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DEAN CANNON
Speaker of the
House of Representatives



June 19, 2012

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Ms. Ann Cole, Commission Clerk
Office of Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Blvd.
Tallahassee, FL 32399-0850

Re: Docket No. 120009-EI

Dear Ms. Cole:

Pursuant to the Memorandum of Understanding regarding Reproduction of Certain Documents, dated October 26, 2011, OPC is filing the PFT/EX's of William R. Jacobs Jr., Ph.D. on behalf of the Citizens of State of Florida.

If you have any questions or concerns; please do not hesitate to contact me. Thank you for your assistance in this matter.

Please indicate the time and date of receipt on the enclosed duplicate of this letter and return it to our office.

Sincerely,

Charles J. Rehwinkel
Deputy Public Counsel

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cc: All parties of record

CRP

DOCUMENT NUMBER- DATE

04020 JUN 19 2012

FPSC-COMMISSION CLERK

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In Re: Nuclear Cost Recovery)
Clause)
_____)

Docket No. 120009-EI

FILED: June 19, 2012

DIRECT TESTIMONY

OF

WILLIAM R. JACOBS, JR., Ph.D.

ON BEHALF OF THE CITIZENS OF

THE STATE OF FLORIDA

REVIEW OF PROGRESS ENERGY FLORIDA'S

NUCLEAR COST RECOVERY RULE FILING

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DOCUMENT NO. DATE

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EXHIBITS

RESUME OF WILLIAM R. JACOBS, JR..... WRJ(PEF)-1

RESUME OF JAMES P. McGAUGHY, JR. WRJ(PEF)-2

CR3 EPU PROJECT COST ESTIMATES 2006-2012 WRJ(PEF)-3

1 **DIRECT TESTIMONY**

2 **Of**

3 **WILLIAM R. JACOBS JR., Ph.D.**

4 On Behalf of the Office of Public Counsel

5 Before the

6 Florida Public Service Commission

7 Docket No. 120009-EI

8
9 **I. INTRODUCTION**

10 **Q. PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.**

11 A. My name is William R. Jacobs, Jr., Ph.D. I am an executive consultant with GDS
12 Associates, Inc. My business address is 1850 Parkway Place, Suite 800, Marietta,
13 Georgia, 30067.

14
15 **Q. DR. JACOBS, PLEASE SUMMARIZE YOUR EDUCATIONAL
16 BACKGROUND AND EXPERIENCE.**

17 A. I received a Bachelor of Mechanical Engineering in 1968, a Master of Science in
18 Nuclear Engineering in 1969 and a Ph.D. in Nuclear Engineering in 1971, all from
19 the Georgia Institute of Technology. I am a registered professional engineer and a
20 member of the American Nuclear Society. I have more than thirty years of
21 experience in the electric power industry including more than twelve years of power
22 plant construction and start-up experience. I have participated in the construction and
23 start-up of seven power plants in this country and overseas in management positions
24 including start-up manager and site manager. As a loaned employee at the Institute of
25 Nuclear Power Operations ("INPO"), I participated in the Construction Project

1 Evaluation Program, performed operating plant evaluations and assisted in the
2 development of the Outage Management Evaluation Program. Since joining GDS
3 Associates, Inc. in 1986, I have participated in rate case and litigation support
4 activities related to power plant construction, operation and decommissioning. I have
5 evaluated nuclear power plant outages at numerous nuclear plants throughout the
6 United States. I was on the management committee of Plum Point Unit 1, a 650
7 MWe coal fired power plant in operation near Osceola, Arkansas. As a member of
8 the management committee, I assisted in providing oversight of the Engineering,
9 Procurement and Construction ("EPC") contractor for this project. I am currently the
10 Georgia Public Service Commission's (GPSC) Independent Construction Monitor for
11 Georgia Power Vogtle 3 and 4 nuclear project. As the Independent Construction
12 Monitor, I assist the GPSC Commissioners and Staff in providing regulatory
13 oversight of the project. My monitoring activities include regular meetings with
14 project management personnel and regular visits to the Vogtle plant site to monitor
15 construction activities and assess the project schedule and budget. My resume is
16 included as Exhibit WRJ(PEF)-1.

17
18 **Q. WERE YOU ASSISTED BY OTHER GDS PERSONNEL IN THIS EFFORT?**

19 **A.** Yes I was. The GDS team involved in the review and evaluation of the requests for
20 authorization to recover costs consisted of me and Mr. James P. McGaughy, Jr., a
21 former nuclear utility executive with over 37 years of experience. The resume of Mr.
22 McGaughy is attached to this testimony as Exhibit WRJ(PEF)-2. I have reviewed the
23 work of Mr. McGaughy and am familiar with his input and have incorporated and
24 adopted it as my own.

1 **Q. WHAT IS THE NATURE OF YOUR BUSINESS?**

2 A. GDS Associates, Inc. (“GDS”) is an engineering and consulting firm with offices in
3 Marietta, Georgia; Austin, Texas; Corpus Christi, Texas; Manchester, New
4 Hampshire; Madison, Wisconsin; and Auburn, Alabama. GDS provides a variety of
5 services to the electric utility industry including power supply planning, generation
6 support services, rates and regulatory consulting, financial analysis, load forecasting
7 and statistical services. Generation support services provided by GDS include fossil
8 and nuclear plant monitoring, plant ownership feasibility studies, plant management
9 audits, production cost modeling and expert testimony on matters relating to plant
10 management, construction, licensing and performance issues in technical litigation
11 and regulatory proceedings.

12

13 **Q. WHOM ARE YOU REPRESENTING IN THIS PROCEEDING?**

14 A. I am representing the Florida Office of Public Counsel (“OPC”) who represents the
15 ratepayers of Progress Energy Florida (“PEF” or “Company”).

16

17 **Q. WHAT WAS YOUR ASSIGNMENT IN THIS PROCEEDING?**

18 A. I was asked to assist the OPC to conduct a review and evaluation of requests by PEF
19 for authority to collect historical and projected costs associated with the Extended
20 Power Uprate (“EPU”) project being pursued at Crystal River Unit 3 (“CR3”) through
21 the capacity cost recovery clause.

1 Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THIS COMMISSION?

2 A. Yes. I testified on behalf of the OPC in the previous Nuclear Cost Recovery Clause
3 (“NCRC”) proceedings in Docket Nos. 080009-EI, 090009-EI, 100009-EI and
4 110009-EI.

5
6 Q. PLEASE SUMMARIZE PEF’S REQUEST FOR COST RECOVERY FOR
7 THE CR3 EPU PROJECT IN THIS DOCKET UNDER THE NUCLEAR COST
8 RECOVERY CLAUSE.

9 A. The total estimated revenue requirements for the CR3 EPU project are \$17.8 million
10 for 2012 with projected total revenue requirements of \$37.3 million in 2013.

11

12 II. METHODOLOGY

13 Q. PLEASE DESCRIBE THE METHODOLOGY THAT YOU USED TO
14 REVIEW AND EVALUATE THE REQUESTS FOR AUTHORIZATION TO
15 COLLECT COSTS SUBMITTED BY PEF UNDER THE NUCLEAR COST
16 RECOVERY CLAUSE.

17 A. I first reviewed the Company’s filings in this docket and assisted in the issuance of
18 interrogatories and requests for production of documents. To evaluate the issues
19 related to project schedule and cost, I reviewed internal documents, status reports and
20 correspondence with regulatory authorities. I reviewed responses to discovery
21 requests and issued additional discovery requests as needed.

22

23 Q. WERE YOU ASKED BY THE OPC TO MAKE ANY ASSESMENT OF, OR
24 PROVIDE ANY JUDGEMENT ABOUT, THE ADEQUACY OF PEF’S
25 PROJECT MANAGEMENT AND COST CONTROLS?

1 A. No. Due to the circumstances of this docket this year, I was not asked to focus my
2 efforts in that area. So I offer no opinions as to the adequacy of these efforts.
3 However, the absence of any testimony on my part concerning the adequacy of PEF's
4 project management and cost controls should not be construed as evidence supporting
5 a finding that PEF's project management and cost controls were adequate.

6

7 **III. SUMMARY OF RECOMMENDATIONS**

8 **Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS REGARDING THE**
9 **CRYSTAL RIVER 3 EPU PROJECT?**

10 A. The Commission should ensure that PEF minimize all expenditures related to the
11 CR3 EPU project. I recommend that the avoidable or deferrable remaining EPU
12 construction work not be contracted for or performed until late in the containment
13 repair process when the success of the repair and NRC acceptance of that repair is
14 assured. In addition, the Commission should require that PEF provides timely
15 updates on the status of the containment repair decision and update its EPU project
16 plan, even if it requires supplemental testimony.

17

18 **IV. THE CRYSTAL RIVER 3 EPU PROJECT**

19 **Q. PLEASE PROVIDE A BRIEF UPDATE OF THE STATUS OF THE CR3 EPU**
20 **PROJECT.**

21 A. The scope of the CR3 EPU project remains as I have described in my prior testimony.
22 However, the schedule has been severely impacted primarily by the damaged CR3
23 containment building. The EPU project that was planned for completion in 2011 will
24 not likely be ready to provide energy to customers until 2015 at the earliest.

1 If the project is completed and the License Amendment Request (“LAR”) is
2 approved, it will increase the output of CR3 by 180 MWe by increasing reactor power
3 and thereby increasing steam output. Additional output is provided by increasing the
4 size and efficiency of the plants turbine-generator and by increasing the accuracy of
5 plant instrumentation. The project was originally conceived to be carried out in three
6 phases. Phase 1, completed in 2007, improved the accuracy of plant measurements of
7 plant parameters and allowed output to be increased about 12 MWe. Phase 2 was
8 scheduled to be completed in 2009 and Phase 3 in 2011. Phase 2 consisted of
9 replacing the turbine-generator and other non-nuclear portions of the plant. As
10 originally planned, this would have increased plant output by 28 MWe immediately,
11 and allowed for the increased steam flow to be provided by Phase 3. Two highly
12 significant events occurred in 2009 that prevented Phase 2 from being completed
13 according to schedule.

- 14 1. The new turbines failed testing in Germany and had to be modified.
- 15 2. The reactor containment building suffered a delamination in October 2009
16 while PEF was cutting a hole in the building to facilitate removing and
17 replacing steam generators. Since that time, PEF’s primary efforts have been
18 to repair the damaged containment building.

19 As a result of the delamination, there is continued uncertainty surrounding when
20 Phases 2 and 3 of the EPU project will be completed. Progress Energy CEO William
21 Johnson has stated that the Company has yet to make a final decision whether to
22 attempt another repair of the building. The Company has publically stated that it will
23 take approximately 30 months to effectuate a repair based on current information.
24 Since commencement of containment building repairs will likely not begin any earlier
25 than the latter part of this year, if at all, based on publically known information and

1 my judgment, the remaining two phases of the EPU project will likely not be placed
2 in service until 2015 at the earliest – if they can be and are implemented during the
3 current extended outage.

4 When the project was initially proposed to the Commission in 2006, according
5 to the testimony of PEF Witness Javier Portuondo in Docket Nos. 060642-EI and
6 070052-EI, the total cost of the EPU project at-the-plant-site was estimated to be less
7 than \$300 million, not including transmission. The Company at the time included
8 \$89 million in transmission costs in the original EPU project cost estimate. As
9 shown in TOR-7, sponsored by PEF Witness Daniel Roderick in Docket No. 080009-
10 EI, Progress performed a transmission study and determined that the transmission
11 costs initially included were no longer necessary for the EPU project. Since 2006,
12 Generation Plant costs increased from approximately \$250 million to over \$489
13 million, and the NCRC-recoverable Total Uprate Project Cost (without transmission)
14 increased from \$293 million to over \$556 million. See Table 1 in Exhibit ____
15 (WRJ(PEF)-3) entitled CR3 EPU Cost Estimates 2006-2012. Table I was created
16 from publically available documents in Docket Nos. 060642-EI, and 070052-EI, and
17 the Company's TOR-7 (True-up to original, Schedule 7) filed in Docket Nos.
18 080009-EI, 090009-EI, 100009-EI, 110009-EI, and 120009-EI. As one can see in
19 Table 1, most of the significant EPU project cost increases have taken place since
20 2010.

21 As shown in Exhibit TGF-6, Schedule TOR-6, from 2006 through 2011,
22 Progress has actually spent over \$318 million on the EPU project, and plans to spend
23 \$51.5 million in 2012 (Actual/Estimated) and another \$110.2 million in 2013
24 (Projected). If Progress spends according to its currently filing, by the end of 2013,
25 Progress will have spent nearly \$480 million on the EPU project, none of which can

1 be used and useful due to the extended outage. To complete the project, according to
2 TOR-6, Progress must spend in 2013 to 2015 another \$186 million.¹ Based on past
3 experience, we can expect further and significant cost increases until the project is
4 completed.

5
6 **Q. MR. FRANKE STATES IN HIS TESTIMONY THAT THE INITIAL COST OF**
7 **THE PROJECT WAS PROJECTED TO BE \$439,300,000. IS THAT**
8 **CORRECT?**

9 A. First of all I do not concur that the “original” cost of the project presented to the
10 Commission was \$439.3 million. When the project was first proposed to the
11 Commission for a need determination in 2006, the estimate was \$382 million and not
12 \$439.3 million. Mr. Franke’s characterization of the initial project estimate is
13 misleading because it includes a 15% “indirect cost” adder which the Company
14 included in the Total Project Cost in 2008 when it initially filed for recovery through
15 the NCRC. According to the TOR-7, filed in Docket No. 080009-EI, the adder was
16 first included in Total Project Cost to make “initial milestones” amount comparable to
17 the “revised milestone” amounts. Therefore, a more accurate starting point for the
18 original total project cost estimate would be \$382 million. In my judgment, an even
19 more accurate starting point for comparing original to current project cost estimate
20 would be to deduct unnecessary transmission cost that the Company removed from
21 the uprate project in early 2008.

22 By the time the Company filed its first request for recovery in the NCRC
23 docket, transmission and its associated costs were no longer part of the overall uprate
24 project according to TOR-7 filed in 2008, and not necessary for the inside-the-plant

¹ \$110.2 million in 2013 + \$64.5 million in 2014 + \$11.3 million in 2015 = \$186 million.

1 project. If the \$102.4 million in transmission cost is deducted from Mr. Frank's
2 \$439.3 million "original" total project cost estimate included in the current filings, the
3 comparable original total project estimate (without transmission) would be \$337
4 million. If the adder is excluded from the 2006 and 2007 costs initially presented to
5 the Commission, then on a truly comparable basis Mr. Franke's "original" total
6 project estimate (less transmission costs) would be \$293 million instead of \$439.3
7 million.

8 For a comparison of estimated uprate costs from 2006 to 2012, please refer to
9 Table 1 of Exhibit ___(WRJ(PEF)-3). This table illustrates how various components
10 of the CR3 EPU Project have increased over time. It includes a category called
11 "Total Uprate Project Cost (without Transmission)" that illustrates how the Total
12 Project Cost has increased from \$239 million in 2006 to over \$556 million in 2012
13 and offers a clear view of the true nature of the project's cost escalation.

14
15 **Q. WHAT ARE YOUR CONCERNS REGARDING THE CR3 EPU PROJECT?**

16 A. My concerns focus upon the significant increases in cost over the original cost
17 estimate experienced by the project to date and the difficulty in achieving regulatory
18 approval by the NRC of the power uprate.

19 The cost increases I described above have largely been caused by increased
20 scope and licensing issues as pointed out by PEF Witness Franke. Mr. Franke states
21 in his April 30, 2012 testimony at line 17 of page 21 that the Company's current
22 estimate "...is accurate between -15 and +20%..." However, the history of this
23 project reveals that Mr. Franke's upper limit of +20% will be more likely. On page
24 23 of his testimony, Mr. Franke admits now that "... the full scope and assessment of

1 the EPU phase work was not known and could not be known earlier...” until the
2 design work was complete.

3 Mr. Franke admits that engineering design work is *now* only 70% complete,
4 the NRC is only six months into what may be a 24-month review of the LAR, and the
5 construction contracts have not been awarded at this time. This means there are still a
6 lot of unknowns out there which can still drive the final cost upwards. It is important
7 to point out that 70% of engineering design work complete does not mean that the
8 project is 70% complete. It does mean that at least 30% of the anticipated scope of
9 the design has not been done. Also to be done is new design, known as “emergent
10 work” and work that will come out of new requirements that inevitably are the result
11 of the NRC’s review of the requested license amendment (or NRC permission to
12 operate at increased power). Oftentimes, much of a project’s new costs become
13 evident while performing the last 30% of the engineering design work. For example,
14 for FPL’s EPU project, which is supposed to complete in less than a year from now,
15 project cost estimates have gone up enormously in the past year alone as the project
16 engineering approached substantial completion.

17 As examples of heretofore unknown EPU project cost drivers, Mr. Franke
18 highlighted a number of expensive project revisions. Project scope and engineering
19 changes that had not been originally contemplated and have now been determined to
20 be necessary include new feedwater heaters, condensate system modifications,
21 ICCMS (instrumentation) and new booster feed pumps. The original estimate
22 obviously did not include enough contingency for Commission understanding and
23 evaluation for reasonableness or prudence.

24 Regarding NRC licensing concerns, I pointed out in my 2010 testimony that
25 the CR3 uprate (originally Phase 3) of 140 MWe for the nuclear reactor itself is by far

1 the largest ever requested to be approved for a U.S. pressurized water reactor (PWR).
2 To be able to operate at this increased reactor power level, an amendment to the
3 operating license is required. PEF had originally planned to file the CR3 EPU LAR
4 in 2009. PEF finally submitted the LAR in June 2011. The NRC, in their acceptance
5 letter (Franke Exhibit JF-1) for the LAR, stated that, while a normal uprate review
6 would take one year, this review will take up to two years. The NRC required an
7 extended review because it is a "...first-of-a-kind application for a Babcock and
8 Wilcox..." plant and because of some new, unreviewed safety systems that are made
9 necessary by this design. The NRC also stated that they may delay their review
10 depending on the schedule of when and if the containment will be repaired. This
11 intense and delayed NRC review can only lead to increased project scope and cost.

12
13 **Q. WHAT DO YOU RECOMMEND REGARDING FUTURE EXPENDITURES**
14 **FOR THE CR3 EPU PROJECT?**

15 A. I recommend that the avoidable or deferrable remaining EPU construction work not
16 be contracted for or performed until late in the containment repair process when the
17 success of the repair and NRC acceptance of that repair is assured. Only absolutely
18 necessary expenditures should be incurred because any expenditures will be wasted if
19 the decision is made to retire CR3 rather than repair the containment building and
20 return the plant to service.

21
22 **Q. HAVE YOU IDENTIFIED ANY PLANNED EXPENDITURES THAT**
23 **SHOULD BE DEFERRED UNTIL THE CONTAINMENT REPAIR**
24 **DECISION HAS BEEN MADE?**

1 A. Yes. There are approximately \$186,000,000 of planned expenditures remaining to
2 complete the EPU project plus the possible additional +20% that Mr. Franke has
3 estimated. These expenditures are for project management, onsite construction
4 facilities, power block engineering and construction, and non-power block
5 engineering and construction. If the EPU project is to continue at all, engineering and
6 licensing work must continue and long-lead equipment items must be procured. The
7 bulk of the remaining money will be spent on construction contracts for turbine-
8 generator replacement, new nuclear safety systems, feedwater heaters, condensate
9 pumps and other equipment. This work can be done during an outage lasting a few
10 months. Since the containment repair will take several years, I recommend that the
11 avoidable or deferrable remaining EPU construction work not be contracted for or
12 performed until late in the containment repair process when the success of the repair
13 and NRC acceptance of that repair is assured. If the Company places the avoidable or
14 deferrable remaining EPU construction work on hold as per my recommendation and
15 the unit is not successfully returned to service or a decision is made to retire the plant,
16 a large portion of the approximately \$186,000,000 of planned expenditures of the
17 customers' money will not be spent. Based on the present uncertainty surrounding
18 the return to service date for CR3 and until the decision to proceed in earnest with the
19 repair is made, there is certainly no need to spend this large sum of money more than
20 two years early.

21

22 **Q. WHAT NOTICE SHOULD THE COMMISSION PROVIDE THE COMPANY**
23 **REGARDING THESE DEFERRED EPU EXPENDITURES YOU ARE**
24 **RECOMMENDING?**

1 A. If the Company decides to incur avoidable or deferrable expenditures on the EPU in
2 the face of the uncertainty surrounding the return of CR3 to service prior to 2015, the
3 Commission should withhold any determination of reasonableness for expending this
4 money in 2012 and 2013, and put the Company on notice that any EPU money spent
5 in 2013 will be held subject to refund until PEF makes an official decision to repair
6 the building and to begin that repair in earnest.

7

8 **Q. DO YOU HAVE ANY ADDITIONAL RECOMMENDATIONS REGARDING**
9 **THE CR3 EPU PROJECT?**

10 A. Yes, I recommend that the Company update the Commission regarding the status of
11 the containment repair plan and schedule in a timely manner and not wait until the
12 required NCRC filing dates. If a decision to repair or retire is made before the 2012
13 NCRC hearing, the Company should file supplemental testimony, notifying the
14 Commission of this decision. If the decision is made after the NCRC hearing but
15 before the Commission votes on the 2013 factor, the Company should make the
16 appropriate filing in this docket to inform the Commission.

17

18 **V. THE LEVY NUCLEAR PROJECT**

19 **Q. DO YOU HAVE ANY COMMENTS REGARDING THE LEVY NUCLEAR**
20 **PROJECT?**

21 A. No, I do not. Due to the settlement involving the Levy Nuclear Project, I have been
22 asked to limit the scope of my review to the CR3 EPU project.

23

24 **Q. DOES THAT CONCLUDE YOUR TESTIMONY?**

25 A. Yes it does.

CERTIFICATE OF SERVICE

Docket No. 120009-EI

I HEREBY CERTIFY that a true and correct copy of the foregoing Direct Testimony and Exhibits of William R. Jacobs, Jr., Ph.D. (PEF) has been furnished by U. S. Mail and electronic mail to the following parties on this 19th day of June, 2012.

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Charles J. Rehwinkel
Deputy Public Counsel

William R. Jacobs, Jr.
Executive Consultant

GDS Associates, Inc.
Page 1 of 7

EDUCATION: Ph.D., Nuclear Engineering, Georgia Tech 1971
MS, Nuclear Engineering, Georgia Tech 1969
BS, Mechanical Engineering, Georgia Tech 1968

ENGINEERING REGISTRATION: Registered Professional Engineer

PROFESSIONAL MEMBERSHIP: American Nuclear Society

EXPERIENCE:

Dr. Jacobs has over thirty-five years of experience in a wide range of activities in the electric power generation industry. He has extensive experience in the construction, startup and operation of nuclear power plants. While at the Institute of Nuclear Power Operation (INPO), Dr. Jacobs assisted in development of INPO's outage management evaluation group. He has provided expert testimony related to nuclear plant operation and outages in Texas, Louisiana, South Carolina, Florida, Wisconsin, Indiana, Georgia and Arizona. He currently provides nuclear plant operational monitoring services for GDS clients. Dr. Jacobs was a witness in nuclear plant certification hearings in Georgia for the Plant Vogtle 3 and 4 project on behalf of the Georgia Public Service Commission and in South Carolina for the V.C. Summer 2 and 3 projects on behalf of the South Carolina Office of Regulatory Staff. His areas of expertise include evaluation of reactor technology, EPC contracting, risk management and mitigation, project cost and schedule. He is assisting the Florida Office of Public Counsel in monitoring the development of four new nuclear units in the State of Florida, Levy County Units 1 and 2 and Turkey Point Units 6 and 7. He has been selected by the Georgia Public Service Commission as the Independent Construction Monitor for Georgia Power Company's new AP1000 nuclear power plants, Plant Vogtle Units 3 and 4. He has assisted the Georgia Public Service Commission staff in development of energy policy issues related to supply-side resources and in evaluation of applications for certification of power generation projects and assists the staff in monitoring the construction of these projects. He has also assisted in providing regulatory oversight related to an electric utility's evaluation of responses to an RFP for a supply-side resource and subsequent negotiations with short-listed bidders. He has provided technical litigation support and expert testimony support in several complex law suits involving power generation facilities. He monitors power plant operations for GDS clients and has provided testimony on power plant operations and decommissioning in several jurisdictions. Dr. Jacobs represents a GDS client on the management committee of a large coal-fired power plant currently under construction. Dr. Jacobs has provided testimony before the Georgia Public Service Commission, the Public Utility Commission of Texas, the North Carolina Utilities Commission, the South Carolina Public Service Commission, the Iowa State Utilities Board, the Louisiana Public Service Commission, the Florida Public Service Commission, the Indiana Regulatory Commission, the Wisconsin Public Service Commission, the Arizona Corporation Commission and the FERC.

A list of Dr. Jacobs' testimony is available upon request.

William R. Jacobs, Jr.
Executive Consultant

GDS Associates, Inc.
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1986-Present GDS Associates, Inc.

As Executive Consultant, Dr. Jacobs assists clients in evaluation of management and technical issues related to power plant construction, operation and design. He has evaluated and testified on combustion turbine projects in certification hearings and has assisted the Georgia PSC in monitoring the construction of the combustion turbine projects. Dr. Jacobs has evaluated nuclear plant operations and provided testimony in the areas of nuclear plant operation, construction prudence and decommissioning in nine states. He has provided litigation support in complex law suits concerning the construction of nuclear power facilities. Dr. Jacobs is the Georgia PSC's Independent Construction Monitor for the Plant Vogtle 3 and 4 nuclear project.

1985-1986 Institute of Nuclear Power Operations (INPO)

Dr. Jacobs performed evaluations of operating nuclear power plants and nuclear power plant construction projects. He developed INPO Performance Objectives and Criteria for the INPO Outage Management Department. Dr. Jacobs performed Outage Management Evaluations at the following nuclear power plants:

- Connecticut Yankee - Connecticut Yankee Atomic Power Co.
- Callaway Unit I - Union Electric Co.
- Surry Unit I - Virginia Power Co.
- Ft. Calhoun - Omaha Public Power District
- Beaver Valley Unit 1 - Duquesne Light Co.

During these outage evaluations, he provided recommendations to senior utility management on techniques to improve outage performance and outage management effectiveness.

1979-1985 Westinghouse Electric Corporation

As site manager at Philippine Nuclear Power Plant Unit No. 1, a 655 MWe PWR located in Bataan, Philippines, Dr. Jacobs was responsible for all site activities during completion phase of the project. He had overall management responsibility for startup, site engineering, and plant completion departments. He managed workforce of approximately 50 expatriates and 1700 subcontractor personnel. Dr. Jacobs provided day-to-day direction of all site activities to ensure establishment of correct work priorities, prompt resolution of technical problems and on schedule plant completion.

Prior to being site manager, Dr. Jacobs was startup manager responsible for all startup activities including test procedure preparation, test performance and

William R. Jacobs, Jr.
Executive Consultant

GDS Associates, Inc.
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review and acceptance of test results. He established the system turnover program, resulting in a timely turnover of systems for startup testing.

As startup manager at the KRSKO Nuclear Power Plant, a 632 MWE PWR near Krsko, Yugoslavia, Dr. Jacobs' duties included development and review of startup test procedures, planning and coordination of all startup test activities, evaluation of test results and customer assistance with regulatory questions. He had overall responsibility for all startup testing from Hot Functional Testing through full power operation.

1973 - 1979 NUS Corporation

As Startup and Operations and Maintenance Advisor to Korea Electric Company during startup and commercial operation of Ko-Ri Unit 1, a 595 MWE PWR near Pusan, South Korea, Dr. Jacobs advised KECO on all phases of startup testing and plant operations and maintenance through the first year of commercial operation. He assisted in establishment of administrative procedures for plant operation.

As Shift Test Director at Crystal River Unit 3, an 825 MWE PWR, Dr. Jacobs directed and performed many systems and integrated plant tests during startup of Crystal River Unit 3. He acted as data analysis engineer and shift test director during core loading, low power physics testing and power escalation program.

As Startup engineer at Kewaunee Nuclear Power Plant and Beaver Valley, Unit 1, Dr. Jacobs developed and performed preoperational tests and surveillance test procedures.

1971 - 1973 Southern Nuclear Engineering, Inc.

Dr. Jacobs performed engineering studies including analysis of the emergency core cooling system for an early PWR, analysis of pressure drop through a redesigned reactor core support structure and developed a computer model to determine tritium build up throughout the operating life of a large PWR.

SIGNIFICANT CONSULTING ASSIGNMENTS:

Georgia Public Service Commission – Selected as the Independent Construction Monitor to assist the GPSC staff in monitoring all aspects of the design, licensing and construction of Plant Vogtle Units 3 and 4, two AP1000 nuclear power plants.

Georgia Public Service Commission – Assisted the Georgia Public Service Commission Staff and provided testimony related to the evaluation of Georgia Power Company's request for certification to construct two AP1000 nuclear power plants at the Plant Vogtle site.

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South Carolina Office of Regulatory Staff – Assisted the South Carolina Office of Regulatory Staff in evaluation of South Carolina Electric and Gas' request for certification of two AP1000 nuclear power plants at the V.C. Summer site.

Florida Office of Public Counsel – Assists the Florida Office of Public Counsel in monitoring the development of four new nuclear power plants in Florida including providing testimony on the prudence of expenditures.

East Texas Electric Cooperative – Represents ETEC on the management committee of the Plum Point Unit 1 a 650 Mw coal-fired plant under construction in Osceola, Arkansas and represents ETEC on the management committee of the Harrison County Power Project, a 525 Mw combined cycle power plant located near Marshall, Texas.

Arizona Corporation Commission – Evaluated operation of the Palo Verde Nuclear Generating Station during the year 2005. Included evaluation of 11 outages and providing written and oral testimony before the Arizona Corporation Commission.

Citizens Utility Board of Wisconsin – Evaluated Spring 2005 outage at the Kewaunee Nuclear Power Plant and provided direct and surrebuttal testimony before the Wisconsin Public Service Commission.

Georgia Public Service Commission - Assisted the Georgia PSC staff in evaluation of Integrated Resource Plans presented by two investor owned utilities. Review included analysis of purchase power agreements, analysis of supply-side resource mix and review of a proposed green power program.

State of Hawaii, Department of Business, Economic Development and Tourism – Assisted the State of Hawaii in development and analysis of a Renewable Portfolio Standard to increase the amount of renewable energy resources developed to meet growing electricity demand. Presented the results of this work in testimony before the State of Hawaii, House of Representatives.

Georgia Public Service Commission - Assisted the Georgia PSC staff in providing oversight to the bid evaluation process concerning an electric utility's evaluation of responses to a Request for Proposals for supply-side resources. Projects evaluated include simple cycle combustion turbine projects, combined cycle combustion turbine projects and co-generation projects.

Millstone 3 Nuclear Plant Non-operating Owners – Evaluated the lengthy outage at Millstone 3 and provided analysis of outage schedule and cost on behalf of the non-operating owners of Millstone 3. Direct testimony provided an analysis of additional post-outage O&M costs that would result due to the outage. Rebuttal testimony dealt with analysis of the outage schedule.

H.C. Price Company – Evaluated project management of the Healy Clean Coal Project on behalf of the General Contractor, H.C. Price Company. The Healy Clean Coal Project is a 50 megawatt coal burning power plant funded in part by the DOE to demonstrate advanced clean coal

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technologies. This project involved analysis of the project schedule and evaluation of the impact of the owner's project management performance on costs incurred by our client.

Steel Dynamics, Inc. – Evaluated a lengthy outage at the D.C. Cook nuclear plant and presented testimony to the Indiana Utility Regulatory Commission in a fuel factor adjustment case Docket No. 38702-FAC40-S1.

Florida Office of Public Counsel - Evaluated lengthy outage at Crystal River Unit 3 Nuclear Plant. Submitted expert testimony to the Florida Public Service Commission in Docket No. 970261-EI.

United States Trade and Development Agency - Assisted the government of the Republic of Mauritius in development of a Request for Proposal for a 30 MW power plant to be built on a Build, Own, Operate (BOO) basis and assisted in evaluation of Bids.

Louisiana Public Service Commission Staff - Evaluated management and operation of the River Bend Nuclear Plant. Submitted expert testimony before the LPSC in Docket No. U-19904.

U.S. Department of Justice - Provided expert testimony concerning the in-service date of the Harris Nuclear Plant on behalf of the Department of Justice U.S. District Court.

City of Houston - Conducted evaluation of a lengthy NRC required shutdown of the South Texas Project Nuclear Generating Station.

Georgia Public Service Commission Staff - Evaluated and provided testimony on Georgia Power Company's application for certification of the Intercession City Combustion Turbine Project - Docket No. 4895-U.

Seminole Electric Cooperative, Inc. - Evaluated and provided testimony on nuclear decommissioning and fossil plant dismantlement costs - FERC Docket Nos. ER93-465-000, et al.

Georgia Public Service Commission Staff - Evaluated and prepared testimony on application for certification of the Robins Combustion Turbine Project by Georgia Power Company - Docket No. 4311-U.

North Carolina Electric Membership Corporation - Conducted a detailed evaluation of Duke Power Company's plans and cost estimate for replacement of the Catawba Unit 1 Steam Generators.

Georgia Public Service Commission Staff - Evaluated and prepared testimony on application for certification of the McIntosh Combustion Turbine Project by Georgia Power Company and Savannah Electric Power Company - Docket No. 4133-U and 4136-U.

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New Jersey Rate Counsel - Review of Public Service Electric & Gas Company nuclear and fossil capital additions in PSE&G general rate case.

Corn Belt Electric Cooperative/Central Iowa Power Electric Cooperative - Directs an operational monitoring program of the Duane Arnold Energy Center (565 Mwe BWR) on behalf of the non-operating owners.

Cities of Calvert and Kosse - Evaluated and submitted testimony of outages of the River Bend Nuclear Station - PUCT Docket No. 10894.

Iowa Office of Consumer Advocate - Evaluated and submitted testimony on the estimated decommissioning costs for the Cooper Nuclear Station - IUB Docket No. RPU-92-2.

Georgia Public Service Commission/Hicks, Maloof & Campbell - Prepared testimony related to Vogtle and Hatch plant decommissioning costs in 1991 Georgia Power rate case - Docket No. 4007-U.

City of El Paso - Testified before the Public Utility Commission of Texas regarding Palo Verde Unit 3 construction prudence - Docket No. 9945.

City of Houston - Testified before Texas Public Utility Commission regarding South Texas Project nuclear plant outages - Docket No. 9850.

NUCOR Steel Company - Evaluated and submitted testimony on outages of Carolina Power and Light nuclear power facilities - SCPSC Docket No. 90-4-E.

Georgia Public Service Commission/Hicks, Maloof & Campbell - Assisted Georgia Public Service Commission staff and attorneys in many aspects of Georgia Power Company's 1989 rate case including nuclear operation and maintenance costs, nuclear performance incentive plan for Georgia and provided expert testimony on construction prudence of Vogtle Unit 2 and decommissioning costs of Vogtle and Hatch nuclear units - Docket No. 3840-U.

Swidler & Berlin/Niagara Mohawk - Provided technical litigation support to Swidler & Berlin in law suit concerning construction mismanagement of the Nine Mile 2 Nuclear Plant.

Long Island Lighting Company/Shea & Gould - Assisted in preparation of expert testimony on nuclear plant construction.

North Carolina Electric Membership Corporation - Prepared testimony concerning prudence of construction of Carolina Power & Light Company's Shearon Harris Station - NCUC Docket No. E-2, Sub537.

City of Austin, Texas - Prepared estimates of the final cost and schedule of the South Texas Project in support of litigation.

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Tex-La Electric Cooperative/Brazos Electric Cooperative - Participated in performance of a construction and operational monitoring program for minority owners of Comanche Peak Nuclear Station.

Tex-La Electric Cooperative/Brazos Electric Cooperative/Texas Municipal Power Authority (Attorneys - Burchette & Associates, Spiegel & McDiarmid, and Fulbright & Jaworski) - Assisted GDS personnel as consulting experts and litigation managers in all aspects of the lawsuit brought by Texas Utilities against the minority owners of Comanche Peak Nuclear Station.

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EDUCATION: M.S., Mechanical Engineering, Stanford University, 1969
U.S. Navy Nuclear Power Training Program, 1964-65
B.S., Electrical Engineering, MIT, 1964

ENGINEERING REGISTRATION: Registered Professional Engineer

PROFESSIONAL MEMBERSHIP: American Nuclear Society
Institute of Electrical and Electronic Engineers

EXPERIENCE:

Mr. McGaughy directs the power generation services function at GDS Associates, Inc. He has more than 40 years experience in the power generation field in the areas of licensing, design, construction, start-up, operation, and maintenance of nuclear and fossil-fired power plants. Mr. McGaughy has worked with top utility management to solve problems on a wide range of power generation issues. He has successfully managed extremely large and complex generation projects, both nuclear and fossil, which required the rigorous maintenance of project schedules and quality. He has performed studies concerning cogeneration projects involving unit dispatch and FERC operating and efficiency standards. Mr. McGaughy has provided testimony before the Texas Public Utility Commission, Public Utility Commission of Ohio, South Carolina Public Service Commission, Georgia Public Service Commission, Hawaii Public Utility Commission, New Jersey Board of Regulatory Commissioners, Michigan Public Utility Commission, Wisconsin Public Service Commission and FERC. He has performed work concerning over 30 nuclear units and 24 fossil-fired steam units as well as numerous combustion turbine and combined cycle units.

Specific Experience Includes:

1986-Present GDS Associates, Inc.

As Vice President and Secretary, Mr. McGaughy serves as head of the Generation Services Department of GDS. GDS has provided construction and operations monitoring program at five nuclear units and six coal-fired units for minority owners. GDS has provided expert witness and litigation support in lawsuits involving six nuclear units. Mr. McGaughy also has been responsible for prudence, construction monitoring and litigation support efforts at numerous other nuclear units and for development of a nuclear performance standard program for the Georgia Public Service Commission. He has testified on combustion turbine construction projects in certification proceedings and has testified on dispatch, reliability, avoided cost and other issues concerning cogeneration projects.

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1984-1986 **Southern Engineering Company**

As Director of Generation Services, Mr. McGaughy conducted construction and operations monitoring for clients at power plants throughout the United States. In addition, Mr. McGaughy prepared testimony for various rate cases on generation matters at FERC and state commissions. He provided assistance to clients in all generation matters including contract administration and litigation support.

1980-1984 **Mississippi Power and Light Company**

Mr. McGaughy served as Vice President, Nuclear (1983-84) and Assistant Vice President, Nuclear Production (1980-82). He was responsible for all aspects of construction and operation of a multi-billion dollar power generation facility. In this capacity he hired and trained the nuclear power plant staff of over 500 people, including 29 licensed operators and numerous experienced utility managers. Mr. McGaughy also established a unique design engineering group which grew to over 125 people and had overall responsibility for interface with the Nuclear Regulatory Commission and all contractors on the project. During this tenure, cost and schedule performance was better than at any other similar plant (G.E. Boiling Water Reactor, BWR-6 design).

1973-1980 **Mississippi Power and Light Company**

Mr. McGaughy served as Director of Power Production (1978-80). In this capacity he was responsible for all power production related activities including construction, operation, engineering, maintenance, licensing, nuclear safety, staffing, and training. He prepared and administered annual personnel and operating budgets for 600 people and more than \$50 million, and an annual capital budget of \$280 million. He also established a formal screening program for hiring craft personnel, established a formal preventive maintenance program, and reorganized his department based on job performance. He served as project manager for 2-unit, 1,600 MW coal project.

Mississippi Power and Light Company

Mr. McGaughy served as Nuclear Project Manager (1976-78) and Assistant Project Manager (1973-75). He was responsible for forming and managing an organization to control the prime contractor on a \$4 billion construction project. He began the formation of plant staff organization. He was also responsible for relations with the Nuclear Regulatory Commission and the prime contractor (Bechtel). The construction permit was awarded in record time.

1971-1973 **Middle South Services, Inc.**

Mr. McGaughy served as a nuclear engineer on the holding company staff responsible for economic and engineering studies including the feasibility evaluation for Grand Gulf

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Nuclear Station. He performed nuclear fuel and uranium buying functions. He also performed generation-mix studies.

1969 - 1971 **Arkansas Power and Light Company**

Mr. McGaughy was responsible for nuclear fuel procurement and performed the licensing work including the preparation of the Safety Analysis Report for Arkansas Nuclear One, Unit 2.

SIGNIFICANT CONSULTING ASSIGNMENTS:

North Carolina Electric Membership Cooperative – Performed due diligence review of management for a 3-site, 1,200 MW, peaking project. Reviewed management site selection, fuel, equipment selection, environmental, contracting and other aspects.

VECO Alaska, Inc. – Served as construction project management expert witness for EPC contractor in lawsuit concerning construction overruns in a turnkey cogeneration project in Alaska. Served as witness in successful mediation.

H.C. Price Construction Company – Provided detailed analysis and mediation presentations concerning construction project management in case involving construction contractor and owner (State of Alaska) of a coal-fired plant in Alaska.

Rusk County, Texas Rural Electric Cooperative/Richard Balough – Testified before the Texas Public Utility Commission concerning coal-fired plant station electric service in territorial dispute with Texas Utilities.

Sam Rayburn G&T – Ongoing operational monitoring program concerning client's interest in Nelson 6 Coal Station operated by Gulf States Utilities.

Kamo Electric Cooperative – Operational monitoring program for client's minority interest in GRDA Unit 2 Coal Fired Station.

Northeast Texas Electric Cooperative – Ongoing construction monitoring and operational monitoring program concerning NTEC's interest in Pirkey Coal Station operated by Southwestern Electric Power Company and Dolet Hills Station operated by Central Louisiana Electric Company.

Sawnee and Coweta/Fayette Electric Membership Cooperatives – Served as Owner's project monitor on Sewell Creek Combustion Turbine Plant, Doyle Combustion Turbine Project, Chattahoochee Combined Cycle Project and Talbot County Combustion Turbine Project.

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Northeast Texas Electric Cooperative – Served as Owner's representative on Project Management Committee for design, construction and operation of 500Mw combined cycle plant.

U.S. Department of Justice – Served as expert witness in two tax cases involving investment tax credits for nuclear fuel.

Pacific Gas & Electric Company – Performed technical analyses of two different cogeneration plants to determine if projects had met FERC and state efficiency and operating standards.

Steel Dynamics, Inc. – Analysis of imprudence and replacement power costs at D.C. Cook Plant.

Corn Belt Power Cooperative – Performed review of available options for board of directors with recommendations for future plan of action.

Niagara Mohawk Power Corporation/Swidler & Berlin – Prepared extensive technical analysis for filing in federal court and at FERC concerning efficiency and operating standards of cogeneration facility in support of motion to revoke QF certification.

Niagara Mohawk Power Corporation/Swidler & Berlin – Assisting in FERC proceeding to set new rates for disqualified former QF.

East Texas Electric Cooperative – Assisted cooperative in negotiating steam and electric service contract with industrial customer.

Georgia Public Service Commission Staff – Testified before the Georgia Public Service Commission recommending that a nuclear performance standard be implemented in the State of Georgia. The Commission implemented the recommended standard.

City of El Paso – Testified before the Public Utility Commission of Texas regarding Palo Verde operations and maintenance expenses.

City of El Paso – Testified before the Public Utility Commission of Texas regarding valuation of Palo Verde power plant and other merger issues.

City of Homestead, Florida/Spiegel & McDiarmid – Assisted City in lawsuit regarding DeLaval Diesel-Generators. Prepared expert testimony and gave major deposition on subject before favorable settlement.

El Paso Community College/Law offices of Jim Boyle – Prepared testimony concerning level of Palo Verde Nuclear Station operation and maintenance costs requested by El Paso Electric. Analysis was performed on bases of comparative studies and on specific analysis of cost filed by El Paso Electric.

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Old Dominion Electric Cooperative – Prepared testimony filed at FERC concerning prudent levels of coal inventory for inclusion Virginia Power working capital.

Long Island Lighting Company/Shea & Gould – Prepared expert testimony on nuclear plant construction.

Ohio Public Service Commission – Prepared testimony related to decommissioning costs of Toledo Edison's Davis-Besse Nuclear Station.

Georgia Public Service Commission/Hicks, Maloof & Campbell – Assisted Georgia Public Service Commission staff and attorneys in many aspects of Georgia Power Company's 1989 rate case including analysis of service company charges, construction prudence of Vogtle Unit 2, decommissioning costs of Vogtle and Hatch nuclear units, prepared expert testimony on operation and maintenance costs for Hatch and Vogtle nuclear units, prepared expert testimony on Performance Incentive Plan for Georgia Power nuclear units.

Georgia Public Service Commission/Hicks, Maloof & Campbell – Prepared testimony related to Vogtle and Hatch plant operations and maintenance costs in 1991 Georgia Power rate case.

Georgia Public Service Commission Staff – Prepared testimony concerning certification of McIntosh Units, Warner Robins Units, Intercession City Unit and Florida Power Corporation Power Purchase (three separate dockets)

City of Houston – Testified before Texas Public Utility Commission regarding South Texas Project operation and maintenance expenses.

Sam Rayburn G&T – Prepared testimony before Texas Public Utility Commission concerning certificate of convenience and necessity for co-op purchase of 38 mw interest in an existing coal-fired plant.

Aetna Insurance Company/Dickson, Carlson & Campillo – Assisted attorneys in analysis of Southern California Edison claims of property damage and replacement power costs. Prepared written analyses used in achieving favorable settlements for clients.

East Texas Electric Cooperative – Performed economic and technical feasibility analyses on hydro and thermal generation alternatives.

Allegheny Electric Power Cooperative – Assisted co-op in review of various financial and technical issues of Susquehanna Nuclear Station.

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Saluda River Electric Cooperative – Assisted co-op in review of technical issues including decommissioning and minimum net dependable capability ratings for the co-op's minority interest in Catawba Nuclear Station operated by Duke Power Company.

City of Midland, Michigan – Assisted city in tax assessment case concerning Midland Nuclear Plant with Consumer's Power Company.

City of Wallingford, Connecticut – Reviewed decommissioning costs of Millstone Nuclear Units 1, 2, and 3 in CP&L rate case at FERC.

Nucor Steel/Ritts, Brickfield & Kaufman – Prepared testimony concerning prudence of construction of Carolina Power & Light Company's Sheron Harris Station.

City of Austin, Texas – Review of cost and schedule of South Texas Nuclear Plant.

Sam Rayburn Municipal Power Authority – Performed operational monitoring program relative to the client's minority interest in Nelson 6 Coal Station operated by Gulf States Utilities.

Tex-La Electric Cooperative/Brazos Electric Cooperative – Conducted construction and operational monitoring program for minority owners of Comanche Peak Nuclear Station.

Tex-La Electric Cooperative/Brazos Electric Cooperative/Texas Municipal Power Authority (Attorneys - Burchette & Associates, Spiegel & McDiarmid, and Fulbright & Jaworski) – Assisted attorneys as consulting experts and litigation managers in all aspects of the lawsuit brought by Texas Utilities against the minority owners of Comanche Peak Nuclear Station.

Attorney General, State of Michigan – Prepared analysis and testimony concerning power plant availability and system dispatch in Consumer Power fuel plan case.

Attorney General, State of Michigan – Prepared analysis and testimony concerning purchased power costs in Consumer Power fuel reconciliation case.

Attorney General, State of Michigan – Prepared analysis and testimony concerning avoided costs, PURPA rates, reserve margins, plant availability and dispatchability in MCV settlement case U-10127.

Attorney General, State of Michigan – Analysis and testimony concerning Consumers' application of requirements of order in Case No. U-10127.

New Jersey Rate Counsel – Review of Public Service Electric & Gas Company nuclear and fossil O&M costs and capital additions in PSE&G general rate case.

CR3 EPU Cost Estimates 2006-2012

Table 1

CR3 Uprate Project Costs	Initial Milestone			Revised Milestone				
	2006	2007	2008	2008	2009	2010	2011	2012
Licensing/Permits/Authorization/Legal	n/a	n/a	\$0.0	\$0.0	\$17.7	\$23.6	\$27.7	\$32.3
Site/Site Preparation	n/a	n/a	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Point of Discharge (POD)	\$43.0	\$43.0	\$49.5	\$42.7	\$36.9	\$34.9	\$35.0	\$34.8
Generation Plant	\$250.0	\$250.0	\$287.5	\$321.6	\$307.8	\$360.1	\$493.4	\$489.1
Transmission	\$89.0	\$89.0	\$102.4	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Total Uprate Project Cost (With Transmission)	\$382.0	\$382.0	\$439.3	\$364.3	\$362.4	\$418.6	\$556.1	\$556.2
Total Uprate Project Cost (Without Transmission)	\$293.0	\$293.0	\$337.0	\$364.3	\$362.4	\$418.6	\$556.1	\$556.2
Source:	Docket No. 060642-EI & testimony - CR3 uprate need determination petition	Docket No. 070052-EI & testimony - petition to recover CR3 uprate through fuel clause	TOR-7 - 2008 NCRC	TOR-7 - 2008 NCRC	TOR-7 - 2009 NCRC	TOR-7 - 2010 NCRC	TOR-7 - 2011 NCRC	TOR-7 - 2012 NCRC
Notes:			See Note 1	See Note 2			See Note 3	See Note 4
<p>Note 1) Initial Milestone is the original need determination cost estimate plus 15% cost adder to include "indirect costs". Other than the brief explanation in TOR-7 filed in the NCRC docket, there is no further explanation or definition or justification of "indirect costs" in PEF witness Roderick or PEF witness Cross' testimony, at the 2008 NCRC hearing, or in Final Order PSC-08-0749-FOF-EI.</p>								
<p>Note 2) PEF's first Revised Milestone, EPU Generation Plant increases from \$250m to \$321.6m over original need determination estimate. PEF removes \$89m (or \$102.4m) in Transmission from the EPU Project. Total EPU Cost Decreases by \$75m. This decrease is driven by the removal of \$102m in unnecessary Transmission costs from the EPU Project; however, non-Transmission EPU costs increase by \$27m.</p>								
<p>Note 3) In one year, Total EPU Cost increases by approximately \$137m (or 32%), mostly driven by a \$133m (37%) increase in Generation Plant cost.</p>								
<p>Note 4) From 2006-2012, Total EPU Cost increased by \$174m (or 45%) if the original Transmission estimate is included; however, if Transmission is removed from the original cost estimate of \$382m, then Total EPU Cost without Transmission increased by \$263m from \$289m to \$556m (or 89%), nearly double the original cost estimate submitted to the Commission in 2006.</p>								