and discussed earlier in my rebuttal testimony is a review of the decisions of management based on information known or that reasonably should have been known at the time the decision was made. As I also testified, individuals may make different decisions which may still both fall within a zone of reasonableness. It is inappropriate to substitute one's own judgment of what should have been done and with what project control tools as BREI has done in its estimated completion date analysis as described on page 41 of its prudency report. As I have testified, MPC and SCS made reasonable and prudent decisions in its use of the chosen project control tools to monitor schedule and project resources and made reasonable decisions relative to maintaining the May 1, 2014 COD date, reasonably weighing the costs of acceleration against the costs of delay, and holding the date until it became clear to management that the May 2014 COD date could not be achieved.

3. PROJECT MANAGEMENT TOOLS

Q. Have you reviewed and are you familiar with the testimony of the Sierra Club's witness Mr. Schlissel and Staff's witness BREI regarding MPC's decisions relating to its project management tools and specifically its cost forecasting and trending tools and findings that due to MPC's unreasonable actions in these areas that MPC did not recognize the impacts of increased quantities and productivity impacts on the Kemper IGCC Project which resulted in unreasonable costs increases associated with those inefficiencies, shortcomings and deficiencies?

A. Yes I have an am. In response to Mr. Schlissel's and BREI's findings and conclusions, I have organized my Rebuttal Testimony as follows:

- Trending and Forecasting;
- Cost Control;
- Commodity Quantity Growth;

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- MPC Commodity Quantity Monitoring; and,
- Evaluation of Commodity Quantity Data.

Q. As a foundational basis to your response to Mr. Schlissel and BREI, can you define "project management tools" and why they are important to the management of the Kemper IGCC Project?

A. When designing and constructing a large and complex project, trending and forecasting, earned value, progress management and control systems are not discrete functions; all are quasi-integrated elements of the total project data set which enable Project Management to identify where the status of a project is against plan, and where the project is projected to be against plan given management predictions of future projects conditions (in part based on past trends and current position). Common formats for reporting performance data include bar charts, S-curves, histograms and tables.

As can be seen in the various examples of performance reports, which I discuss later in my Rebuttal Testimony below, the Kemper PMT used all of those reporting tools to monitor, trend and forecast costs and progress during execution of the Kemper IGCC Project.

By knowing where the project has been, where it currently is, and what management forecasts may occur in the project in the future, Project Management has the best chance of identifying solutions and considering options for changing the execution plan to improve the probability that the project can successfully meet its schedule, cost and performance goals and objectives.

Trending, forecasting and earned value are all considered important project management and control tools which enable Project Management to identify concerns, project consequences and formulate management responses to positive or negative performance issues over a wide variety of work elements and scopes. The Kemper PMT implemented and used those tools, which are generally accepted within the utility and construction industries as the core of project cost trending and forecasting.

a. TRENDING AND FORECASTING

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Q. In response to Mr. Schlissel and BREI, did Pegasus-Global in its prudence audit and evaluation review MPC's use of trending and forecasting as part of its decision-making process?

A. Yes. I, as part of the Pegasus-Global team, examined information and documents prepared for meetings, meeting minutes, reports prepared for internal and external audiences, as well as IM reports.

Q. Do you have any overall observations regarding MPC's use of trending and forecasting in its decision-making processes?

A. Yes. In Pegasus-Global's review of MPC's documentation, Pegasus-Global found that MPC used trending and forecasting tools appropriately, and within prudent utility industry practice and industry standards. Further, the use of these tools assisted MPC in its decision-making.

In the following testimony, I will discuss trend and forecasting industry standards, to provide a framework for my conclusion that MPC's processes and procedures met industry standards and good utility practice. I will then provide detail as to the methods and procedures employed by MPC, comparing them to the industry standards.

Q. Are their specific construction and utility industry standards for trending and forecasting that MPC should have used?

A. There are no definitive tools or systems required within the industry at large, however there are some general processes which are recommended as best practices within the industry by such institutions as the PMI, AACEI and the CMAA. Typically large firms involved in major construction projects will use an internally developed system which is aligned with the firm's internal accounting, management, and recording keeping systems. According to AACEI Cost Control is:[534]

[534] AACEI, Recommended Practice No. 10S-90, Cost Engineering Terminology, page 27, January 14, 2014

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> *"The application of procedures to monitor expenditures and performance against progress of projects or manufacturing operations; to measure variance from authorized budgets and to allow effective action to be taken to achieve minimum costs."*

It is a normal that changes will take place on any large and complex project that can potentially impact project costs during project execution; it is a normal condition which must be addressed by Project Management as effectively and efficiently as possible to minimize cost impacts. To effectively manage and control cost on large and complex projects, Project Management must anticipate, identify and respond to changes quickly and decisively. To optimize effective Project Management's control of changes, the team must have accurate knowledge of the projects' past trends, current conditions and the ability to forecast future conditions. That said, there is no universally accepted process for monitoring expenditures or performance to identify variances; however, the two monitoring and control principles cited repeatedly are cost trending and cost forecasting, and the most common trend and forecast tools in the industry are cost curves, progress curves, and performance curves (earned value curves), which will be discussed later in this testimony.

Q. How does the construction industry define a trend?

A. 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 for a period of at least three consecutive reporting periods.

Q. Why does Project Management use trending as one of its tools in the decision-making process?

A. A trend is established in relation to planned events or performance as set by Project Management during the planning of the project, allowing for the comparison to actual performance of the

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project against the planned performance forecast for a specific point in time. Understanding trends allows Project Management to identify potential issues and adjust its plan and mitigate those issues.

Q. How would Project Management use trending to compare actual performance against planned performance using a typical example?

A. I will use the example of how trending is used to monitor project cash flow. Once a total cost estimate has been set for a project it is converted into a project budget. That project budget is the basis from which a project cash flow plan is developed. A cash flow plan establishes the amount of money which Project Management expects to expend during each month. From that cash flow plan Project Management develops a cash flow curve, which reflects the cumulative expenditures on a monthly basis from the first planned monthly expenditure to the last planned monthly expenditure. Project Management will then prepare an actual cash flow curve, enabling Project Management to compare the actual expenditures each month against what was planned. This allows Project Management to determine if the project is spending as planned, higher than planned or lower than planned, making it possible to see quickly if there maybe issues requiring further investigation, or if all is on track.

Q. How is a trend identified by Project Management?

A. Trends are typically established based on three months of consistent comparative results. Using the same example as above, if the actual expenditure of cash exceeds the planned expenditure of cash over a three month period, a trend of over-expenditure has been established.

Q. How does Project Management use trend information?

A. Having ready access to trend information enables Project Management to identify anomalies in actual performance as measured against planned performance. Having identified an anomaly, Project Management can conduct what is known as a trend analysis to determine what event(s), condition(s), or performance factor(s) is responsible for or contributing to the trend. Using the

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results of the trend analysis Project Management can formulate the appropriate actions and mitigation to be taken in response.

Q. Can you provide an example of a trend, how that trend would be analyzed and how Project Management would use the results of that trend analysis?

A. Yes. One example is MPC's use of LPIs and SPIs to track earned value progress for total EPC, total engineering, KBR engineering, SCS engineering and total construction performance. Again using the cost cash flow example, assume that a trend has been established which reflects that the project is expending at a rate lower than planned. There are number of reasons that the under-expenditure may be happening, some of which may be positive and some of which may be negative. A positive cause may be that the cost of equipment is lower than had been original estimated and built into the planned cash flow curve. Obtaining lower cost equipment would result in the project having more cash than planned, which Project Management would quantify and distribute back into the project budget and cash flow plans. However, there are also negative reasons for the lower than planned cumulative cash flow. For example, it may be that the project is significantly behind schedule and expenditures are not being made at a rate planned due to those delays. In this instance, Project Management must determine the duration of the delay and adjust its cash flow curve to reflect that the cost impact of that delay. The trend signaled that management should be paying attention to schedule delay, giving them the ability to address the situation. That is the job of trending; to alert Project Management of potential issues, negative or positive, so it has the ability to adjust and/or remedy the issue.

Q. How does the construction industry define a forecast?

A. A forecast is an estimate and prediction of future conditions, events, or performance based on information and knowledge available at the time of the forecast.[535] As an example of how MPC used forecasting on the Project, each month in the Production Team Meetings there was a

[535] AACEI, Recommended Practice 10S-90, Cost Engineering Terminology, page 48, January 14, 2014

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"Engineer Procured Forecast Changes" that tracked the total changes to Engineer Procured costs on the Project, providing detail for the specific changes each month as well as the summary totals for previous months' changes. In the September 2011 Production Team Meeting, detailed items including, but not limited to, the following appeared as forecast changes:[536]

- COS Hydrolysis Catalyst (updated per contract): ([redacted])
- Transport Air Compressor (updated per contract): [redacted]
- Transformer Precast Firewalls (updated per PO): [redacted]
- Sample Station Move to EP I&C: [redacted]
- Reduction in Construction Material Sales Taxes Electrical: ([redacted]

The total forecast changes for September 2011 Engineer Procured costs amounted to a net reduction of $1,485,842 to the overall Engineer Procured forecast. This type of detailed forecast information was presented monthly to MPC Management in the Production Meetings.

Trending costs is relatively simple because, as described above, it is based on known data and information. Forecasting, however, is more difficult and imprecise; it involves making predictions as to future events and conditions, then estimating the cost impacts which might flow from those event or conditions. While past trends provide Project Management with a basis from which to predict future outcomes, cost forecasting ultimately involves the exercise of Project Management's collective judgment which is based on information and knowledge available at the time of the forecast.[537]

Q. Why does Project Management use forecasting as part of the decision-making process?

A. It is Project Management's responsibility to establish a plan for executing the project looking forward from a given point in time to the end of a project. One tool which assists Project Management in doing this is forecasting. Project Management uses a combination of three

[536] EPC Status Production Meeting, page 35, October 19, 2011
[537] Project Management Institute, *A Guide to the Project Management Body of Knowledge (PMBOK)*, Fifth Edition, Project Management Institute, Chapter 7, page 220, 2013

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elements to create a forecast: actual project performance to date; current and expected industry conditions; and, management experience and judgment as to future conditions, events and performance.

Q. How does Project Management use its experience and judgment in the development of a forecast?

A. Many of the issues and challenges faced by projects are common to the construction industry and most Project Management personnel will have prior experience with how those issues evolve into trends. For example, if analysis of a trend reveals that a cost overrun is due to higher than anticipated labor costs due to a shortage of local labor resources, Project Management can use its experience to predict whether the labor shortage is likely to improve, remain stable or worsen in the future. Using its judgment and previous experience, Project Management can develop an action plan, which will either alleviate that specific impact problem or find alternative execution plans which will mitigate at least a portion of the forecast condition.

Q. Are trends and forecasts used by Project Management as part of the decision-making process?

A. Yes. As discussed above, trending and forecasting are project control tools which Project Management uses in conjunction with other tools as well as professional judgment, to enable Project Management to execute the project as effectively and efficiently as possible. In addition, the information provided by using these tools assists MPC Executive Management as one piece of information used in making informed choices and decisions about potential actions that can be taken to address trends and forecast progress.

Q. Does the construction industry have standard tools or systems for project trending and forecasting?

A. The most common trend and forecast tools in the industry are cost curves, progress curves, and performance curves (earned value curves).

Q. Do all construction industry projects use the same trend and forecast curves?

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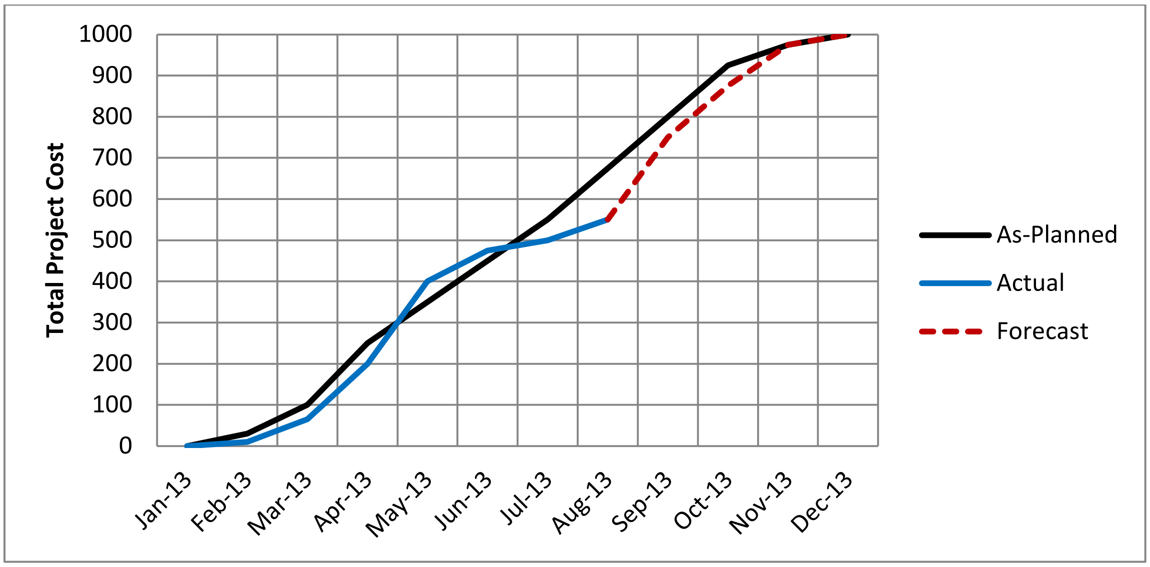
A. No. Each project will have unique set of trend and forecast curves depending on the size and complexity of the project, the project management systems used during the execution of the project, and the need to align and integrate the project trending and forecast data and curves to the internal corporate management and control systems.

Q. Can you generally describe a cost curve as used in trending and forecasting?

A. Yes. **Figure A** directly below is a generic cost trending and forecasting curve:

Figure A – Cost Trending and Forecasting Curve



As can be seen in the above **Figure A**, the Y axis (vertical scale) of the cost curve establishes the amount of money from zero to the final estimated total cost of the project. In the sample cost curve the total cost estimated is $1,000, broken into $100 increments. The X axis (horizontal axis) measures the duration of the project by months to the estimated completion of the project (the end of expenditures).

The typical cost graph has three curves. The As-Planned curve represents Project Management's plan for project expenditures over the life of the project. The Actual curve represents the actual amount expended to-date by month. The Forecast curve represents Project Management's forecast of the project costs for the remaining project duration. It is common for Project Management to monitor a variety of elements and demonstrate planned, actual and forecast

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progress for each. Management's choices will depend which elements are critical to project delivery, and the level of detail necessary to monitor those elements. The example above in **Figure A** is a total project cost curve, which is commonly seen on projects. The Kemper PMT utilized a similar cost trending and forecast curve on the Project to determine current year EPC cost progress. This graphic was reported in the Production Team Meetings and showed the current year EPC budget, actual spent and forecast for the remainder of the current year.

Q. How does Project Management use cost curves during the execution of a project?

A. Cost curves are a graphical representation of what Project Management planned to expend over time (As-Planned); what was actually expended over time (Actual); and what Project Management plans to expend over time going forward (Forecast). Using a cost curve, Project Management can quickly identify past trends. For example, in **Figure A** the project did not achieve its planned expenditure at any time to date. However, the project did better than planned some months and worse than planned in other months. This means that there are two different trends, each of which Project Management would analyze and develop plans and take actions to correct. The forecast curve reflects Project Management's expenditure plan going forward on the project; as presented in **Figure A**, Project Management intends to complete the project at the planned expenditure level and at the planned point in time. To meet that forecast on time, on budget expenditure plan Project Management will have to continuously monitor expenditures and take corrective actions to meet plan.

Q. Can you generally describe a progress curve as used in trending and forecasting?

A. Yes. Progress trend and forecast curves have the same elements as a cost curve; however progress curves track the progress being made towards completion of specific items of work such as installation of piping, steel, cable, or other work. **Figure B** directly below is a generic total progress graphic:

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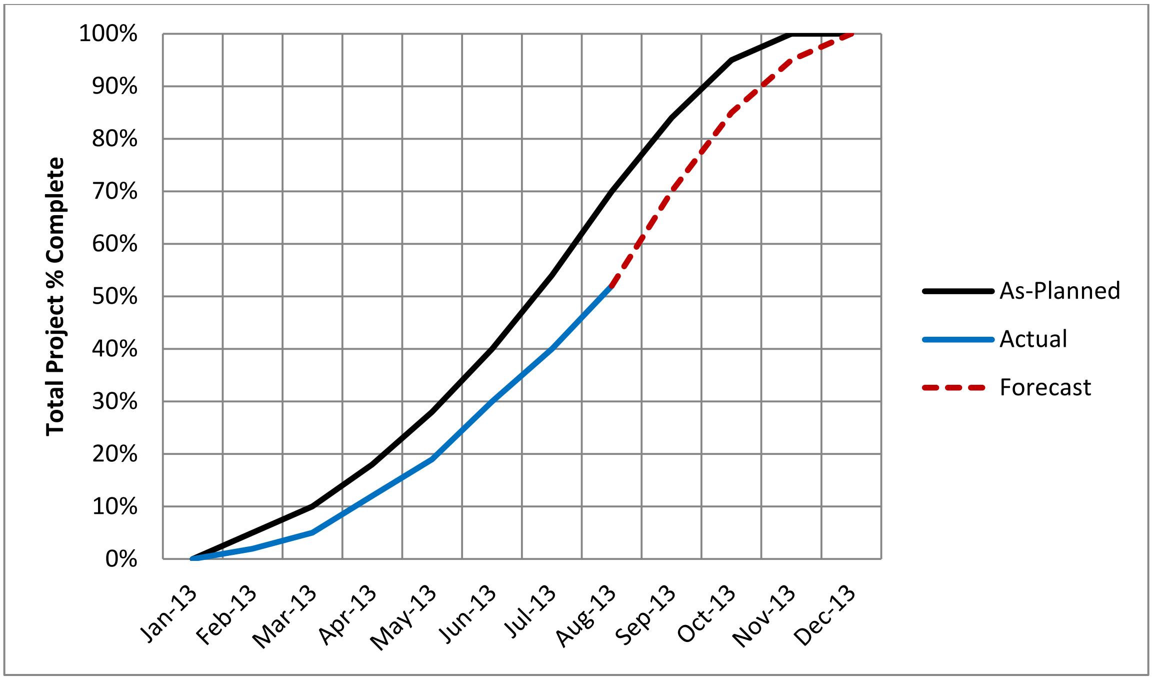
Figure B – Progress Trending and Forecasting Curve



Here, the Y axis (vertical scale) measures the percent complete of the project from zero to 100%. The X axis (horizontal axis) depicts the full duration of the project broken into months, continuing to the estimated completion of the project.

The typical progress graph has three curves. The As-Planned curve represents Project Management's plan for cumulative project progress over the life of the project. The Actual curve represents the actual cumulative progress to-date by month. The Forecast curve represents Project Management's predicted forecast of the project cumulative percent complete for the remaining project duration. As discussed further below, there were multiple progress curves established by Project Management for measuring and monitoring progress on the Kemper IGCC Project.

Q. How does Project Management use progress curves during the execution of a project?

A. Progress curves are a graphical representation of what Project Management planned to achieve over time; what was actually achieved over time; and what Project Management plans to achieve going forward. Using progress curves, Project Management can quickly identify past trends; for

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example, in **Figure B** the project has not achieved its planned progress at any time to date, and the gap between planned progress and actual progress has been widening during that entire time. The forecast curve reflects Project Management's plan going forward on the project; as presented in **Figure B**, Project Management intends to initiate actions to recover at least part of the lost progress, but has also determined that even with those recovery actions the project will likely be completed at least one month later than planned.

Q. How does the construction industry typically define performance?

A. In preparing a project schedule and cost estimate, Project Management has to make a number of assumptions as to the conditions within which the project will be executed; for example the prevailing weather conditions, the local labor availability, the escalation of materials and equipment, and the complexity of the facility being constructed. One of the more crucial assumptions that must be set by Project Management is how much progress will be made on the project scope of work for the amount of time and/or money expended. Put simplistically, the question is, for each dollar invested, how much work is expected to be completed? Within the construction industry the process by which performance is calculated is called earned value.

Q. Can you explain earned value and how it is calculated?

A. An earned value measurement is the ratio of work accomplished (earned) against the cost of accomplishing that work (the value). To measure earned value, Project Management will determine the planned amount of work it expects to accomplish for a specific expended cost, then during the course of the project it will calculate the actual amount of work accomplished for the actual amount expended to accomplish that amount of work. If the actual amount of work accomplished was done for the amount of the originally planned expenditure the ratio of earned value is expressed as 1.00, or a one to one ratio. Project Management's target is to meet a 1.00 ratio each month and throughout the entire project execution duration. If less work was accomplished for the actual amount expended than project management had planned the ratio would be less than 1.00. If more work was accomplished for the actual amount expended the

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ratio would be higher than 1.00. The ratio achieved is a measure of how well the project actually performed measured against the performance assumption originally set by Project Management. As is the case with cost and performance monitoring, earned value is depicted graphically, allowing Project Management to quickly identify whether the monitored work is on track or not. Using earned value measurements, Project Management can measure the SPI which uses a ratio of earned value to planned or budgeted value to determine observed performance, where a value less than 1.00 indicates that less work is being accomplished than planned. Another earned value measurement is LPI which measures the earned hours to the actual amount of labor (hours) needed to achieve that earned value. Both of these measures were tracked by MPC Project Management and reported in the Production Meetings.

Q. Do you agree with BREI's finding that *"there were no written instruction or procedures on the EVM system"*[538]?

A. No. This statement by BREI implies that SCS was seemingly in the dark when it came to EVM, which is categorically untrue. By March 2010, SCS had issued Rev. 0 of its Project Controls Standards for E&CS Capital Projects which included procedures for percent complete progress curves and installed quantity progress curves. Each progress curve included a budget line and an actual earned percent complete line. In addition, this procedure included a specific section dedicated to earned value analysis which included such detail as how to determine progress for a particular commodity with the following example:[539]

> *"For example, progress for a particular commodity may be evaluated in this manner: Receive – 5%, Fabricate – 38%, Test and Inspect – 10%, Paint and Polish – 5%, Erect – 15%, Hangers and Supports – 10%, Bolt-Up – 10%, Valves and Miscellaneous Items – 5%, Touch-Up – 2%. As each of these categories is*

[538] Burns and Roe, Inc., Prudency Evaluation Report, page 46, March 19, 2014
[539] Engineering and Construction Services, Project Controls Standards for E&CS Capital Projects, Scheduling Rev. 0, page 41, March 2010

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completed, a particular work effort earns credit until progress is 100 percent earned."

After earned value had begun to be reported as the Project was underway, a January 2011 Production Report featured a specific discussion as to earned value calculations, ensuring the Kemper PMT was fully aware of EVM. This provided four key steps for determining earned percent complete:[540]

1. Calculating Percent Complete
   - *Utilize rules of credit to determine progress on a monthly basis.*
   - *Provided at the discipline level of Engineering.*
     - *Examples of Engineering credits – creating drawing, calculations ready for review, review of drawing, etc…*
   - *Rules of Credit for Construction activities may be provided at the commodity level, system level or contract package level.*
     - *Examples of Construction credits – cable (receive/store), cable (installation), piping system (receipt/store), piping system (field fab).*
2. Determining Budgeted Hours/Earned Hours
   - *Budgeted hours are extracted from the resource loaded schedule and/or the certified budget for each disciplines, construction activities, etc….*
   - *Budgeted hours are captured in two distinct categories:*
     - *Original budgeted hours*
     - *Current budget hours – reflect approved scope changes*
   - *Earned hours are calculated by multiplying the % complete and the budgeted hours.*
3. Calculating Performance Indicators

[540] EPS Status Production Meeting, pages 62-78, January 18, 2011

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- *Two basic Earned Value indicators:*
  - *Labor Performance Indicators (PI) – Indicator of how efficiently the project is using it's* [sic] *resources (i.e. cost component)*
    - *Calculated by dividing Earned Hours by the Actual Hours expended through the same period*
  - *Schedule Performance Indicator (SI) – Indicator of how efficiently the project is using it's* [sic] *time*
    - *Calculated by dividing the Earned Hours by the Budgeted Hours for the same period*

4. Graphing and Analyzing the Results
   - *Results for each function, construction are combined on a monthly basis*
     - *EPC Total Earned Value*
     - *Total Engineering Earned Value*
     - *SCS Engineering Earned Value*
     - *KBR Engineering Earned Value*
     - *Construction & Start-up Earned Value*

Q. Did you agree with BREI's finding that the *"earned value performance measurement for engineering was more of a level of effort task rather than a deliverable based task"* and that *"engineering progress…was not measured against a baseline planned percentage"*?[541]

A. No. BREI does not provide a basis for this opinion, and also seemingly ignores the metrics being measured and reported by the Kemper PMT over the course of the Project. As noted above, the process for determining earned percent complete for engineering involved utilization of rules of credit. For example, for Civil Engineering earned value, site work included activities such as:

[541] Burns and Roe, Inc., Prudency Evaluation Report, page 46, March 19, 2014

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underground investigation/discovery, site preparation drawings, environmental permitting, etc. And the measures of credit for site work were defined as:[542]

- Basis for Drawings Completed (Underground Investigation/Discovery; Modeling) – 20%
- Calculations Ready for Checking – 10%
- Drawings Ready for Checking – 30%
- Calculations signed Off – 10%
- Issue Rev 0 Drawings – 30%

PMI defines this type of earned value calculation not as a level of effort, but as a discrete effort, which means:[543]

> *"…an activity that can be planned and measured and that yields a specific output. Discrete effort is directly related to specific end products or services with distinct and measurable points, and outputs that result directly from the discrete effort."*

PMI explains that there are four principal measurement methods available to enable accurate measurement of work accomplished. The method used by the Kemper PMT on the Kemper IGCC Project was "percent complete" which shows an estimate of the percentage of work that is complete at the end of each measurement period (weekly or monthly depending on the case). As noted above, the results of these earned value measurements for each function or discipline are combined on a monthly basis and are reported in the Production Meetings.

Q. Do you agree with BREI's conclusion that the Project suffered from a *"failure of SCS to implement an effective EVM system"*?[544]

A. No. Beginning in the November 2010 Production Report, LPI and SPI, two industry standard EVM metrics were reported for the total EPC value, engineering value and construction and start-

[542] EPS Status Production Meeting, page 66, January 18, 2011
[543] Project Management Institute, *Practice Standard for Earned Value Management – Second Edition*, page 36, 2011
[544] Burns and Roe, Inc., Prudency Evaluation Report, page 49, March 19, 2014

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up value. Over the course of the Project's execution, these metrics were refined to reflect the current needs for the Kemper PMT in having the appropriate and effective information needed to monitor the Project, for instance in 2012 LPI and CPI metrics were being tracked not just for total engineering, but for SCS engineering, SCS/KBR design support, SCS design and support, KBR design. In addition, construction and start-up metrics began to be tracked independently to reflect the level of progress achieved on the Project. 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.

As explained in detail in my Rebuttal Testimony below, SCS implemented a number of performance and progress measurement practices, including earned value, which provided Project Management with an accurate representation of the status of the Project at a given moment in time which was provided to MPC Executive Management to use as one of the pieces of information allowing them to make informed decisions regarding the Kemper IGCC Project.

Q. Did MPC and SCS develop and utilize project trending and forecasting processes during the execution of the Kemper IGCC Project?

A. Yes. MPC/SCS has corporate processes for producing trending and forecasting data and curves, including:

- Kemper specific processes for determining and reporting earned percent complete;[545]
- Standard progress measurement processes and curves;[546]
- Earned value calculation and reporting;[547]
- Variance reporting;[548] and
- Cost control and management reporting.[549]

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[545] Kemper IGCC Process for Determining Earned Percent Complete, July 2012 Revision
[546] Kemper IGCC Process for Determining Earned Percent Complete, July 2012 Revision
[547] Southern Company, Appendix 5: Earned Value Primer
[548] Engineering and Construction Services, Project Controls Standards for E&CS Capital Projects, Schedule Rev. 2, page 41, February 2013

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Pegasus-Global determined that those MPS and SCS processes met good utility practice for trending and forecasting project conditions.

Q. Did MPS/SCS produce trending and forecasting curves during the execution of the Kemper IGCC Project?

A. Yes. Progress and performance curves were produced during the execution of the Kemper IGCC Project. The Kemper PMT also produced summary reports of the data from which those progress and performance curves were derived. The Kemper PMT also prepared a Variance Report which enabled the Kemper PMT to highlight some of the factors which were impacting Project progress and performance.

Q. What project trending and forecasting curves did MPC and SCS produce?

A. MPC and SCS produced all three of the typical trending and forecasting reports on a monthly basis: cost, progress and performance beginning in November 2010.[550] In addition, MPC and SCS produced curves beyond the typical summary level. Instead of a single project progress summary report, the Kemper PMT produced several different trending and forecasting progress reports including:

- Total EPC construction progress;
- Piling construction progress;
- Caisson construction progress;
- Underground piping installation progress;
- Concrete foundation progress;
- Earthwork construction progress;
- Steel construction progress;
- Pipe construction progress;

[549] Southern Company Generation, Engineering and Construction Services, Project Controls Procedures PC-03, Project Cost Tracking and Forecasting, Rev. 2, August 30, 2009
[550] EPC Status Production Meeting, pages 54-60, November 18, 2010

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- Electrical construction progress;
- Total engineering progress;
- Total design progress;
- Combined construction and start-up progress;
- Procurement progress;
- Drawing Releases;
- Total construction labor headcounts;
- Engineering labor headcounts;
- SCS management labor headcounts;
- Craft labor headcounts; and
- SCS start-up labor headcounts.

The Kemper PMT also produced several different performance trend and forecast curves:

- Total EPC performance;
- Total engineering performance;
- SCS engineering performance;
- KBR engineering performance;
- Total design performance;
- SCS design performance;
- Construction performance; and
- Startup performance.

The actual progress and performance curves prepared and distributed in any given month might be different from the lists provided above as the focus of the Kemper IGCC Project shifted from one phase to the next.

Q. Did Pegasus-Global review the trending and forecasting curves and detailed data reports as part of its prudence evaluation?

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A. Yes. Pegasus-Global examined all of the trending and forecasting curves, and the detailed data reports produced by the Kemper PMT between July 2010 and April 2013.

Q. Who received progress and performance trend and forecast information for the Kemper IGCC Project, and in what form did the information take?

A. Progress and performance data was provided to a variety of audiences in several settings and reports. Pegasus-Global reviewed a series of documents that contained numerous and various trend and forecast data and curves. I will discuss three examples of reporting to three different audiences, including the type of information being reported in the following paragraphs.

<u>EPC Production Team Meeting presentations</u>. These presentations are conducted monthly and began in June 2010 and continue through today. Presentations prepared for this meeting are internal to MPC and SCS and contain detailed cost trend and forecast information generated by MPC and SCS. The format, content and organization of the Production Team Meeting presentations changed over time to meet the information needs of management and information discussed reflects the various stages of the Project. The earliest presentations focused on planning and execution issues being addressed by the PMT. As Project execution moved ahead, the Production Team Meeting presentations became detailed and lengthy, befitting the complexity of the Project. Topics and trend information also changed with the stage of the Project as one would expect. The Production Team Meeting presentations provided various trend and forecast reports, five major types of which were specifically important to monitoring cost trends and forecasts:

- Kemper IGCC Project –Production Reports. Specific Production Reports were produced for SCS Controlled Labor, Major Equipment, Engineer Procured, Engineered Commodities and Craft Labor, and Construction Contractor Packages. The Engineered Commodities and Craft Labor Production Report provided estimates (forecasts) of primary commodities, including concrete, steel, pipe, cable, cable tray, and craft labor. Those elements account for the major project engineering and construction efforts, direct

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unit costs, and costs associated with changes in design that rippled into other areas. The first Production Reports identified was in the September 2010 Production Team Meeting (however this also included Production Reports for the month of August).[551]

- Kemper IGCC Project – Variance Review Report ("VR"). This table report tracks the following specific items:
    - Major Equipment
    - Engineering Procured
    - Fuels
    - Construction
    - SCS Start Up Labor
    - Sales Tax
    - Project Development
    - Pre-COD O&M
    - Project Contingency
    - Total Project Cost

  The VR is a single spreadsheet that connects the certification budget to the items identified above against the (estimated) budget for that item. The VR Report also tracks total actual and estimated project costs in total against the total certified project estimate, and recorded variances. The first VR report identified was in the June 2011 Production Team Meeting presentation.[552]

- Kemper IGCC Project – Current Year EPC Cost Progress (EPC Cost Curve). This report is a typical three line cost curve, practically presented to the sample given above. The

[551] Production Meeting, pages 10-19 and 63-67, September 16, 2010
[552] EPC Status Production Meeting, page 45, June 20, 2011

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first EPC Cost Curve report was presented in the September 2011 Production Team Meeting presentation.[553]

- Kemper IGCC –Performance Indicators (Earned Value Curve). These reports summarize the cumulative total labor and schedule earned value for the Project including: EPC Total Performance; Total Engineering Performance; SCS Engineering Performance; Total Engineering Design Performance; SCS Engineering Design Performance; KBR Engineering Performance; and, Construction/Start-up Performance. The first Earned Value Curve was identified in the November 2010 Production Team Meeting presentation.[554]
- Kemper IGCC Project –% Complete Curves (Progress Curves). These reports were typical total project S-curves, linked with a monthly bar chart which compared monthly planned completion percentages against actual monthly completion percentages for the total Project, engineering and construction/start-up. The EPC Total Completion Report was presented starting in the November 2010 Production Team Meeting Report.[555]

Taken together those five types of major reports met the industry recommended standards for cost trending and forecasting. The primary source of the information found in these five reports is the project procurement reports and documents (including contract awards, equipment purchase awards, vendor purchase orders and the project transaction report); project equipment, labor and commodity total costs and quantities; and forecasts based on past trends and management judgment. As expected, all five of these reports evolved over the course of the Project to meet the needs of the Kemper PMT and to provide information to MPC Executive Management for its decision-making process.

[553] EPC Status Production Meeting, page 56, September 19, 2011
[554] EPC Status Production Meeting, pages 55-57, November, 11 2010
[555] EPC Status, Production Meeting, page 58-60, November, 11 2010

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Public Service Commission Monthly Status Report ("PSC Report"). The MPSC is provided monthly reports regarding the status of work and costs associated with that work. The first PSC Report was submitted to the MPSC in July 2010, and reports have continued to be submitted monthly as of this date. The PSC Report information is presented at a summary level; however, the individual summary reports are backed up by detailed transaction reports contained with each of the PSC Reports.[556] The detail of the cost backup provided with the PSC Report used to establish the actual cost curve is reflective of commonly accepted practices.

Beginning with the initial July 2010 PSC Report, several tables were used to present cost trending and forecasting information including: the Certified Plant Cost table, an industry standard cost curve; the Certified Plant Cumulative Spending Curve; and a Variance Explanations Table that summarizes variances that impacted the project planned spending curve.

- The Certified Plant Cost table (renamed Capped Plant Costs in January 2013) contains information regarding areas of cost such as land acquisition, engineering and support, equipment and materials, construction, transmission, fuels, pre-commercial operations, project development, start up, and CCPI funding. In addition, current forecasts are compared to certified amounts, actual costs, and variances.[557] As was the case with the Production Team Meeting information, the tables and graphs morphed over time, though the information presented was essentially the same.
- The Certified Plant Cumulative Spending Curve provides the month-to-date cost curve trends and forecasts for the Project as a whole.[558] The Certified Plant Cumulative

[556] The primary source documentation were confidential transaction reports which was generated out of the project accounting documents and records. See Mississippi Power Kemper County IGCC Project Cost Summary, MPSC Docket No. 2009-UA-014, Monthly Status Report, Through December 2012 for an example.
[557] See Mississippi Power Kemper County IGCC Project Cost Summary, MPSC Docket No. 2009-UA-014, Monthly Status Report, Through July 2010, page 2 for an example
[558] Mississippi Power Kemper County IGCC Project Cost Summary, MPSC Docket No. 2009-UA-014, through July 2010, page 2

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Spending Curve included in the PSC Reports is an industry standard tool. It has the requisite as-planned cost curve, actual cost to date cost curve, and forecast cost curve.

The Plant Cost Table and the Certified Plant Cumulative Spending Curve are tools which one would expect to find in use for trending and forecasting costs on a major construction project and most experts would agree that these tools are essential on a large and complex project such as the Kemper IGCC Project.

The PSC Reports also included a Variance Explanations Table which summarized the causes of a variance to the planned cost curve and whether the variance was above or below the as-planned costs.

Independent Monitor Status Report (IM Report). The IMs are given a monthly update as to the status of the Project, and in turn the MPSC IM, URS, beginning in June 2011 has generated a monthly URS Report for the MPSC; similarly the MPUS IM, BREI beginning in March 2011, generated a monthly BREI Report for the MPUS. These status reports have since been ongoing. The trend and forecast curves that are produced for the monthly Production Team Meeting presentations are provided to the IMs for their review, allowing them time to provide questions during the monthly meetings held between the Kemper PMT and the IMs. The URS Reports have appendices which contain reproductions of a portion of the Production Team Meeting presentations, including the EPC Total % Complete curves and the EPC Total Performance (earned value) curves discussed above.

Q. Did Pegasus-Global form any opinion as to whether or not the trending and forecasting curves and reports examined were suitable to their intended purpose?

A. Yes. Using the trending and forecasting curves and reports described above, the Kemper PMT could, and did establish cost, progress and performance trends. From those trends the Kemper PMT was able to prepare forecasts to Project completion based on the Kemper PMT's assumptions and predictions of Project conditions in the future.

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Q. In your opinion, did the trending and forecasting processes and tools used by the Kemper PMT meet expected prudent and good utility management practices?

A. Yes.

b. COST CONTROL

Q. Did Pegasus-Global review MPC's cost management and control of the Kemper IGCC Project in its prudence review?

A. Yes.

Q. How is the term "cost control" generally understood within the utility and construction industry?

A. In general, cost control is the systematic management of actual project costs to an established project budget. It is the application of management policies and procedures which enable Project Management to monitor the variance in actual project expenditures against the detailed project budget established prior to the initiation of the project. Using the results of that monitoring, Project Management analyzes the root cause of any variations from the budget, formulates response actions to correct those variations and implements those corrective actions.

Q. What is the objective of cost controls on a project?

A. The overriding objective of cost controls is to enable Project Management to execute the project within the budget set for the project. Just as important, these control tools provide Project Management with accurate, timely data from which it can formulate and implement actions to overcome anomalies which occur between the original budgeted cost and the actual cost of a project cost element.

Q. Can you explain what you mean by project cost element?

A. Yes. A cost element is a basic unit of cost created within a project budget. A unit of cost is generally synonymous with the terms "line item" or "cost code."

Q. How are cost elements typically tracked in the construction industry?

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A. Creating cost elements within a project is a method for organizing the costs of a project in a manner that provides Project Management with a logical basis from which to monitor, manage and control project costs. When a project estimate is converted into the project budget, each of the cost line items in the estimate is allocated to a specific cost category in the budget structure. Each of those specific cost categories are assembled into a project "code of accounts." A code of accounts consists of an increasingly detailed system of numbering of project activity costs. It is common for a construction budget to use the project's Work Breakdown Structure ("WBS") as the basis for the project's code of accounts. Each major classification of work in the WBS has a root account code number, and each of the discrete actions under that account code will have subordinate account code numbers.

Q. Are all project budgets established from a project's WBS?

A. No. A project budget may be organized by any number of characteristics including the project WBS, project systems, trade labor accounts, procurement actions, etc. However, the typical industry practice is to link the project budget to the work scope using the WBS. Using the WBS provides Project Management with the ability to establish a common link between various project management tools including the project schedule and project procurement tools.

Q. Are there any generally recognized industry standards for cost management and control?

A. Yes. There are several organizations which have promulgated cost management and control standards, including PMI, AACEI, CMAA and a number of recognized industry publications.

Q. Were the cost management and control systems used by MPC on the Kemper IGCC Project consistent with industry standards?

A. Yes. The management and control systems established for the Kemper IGCC Project met the established industry standards. Likewise, Kemper Project and Corporate Management initiated, implemented and followed those cost management and control systems during the execution of the Kemper IGCC Project.

Q. Did Pegasus-Global review the MPC accounting policies and procedures?

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A. Yes. Pegasus-Global reviewed policies and procedures that were germane to the execution of a large and complex construction projects. For example, Pegasus-Global reviewed the procedures and processes for procurement,[559] contracting,[560] invoicing,[561] payment and account management.[562]

Q. Did Pegasus-Global find MPC's accounting policies, procedures and processes to be consistent with prudent utility industry practices?

A. Yes. The breadth and depth of the MPC Corporate accounting policies, procedures and processes were complete and comprehensive. As written, those accounting policies, procedures and processes provided the PMT with the tools needed to estimate, budget, manage, control and report on the cost components of the Kemper IGCC Project.

Q. Were there corporate procedures specific to construction project cost management?

A. Yes. Project Controls Procedure PC-03,[563] generated by Southern Company, was the construction specific cost control procedure followed during the execution of the Kemper IGCC Project. PC-03 defined the responsibilities for each project management position for cost management and control and set the procedures and process flow which would be followed during the execution of the Project.

Q. Can you generally describe the processes employed by MPC to manage and control costs on the Kemper IGCC Project?

A. Yes. As expected within the industry, the first step taken by Kemper Project and Corporate Management was to convert the final project estimate into a project budget which was built on a standard construction project code of accounts format which had been tailored to align with the

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[559] Southern Company, Supply Chain Management, Procurement Policies & Procedures, Module 1: General Policies and Guidelines, Revision 3, June 2013
[560] Southern Company, Contract Guidance Manual, Issued Date: January 2007, Revised May 2013
[561] A number of individual invoice processing procedures were provided in response to BRE-1-115
[562] Mississippi Power Company, Accounts Payable Overview, May 14, 2008
[563] Southern Company Services, Engineering and Construction Services, Project Controls Procedures PC-03 Project Cost Tracking and Forecasting, Rev. 2, August 30, 2009

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Corporate accounting system. During execution of the Kemper IGC Project, the management and control of costs was executed as a joint effort between the MPC Accounting group (*Accounting*) and the PMT. Each cost account was allocated to a named "*Owner*" (as defined within the MPC Corporate Accounting Procedures) that was responsible to manage the assigned cost accounts. On a monthly basis, MPC Accounting would meet with each of the cost account Owners to compare the budgeted costs and the actual expenditures which had been made from those cost accounts. During those reviews any corrections or adjustments to the cost allocations were identified and corrections were made as necessary.

If a budgeted cost element budget had experienced any conditions which might require a change in the original estimated cost amounts – including contingency amounts – the proposed change was reviewed by the cost Owner and senior project management. If warranted, senior project management approved or rejected the budget change, which was then be captured in the project budget by Accounting.

Q. Did MPC use the data and reports generated in the process you just described?

A. Yes. The Kemper PMT used the comparative information generated by Accounting and the Owners to identify anomalies in the project budget that then was analyzed to determine the root cause for the anomalies. Once the root causes had been identified, the Kemper PMT developed and implemented appropriate actions in response to those anomalies. Options ranged from simply shifting contingency to cover a one-time anomaly such as an unexpected increase in material or equipment costs, to a full re-forecast of the cost element based on a trend of increases in a cost element. The MPC procedures and processes in place provided the Kemper PMT with timely and accurate actual and forecast cost data at a level which enabled the Kemper PMT to formulate and implement an appropriate response to any anomaly between the Project budget and the actual costs to-date.

Q. Have you reviewed Sierra Club witness Schlissel's assertion that MPC management had sufficient evidence by the spring of 2011 that the Kemper IGCC Project was going to

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experience significantly higher capital costs than it had claimed in early 2010 in Docket No. 2009-UA-014?

A. Yes I have.

Q. Do you agree with Sierra Club witness Schlissel's assertion that by spring of 2011 there was sufficient evidence that the Kemper IGCC Project was going to experience significant higher capital costs?

A. No. Mr. Schlissel provides a series of bullet point examples he claims provide sufficient support to the claim that the Kemper IGCC Project was going to experience significant higher capital costs, unfortunately these points used by Mr. Schlissel are presented without appropriate context as to the overall status of the Project.

- Mr. Schlissel cites to a November 18, 2010 Production Meeting showing a list of Scope Additions/Variances and the listing of "Reasons for Exceeding FEED Budget," the majority issue on both these lists is the Nitrogen System. Mr. Schlissel fails to mention that in this Production Meeting it was also reported that, to date, Major Equipment was $25.14M under the Certification Estimate amount.[564] It was both reasonable and prudent of MPC to continue to monitor the reported costs as they were being realized on the Project and as is typical on any large and complex project, there will be cost variances (both positive and negative) as the project develops and costs are confirmed.
- Mr. Schlissel also points to low SCS Engineering labor performance in December 2010 as a reason for why MPC should have known that the Project might experience "significantly higher capital costs." Mr. Schlissel does not identify how the SCS Engineering labor performance translates to "significantly higher capital costs," and he

[564] EPC Status Production Meeting, page 37, November 18, 2010

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omits the fact that the Company identified actions to take in response to the issue identified, including:[565]

- *Review originally planned cash flow vs. actuals. Adjust as necessary to match current plan.*
- *Review potential Variances/Scope Changes.*
- *Complete assessment by the end of January.*

This demonstrates reasonable and prudent action on the part of MPC in properly identifying the potential issue of poor SCS Engineering labor performance and implementing the steps to take to mitigate the potential impact it may have:

- In Mr. Schlissel's next bullet point he cites that in April 2011 the total projected EPC budget had increased by $391.8M, based on a presentation given to Tommy Anderson at the time. Mr. Schlissel fails to note that SCS identified over $72M in capital cost reductions at this point and that a number of other reductions and optimizations were identified to reduce potential cost pressures on the Project.[566] Furthermore, due to the level of engineering completed at this point, and the fact that the major construction contracts had not been let, there remained far too much uncertainty in this EPC estimate to conclude that its projections would in fact be realized. In fact, the presentation of this early estimate led MPC to perform a full re-estimate of the Project, which was planned in the May 2011 ERB Meeting, noting that this process would take eight months to complete.[567]
- Mr. Schlissel notes that the April 19, 2011 Production Meeting "*seemed to suggest*" that the Project's new MW output would be lower. This question was answered in the next page, but more importantly, Mr. Schlissel chooses to ignore

[565] EPC Status Production Meeting, page 49, December 20, 2010
[566] Sierra Club-MPC 1-16 Supplemental Attachment A1, pages 28-29 of 32
[567] Executive Review Board Meeting, Project Review Manual, page 6.6, May 12, 2011

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or is unaware that the Revision 2 Heat Balances show that the new output has actually increased (by 1 MW to 526 MW) since the Certification case.[568]

- Mr. Schlissel references quantity increases of concrete, steel and cable as reported in the May 2011 Production Meeting, implying that risks identified in the April 2011 EPC Estimate Update were already being realized, when in fact those quantity increases had been identified by October 2010 (for steel and concrete) and by April 2011 (for cable), and were accounted for the in the April 2011 EPC Estimate Update. Mr. Schlissel appears to be attempting to "double count" the impacts of these quantity increases and ignore any instance of cost savings or mitigations measures being taken by the Company in this early 2011 time period.
- In Mr. Schlissel's last bullet point he refers to a Kemper IGCC Project update presented at an April 18, 2011 Southern Company Board of Directors ("BOD") Nuclear/Operations Committee meeting, in this point Mr. Schlissel appears to conclude that because design/engineering was listed as a top 5 risk, it was inevitable that capital costs would increase. Mr. Schlissel does not clarify how the identification of a potential risk will lead to higher capital costs, and in any case, this demonstrates that the Project risks were continuously being monitored and reported from the Project-level up through the Southern Company BOD.

Q. Did Pegasus-Global find that MPC reasonably reported the results of its cost control analysis?

A. Yes. At the completion of the cost review and analyses with the Cost Owners, Accounting prepared a draft cost report which was submitted to the Production Team. During the Production meetings, cost information reviewed included:

[568] Mississippi Power Company, Response to URS 2-526, May 17, 2012

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- SCS Controlled Labor Production Report;
- Major Equipment;
- Future Major Equipment Change Orders;
- Engineer Procured Equipment; Engineer Procured Budget and Forecast Changes;
- Future Engineering Procured Change Orders/Potential Budget Overruns;
- Engineered Commodities and Craft Labor Production Report; and
- Construction Contractor Packages Production Report.

Similar information was reviewed monthly during the Core Team and MRB meetings. After review by the Kemper PMT, the current cost reports were provided to the ERB for review and approval. Following final approval by senior management, the MPSC cost report was prepared and submitted.

Q. In your opinion, did the cost management and control systems and processes employed by MPC during the execution of the Kemper IGCC Project provide the necessary information to reasonably and prudently manage and control costs on the Kemper IGCC Project?

A. Yes.

c. COMMODITY QUANTITY GROWTH

Q. In response to the findings and conclusions of Mr. Schlissel and BREI with respect to commodity growth, did Pegasus-Global evaluate the commodity quantities on the Kemper IGCC Project?

A. Yes, part of Pegasus-Global's prudence audit and evaluation included an examination of the major commodities on the Kemper IGCC Project and the changes to those quantities from the evolution of detailed design, including how MPC tracked and forecasted the quantities.

Q. Can you explain what the key commodities are on a large and complex project such as the Kemper IGCC Project?

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A. Yes. Commodities within the construction industry are component materials, other than manufactured equipment, that are required to build and construct a project. The commodities tracked on the Kemper IGCC Project include: Site Excavation (volume of excavated earth); Caissons; Drilled Piers; Concrete Foundations; Steel; Pipe; Cable; Cable Tray; and, Instruments. What allows for these commodities to be tracked is that they are physically measurable; for example, it is possible to measure the number of cubic yards of site excavation, or the linear feet of the caissons or pipe installed on a project.

Q. What are the importance of the key commodities on a large, complex project such as the Kemper IGCC Project?

A. The commodities provide the basis for a large, complex project to apply the numerous individual processes necessary for taking the source material (*i.e.* coal) converting it to syngas and thus allowing for the final output, in the case of the Kemper IGCC Project this is primarily power generation, with byproducts such as CO_2, anhydrous ammonia and sulfuric acid also being final outputs of the process. There are a number of different items required to make the entire process operate as intended, this includes items such as:[569]

- *'Process equipment' items, in which material is transformed physically or chemically, for example crushers, reactors, screens, heaters and heat exchangers. The process equipment is required to effect the physical and chemical changes and separations necessary to produce the desired products, and also to deal with any unwanted by-products, including waste, spillage, dust and smoke.*
- *Materials transport and handling devices, by which the processed materials and effluents are transferred between the process equipment*

[569] P. Watermeyer, *Handbook for Process Plant Project Engineering*, pages 13-14, 2002

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items, and in and out of the plant and any intermediate storage, and by which solid products and wastes are handled.

- *Material storage facilities, which may be required to provide balancing capacity for feedstock, products, or between process stages.*
- *'Process utilities' (or simply 'utilities'), which are systems to provide and reticulate fluids such as compressed air, steam, water, and nitrogen, which may be required at various parts of the plant for purposes such as powering pneumatic actuators, heating, cooling, and providing inert blanketing. Systems to provide process reagents and catalysts may be included as utilities, or as part of the process.*
- *Electric power reticulation, for driving process machinery, for performing process functions such as electrolysis, for lighting, for powering of instrumentation and controls, and as a general utility.*
- *Instrumentation, to provide information on the state of the process and plant, and, usually closely integrated to the instrumentation, control systems.*
- *Structures (made of various materials, including steel and concrete), which support the plant and equipment in the required configuration, enclose the plant if needed, and provide access for operation and maintenance.*
- *Foundation, which support the structures and some plant items directly, and various civil works for plant access, enclosure, product storage, and drainage.*
- *Plant buildings such as control rooms, substations, laboratories, operation and maintenance facilities and administration offices.*

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Each of those above items requires varying amounts and specific types of commodities not just to be constructed, but to provide the integration necessary to make the given project a success.

Q. How did MPC develop the commodity quantities?

A. The preliminary source for commodity quantities stems from the development of the FEED Study for the Kemper IGCC Project. As discussed in **Section V.C.3.** of my Rebuttal Testimony, the FEED Study provided for the development of PFDs, Plant layout and General Arrangement drawings, P&IDs, design specifications, HMB calculations, Major Equipment lists, Line lists, instrument lists and other related design and engineering information. This information provided MPC with the initial quantity estimates for the Kemper IGCC Project that were used for developing the Certification Estimate.

Q. Did Pegasus-Global review the Certification Estimate to determine if the commodity quantities presented within it appeared reasonable?

A. Yes, the commodity quantities presented in the Certification Estimate were prepared in a reasonable manner based on the level of design completed on the Kemper IGCC Project at the time. The development of the Certification Estimate is further discussed in **Section V.D.** of my Rebuttal Testimony.

Q. Can you summarize the findings of this review of the Certification Estimate as it pertains to the commodity quantities?

A. Yes. Commodity quantities in the Certification Estimate were based on what was developed during the FEED Study and used the probable location of the equipment which was based on the size of the equipment and how it relates to the rest of the process; the combined cycle area was based on Southern Company's combined cycle reference plant updated for site specific conditions. The information provided by that assessment allowed for a factored estimated to be completed for the commodities such as pipe and cable. As summarized by B&V:[570]

[570] Black & Veatch, Kemper County IGCC Readiness Review, page 10-4, February 26, 2010

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> *"The cost estimates for commodities are based on the quantities included in the FEED and 3-D model. The* [combined cycle power plant] *quantity basis is from previous experience on SCS's combined cycle units. Currently large bore pipe quantities for the GI are based on the model for piping 10 inch and larger, with factors applied to estimate piping amounts for smaller pipe. Small bore pipe was estimated based on historical data. Electrical quantities are estimated in the FEED and adjusted based on the experience of KBR and SCS and further adjusted based on the current site layout. Structural steel is estimated in the FEED, and incorporates the results of studies that were completed to optimize the structural steel. The concrete estimate is based on preliminary design for the equipment and quantities from the Orlando project."*

The approach used by MPC for developing the initial quantities in the Certification Estimate was reasonable and prudent based on the information available from the level of design completed at the time and from the use of SCS and KBR's experience on other projects.

Q. How is the process and development of the actual quantities installed on the Project different than the initial Certification Estimate quantities?

The primary source of the final commodity quantities is calculated from the detailed design engineering that SCS and KBR produced in order to have the necessary information and documentation for the Kemper IGCC Project to be constructed. Such detailed design simply cannot be undertaken until after the CPCN is received allowing the necessary funding for the Project to go forward. The major engineering tasks undertaken on the Kemper IGCC Project were summarized by a DOE *Preliminary Public Design Report* on the Project, which noted the following:[571]

[571] Department of Energy, *Kemper County IGCC™ Project Preliminary Public Design Report*, pages 17-18, June 30, 2012

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Structural Steel and Concrete – *This subtask will include all civil, structural, and geotechnical engineering associated with the design of the facility...*

Architectural – *This subtask will include the design of all buildings and facilities…*

Mechanical – *This subtask includes the following:*

- *Mechanical design of all equipment including the development of fabrication drawings and specifications for procurement.*
- *Piping layout, stress analysis and support design, generation of isometric drawings for all piping, definition of the piping, and valve specifications for procurements.*
- *Site service systems including fire protection, water supplies, sewage and fuel facilities.*

Electrical – *This subtask includes the following:*

- *Development of the single-line configuration to determine the electrical distribution throughout the facility.*
- *Design of the substation and interconnecting facilities required to interface the generating plant with the electrical distribution grid.*
- *Development of plans for electrical grounding, lighting, cable trays and conduit.*
- *Design of the station service and plant communication systems.*
- *Development of interconnection wiring diagrams for all the equipment, programmable logic controllers, and the integrated control system (ICS).*
- *Design and procurement specifications for the motor control centers, switchgear, transformer and other electric equipment.*

Instrumentation and Controls – *This subtask includes the following:*

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- *Configuration of the Southern Company standard plant data archiving system.*
- *Instrumentation sizing, specification and selection.*
- *Instrument location drawings and installation details.*
- *Instrumentation loop drawings, control schematics, logic diagrams, and interlock logic diagrams.*
- *ICS control configuration.*
- *Performance management configuration programming.*

As demonstrated from the list above, the completion of detailed engineering is a very intensive process that is sequenced such that the first detailed engineering that will be completed will align with the first phase of construction (*i.e.* sitework). This is known within the construction industry as "overlapping execution" and is discussed further in **Section V.F.2.** of my Rebuttal Testimony on scheduling. The result of an overlapping execution schedule is that detailed design takes years to complete and will not in fact be completed until after construction is well underway. This leads to quantities being developed over the course of the project, in fact as start-up testing is underway it is possible for certain quantities to be further refined as system testing is brought online.

Q. Did Pegasus-Global conduct a prudence review of MPC's management of the commodity growth and what MPC knew or reasonably should have known regarding the quantity growth?

A. Yes. Pegasus-Global reviewed how the initial quantities were developed, as well as how they are tracked and reported on the Project.

Q. Do you agree with the assertion made by BREI that MPC knew the Kemper IGCC Project would be exposed to uncertainties involving commodity quantity growth because of the quantity growth experienced at DEI's Edwardsport IGCC Project?

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A. No. As I explain in **Section VII.** of my Rebuttal Testimony there were several significant differences between the two IGCC projects, including different technologies, different EPC contractors and different levels of design following the completion of the FEED studies. In fact, the Edwardsport IGCC Project was, according to GE and Bechtel, based on a reference plant design that was already completed. In addition, the DEI Edwardsport IGCC Project was not the "first mover" for the GE/Bechtel Alliance design, as AEP was the first mover with its FEED Study already completed. While the Kemper IGCC Project represents a FOAK project, SCS had the unique opportunity to utilize its nearly two decades of experience with this technology acquired from the testing and development done at the PSDF Facility. The FOAK nature of the Kemper IGCC Project is discussed in greater detail in **Section V.C.2.** of my Rebuttal Testimony. With regard to the FOAK impact on commodities, MPC was aware of the potential risks involved in the Kemper IGCC Project, and in fact, SCS applied techniques in the development of the Certification estimate that B&V noted were consistent with world-class standards, including the development of quantities for the commodities. B&V noted that the development of quantities to support the estimate had multiple benefits, including:[572]

- *Detailed quantities will make the cost estimate more accurate, both by cost of material and cost for labor for installation.*
- *The quantities will provide a better assessment of labor levels required and can assist in the scheduling of the labor.*
- *The quantities will assist in providing definition of work scope to construction contractors if complete drawings are not available at bid time.*

As discussed elsewhere in my Rebuttal Testimony, SCS and KBR having jointly developed the TRIG™ technology have the shared expertise necessary for the gasification island, with KBR

[572] Black & Veatch, Kemper County IGCC Readiness Review, pages 5-30 to 5-31, February 26, 2010

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having extensive experience with syngas production as well as being the original designer of the transport gasifier test facility at the PSDF. SCS has substantial experience on the combined cycle portion of the Kemper IGCC Project, having completed fifteen 2-on-1 combined cycle units for Southern Company since 2000. Southern Company has extensive experience in the construction of new power generation, including sub-critical pulverized coal, super-critical pulverized coal, nuclear, and gas-fired combined cycle and simple cycle technologies. Using the collective knowledge of SCS and KBR, the quantities as originally developed for the Certification Estimate were developed in a manner described by B&V as "world-class" and provided MPC with the best information available based on what was known at the time.

Q. Can you summarize Pegasus-Global's findings relative to the commodity quantity growth?

A. As detailed design continued to develop across the Kemper IGCC Project, the commodity quantities reported monthly in the Production Team Meetings were updated to reflect the known commodities in the latest design. When new quantities were identified based on the design development, they were thoroughly and timely reviewed and assessed before an updated estimate was presented to MPC Management. For instance, in November 2012 the Production Team Meeting noted that piping design was still in process,[573] the Isometric drawings were completed on November 30, 2012, which led to a verification process and estimate taking place through December 2012 into January 2013. MPC management was presented the results of the verification and new estimate in February 2013, and in the February 2013 Production Team Meeting it was noted that the piping quantity increased 123,190 LF (with an estimated material increase cost of $39.5M and an estimated installation increase cost of $19.4M).[574]

With detailed design at various stages of completion, the impact to commodities would be reflective of this, for instance early increases in steel or concrete would not have a relation to the later completion of detailed design that identified the increases in piping. This verification

[573] EPC Status Production Meeting, page 105, November 19, 2012
[574] EPC Status Production Meeting, page 32, February 26, 2013

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process ensured that MPC management had the most accurate and current information on the commodity quantities throughout the course of the Project based on what was known at the time.

Q. Based on Pegasus-Global's review, what have you concluded about the commodity quantity growth?

A. In summary, as the detailed design progressed, the quantities were subsequently refined. The result of this refinement was an increase from the Certification quantities to the quantities necessary to construct and complete the Kemper IGCC Project based on the final design. Most of the increase in quantities occurred in the gasifier and gas cleanup areas of the Kemper IGCC Project, while the combined cycle area was more closely aligned with the initial commodity quantities estimate. It is the opinion of Pegasus-Global, that the initial estimated quantities were reasonable and based on the best information available to MPC at the time, during the execution of the Project the quantities were regularly updated based on the new information becoming available, specifically through the completion of design, leading to the overall conclusion that MPC's management of the quantities was both reasonable and prudent based on the information known and available to MPC at the time.

i. MPC COMMODITY QUANTITY MONITORING

Q. What is the importance of tracking the commodity quantities on a project?

A. Variation from the baseline quantities can directly impact a project's cost (either by direct cost of material, or by the time and labor needed to install additional quantities) and a project's schedule (more quantities requiring more time to install, although some mediation measures can limit the impact this has). In addition, although the quantities are tracked by individual commodity, a change in one quantity often has a cause or effect impact on another commodity. For example, the more cable needed for a project, the more cable tray that is likely to be required, possibly leading to more steel to support the cable trays. The specific means by which MPC tracked and monitored the commodity quantities are discussed in greater detail in my Rebuttal Testimony below.

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Q. Do you agree with BREI's statement that, *"The method for tracking commodity quantities…created challenges in the ability to forecast their impacts on costs, schedule and progress measurement."*[575]?

A. No. 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.[576] Following the completion of the re-estimate, MPC 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.[577] Specific commodity trends were also reported, for instance in the June 2012 Production Report, concrete was presented with the following cost trend information:[578]

- *Current total CY: 97,191 foundations and slabs, not including LDF*
    - *Updated total unit cost is [redacted]/cy for concrete work, which translates to a [redacted]/cy increase relative to the 5/9 Forecast*
    - *Concrete material [redacted]/CY* *$69/CY increase*
    - *Rebar/embeds material [redacted]/CY* *$35/CY decrease*
    - *Labor including indirects [redacted]/CY* *$295/CY increase*
- *Current total CY: 97,191 foundations and slabs, not including LDF*
    - *Current View using total CY and updated unit cost is $[redacted]*
    - *Previous Month Total was [redacted]*
    - *Concrete increase of $[redacted]*

[575] Burns and Roe, Inc., Prudence Evaluation Report, page 47, March 19, 2014
[576] EPC Status Production Meeting, page 44, January 24, 2012
[577] Mississippi Power Company, *Kemper Project Cost Outlook Discussions*, page 7, May 10-11, 2012
[578] EPC Status Production Meeting, page 43, June 28, 2012

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As the above examples indicate, SCS had the appropriate processes in place to update the commodity quantities as new information was available, leading to updated cost, schedule (manhours) and performance impacts. As discussed in greater detail within **Section V.F.2.** regarding schedule management, MPC encountered a number of issues with the P6 scheduling software which impacted its ability to resource load the schedule in P6 in the manner in which BREI suggests.

Q. Was MPC reasonable in its timing of the total Project cost reforecasts?

A. Yes, over the execution of the Project, MPC has, at specific times deemed necessary by the Kemper PMT, conducted reviews of the total Project cost estimate based on the current Project status, performance metrics, available contingency and other relevant factors that led to a reforecast of the total Project cost. While there is no hard rule or standard for determining when to conduct a Project reforecast, especially on a large and complex project like the Kemper IGCC Project, there are particular points during a project's execution when project management determines that reforecasting the project's costs is reasonable. For example, such points project management may use as a point to reforecast the project may include: the release of major construction contracts; when engineering reaches a particular percent completion (e.g. 75%); or when sufficient information is available to allow project management to make an informed decision (e.g. multiple months of productivity measurements). MPC continually monitored the status of the Project as it was executed, and reasonably determined when it was appropriate to reforecast the Project, notably resulting in updated cost estimates in May 2012 and March 2013.

Q. Is MPC's cost reporting consistent with the practices you have observed on other large and complex projects?

A. Yes. As I testified in the Edwardsport IGCC Project prudence hearing, DEI similarly waited until it had sufficient and appropriate information including the completeness of design and the stabilization of commodity quantities before completing a cost reforecast.

Q. How do commodity quantities impact the overall total project cost?

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A. Quantities are determined based on data gathered from P&IDs, General Arrangement drawings, Vendor drawings, and 3D models of the plant layout. When a quantity increase is determined from that data, it can lead to a number of different cost impacts, including: the actual commodity/material cost; Engineering and Design Labor (Civil, Mechanical, Electrical, Instruments & Controls, Gas Tech, Tech Services); Other Labor (Expediting, Vendor Surveillance, Supply Chain, Document Control); Construction (including direct work to install the commodities and indirects such as scaffolding or special equipment); and, Startup (labor to test components and systems or oil flushes, steam blows and other such startup processes). Thus, it is not simply identifying a commodity quantity increase and plugging in a per unit cost to realize the full cost impacts associated with commodity quantity increases. In addition to verifying the actual commodity quantities themselves, the impact must be determined for all of the various impacts noted above in order to determine the total cost impact.

Q. BREI noted that *"Quantity forecasts were adjusted based on SCS's 3-D model updates and were tracked and reported in total."* Do you find that to be an acceptable practice?

A. Yes. The use of 3-D models for tracking quantity forecasts benefits the Kemper PMT, and as noted by CII provides the ability to effectively identify interference problems as well as conduct maintainability/constructability analyses and review designs.[579]

Q. What was the process for forecasting and tracking commodity quantities during execution of the Kemper IGCC Project?

A. The E&CS group has responsibility for tracking and monitoring commodity quantities on the Project. Within the Production Team Meetings, an "Engineered Commodities and Craft Labor Production Report" was featured that provided a summary level view of the status of commodity quantities on the Project. The major commodities included in this report were shown with the Certification quantity, the total Project forecast for the current and previous months, the total

[579] Construction Industry Institute, *Best Modern Practices for Design in Fast Track Projects*, Research Summary 222-1, page 15, 2007

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quantities derived from the drawings that had been Issued for Construction ("IFC") to date for the previous and current month, and a summary delta of the change from the Certification estimate to the total Project forecast. The Production Team Meetings also included charts demonstrating the projected, modeled and IFC quantities for the major commodities which compared the current month to the previous month. Progress curves were also provided to show the installation progress of the various key commodities that showed the planned versus actual progress as well as projected and earned quantities. Some commodities (*e.g.* pipe) showed quantities that were broken down to further define their purpose (*i.e.* plant, treated effluent, CO_2, or natural gas) as well as by area of the project (in the case of Kemper, the combined cycle, gasifier and gas clean-up areas).

During times of significant quantities development, the Production Team Meetings often included additional information relevant to the updated quantity forecasts; for example during the October 2011 Production meeting it was noted that there was an increase in the concrete and piling quantities; the following information was provided within the Production meeting:[580]

- *"Concrete Increase Due to:*
  - *Revised foundations from mats to table tops for the Recycle Gas Compressors, Transport Air Compressors, and AGR Recycle Gas Compressors*
  - *Revised foundations due to growth in size of the PEEC buildings, Dryer Pre-heaters, Water Analysis Building, Reservoir Pump Structure*
  - *Additional foundations added in the Refrigeration area and new CO2 Thrust Blocks*
- *Deep Foundation Changes Due to:*

[580] EPC Status Production Meeting, page 37, October 19, 2011

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- *Increase in Auger Cast Piling required for the AGR Feed Product Exchanger and a Scrubber Vessel in the Refrigeration Area that was originally thought to be supported on mats*
- *Decrease in Caissons in the Refrigeration & CO2 Capture Area due to shorts lengths than originally anticipated"*

The progress curves with associated planned, projected and earned quantities that were presented in the Production Team Meetings were also included in the Core Team, MRB Meetings and ERB Meetings.

As more information on the Project was developed, MPC prudently adapted its commodity tracking to reflect actual Project conditions. For example, beginning in October 2011, the instruments quantity was reported as, *including Vendor Supplied Instruments.* This was a result of the situation on the Kemper IGCC Project where some vendors included the instruments in their bid packages, while in other instances instruments were procured separately, and thus the only way to accurately monitor the total quantity of instruments was to include those that were part of equipment packages with those that were not.

Q. What commodity quantity information was reviewed by the IMs?

A. The IMs reviewed the material that was presented as part of the Production Team Meetings. As noted above, this includes the "Engineered Commodities and Craft Labor Production Report" which summarizes the major commodity quantities with information including Certification quantities, forecasted quantities, and IFC quantities. Construction metrics showing the installation progress of the various commodities were also reviewed, as discussed above these demonstrated the planned versus actual progress as well as planned, projected and earned to date quantities for the commodities.

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Additionally, a special two-day meeting with the IMs was held on May 10-11, 2012 to discuss the $2.76B cost estimate which included discussion on the drivers of this re-estimate such as quantity growth and the impact quantity growth has on Project cost.[581]

Q. Did the IMs raise any concern with the growth in commodity quantities during the execution of the Project?

A. Both URS and BREI as part of their respective monitoring of the Project activities regularly reviewed commodity quantities, and accordingly offered comments in regards to the commodities. In BREI's report issued in January 2012, it noted that although it did not check the quantities indicated in the Certification Estimate, the Kemper PMT spent significant time discussing this area.[582] BREI's monthly reports were limited in their narrative, with discussion of commodity quantities typically limited to comments such as, …*forecasted quantities continue to creep upward, which adds additional cost to the project.*[583] BREI also completed a *Project Schedule and Cost Evaluation* for the MPUS over the summer of 2012 with the final report being issued on November 15, 2012. This November 2012 report was intended to provide:[584]

> *"…a more accurate and independent estimate of the current status, percent complete, scope, schedule risk, and cost of the remaining work, as well as the estimated total cost and completion date for the Kemper Project."*

During this review, BREI evaluated the gasifier, gas cleanup and pipe racks areas it considered as representing the highest level of construction completion and the most complex parts of the plant.

[581] Mississippi Power Company, "Kemper Project Cost Outlook Discussions", May 10-11, 2012
[582] Burns and Roe Enterprises, Inc., Independent Engineering Due Diligence Report, page 82, January 6, 2012
[583] Burns and Roe Enterprises, Inc., Kemper Site Visit Report, page 12, July 12, 2012 and Kemper Site Visit Report, page 14, September 13, 2012
[584] Burns and Roe Enterprises, Inc., Independent Monitor's Project Schedule and Cost Evaluation Report, pages 1-2, November 15, 2012

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This evaluation included BREI estimating the "to-go" quantities of structural steel, piping, cable tray and cable. BREI noted that:[585]

> *"BREI estimated the remaining or 'to-go' quantities based upon our understanding and verification of the SCS methods of calculating quantities coupled with our own in-house methods, databases and the experience of our evaluation team."*

The 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 in the piping quantity, where BREI found that MPC's July 2012 forecast of 731,493 LF was understated by 13,792 (or 1.9%).[586] Despite the independent verification of these quantities being effectively the same as what MPC was reporting, as detailed design continued, the reported quantities continued to fluctuate based on the status of the design at the given time. The following table illustrates some of the changes in quantities that took place between the July 2012 MPC forecast, the BREI independent evaluation and the March 2013 MPC forecast:

Commodity	MPC July 2012 Forecast	BREI Independent Forecast	MPC March 2013 Forecast
Steel (TN)	37,552	37,552	37,810
Piping (Above Ground) (LF)	731,493	745,285	855,957
Cable (LF)	12,756,782	12,756,782	11,860,997
Cable Tray (LF)	148,280	148,280	148,280
Instruments (EA)	10,625	10,625	10,625

As demonstrated above, based on the information available at the time, MPC's forecast of major commodity quantities was right in line with what BREI *independently* forecasted, however as detailed design continued some of the quantities changed, most notably an increase in approximately 124,000 LF in piping and a decrease in approximately 900,000 LF of cable. Both

[585] Burns and Roe Enterprises, Inc., Independent Monitor's Project Schedule and Cost Evaluation Report, page 9, November 15, 2012
[586] Burns and Roe Enterprises, Inc., Independent Monitor's Project Schedule and Cost Evaluation Report, page 10, November 15, 2012

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changes represent fairly significant quantities, however there is simply no conceivable way they could have been forecasted at an earlier point in the detailed design.

URS in its monthly report comments on the commodity quantities as well, focusing typically on the delay between when a quantity increase is forecasted and when a cost increase is correspondingly forecasted.[587] As discussed above, as designs were completed, the new quantities were vetted by the Kemper PMT prior to going to management for approval and incorporation into the Project forecast.

Q. Did Pegasus-Global's review determine whether there was a delay between when commodity quantities were identified and when they were reported?

A. Yes. When a change in a commodity quantity was identified by the Kemper PMT it would be discussed in the monthly project meetings. Depending on how advanced the design was that was causing the change in commodity, the Kemper PMT would determine whether a true revised quantity estimate was ready or not. For instance, it may have been indicated that a revised design would have an impact on cable, but the exact amount of the impact would not be known until the specific design was further completed or vendor design was received and reviewed, at which time an estimate of the quantity impact could be prepared. In general, commodity quantities were regularly updated in the monthly reports, with adjustments to the forecast made on a regular basis to reflect changes occurring as the design became more and more complete. Of course, depending on the nature and impact of the new information, the process to have verifiable information upon which to accurately report the revised quantities took differing amounts of time. As an example of a more significant increase, the 123,190 LF piping increase reported in February 2013's Production Team Meeting stemmed from the completion of the Revision 0 Isometrics drawings that were completed on November 30, 2012.[588] Verification of the new

[587] URS Corporation, Appendix D – Project Cost and Schedule Review, page 2, March 7, 2012 (part of the March 2012 URS Monthly Report)
[588] Kemper IGCC Project, Production Meeting, page 32, February 26, 2013

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quantities began in December 2012. However, verification of this process does not just require taking the distance from the start point to the end point of a given pipe line. The verification involves a number of steps including:

- Determining if the indicated route is accurate, or optimal. For instance, if the pipe line in question was moved one foot left or right, could some of the increased quantities be avoided?
- Verifying that the correct type of pipe is indicated. For example, when dealing with so many varieties of pipe, it is imperative that something that calls for a 2" pipe should not actually be large bore pipe, or vice-versa.

As the individual pipe drawings are verified for accuracy, estimators can begin to calculate the associated increase in cost. As noted above, with multiple varieties of pipe on the Project, there are inevitably multiple prices for the various types of pipe. This not only includes the actual price of the material itself, but also calculating the cost of installing the additional quantities, each type of which will have a varying degree of complexity as to its installation process. This process enables MPC management to have the most accurate view of the quantity data based on the information available at the time the analysis is conducted.

Q. What was MPC's process for updating and reporting the commodity quantities forecast, and how long did it typically take?

A. As an example, E&CS Civil Design was responsible for the concrete and steel for the Kemper IGCC Project. Concrete is modeled by specific area in MicroStation or AutoCad as solid elements (*i.e.* volume); the quantities of the individual areas are extracted to determine the total modeled concrete for the Project. The forecasted quantities are periodically updated and tracked

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in a database that, for concrete, includes each foundation in each area. As the Project progressed, design was refined and the quantities were updated.[589]

The full process to determine the impact of a particular design evolution may have taken a couple months to be fully verified, estimated and reported. As discussed above, the piping quantity increase stemming from the completion of Revision 0 Isometrics drawing completed on November 30, 2012 was officially reported in the February 2013 Production Team Meeting. While it was possible to speculate there would be increases before this time, (E&CS conducted a review in September 2012 indicating the potential for increased pipe quantities)[590] the design was simply not advanced to a point where the impacts could be accurately measured. In the time between the release of the Revision 0 Isometrics drawing and the Production Team Meeting (February 26, 2013), efforts were made to verify the change in quantity, with an estimate completed in late January 2013. Following management reviews in February 2013, the results were promptly reported in that month's Production Team Meeting, as would be expected with good utility practice.

Q. Did MPC reasonably raise and discuss concerns over the course of the Kemper IGCC Project about the growth in commodity quantities experienced on the Project as part of its decision-making process?

A. Yes. Construction and commodity costs were identified in risk assessments conducted on the Project as well as scope change/growth in engineering. Additionally, commodity quantity risk was discussed appropriately in the Project Management meetings; for example, a December 2010 Core Team meeting noted that earthwork, steel and concrete had experienced quantity growth of approximately 20%; this also noted commodity impacts in regards to the price of the commodity and impact to construction. As the Project advanced the commodity quantities remained an area

[589] E&CS Design, Civil Modeled and Forecasted Concrete and Steel Quantities for the Independent Monitor (Burns and Roe), June 13, 2012
[590] Mississippi Power Company, Response to Sierra Club-MPC 1-16 Supplemental, November 7, 2013

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of focus for the Kemper PMT, being discussed in the monthly project meetings, and in certain cases being the subject of special presentations that were prepared to further discuss specific commodity quantities.

ii. EVALUATION OF COMMODITY QUANTITY DATA

Q. Can you briefly describe how Pegasus-Global evaluated MPC's monitoring of the commodity quantities on the Project?

A. Pegasus-Global examined the monthly activity on the Project as it was reported by the Kemper PMT. This included review of the reported commodity quantities as well as any explanation for change provided and the corresponding action taken by MPC management.

Q. What were the major commodity quantity increases on this Project?

A. Each of the major commodity quantities experienced a growth of varying significance over the development of the Project from what was initially estimated during the Certification. As the design is done in sequence, the timing of the commodity increases was dependent on the individual commodity's order in the development of the Project (*i.e.* earthwork would be completed long before piping was completed). The bulk of the quantity increases occurred in late 2011/early 2012 leading up to the \$2.76B and \$2.88B estimates. These were discussed in detail during a special two-day presentation with the IMs on May 10-11, 2012 which explained the amount each major commodity and the experienced growth above the Certification Estimate.[591] The major commodity increases on the Project (through the April 2013 forecast) are summarized as follows:

- Earthwork – increased 717,691 CY from Certification estimate. The bulk of the changes in earthwork were centered on the Reservoir/Laydown areas which gave the Project Management a larger laydown area to utilize during construction. Another primary reason for the increase in earthwork quantities was the decision by MPC to relocate the

[591] Kemper Project Cost Outlook Discussions, May 10-11, 2012

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Reservoir, which was pursued to saving costs associated with less wetland mitigation requirements.[592]

- Deep Foundations – changed from pilings in the Certification estimate to caissons and drilled piers. The original design proposed by KBR called for the use of friction piles. After early subsurface evaluations were completed and the site layout underwent several refinements to accommodate equipment or other requirements, the decision was made to use caissons and drilled piers.[593]
- Concrete – increased 28,507 CY from the Certification Estimate. This increase is largely associated to the need for revised foundation for some of the equipment and buildings as well as actual design quantities for specific aspects of the Project (*e.g.* Nitrogen Plant, Reservoir Intake Structure, Cooling Tower Chemical Storage Area and Reflux Probe Supports).[594]
- Steel – increased 9,642 TN from the Certification Estimate. Steel primarily had two notable increases. The first in September 2010, when the forecast showed the steel quantities were 6,462 TN above the Certification Estimate,[595] and the second in February 2012, when the forecast showed the steel quantities increased an additional 2,909 TN. The latter increase was predominantly confined to the gasifier area and was a result of the completed Revision 0 Pipe Rack Steel drawings.[596]
- Cable – increased 8,642,322 LF from the Certification Estimate. As with piping, there are a vast number of variations in the needed types of cable on the Project; these fall under the broad categories of power cables; fiber optic cables; instrument cables; and, control cables. The cable quantities were reviewed in March 2010 at which time

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[592] Mississippi Power Company, Record of Decision – Treated Effluent Reservoir Location, May 14, 2010
[593] Kemper County IGCC Project, Pilings White Paper, September 4, 2013
[594] Kemper IGCC Project, Production Meeting, page 37, October 19, 2011; Southern Company Services, September 2012 Quantity Discussion, page 3
[595] Kemper IGCC Project, Production Meeting, page 16, September 16, 2010
[596] Kemper IGCC Project, Production Meeting, pages 56, 81, 170, February 23, 2012

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considerable progress had been made in developing the general arrangement of the facility and defining the electrical loads.[597] As design progress, the first reported forecast of cable quantities in March 2011 showed just over 11M LF of cable, the following month the quantities were updated to approximately 12.8M LF.[598] It was identified that the majority of the cable increase was related to instrument and control cable.[599]

- Plant Pipe – increased 257,290 LF from the Certification Estimate. As discussed earlier, plant piping was notable for its 124,464 LF increase that was reported in February 2013 resulting from the completion of Revision 0 Piping Isometrics.[600] Earlier in the Project, during 2012, piping experienced less significant increases (and a decrease) in the forecasted quantities based upon the status of the design completed at a given time.

Q. Why is it difficult to accurately forecast commodity quantities early in a project's design?

A. Developing accurate commodity quantity forecasts is entirely dependent on the information available at the time the forecast is being made. For instance, at 10% design you are certain to have a less accurate forecast for completion than when design is at 70%. Projects such as the Kemper IGCC Project are inherently complex, with numerous items built around numerous pieces of processing equipment for which the design must interface to the exact specifications and characteristics of the vendor equipment as well as the exact layout of the equipment, which can only be finalized when commercial agreements have been completed. With that degree of complexity, a seemingly minor change in the specifications to one piece of equipment can have a ripple impact across a large area of a project which directly impacts the quantity of various commodities that may be required.

Q. Was MPC's management of the commodity quantities on the Kemper IGCC Project reasonable and prudent?

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[597] Kemper County Electrical Quantity Development Discussion (Onsite meeting with BREI)
[598] Kemper IGCC Project, Production Meeting, page 30, April 19, 2011
[599] Kemper Quantity update Jan. 2011; Kemper Cable Quantities Submittal Copy January 25, 2012
[600] Kemper IGCC Project, Production Meeting, page 32, February 26, 2013

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A. Yes. With the initial quantities based on what was developed during the FEED Study, MPC had an appropriate basis from which to estimate commodity quantities. As the detailed design progressed on the Project, commodity quantities were appropriately updated based on what was known at the time. MPC received regular and complete information regarding the development of the commodity quantities. In the event of a more significant increase, the quantities in question were verified and estimated and reviewed by the Kemper PMT prior to being reported, this ensured that the data being reported was as accurate as possible.

4. RISK MANAGEMENT

Q. Have you read and are you familiar with Staff witness BREI's conclusions regarding MPC's risk management process?

A. I have, and I am.

Q. Do you agree with BREI's conclusion that, *"SCS's risk management process was flawed because of its short term focus which prevented the Project team from appreciating the longer term potential risks through the life of the project."* And that, *"…its risk assessments were not comprehensive enough with respects to its cost estimate and schedule"*?[601]

A. No, as I discuss in more detail below.

Q. Do you have any observations regarding BREI's statement that the Kemper Project Management Team did not complete a fully effective cost or schedule risk analysis?

A. Yes. As I discuss in more detail below, Pegasus-Global has cited examples of the extent to which MPC executed risk management during the Project and the many independent reviews that have occurred throughout the life of the Project. Additionally, there are no industry standards for a "complete cost or schedule risk analysis." This statement is subjective and does not add any definitive or objective facts regarding the performance of the management team with regard to risk analysis. There are many aspects about risk identification, analysis, assessment and

[601] Burns and Roe, Inc., Prudency Evaluation Report, page 49, March 19, 2014

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modeling that are documented in the industry by such organizations as PMI, AACEI and CMI. I have cited some of these in my Rebuttal Testimony. However, the overriding aspect of risk is mitigation, which is an essential aspect of "control" that follows. As I discuss below, control is one of the four key elements of risk management.

Q. Do you have any observations regarding BREI's statement that the period for risk assessment was limited to the next two quarters?

A. Yes. Subjective statements about the risk assessment do not address the fact that risk assessment was being continually performed on this Project. 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 MPC, then this statement would have a deeper meaning. 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.

Q. Can you explain what you mean about taking action to mitigate risks?

A. Pegasus-Global previously cited the coordination of the heavy haul permits undertaken by MPC as an example of the mitigation to a threat risk and the fulfillment of an opportunity risk in the implementation of the solution coordinating the heavy haul permits. In that instance the threat risks were reduced as MPC mitigated the potential for equipment delivery delays due to the equipment contractors failing to appropriately acquire the permits and approvals necessary to deliver the equipment to the Project site per the contractually obligated schedule; this is discussed in greater detail in **Section V.E.** of my Rebuttal Testimony.

Q. Have you previously testified about Risk Controls in this proceeding?

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A. Yes, I previously testified about risk controls on this Project in my Supplemental Direct Testimony dated December 13, 2013.[602]

Q. Are you familiar with the use of risk management on large complex power projects?

A. Yes, as stated in my curriculum vita ("C.V.") which was Exhibit PG-1 to my Supplemental Direct Testimony I have extensive experience examining the risk management of large, complex power plant projects.

Q. Are there accepted standards for terminology and practices used to define aspects of risk for large complex projects?

A. Yes. The term "risk" by itself does not identify specific acts or practices, but in general all risk management and control programs have the same objective, which was offered in my Supplemental Direct Testimony.[603] While there are many different industry standards which have defined the practices of risk management, to some extent each of those definitions are slightly different. For example AACEI provides the following definitions:[604]

RISK-

(1) An ambiguous term that can mean any of the following: a) All uncertainty (threats + opportunities); or b) Undesirable outcomes (uncertainty = risk + opportunities); or c) The net impact or effect of uncertainty (threats - opportunities). The convention used should be clearly stated to avoid misunderstanding.

(2) Probability of an undesirable outcome.

(3) In total cost management, an uncertain event or condition that could affect a project outcome or business goal.

[602] Supplemental Direct Testimony of Dr. Patricia D. Galloway on behalf of Mississippi Power Company, Docket No. 2013-UA-189, pages 57-63, December 13, 2013
[603] Supplemental Direct Testimony of Dr. Patricia D. Galloway on behalf of Mississippi Power Company, Docket No. 2013-UA-189, page 58, December 13, 2013
[604] AACEI, Recommended Practice 10S-90, Cost Engineering Terminology, pages 94-95, January 14, 2014

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> *<u>RISK MANAGEMENT</u>-A process for managing asset and project risks. In* [Total Cost Management], *the process includes risk planning, risk assessment, risk treatment and risk control.*

Although there are variations in the definition of risk, the goal is always the same; to identify, quantify, control, and periodically report on risk elements which may arise on a given construction project. However, the industry at large also recognizes that every large, complex construction project is to some extent unique and as a result the term "risk" must to some extent be tailored to the project to be constructed. As defined on the Kemper IGCC Project, the definition of risk generally conformed to that established by AACEI, which I have quoted above. The definitions by AACEI are consistent with the definitions offered in my Supplemental Direct Testimony.

Q. At what stage of a construction project are the identification, quantification, control decisions and risk reporting undertaken by project management?

A. The simplest answer is that those four actions are done continuously throughout the lifecycle of a project.

Q. Can you explain your answer in more detail?

A. Yes. Risk management during a large, complex construction project is evolutionary, by which I mean those four primary steps in a risk management program – identification, quantification, control and periodic reporting – are not one time functions. During the life cycle of a project the one certainty is that things will, and do, change and this change is continuous. Some of those changes are purposely implemented in order to improve project execution; some may be purposely implemented to improve the ultimate operation of the facility once it is placed into service; and many changes are made in reaction to events over which project management has little or no control. Any change to a project has the potential to introduce some new risk elements while simultaneously eliminating other risks from the project. Because of that, the management of risk on a construction project has no industry established definitive starting point or end point.

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Q. In general terms then can you explain when risk management actions are first implemented on large, complex projects?

A. Yes. The initial identification of risk elements is a very general identification of risk elements that is usually conducted by corporate management prior to committing the corporation to the project. At that stage risk is defined in very broad terms such as:

- What is the risk that the facility to be constructed will not meet the needs goals identified for the facility?
- What is the risk of inability to secure sufficient financing for the project?
- What is the risk that there be that a suitable location for the project cannot be identified?

All of those risk elements identified at that stage will go into the decisions taken by corporate management relative to the approval or disapproval of the project. At that point the identification and quantification of risk elements is very general as there is not sufficient detailed information to enable corporate management to quantify the probability of individual or collective risks occurring.

Q. Did MPC conduct such general risk management actions?

A. Yes. For example, in March 2006, the Management Council identified the broad risks to the Project and discussed the probabilities that those risks would occur during the execution of the Project. In October 2006, the MPC Board of Directors held a meeting at which the Project risks and possible risk mitigation options were discussed. In February 2007, the Management Council conducted a second meeting at which the risk elements specific to the IGCC technology and plant fuel were examined and discussed. In April 2007, the Management Council met again and during that meeting examined costs risks to the Project.

Q. What is the next stage in risk management on a construction project?

A. Assuming that corporate management has approved the project the next evolution in the project risk management process will typically be to identify or establish the risk management program

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and/or process by which risk will be identified, quantified and managed during the execution of the project.

Q. Was that step undertaken by MPC on the Kemper IGCC Project?

A. Yes, the initial risk register requirements for the Kemper IGCC Project were established though the E&CS procedure PM-04, Risk Management.[605] That risk process was expanded and honed for the Project in September 2010 with the creation of the Kemper IGCC Project PMP.[606]

Q. In general terms, please describe the evolution that occurred on the Kemper IGCC Project in regards to risk management actions taken by MPC from 2007-2010?

A. MPC's risk management program was formally initiated in 2007 with an internal Technology Risk Assessment conducted by Southern Company.[607] In July 2007, MPC made the decision to engage a consultant, Scott Madden Management Consultants to examine the cost, schedule and technological risk elements that could potentially impact the project cost and schedule goals.[608] During that session, the first Project specific risk register was developed within which key project execution risks were identified, quantified and risk mitigation strategies formulated. The results of that session became the foundation of the Kemper IGCC Project risk management program, which was subsequently updated and revised as necessary throughout the execution of the Project. There was a focus on different aspects of project risks including: cost and schedule to completion, operational risks and corporate risks. The initial analysis was prepared by Southern personnel from outside the Kemper IGCC Project and focused on the risks associated with the use of TRIG™ technology. As I discuss in more detail below, those initial risk evaluations were conducted following a set of formal processes and procedures which were essentially adopted and employed by MPC during its execution of the Kemper IGCC Project.

605 Southern Company Generation, Engineering and Construction Services, Procedure PM-04, Risk Management, Rev. 2, September 20, 2013
606 Kemper County IGCC Project, Project Management Plan – Desktop Instruction 1.0, Rev. 0, pages 4-6, September 7, 2010
607 Southern Company, IGCC Technical Risk Assessment, April 21, 2007
608 Kemper County IGCC Project Risk Analysis, ScottMadden Management Consultants, July 19, 2007

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Q. Did the risk management program end with that initial risk management session?

A. No. Project risk was continuously examined by MPC and SCS between 2007 and 2010, when the first detailed project execution Risk Register was issued. For example, in July 2007, the first comprehensive Risk Matrix was developed and reviewed during a risk presentation given before the MPC Management Council. In October 2008, MPC issued a "Risk Book" which identified 178 individual risk elements which would have to manage during the Project, focusing on the initial Project decisions such as carbon capture and contracting strategies. In February 2009, the Management Council established a Risk Oversight Committee and developed an updated risk matrix for the Project. In February 2010, the Core Team reviewed the draft Project risk assessment chart. In August 2010, E&CS published the Project construction risk register process under which the Project risks would be documented and monitored. In September 2010, the Kemper Core Team reviewed the Project risk assessment matrix, which further delineated project risk elements, quantified those risk elements and outlined various management responses should those risks manifest during the execution of the Kemper IGCC Project.

Q. Were there independent reviews of the Kemper IGCC Project risk management plan?

A. Yes. Additional technology assessments completed in 2008 and 2011, which are also listed in my Supplemental Direct Testimony. Other independent examinations during this early period between 2008 and 2009 focused on three aspects of project execution risk: cost and schedule to completion, operational risks and corporate risks. In February 2010, B&V conducted a Kemper IGCC Readiness Review within which noted that:[609]

> "*It is appropriate that SCS is considering project risk and is attempting to define it. Many categories of risk have been identified and addressed in the Risk Assessment Checklist* [the risk register and risk matrix].

[609] Black & Veatch, Kemper Country IGCC Readiness Review, page 4-5, February 26, 2010

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B&V provided suggestions "…*which SCS may wish to consider it there is merit to expanding the risk assessment*…" Included in that list of suggestions were performance, schedule, emissions, labor availability and financial risks.

Q. Did MPC act on the recommendations made by Black and Veatch?

A. Yes. First, technological performance, emissions and financial risk had already been identified and examined during the 2007 through 2009 time period through various other corporate management divisions and offices. Schedule and labor availability had also been identified during the initial ScottMadden meetings addressed earlier in my Rebuttal Testimony above. In addition, a formal presentation of the Project Risk Program held in April 2011 examined the entire risk management program and risk register. In that formal presentation, all of the B&V risk element suggestions were identified, quantified and had mitigation plans reported, along with a total of 240 other risk elements.[610] All recommendations from any source were reviewed in various Project MRB, Production and Core team meetings held throughout the planning and execution of the Project.

Q. In your discussion on policies and procedures, you identified a Kemper County IGCC Readiness Review; did MPC take any actions with regard to the risk management observations of this Internal Readiness Review?

A. Yes, the internal readiness review identified the following observation regarding risk management with the corresponding action taken by the Kemper PMT. As noted in the report:[611]

- ***Risk Planning:*** *High level project risks have been identified by MPC and assigned to MPC personnel; however, at the time of the review, written risk management procedures to be used throughout the project as*

[610] Mississippi Power Company, Kemper Risk Program Presentation, April 11, 2011
[611] Mississippi Power Company, Kemper County IGCC Readiness Review, Report No. GEN2010-02, page 6, December 17, 2010

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well as specific risk mitigation plans identified on a per risk basis were not available.

Management Response: *E&CS is revising the risk register developed during the FEED phase of the project to reflect current plans and schedules. Key issues will be discussed with MPC Project Management to allow management to take appropriate measures at the project level. This risk register will be in place by the end of the 3rd quarter and will be reviewed periodically as the project is implemented.*

Q. Were any other independent reviews of the Kemper IGCC Project risk management plan conducted?

A. Yes. Several internal audits of the risk management program were conducted over the course of the Project, including audits conducted in December 2010, March 2011, August 2011, September 2011, March 2012, April 2012, January 2013, and May 2013.

In an April 2011 examination conducted by URS it determined that the risk management matrix was an "*acceptable and standard risk assessment methodology*".[612]

Q. Did MPC continue its risk management program during the execution of the Kemper IGCC Project?

A. Yes. There is extensive documentation which was produced over the entire planning and execution phases of the Project that demonstrates MPC's risk management activities throughout the Project. In addition, project risk was monitored on a routine basis at each of the management meetings, including the Core Team, Production Team and MRB meetings and meetings with the IMs.

Q. Does a risk management program look only for possible threats to the successful attainment of project goals and objectives?

[612] URS Corporation, Kemper IGCC Project Due Diligence Report, page 20, April 29, 2011

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No. A risk management program identifies two different sides of every risk element. Threat risks are risks which tend to have a potential to negatively impact both project cost and schedule. Opportunity risks are those that have the potential to positively impact both project cost and schedule.

Q. Please provide an example of an opportunity risk associated with the Kemper IGCC Project.

A. One example of an opportunity risk is associated with the grey water solution for this Project, which included investments in the infrastructure of the Meridian wastewater system to improve reliability. Investment in that system reduced the risk associated with a potential loss of service and provided an opportunity for MPC to reduce a risk. In addition, MPC seized an opportunity to improve the local environment by working with the City of Meridian to meet two different needs, which in longer term benefited both parties.

Q. Did the procedures used by MPC identify the positions responsible for management and control of various risks?

A. Yes, the 2008 Risk Book identified each of the risk owners.

Q. You said that risk profiles evolve over the execution of a project. Can you provide some examples of risk evolution?

A. Yes, early in the development of a project the staff is concerned with obtaining financing, permits, and the up-front planning necessary to get a project started. Then the emphasis shifts to the design/construction phase of the project. There are different risks that are paramount during different phases of a project. The impact of some of the key risks continues throughout the entire project. Because all projects are very dynamic, some unanticipated risks can occur during the project. One example of such a situation for the Kemper IGCC Project was the need for MPC to change its approach for delivery of commodities and equipment from relying on the sub-contractors and vendors getting their permits for hauling to a more centralized method of coordinating permits through coordination with MDOT, while providing the scheduling and

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priority of deliveries. This particular risk arose during the Project and was addressed and mitigated by the Project Management Team.

Q. Has MPC previously addressed the risks of the Kemper IGCC Project before the Commission?

A. Yes. For example, risk mitigation was discussed during the Certificate hearing and in the Rebuttal Testimony of Thomas Anderson.[613] And, as noted earlier, risk was a routine topic during the IM reviews of the Kemper IGCC Project. The IM Monthly reports to the MPSC included a summary of those risk discussions and examinations.

Q. Has MPC's tracking of the Kemper IGCC Project for risks been comprehensive?

A. Yes. Throughout the execution of the Kemper IGCC Project tracking of risks and the reporting about risks has been comprehensive. Since 2009 there have been regular reports presented to various levels of management. Some of these reports are informational and some of them are the basis for management decisions. One of these groups that was mentioned in my Supplemental Direct Testimony is the Core Team.[614] These management decisions are recorded and the changes caused by such actions are recorded on subsequent updates to the risk reports.

Q. Have the management at various levels of the Kemper IGCC Project been made aware of the changes in the risk profile throughout the Project?

A. Yes, as mentioned in my Supplemental Direct Testimony, the Core Team, the E&CS Team, the MRB and ERB have all been informed regularly about risk management.[615] As noted in the "Kemper Risk Program" presentation, MPC made the decision that the risk matrix be updated at least every quarter and that the full risk profile was to be updated no less than semi-annually in

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[613] Phase II Proceedings before the Mississippi Public Service Commission, Docket No. 2009-UA-014, pages 1391-1392, February 1, 2010; Phase Two Rebuttal Testimony of Thomas O. Anderson, Docket No. 2009-UA-014, pages 6-10, January 5, 2010

[614] Supplemental Direct Testimony of Dr. Patricia D. Galloway on behalf of Mississippi Power Company, Docket No. 2013-UA-189, page 62-63, December 13, 2013

[615] Supplemental Direct Testimony of Dr. Patricia D. Galloway on behalf of Mississippi Power Company, Docket No. 2013-UA-189, pages 61-63, December 13, 2013

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conjunction with the deep dives.[616] However, any significant changes to the risk matrix or profile would be reported to the various management committees as they occurred on the Project.

Q. Did the risk management program established by MPC meet the industry standards for risk management?

A. Yes. Referring to my Supplemental Direct Testimony, I cited thirteen specific examples that attest to the continual risk management used on the Project.[617] Some of these citations attest to technical risks examined and mitigated and other citations attest to the management plans executed and updated. Again, the actions initiated by MPC were consistent with those identified by CMAA, PMI and AACEI. These three professional societies constitute the core organizations that promulgate standards and guidelines used for risk management.

Q. Has MPC taken reasonable and prudent actions in regards to the risk management on the Kemper IGCC Project?

A. Yes. MPC and the Kemper PMT have taken reasonable and prudent actions regarding the management of risk on the Kemper IGCC Project in accordance with prudent utility practice and industry standards.

G. PRODUCTIVITY

Q. Have you reviewed, and are you familiar with, the allegations made by BREI and URS regarding the productivity on the Kemper IGCC Project?

A. Yes, I have and I am.

Q. Could you summarize the productivity issues that have been raised by MPSC's witness URS?

A. Yes. In summary, the productivity issues raised are as follows:[618]

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[616] Mississippi Power Company, Kemper Risk Program Presentation, page 20, April 11, 2011
[617] Supplemental Direct Testimony of Dr. Patricia D. Galloway on behalf of Mississippi Power Company, Docket No. 2013-UA-189, pages 58-61, December 11, 2013
[618] URS Corporation, IM Prudence Report, page 37, March 9, 2014

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- URS alleges that decisions made by MPC to maintain the May 2014 COD resulted in *"…productivity losses and efficiency losses due to required schedule work arounds and work installed out of normal sequence."* URS also claims that it *"may be argued that a Lump Sum (Firm Fixed Price) strategy with established unit rates for quantity increases would have at least shifted some of the productivity risk from MPC…"*

Q. What were the general findings regarding productivity of BREI in its Prudence Report?

A. BREI found that the continuing detailed design as the Project was executed led to a growth in bulk commodities, which corresponded to an increase in the number of craft labor hours needed to complete the installation. BREI noted that:[619]

> *"This large increase of commodities and installation labor hours created severe labor congestions which is sometimes referred to as a 'stacking of trades' in tight areas of the plant. This stacking of trades negatively impacted labor productivity which has required in some cases the need for more detailed and/or revised installation strategies, especially in the piping and electrical disciplines to mitigate additional losses in schedule due to the congestion in tight work spaces."*

In addition to the commodity growth on the Project, BREI also indicated that the holding of the May 2014 COD and late equipment or material deliveries also led to productivity issues, noting that:[620]

> *"BREI evaluated bulk commodity installation rates 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*

[619] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 11, March 19, 2014
[620] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, pages 73-74, March 19, 2014

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> *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 not penalize the Project for the incremental labor costs due to the growth in commodities."*

BREI concluded that:[621]

> *"…if MPCo had recognized the need to extend the schedule to reflect a 4Q2014 COD at that time* [third quarter of 2012]*, then the 2012 projected labor rates and productivity factors could have been maintained by mitigating the negative effects of labor congestion, reduced peak labor requirements, productivity losses due to congestion, and staking of trades that have resulted from the compressed schedule. This would also have allowed engineering progress to catch up with the design deliverables required to support construction without the inefficiencies of just-in-time engineering and resulting construction work-arounds."*

Q. Do you agree with the observations and conclusions identified by URS?

A. There are fundamental flaws in the conclusions reached by BREI and URS, for instance URS mentions productivity issues brought about by the decision to maintain the May 2014 COD. However, URS makes no attempt to quantify either the costs of maintaining the May 2014 COD (specifically the cost impacts of lower productivity), nor do they take into account the costs of extending the COD beyond May 2014, including loss of the §48A Phase I ITC and additional construction overhead costs, as discussed in **Section V.F.2.** of my Rebuttal Testimony.

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[621] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 75, March 19, 2014

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Q. Is it reasonable to compare a planned commodity installation rate, as BREI has done, to the actual installation rate achieved?

A. Yes, this is an appropriate means of tracking productivity against a baseline plan. BREI notes that concrete, steel and piping installation rates were approximately 30% to 40% higher than planned. However, while BREI acknowledges that it *"did not penalize the Project for the incremental labor costs due to the growth in commodities,"*[622] it fails to indicate whether other factors such as inclement weather were taken into account. Additionally, BREI appears to suggest that the level of productivity that the Kemper IGCC Project should have achieved should have been nearer to a standard of perfection, which is inappropriate when evaluating the reasonableness and prudency of actions and decisions made by management on a project.

Q. Do you agree with BREI's conclusion that if the schedule had been extended in the third quarter of 2012, the productivity losses would have been mitigated?

A. It is certainly possible that extending the schedule in the third quarter of 2012 could have lessened some of the productivity impacts being experienced by the Project. However, as I discuss elsewhere in my Rebuttal Testimony, BREI fails to compare any potential productivity gains against the negative impacts of a schedule extension, particularly that extending the schedule would have immediately cause the loss of the $133M Section 48A Phase I ITC and the incurrence of additional costs related to construction overhead. Additionally, as I discuss in **Section V.F.3** of my Rebuttal Testimony, in BREI's November 2012 Project Schedule and Cost Evaluation Report, even BREI was unable to forecast what the commodity quantities would be in 2013.

Q. Did BREI quantify the alleged productivity impacts it says were experienced on the Kemper IGCC Project?

A. BREI notes that there was $74M to $109M in incremental construction costs related to inefficiencies; however, this range includes a number of other alleged inefficiencies such as

[622] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 74, March 19, 2014

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utility line relocation and pipe fabrication which I address elsewhere in my Rebuttal Testimony. Additionally, BREI notes that it believed, *"approximately 7% to 10% of the growth in construction costs were due to inefficiencies…"*[623] however, BREI provides no rationale for its use of a 7% to 10% range of inefficiencies and appears to have selected this range seemingly at random.

H. REWORK

Q. URS *"…has requested* [of MPC] *an explanation of how these* [rework] *costs are being tracked."*[624] Please explain rework as it pertains to construction projects.

A. CII defines field rework as, *"activities that have to be done more than once or activities that remove work previously installed as a part of a project."* [625] More simply, rework refers to when installed work in the field (construction) has to be redone (reworked). Rework can result from a number of causes, including: contractor error; deficient or non-compliance in the materials or equipment provided to the contractors; or, an error in the IFC design drawings. In an ideal project environment, there would be no need for rework. Yet experienced project personnel understand that certain forces remain outside of their control and a certain amount of rework may be anticipated, especially for large and complex projects.

Q. Please provide an example for each rework type you have mentioned.

A. With respect to contractor error, for example, it is not unusual for the contractor to pour a concrete foundation where the foundation bolt location is not in accordance with the IFC drawing, requiring the contractor to correct the error in the location of the foundation bolts, causing rework.

With respect to non-compliant equipment, rework may result when a piece of equipment delivered is not in conformance with the venders certified drawings on which the IFC was based.

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[623] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 75, March 19, 2014
[624] URS Corporation, IM Prudence Report, page 37, March 7, 2014
[625] Hwang, Bon-Gang, et. al, Journal of Construction Engineering and Management, *"Measuring the Impact of Rework on Construction Cost Performance"*, page 187, March 2009

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This would be found during installation when it does not fit t within the space allowed or perhaps a piping connection on the equipment is not in conformance with the certified vender drawing. With respect to error in the IFC drawings, rework may be required as the result of a drawing incorrectly indicating a cable being terminated to the wrong equipment, which, if installed in accordance with the drawing, would require the cable to be re-installed/re-routed, *i.e.* reworked.

Q. URS has requested an explanation of how *"these* [rework] *costs are being tracked."* Please describe how MPC tracked rework costs.

A. MPC did not track these costs *per se*. MPC treated rework resulting from the root causes identified above differently, as follows:[626]

- The Lump Sum price and Unit Price Contracts by their nature contractually make the contractor responsible for the cost of rework resulting from the contractor's error. In managing T&M rework caused by the contractor errors, MPC's approach was to reject contractor's timesheets for rework caused by the contractor itself. Since MPC's approach was to force the cost of this rework onto the contractor's account, MPC did not track these costs. However, MPC did record the quality of the contractors' work with respect to welding, as is normal industry practice, and noted welding reject rates which were reported in the monthly Production Reports.
- Rework resulting from nonconforming equipment delivered to the Project site was tracked by MPC and back-charged to the vendor.[627]
- Rework resulting from design errors was not recorded, primarily because MPC is responsible for the cost of this rework.

Q. Do you have an opinion of the magnitude of rework on a typical project?

A. A "typical project," as I previously noted, can experience a wide range of potential rework due to the vast amount of variables encountered by each unique project. Variables include the type and

[626] Kemper IGCC Rework Tracking Spreadsheet
[627] Zeeco Flare Rework/Material Reorder Spreadsheet

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nature of the work, the experience of the contractor performing the work, and the engineer preparing the IFC drawings. However, the most important factor is the implementation of effective quality control programs with both the engineer and contractor. CII, based on the data collected from its members, reveals that direct costs caused by rework average five percent of construction costs. [628] However, as I discuss below, the cost of rework resulting from contractor performance issues and equipment delivered not in conformance with the certified drawings, was charged back to the account of the contractor or equipment vender.

Q. Based on your review of the Kemper IGCC Project records do you have an opinion as to where the Project-level of rework would be in reference to the industry norms?

A. Yes, it is my opinion that rework on Kemper IGCC Project would be similar or less than the industry norm.

Q. Would you explain the basis for this opinion?

A. Rework resulting from design errors (such as field interferences, inaccurate dimensions on construction drawings) was minimized by the utilization of design tools that perform interference detection, including the use of a 3D model, and quality checks on final deliverables prior to release to construction. Consequently, MPC has not uniquely tracked rework due to design errors.

Additionally, as I noted above, weld reject rates were tracked by MPC. The overall cumulative rate at 2.7 percent is in the acceptable range,[629] which may be considered as indicative of the overall project rework rate.

Q. You have stated that MPC did not track rework cost per se. In your opinion, is this reasonable?

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[628] Hwang, Bon-Gang, et. al, Journal of Construction Engineering and Management, *"Measuring the Impact of Rework on Construction Cost Performance"*, page 187, March 2009

[629] Kemper County IGCC Metrics January 2014, Actual Through February 2, 2014 Monthly Report, page 35

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A. Yes I do. As a general matter, for lump sum contracts, the contractor has sole responsibility for performing the contract scope for the agreed price, and would only be entitled for a change in the contract price in the event MPC made a change in the scope of the work, or the conditions of the contract changed. While MPC was correctly concerned with the quality of the work, monitoring quality through its field inspectors and providing general oversight of the contractor's performance, the cost of the work was still the sole responsibility of the contractor. Therefore, from a cost perspective MPC would not have the ability to track rework costs on lump sum contracts. This is similarly true with unit price contracts, as MPC paid the contract unit price for each unit of work that MPC accepted as complete and in compliance with the IFC drawings and specifications. Rework costs the contractor incurred to complete the unit of work in accordance with the IFC drawings and specifications was the sole responsibility of the contractor and would not be known by MPC. This is also similarly true for T&M Contracts, as MPC did not approve the contractor's timesheets for rework and therefore did not pay for rework, but would not know the contractor's actual cost for rework.

Q. URS also asked, "*Once quantified, an explanation should be provided regarding how the* [rework] *costs due to contractor errors are segregated from other costs*."[630] How would you respond to this?

A. As noted above, MPC did not track rework costs per se and therefore cannot *segregate cost due to contractor error from other costs.* However, it is important to note, MPC did not pay for rework arising from either contractor errors or from equipment delivered to the site not in conformance with the certified drawings.

Rework arising from scope changes and design change notices ("DCNs") is different and was paid by MPC at the contract unit rate for unit price contracts. Rework from scope changes and

[630] URS Corporation, IM Prudence Report, page 37, March 7, 2014

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DCNs on Lump Sum contracts would be negotiated, or be paid within identified unit price provisions existing in the contract. All such changes in scope required signed change orders.

I. PROCESS DEVELOPMENT ALLOWANCE

Q. What is the PDA?

A. The PDA is a special allowance of $46.1M provided for in the capital budget that is outside of the Cap. The purpose of the PDA account is to allow for:[631]

> "*…systems design changes, equipment modifications, or other changes that may make the long-term operations and maintenance of the Kemper IGCC more economic or optimal*."

This budget was originally intended to be used during the first five years of plant operation. It was foreseen that changes or improvements in the plant process design would become apparent once operations began. Further, budget was set aside to incorporate lessons learned garnered specifically from the Dongguan IGCC project in China. MPC was granted approval to implement some of those improvements prior to operation as it would be more efficient to construct known improvements into the plant before operations began than to retrofit them in later. The 7-year plan on file with the MPSC reflects a timing change with the PDA that would allow use of the PDA funds to be made available during construction and startup to the extent they were needed.

Q. Please summarize the findings and observations on PDA that BERI offered in its Kemper IGCC Project Prudence Report.

A. BREI in its Prudence Report noted in respect to the five design changes that I mentioned above:[632]

> "*From an engineering and technical viewpoint, we believe it to have been reasonable a decision on MPCo's part to implement these changes during the*

[631] Mississippi Power Company Updated Design, Description and Cost of Kemper County IGCC Project, Submitted to Mississippi Public Service Commission, Exhibit TOA-1, page 27, December 7, 2009
[632] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 70, March 19, 2014

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> *construction phase of the project rather than have to waited until the Project went into commercial operation because the changes are either less costly to implement now than to retrofit later, or were required to assure safety and plant operability at the time of COD compared to proceeding without making those changes."*

Q. Does URS also make observations regarding the use of the PDA funds during construction and startup?

A. Yes. URS in its Prudence Report states: [633]

> *"This is a reflection that design changes and improvements are encountered as final detailed design is completed and the Project goes through the startup process. Allowing changes to be made before construction and startup are complete is less expensive than making the changes after construction is complete."*

Q. Has MPC identified any of the PDA funds to be used during the construction and startup periods?

A. Yes. There are five items that have been identified by MPC for use of PDA funds of which Sour Water Stress Corrosion Cracking Protection is the highest amount at [redacted].

Q. Have you evaluated the issues surround the Sour Water Stress Corrosion Cracking and does the work performed conform to the PDA planned usage?

A. Yes I have and yes it does. Issues of corrosion cracking arose which could have adversely affected the Kemper IGCC Project's availability necessitated MPC's decision to modify the plant's design to install a sour water corrosion protection system. The use of funds from the PDA to address the risk of corrosion cracking was reasonable and prudent.

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[633] URS Corporation, IM Prudence Report, pages 50-51, March 7, 2014

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Q. Do you agree with BREI's and URS's opinions that it was a reasonable decision on MPC's part to implement the changes that were charged to the PDA account during the construction phase of the Project rather than wait until the Project reaches COD?

A. Yes.

VI. RESPONSE TO CERTAIN TECHNICAL ASPECTS OF THE PROJECT

A. CFI REFRACTORY

Q. Have you read and are you familiar with Staff's witness BREI's findings regarding the late gasifier deliveries by CFI?[634]

A. I have, and I am.

Q. Do you have any overall observations regarding BREI's evaluation of MPC's decision-making process and decisions regarding the delayed gasifier delivery by CFI?

A. Yes. BREI describes the issues and consequences of the refractory installation problems and subsequent late delivery of the gasifier pieces. BREI also describes and supports MPC's actions in working with CFI and especially in placing a dedicated "task manager" in the supplier's facility to expedite the delivery. However, BREI opines that:[635]

> *"…due to the FOAK nature of the manufacturing process of the gasifiers, SCS should have placed a dedicated full time task manager at the gasifier supplier's facility sooner or even from the onset of the manufacturing process to avoid lost time in the delivery of these critical components."*

I disagree with this opinion.

The gasifier delivery delay was primarily caused by a technical issue with application of the refractory lining, not by scheduling problems. It was entirely reasonable to expect that the gasifier supply team would be able to deliver the gasifier as contracted and until the refractory adhesion issues arose, that was the case. As I describe in more detail in my Rebuttal Testimony

[634] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, pages 55-56, 58-59, March 19, 2014
[635] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 56, March 19, 2014

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below, MPC had provisions for having an expeditor and quality control personnel visit and inspect operations in the contract, which it utilized. MPC's engineers and managers met with CFI frequently to resolve the technical issue.[636,637,638,639,640] Once the technical issues had been resolved and a path forward was developed, then the fabrication schedule became an issue which MPC responded to appropriately. To suggest someone should have been assigned to CFI earlier is hindsight and not appropriate to a prudence review.

Q. In response to BREI's findings, did Pegasus-Global evaluate MPC's response to the problems encountered with the refractory application?

A. Yes, Pegasus-Global examined the information surrounding the CFI refractory issue as well as how that information was monitored and communicated to key project stakeholders. In addition, Pegasus-Global evaluated the settlement and payments associated with the refractory between CFI and MPC.

In responding to BREI's findings, I have organized my Rebuttal Testimony as follows:

- Gasifier Brief Overview;
- Gasifier Refractor Specification;
- Gasifier Contracting;
- Refractor Problems and MPC Response; and
- CFI Refractory Conclusions.

1. GASIFIER BRIEF OVERVIEW

Q. Please provide a brief overview of the issues encountered by CFI in applying the refractory to the gasifier components that CFI fabricated.

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[636] Mississippi Power Company, Kemper County IGCC Project Refractory White Paper, June 7, 2013
[637] Kemper EPC Status Report for the Week of March 12, 2012
[638] Kemper EPC Status Report for the Week of March 26, 2012
[639] Kemper EPC Status Report for the Week of April 9, 2012
[640] Kemper EPC Status Report for the Week of May 21, 2012

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A. The two gasifiers consist of twelve individual pieces each, for a total of twenty-four pieces. These pieces are various complex shapes constructed of steel and lined with refractory materials to insulate and protect the metal vessel walls and appurtenances from extreme heat and corrosion. MPC awarded CFI a contract for the fabrication of the gasifier components for a contract price of $[redacted] with a delivery schedule from April 2012 through July 2012.[641] CFI fabricated several of the gasifier components and began applying refractory material to the interiors of completed components in late 2011.

The refractory material failed to meet specified properties and to adhere to the vessel walls, which in accordance with the requirements of the contract specifications needed to be corrected.[642] MPC (SCS/KBR) worked with CFI through April 2012[643] to identify the root cause of the problem and find a solution to the problem. During this period of investigation, analysis and resolution of the refractory problem, no gasifier components were delivered to the site. The first piece was delivered to the site September 9, 2012, approximately five months later than the contract schedule specified.[644] The last gasifier component from CFI was delivered to site January 18, 2013, approximately four months later than the contract schedule required.

Q. Did the late gasifier component late deliveries impact other Kemper IGCC Project activities?

A. Yes. The late delivery of some gasifier components did impact gasifier steel erection. Because of the size of some of the larger gasifier components it was not practical to use the normal workaround of delaying erection of certain pieces of steel out and installing after late delivered gasifier component had been installed and then completing steel erection.

[641] Mississippi Power Company, Contract No. 5019766, Project Agreement for the Purchase and Sale of Gasifier Components, June 30, 2010
[642] KBR, Technical Specification P11-6TS-6553, Refractory Linings for Coal Gasification Service, Rev. 0, October 15, 2007
[643] Mississippi Power Company, Kemper County IGCC Project Refractory White Paper, June 7, 2013
[644] CFI Gasifier Components Actual Delivery Dates Spreadsheet

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Q. Was MPC reasonably able to recover costs associated with the delay to the gasifier steel erection from CFI?

A. Yes. MPC sought LDs from CFI for late delivery of components as stipulated in 41.0 of Schedule D[645] of the CFI contract.

Q. Is it normal industry practice for an owner to recover vendor delay damages with the use of LDs?

A. Yes. It is standard industry practice for an owner to utilize LDs as a means of recovering costs associated with delay.

2. GASIFIER REFRACTORY SPECIFICATION

Q. Please provide a summary of the refractory specification.

A. The refractory specification was developed and released by KBR in October of 2007.[646] Specific details by gasifier component were specified on the gasifier drawings. Those drawings were initially developed "for inquiry" in October-November of 2007 and finalized for the price quote request in late 2009.[647]

Q. What was the refractory information specified in the Gasifier inquiry package/contract?

A. The gasifier specification and component drawings specified the specific refractory material, thickness, the type of application to be used and details on joints etc. For instance, the drawings for the Presalters specified a [redacted].[648] Four specific drawings titled "Standard Refractory

[645] Mississippi Power Company, Contract No. 5019766, Project Agreement for the Purchase and Sale of Gasifier Components, Schedule D, page 20, June 30, 2012
[646] KBR Technical Specification P11-6TS-6553, Refractory Linings for Coal Gasification Service, Rev. 0, October 15, 2007
[647] Mississippi Power Company, Contract No. 5019766, Project Agreement for the Purchase and Sale of Gasifier Components, Schedule E, June 30, 2010
[648] Mississippi Power Company, Contract No. 5019766, Project Agreement for the Purchase and Sale of Gasifier Components, Schedule E, page 56, June 30, 2010

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Details" further described fabrication and assembly details related to refractory anchors, typical joints, nozzles, etc.[649]

KBR's *Standard Refractory Specification*s included in the contract described requirements for various refractory materials, including those used on the Kemper IGCC Project gasifier. The document laid out application procedures and requirements, curing requirements, temperature and other environmental condition requirements, testing procedures, and quality assurance test parameter values to pass inspection. The document also included a list of refractory contractors approved by KBR. Further requirements for monitoring of installation, testing and performance test result acceptable ranges of values were included in the Quality Assurance document also made part of the contract.[650]

Q. Was it reasonable for MPC to rely on KBR's prior experience with refractory on this type of application?

A. Yes. As noted in Supplemental Direct Testimony, KBR has been involved in gasification technology for over 35 years, including working with the associated refractory requirements.[651] On May 23, 2012 MPC responded to a question from URS on KBR's experience with the particular refractory used on the Kemper gasifier:[652]

> *"KBR has about 35 years' experience with the gasifier refractory and installation procedure selected. The process conditions have not generally changed during that period.*
>
> *1. Rescocast 17 was used in the original test gasifier at Waltz Mill by KRW (Kellogg Rust Westinghouse) for approximately 10 years. In 1986 this material*

[649] Mississippi Power Company, Contract No. 5019766, Project Agreement for the Purchase and Sale of Gasifier Components, Schedule E, Drawings 499-D01 through 499-D04, June 30, 2010

[650] Mississippi Power Company, Contract No. 5019766, Project Agreement for the Purchase and Sale of Gasifier Components, Schedule E, June 30, 2012

[651] Supplemental Direct Testimony of Dr. Patricia D. Galloway, On Behalf of Mississippi Power Company, Docket No. 2013-UA-189, page 42, December 13, 2013

[652] Mississippi Power Company, Response to RFI No. URS 2-508, May 23, 2012

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was updated with Rescocast 17E (extreme service), a material commonly used in Fluid Catalytic Crackers in the Petrochem industry. Rescocast 17E was used in all KBR gasification projects from 1988 to 2004. In 2005 KBR upgraded again to Rescocast 88VC. This material was an upgrade from 17E and had a specified 20% better erosion resistance. We were looking for a more erosion resistant material because of erosion in the cyclones. In some cases Resco Sureflow 88 was substituted for 88VC. It is a very similar material, but with different flow characteristics. The only problem we have had is that the sureflow materials require over pouring because of deairing problems (the top 6 to 8 inches is like foam).

2. The installation procedures presented to KBR in 1986 by KRW were the same procedures being used in FCC for the previous 10 years and they were updated at that time for coal gasification. There have been and will continue to be many updates to the specifications, but the basics remain basically the same as they have been under the same control for the entire 35 year period. The specifications include installation basics, such as temperature control, but leave it up to the refractory installer to write the detail procedure (for instance how they would control the temperature).”

KBR was responsible for the refractory specification on the PSDF TRIG™ gasifier. The PSDF facility was used extensively to test technologies for use in the Kemper IGCC Project. As such, the refractory specification for the Project was developed from that used in the PSDF gasifier. A May 2010 report from the PSDF reported post-test inspections on the TRIG™ gasifier refractory, and concluded:[653]

[653] Power Systems Development Facility, Final Report, page 3-7, April 2009

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> *"In general, the new gasifier refractory was in excellent condition with two exceptions: the inlet of the first separation device and the seal leg. The original refractory was still in acceptable condition with only minor cracking observed.."*

Q. Was it reasonable for MPC to rely on the specification provided by KBR?

A. Yes. Based on the results from the PSDF and KBR's other extensive experience, KBR, SCS, and MPC reasonably concluded the same refractory would serve the Kemper IGCC Project gasifier. MPC prudently ensured the refractory was tested and expectations were verified at the PSDF prior to finalizing the specifications and contracting of the Kemper IGCC Project gasifier supply. KBR has extensive experience with refractory specifications in this type of application, was abreast of current technology and was prudent in testing the material to be used prior to the fabrication of the Kemper transport gasifier.

3. GASIFIER CONTRACTING

Q. Please provide a summary of the contracting of the Gasifier supply, including refractory installation.

A. Three Gasifier inquiry packages were developed in late 2009 and released in January-February of 2010. The three packages were for 1) Pre-Salters and Mixing Zones; 2) heavy-walled components; and 3) thin-walled components. The refractory for the gasifier was included as part of the supply of the gasifier components.

CFI teamed with J.T. Thorpe & Son to supply the gasifier refractory as part of their bid packages. Thorpe & Son was one of the suppliers on KBR's approved supplier list. CFI bid on all three packages, with the last bid received April 5, 2010.[654] There were five additional bidders for the

[654] Mississippi Power Company, Contract No. 5019766, Project Agreement for the Purchase and Sale of Gasifier Components, Schedule F, June 30, 2010

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Thin Wall Component inquiry[655] and no other complete bids for the Presalters/Mixing Zones or Heavy Wall Component inquiries.[656,657]

On May 21, 2010, the fabrication contract for all three portions of the transport gasifier was awarded to CFI.[658] CFI had fabricated the gasifier at the PSDF and had been selected to fabricate the Orlando project gasifier and had completed some work with SCS and the equipment prior to the Orlando project being cancelled. That familiarity, CFI's ability to construct all the pieces of the gasifier (hence reducing likelihood of fit-up errors), and its location within the state of Mississippi were some of the factors contributing to its selection, in addition to having the lowest price.[659] The total contract amount was [redacted], which included a [redacted] discount for supplying all three gasifier packages. Freight to the Kemper site was included, but not costs of moving utility lines. Components were to be delivered from April 3, 2012 – July 15, 2012. The contract was effective as of June 30, 2010 and the final signature on the contract was dated July 14, 2010.[660] Liquidated damages provisions were provided.[661]

Q. Did the contract reasonably provide for the selection, application and quality control of the preparation and application of the refractory by the contractor?

A. Yes. As detailed in the Contract and Technical Specifications of the Contract, the contractor was required to use the refractory and general installation method specified by KBR in the design drawings. Further contractor responsibilities were detailed in Schedule D of the contract. The

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[655] Kemper County IGCC Project, Gasifier Thin Wall Components Vendor Recommendation Form, April 26, 2010

[656] Kemper County IGCC Project, Presalters and Upper and Lower Mixing Zone Components Vendor Recommendation Form, March 15, 2010

[657] Kemper County IGCC Project, Remaining Heavy Wall Components Vendor Recommendation Form, March 23, 2010

[658] EPC Status Production Meeting, page 37, November 18, 2010

[659] Kemper County IGCC Project, Gasifier Thin Wall Components Vendor Recommendation Form, April 26, 2010; Kemper County IGCC Project, Presalters and Upper and Lower Mixing Zone Components Vendor Recommendation Form, March 15, 2010; Kemper County IGCC Project, Remaining Heavy Wall Components Vendor Recommendation Form, March 23, 2010

[660] Mississippi Power Company, Contract No. 5019766, Project Agreement for the Purchase and Sale of Gasifier Components, pages 1,4,6, June 30, 2010

[661] Mississippi Power Company, Contract No. 5019766, Project Agreement for the Purchase and Sale of Gasifier Components, Schedule D, Section 41.0, pages 20-21, June 30, 2010

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contractor was responsible for developing drawings and procedures for all unsettled details, which were to be approved by MPC prior to finalization; for providing design and drawings for support structures and information; and appurtenances required for testing and maintenance of the gasifier.[662]

> *"5.1 Supplier will furnish all necessary drawings, lists, manuals, training materials, schedules and other documentation (collectively 'Documents'), including necessary details for the design of proper supporting structures, required by Company for use in the installation, testing and commissioning, operation, update, repair, replacement and maintenance of the Equipment."*

The supplier must also provide accurate technical directions and any information required for development of the plant simulator(s).[663]

A provision was included for changes in the equipment or work included in the contract by either MPC or the contractor. Any changes made by the contractor had to be authorized by MPC beforehand. MPC had the right to appoint an inspector to have free access to the equipment throughout the fabrication process and similarly to have an expeditor on-site.[664]

The supplier's warranty was explicit and included provision that the equipment would be *"free from errors, omissions, faults and defects in design, workmanship, and materials"*[665]

The contractor was also responsible for having a quality program in place, including an approved manual, which met MPC standards laid out in an attachment to the contract.[666] Witness and hold points for each portion of the gasifier contract were specified in the QA Requirements

[662] Mississippi Power Company, Contract No. 5019766, Project Agreement for the Purchase and Sale of Gasifier Components, Schedule D, Section 5.1 and 5.2, June 30, 2010
[663] Mississippi Power Company, Contract No. 5019766, Project Agreement for the Purchase and Sale of Gasifier Components, Schedule D, Section 5.5 and 13, June 30, 2010
[664] Mississippi Power Company, Contract No. 5019766, Project Agreement for the Purchase and Sale of Gasifier Components, Schedule D, Sections 8-10, June 30, 2010
[665] Mississippi Power Company, Contract No. 5019766, Project Agreement for the Purchase and Sale of Gasifier Components, Schedule D, Section 11.1, June 30, 2010
[666] Mississippi Power Company, Document SQAR-2 – Supplier Quality Assurance Requirements, Rev. 13, November 3, 2009

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attachment.[667] Quality testing requirements for which the contractor was responsible were further specified in the Refractory Technical Standard document. The contractor was responsible for creating and testing refractory specimens, for the refractory manufacturer to test each batch of refractory shipped to the supplier, for tracking and handling of each refractory batch by the contractor, and for qualifying each batch of high density refractory material, performing flow tests of the refractory, and post-installation testing.[668]

4. REFRACTORY PROBLEMS AND MPC RESPONSE

Q. Please describe the events pertaining to the refractory failure on the gasifier components.

A. CFI and its subcontractor began applying refractory material to the interiors of completed gasifier components in December of 2011 and immediately began noting air bubble cracks in the hot-face surface. These were repaired per KBR specifications.[669] In January 2012, two refractory batches failed quality testing and installed refractory began spalling from the gasifier interiors.[670] At first the cause was attributed to issues with the temperatures at which the refractory was applied and cured, and the initial response was to repeat the work with tighter controls on the temperatures and ambient conditions. When that did not solve the problem, MPC worked with the supplier to develop alternative theories and try different "dry-out" methodologies. Those also failed. MPC then immediately gathered a team of experts from MPC, CFI, the PSDF, the refractory subcontractor, the refractory manufacturer, and experts in China to develop more theories and possible solutions. Through these meetings, multiple solutions were developed and a testing plan implemented. In developing the testing plan, MPC prudently considered the time and delay associated with removing and redoing work on the gasifier pieces and gained approval to create test pieces and to work on smaller pieces of the gasifier. By May of 2012 a solution had been

[667] QA Requirement for KBR ERW C462-MD-TREQ-MD501 part 1-3
[668] KBR Technical Specification P11-6TS-6553, Refractory Linings for Coal Gasification Service, Rev. 0, October 15, 2007
[669] EPC Status Production Meeting, page 137, December 15, 2011
[670] EPC Status Production Meeting, page 135, January 24, 2012; EPC Status Production Meeting, page 150, February 23, 2012

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determined on and a schedule developed with CFI to complete the gasifier.[671] Weekly conference calls had been going on between MPC and CFI throughout this process, and by May, a full-time inspector had been placed in CFI's shop to expedite the remainder of the gasifier component fabrication.[672]

Q. Does BREI raise concerns regarding the gasifier delay impact to the Kemper IGCC Project and have you evaluated MPC's decision-making process relative to that delay?

A. Yes. BREI in its Prudence Report finds that: [673]

> *"…the Lampson Crane…was required to be onsite roughly five months longer than planned, to complete installation of the gasifier and gasifier structure."*

That caused impacts to the heavy rigging plan, presumably adding costs.

The delay in the gasifier was one of several things causing construction delays at the plant. As one of several efforts to mitigate construction schedule issues, MPC met with CFI on July 20, 2012[674] to improve scheduled component deliveries from the May schedule.[675] Gasifier components began shipping in August of 2012 and completed in January of 2013. Due to the complex nature of the technical issues, MPC assessed LDs in 2013 based on the shipping dates negotiated at the July 20, 2012 meeting, per negotiations with CFI.[676]

Based on the information known to MPC at the time of its contract with CFI, MPC could not have reasonably foreseen the resulting delay and impact to the heavy rigging plan and took reasonable and prudent actions to address the situation when it arose.

5. CFI REFRACTORY CONCLUSIONS

[671] Kemper EPC Status Report for the Week of May 21, 2012
[672] EPC Status Production Meeting, page 200, April 26, 2012; EPC Status Production Meeting, page 177, May 24,2012
[673] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 74, March 19, 2014
[674] Mississippi Power Company, letter to Contract Fabricators Inc., Re: Notification of Liquidated Damages for Late Delivery, MPC Contract No. 5019766/Gasifier Components, August 30, 2013
[675] 08-03-12 Kemper County IGCC Expediting Report.xls; 08-31-12 Kemper County IGCC Expediting Report.xls
[676] MPC letter to Contract Fabricators Inc., Re: Notification of Liquidated Damages for Late Delivery, MPC Contract No. 5019766/Gasifier Components, August 30, 2013

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Q. In your review of the issues arising from the fabrication of the gasifier components by CFI and in particular the application of the refractory to those components, did MPC reasonably and prudently manage the CFI Refractory issue?

A. Yes. Based on Pegasus-Global's review, Pegasus-Global is of the opinion that MPC was proactive in responding to these issues and appropriately applied the CFI contract for the overall benefit of the Kemper IGCC Project. MPC was aware of the critical nature of the refractory to the performance of the gasifier and timely delivery of gasifier components was important to supporting the construction schedule.[677]

Though CFI had full responsibility under its contract for the quality of the refractory lining on the components, MPC found it prudent to work with CFI to resolve problems and get the gasifier completed. Also, at the time, the cause of the problem, and hence who was responsible, was not clear.

CFI and its consultant, Thorpe, were unable to identify root cause for the refractory issues experienced, and MPC worked with them to resolve the issue, including development of alternative application methods and release of CFI from the contract refractory materials.

Notwithstanding this proactive and cooperative approach, MPC applied LDs as allowed under the contract.[678]

Q. Was MPC's decision not to fully assess liquidated damages reasonable?

A. Yes. In an effort to mitigate Project delay, MPC made the decision to not fully assess LDs in order to work cooperatively with CFI in developing a solution to the refractory issue. MPC weighed its decision in consideration of additional costs to the Project should the CFI refractory delay be prolonged. This decision was reasonable and prudent management given the circumstance.

[677] Mississippi Power Company, Kemper County IGCC Project Refractory White Paper, June 7, 2013
[678] MPC letter to Contract Fabricators Inc., Re: Notification of Liquidated Damages for Late Delivery, MPC Contract No. 5019766/Gasifier Components , August 30, 2013

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VII. REBUTTAL TO SIERRA CLUB AND BREI REGARDING THE COMPARISON OF KEMPER TO EDWARDSPORT

Q. Did you provide testimony in the DEI prudence proceeding regarding the Edwardsport IGCC Project?

A. Yes. I provided direct testimony in the Edwardsport IGCC Project prudency hearing on behalf of DEI as well as rebuttal testimony in both the Phase I and Phase II hearings.

Q. Are you familiar with the circumstances surrounding the initial CPCN cost estimate submitted by DEI for the Edwardsport IGCC Project and the resulting increases to the CPCN estimate as submitted by DEI to the IURC?

A. Yes.

Q. Have you read and are you familiar with the testimony filed by Sierra Club's witness Mr. Schlissel regarding his allegation that "*There was no reason to expect that Southern Company would be able to avoid all of the same problems that had led to Edwardsport's capital cost increasing by 26 percent between 2007 and 2009*" and "*This dramatic increase in construction costs at the only other IGCC Project under construction in the U.S. should have warned Mississippi Power that, as had happened at Edwardsport, Kemper also would be susceptible to the same design evolution and growth in plant size (and consequently, quantities of bulk commodities that would be required). Instead, the Company dismissed the Edwardsport experience*"?[679]

A. Yes, I have and am.

Q. Have Staff witness BREI made similar allegations?

A. Yes. Specifically, BREI concluded that:[680]

[679] Direct Testimony of David A. Schlissel, On Behalf of Sierra Club, Docket No. 2013-UA-189, page 43, March 14, 2014
[680] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 37, March 19, 2014

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> *"There were also lessons that could have been learned from the Edwardsport visits but that were apparently were thought not to be applicable to the Kemper Project. The most significant items which appeared to be common to both Edwardsport and the Kemper Project were issues related to the forecasting of quantities and costs during the Project so that they could be reacted to in a timely manner. The just-in-time engineering approach influenced the sequence of work on both projects which ultimately influenced costs."*

Q. Do you agree with the assertions made by Mr. Schlissel and BREI regarding the lessons learned from Edwardsport that should have been applied by MPC to the Kemper IGCC Project?

A. No.

Q. Do you agree with BREI's finding that *"the action taken by the Kemper Project team to engage in discussions with the Edwardsport team was a proactive approach to understanding the issues faced by the Edwardsport project team"*?[681]

A. Yes. The Kemper PMT conducted visits to the Edwardsport IGCC Project in October 2010 and February and October 2011 in order to obtain information that may assist MPC in its delivery of the Kemper IGCC Project.

Q. Did you in your prudence audit of the Edwardsport IGCC Project also conduct a site visit of the Edwardsport IGCC Project?

A. Yes I did.

Q. Were you aware at the time of your prudence review conducted on the Edwardsport IGCC Project that DEI had met with the Kemper PMT?

[681] Burns and Roe Enterprises, Inc., Prudency Evaluation Report, page 36, March 19, 2014

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A. I may have heard that DEI had met with MPC, but I did not know whether a site visit had been conducted nor did I know of nor did I see any meeting minutes or site visit reports from either DEI or MPC while conducting my prudence review regarding the Edwardsport IGCC Project.

Q. Have you since reviewed those site visit reports as part of your prudence review on the Kemper IGCC Project?

A. I have.

Q. What general overall conclusion did you take away from site visit reports prepared by MPC?

A. While there were some lessons learned in construction and start-up that the Kemper PMT was able to gather, the primary finding was that there were very few similarities between the two projects, in addition the Kemper IGCC Project was already well under development at this time.

Q. Did you file testimony and present oral testimony in front of the IURC regarding your prudence review on the Edwardsport IGCC Project?

A. Yes. I filed three sets of testimony regarding the Edwardsport IGCC Project, including:

- Direct Testimony filed March 9, 2011;
- Phase I Supplemental Rebuttal Testimony filed August 3, 2011; and
- Phase II Response Testimony filed September 9, 2011.

I also orally testified in these proceedings on November 3-4, 2011 and November 21-22, 2011.

Q. Did your work on the Edwardsport IGCC Project provide you with the necessary information to compare the Edwardsport IGCC Project and the Kemper IGCC Project?

A. Yes. The Pegasus-Global's review spanned a period from when DEI first considered building an IGCC plant up until the time I testified, so I am familiar with the both the Edwardsport and Kemper IGCC Projects.

Q. Can the Kemper IGCC Project be compared to the Edwardsport IGCC Project in any way?

A. No, with the exception that they are both IGCC plants. That being said, the Kemper PMT took the reasonable course of action in visiting and reviewing the available information on the

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Edwardsport IGCC Project in addition to the knowledge and expertise SCS gained from its several years of testing at the PSDF.

Q. Can you provide a summary of what the major differences are between the Kemper IGCC Project and the Edwardsport IGCC Project?

A. Yes. The major differences between the two projects are as follows:

- Different technologies;
- Different fuel;
- Different water sources;
- CO_2 capture included in the Kemper IGCC Project, but not at Edwardsport;
- Different Project site size;
- Different Engineering Approach;
- Different FEED Timing and Engineering Percent Complete at CPCN;
- Different EPC Management Structure;
- Different Quantities; and
- Different Basis for Cost Estimates and Cost Increases.

Q. Can you provide a brief overview of why the two technologies are different?

A. Yes. The Edwardsport IGCC Project is a nominal 630 MW plant and uses GE technology while the Kemper IGCC Project is a nominal 582 MW plant and uses the TRIG™ technology. The GE technology is entrained flow (once through), is oxygen blown and a burner-type slagging gasifier. The Kemper IGCC Project uses TRIG™ technology, does not use a burner and uses a non-slagging gasifier, is a fluid bed and is air blown. The TRIG™ technology eliminates the oxygen Air Separation Unit for gasifier operation. The water treatment is different in the two technologies in that the dry dust removal in the TRIG™ technology eliminates the grey water system that was added to the Edwardsport IGCC Project.

Q. What are the different fuel sources?

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A. The Edwardsport IGCC Project uses Indiana bituminous #5 seam coal which is located offsite and requires a rail line to bring coal to the site whereas the Kemper IGCC Project uses Mississippi lignite which is mined from a lignite mine adjacent to the plant site and is brought to the site via off-road mining trucks.

Q. Do the two projects have similar water sources for their plants?

A. No. The Edwardsport IGCC Project takes its water from the river, whereas the Kemper IGCC Project takes its water from the City of Meridian.

Q. Does the Edwardsport IGCC Project include carbon capture?

A. No. The Edwardsport IGCC Project is carbon capture ready and the site arrangement includes space for future carbon capture equipment, however no additional gasification plant capacity was added to the design to account for future de-rating of the plant were carbon capture required. The Kemper IGCC Project will capture carbon at a rate of 65%.

Q. Are the two Project sites the same size?

A. No. The Edwardsport IGCC Project is a 200 acre site with 150 acres used for the plant. The Kemper IGCC Project is a 3000 acre site with 165 acres for the plant.

Q. How were the engineering approaches different between the Edwardsport IGCC Project and the Kemper IGCC Project?

A. In the Edwardsport IGCC Project, there were four major engineering entities with major scope including: GE and Bechtel; Burns & Roe; Sargent & Lundy, and DEI. The GE/Bechtel Alliance performed the engineering services required to deliver the GE Gasification technology, the power block and their interconnection. DEI oversaw but allowed Bechtel to manage that aspect of the engineering, but managed by others for scope outside the GE/Bechtel Alliance scope of work, including coal handling and receiving, ancillary Outside the Battery Limits ("OSBL") areas, the switchyard, Ranney wells, slag handling, deep well injection for grey water (later changed to zero liquid discharge when GE changed the grey water composition) and the sulfur by-product handling. DEI had to rely on GE/Bechtel for the engineering for the primary components of the

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Edwardsport IGCC Project as those components were dependent on "black-box" GE Gasification Technology. In the Kemper IGCC Project, there are only two engineering entities comprised of Southern Company E&CS and KBR, both partners in the development of the TRIG™ technology used for the Kemper IGCC Project. E&CS managed the overall engineering and directed KBR, to designs that are optimal from an owner's perspective.

Q. How was the FEED Study different for each of the two Projects?

A. In the Edwardsport IGCC Project, the FEED effort was performed over a 13-month period in three phases. The FEED Study dated April 2, 2007 was completed prior to the CPCN filing and contained PFDs, HMBs, P&IDs, single lines, layouts and general arrangements, construction model, quantities developed, Project Scope Book, and a detailed schedule and estimate, which was developed based on engineered drawing sufficient for Material Take Offs ("MTOs"). The Edwardsport FEED and the Project Scope Book was nearly complete at the time of the CPCN filing with the IURC, with engineering at approximately 30% complete, with the exception of finalization of some items related to the steam turbine, the guarantee performance section and finalization of HAZOP, although design reviews of FEED continued post FEED prior to entering into final design stage.

In the Kemper IGCC Project, the FEED Study dated August 2009, was also complete at the time of the CPCN and had been developed over a period of nearly 27 months including preliminary design reviews. However, the engineering for the Kemper plant was only approximately 10% complete, and contained only a preliminary model and preliminary schedule. The estimate was also not to the level of detail as the estimate developed for Edwardsport, which was primarily reflective of the percent of design complete and the fact that Edwardsport was based on a completed reference plant design, according to GE and Bechtel.

Q. Is it reasonable to say that MPC did not conduct sufficient engineering in its FEED study before filing with the MPSC?

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A. No. In process engineering, FEED engineering typically ranges from 10-30% depending on the schedule. One product produced from the FEED study is a project estimate. The level of estimate in the Edwardsport IGCC Project was at a Level 2, per AACEI standards as discussed in my Phase II Testimony before the IURC.[682] The Kemper IGCC Project estimate was at a Level 3 of estimate, based on significantly less engineering, and several portions of the estimate were factored versus MTOs that were done in the Edwardsport IGCC Project estimate.

Q. Can you reconcile the statements made by the Kemper PMT from its site visits to the Edwardsport IGCC Project that the Edwardsport FEED Study was not complete at the time of the CPCN filing?

A. Yes. At the time of the Kemper PMT visiting the Edwardsport site, the first of which did not occur until October 2010, DEI was beginning to learn that the FEED study had probably not been completed as indicated by GE and Bechtel. This realization was based on the significant commodity growth being experienced in 2009 and continuing into the fall of 2010. DEI did not have that information and was unaware of certain facts about the FEED study at the time of the CPCN filing.

Q. How were the management structures different between the Edwardsport IGCC Project and the Kemper IGCC Project?

A. While DEI had overall management responsibility of the Edwardsport IGCC Project, DEI also engaged Bechtel on an EPCM basis to serve as the construction manager for the Edwardsport IGCC Project. Bechtel was responsible to monitor cost and schedules, prepare the project schedule, monitor trends and forecasts, and report monthly to DEI regarding the work that was within the GE/Bechtel scope of work, which included both the gasification and combined cycle portions of the plant. In contrast, on the Kemper IGCC Project, the engineering and construction

[682] Responsive Testimony of Dr. Patricia D. Galloway, On Behalf of Duke Energy Indiana, Inc., Cause No. 43114-IGSS-4S1, pages 164-165, September 9, 2011

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was managed by SCS who served as the EPC contractor for the Project and performed all the project control and reporting functions.

Q. Were the commodity quantities the same for both the Edwardsport IGCC Project and the Kemper IGCC Project?

A. No. As can be seen from the Table below, the approximate commodity quantities between the two projects were quite different, as evidenced by the different technologies, including lack of CO_2 capture at the Edwardsport IGCC Project, and thus design of the two projects:

Commodity	Units	DEI Edwardsport IGCC[683]	MPC Kemper IGCC[684]
Carbon Capture	%	0	65
Excavation/Backfill	CY	3,096,500	6,578,791
Piling/Caisson, Drill Pier	EA/LF	2,597	196,680 LF
Concrete	CY	136,000	98,443
Structural Steel	TONS	33,000	37,923
Pipe	LF	794,000	856,887
Equipment to Set	EA	1,666	10,625
Electrical Cable	LF	4,619,000	11,860,997

Q. There are similar estimate numbers for both the Edwardsport IGCC Project and the Kemper IGCC Project, *e.g.* Kemper's initial \$2.2B estimate submitted to the MPSC in January 2009 and the Edwardsport's initial \$1.985B estimate submitted to the IURC in April 2007, and \$2.88B Edwardsport estimate submitted to the IURC in 2010 and the \$2.88B Kemper estimate submitted to the MPSC in 2012; do these estimates reflect the same basis and scope of work?

A. No. While the numbers may appear similar or the same, they are not reflective of the same scope of work nor reflect similar reasons for increase.

Q. Both the Edwardsport IGCC Project and the Kemper IGCC Project experienced significant commodity growth increases. Were they for the same reasons?

[683] Edwardsport Debrief, page 8, January 25, 2011
[684] EPC Status Production Meeting, page 110, January 22, 2014

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A. No. As I have testified to earlier, in the Edwardsport IGCC Project, when its FEED study was completed in April 2007, Bechtel indicated that all commodity quantities had been identified and MTOs prepared to arrive at those quantities. DEI relied on the Alliance's representations that all of the commodity quantities had been captured because the majority of the commodity quantities had been based on the Reference Plant design, and only the Edwardsport specific commodity quantities had to be captured and added to the Reference Plant commodities. Bechtel and GE assured DEI that all of the commodity quantities had been captured in the FEED study estimate. It was not until 2009, after detailed engineering had been essentially completed, that the dramatic increase in commodities began to surface, which came as a surprise to DEI. In the Kemper IGCC Project, at the end of FEED in 2009, engineering was only 10% complete and there were several areas of the estimate that had been factored and MTOs not prepared. As would be expected, and as reflective in the expected accuracy of a Level 3 estimate, as detailed design progressed additional commodities were identified as well as when vendor bid packages were received. Thus, while both projects experienced commodity increases, the root causes were completely different.

Q. Based on your understanding of both the Edwardsport and Kemper IGCC Projects, and your testimony herein, would it be reasonable to compare the Kemper IGCC Project to the Edwardsport IGCC Project in any way?

A. No, it would not.

VIII. RESPONSE AND REBUTTAL TO ALLEGED IMPACTS AND RECOMMENDED IMPRUDENCE DISALLOWANCE

Q. In general, what are controllable and avoidable costs?

A. Controllable and avoidable costs arise from project management's inability to react to issues or circumstances in a timely, efficient and effective manner. One of project management's functions is to react effectively and efficiently to impact situations so as to avoid, control, or minimize those impacts on costs and/or the schedule. For example, if project management is

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alerted to the fact that a critical piece of engineered equipment is going to be delayed significantly, and that delay may impact the project's planned work flow, management can develop what is known in the industry as a "workaround," *i.e.*, it can redirect resources to other, unaffected aspects of the work while controlling (or avoiding altogether) the impact of that late equipment on the project. If project management has accurate, complete, timely, reliable information, it often can minimize the impact of inevitable delays or errors that affect every megaproject. On the other hand, without accurate, complete, timely and reliable information, project management will be essentially helpless to avoid the adverse impact of such delays or errors.

Q. Has Pegasus-Global reviewed the testimony and reports of the Sierra Club's, Staff's and MPSC's witnesses regarding their recommendations as to potential imprudence and disallowances thereof and do you have any overall observations on the recommendations presented to the MPSC?

A. Yes. First, I note that no witness has rendered any conclusive decisions as to whether any decision or action of MPC was imprudent or unreasonable and has made no specific monetary disallowance findings of imprudence. Second, with respect to the opinions that have been made for MPSC's consideration, I have the following overall observations regarding the recommendations by these witnesses with respect to their conclusions with respect to potential imprudence and any recommended actions to be taken by the MPSC.

1. The Sierra Club's witness Mr. Schlissel does not make any specific determination of disallowance. Rather, Mr. Schlissel simply opines that the Kemper IGCC Project should have not been built or should have been cancelled. Both of these conclusions are reached in hindsight and are not appropriate in this prudence review.

2. MPSC's witness URS has not calculated any disallowance noting that it "*will be done in a future report*." Further, URS's findings are more "observational" and qualified with the word "*may*" and thus it has not yet made any determination of imprudence.

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3. Staff's witness BREI has proposed an amount that equates to "*inefficiencies, shortcomings and inadequacies*" but it never states or provides an opinion as to whether these amounts are imprudent or unreasonable. BREI also makes no recommendation as to where these amounts should be taken, meaning whether the amounts would be taken from the approved capped amount or whether they would be above the capped amount. Further, the methodology used by BREI to determine the recommended range of "*inefficiencies, shortcomings and inadequacies*" is arbitrary and is not in accordance with proper prudence disallowance calculations that must be tied to cause and effect of cost increases.

Pegasus-Global has significant experience in working with and before regulatory commissions and in deciding construction and commercial issues as arbitrators and dispute review board members. Based on this experience, Pegasus-Global notes that for proper prudence monetary disallowance to be advanced, the following steps should be followed in quantifying costs attributable to either disallowance or entitlement (damages) issues: (1) the acts about which the party complains must give rise to liability; and (2) there must be a nexus between the acts which give rise to the liability and the alleged consequences.

Q. What is Pegasus-Global's overall conclusion with respect to any claim for disallowance by the Intervenor, Staff or MPSC witnesses?

A. In the first instance, none of the witnesses have shown any liability that would lead to damages; nor have they made a showing that any alleged actions about which they complain actually or proximately caused quantifiable damages (foreseeable consequences).

Q. Given that Pegasus-Global has concluded that the Sierra Club's, MPSC's and Staff's witnesses have not proven liability and therefore, a basis for any cost disallowance, did Pegasus-Global perform any further analyses regarding the witnesses' cost disallowance recommendations?

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A. Pegasus-Global has reviewed the basis of the witnesses' recommendations for disallowances to determine whether, even assuming liability, there is any causal connection between the actions they claim gives rise to liability, the review of resulting impacts and whether those alleged impacts were foreseeable and led to consequences that should give rise to a disallowance.

Q. Based on Pegasus-Global's experience in working for Commissions and utilities, how does the general purpose for regulation of investor-owned utilities factor into Pegasus-Global's evaluation?

A. As I testified earlier, in Pegasus-Global's experience, the regulatory framework is intended to balance the interests of the Company with those of its customers. By this, I mean that the MPSC ensures that the Company's investments are in the public interest based on a total, life cycle cost analysis and that investors are given the opportunity to earn a reasonable return. This process is comparable to regulation of investor-owned utilities in other states that may have similar or other public policy goals that focus on the long term benefit of the new generation because power availability at a reasonable cost is essential to economic growth and productivity. It is this long-term balance between customers' interests and investors' interests that permeates regulation of utilities.

Q. Why is this long-term balance between a reasonable return on the costs of the plant and the customer's needs important to Pegasus-Global's analysis of the witnesses' testimony recommendations with respect to disallowance?

A. Prudent cost recovery is rooted in Constitutional analysis and is mandatory under Mississippi statute to provide the Company a rate of return on its investment in new generation. The mandated recovery of prudent costs is however, balanced with an inquiry into whether or not the Company is attempting to recover actually incurred (booked) costs that were determined to be unreasonable and imprudent. In other words, the utility may not recover costs incurred that were deemed to be unreasonable and imprudent and instead can only recover those costs that are determined to be prudently incurred and were incurred based on the Company's management of

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the Project within a zone of reasonable behavior. If the Company's management is outside of the bounds of all reasonable choices, such costs should not be recovered. The focus is not on whether costs were higher than expected or whether the project was perfectly run. Rather the focus is on whether additional costs incurred were caused by unreasonable or imprudent decisions.

Q. Does Pegasus-Global recommend that any disallowance be made from the $2.88B Project Cap?

A. No. Although the final costs are not yet known, MPC has already agreed to a Project cap, with specified exceptions, of $2.88B. MPC and its shareholders have already absorbed all costs over the $2.88B and thus any unreasonable or imprudent costs, if determined at some future point in time, should be considered as part of the monies already absorbed by MPC over the cap. Since the IMs have stated that MPC could not have feasibly built the capped portion of the plant for less than $2.88B and since the effects of MPC's actions are not quantified in any manner by the witnesses much less tied to any specific imprudent action by MPC, MPC's agreed to cap is more than fair. In fact, both BREI and URS specifically note the write-off already taken by MPC and Southern Company's investment in the Project. For those reasons, and the fact that the Mississippi rate payers are receiving an incredible benefit of a project that has actually cost more than the capped amount, the investment made by the rate payers is sound.

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BEFORE THE MISSISSIPPI PUBLIC SERVICE COMMISSION

MISSISSIPPI POWER COMPANY **DOCKET NO. 2013-UN-189**
EC-120-0097-00

IN RE: PETITION OF MISSISSIPPI POWER COMPANY FOR FINDING OF PRUDENCE IN CONNECTION WITH THE KEMPER COUNTY INTEGRATED GASIFICATION COMBINED CYCLE GENERATING FACILITY

AFFIDAVIT OF PATRICIA D. GALLOWAY

PERSONALLY appeared before the undersigned officer authorized to administer oaths, Patricia D. Galloway, who being duly sworn, deposes and says; that the foregoing rebuttal testimony was prepared by her or under her supervision; that said testimony was prepared for use as rebuttal testimony on behalf of Mississippi Power Company in the captioned proceeding; that the facts stated therein are true to the best of her knowledge, information and belief; and that if asked the questions appearing therein, her answers, under oath, would be the same.

This the 21 day of May, 2014.

PATRICIA D. GALLOWAY

Sworn to and subscribed before me this the 21 day of May, 2014.

Kim M. Coe
Notary Public

My Commission Expires:

December 2, 2017

KIM M COE
NOTARY PUBLIC
COMMISSION EXPIRES DECEMBER 2, 2017
STATE OF WASHINGTON

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