BEFORE THE
CALIFORNIA PUBLIC UTILITIES COMMISSION

Application of Pacific Gas and Electric Company	**)**	
(U39E) for Authority to Increase Revenue	**)**	
Requirements to Recover the Costs to Replace Steam	**)**	**Application No.**
Generators in Units 1 and 2 of the Diablo Canyon	**)**	**04-01-009**
Power Plant	**)**	

Direct Testimony of
David A. Schlissel
Synapse Energy Economics, Inc.

On Behalf of
The Utility Reform Network

August 3, 2004

Q. Please state your name, position and business address.

A. My name is David A. Schlissel. I am a Senior Consultant at Synapse Energy Economics, Inc, 22 Pearl Street, Cambridge, MA 02139.

Q. On whose behalf are you testifying in this case?

A. I am testifying on behalf of The Utility Reform Network ("TURN").

Q. Please describe Synapse Energy Economics.

A. Synapse Energy Economics ("Synapse") is a research and consulting firm specializing in energy and environmental issues, including electric generation, transmission and distribution system reliability, market power, electricity market prices, stranded costs, efficiency, renewable energy, environmental quality, and nuclear power.

Q. Please summarize your educational background and recent work experience.

A. I graduated from the Massachusetts Institute of Technology in 1968 with a Bachelor of Science Degree in Engineering. In 1969, I received a Master of Science Degree in Engineering from Stanford University. In 1973, I received a Law Degree from Stanford University. In addition, I studied nuclear engineering at the Massachusetts Institute of Technology during the years 1983-1986.

Since 1983 I have been retained by governmental bodies, publicly-owned utilities, and private organizations in 24 states to prepare expert testimony and analyses on engineering and economic issues related to electric utilities. My clients have included the Staff of the California Public Utilities Commission, the Staff of the Arizona Corporation Commission, the Staff of the Kansas State Corporation Commission, the Arkansas Public Service Commission, municipal utility systems in Massachusetts, New York, Texas, and North Carolina, and the Attorney General of the Commonwealth of Massachusetts.

I have testified before state regulatory commissions in Arizona, New Jersey, Connecticut, Kansas, Texas, New Mexico, New York, Vermont, North Carolina, South Carolina, Maine, Illinois, Indiana, Ohio, Massachusetts, Missouri, and

Wisconsin and before an Atomic Safety & Licensing Board of the U.S. Nuclear Regulatory Commission.

A copy of my current resume is attached as Exhibit___DAS-1.

Q. Have you previously submitted testimony before this Commission?

A. Yes. I submitted testimony in Commission Docket No. 90-12-018 in 1991, 1992, and 1993 on the issue of whether any of the outages of the three units at the Palo Verde Nuclear Generating Station during 1989 and 1990 were caused or extended by mismanagement.

Q. What is the purpose of your testimony?

A. Synapse was asked by TURN to examine issues related to Pacific Gas & Electric Company's ("PG&E") proposed replacement of the steam generators at the two Diablo Canyon nuclear units. This testimony presents the results of our investigations.

Q. What is a steam generator?

A. A steam generator is essentially a large cylindrically shaped heat exchanger.[1] Primary reactor coolant, which is heated in the reactor, flows inside the main body of the steam generator through thousands of small diameter tubes. The secondary system coolant flows around the outside of these small tubes.

The function of the steam generator is to transfer heat from the primary system coolant to the secondary system coolant. Once the secondary system coolant has been transformed into steam, it is used to drive the plant's turbine-generator to produce electricity. There are a number of different steam generator designs. However, all steam generators have the same general function – using the heated primary system coolant to produce steam to generate electricity.

[1] PG&E has provided a drawing of a steam generator similar to those at Diablo Canyon at page 2-5 of its testimony in this proceeding.

Each Diablo Canyon unit has four steam generators. Each steam generator is approximate 70 feet tall by 16 feet in diameter and weighs approximately 326 tons. There are approximately 3,400 small diameter tubes within each steam generator. Each tube has very thin walls.

Q. Please explain how Synapse conducted its investigations of PG&E's proposed replacement of the steam generators at Diablo Canyon.

A. We completed the following tasks as part of this investigation:

1. Reviewed the testimony submitted by PG&E and prepared data requests that TURN submitted to the company.

2. Reviewed the responses to the data requests submitted by TURN and other active parties.

3. Reviewed relevant CPUC and other state regulatory commission Orders.

4. Examined articles, papers, reports and testimony in my files related to steam generator corrosion/degradation issues and replacements at other nuclear power plants.

5. Examined materials available in the U.S. Nuclear Regulatory Commission's public docket files related to steam generator issues and replacements at other nuclear power plants.

6. Reviewed extensive documentation provided by Southern California Edison and San Diego Gas & Electric concerning their litigation against Westinghouse over steam generator problems at SONGS 1.

7. Reviewed publicly available materials from the lawsuit brought by Northern States Power Company against Westinghouse over steam generator problems at the Prairie Island nuclear units.

8. Reviewed steam generator related documents from the files of the Union of Concerned Scientists.

Q. Have you evaluated steam generator related issues and replacements at other nuclear power plants?

A. Yes. I have evaluated steam generator tube degradation and related design and materials issues at a number of nuclear power plants including the Ginna, Seabrook, Wolf Creek, Trojan, Point Beach 2, Indian Point 2, Maine Yankee, Millstone Unit 2, Calvert Cliffs, ANO-1, and ANO-2 facilities. I also have evaluated the reasonableness of the proposed replacements of the steam generators at the Trojan, Calvert Cliffs, ANO-1, ANO-2, Indian Point 2, and Point Beach 2 nuclear plants. In addition, I have evaluated the reasonableness of Northeast Utilities' planning for and management of the replacement of the steam generators at the Millstone Unit 2 nuclear plant.

Q. Please summarize your conclusions in this investigation.

A. I have reached the following conclusions:

1. The steam generator tube degradation that has been experienced at Diablo Canyon has been typical of the damage experienced at other Westinghouse-designed nuclear power plants with similar design features and materials.

2. Given the materials used in the original Diablo Canyon steam generators it was essentially inevitable that Diablo Canyon would experience significant steam generator tube degradation.

3. I have seen no evidence that PG&E failed to take any reasonable actions that would have arrested or slowed down the corrosion of the tubes in the original steam generators at Diablo Canyon.

4. However, PG&E has been unreasonably and imprudently passive in its efforts to pursue legal remedies against Westinghouse and secure compensation for steam generator related problems at Diablo Canyon.

5. The data in PG&E's "benchmarking" study of the cost of replacing the steam generators at other nuclear power plants does not support the

Company's claim that its cost estimates for the Diablo Canyon steam generator replacement project are reasonable and prudent.

6. The CPUC should reject PG&E's request that it adopt $706 million, as adjusted for actual inflation and cost of capital, is the reasonable and prudent cost for the replacement of the Diablo Canyon steam generators.

7. The CPUC also should reject PG&E's request that any actual costs of replacing the Diablo Canyon steam generators that are equal to or less than the CPUC pre-approved reasonable and prudent cost (as adjusted) be placed in rate base and fully recoverable in rates.

8. PG&E's economic analyses have not considered all relevant uncertainties associated with the continued operation of Diablo Canyon.

Q. What were the root causes of the steam generator tube problems that have been experienced at Diablo Canyon?

A. The root cause of the steam generator tube degradation experienced at Diablo Canyon was the susceptibility of the materials used in the original steam generators to degradation when exposed to the operating environment in the steam generators. In particular, the Alloy 600 material used to fabricate the steam generator tubes has been shown to be very susceptible to a variety of degradation mechanisms including denting, primary water and outside diameter stress corrosion cracking, and intergranular attack.

Q. Were the materials used in the Diablo Canyon steam generators typical of the types of materials used in steam generators built in the 1970's?

A. Yes. The materials used in the Diablo Canyon steam generators, including the Alloy 600 material used for the steam generator tubes, were typical of the

materials used in pressurized water reactor nuclear power plants ("PWRs") of the same vintage as Diablo Canyon.[2]

Q. Has the steam generator tube degradation that has been experienced at Diablo Canyon been typical of the corrosion experienced at other operating PWRs?

A. Yes. Essentially all operating PWRs have experienced some degree of steam generator tube corrosion. However, the specific degradation mechanisms experienced and the numbers of tubes with defects have varied significantly from plant to plant.

Q. Were there any actions that PG&E could have taken that would have enabled the Company to avoid tube degradation in the original Diablo Canyon steam generators?

A. No. Given the materials used in the original Diablo Canyon steam generators, and the experience of other operating nuclear power plants of a similar vintage, both in the U.S. and abroad, it was essentially inevitable that Diablo Canyon would experience significant steam generator tube corrosion. The only action that PG&E could have taken that would have prevented steam generator tube degradation would have been to install replacement steam generators, with different designs and materials features, before the two Diablo Canyon units began commercial operations in 1985 and 1986.

Q. Have you seen any evidence that PG&E failed to take any reasonable actions that would have arrested or slowed down the corrosion of the steam generator tubes at Diablo Canyon?

A. No. I believe that there were not any actions, other than those that were taken by PG&E, that could have slowed down or arrested the corrosion of the steam generator tubes at Diablo Canyon.

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[2] Pressurized water reactor nuclear power plants ("PWRs") like Diablo Canyon have steam generators. Boiling water reactor nuclear power plants ("BWRs") do not have steam generators.

Q. Have you seen any evidence that PG&E's operational practices increased the severity of the steam generator tube degradation experienced at Diablo Canyon?

A. No. I have seen no evidence that suggests PG&E's operational practices made the steam generator tube corrosion at Diablo Canyon more severe.

Q. Has the NRC expressed any serious concerns about the actions taken by PG&E concerning the steam generators at Diablo Canyon?

A. No. I have seen no evidence that the NRC expressed any serious concerns about any of the actions taken by PG&E concerning steam generator tube degradation at Diablo Canyon.

Q. Who designed the Diablo Canyon steam generators?

A. The original steam generators included in the Diablo Canyon Nuclear Steam Supply System were designed and supplied to PG&E by the Westinghouse Electric Corporation ("Westinghouse").

Q. Do many other PWRs in the U.S. have steam generators that were designed and supplied by Westinghouse?

A. Yes. Approximately fifty of the PWRs in the U.S. have nuclear steam supply systems, including steam generators that were designed, fabricated, and supplied by Westinghouse. Almost all of these plants originally had steam generators with the same materials and most of the same design features as the Diablo Canyon steam generators. Several of the more recent plants designed and supplied by Westinghouse did begin operations with newer design steam generators that had different materials and design features that addressed some of the tube damage mechanisms that had been experienced by the earlier vintage plants.

Therefore, BWRs do not have the same set of degradation problems as PWRs.

Q. Have the other Westinghouse-designed PWRs of the same vintage as Diablo Canyon experienced the same steam generator tube damage mechanisms that have been experienced at Diablo Canyon?

A. Yes. The damage mechanisms experienced at Diablo Canyon are typical of the mechanisms that have degraded the steam generator tubes at other plants with Westinghouse-designed steam generators.

Q. Have any utilities sued Westinghouse over problems experienced by the steam generators at their PWRs?

A. Yes. A substantial number of utilities have sued Westinghouse over the problems experienced by the steam generators at their PWRs:

Table 1: Utility Lawsuits against Westinghouse on Steam Generator Issues

Utility	Nuclear Power Plant(s)	Year Lawsuit Filed
Florida Power & Light	Turkey Point Units 3 and 4	1978
Con Edison of New York	Indian Point 2	1982
Furnas Contrais Eletricas-Brazil	Angra 1	1987
Southern California Edison	San Onofre Unit 1	1983
San Diego Gas & Electric	SONGS 1	1983
Carolina Power & Light	Harris and Robinson 2	1989 and 1990
Duke Power	Catawba Units 1 and 2 and McGuire Units 1 and 2	1990
Houston Light & Power	South Texas Units 1 and 2	1990
South Carolina Electric & Gas	Summer	1990
Commonwealth Edison	Braidwood Units 1 and 2 Byron Units 1 and 2 Zion Units 1 and 2	1990
Duquesne Light	Beaver Valley Units 1 and 2	1991
Portland General Electric	Trojan	1993
Northern States Power	Prairie Island Units 1 and 2	1993
Public Service Electric & Gas	Salem Units 1 and 2	1996

Q. What were the claims cited by these utilities against Westinghouse?

A. I have reviewed the claims made in approximately ten of the steam generator lawsuits brought against Westinghouse. The specific claims varied between companies. For example, the initial lawsuit which was brought by Florida Power & Light ("FP&L") in 1978 raised five separate counts against Westinghouse:

1. Westinghouse breached its express warranty and guarantee that the equipment it furnished under its contract with FP&L would produce stated guaranteed outputs.

2. Westinghouse breached the express warranties that the steam generators it provided would be free from defects in workmanship and material and would be suitable for the use intended. Westinghouse also failed to promptly correct any defects, without cost.

3. Westinghouse breached the implied warranty that the steam generators designed, manufactured, furnished, and sold by it to FP&L pursuant to the Contract between the two companies, were of merchantable quality and free of defects.

4. Westinghouse breached its implied warranty that the plant equipment that it was to supply pursuant to the Contract, would be fit to be included in Turkey Point Units 3 and 4 by supplying equipment that was not fit for its intended purpose, not fit for the production of steam, and that contained defects in design, materials, and workmanship.

5. Westinghouse negligently designed and manufactured the steam generators in several particulars:

   a. Certain tubes comprising an integral part leaked substantially, impairing their effectiveness.

   b. Improper materials which were not corrosion resistant were used, causing the tubes and tube support plates to deny, partially close and crack.

   c. Even though Westinghouse was aware of similar problems with steam generators of the same type sold to other utility customers, it failed to warn FP&L of the possibility or likelihood of such

problems occurring in the steam generators for Turkey Point Units 3 and 4.[3]

Later lawsuits also alleged substantial fraud by Westinghouse. For example, the Complaint filed by Duke Power Company in 1990 contained the following representative instances of fraudulent actions by Westinghouse:

> 16. Prior to entering into each of the Contracts, [between Westinghouse and Duke] Westinghouse knew or recklessly disregarded information showing that (a) the tubes in the steam generators would be susceptible to corrosion and cracking; (b) this defective condition would prevent the steam generators from operating effectively and without costly preventive maintenance for their full design life; and (c) this defective condition would not be eliminated by adherence to Westinghouse's water chemistry specifications. In the years following execution of the Contracts, Westinghouse continued to discover and compile information that confirmed these and other facts concerning defects in the steam generator tubes.
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> 17. Westinghouse's knowledge and information about the susceptibility of the steam generator tubes to corrosion and cracking was based on, among other things, sources not available to Duke, including proprietary data generated by Westinghouse's research and development program, and tests and studies conducted by Westinghouse's material suppliers or licensees concerning corrosion and cracking. For example, an August 17, 1964 internal Westinghouse memorandum on the "Inconel corrosion problem" stated:
>
> > Mr. Simpson (Steam Division) was informed that he was not to inform anyone with the exception of his boss of the Inconel corrosion problem, to prevent a possible hold on steam generator production.
>
> A June 11, 1968 internal Westinghouse memorandum on the continuing "Inconel Stress Corrosion Problem" in steam generator tubing has the following handwritten notation by one researcher:

[3] *Complaint for Damages* in Florida Power & Light Company vs. Westinghouse Electric Corporation, US District Court for the Southern District of Florida, 1978. A copy of this Compliant is included as Exhibit____DAS-2.

> What do we tell them at this stage? That the alloy [Inconel] is crumbling in front of our eyes or that service experience is so far good?

Westinghouse knew that Duke would reasonably rely upon Westinghouse to advise it of all material information concerning the reliability and suitability of the steam generators. Indeed, Westinghouse intentionally induced such reliance by repeatedly emphasizing its own superior technical capabilities and expertise in its communications with Duke and with the utility industry. Westinghouse repeatedly advised Duke that it was supplying Duke with all available information on tube problems encountered by other utilities with Westinghouse steam generators.

> 18. Prior to, and at the time each of the Contracts was executed, Westinghouse intentionally or recklessly misrepresented material facts and intentionally or recklessly failed to disclose to Duke material facts concerning the steam generator tubes' susceptibility to corrosion and cracking, and falsely represented that the steam generators would operate effectively for their full 40-year design life and would require no periodic preventive maintenance or inspection other than assuring that water chemistry is always kept within allowable limits. Westinghouse knew that this information was material to Duke's decision to enter into the Contracts and that Duke would rely to its detriment upon Westinghouse's misrepresentations. Westinghouse's fraudulent misrepresentations were made with the intent to deceive Duke in order to promote Westinghouse products and services in the face of competition, and were made by Westinghouse with knowledge that they were untrue or with reckless disregard for whether or not they were true……[4]

Consequently, Duke alleged the following counts against Westinghouse:

1. Fraudulent inducement by Westinghouse in making false pre-contractual representations and by failing to disclose facts regarding the capabilities of the steam generators it sold to Duke that were material to Duke's decision to enter into the contract.

2. Post-contract fraud by Westinghouse in making false post-contractual representations and by failing to disclose material facts to Duke.

[4] *Complaint*, Duke Power Company vs. Westinghouse Electric Corporation, U.S. District Court for the District of South Carolina, 1990, at pages 10-13. A copy of this Complaint is included as Exhibit____DAS-3.

3. Westinghouse was negligent, grossly negligent and guilty of willful misconduct in designing and fabricating the steam generators for Duke's Catawba and McGuire nuclear units.

4. Westinghouse engaged in unfair trade practices in violation of the laws of both North and South Carolina.

5. Promissory estoppel in that Westinghouse intentionally concealed relevant information from Duke concerning the steam generators, including the latest relevant research data concerning corrosion mechanisms that might affect the steam generators that Westinghouse had promised to provide.

6. That Westinghouse had violated 18 U.S.C. Section 1962(c) in that it had engaged in a pattern of fraudulent acts since at least 1968 directed against Duke involving repeated misrepresentations and nondisclosures of material facts concerning defects in Westinghouse steam generators.[5]

Q. Did other utilities plead similar causes of action based on fraudulent acts by Westinghouse?

A. Yes. The lawsuits brought by a number of utilities including Commonwealth Edison, Portland General Electric, Carolina Power & Light, and South Carolina Electric and Gas also pled fraud-related causes of action based on Westinghouse's misrepresentation and failure to disclose material facts related to defects in the steam generators.

Q. What claims were raised by Southern California Edison and San Diego Gas & Electric in their lawsuits against Westinghouse over steam generator problems at SONGS 1?

A. Southern California Edison ("Edison") and San Diego Gas & Electric ("SDG&E") raised ten steam generator-related causes of action in their original complaints against Westinghouse:

[5] Exhibit____DAS-3.

1. Pursuant to specific terms in the Contract for SONGS 1, Westinghouse was required to correct identified deficiencies in the unit's steam generators and was liable for any loss, damage or expense incurred.

2. Westinghouse was required by law to repair the deficiencies in the SONGS 1 steam generators, or replace the equipment at its own expense, to compensate Edison and SDG&E for all loss, damage or expense incurred as a result of the defects.

3. Westinghouse negligently breached its duty to exercise reasonable care in the design, engineering, fabrication, manufacture, installation, inspection, and maintenance of the SONGS 1 steam generators. Westinghouse also breached its duty to exercise reasonable care in its duty to provide instructions for water chemistry, operation and maintenance.

4. Westinghouse negligently breached its duty to exercise due care by negligently representing, among other things, that the SONGS 1 steam generators would have a useful life in excess of thirty years, when in fact said generators were inoperable after twelve years.

5. The steam generators at SONGS 1 were defective in that they were unreasonably prone to corrosion, leakage and deterioration, among other things.

6. Westinghouse had breached its continuing duty to advise of all information, data, engineering, design, and maintenance developments related to its agreement and undertaking to provide steam generators with a useful life of at least thirty years.

7. Westinghouse had failed and refused to correct its work, acknowledge its liability or indemnify Edison or SDG&E.

8. Westinghouse breached the express warranties that the design, engineering, manufacture and installation of the SONGS 1 steam generators would operate as required.

9. Westinghouse breached the implied warranty that the SONGS 1 steam generators would be of merchantable quality and free from defects for their intended uses and purposes.

10. Westinghouse had failed to disclose knowledge and data that the deterioration and degradation of the SONGS 1 steam generators could occur and was occurring.[6]

Edison and SDG&E amended their complaints over time to also include causes of action related to steam generator inspection and sludge removal services performed by Westinghouse pursuant to a series of agreements entered into in 1973 through 1980.[7]

Q. What were the results of the lawsuits filed by utilities against Westinghouse on steam generator issues?

A. Westinghouse prevailed after a trial on the lawsuit brought by Duquesne Light & Power and after arbitration by the International Chamber of Commerce of the litigation brought by the Brazilian utility. All of the other lawsuits have been settled.

Q. What compensation did the utilities who settled with Westinghouse receive?

A. Unfortunately, the terms of each of the settlements of the steam generator lawsuits against Westinghouse have been kept confidential. However, Westinghouse has

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[6] *Complaint*, Southern California Edison v. Westinghouse Electric Corporation, March 31, 1983.

[7] Edison and SDG&E also alleged in their amended complaints that Westinghouse had violated the federal Racketeer Influenced and Corrupt Organizations Act, 18 U.S.C. Sections 1961-1968, by using the mails and/or interstate wires, and knowingly causing and inducing people to travel in interstate commerce, with the specific intent to defraud Edison, SDG&E, and multiple other existing and potential Westinghouse utility customers through non-disclosures and misrepresentations of material fact concerning the condition of steam generators sold by Westinghouse to utilities.

indicted that the compensation provided to utilities involved a combination of cash and discounts for goods and services.[8]

Q. Have you seen any quantification of the compensation paid by Westinghouse to settle steam generator lawsuits?

A. Yes. A 1989 article in *Nucleonics Week* reported that Westinghouse had paid $35 million of the price of replacing the steam generators at the Surry 2 nuclear power plant in 1980.[9] The same article also reported that Westinghouse similarly had paid $35 million of the price of replacing the steam generators at Point Beach Unit 1 in 1984.

Q. Do the materials submitted by PG&E in this application suggest the compensation that some utilities may have received from Westinghouse in settlement of their lawsuits?

A. Yes. The Workpapers for Chapter 4 of the Testimony submitted by PG&E contain comments provided by Demark regarding industry data on the costs of replacement steam generators. These comments note that Westinghouse's bid for the replacement steam generators for the Prairie Island 1 plant had been reduced by a $4.5 million "out of court discount."[10]

Other comments by Demark note that Westinghouse was providing the replacement steam generators for the Farley 1 and 2, South Texas 1 and 2, and Harris nuclear plants and that there had been a settlement with Westinghouse.[11] It is significant that there are no entries in the price column for the cost of any of these replacement steam generators. This suggests that Westinghouse may have

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8 For example, see "Westinghouse, Commonwealth Settle Lawsuit over Steam Generators," *Nucleonics Week*, dated September 26, 1996, at page 9. A copy of this article is included as Exhibit____DAS-4.

9 "Steam Generator Replacement Becoming Viable Option in U.S., *Nucleonics Week*, dated July 27, 1989, at page 1. A copy of this article is included as Exhibit____DAS-5.

10 PG&E filing, Workpapers – Chapter 4, at page 11.

11 Ibid, at pages 13, 14, and 15.

provided those steam generators at no cost pursuant to the terms of the lawsuit settlement agreements.

Q. Was PG&E asked to explain these comments in the workpapers regarding the replacement steam generators at these plants?

A. Yes. PG&E was asked to explain the comments "W settlement" and "W bid [for Prairie Island] $25 million based on a $4.5 million out of court discount" in a series of questions from the ORA.[12] Unfortunately, PG&E was unable to provide any detailed explanation of these comments beyond noting that:

> The workpapers cited above provide benchmark data on the estimated prices other utilities paid for their replacement steam generators. In some cases, the consultants providing PG&E with cost estimates knew that certain utilities entered into out-of-court settlements with the manufacturer of the original steam generators. PG&E is not aware of the value of these settlements, as settlement values generally are proprietary information. PG&E understands, however, that in some of the settlements, the utility has received a discount on future equipment or services.[13]

Q. Did any utilities negotiate settlements with Westinghouse rather than initiate litigation?

A. Yes. The Wisconsin Electric Power Company negotiated a confidential settlement with Westinghouse in which it received price concessions on the purchase of replacement steam generators and sleeving repairs.[14] According to the Public Service Commission of Wisconsin, this settlement eliminated the need for what could have been long and costly litigation with Westinghouse. The Wisconsin Commission, which reviewed the terms of the agreement in camera, also found that the settlement was a "very favorable one" for the utility.[15]

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[12] See Data Requests ORA 006-03 through 006-07.

[13] PG&E response to Data Request ORA 006-07.

[14] Public Service Commission of Wisconsin Order in Dockets Nos. 6630-UI-2 and 6630-CE-20, dated August 11, 1981, at page 3.

[15] Ibid, at page 14.

Other utilities may similarly have negotiated settlements with Westinghouse.[16]

Q. Has the CPUC ever addressed the question of whether it was prudent for a utility to sue a vendor over steam generator related problems at an operating nuclear power plant?

A. Yes. The CPUC required Edison and SDG&E to initiate litigation against Westinghouse over steam generator problems and costs at SONGS 1.

Q. Please describe the circumstances in which this issue arose?

A. When SONGS 1 was shut down for a refueling outage in 1980, Edison discovered that a significant number of steam generator tubes had sustained degradation from a mechanism known as Intergranular Attack ("IGA"). Edison decided to perform a process know as sleeving the degraded tubes in order to return SONGS 1 to service.

This sleeving cost $70.8 million. Edison sought to recover its 80% share of this amount, or $56.6 million, from ratepayers in Application 60321. The Commission withheld final judgment of this issue and deferred it to Application 61138.

Public Staff reviewed the reasonableness of Edison's actions and agreed that sleeving was the only reasonable choice. Staff also agreed that the repair operation was performed reasonably and prudently. However, the Staff witnesses recommended that Edison only be permitted to recover $26 million of the cost of the sleeving and that this $26 be expensed over a four-year period rather than capitalized and included in rates.[17] This rate treatment would have shared the cost of the sleeving project between shareholders and ratepayers rather than requiring

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[16] For example, the Workpapers for the Chapter 4 testimony submitted by PG&E note that the cost of the replacement steam generators at the Farley 1 and 2 units was reduced due to a "W settlement" which suggests that the Southern Company, which owns the Farley units, negotiated a settlement with Westinghouse instead of pursuing litigation.

[17] CPUC Decision No. 82-12-055, dated December 13, 1982, at page 55. A copy of this CPUC Decision is included as Exhibit____DAS-6.

that the entire cost be borne by ratepayers. As explained by the CPUC in its decision in Application 61138:

> The staff engineer gave the opinion that Westinghouse Electric Corporation (Westinghouse), the manufacturer of the equipment, was responsible for the degradation of the tubing in the steam generators because of its faulty design of the sludge removal system. He was cross-examined on the question of whether or not Westinghouse should share a part of the expense burden, and he replied that others had brought suit against Westinghouse for the identical problem and that Edison should consider suing as a means of recovering the disallowed portion of the sleeving cost. Specifically, staff cited complaints for damages brought by Virginia Electric Power Company, Florida Power & Light (FP&L), Wisconsin Electric, and Consumers Power Company in Michigan against suppliers of steam generators. Settlement was reached in all but the FP&L case which is still pending. The engineer went on to state that a report should be prepared which would analyze Edison's legal position and whether Edison could in good faith file a lawsuit, and that if the report showed that Edison could not in good faith file a lawsuit, the staff would recommend that the entire amount of the sleeving cost be capitalized and allowed in rates.[18]

In response, Edison presented a legal expert who testified that the probability that Edison would recover from Westinghouse for the cost of restoring the steam generators was extremely small, i.e., less than one chance in 20,000.[19] Staff disagreed, arguing that it was not at all certain that Edison would have no chance of winning a lawsuit against Westinghouse. Staff cited the success that other utilities had achieved in similar circumstances.[20] Edison responded by saying that the actions by other utilities in other jurisdictions was irrelevant, unless the law in the other jurisdictions was the same as California law and the facts were related to the SONGS 1 tube failures. Edison also pointed out that the staff had provided no analysis or evidence of either the law or facts involved in the other litigation.[21]

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[18] Exhibit____DAS-6, at page 56.

[19] Exhibit____DAS-6, at page 57.

[20] Exhibit____DAS-6, at page 57.

[21] Exhibit____DAS-6, at page 57.

The Commission concluded that there was no basis in the record to find that Edison acted unreasonably in accepting from Westinghouse what proved to be a faulty plant design or in its detection and repair of the steam generator failure which subsequently occurred. The CPUC, however, was "uncertain whether Edison acted reasonably in possibly having failed to take timely legal action against Westinghouse":

> Even absent unreasonable conduct on Edison's part, it is conceivable that rate recovery of all or a part of the repair costs should be deferred, pending a determination of Edison's prospects of recovering such costs from Westinghouse.
>
> Based on the showing, described above, by the staff and by a legal expert engaged by Edison, we find our record inadequate to determine whether Edison could successfully sue Westinghouse under any of the various legal theories discussed on that record. We share our staff's concern, however, as to the narrow range of potential legal options considered by Edison's witness.
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> * * * *
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> We are concerned that Edison's evaluation of and action on its legal options in the present circumstances may not match what would be expected of an unregulated business corporation, faced with a similar extraordinary operational failure but without the financial backstop of utility ratepayers. Edison has hired counsel to testify before this Commission as to a variety of reasons why a successful suit is unlikely. A major risk averted too is that the statute of limitations may already have run on any claim Edison may have had. The record also suggests, however, that the statute of limitations may still be running and, in fact, may shortly be running out. In addition, retaining counsel to impugn its own litigation prospects on an official hearing record could prove harmful to the interests of Edison and its ratepayers.
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> For these reasons, we are not satisfied that Edison has acted prudently in evaluating and pursuing its legal options in relation to Westinghouse's potential liability. On the other hand, we cannot say that Edison has been imprudent; nor do we wish to induce this or any utility to pursue frivolous or pointless litigation. Therefore, we will not, at this time, disallow recovery of any portion of the SONGS Unit 1 sleeving expense. We will, however, retain the ability and the option to disallow an appropriate share of such

> expense, if warranted, at a later date, and we will secure the means to complete the necessary evaluation.[22]

In this Decision, the CPUC allowed Edison to recover the first $14.2 million of its share of the cost of sleeving the SONGS 1 steam generator tubes during the 1980 outage. In addition, the CPUC also stated its intention to examine further whether Edison had adequately pursued its remedies against Westinghouse and whether such remedies should be pursued further:

> Our decision to allow Edison to begin recovery of its sleeving costs comes only after much deliberation. Although we have not adopted a risk allocation theory in this instance we believe that a case can be made that, in terms of risk allocation, shareholders should not necessarily be immune from the costs of an extraordinary occurrence such as the one at SONGS Unit 1 even if imprudence has not been shown. Our decision does not foreclose us from adopting a risk allocation theory in a future proceeding.
>
> Further, we have seriously considered disallowing half of the sleeving costs, for the reason that Edison has not finally persuaded us that it has acted prudently in failing to pursue its legal remedies against Westinghouse. As noted above, we are not persuaded that the legal expert retained by Edison has thoroughly evaluated the utility's prospects for successful litigation against Westinghouse.[23]

Thus, the CPUC put Edison on notice that it was directing its General Counsel to examine what legal remedies Edison had in the past or had against Westinghouse at that time to recover all or part of the costs associated with the sleeving of SONGS Unit 1.[24] The CPUC also put Edison on notice that if it found that Edison should pursue its present legal remedies against Westinghouse, the utility would be expected to do so. Finally, the CPUC warned that "if Edison has failed in the past or fails in the future to pursue those remedies with adequate vigor, we will disallow an appropriate amount of the sleeving costs."[25]

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[22] Exhibit____DAS-6, at pages 57-60.

[23] Exhibit____DAS-6, at page 62.

[24] Exhibit____DAS-6, at page 62.

[25] Exhibit____DAS-6, at page 62.

Q. Did the CPUC subsequently address the specific issue of whether Edison should pursue legal remedies related to the costs of sleeving the SONGS 1 steam generator tubes?

A. Yes. In Decision No. 83-03-032, issued on March 16, 1983, the CPUC noted that its General Counsel had reviewed the record in Application 61138 and the applicable law and had reported that:

1. Edison's claim that any legal action against Westinghouse was barred by the statute of limitations was without merit.

2. The facts in the record before the CPUC did not conclusively show that Edison would lose a lawsuit against Westinghouse.

3. The factual record before the CPUC in Application 61138 was very incomplete and did not form an adequate basis for evaluating Edison's chances of success in litigation against Westinghouse.[26]

Consequently, the CPUC said that it could no longer find that Edison had made a prima facie case for not filing a lawsuit. Therefore, the CPUC warned Edison that "we expect Edison to file a suit against Westinghouse as soon as possible, but no later than April 7, 1983, and to vigorously pursue said litigation in good faith."[27] The CPUC further warned that "if Edison fails to file suit it will have a heavy burden of showing the reasonableness of such action at its next attrition adjustment proceeding or ECAC proceeding."

Q. When did Edison file its lawsuit against Westinghouse?

A. Edison and SDG&E filed their lawsuits against Westinghouse on March 31, 1983.

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[26] CPUC Decision No. 83-03-032, issued on March 16, 1983, at page 2. A copy of this CPUC Decision is included as Exhibit____DAS-7.

[27] Exhibit____DAS-7, at page 2.

Q. What action did Westinghouse take in response to this lawsuit?

A. Westinghouse filed a Motion for Summary Judgment seeking dismissal of the lawsuits filed by Edison and SDG&E. On April 20, 1984, the Court granted most of Westinghouse's Motion and ordered the dismissal of all of the claims raised by Edison and SDG&E, except for the claims related to fraud and misrepresentations. The court's decision was based on (1) the conclusion that both Edison and SDG&E were judicially estopped from pursuing their claims because of the numerous statements made by Edison in 1981 and 1982 in CPUC Application 61138 regarding the reasonableness of Westinghouse's actions and the absence of grounds on which successful litigation could be brought; (2) the fact that Edison had signed a release in 1978 in the context of a prior lawsuit that released Westinghouse from the claims in the present action; and (3) the expiration of the warranties in the contract and the inability to recover economic loss in a tort action. The court's ruling was not based on an analysis of the merits of the plaintiffs' claims.

Q. Please briefly describe the circumstances which led Edison to file the lawsuit against Westinghouse that led to the 1978 settlement.

A. Edison filed a lawsuit against Westinghouse in April 1976 seeking $191,938 in damages related to steam generator tube leaks that had been experienced at SONGS 1 between October 13, 1971 and April 29, 1974. This case was settled in 1978. In consideration for the supply of a plant system that Public Staff later valued at about $43,500, Edison released all claims including, but not limited to, claims that Westinghouse did, in steam generators performed under the contract between the parties of January 11, 1963, perform all contract obligations due under said contract; that Westinghouse was negligent and reckless in the design, fabrication, manufacture, assembly, supply, delivery, and sale of the SONGS 1 generators; that Westinghouse both negligently and intentionally misrepresented various facts concerning the steam generators; that Westinghouse expressly warranted the steam generators and failed to honor these warranties; that Westinghouse impliedly warranted the steam generators both as to

merchantability and fitness for purpose and failed to honor these warranties; and the Edison was due any sums, services, or things stemming from these claims, demands, or causes of action.

Q. What action did the CPUC subsequently take with regard to the recoverability of those sleeving costs that had not been passed through to ratepayers in Decision No. 82-12-055?

A. On January 29, 1985, the Public Staff filed a Motion for an Order Removing the SONGS 1 Sleeving Expenses from Rates. In this Motion, the Public Staff explained why Edison's lawsuit against Westinghouse was extremely important to ratepayers of Edison and SDG&E:

> Edison had undertaken a $70 million sleeving repair, and there arose the question of who should pay for the repair. The available parties were the ratepayers, the shareholders, and Westinghouse. In fairness, Westinghouse should bear that cost. That company manufactured the steam generator tubes which failed less than halfway through (12 years) their expected minimum life of 30 years. The lawsuit was the one practical means of shifting the cost burden of tube failure from ratepayers to Westinghouse.[28]

The Public Staff also identified the specific imprudent acts of Edison and SDG&E that resulted in the Court's summary judgment order:

> In a competitive market, a company which acts imprudently is forced by the market to pay for its imprudence. The company may choose to raise the price of its products. In that case, the company loses sales to competing firms which have not been imprudent and have not been forced to raise prices. The company may choose to maintain its price at the same level to meet its competition. In that instance, the company's penalty for imprudence is reflected in reduced profit per sale. The costs of imprudence are borne by the company's shareholders, not by its customers. The self-regulating character of competitive markets mandates that result.
>
> Here, there is no competition in the sale of electricity. Edison and SDG&E have been granted franchises to sell electricity, on monopoly bases, in specific geographical areas. If a residential

[28] *Public Staff's Motion for an Order Removing Sleeving Expenses from Rates*, OII 83-10-02, dated January 29, 1985, at page 11. A copy of this Motion is included as Exhibit____DAS-8.

> customer living in Edison's franchise area desires electrical service, he must purchase electricity from Edison or do without it.
>
> Accordingly, regulation must protect electricity customers from bearing the costs of imprudence, because competition is unavailable to do so. This Commission has always recognized its responsibilities to protect customers from the costs of imprudent acts. Thus, the Commission disallows costs – both expenses and rate base items – when they are excessive or otherwise unreasonably incurred…
>
> The Commission, then, protects customers of regulated utilities from imprudent acts. What is prudence and imprudence. Prudence is defined as "[c]arefulness, precaution, attentiveness, and good judgment, as applied to action or conduct." Black's Law Dictionary, Revised Fourth Edition. Imprudence may be deemed the absence or opposite of those characteristics.
>
> Under this or any other accepted definition, Edison has been imprudent. To put it mildly, the company's acts have been careless, rash, inattentive, and in poor judgment. Staff will demonstrate in parts A and B below the specific acts which constituted imprudence and which directly led to summary judgment against Edison and SDG&E in their litigation against Westinghouse.
>
> The imprudence to be discussed here relates to acts occurring before the Westinghouse suit which later adversely affected the suit. Staff takes no position now as to whether Edison and SDG&E, once the suit was filed, have aggressively and competently pursued the suit. Staff reserves the right to later review, if necessary, the actions of Edison and SDG&E in the Westinghouse litigation. There is no need for that review now, however. After Edison's imprudence had run its course, the very finest trial efforts most likely would not have salvaged the Westinghouse litigation.[29]

In part A of its Motion, the Public Staff cited the numerous statements by Edison before the CPUC that later were cited by Westinghouse in its Motion for Summary Judgment of the lawsuit. Staff also explained why Edison's statements were "highly imprudent" and "potent weapons for Westinghouse."[30]

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[29] Exhibit____DAS-8, at pages 12 and 13.

[30] Exhibit____DAS-8, at pages 14 and 15.

There are three important additional points about Edison's statements. First, at the time they were made, it was as plain as day that Westinghouse, if sued, would bring them to the Court's attention. Westinghouse is a large company, and when it is sued for millions of dollars, it defends itself with teams of experienced and competent attorneys. The chances of those attorneys overlooking or ignoring Edison's statements are, in staff's calculation of probabilities, far less than 1 in 20,000. Second, it was perfectly foreseeable that these statements would significantly damage Edison's suit against Westinghouse. The law of judicial estoppel is available to anyone interested enough to read it. Also available to anyone with any common sense – even without detailed knowledge of judicial estoppel – is the certain knowledge that statements such as these are going to be very harmful in litigation to those who have made them. Third, Westinghouse itself was the source of the statements which Edison made about Westinghouse! ….

* * * *

No prudent company would ever dare to judge its litigation prospects on information, investigations, and opinions supplied by its future litigation adversary. Yet this is exactly what Edison has done. Edison has received from Westinghouse the information that litigation prospects against Westinghouse were extremely poor, and then Edison parroted that information to the Commission for Westinghouse's later use before the Federal Court. Slapstick comedies are made of such nonsense. Here, though, a $70 million bill to ratepayers inhibits any laughter.

* * * *

Edison made its pernicious statements in A.61138 in an attempt to convince the Commission that the company should not sue Westinghouse, because of the cost of suit to ratepayers. Edison had a right to take that position. <u>But Edison had no right, nor did it have a need, to support that position with statements clearly destructive to future litigation</u>! Edison could have discussed the great costs of suit without subjecting itself to the danger of judicial estoppel. If it had wished to discuss the uncertainties of prevailing in a lawsuit, Edison also could have done so without destroying future litigation prospects. Instead, it paraded a series of specific and devastating admissions for Westinghouse's use. As Westinghouse later said, "Plaintiffs stumbled over one another in their efforts to prove to the PUC that Westinghouse was blameless

> – on all counts – for the damage at SONGS 1."[31] (emphasis in original)

Finally, Public Staff explained that it believed that, absent Edison's imprudence, the case against Westinghouse would have been a good one.[32] This conclusion was based on an analysis by one of Edison's experts and by the fact that a number of the lawsuits filed against Westinghouse by other utilities had been settled:

> These settlements may indicate knowledge by the steam generator manufacturers that the complaints had some merit. The Michigan suit, for example, was settled for $30 million. This is obviously not a "nuisance" settlement, but is one which reflects legal liability of a steam generator manufacturer.[33]

Staff also noted that the New York and Florida cases were still pending:

> Some of the plaintiffs' claims have been thrown out of those cases. However, unlike the litigation here, the major claims remain intact and viable. Apparently, no employees of the New York or Florida utilities felt compelled to eviscerate their companies' litigation prospects with releases or unwise statements. The continued life of those cases also indicates that suits by utilities against Westinghouse may well be valid claims.[34]

Q. What action did the CPUC take in response to the Public Staff Motion?

A. On March 20, 1985 the CPUC issued an Order re Public Staff's Motion. In this Order, the CPUC directed that Edison and SDG&E cease further collections of the costs of sleeving the SONGS 1 steam generator tubes.[35] The CPUC also ordered that the reasonableness of sleeving costs and related issues would be determined at a future time. In addition, the CPUC noted that "it is not acceptable for a regulated utility to look to ratepayers as a deep pocket of first resort when it

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[31] Exhibit____DAS-8, at pages 18 and 19.

[32] Exhibit____DAS-8, at pages 31 through 33.

[33] Exhibit____DAS-8, at pages 33 and 34.

[34] Exhibit____DAS-8, at page 34.

[35] CPUC Order No. 85-03-087, issued March 20, 1985, at page 8. A copy of this CPUC Order is included as Exhibit____DAS-9.

arguably has an adequate remedy at law against the manufacturer of a defective product."[36]

The CPUC subsequently concluded that Edison had been imprudent in signing an unnecessarily and inappropriately broad release in settlement of the 1976 litigation against Westinghouse. The Commission also found that "because of the broad wording of the release, the riskiness of the current litigation with Westinghouse has increased, and the possibility that ratepayers will be compensated for sleeving and related expenses that they have borne has accordingly decreased."[37]

Consequently, the Commission decided that based on the circumstances of this case, "it is reasonable that Edison and SDG&E should retain one-fourth of their respective costs of the sleeving repairs and refund with interest all funds collected in excess of one-fourth of the sleeving repair costs."[38] In support of this decision, the Commission explained that:

> Under these circumstances, we believe that a fair resolution of this matter is for Edison to refund $15,853,000 (plus interest) that was previously collected subject to refund and to terminate the memorandum account that recorded the suspended rates related to its sleeving expenses. Ratepayers have already borne a total of $181 million in replacement fuel expenses and $13.1 million of Edison's sleeving costs that were collected and were not subject to refund. With the disposition outlined above, Edison will be at risk for approximately $39.7 million. Any recovery that it receives from prosecution or settlement of its current suit against Westinghouse will further compensate it for the sleeving costs that it has not yet collected from ratepayers. Given our decision today, Edison will have a direct incentive to pursue the suit, and it may manage its litigation without our oversight. We believe that this result is fair and reasonable under the unusual circumstances of this case.[39]

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[36] Exhibit____DAS-9, at page 6.

[37] CPUC Order No. 86-09-008, issued September 4, 1986, at page 21. A copy of this CPUC Order is included as Exhibit____DAS-10.

[38] Exhibit____DAS-10, at page 22.

[39] Exhibit____DAS-10, at page 19.

The CPUC ordered similar rate treatment for the sleeving costs incurred by SDG&E.

Q. What was the ultimate outcome of the Edison and SDG&E lawsuits against Westinghouse?

A. In decisions in 1987, 1989 and 1992, the Court granted Westinghouse's motions for summary judgment and dismissed all of the claims presented by Edison and SDG&E. The grounds which the Court cited were the terms of the 1978 release; the fact that the plaintiffs were judicially estopped from presenting each of their claims, which are inconsistent with, and contradictory to, their prior positions before the CPUC; the terms of the original contract with Westinghouse and a later 1980 sleeving contract; California law which barred recovery of economic losses for the claims presented by plaintiffs; and, the fact that Edison and SDG&E had not provided any evidence that the 1978 release was fraudulently induced.

Nevertheless, Edison and Westinghouse entered into a settlement agreement concerning the SONGS 1 steam generators. Unfortunately, the terms of this agreement have not been made public and, despite a data request seeking information on the terms, Edison has refused to provide TURN a copy of the settlement agreement.[40]

Q. Have you seen any other instances in which a state regulatory commission has disallowed steam generator repair costs on the grounds that the utility should pursue legal remedies against Westinghouse to recover those costs?

A. Yes. In 1995 the Oregon Public Utility Commission disallowed post-1991 capital expenditures to repair the Trojan nuclear plant's steam generators even though the Commission found that Portland General Electric, Trojan's main owner, "acted

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[40] Southern California Edison's response to Data Request Set TURN-SCE-01 in A.04-02-026, Question 002, stated that "SCE entered into a settlement agreement with Westinghouse concerning this litigation in September 1993. The terms of this settlement are confidential attorney work product prepared in support of negotiation and not discoverable or admissible in litigation. The terms of the Settlement Agreement are further subject to an express confidentiality agreement incorporated directly into the Settlement Agreement itself. Therefore, SCE is not producing the Settlement Agreement and attaches a privilege log to this data request response."

prudently with regard to its maintenance and operation of the steam generators."[41] The Commission noted that Portland General Electric was "better situated to pursue remedies for any manufacturing defects against Westinghouse, the steam generator manufacturer, than are the ratepayers."[42]

Q. When did the Trojan nuclear plant commence operations?

A. Trojan began operations in late 1975. The notice period under the Equipment Warranty in the Westinghouse contract for Trojan expired in September 1976.[43] This was long before the 1995 Oregon Public Utility Commission noted above.

Q. Has PG&E sued Westinghouse to recover damages for steam generator related problems or for any portion of the cost of replacing the Diablo Canyon steam generators?

A. No.

Q. Has PG&E exchanged correspondence or engaged in negotiations or discussions with Westinghouse to recover damages for steam generator related problems or for any portion of the cost of replacing the Diablo Canyon steam generators?

A. No.[44]

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41 Oregon Public Utility Commission Order No. 95-322, March 29, 1995, 1995 Ore. PUC Lexis 45. A copy of this Oregon PUC Order is included as Exhibit____DAS-11.

42 Exhibit____DAS-11, at pages 2, 40, and 41.

43 *Complaint*, Portland General Electric Company v. Westinghouse Electric Corporation, U.S. District Court for the Western District of Pennsylvania, at page 24.

44 PG&E response to Data Request TURN 002-01(a)

Q. What explanation has PG&E given for its failure to sue Westinghouse or to exchange correspondence, negotiate or talk with Westinghouse to recover damages for steam generator related problems or for any portion of the cost of replacing the Diablo Canyon steam generators?

A. PG&E has given the following reason for its failure to sue Westinghouse or to exchange correspondence, negotiate or even talk with Westinghouse in an attempt to recover damages related to steam generator problems or replacement at Diablo Canyon:

> The Nuclear Steam Supply System Equipment Contract (executed in 1968) between PG&E and Westinghouse Electric Corporation includes a Westinghouse warranty that the nuclear steam supply system, including the steam generators, "shall be free from defects in workmanship and material and shall be suitable for the intended purpose." However, the remedy is limited as follows: "Should any failure to fulfill this warranty appear within one year after NSSS acceptance, Westinghouse shall, upon written notice by Pacific of a defect, repair and replace the defective work." The contract further provides that such warranty, as well as the warranty of licenseability and output performance, "are in lieu of all other conditions and warranties express or implied. In any event, the liability of Westinghouse whether in contract, in tort, under any warranty, or otherwise, shall, except as expressly provided herein, be limited to repair or replacement under the warranty set forth herein." The contract further provides that Westinghouse shall not be responsible for any consequential damages, including "the cost of purchased or replacement power." In light of these provisions, and the fact that the steam generators have successfully operated since 1984 and 1985 in Units 1 and 2, there does not appear to be any basis for asserting a warranty claim.[45]

[45] PG&E response to Data Request TURN 002-01(b).

Q. Does the evidence that you have seen suggest that the warranty provisions in PG&E's contract with Westinghouse for Diablo Canyon's nuclear steam supply system ("NSSS"), that PG&E cites as support for its failure to sue, are similar to the provisions in the NSSS contracts for the nuclear power plants owned by the utilities that have sued Westinghouse?

A. Yes. The warranty provisions in the Diablo Canyon contract appear to be fairly typical of the provisions in contracts that utilities signed with Westinghouse back in the 1960s and 1970s or at least typical of the contracts signed by those utilities which have sued Westinghouse over steam generator problems.

Q. Were the utilities that sued Westinghouse successful in the claims they brought pursuant to the warranty provisions in their contracts with Westinghouse?

A. No. From what I have seen, Westinghouse was generally successful when it submitted motions for summary judgment against utility claims based on the warranty provisions and/or the general terms of the NSSS contracts.

However, as I have indicated earlier in this testimony, many utilities that sued Westinghouse generally included causes of action based on Westinghouse's alleged fraud in inducing utilities to enter into the NSSS contracts, either by misrepresentation or non-disclosure, or in post-contract fraud. Westinghouse was generally unsuccessful in getting the courts to dismiss these claims.[46]

Q. How then would you compare PG&E's actions regarding pursuing legal remedies and seeking compensation for steam generator related problems at Diablo Canyon with the actions taken by other utilities in similar situations?

A. PG&E was unreasonably and imprudently passive as compared to many other utilities that had purchased Westinghouse designed and supplied steam generators

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[46] For example, see the U.S. District Court's 1993 decision in South Carolina Electric & Gas Company v. Westinghouse, Duke Power Company v. Westinghouse, and Carolina Power & Light Company v. Westinghouse, at 826 F. Supp 1549. A copy of this Court decision is included as Exhibit____DAS-12.

for their nuclear plants that had the same materials and design features as the steam generators at Diablo Canyon.

Q. What standard have you applied in your review of the reasonableness and prudence of PG&E's efforts to pursue legal remedies and seek compensation from Westinghouse?

A. I have employed the standard commonly used in regulatory reviews of the reasonableness and prudence of utility actions. 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 through hindsight is given no weight. This standard is based on judgments concerning how reasonable persons, with the skill and knowledge attributed to reasonable utility managers should have been expected to cope with the circumstances confronting PG&E.

Q. Doesn't the outcome of the Edison and SDG&E lawsuits against Westinghouse show that any litigation by PG&E would have been unsuccessful?

A. No. As explained by the Public Staff in its January 1985 Motion in OII 83-10-02 for an Order Removing Sleeving Expenses from Rates, the Edison and SDG&E lawsuit was essentially doomed as a result of (1) the broad release signed by Edison in 1978 relieving Westinghouse of liability for steam generator related costs and (2) the many negative statements made by Edison to CPUC about the potential for successfully bringing litigation against Westinghouse. I am not aware of any similar actions by PG&E.

Q. Earlier you mentioned that Westinghouse had prevailed in the one steam generator that had gone to trial in the U.S. Doesn't the outcome of this trial show that any litigation by PG&E would have been unsuccessful as well?

A. Not necessarily. Although the jury found Westinghouse innocent of charges of fraud, it appears that Westinghouse defended against claims that had intentionally misled the Duquesne Light Company about the steam generators for the Beaver

Valley nuclear units by arguing that Duquesne had abused the steam generators through its own gross mismanagement. To support this claim, Westinghouse used confidential Institute of Nuclear Power Operations ("INPO") reports which said that Duquesne's chemistry equipment program was "a disgrace" and that the Beaver Valley units' operation department could be the first in the nation or the world in having "an attitude problem."[47]

I have seen no evidence whatsoever that would suggest that a similar defense by Westinghouse that PG&E abused or mismanaged the Diablo Canyon steam generators could be credibly mounted.

Q. Did Westinghouse settle any steam generator lawsuits after it prevailed in the Duquesne Light Company trial?

A. Yes. The Duquesne Light Company trial was completed in early December 1994. Westinghouse settled the lawsuits by Houston Light & Power, Commonwealth Edison, Portland General Electric, Northern States Power, and Public Service Electric & Gas after this date.

Q. Should PG&E have been aware before Diablo Canyon Units 1 and 2 began operations in 1984 and 1985 that it would experience significant steam generator related degradation and incur substantial costs maintaining, repairing, and possibly replacing the steam generators?

A. Yes. By the late 1970s and early 1980s there was a substantial body of publicly available evidence which showed that any operator of a nuclear power plant that had steam generators with design features and materials like those at Diablo Canyon (most significantly tubes fabricated from non-thermally treated Inconel 600 alloy) could expect unpleasant surprises and significant problems with this equipment well before the expected end of their facilities' projected 40 year service lives.

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[47] "Jury Says Westinghouse Innocent of Fraud in Steam Generator Case," *Nucleonics Week*, dated December 8, 1994, at page 2. A copy of this article is included as Exhibit____DAS-13.

For example, by the time that the Diablo Canyon units had started commercial operations in May 1985 and March 1986, steam generators with materials and design features similar to those at Diablo Canyon had already been replaced at six U.S. operating nuclear power plants, none of which had been in operations for more than 13 years before the replacements were made. Indeed, the Model 51 steam generators at the Surry Nuclear Plants, which were identical to the Diablo Canyon steam generators, had been replaced in 1980 and 1981 after only eight and seven years of operation. The steam generators at the Turkey Point Unit 3 and Unit 4 plants, that had similar design features and materials to those at Diablo Canyon, also were been replaced in 1982 and 1983 after only ten and nine years of operation. In addition, the owners of some power plants under construction had ordered new steam generators, with modified materials and design features from Westinghouse to replace the steam generators that were to have been installed in their facilities.

At the same time, there was an increasing body of information public available from steam generator service experience and laboratory test results that showed that tubes fabricated from non-thermally treated Inconel 600 alloy would experience degradation as a result of a number of different damage mechanisms including the Primary Water Stress Corrosion Cracking and the Outside Diameter Stress Corrosion that have been experienced since the late 1990s at Diablo Canyon. For example, an NRC report issued in early 1982 noted that approximately 40 of the 47 licensed PWRs had already experienced some kind of tube degradation.[48]

Numerous industry papers, and articles also reported Inconel 600 alloy steam generator tube degradation due to various old and emerging damage mechanisms. For example, an October 1981 article in a special edition of the journal *Nuclear Technology* devoted to Materials Performance in Nuclear Steam Generators noted that:

> Major corrosion problems have been experienced in operating steam generators resulting from a combination of inadequate design and fabrication, non-optimized secondary plant design and materials of construction, and poor operating practice. Development work, sponsored in large part by the [Steam Generator Owners Group], has helped to identify the causes and mechanisms for several different problems and will continue to investigate other corrosion events experienced more recently. Operating plants are responding to suggested corrective measures and continue to make major changes in plant design and operating practice. In addition, steam generator vendors have given great attention to deficiencies in design and materials and have developed new model steam generators that are expected to provide significantly greater margin during operation.
>
> No quick and easy cures have been or likely to be discovered. As a consequence, efforts will continue to identify, characterize, minimize, and solve these problems. Additional work in continuing to quantify new areas where the potential for corrosion or mechanical damage exists, so that utilities will have the information they require to optimize their steam generators for maximum serviceability over their design life.[49]

A paper presented in August 1983 at an International Symposium on the environmental degradation of materials in nuclear power systems, sponsored by the American Nuclear Society and the National Association of Corrosion Engineers, reported that while the older problems of denting, resulting from the corrosion of the carbon steel plates and tubesheets, and wastage, resulting from poor operating chemistry with phosphate water chemistry control, appear to be somewhat alleviated resulting from improvements in operation and design, "newer problems had arisen associated primarily with corrosion of the Alloy 600 tubing both from the inside and outside surfaces."[50]

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[48] NURG-0886, "Steam Generator Tube Experience," as reported in "40 PWRs now listed as having tube problems," *Nuclear News,* May 1982, at page 35.

[49] "Materials Performance in Nuclear Pressurized Water Reactor Steam Generators," *Nuclear Technology*, October 1981, at pages 28 and 29. A copy of this article is included as Exhibit____DAS-14.

[50] "Steam Generator Materials – Experience and Prognosis," *Proceedings of the International Symposium on Environmental Degradation of Materials in Nuclear Power Systems – Water Reactors,* at page 69. . A copy of this article is included as Exhibit____DAS-15.

Finally, by 1982 two utilities, Florida Power & Light and Consolidated Edison Company of New York had sued Westinghouse over design and materials defects in the steam generators at the Turkey Point 3 and 4 and the Indian Point 2 nuclear power plants.

All of this information should have given PG&E ample evidence by the early 1980s, well before these units went into commercial operation, that the steam generators supplied by Westinghouse for Diablo Canyon were not free from defects in workmanship and material and were not suitable for their intended purpose, as Westinghouse had warranted.

Q. Have you reviewed the steam generator replacement "benchmarking" study that PG&E has submitted to justify the reasonableness or prudence of its cost estimates for the Diablo Canyon steam generator replacement project?

A. Yes.

Q. Do you find the cost data in that "benchmarking" study supports PG&E's claim that its cost estimates for the Diablo Canyon steam generator replacement project are reasonable?

A. No. PG&E's benchmarking study is based on the cost data from five recently completed steam generator replacements and two planned replacements. For the following reasons, I believe that the CPUC should not rely on the unadjusted actual or projected cost information from these units to justify the reasonableness of PG&E's cost estimates for the replacement of the steam generators at Diablo Canyon:

1. PG&E offers no evidence that the actual costs of the replacements at the Cook, Salem, Byron, Braidwood, and St. Lucie plants were, in fact, reasonable or prudent. In fact, the replacements of the steam generators at Salem Unit 2 and D.C. Cook Unit 1 were undertaken and completed during multi-year outages of those units as a result of the mismanagement of plant engineering, maintenance, and operational activities. It is reasonable to expect that the costs and durations of the steam generator

replacements at these units may have been affected by this mismanagement.

2. Unlike the Diablo Canyon units, St. Lucie Unit 1 and the Palo Verde units have nuclear steam supply systems that were designed by Combustion Engineering ("CE") not Westinghouse. It is reasonable to expect that the differences between CE-designed units and Westinghouse-designed units may affect the cost of replacing the steam generators. For example, each CE-designed plant has two steam generators each of which is much larger than the steam generators in Westinghouse designed units.

3. D.C. Cook Unit 1 has an ice condenser containment which has less space inside than the dry containments in Westinghouse PWRs like Diablo Canyon. The smaller ice condenser containment at a plant like Cook can be expected to have added to the complexity of the steam generator replacement as opposed to the proposed replacement at Diablo Canyon.[51]

4. The replacements of the steam generators at the Byron and Braidwood nuclear plants each involved cutting an opening in the plant's containment to allow the removal of the old steam generator and the installation of the replacement units. Such containment cuts are not planned at Diablo Canyon.

5. Commonwealth Edison originally planned to replace the Byron Unit 1 steam generators in 1999. However, early in 1997, the Company discovered faster than expected tube degradation. As a result, the steam generator replacement was advanced from 1999 to the end of 1997.

This affected the cost of the steam generator replacement in several ways:

a. Commonwealth Edison did not have the luxury of a preparatory outage – a number of the activities that would normally have been

[51] See "Duke Eyes Extended Operation with New Steam Generators," *Nucleonics Week*, dated April 4, 1996, at page 7. A copy of this article is included as Exhibit____DAS-16.

completed during such a preparatory outage had to be performed during the actual steam generator replacement outage. This extended the planned duration of the steam generator outage to approximately 110 days, from the 70-90 day outages during which the steam generators were being replaced at other nuclear power plants. The actual duration of the Byron Unit 1 steam generator replacement outage was 124 days which was substantially longer than the durations of other recent steam generator replacements.

b. Commonwealth Edison had to get the manufacturer to speed up the production of the replacement steam generators. It is reasonable to expect that this would have increased the cost of the replacement steam generators.

c. The steam generators would have to be replaced during the fierce winter weather in Illinois.[52]

For these reasons, I do not believe that the costs of the seven nuclear units examined by PG&E provide a reasonable benchmark and may, in fact, overstate the reasonably projected cost of the replacement of the steam generators at Diablo Canyon. Certainly, any benchmarking comparison should adjust the costs of the steam generator replacements at these units to reflect issues or design features that are not relevant to Diablo Canyon.

Moreover, and this is very important, PG&E is not seeking to recover a project cost that is equivalent to the escalated actual cost experienced at what it asserts are the appropriate benchmark plants. Instead, PG&E is seeking to recover a substantially higher project cost that reflects direct costs that are about the same as the cost of the steam generator replacements at these plants + sales & use taxes + material burden + AFUDC + escalation + $96 million (in 2008$) of contingency.

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[52] "ComEd Gears Up Byron, Braidwood Steam Generator Replacements," *Nucleonics Week*, January 30, 1997, at page 11. . A copy of this article is included as Exhibit____DAS-17.

Q. Do you think that it is reasonable to include estimated steam generator replacement costs for the Beaver Valley and Palo Verde nuclear plants in PG&E's benchmarking study?

A. I think that it is reasonable to include estimated steam generator replacement costs for other plants if the purpose of the benchmarking is to show that, if needed adjustments are made to reflect design differences and circumstances, the Diablo Canyon estimates are comparable to what other utilities are currently estimating to replace the steam generators at their nuclear plants. However, it is not reasonable to include estimated steam generator replacement costs if the purpose of the benchmarking study is to be included as evidence that the Diablo Canyon estimates are reasonable and prudent and should be included in rates. Only actual plant costs should be used for that purpose.

Q. Are there other recent steam generator replacements that are more comparable to the proposed replacement of the Diablo Canyon steam generators than the replacements at St. Lucie and Palo Verde?

A. Yes. The steam generators at the Westinghouse-designed Harris, South Texas, Farley, and Point Beach 1 nuclear plants have been replaced in recent years. Each of these plants has a dry containment like Diablo Canyon. Other steam generator replacements also have been completed at the Westinghouse-designed Catawba and McGuire nuclear plants since 1996. These units have smaller ice condenser containments but are otherwise comparable to Diablo Canyon.

Q. Do you agree with PG&E's request that the CPUC pre-approve $706 million, as adjusted for actual inflation and cost of capital, as the reasonable and prudent cost of the Diablo Canyon steam generator replacement project?[53]

A. No. I believe that the CPUC should conduct a prudence review after the steam generator replacement project is completed to determine whether any project costs should be disallowed as being unreasonable and imprudent. I have seen no

[53] PG&E Testimony, Revised 5/27/2004, at pages 7-4 and 7-5.

persuasive evidence as to why the CPUC cannot conduct such a prudence review for this project as it has done for other major utility projects.

In particular, I believe that PG&E's request for pre-approval should be rejected for the following reasons:

1. CPUC pre-approval of PG&E's estimated $706 million project cost, as adjusted for actual inflation and cost of capital, would eliminate any significant incentive for PG&E to control project costs.

2. Including large contingencies (i.e., 20 percent for installation and owner's costs) may be appropriate for preparing cost estimates but the prudent and reasonable costs allowed into rates should reflect the actual costs expended on a project.

3. CPUC pre-approval of PG&E's estimated $706 million project cost, as adjusted for actual inflation and cost of capital, would mean that the company will recover approximately $96 million more than its own detailed estimates currently forecast will be the cost of replacing the Diablo Canyon steam generators.

4. As I noted above, there are a number of reasons to believe that PG&E's benchmark study overstates the cost of replacing the steam generators at plants similar in design to Diablo Canyon. But even if you accept the validity of PG&E's benchmark study, CPUC pre-approval of PG&E's estimated $706 million project cost, as adjusted for actual inflation and cost of capital, would mean that the PG&E would be able to recover substantially more than it has cost to replace the steam generators at those power plants that PG&E believes are comparable to Diablo Canyon.

5. CPUC pre-approval of PG&E's estimated $706 million project cost, as adjusted for actual inflation and cost of capital, would mean that PG&E could potentially recover substantially (e.g. $96 million) more than it actually spends on replacing the Diablo Canyon steam generators.

6. CPUC pre-approval of PG&E's estimated $706 million project cost, as adjusted for actual inflation and cost of capital, would mean that the Commission has not made any adjustment to reflect PG&E's unreasonably passive efforts to pursue legal remedies and obtain compensation from Westinghouse for steam generator related problems at Diablo Canyon.

7. The PG&E proposal is asymmetric. Ratepayers would receive no benefit if the actual cost of replacing the steam generators is equal to or below the pre-approved cost, as adjusted, but would be at risk if the actual cost exceeds the pre-allowed figure. PG&E would have no risk of being unable to recover its expenditures up to the pre-approved figure, as adjusted for actual inflation and cost of capital, and would only be at risk for any unreasonable and imprudent costs above the pre-approved amount, as adjusted.

8. PG&E has not provided any evidence in its testimony or workpapers to support the claim that the failure of the CPUC to pre-approve the steam generator replacement costs would detrimentally affect its ability to raise capital and/or maintain an investment-grade credit rating.

Q. Do you agree that PG&E's economic analyses considered all relevant uncertainties associated with continued operation of Diablo Canyon?

A. No. I think that the projected capacity factors, O&M, and capital additions examined in PG&E's economic analyses did not fully reflect the potential range of future possibilities. Therefore, I have recommended that TURN witness Marcus prepare a number of additional sensitivity studies which examine the economics of replacing Diablo Canyon's steam generators assuming that the future capacity factors for the two Diablo Canyon units are lower and that future O&M costs and annual capital additions expenditures are higher than the Company has estimated in its studies.

In particular, I recommended to Mr. Marcus that he examine scenarios in which the average annual capacity factors of the two Diablo Canyon units will be 85 percent, 80 percent, or 75 percent; future O&M expenditures experience real

escalation of 1 percent or two percent; and future capital additions expenditures are five or ten percent higher than PG&E now estimates. I also recommended that Mr. Marcus examine at least one scenario in which each of the Diablo Canyon units experiences a year-long outage at some time during its remaining service life. These additional studies reflect scenarios in which the future contains unpleasant surprises that PG&E does not now anticipate. Such unpleasant surprises may be more likely as the Diablo Canyon units age during the remaining twenty or so years of their operating lives.

Q. Can you give an example of a recent "unpleasant surprise" that has significantly affected the performance or costs of operating the Diablo Canyon units?

A. Yes. Along with many other nuclear power plant owners, PG&E is now planning for the replacement of the reactor vessel heads of the Diablo Canyon units. According to PG&E, these replacements will cost approximately $67 million.[54] In addition, the cost of maintaining Diablo Canyon has been somewhat higher in recent years due to the need for additional reactor vessel head inspections.

Reactor vessel head cracking is a serious industry-wide issue that was not anticipated five years ago. Thus, it represents an "unpleasant surprise," the cost of which must now be factored into estimates of future plant capital additions expenditures.

Q. Are there any other "unpleasant surprises" visible on the planning horizon?

A. By their very nature, such unpleasant surprises cannot be anticipated. However, the possible replacement of the pressurizers in PWRs appears to represent one possible "surprise."[55]

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[54] PG&E Testimony, revised 5/27/04, at page 5A-23.

[55] A pressurizer is a large tank inside the containment in a PWR that controls the primary system coolant pressure.

A number of utilities have discovered cracks in the pressurizers in their nuclear power plants. It appears that this cracking is related to the same material degradation issue that has led utilities to replace reactor vessel heads.

Florida Power & Light has recently become the first U.S. utility to place an order for a replacement pressurizer. It intends to install this replacement pressurizer in the St. Lucie Unit 1 nuclear power plant in 2005.[56] According to the vendor that will be supplying the replacement pressurizer, some other utilities have determined that it is more economical to replace the pressurizers in their plants rather than perform restoration due to issues surrounding the potential for stress corrosion cracking problems in the existing Alloy 600 heater nozzles.[57]

Although I have not seen any estimates of the magnitude of the costs associated with the repair or replacement of cracking pressurizers, this issue appears to have the potential to increase future plant O&M expenditures and/or future capital additions expenditures by more than the $5 million that PG&E currently expects to spend on replacing some of the pressurizer heaters.[58]

Q. What evidence have you seen that suggests that it is possible that either or both of the Diablo Canyon units could be shutdown for an extended outage of a year or longer at some time during their remaining service lives?

A. As shown in Table 2 below, sixteen nuclear power plants have been shutdown since January 1, 1990 for outages of twelve months or longer.

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[56] "Frameatome ANP Wins Nuclear Plant Pressurizer Order," *Worldwide Energy*, August 2004.

[57] "AREVA Wins First Replacement Pressurizer Order for U.S. Nuclear Power Plant, *PR Newswire*, June 24, 2004.

Table 2: Nuclear Power Plant Outages of Twelve Months or Longer Since January 1, 1990

Plant	Period Shutdown	Outage Duration
Beaver Valley 2	December 1997 - September 1998	9 months
Clinton	September 1996 - May 1999	32 months
Cook Unit 1	September 1997 - December 2000	39 months
Cook Unit 2	September 1997 - June 2000	33 months
Crystal River 3	September 1996 - February 1998	16 months
Davis-Besse	February 2002 - March 2004	25 months
Fitzpatrick	November 1991 - January 1993	14 months
Indian Point 3	February 1993 - June 1995	28 months
LaSalle Unit 1	September 1996 - August 1998	23 months
LaSalle Unit 2	September 1996 - April 1999	31 months
Millstone Unit 2	February 1996 - May 1999	39 months
Millstone Unit 3	March 1996 - June 1998	27 months
Salem Unit 1	May 1995 - April 1998	35 months
Salem Unit 2	June 1995 - August 1997	26 months
South Texas 1	February 1993 - February 1994	12 months
South Texas 2	February 1993 - May 1994	15 months

At least another six units have been shutdown for outages of between nine and twelve months in duration during this same period.[59]

These outages suggest to me that the potential for a year-long outage is a scenario that needs to be considered when evaluating the economics of replacing the Diablo Canyon steam generators.

Q. Do any of the cases that you have recommended to Mr. Marcus represent "worst case" scenarios?

A. No. None of the scenarios assume dramatically low capacity factors for future Diablo Canyon operations or dramatically high O&M or capital additions expenditures.

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[58] PG&E Testimony, revised 5/27/04, at page 5A-24.

[59] These units are Beaver Valley 2, Dresden 2, Indian Point 2, Kewaunee, Point Beach 1, and Point Beach 2

Q. Does this complete your testimony?

A. Yes.