

**BEFORE THE
CALIFORNIA PUBLIC UTILITIES COMMISSION**

**Application of Southern California Edison Company)
(U338E) for Authorization (1) to Replace San Onofre)
Nuclear Generating Station Unit Nos. 2 & 3 (SONGS 2)
& 3) Steam Generators; (2) Establish Ratemaking for)
Cost Recovery; and (3) Address Other Related Steam)
Generator Replacement Issues.**

**Application No.
04-02-026**

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

**On Behalf of
The Utility Reform Network**

**PUBLIC VERSION
Protected Materials Redacted**

December 13, 2004

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

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

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

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

6 **Q. Please describe Synapse Energy Economics.**

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

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

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

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

26 I have testified before state regulatory commissions in Arizona, New Jersey,
27 Connecticut, Kansas, Texas, New Mexico, New York, Vermont, North Carolina,

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1 South Carolina, Maine, Illinois, Indiana, Ohio, Massachusetts, Missouri, and
2 Wisconsin and before an Atomic Safety & Licensing Board of the U.S. Nuclear
3 Regulatory Commission.

4 A copy of my current resume is attached as Exhibit ___ DAS-1.

5 **Q. Have you previously submitted testimony before this Commission?**

6 A. Yes. I submitted testimony in Commission Docket No. 90-12-018 in 1991, 1992,
7 and 1993 on the issue of whether any of the outages of the three units at the Palo
8 Verde Nuclear Generating Station during 1989 and 1990 were caused or extended
9 by mismanagement. I also testified in Commission Docket A.04-09-001 in
10 August 2004 concerning PG&E's proposed replacement of the steam generators
11 at the two unit Diablo Canyon Power Plant.

12 **Q. What is the purpose of your testimony?**

13 A. Synapse was asked by TURN to examine issues related to Southern California
14 Edison's ("SCE," "Edison," or "the Company") proposed replacement of the
15 steam generators at San Onofre Nuclear Generating Station ("SONGS") Units 2
16 and 3. This testimony presents the results of our investigations.

17 **Q. What is a steam generator?**

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

22 The function of the steam generator is to transfer heat from the primary system
23 coolant to the secondary system coolant. Once the secondary system coolant has
24 been transformed into steam, it is used to drive the plant's turbine-generator to

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.

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1 produce electricity. There are a number of different steam generator designs.
2 However, all steam generators have the same general function – using the heated
3 primary system coolant to produce steam to generate electricity.

4 SONGS 2 and 3 each has two steam generators. Each of these original steam
5 generators is approximately 65 feet tall with a maximum diameter of 22 feet and
6 weighs approximately 620 tons. There are 9,350 small diameter tubes within each
7 steam generator. Each tube has a nominal outside diameter of 0.75 inch and very
8 thin walls with a nominal thickness of 0.048 inch.²

9 **Q. Please explain how Synapse conducted its investigations of SCE’s proposed**
10 **replacement of the steam generators at SONGS 2 and 3.**

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

- 12 1. Reviewed the testimony submitted by SCE and prepared data requests that
13 TURN submitted to the company.
- 14 2. Reviewed the responses to those data requests submitted by TURN that
15 have been answered as of December 10, 2004.
- 16 3. Reviewed the responses to the data requests submitted by other parties to
17 SCE that have been provided to TURN by December 10, 2004.
- 18 4. Reviewed relevant CPUC and other state regulatory commission Orders.
- 19 5. Examined articles, papers, reports and testimony in my files related to
20 steam generator corrosion/degradation issues and replacements at other
21 nuclear power plants.
- 22 6. Examined materials available in the U.S. Nuclear Regulatory
23 Commission’s public docket files related to steam generator issues and
24 replacements at other nuclear power plants.

² An illustration of a SONGS steam generator is included in Exhibit SCE-2, at page 6.

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1 **Q. Have any of these evaluations involved nuclear power plants that have steam**
2 **generators similar in design to those at SONGS Unit 2 and 3?**

3 A. Yes. The steam generators that I have evaluated at the Maine Yankee, Millstone
4 Unit 2, Calvert Cliffs, and ANO-2 nuclear plants have the same general materials
5 and same or similar design features to the steam generators at SONGS 2 and 3.

6 In addition, almost all of the other steam generator-related evaluations that I have
7 performed have involved steam generators at Westinghouse-designed nuclear
8 power plants. These steam generators at Westinghouse-designed nuclear power
9 plants used the same Alloy 600 mill annealed (“Alloy 600 MA”) material for
10 steam generator tubes as SONGS 2 and 3 and also had the same or very similar
11 design features.

12 **Q. Please summarize your conclusions in this investigation.**

13 A. I have reached the following conclusions:

- 14 1. The steam generator tube degradation that has been experienced at
15 SONGS 2 and 3 has been typical of the damage experienced at other
16 Combustion Engineering-designed nuclear power plants with Alloy 600
17 MA tubes, carbon steel tube support plates, and similar design features.
- 18 2. Given the materials used in the original SONGS 2 and 3 steam generators,
19 most significantly the use of Alloy 600 MA tubes, it was essentially
20 inevitable that SONGS would experience significant steam generator tube
21 degradation.
- 22 3. Because SCE has not provided the engineering and maintenance materials
23 that TURN requested I have been unable to determine whether SCE failed
24 to take any reasonable actions that would have arrested or slowed down
25 the corrosion of the tubes in the original steam generators at SONGS.
- 26 4. Because SCE has not provided the engineering and maintenance materials
27 that TURN requested I have been unable to determine whether SCE’s

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1 operational practices increased the steam generator tube degradation that
2 has been experienced at SONGS 2 and 3.

3 5. [REDACTED]

4

5 SCE has testified that SONGS 2 and 3 were not designed to allow for the
6 replacement of the steam generators.

7 6. If the SONGS 2 and 3 steam generators are replaced in 2008 and 2009 as
8 SCE now proposes their operating lives will have been only 25 years.

9 7. SCE has not sued Combustion Engineering over steam generator problems
10 experienced at SONGS 2 and 3. SCE has refused to even explain why it
11 has not initiated litigation against Combustion Engineering or to provide
12 any documents supporting that decision.

13 8. SCE pursued claims against Combustion Engineering in 1985 for
14 compensation for costs associated with two steam generator tube problems
15 that had been experienced during the early operations of SONGS 2 and 3.
16 SCE and Combustion Engineering executed a settlement related to these
17 claims in December 1987.

18 9. SCE's decision to seek compensation from Combustion Engineering
19 regarding these two problems was reasonable. However, SCE's failure to
20 also seek protection from Combustion Engineering and compensation
21 related to the foreseeable consequences of the other degradation
22 mechanisms that were known in 1985 to affect steam generators with
23 Alloy 600 MA tubes and carbon steel tube support plates, and that SCE
24 recognized could affect the SONGS 2 and 3 steam generators, was
25 unreasonable.

26 10. Instead of pursuing these broader claims, the December 1987 Settlement
27 between SCE and Combustion Engineering granted Combustion

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1 Engineering a broad release that freed it from liability for future claims
2 related to the steam generators and fourteen other NSSS components
3 (including such items as the reactor coolant pumps) that were known in
4 late 1987, were suspected or were able to be known at that time through
5 the exercise of due care. This was not reasonable.

6 11. SCE decision to pursue claims against Combustion Engineering
7 concerning the feeding components of the steam generators that had
8 failed in service by 1990 was reasonable. These components had been
9 redesigned by Combustion Engineering following their earlier failure
10 during SONGS 2 preoperational testing in 1981.

11 12. I have seen no evidence that SCE has sought compensation from
12 Combustion Engineering for any steam generator related problems since
13 1993 despite the increasing tube degradation that has been experienced at
14 SONGS 2 and 3 and the planned and expensive replacement of the
15 SONGS 2 and 3 steam generators.

16 13. For these reasons, SCE has acted unreasonably in not adequately
17 protecting ratepayers from steam generator related costs at SONGS 2 and
18 3.

19 14. SCE's economic analyses have not considered all relevant uncertainties
20 associated with the continued operation of SONGS 2 and 3.

21 **Q. What were the root causes of the steam generator tube problems that have**
22 **been experienced at SONGS 2 and 3?**

23 A. The root cause of the steam generator tube degradation experienced at SONGS 2
24 and 3 was the susceptibility of the materials used in the original steam generators
25 to degradation when exposed to the operating environment in the steam
26 generators. In particular, the Alloy 600 MA material used to fabricate the steam
27 generator tubes has been shown to be very susceptible to a variety of degradation

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1 mechanisms including denting, primary water and outside diameter stress
2 corrosion cracking, and intergranular attack.

3 **Q. Were the materials used in the SONGS 2 and 3 original steam generators**
4 **typical of the types of materials used in steam generators built in the 1970's?**

5 A. Yes. The materials used in the SONGS Unit 2 and 3 original steam generators,
6 including the Alloy 600 MA material used for the steam generator tubes, were
7 typical of the materials used in pressurized water reactor nuclear power plants
8 ("PWRs") of the same vintage as SONGS 2 and 3.³

9 **Q. Has the steam generator tube degradation that has been experienced at**
10 **SONGS 2 and 3 been typical of the corrosion experienced at other operating**
11 **PWRs?**

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

16 **Q. Were there any actions that SCE&E could have taken that would have**
17 **enabled the Company to avoid tube degradation in the original SONGS 2**
18 **and 3 steam generators?**

19 A. The only action that SCE could have taken that would have prevented steam
20 generator tube degradation would have been to require Combustion Engineering
21 to replace the Alloy 600 MA tubes in the original steam generators or to install
22 replacement steam generators, with different designs and materials features,
23 before SONGS 2 and 3 began commercial operations in 1983 and 1984, or at
24 some time thereafter. Given the materials used in the original SONGS 2 and 3
25 original steam generators, and the experience of other operating nuclear power

³ 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. Therefore, BWRs do not have the same set of degradation problems as PWRs.

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1 plants of a similar vintage, both in the U.S. and abroad, it was essentially
2 inevitable that SONGS would experience significant steam generator tube
3 corrosion.

4 **Q. Has SCE indicated or provided any information concerning what the**
5 **Company was told by Combustion Engineering prior to the start of**
6 **commercial operations concerning the suitability of using Alloy 600 MA in**
7 **the SONGS 2 and 3 steam generators?**

8 A. No. None of the correspondence from Combustion Engineering that SCE has
9 provided to TURN addressed the underlying question of the suitability of Alloy
10 600 MA given the operating experience at other nuclear power plants in the
11 1970s. SCE also has not yet provided all of the internal Company documents or
12 meeting minutes from the 1970s that TURN requested more than a month ago.
13 Such internal SCE materials might offer some insights into what the Company
14 knew or believed about the suitability of the Alloy 600 prior to the start of
15 commercial operations at SONGS 2 and 3.

16 **Q. Have you been able to determine whether SONGS failed to take any**
17 **reasonable actions that would have arrested or slowed down the corrosion of**
18 **the steam generator tubes at SONGS 2 and 3?**

19 A. Based on my review of steam generator problems at other PWRs, I do not believe
20 that there were any actions that could have ultimately prevented much of the
21 degradation of the steam generator tubes that SCE has experienced at SONGS. In
22 addition, the list of mitigation measures that SCE implemented at SONGS appears
23 to be consistent with the actions taken at other nuclear power plants to address or
24 slow down tube degradation.

25 However, I have not been able to complete my review of the reasonableness of
26 the specific actions taken by SCE at SONGS 2 and 3 because the Company has
27 objected so far to providing a significant part of the engineering materials and
28 documents that TURN requested. At the same time, SCE also has not provided
29 answers to some of the relevant data requests to which it has not objected. It is

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1 not possible for me to reach an ultimate conclusion concerning the reasonableness
2 of the Company's actions to arrest or slow down steam generator tube corrosion
3 without these materials. On Friday December 9th, over one month after TURN
4 submitted the relevant data requests, SCE offered to let me talk with SONGS
5 personnel. Unfortunately, I have not had the time to pursue this offer before filing
6 this testimony. I will try to do so after this testimony is filed on December 13th.

7 **Q. Have you seen any evidence that SCE's operational practices increased the**
8 **steam generator tube degradation that has been experienced at SONGS 2**
9 **and 3?**

10 A. As I have explained in my previous answer, I have not been able to complete my
11 evaluation of the reasonableness of the specific actions taken by SCE at SONGS 2
12 and 3 because the Company has not yet provided the materials that I need as part
13 of this review. Again, I hope to pursue this question, and perhaps finally obtain
14 all of the documents I need, when I am able to talk with SONGS personnel.

15 **Q. Have any other utilities objected to providing their engineering and**
16 **maintenance reports so that you could evaluate the reasonableness of their**
17 **operational or maintenance practices concerning their steam generators?**

18 A. No. I cannot think of a single instance in which a utility has refused to provide
19 the engineering and maintenance reports I have requested in my steam generator
20 evaluations. At most, the utilities have worked with me to limit my requests to
21 those documents that are the most relevant and necessary.

22 **Q. Who designed the SONGS 2 and 3 original steam generators?**

23 A. The original steam generators included in the SONGS Unit 2 and 3 Nuclear
24 Steam Supply Systems ("NSSS") were designed and supplied to SCE by
25 Combustion Engineering. ("CE")

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1 **Q. How many other PWRs in the U.S. have steam generators that were designed**
2 **and supplied by Combustion Engineering?**

3 A. As shown in Table 1 below, there have been a total of fifteen PWRs in the U.S.
4 with nuclear steam supply systems, including steam generators, that were
5 designed, fabricated, and supplied by Combustion Engineering. These plants
6 originally had steam generators with the same materials and most of the same
7 design features as the SONGS 2 and 3 steam generators.

8 **Table 1: U.S. Nuclear Power Plants with Combustion Engineering Designed**
9 **Steam Generators**

Nuclear Power Plant	Majority Utility Owner	Start of Commercial Operations
Arkansas Nuclear One – Unit 2	Entergy	November 1980
Calvert Cliffs Unit 1	Constellation Energy ⁴	May 1975
Calvert Cliffs Unit 2	Constellation Energy	April 1977
Fort Calhoun	Nebraska Public Power District	September 1973
Maine Yankee	Maine Yankee Atomic	December 1972
Millstone Unit 2	Dominion	December 1975
Palisades	CMS Energy ⁵	December 1971
Palo Verde Unit 1	Arizona Public Service	January 1986
Palo Verde Unit 2	Arizona Public Service	September 1986
Palo Verde Unit 3	Arizona Public Service	January 1988
SONGS Unit 2	SCE, SDG&E	August 1983
SONGS Unit 3	SCE, SDG&E	April 1984
St. Lucie Unit 1	Florida Power & Light	December 1976
St. Lucie Unit 2	Florida Power & Light	August 1983
Waterford Unit 3	Entergy	September 1985

10 **Q. Are all of these nuclear power plants still in operation?**

11 A. No. The Maine Yankee plant was permanently retired in 1996 due, in part, to
12 costs related to the unexpected discovery of significant steam generator tube
13 degradation. The other power plants listed in Table 1 remain in commercial
14 operations.

⁴ The previous owner of the Calvert Cliff nuclear plants was Baltimore Gas & Electric.

⁵ The previous name of CMS Energy was Consumers Power Company.

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1 **Q. Have the other Combustion Engineering-designed PWRs experienced the**
2 **same steam generator tube damage mechanisms that have been experienced**
3 **at SONGS 2 and 3?**

4 A. Yes. The damage mechanisms experienced at SONGS 2 and 3 are generally
5 typical of the mechanisms that have degraded the steam generator tubes at other
6 plants with Combustion Engineering-designed steam generators.

7 **Q. Have the steam generators been replaced at any Combustion Engineering-**
8 **designed nuclear power plants?**

9 A. Yes. The steam generators have been replaced at the Combustion Engineering-
10 designed Millstone 2, St. Lucie 1, Palisades, Calvert Cliffs 1, Calvert Cliffs 2 and
11 Palo Verde 2 nuclear power plants.

12 **Q. Did the original steam generators provided by any other NSSS vendors use**
13 **the same Alloy 600 MA tube material and have the same or similar design**
14 **features as the Combustion Engineering-designed steam generators?**

15 A. Yes. The original steam generators provided by Westinghouse to approximately
16 45 nuclear plants in the U.S. had tubes fabricated from Alloy 600 MA material
17 and contained design features similar to those in the Combustion Engineering-
18 designed units.

19 **Q. Have any utilities sued Combustion Engineering over problems experienced**
20 **by the steam generators at their PWRs?**

21 A. Yes. Consumers Power Company sued Combustion Engineering in the mid-
22 1970s over problems, including steam generator tube degradation, at the Palisades
23 nuclear power plant and Florida Power & Light sued Combustion Engineering in
24 1995 over tube degradation at the St. Lucie 1 nuclear power plant.

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1 **Q. What specific claims were raised by Consumers Power Company in its**
2 **lawsuit against Combustion Engineering?**

3 A. Unfortunately, I have not seen the grounds on which Consumers Power Company
4 sued beyond a description that the lawsuit addressed the design and operating
5 recommendations concerning the original steam generators that had provided by
6 Combustion Engineering for the Palisades nuclear plant.

7 **Q. What was the ultimate outcome of this lawsuit?**

8 A. The lawsuit was settled in 1977.

9 **Q. Have you seen any evidence concerning the terms of the settlement between**
10 **Consumers Power Company and Combustion Engineering?**

11 A. Yes. According to an article in the Wall Street Journal, the settlement called for
12 payment by Combustion Engineering to Consumers Power of about \$36 million
13 in cash, goods and services, and cancellation of about \$4 million in claims by
14 Combustion Engineering against Consumers Power.⁶ According to the Wall
15 Street Journal, the settlement also provided that Combustion Engineering shared
16 50 percent of the cost of fabricating the two replacement steam generators for
17 Palisades.

18 **Q. What were the claims in the lawsuit brought by Florida Power & Light**
19 **against Combustion Engineering?**

20 A. In its Complaint, Florida Power & Light (“FPL”) noted that pursuant to the NSSS
21 Contract, Combustion Engineering had furnished an NSSS – including two steam
22 generators – for Unit 1 of the St. Lucie Plant.⁷ The utility also noted that that
23 NSSS had not conformed to the requirements of the Contract or lived up to the
24 many representations, commitments and assurances promised to FPL by

⁶ Exhibit___DAS-2.

⁷ Exhibit___DAS-3, at page 5.

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1 Combustion Engineering in order to obtain the St. Lucie contract. The tubes in
2 the steam generators had experienced an unacceptable rate and level of corrosion
3 and cracking. This had required expensive analyses and comprehensive repairs of
4 the steam generators and, ultimately led to their premature and extraordinary
5 costly replacement. FLP emphasized that the steam generators were an
6 indispensable component of the NSSS, for without them a nuclear power plant
7 cannot perform its primary function of producing electricity.

8 FPL then pled two counts in its Complaint. Count I was for Breach of Express
9 Warranty. Count II was titled Negligent Misrepresentation but the language
10 appears to have covered intentional misrepresentation and the withholding of
11 material information, as well:

12 Count I – Breach of Express Warranty

13 17. FPL bargained for an intended to receive express assurances and
14 commitments from CE that the NSSS would perform effectively and
15 reliably for its 40-year design life.

16 18. CE, with full knowledge and understanding of FPL’s specific
17 requirements and the reasons behind them, expressly warranted that the
18 NSSS furnished under the Contract would be suitable for its intended
19 purpose; would have a useful operating lifetime of at least 40 years; and
20 would be licensable, reliable, operable and maintainable for 40 years.
21 These express warranties became an essential part of the basis of the
22 bargain for FPL’s purchase of the NSSS from CE.

23 19. CE breached the foregoing express warranties by furnishing an NSSS for
24 St. Lucie Unit 1 that, because of the corrosion and cracking of the steam
25 generator tubes, (a) was not reliable, operable or maintainable over the 40
26 year design life, in that the steam generators must be replaced
27 approximately 20 years earlier than if the steam generators had conformed
28 to the express warranty, and (b) was not suitable for the intended purpose
29 of providing electric generating capacity throughout the 40-year design
30 life of the St. Lucie Plant.

31 * * *1 *

32 20. As a direct and proximate result of CE’s breaches of its express
33 warranties, FPL has been required, continues to be required, and will, in
34 the future, be required to make major repairs, revisions and inspections of
35 the NSSS for Unit 1 of the St. Lucie Plant; to remove and replace the
36 two steam generators at Unit 1 approximately 20 years before they were

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1 due to be replaced; and has incurred, continues to incur and will in the
2 future incur other direct and consequential damage.

3 * * * *

4 Count II – Negligent Misrepresentation

5 23. CE, in the course of its business and in connection with the negotiation
6 and execution of the Contract in which CE had a pecuniary interest,
7 supplied the following false information to FPL:

8 * * * *

9 b. That the NSSS to be furnished under the Contract, including the
10 steam generators was licensable, reliable, operable and
11 maintainable for at least 40 years of useful life.

12 c. That the NSSS to be furnished under the Contract, including the
13 steam generators would be suitable for its intended purpose of
14 providing electric generating capacity satisfactorily during the 40-
15 year design lifetime of the NSSS.

16 d. That the materials used in the steam generators to be furnished as
17 part of the NSSS under the Contract would not be adversely
18 affected by a wide range of abnormal water chemistry.

19 * * * *

20 f. That the design of the NSSS to be furnished under the Contract by
21 CE, including the steam generators, had been qualified through
22 prior successful usage, prototype tests, demonstration tests of
23 completed units, or by independent review of engineering design.

24 g. That corrosion problems with the steam generator tubes in the
25 NSSS could be eliminated or controlled by CE or through
26 implementation of its recommendations, such that those problems
27 would not threaten the integrity of the steam generators over the
28 40-year design life of the NSSS.

29

30 24. CE failed to supply the following information to FPL:

31 * * * *

32 b. That operational and scientific data derived from other CE-
33 designed nuclear steam supply systems and other scientific and
34 industry sources failed to support CE's assurances that the NSSS
35 furnished under the Contract could operate suitably and reliably for
36 at least 40 years.

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- 1 c. That it had no reasonable basis to conclude that the corrosion
2 control techniques and procedures it proposed would control or
3 limit corrosion in the steam generator tubes or would not
4 themselves lead to other and further corrosion problems.
- 5 d. That in the absence of long-term operating experience in the
6 environment in which the St. Lucie Plant would function, CE had
7 no ability to predict realistically the types or extent of corrosion
8 attacks or degradation that might occur in the St. Lucie Plant.
- 9 25. CE supplied the false information described in Paragraph 23 and withheld
10 essential information described in paragraph 24 with the intent that FPL
11 rely on CE's actions in ways that were reasonably contemplated, to wit:
- 12 a. In entering into the Contract
- 13 b. In establishing and maintaining a business relationship between
14 FPL and CE for the purchase of NSSS-related goods and services
15 from CE over the lifetime of the NSSS.
- 16 c. In deferring for years the inevitable and necessary replacement of
17 the steam generators supplied under the Contract.
- 18 26. The representations made by CE and the facts withheld by CE were
19 material to FPL. If FPL had known the falsity of the representations set
20 forth above and/or if it had known the facts which had been withheld by
21 CE, FPL would not have entered into the Contract, would not have made
22 payments to CE under the Contract, or would not have entered into other
23 contracts with CE for the repair, maintenance or inspection of the NSSS.
24 Moreover, FPL would have demanded that CE correct the steam generator
25 defects at a time when the cost of such corrections was far less than their
26 present cost; would have sought to cancel the Contract and thereby avoid
27 later expenses associated with the balance of plant and steam generator
28 remediation efforts; and/or would have asserted other Contract or statutory
29 rights.
- 30 27. Prior to executing the Contract, and in the course of the commercial
31 relationship thereby and thereafter established, CE had a duty not to
32 supply FPL with false information or not to withhold essential, material
33 information regarding the design, operating characteristics and longevity
34 of the NSSS, including the steam generators.
- 35 28. Having made affirmative representations regarding the longevity, design
36 and operating characteristics of the NSSS, CE had a duty to provide
37 relevant material information in its possession or which, in the exercise of
38 reasonable care, should have been in its possession that contradicted or
39 undermined its claims regarding the longevity, design, reliability,
40 operability and maintainability of the NSSS during its 40-year design life.

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- 1 29. CE acted without reasonable care or competence in obtaining or
2 communicating information to FPL or withholding material information
3 relating to the NSSS including the steam generators.
- 4 30. FPL justifiably relied on the truthfulness, accuracy and completeness of
5 the foregoing information to its detriment resulting in a pecuniary loss to
6 FPL. FPL justifiably relied on CE to provide relevant material information
7 in CE's possession – or which in the exercise of reasonable care should
8 have been in CE's possession – to FPL's detriment resulting in pecuniary
9 loss to FPL.
- 10 31. As a direct and proximate result of CE's negligent misrepresentations and
11 omissions before the execution of the Contract and during the course of its
12 business relationship, FPL has been required, continues to be required, and
13 will, in the future, be required to make major repairs, revisions and
14 inspections of the NSSS for Unit 1 of the St. Lucie Plant; to remove
15 and replace the two steam generators at Unit 1 approximately 20 years
16 before they were due to be replaced; and has incurred, continues to incur
17 and will in the future incur other direct and consequential damage.⁸

18 **Q. What was the ultimate outcome of this lawsuit?**

19 A. The lawsuit was settled. The terms of this settlement have not been made public.

20 **Q. Has SCE sued Combustion Engineering over steam generator related**
21 **problems at SONGS?**

22 A. No.⁹

23 **Q. What explanation has SCE provided for its failure to sue Combustion**
24 **Engineering over steam generator related problems at SONGS?**

25 A. TURN asked SCE to explain why it has not initiated litigation against
26 Combustion Engineering over steam generator related problems experienced at
27 SONGS 2 or 3. SCE refused to provide any explanation of the reasons why it has

⁸ Exhibit___DAS-3, at pages 7 to 12.

⁹ Data Request Set No. TURN-SCE-02 Question 22, included in Exhibit___DAS-4.

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1 not sued Combustion Engineering claiming that such an explanation is subject to
2 the attorney-client and attorney-work product privileges.¹⁰

3 **Q. Has SCE provided any documents to support its decision not to sue**
4 **Combustion Engineering over steam generator related problems at SONGS?**

5 A. No. TURN asked the Company to provide copies of any analyses, assessments or
6 evaluations, prepared by or for SCE, which examined the potential grounds on
7 which SCE might initiate litigation against Combustion Engineering over steam
8 generator related problems at SONGS 2 or 3. SCE refused to provide the
9 requested information on the grounds that the request seeks information protected
10 by the attorney client privilege and the work product document.¹¹ SCE similarly
11 refused to provide copies of Company memoranda or correspondence that
12 discussed the possibility of suing Combustion Engineering over steam generator
13 problems at SONGS Units 2 or 3.

14 TURN additionally requested that SCE provide any correspondence between the
15 Company and any of its three joint SONGS owners which addressed or discussed
16 the possibility of suing Combustion Engineering over steam generator problems at
17 SONGS 2 or 3. SCE again refused to provide the requested information.¹²

18 At the same time, TURN also asked SCE to provide copies of materials provided
19 to senior Company management personnel and correspondence with any of the
20 other SONGS joint owners that had addressed any of the following subjects:

- 21 a. litigation against Combustion Engineering over steam generator problems
22 or costs at SONGS 2 and 3.
- 23 b. discussions or negotiations with Combustion Engineering over steam
24 generator problems or costs at SONGS 2 and 3.

¹⁰ Data Request Set No. TURN-SCE-02 Question 22, included in Exhibit ___DAS-4.

¹¹ Data Request Set No. TURN-SCE-02 Question 21, included in Exhibit ___DAS-4.

¹² Data Request Set No. TURN-SCE-02 Question 21, included in Exhibit ___DAS-4.

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- 1 c. settlement(s) between SCE and Combustion Engineering over steam
2 generator problems or costs at SONGS 2 and 3.
- 3 d. settlement(s) between any of the SONGS 2 and 3 owners and Combustion
4 Engineering over steam generator related problems or costs at SONGS 2
5 and 3.

6 Unfortunately, SCE has provided only a single one-page Company memo in
7 response to these requests. The Company has refused to provide any other of the
8 requested internal company materials claiming that they are protected by the
9 attorney-client and attorney work product privileges.¹³ It also has refused to
10 provide copies of any correspondence with the SONGS joint owners that
11 addressed any of these subjects.¹⁴

12 **Q. Did any utilities reach settlements with Combustion Engineering without**
13 **suing?**

14 A. Yes. Arizona Public Service Company (“APS”) executed a settlement with
15 Combustion Engineering in 1996 concerning steam generator tube degradation at
16 the Palo Verde Nuclear Generating Station. I also am aware from other work in
17 the late 1990s that Entergy and Baltimore Gas & Electric at that time were
18 holding discussions with Combustion Engineering over steam generator issues at
19 the ANO-2 and Calvert Cliffs plants. However, I do not know whether those
20 discussions led to settlements.

21 **Q. What compensation did the Palo Verde Participants receive in the 1996**
22 **settlement with Combustion Engineering over steam generator tube**
23 **degradation at Palo Verde?**

24 A. [REDACTED]

¹³ Data Request Set No. TURN-SCE-02 Question 01C, included in Exhibit ___DAS-4.

¹⁴ Data Request Set No. TURN-SCE-02 Questions 42C, 43C, and 44C, included in Exhibit ___DAS-4.

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1 [REDACTED]¹⁵

2

3

4

5

6 **Q. Is it reasonable to expect that the Palo Verde Participants will take**
7 **advantage of and receive value from the [REDACTED]?**

8 A. Yes. An earlier 1989 settlement between the Palo Verde Participants and
9 Combustion Engineering over warranty and contract issues related to the
10 construction of Palo Verde provided \$40 million to the Participants in future
11 credits for goods and services.¹⁶ [REDACTED]

12

13

14

15 **Q. Did the settlement between APS and Combustion Engineering contain any**
16 **release?**

17 A. [REDACTED]¹⁷

18

19

¹⁵ Exhibit___DAS-5 Confidential.

¹⁶ "C-E Settles Suit over Palo Verde; Plant Owners to Split \$40 Million," June 12, 1989 Electric Utility Week, at page 3.

¹⁷ Exhibit___DAS-5 Confidential, at pages 13 and 14.

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1 **Q. Has SCE sought any compensation from Combustion Engineering for steam**
2 **generator problems at SONGS 2 and 3?**

3 A. Yes. SCE has provided two settlements between the SONGS joint owners and
4 Combustion Engineering related to steam generator costs. The first of these
5 settlements was dated December 1987. The second settlement was dated March
6 1993.

7 **Q. Please describe the circumstances which led to the 1987 settlement between**
8 **the SONGS owners and Combustion Engineering.**

9 A. SCE experienced two separate steam generator tube problems during the first
10 operating cycles of each of the SONGS Units. The first problem involved some
11 steam generator tubes that had not been properly annealed during the
12 manufacturing process.¹⁸ The second problem involved tube wear caused by flow
13 induced vibration of diagonal straps called batwings.¹⁹ This second problem was
14 the result of a design change made during the design process to improve the flow
15 patterns in the upper tube regions of the steam generators.²⁰

16 SCE has provided the following summary of the events which led to the 1987
17 settlement with Combustion Engineering:

18 During 1984, there was one Unit 2 outage and two Unit 3 outages
19 caused by steam generator tube leakage. The extent of steam
20 generator problems was further analyzed during the first refueling
21 outage. On February 15, 1985, SCE advised Combustion
22 Engineering that “all costs incurred by CE or Edison which are
23 connected with identification, mitigation, or correction of steam
24 generator tube problems or structural design deficiencies are
25 considered by Edison to be a CE responsibility pursuant to the
26 NSSS Contract.” At that time, SCE also deducted certain amounts
27 from Combustion Engineering invoices which it believed were for

¹⁸ See Bates Page Number SGR001305 in SCE’s response to TURN-SCE-02 Question 8.

¹⁹ A picture of a “batwing” diagonal support is included as Figure II-3 at page 7 of Exhibit SCE-2.

²⁰ Bates Page Number SGR001330 in SCE’s response to TURN-SCE-02 Question 8.

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1 work “pursuant to the warranty provisions, Section 19, of the
2 NSSS Contract.”

3 In May of 1985, Combustion Engineering approached SCE in an
4 effort to settle the matter. Combustion Engineering’s initial
5 approach was not acceptable to SCE. In August of 1985, SCE
6 again confirmed to Combustion Engineering that it believed
7 Combustion Engineering to be responsible for “costs associated
8 with identifying, correcting and/or mitigating steam generator tube
9 failures caused by metallurgical deficiencies, as well as analysis
10 and corrective work associated with deficiencies in the diagonal
11 spacer supports [known as batwings].”

12 In November of 1985, SCE again reiterated its position and again
13 withheld payments for 100% eddy current testing it believed was
14 necessary to analyze the scope of the problem. In December of
15 1985, Combustion Engineering made an offer to plug all steam
16 generator tubes that would likely be affected by batwing wear
17 according to a 40 year wear progression model Combustion
18 Engineering had developed. Alternately, Combustion Engineering
19 offered a credit equal to the cost of performing such plugging at
20 the time it could have been accomplished. Acceptance of either of
21 these options would discharge Combustion Engineering from its
22 warranty obligations related to batwing wear.

23 SCE did not accept this offer. A further meeting was held in
24 February of 1986 at which Combustion Engineering offered to
25 plug approximately 175 tubes in each steam generator which it
26 claimed would resolve the batwing problem. SCE again rejected
27 Combustion Engineering’s offer on the ground that the existing
28 status of the technical documentation made it premature to accept
29 such an outcome as a final resolution of Combustion Engineering’s
30 warranty responsibilities, and again requested Combustion
31 Engineering to do additional inspection and analysis work.

32 On February 12, 1986, SCE invoked the arbitration clause of the
33 NSSS Contract and sought binding arbitration regarding tubes that
34 were not properly annealed in each of the steam generators at Units
35 2 and 3 and regarding tubes damaged as a result of batwing wear.
36 The parties subsequently entered into a standstill agreement as
37 negotiations continued.

38 The parties ultimately entered into a settlement agreement in
39 December of 1987. Combustion Engineering provided a credit as
40 described above the cover the cost of plugging tubes it current
41 calculated would require plugging during 40 years of operation as

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1 a result of batwing wear. However, SCE also succeeded in getting
2 Combustion Engineering to agree that if at any time prior to
3 completion of the active life of SONGS 2 and 3 steam generators
4 or until January 1, 2023, whichever should occur first, should tubes
5 require plugging as a result of improper anneal or batwing wear,
6 then Combustion Engineering would perform the work at its
7 expense. SCE accordingly obtained long term protection should
8 significant problems due to improper annealing or batwing wear
9 occur in the future.²¹

10 **Q. Did the negotiations which led to the 1987 settlement also address problems**
11 **in other SONGS NSSS components or systems?**

12 A. Yes, I believe that they did because the language in the 1987 settlement
13 agreement addressed problems related to a broken incore instrumentation thimble
14 (“ICI”).²²

15 **Q. Has SCE provided all of the correspondence between SCE and Combustion**
16 **Engineering that led to the 1987 settlement or the notes of meetings and**
17 **discussions between the two parties?**

18 A. No. SCE has provided some documentation from late 1984 through early 1986.
19 However, there is more than a 22 month gap, between March 1986 and late
20 December 1987, in the materials that have been provided by SCE. SCE also has
21 said that it has been unable to locate any correspondence, notes, minutes or
22 reports of any negotiations or discussions leading to this settlement.²³

23 **Q. Have you seen any evidence that improper annealing or batwing wear were**
24 **generic problems affecting other Combustion Engineering plants?**

25 A. Yes. The tube wear caused by flow induced batwing vibration was a problem at
26 several other Combustion Engineering plants.

²¹ SCE’s response to Data Request Set AGLET-SCE-1 Question 15.

²² Exhibit ___ DAS-6.

²³ Data Request Set No. TURN-SCE-02 Question 24.b., included in Exhibit ___ DAS-4.

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1 **Q. What compensation did the SONGS owners receive from Combustion**
2 **Engineering in this settlement?**

3 A. The 1987 Agreement involved the following terms regarding compensation
4 between the parties:

- 5 ▪ Combustion Engineering extended a credit of \$750,000 to the SONGS
6 owners to be used against future Combustion Engineering billings for
7 SONGS work. SCE has noted that “This sum represents the cost C-E
8 would incur if it were to correct the tube failure problems by plugging.”²⁴
- 9 ▪ The SONGS owners would pay Combustion Engineering \$488,000 for
10 previously incurred costs the payment for which had been withheld by
11 SCE. A portion of the \$750,000 credit could be used to offset this
12 amount.
- 13 ▪ Combustion Engineering would modify, at its own cost, the fuel alignment
14 plates in SONGS 2 and 3 to prevent further ICI thimble problems.
- 15 ▪ Combustion Engineering agreed to repair or otherwise correct, for the life
16 of the steam generators or January 1, 2023, whichever came first, any
17 tubes which might fail due to annealing or batwing problems.²⁵

18 **Q. Were the SONGS owners fully compensated for all of the additional**
19 **inspection and repair costs that they had said that they had incurred as a**
20 **result of the specified problems with the SONGS steam generators?**

21 A. Apparently not. As noted above, the settlement Agreement provided a \$750,000
22 credit to be used against future Combustion Engineering billings for SONGS
23 work. However, an August 5, 1985 letter from SCE to Combustion Engineering
24 stated that the costs identified by SCE in connection with the improper tube
25 annealing and batwing wear problems “total approximately five million dollars”
26 through that date.²⁶ According to SCE, these costs fell into three categories: (1)

²⁴ Exhibit___DAS-7.

²⁵ A copy of the settlement agreement is included as Exhibit___DAS-6. An SCE-prepared summary of the Agreement is included as Exhibit___DAS-7.

²⁶ Exhibit___DAS-8.

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1 Edison labor and indirects; (2) procured services (from C-E and others); and (3)
2 material and equipment.

3 **Q. Did the settlement release Combustion Engineering from any liability for**
4 **future steam generator related costs at SONGS?**

5 A. Yes. The 1987 Agreement contained the following very broad language that
6 released Combustion Engineering from liability for any other claims associated
7 with the steam generators and fourteen other Combustion Engineering supplied
8 components that were known, suspected or were able to be known through the
9 exercise of due care:

10 The Participants, for themselves and for their predecessors, each of
11 their subsidiaries and affiliates and each of their predecessors,
12 hereby release Combustion, each of its predecessors, and each of
13 their respective past and present agents, officers, directors and
14 employees, of and from all causes of action, suits, debts,
15 covenants, contracts, promises, agreements, proceedings,
16 investigations, damages, judgments, claims and demands
17 whatsoever in law or equity, whether based on contract, tort
18 (including negligence), or otherwise, except for actions to enforce
19 rights granted by this Agreement or arising from the performance
20 of Combustion's obligations under this Agreement, which the
21 Participants severally or jointly, or any of their predecessors,
22 subsidiaries, affiliates or their predecessors, ever had, now has or
23 hereafter shall or may have, now known, suspected or able to be
24 known in the exercise of due care by any of them for, upon or
25 related in any way to those components of SONGS 2 and 3 listed
26 in Appendix A to this Agreement.²⁷

27 The only exceptions from this broad release were for actions to enforce rights
28 granted by the settlement agreement or arising from the performance of
29 Combustion Engineering's obligations under the agreement.

²⁷ Exhibit ___ DAS-6, at page 7.

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1 **Q. What components were included in this release?**

2 A. The release covered claims related to the following SONGS NSSS equipment²⁸:

- 3 1. Steam Generators
- 4 2. Plant Monitoring System
- 5 3. Fill and Drain Valves (SIT)
- 6 4. Reactor Coolant Pumps
- 7 5. Reactor Trip Switchgear
- 8 6. Mineral Insulated Unit 2 – Twin Pin Cable Connectors
- 9 Mineral Insulated Unit 3 – Twin Pin Cable Connectors
- 10 7. Unit 3 Containment Penetration #87 Cable Connectors
- 11 8. In-core Instrument Thimbles
- 12 9. Letdown Valves
- 13 10. Steam Bypass Valves
- 14 11. Atmospheric Dump Valves
- 15 12. Stickey Grippers – CEDMs
- 16 13. Pressurizer Spray Valves
- 17 14. Foxboro Transmitters
- 18 15. Pressurizer Instrument Nozzle Tap Weld.

19 **Q. Has SCE provided any analyses or other assessments showing that the 1987**
20 **settlement agreement and the broad release it granted to Combustion**
21 **Engineering for future claims related to these 15 components were**
22 **reasonable?**

23 A. No. TURN asked SCE to provide copies of any analyses, assessments,
24 correspondence, evaluations, reports and studies which showed that this
25 settlement was reasonable and prudent. Instead of providing the requested
26 materials, SCE merely referred to its responses to Data Request TURN-SCE-02

²⁸ Appendix A to Exhibit ___ DAS-6.

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1 Questions 1C, 8 and 24.²⁹ However, none of these three responses to which
2 TURN was referred by SCE provided any of the requested materials.

3 In the response to Question 1C, SCE refused to provide any documents
4 whatsoever, claiming that all such materials protected by the attorney-client
5 privilege and the attorney work product doctrine.³⁰ The response to Question 24
6 merely provided copies of the December 1987 and March 1993 settlements but no
7 other documents. Finally, none of the materials provided in the response to
8 Question 8 included the specific documents that had been requested in Question
9 81.b., that is, materials that showed that the terms of the December 1987,
10 including the release granted to Combustion Engineering, were reasonable and
11 prudent.

12 **Q. [REDACTED?]**

13 A. [REDACTED]

14

15 **Q. What were the terms of the [REDACTED]?**

16 A. [REDACTED]

17

18

19 **Q. What was the duration of this [REDACTED]?**

20 A. [REDACTED]

21

22

²⁹ Data Request Set No. TURN-SCE-02 Question 81.b., included in Exhibit ___DAS-4.

³⁰ Data Request Set No. TURN-SCE-02 Question 1C, included in Exhibit ___DAS-4.

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1 [REDACTED]

2

3 **Q. What event(s) defined acceptance of the NSSS by the SONGS owners?**

4 A. [REDACTED]

5

6

7 **Q. Has SCE said when these [REDACTED] expired?**

8 A. No. SCE refused to provide this information in response to a TURN data request.

9 **Q. Is it nevertheless possible to determine the approximate time when the steam**
10 **generator warranties in the SONGS NSSS Contract expired?**

11 A. [REDACTED]

12

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19 **Q. Have you seen any evidence that suggests that such a tolling or stand-still**
20 **agreement was executed?**

21 A. Yes. SCE's response to AGLET Data Request Set One Question 15 states that the
22 Company and Combustion Engineering entered into a standstill agreement in
23 1986 as they continued negotiations.

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1 **Q. Did the NSSS Contract provide for a design or expected useful service life for**
2 **the SONGS NSSS?**

3 A. [REDACTED]³¹
4
5
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11

12 **Q. Were the SONGS units designed to allow the replacement of the steam**
13 **generators?**

14 A. No. SCE explained at several points in its testimony that the SONGS units were
15 not designed to accommodate steam generator replacement.³²

16 **Q. [REDACTED]?**

17 A. Yes. An August 9, 1990 letter from SCE to Combustion Engineering noted that
18 the NSSS Contract “specified a unit design life of 40 years and that all NSSS
19 items not easily replaced or repaired would be capable of performing their
20 intended functions throughout the 40 years without more than routine
21 maintenance.”³³

³¹ Exhibit ___ DAS-9 Confidential, at page A-62.

³² For example, see SCE-1, at page 5, line 4 and SCE-3, Part 1, at page 3, lines 14-15.

³³ Exhibit ___ DAS-10.

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1 **Q. If the SONGS Unit 2 and 3 steam generators are replaced in 2008 and 2009**
2 **as SCE now proposes what will have been their actual operating lives?**

3 A. If the steam generators are replaced in 2008 and 2009 their actual operating lives
4 will have been only 25 years, or only about [] percent of the [] year design lives
5 [REDACTED].

6 **Q. Was steam generator tube degradation recognized as a serious problem for**
7 **PWRs by the years 1985-1987?**

8 A. Yes. Steam generator tube degradation was very widespread by the early 1980s.
9 For example, an NRC report issued in early 1982 noted that approximately 32 of
10 the 40 licensed Combustion Engineering and Westinghouse designed PWRs in the
11 U.S. had already experienced some degree of tube degradation.³⁴

12 Similarly, a study presented by Mr. Gary Doughty of Janus Management
13 Associates to the Maryland and Arkansas Public Service Commissions showed
14 that by 1982, only 4 of the 57 PWRs that had operated for more than five years
15 had not reported any steam generator corrosion problems.³⁵ Mr. Doughty's study
16 also showed that by 1984, only 7 of the 71 PWRs that had operated for more than
17 five years had not reported any steam generator corrosion problems. In other
18 words, more than 90 percent of the PWRs that had operated for more than five
19 years as of 1984 had experienced such problems. It is significant that the
20 substantial majority of these PWRs had steam generators with Alloy 600 MA
21 tubes.

22 In fact, by the late 1970s there was a substantial body of publicly available
23 evidence which showed that any operator of a nuclear power plant that had steam
24 generators with design features and materials like those at SONGS 2 and 3 (most

³⁴ Exhibit___DAS-11, at page 2.

³⁵ Mr. Doughty was SCE's witness on steam generator tube issues in Application A.04.01.009. Copies of the pages from Mr. Doughty's 1998 testimony before the Arkansas Public Service Commission that discuss this study are included as Exhibit___DAS-12.

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1 significantly tubes fabricated from Alloy 600 MA) could expect unpleasant
2 surprises and significant problems with this equipment well before the expected
3 end of their facilities' projected 40 year service lives.

4 **Q. Was it possible to predict which mechanisms would affect individual power**
5 **plants or the timing or extent to which a particular unit would be affected by**
6 **tube degradation?**

7 A. No. It was generally recognized by the mid-1980s that the longer that tubes
8 fabricated from Alloy 600 MA were in operation, they more likely they were to
9 experience some form of degradation. However, it was not possible to
10 specifically predict, with any precision, which degradation mechanism would
11 affect individual power plants, the time when such degradation would occur in a
12 specific steam generator, or the extent to which the tubes in a specific power plant
13 would experience problems.

14 **Q. Had any Combustion Engineering designed steam generators experienced**
15 **tube degradation problems by the years 1985-1987?**

16 A. Yes. According to EPRI data, each of the Combustion Engineering designed
17 PWRs in the U.S. experienced some tube degradation by 1986.

18 For example, according to EPRI data, through the end of 1986, St. Lucie Unit 1
19 had been forced to plug, sleeve or otherwise repair 1,511 tubes, or approximately
20 8 percent of the 17,038 tubes in both of the unit's steam generators. Seven
21 hundred and thirty four of these repairs were due to Stress Corrosion Cracking.

22 Similarly, by the end of 1986, over 4,000 tubes in the two steam generators at the
23 Palisades PWR had been plugged or sleeved. Almost 7,000 tubes in Millstone
24 Unit 2 had been similarly plugged or sleeved.

25 In addition, in early 1987, one of the Millstone Unit 2 steam generators
26 experienced a tube leak due to Outside Diameter Circumferential Cracking. This
27 type of defect represented a more serious safety concern than axial cracking and
28 was believed to be capable of spreading to other tubes in the plant's original

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1 steam generators. The discovery of this Outside Diameter Circumferential
2 Cracking spurred the plant's owners to authorize in late 1987 the purchase of
3 replacement steam generators.

4 **Q. Were there any design differences which would have suggested that SONGS**
5 **2 and 3 might not be as susceptible to the tube degradation problems**
6 **experienced by these other Combustion Engineering designed nuclear power**
7 **plants?**

8 A. There were some design differences between SONGS and the Palisades plant. For
9 example, for the first few years of operations at Palisades, the plant's steam
10 generators were operated on a different secondary water chemistry control
11 ("phosphate control") than was used at SONGS. Palisades also had drilled tube
12 support plates (instead of the more open eggcrate designs at SONGS and other
13 Combustion Engineering plants) which was thought to render them more
14 susceptible to denting. However, denting also was experienced at plants, such as
15 Millstone Unit 2, which had the more open eggcrate tube support plates.

16 However, it was clear by the 1980s that the fact that the SONGS Unit 2 and 3
17 steam generators might have some design features that might make them less
18 susceptible to certain degradation mechanisms did not guarantee that they would
19 not suffer any tube degradation or that they would even be able to avoid
20 significant problems. The use of Alloy 600 MA tubes and carbon steel tube
21 support plates represented inherent defects that still rendered the SONGS Unit 2
22 and 3 steam generators susceptible to significant tube degradation.

23 **Q. Was steam generator tube degradation recognized as a potentially significant**
24 **economic issue by the mid-1980s?**

25 A. Yes. The industry recognized the potentially serious economic consequences of
26 steam generator tube problems for utilities and their ratepayers. For example, a
27 "Nuclear Unit Operating Experience, 1983-1984 Update" report issued by EPRI
28 in 1985 noted that during the two year period 1983-1984, U.S. PWRs had lost
29 4.80 percentage points in their capacity factors due to steam generator tube

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1 problems, although the study predicted that these losses should decrease some in
2 future years.³⁶

3 **Q. Was the nuclear industry aware by the mid-1980s of the problems being**
4 **experienced by Alloy 600 MA steam generator tubes?**

5 A. Yes. Starting in the mid-1970s the NRC issued a number of reports, notices and
6 bulletins to licensees concerning steam generator tube operating experience and
7 corrosion. For example, the NRC issued the following NUREG reports between
8 1979 and 1984:

- 9 ▪ *Summary of Operating Experience with Recirculating Steam Generators,*
10 NUREG-0523, issued in January 1979.
- 11 ▪ *Steam Generator Tube Experience,* NUREG-0886, issued in February
12 1982.
- 13 ▪ *Steam Generator Operating Experience Update 1982-1983,* NUREG-
14 1063, issued in June 1984.

15 These reports gave licensees summary information about steam generator
16 operating experiences and the various degradation mechanisms that were
17 affecting steam generators, including those with Alloy 600 MA tubes.

18 The NRC also issued a number of Information Notices and Bulletins which
19 reported on events at individual plants. For example, the NRC issued Information
20 Notice No. 84-49 on June 18, 1984 to all PWR facilities holding operating
21 licenses or construction permits. The Information Notice was titled “Intergranular
22 Stress Corrosion Cracking Leading to Steam Generator Tube Failure.” The NRC
23 stated this notice was being provided as notification of potentially significant
24 problems pertaining to the operation and inservice inspections of steam generators
25 in PWR systems. It reported on a tube failure that had occurred at the
26 Combustion Engineering designed Fort Calhoun nuclear power plant.

³⁶ Exhibit___DAS-13.

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1 At the same time, nuclear industry publications also were reporting on the
2 operating experience of steam generators with Alloy 600 MA tubes. For example,
3 the journal *Nuclear Safety* published a series of annual articles from 1975 through
4 the early 1980s on “Steam Generator Tube Performance: Experience with Water-
5 Cooled Nuclear Power Plants” during each year. These articles provided
6 summary information on the operational problems that had been experienced at
7 individual plants as well as overviews of the various degradation mechanisms that
8 were affecting steam generators around the world, including those with Alloy 600
9 MA tubes.

10 Articles, papers and presentations by industry, government and academic
11 researchers also reported on Alloy 600 alloy steam generator tube degradation due
12 to both known and emerging damage mechanisms. For example, an October 1981
13 article in a special edition of the journal *Nuclear Technology* devoted to Materials
14 Performance in Nuclear Steam Generators noted that:

15 Major corrosion problems have been experienced in operating
16 steam generators resulting from a combination of inadequate
17 design and fabrication, non-optimized secondary plant design and
18 materials of construction, and poor operating practice.
19 Development work, sponsored in large part by the [Steam
20 Generator Owners Group], has helped to identify the causes and
21 mechanisms for several different problems and will continue to
22 investigate other corrosion events experienced more recently.
23 Operating plants are responding to suggested corrective measures
24 and continue to make major changes in plant design and operating
25 practice. In addition, steam generator vendors have given great
26 attention to deficiencies in design and materials and have
27 developed new model steam generators that are expected to
28 provide significantly greater margin during operation.

29 No quick and easy cures have been or likely to be discovered. As
30 a consequence, efforts will continue to identify, characterize,
31 minimize, and solve these problems. Additional work in
32 continuing to quantify new areas where the potential for corrosion
33 or mechanical damage exists, so that utilities will have the

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1 information they require to optimize their steam generators for
2 maximum serviceability over their design life.³⁷

3 Similarly, a paper presented in August 1983 at an International Symposium on the
4 environmental degradation of materials in nuclear power systems, sponsored by
5 the American Nuclear Society and the National Association of Corrosion
6 Engineers, reported that while the older problems of denting, resulting from the
7 corrosion of the carbon steel plates and tubesheets, and wastage, resulting from
8 poor operating chemistry with phosphate water chemistry control, appear to be
9 somewhat alleviated resulting from improvements in operation and design,
10 “newer problems had arisen associated primarily with corrosion of the Alloy 600
11 tubing both from the inside and outside surfaces.”³⁸

12 **Q. Were these the only articles and papers that you could find from the early-to-**
13 **mid 1980s that addressed steam generator degradation problems?**

14 A. No. A visit to any large engineering library would produce literally hundreds of
15 similar articles in nuclear and corrosion industry journals and papers from nuclear
16 and corrosion industry conferences in the 1970s and 1980s on steam generators
17 and related issues.

18 **Q. What are the most common forms of tube degradation being experienced at**
19 **SONGS 2 and 3?**

20 A. SCE has testified that the four most common forms of tube degradation currently
21 observed at SONGS 2 and 3 are: (1) stress corrosion cracking; (2) intergranular

³⁷ “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.

³⁸ “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.

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1 attack stress corrosion cracking; (3) denting, and (4) flow-induced vibrations
2 causing tube wear to occur.³⁹

3 **Q. Was each of these identified as an existing tube degradation mechanism by**
4 **the mid-1980s?**

5 A. Yes. Attached as Exhibit ___ DAS-11 are several pages from NUREG-0886
6 which was published by the NRC in February 1982. These pages identified
7 Denting, Fretting (another term for wear caused by flow-induced vibrations),
8 Intergranular Attack, and Stress Corrosion Cracking were among “the primary
9 modes of steam generator tube degradation observed” at that time.

10 **Q. Has SCE said when it became aware that the materials used in steam**
11 **generators were susceptible to these degradation mechanisms?**

12 A. SCE has said that it realized in 1970s that the carbon steel material used to
13 fabricate the SONGS 2 and 3 steam generator tube support plates was susceptible
14 to corrosion resulting in support plate denting of tubes in the steam generators.⁴⁰
15 SCE also has said that it realized in the early 1980s that Alloy 600 was
16 susceptible to stress corrosion cracking.⁴¹ However, SCE has said that it
17 anticipated that SONGS 2 & 3 design features and new EPRI and Combustion
18 Engineering water chemistry controls would substantially mitigate the
19 degradation that had affected earlier design steam generators.

20 **Q. Is it reasonable to expect that SCE became aware of the susceptibility of**
21 **Alloy 600 MA tubes to various degradation mechanisms through its**
22 **ownership/operation of SONGS Unit 1?**

23 A. Yes. SCE was not an inexperienced nuclear power plant owner/operator when
24 SONGS 2 and 3 began commercial operations in 1983 and 1984. Instead, SCE

³⁹ Exhibit SCE-2, at page 17, lines 1-3.

⁴⁰ SCE response to Data Request Set TURN-SCE-02 Question 35.

⁴¹ SCE response to Data Request Set TURN-SCE-02 Question 34.

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1 had already operated SONGS Unit 1, a PWR with Alloy 600 MA tubes, for more
2 than a decade and had already experienced significant tube problems at that plant.

3 **Q. Had any domestic U.S. nuclear power plants already replaced their original**
4 **steam generators by the mid-1980s?**

5 A. Yes. By the mid-1980s, steam generators with Alloy 600 MA tubes had already
6 been replaced at six U.S. operating nuclear power units, none of which had been
7 in operations for more than 13 years before the replacements were made.⁴²

8 **Q. Were other steam generator replacements already planned or announced by**
9 **that time?**

10 A. Yes. By 1987, the owners of a number of domestic U.S. PWRs had announced
11 plans for replacing their steam generators or had actually started the procurement
12 process. For example, articles in nuclear industry publications during 1985
13 through 1987 noted that the steam generators were going to be replaced at Cook
14 Unit 2 and Indian Point 3 and that Con Edison had ordered replacement steam
15 generators for Indian Point 2. The Palisades PWR already had obtained
16 replacement steam generators as part of the 1977 settlement of its lawsuit against
17 Combustion Engineering. In addition, the owners of another Combustion
18 Engineering, Millstone Unit 2, had started talking to vendors about possibly
19 obtaining replacement steam generators due to the tube degradation that plant was
20 experiencing.

⁴² These power plants were Surry Units 1 and 2, Turkey Point Units 3 and 4, Point Beach Unit 1, and Robinson Unit 2.

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1 **Q. Is it your testimony that based on this information SCE should have**
2 **purchased replacement steam generators for SONGS 2 and 3 before 1987**
3 **and started planning for the removal of the original steam generators and the**
4 **installation of the replacement units?**

5 A. No. That is not my testimony. Instead, I believe that based on this information
6 SCE had the responsibility to take every reasonable action to ensure that
7 Combustion Engineering, the vendor for the SONGS 2 and 3 steam generators,
8 would bear as large a share as possible of the inevitable costs of repairing the
9 original steam generators and, ultimately, of the costs of purchasing and installing
10 replacement steam generators.

11 Unfortunately, SCE did not do this.

12 **Q. Is it your testimony that SCE was unreasonable for seeking compensation**
13 **from Combustion Engineering in 1985 for costs related to the issues of the**
14 **improper annealing of certain steam generator tubes and wear from the flow**
15 **induced vibration of the batwing supports?**

16 A. No. SCE certainly was reasonable in seeking compensation from Combustion
17 Engineering for the costs related to these two problems.

18 However, at the same time it did so, SCE should have sought similar protection
19 and compensation from Combustion Engineering against costs that would be
20 incurred from the other degradation mechanisms that were known to affect steam
21 generators with Alloy 600 MA tubes and carbon steel tube support plates and that
22 SCE knew could affect the SONGS 2 and 3 steam generators. By doing so, SCE
23 would have protected ratepayers by ensuring that the vendor, who was responsible
24 for the design of and the selection of materials for the steam generators, would
25 bear the costs of repairing and ultimately replacing those units if they failed to
26 achieve the 40 year design lives specified in the NSSF Contract.

27 But, instead of taking such actions against the vendor of the steam generators, in
28 the 1987 Settlement, the Company granted Combustion Engineering a broad

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1 release that freed CE from liability for future steam generator costs resulting from
2 steam generator tube degradation-related claims that were known in late 1987,
3 were suspected or were able to be known at that time through the exercise of due
4 care. This was not reasonable given the information available to SCE at that time.

5 **Q. What standard have you applied in your review of the reasonableness and**
6 **prudence of SCE's efforts to pursue legal remedies and seek compensation**
7 **from Combustion Engineering?**

8 A. I have employed the standard commonly used in regulatory reviews of the
9 reasonableness and prudence of utility actions. This standard requires that the
10 utility's decisions and actions be evaluated in light of the information that was
11 available to it in the pertinent time frame. Information which is available through
12 hindsight is given no weight. This standard is based on judgments concerning
13 how reasonable persons, with the skill and knowledge attributed to reasonable
14 utility managers should have been expected to cope with the circumstances
15 confronting SCE.

16 **Q. By the time that SCE executed the 1987 settlement did SCE have reasonable**
17 **notice that the CPUC expected the company to aggressively pursue**
18 **compensation from vendor for equipment problems before passing costs**
19 **along to ratepayers?**

20 A. Yes. The CPUC's actions concerning SCE's then recent attempts to secure
21 compensation from Westinghouse for steam generator related costs at the SONGS
22 Unit 1 plant should have given the Company notice that the Commission expected
23 it to aggressively seek compensation from vendors rather than ratepayers. In fact,
24 in March 1983, the CPUC had required SCE and SDG&E to initiate litigation
25 against Westinghouse over steam generator problems and costs at SONGS 1.

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

27 A. When SONGS 1 was shut down for a refueling outage in 1980, Edison discovered
28 that a significant number of steam generator tubes had sustained degradation from

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1 a mechanism known as Intergranular Attack (“IGA”). Edison decided to perform
2 a process know as sleeving the degraded tubes in order to return SONGS 1 to
3 service.

4 This sleeving cost \$70.8 million. Edison sought to recover its 80% share of this
5 amount, or \$56.6 million, from ratepayers in Application 60321. The
6 Commission withheld final judgment of this issue and deferred it to Application
7 61138.

8 Public Staff reviewed the reasonableness of Edison’s actions and agreed that
9 sleeving was the only reasonable choice. Staff also agreed that the repair
10 operation was performed reasonably and prudently. However, the Staff witnesses
11 recommended that Edison only be permitted to recover \$26 million of the cost of
12 the sleeving and that this \$26 million be expensed over a four-year period rather
13 than capitalized and included in rates.⁴³ This rate treatment would have shared
14 the cost of the sleeving project between shareholders and ratepayers rather than
15 requiring that the entire cost be borne by ratepayers. As explained by the CPUC
16 in its decision in Application 61138:

17 The staff engineer gave the opinion that Westinghouse Electric
18 Corporation (Westinghouse), the manufacturer of the equipment,
19 was responsible for the degradation of the tubing in the steam
20 generators because of its faulty design of the sludge removal
21 system. He was cross-examined on the question of whether or not
22 Westinghouse should share a part of the expense burden, and he
23 replied that others had brought suit against Westinghouse for the
24 identical problem and that Edison should consider suing as a
25 means of recovering the disallowed portion of the sleeving cost.
26 Specifically, staff cited complaints for damages brought by
27 Virginia Electric Power Company, Florida Power & Light (FP&L),
28 Wisconsin Electric, and Consumers Power Company in Michigan
29 against suppliers of steam generators. Settlement was reached in all
30 but the FP&L case which is still pending. The engineer went on to
31 state that a report should be prepared which would analyze

⁴³ CPUC Decision No. 82-12-055, dated December 13, 1982, at page 55. A copy of this CPUC Decision is included as Exhibit____DAS-16.

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1 Edison’s legal position and whether Edison could in good faith file
2 a lawsuit, and that if the report showed that Edison could not in
3 good faith file a lawsuit, the staff would recommend that the entire
4 amount of the sleeving cost be capitalized and allowed in rates.⁴⁴

5 In response, Edison presented a legal expert who testified that the probability that
6 Edison would recover from Westinghouse for the cost of restoring the steam
7 generators was extremely small, i.e., less than one chance in 20,000.⁴⁵ Staff
8 disagreed, arguing that it was not at all certain that Edison would have no chance
9 of winning a lawsuit against Westinghouse. Staff cited the success that other
10 utilities had achieved in similar circumstances.⁴⁶ Edison responded by saying that
11 the actions by other utilities in other jurisdictions was irrelevant, unless the law in
12 the other jurisdictions was the same as California law and the facts were related to
13 the SONGS 1 tube failures. Edison also pointed out that the staff had provided no
14 analysis or evidence of either the law or facts involved in the other litigation.⁴⁷

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

21 Even absent unreasonable conduct on Edison’s part, it is
22 conceivable that rate recovery of all or a part of the repair costs
23 should be deferred, pending a determination of Edison’s prospects
24 of recovering such costs from Westinghouse.

25 Based on the showing, described above, by the staff and by a legal
26 expert engaged by Edison, we find our record inadequate to
27 determine whether Edison could successfully sue Westinghouse

⁴⁴ Exhibit ___ DAS-16, at page 56.

⁴⁵ Exhibit ___ DAS-16, at page 57.

⁴⁶ Exhibit ___ DAS-16, at page 57.

⁴⁷ Exhibit ___ DAS-16, at page 57.

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1 under any of the various legal theories discussed on that record.
2 We share our staff's concern, however, as to the narrow range of
3 potential legal options considered by Edison's witness.

4 * * * *

5 We are concerned that Edison's evaluation of and action on its
6 legal options in the present circumstances may not match what
7 would be expected of an unregulated business corporation, faced
8 with a similar extraordinary operational failure but without the
9 financial backstop of utility ratepayers. Edison has hired counsel to
10 testify before this Commission as to a variety of reasons why a
11 successful suit is unlikely. A major risk averted too is that the
12 statute of limitations may already have run on any claim Edison
13 may have had. The record also suggests, however, that the statute
14 of limitations may still be running and, in fact, may shortly be
15 running out. In addition, retaining counsel to impugn its own
16 litigation prospects on an official hearing record could prove
17 harmful to the interests of Edison and its ratepayers.

18 For these reasons, we are not satisfied that Edison has acted
19 prudently in evaluating and pursuing its legal options in relation to
20 Westinghouse's potential liability. On the other hand, we cannot
21 say that Edison has been imprudent; nor do we wish to induce this
22 or any utility to pursue frivolous or pointless litigation. Therefore,
23 we will not, at this time, disallow recovery of any portion of the
24 SONGS Unit 1 sleeving expense. We will, however, retain the
25 ability and the option to disallow an appropriate share of such
26 expense, if warranted, at a later date, and we will secure the means
27 to complete the necessary evaluation.⁴⁸

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

33 Our decision to allow Edison to begin recovery of its sleeving
34 costs comes only after much deliberation. Although we have not
35 adopted a risk allocation theory in this instance we believe that a

⁴⁸ Exhibit ___ DAS-16, at pages 57-60.

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1 case can be made that, in terms of risk allocation, shareholders
2 should not necessarily be immune from the costs of an
3 extraordinary occurrence such as the one at SONGS Unit 1 even if
4 imprudence has not been shown. Our decision does not foreclose
5 us from adopting a risk allocation theory in a future proceeding.

6 Further, we have seriously considered disallowing half of the
7 sleeving costs, for the reason that Edison has not finally persuaded
8 us that it has acted prudently in failing to pursue its legal remedies
9 against Westinghouse. As noted above, we are not persuaded that
10 the legal expert retained by Edison has thoroughly evaluated the
11 utility's prospects for successful litigation against Westinghouse.⁴⁹

12 Thus, the CPUC put Edison on notice that it was directing its General Counsel to
13 examine what legal remedies Edison had in the past or had against Westinghouse
14 at that time to recover all or part of the costs associated with the sleeving of
15 SONGS Unit 1.⁵⁰ The CPUC also put Edison on notice that if it found that
16 Edison should pursue its present legal remedies against Westinghouse, the utility
17 would be expected to do so. Finally, the CPUC warned that "if Edison has failed
18 in the past or fails in the future to pursue those remedies with adequate vigor, we
19 will disallow an appropriate amount of the sleeving costs."⁵¹

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

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

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

⁴⁹ Exhibit___DAS-16, at page 62.

⁵⁰ Exhibit___DAS-16, at page 62.

⁵¹ Exhibit___DAS-16, at page 62.

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

3 3. The factual record before the CPUC in Application 61138 was very
4 incomplete and did not form an adequate basis for evaluating Edison's
5 chances of success in litigation against Westinghouse.⁵²

6 Consequently, the CPUC said that it could no longer find that Edison had made a
7 prima facie case for not filing a lawsuit. Therefore, the CPUC warned Edison that
8 "we expect Edison to file a suit against Westinghouse as soon as possible, but no
9 later than April 7, 1983, and to vigorously pursue said litigation in good faith."⁵³
10 The CPUC further warned that "if Edison fails to file suit it will have a heavy
11 burden of showing the reasonableness of such action at its next attrition
12 adjustment proceeding or ECAC proceeding."

13 **Q. When did Edison file its lawsuit against Westinghouse?**

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

15 **Q. What claims did SCE and SDG&E attempt to litigate against Westinghouse?**

16 A. After being directed to do so by the CPUC, SCE and SDG&E filed a lawsuit
17 against Westinghouse in March 1983. The utilities' initial complaint pled ten
18 steam generator-related causes of action against Westinghouse:

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

22 2. Westinghouse was required by law to repair the deficiencies in the
23 SONGS 1 steam generators, or replace the equipment at its own expense,

⁵² 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-17.

⁵³ Exhibit ___ DAS-17, at page 2.

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- 1 to compensate Edison and SDG&E for all loss, damage or expense
2 incurred as a result of the defects.
- 3 3. Westinghouse negligently breached its duty to exercise reasonable care in
4 the design, engineering, fabrication, manufacture, installation, inspection,
5 and maintenance of the SONGS 1 steam generators. Westinghouse also
6 breached its duty to exercise reasonable care in its duty to provide
7 instructions for water chemistry, operation and maintenance.
- 8 4. Westinghouse negligently breached its duty to exercise due care by
9 negligently representing, among other things, that the SONGS 1 steam
10 generators would have a useful life in excess of thirty years, when in fact
11 said generators were inoperable after twelve years.
- 12 5. The steam generators at SONGS 1 were defective in that they were
13 unreasonably prone to corrosion, leakage and deterioration, among other
14 things.
- 15 6. Westinghouse had breached its continuing duty to advise of all
16 information, data, engineering, design, and maintenance developments
17 related to its agreement and undertaking to provide steam generators with
18 a useful life of at least thirty years.
- 19 7. Westinghouse had failed and refused to correct its work, acknowledge its
20 liability or indemnify Edison or SDG&E.
- 21 8. Westinghouse breached the express warranties that the design,
22 engineering, manufacture and installation of the SONGS 1 steam
23 generators would operate as required.
- 24 9. Westinghouse breached the implied warranty that the SONGS 1 steam
25 generators would be of merchantable quality and free from defects for
26 their intended uses and purposes.

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1 10. Westinghouse had failed to disclose knowledge and data that the
2 deterioration and degradation of the SONGS 1 steam generators could
3 occur and was occurring.⁵⁴

4 SCE and SDG&E amended their complaints over time to also include causes of
5 action related to steam generator inspection and sludge removal services
6 performed by Westinghouse pursuant to a series of agreements entered into in
7 1973 through 1980.⁵⁵

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

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

⁵⁴ *Complaint*, Southern California Edison v. Westinghouse Electric Corporation, March 31, 1983.

⁵⁵ 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.

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

3 A. Edison filed a lawsuit against Westinghouse in April 1976 seeking \$191,938 in
4 damages related to steam generator tube leaks that had been experienced at
5 SONGS 1 between October 13, 1971 and April 29, 1974. This case was settled in
6 1978. In consideration for the supply of a plant system that Public Staff later
7 valued at about \$43,500, Edison released all claims including, but not limited to,
8 claims that Westinghouse did, in steam generators performed under the contract
9 between the parties of January 11, 1963, perform all contract obligations due
10 under said contract; that Westinghouse was negligent and reckless in the design,
11 fabrication, manufacture, assembly, supply, delivery, and sale of the SONGS 1
12 generators; that Westinghouse both negligently and intentionally misrepresented
13 various facts concerning the steam generators; that Westinghouse expressly
14 warranted the steam generators and failed to honor these warranties; that
15 Westinghouse impliedly warranted the steam generators both as to
16 merchantability and fitness for purpose and failed to honor these warranties; and
17 the Edison was due any sums, services, or things stemming from these claims,
18 demands, or causes of action.

19 **Q. What were the terms of the release that SCE granted to Westinghouse in**
20 **1978?**

21 A. The SCE-Westinghouse Release of September 12, 1978 read as follows:

22 Release of All Claims

23 In consideration for the supply of one "Reactor Cavity Filtration
24 System" for use at the San Onofre #1 Nuclear Generating Station
25 as referenced in the Westinghouse quotation letter of August 24,
26 1978, RELEASORS for themselves, their predecessors, successors,
27 and assigns, release and forever discharge RELEASEE, its
28 predecessors, successors, and assigns from any and all claims,
29 demands, and causes of action that RELEASORS may now have
30 or that might subsequently accrue to RELEASORS arising out of
31 or connected with, directly or indirectly, those events and actions
32 alleged in the various counts of RELEASOR's Complaint No.

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1 C150027 as filed in the Superior Court of the State of California
2 for the County of Los Angeles on February 2, 1976; accordingly,
3 said Complaint No. C150027 is incorporated by reference into the
4 RELEASE for greater certainty. These claims, demands, and
5 causes of action include, but are not limited to, claims that
6 RELEASEE did not, in steam generators supplied under the
7 contract between the parties of January 11, 1963, perform all
8 contract obligations due under said contract, that RELEASEE was
9 negligent and reckless in the design, fabrication, manufacture,
10 assembly, supply, delivery, and sale of said generators; that
11 RELEASEE both negligently and intentionally misrepresented
12 various factors concerning said steam generators; that RELEASEE
13 expressly warranted said steam generators and failed to honor said
14 warranties; that RELEASEE impliedly warranted said steam
15 generators both as to merchantability and fitness for purpose and
16 failed to honor said warranties; and that RELEASORS are due any
17 sums, services, or things stemming from these claims, demands, or
18 causes of action.⁵⁶

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

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

26 Edison had undertaken a \$70 million sleeving repair, and there
27 arose the question of who should pay for the repair. The available
28 parties were the ratepayers, the shareholders, and Westinghouse. In
29 fairness, Westinghouse should bear that cost. That company
30 manufactured the steam generator tubes which failed less than
31 halfway through (12 years) their expected minimum life of 30
32 years. The lawsuit was the one practical means of shifting the cost
33 burden of tube failure from ratepayers to Westinghouse.⁵⁷

⁵⁶ Exhibit ___ DAS-18.

⁵⁷ *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-19.

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

3 In a competitive market, a company which acts imprudently is
4 forced by the market to pay for its imprudence. The company may
5 choose to raise the price of its products. In that case, the company
6 loses sales to competing firms which have not been imprudent and
7 have not been forced to raise prices. The company may choose to
8 maintain its price at the same level to meet its competition. In that
9 instance, the company’s penalty for imprudence is reflected in
10 reduced profit per sale. The costs of imprudence are borne by the
11 company’s shareholders, not by its customers. The self-regulating
12 character of competitive markets mandates that result.

13 Here, there is no competition in the sale of electricity. Edison and
14 SDG&E have been granted franchises to sell electricity, on
15 monopoly bases, in specific geographical areas. If a residential
16 customer living in Edison’s franchise area desires electrical
17 service, he must purchase electricity from Edison or do without it.

18 Accordingly, regulation must protect electricity customers from
19 bearing the costs of imprudence, because competition is
20 unavailable to do so. This Commission has always recognized its
21 responsibilities to protect customers from the costs of imprudent
22 acts. Thus, the Commission disallows costs – both expenses and
23 rate base items – when they are excessive or otherwise
24 unreasonably incurred...

25 The Commission, then, protects customers of regulated utilities
26 from imprudent acts. What is prudence and imprudence. Prudence
27 is defined as “[c]arefulness, precaution, attentiveness, and good
28 judgment, as applied to action or conduct.” Black’s Law
29 Dictionary, Revised Fourth Edition. Imprudence may be deemed
30 the absence or opposite of those characteristics.

31 Under this or any other accepted definition, Edison has been
32 imprudent. To put it mildly, the company’s acts have been
33 careless, rash, inattentive, and in poor judgment. Staff will
34 demonstrate in parts A and B below the specific acts which
35 constituted imprudence and which directly led to summary
36 judgment against Edison and SDG&E in their litigation against
37 Westinghouse.

38 The imprudence to be discussed here relates to acts occurring
39 before the Westinghouse suit which later adversely affected the

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1 suit. Staff takes no position now as to whether Edison and
2 SDG&E, once the suit was filed, have aggressively and
3 competently pursued the suit. Staff reserves the right to later
4 review, if necessary, the actions of Edison and SDG&E in the
5 Westinghouse litigation. There is no need for that review now,
6 however. After Edison's imprudence had run its course, the very
7 finest trial efforts most likely would not have salvaged the
8 Westinghouse litigation.⁵⁸

9 In part A of its Motion, the Public Staff cited the numerous statements by Edison
10 before the CPUC that later were cited by Westinghouse in its Motion for
11 Summary Judgment of the lawsuit. Staff also explained why Edison's statements
12 were "highly imprudent" and "potent weapons for Westinghouse."⁵⁹

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

30 * * * *

31 No prudent company would ever dare to judge its litigation
32 prospects on information, investigations, and opinions supplied by
33 its future litigation adversary. Yet this is exactly what Edison has
34 done. Edison has received from Westinghouse the information
35 that litigation prospects against Westinghouse were extremely

⁵⁸ Exhibit___DAS-19, at pages 12 and 13.

⁵⁹ Exhibit___DAS-19, at pages 14 and 15.

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1 poor, and then Edison parroted that information to the Commission
2 for Westinghouse’s later use before the Federal Court. Slapstick
3 comedies are made of such nonsense. Here, though, a \$70 million
4 bill to ratepayers inhibits any laughter.

5 * * * *

6 Edison made its pernicious statements in A.61138 in an attempt to
7 convince the Commission that the company should not sue
8 Westinghouse, because of the cost of suit to ratepayers. Edison had
9 a right to take that position. But Edison had no right, nor did it
10 have a need, to support that position with statements clearly
11 destructive to future litigation! Edison could have discussed the
12 great costs of suit without subjecting itself to the danger of judicial
13 estoppel. If it had wished to discuss the uncertainties of prevailing
14 in a lawsuit, Edison also could have done so without destroying
15 future litigation prospects. Instead, it paraded a series of specific
16 and devastating admissions for Westinghouse’s use. As
17 Westinghouse later said, “Plaintiffs stumbled over one another in
18 their efforts to prove to the PUC that Westinghouse was blameless
19 – on all counts – for the damage at SONGS 1.”⁶⁰ (emphasis in
20 original)

21 Finally, Public Staff explained that it believed that, absent Edison’s imprudence,
22 the case against Westinghouse would have been a good one.⁶¹ This conclusion
23 was based on an analysis by one of Edison’s experts and by the fact that a number
24 of the lawsuits filed against Westinghouse by other utilities had been settled:

25 These settlements may indicate knowledge by the steam generator
26 manufacturers that the complaints had some merit. The Michigan
27 suit, for example, was settled for \$30 million. This is obviously
28 not a “nuisance” settlement, but is one which reflects legal liability
29 of a steam generator manufacturer.⁶²

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

31 Some of the plaintiffs’ claims have been thrown out of those cases.
32 However, unlike the litigation here, the major claims remain intact

⁶⁰ Exhibit ___ DAS-19, at pages 18 and 19.

⁶¹ Exhibit ___ DAS-19, at pages 31 through 33.

⁶² Exhibit ___ DAS-19, at pages 33 and 34.

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1 and viable. Apparently, no employees of the New York or Florida
2 utilities felt compelled to eviscerate their companies' litigation
3 prospects with releases or unwise statements. The continued life of
4 those cases also indicates that suits by utilities against
5 Westinghouse may well be valid claims.⁶³

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

7 A. On March 20, 1985 the CPUC issued an Order re Public Staff's Motion. In this
8 Order, the CPUC directed that Edison and SDG&E cease further collections of
9 the costs of sleeving the SONGS 1 steam generator tubes.⁶⁴ The CPUC also
10 ordered that the reasonableness of sleeving costs and related issues would be
11 determined at a future time. In addition, the CPUC noted that "it is not acceptable
12 for a regulated utility to look to ratepayers as a deep pocket of first resort when it
13 arguably has an adequate remedy at law against the manufacturer of a defective
14 product."⁶⁵

15 The CPUC subsequently concluded that Edison had been imprudent in signing an
16 unnecessarily and inappropriately broad release in settlement of the 1976
17 litigation against Westinghouse. The Commission also found that "because of the
18 broad wording of the release, the riskiness of the current litigation with
19 Westinghouse has increased, and the possibility that ratepayers will be
20 compensated for sleeving and related expenses that they have borne has
21 accordingly decreased."⁶⁶

22 Consequently, the Commission decided that based on the circumstances of this
23 case, "it is reasonable that Edison and SDG&E should retain one-fourth of their
24 respective costs of the sleeving repairs and refund with interest all funds collected

⁶³ Exhibit ___ DAS-19, at page 34.

⁶⁴ CPUC Order No. 85-03-087, issued March 20, 1985, at page 8. A copy of this CPUC Order is included as Exhibit ___ DAS-20.

⁶⁵ Exhibit ___ DAS-20, at page 6.

⁶⁶ CPUC Order No. 86-09-008, issued September 4, 1986, at page 21. A copy of this CPUC Order is included as Exhibit ___ DAS-21.

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1 in excess of one-fourth of the sleeving repair costs.⁶⁷ In support of this decision,
2 the Commission explained that:

3 Under these circumstances, we believe that a fair resolution of this
4 matter is for Edison to refund \$15,853,000 (plus interest) that was
5 previously collected subject to refund and to terminate the
6 memorandum account that recorded the suspended rates related to its
7 sleeving expenses. Ratepayers have already borne a total of \$181
8 million in replacement fuel expenses and \$13.1 million of Edison's
9 sleeving costs that were collected and were not subject to refund. With
10 the disposition outlined above, Edison will be at risk for approximately
11 \$39.7 million. Any recovery that it receives from prosecution or
12 settlement of its current suit against Westinghouse will further
13 compensate it for the sleeving costs that it has not yet collected from
14 ratepayers. Given our decision today, Edison will have a direct
15 incentive to pursue the suit, and it may manage its litigation without
16 our oversight. We believe that this result is fair and reasonable under
17 the unusual circumstances of this case.⁶⁸

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

20 **Q. What was the ultimate outcome of the SCE-Westinghouse litigation over**
21 **SONGS Unit 1 steam generator costs?**

22 A. In decisions in 1987, 1989 and 1992, the Federal Courts granted Westinghouse's
23 motions for summary judgment and dismissed all of the claims presented by
24 Edison and SDG&E. The grounds which the Court cited were the terms of a 1978
25 release given by SCE to Westinghouse; the fact that the plaintiffs were judicially
26 estopped from presenting each of their claims, which are inconsistent with, and
27 contradictory to, their prior positions before the CPUC; the terms of the original
28 contract with Westinghouse and a later 1980 sleeving contract; California law
29 which barred recovery of economic losses for the claims presented by plaintiffs;

⁶⁷ Exhibit___DAS-21, at page 22.

⁶⁸ Exhibit___DAS-21, at page 19.

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1 and, the fact that Edison and SDG&E had not provided any evidence that the
2 1978 release was fraudulently induced. However,

3 [REDACTED]

4 **Q. What were the terms of this [REDACTED]?**

5 A. [REDACTED]⁶⁹

6

7

8

9 **Q. Earlier you mentioned that the SONGS owners and Combustion Engineering**
10 **had executed a second settlement on steam generator costs in 1993. Please**
11 **describe the circumstances which led to this 1993 settlement.**

12 A. Correspondence between SCE and Combustion Engineering reveal the following
13 circumstances led to the second settlement in 1993.⁷⁰

14 One of the SONGS Unit 2 steam generator components, called a feedring, failed
15 its preoperational testing in 1981. The feedrings in all of the Units 2 and 3 steam
16 generators were subsequently redesigned by Combustion Engineering.

17 Debris was discovered in the bottom of one of SONGS Unit 3's steam generators
18 during that unit's 1990 refueling outage. An investigation revealed that the
19 feedrings in both steam generators had failed. An analysis confirmed that design
20 deficiency was the root cause of the problem. Similar failures were subsequently
21 discovered in the SONGS Unit 3 steam generators.

22 SCE and Combustion Engineering later disputed which party was responsible for
23 the cost of the 1990 feedring repairs.

⁶⁹ Exhibit___DAS-22 Confidential, at page A-1.

⁷⁰ Exhibit___DAS-10.

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1 **Q. What compensation did the SONGS owners receive as part of this 1993**
2 **settlement?**

3 A. The 1993 settlement provided up to \$4 million in credits for discounts on the
4 prices of certain goods and services that SCE might purchase from Combustion
5 Engineering in future years.⁷¹

6 **Q. Have you seen any evidence that SCE has sought compensation from**
7 **Combustion Engineering for any steam generator related problems at**
8 **SONGS since 1993, including compensation for any portion of the cost of**
9 **replacing the units' steam generators?**

10 A. No. I have seen no evidence that SCE has sought compensation from Combustion
11 Engineering for any steam generator related problems since 1993 despite the
12 increasing tube degradation being experience at SONGS 2 and 3 and the planned
13 and expensive replacement of the SONGS 2 and 3 steam generators.

14 TURN asked whether SCE had exchanged correspondence or held negotiations or
15 discussions with Combustion Engineering in order to obtain backcharges or
16 damages for steam generator problems at SONGS 2 or 3.⁷² The only instances
17 referenced by SCE in its response were in 1988 and 1993.⁷³

⁷¹ Exhibit___DAS-23.

⁷² Data Request Set No. TURN-SCE-02 Question 24, included in Exhibit___DAS-4.

⁷³ The settlement agreement that SCE referenced being dated January 25, 1988 is the same settlement that the Company elsewhere has indicated as being dated December 1987.

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1 **Q. Earlier you testified that the original steam generators provided by**
2 **Westinghouse for approximately 45 nuclear units in the U.S. also had Alloy**
3 **600 MA tubes. Have any utilities sued Westinghouse over steam generator**
4 **related problems and costs?**

5 A. Yes. As shown on Table 2 below, a substantial number of utilities have sued
6 Westinghouse over the problems experienced by the steam generators at their
7 PWRs:

8 **Table 2: 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	SONGS 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

9 **Q. What were the results of those lawsuits?**

10 A. Westinghouse prevailed after a trial on the lawsuit brought by Duquesne Light &
11 Power and after arbitration by the International Chamber of Commerce of the
12 litigation brought by the Brazilian utility. Westinghouse also appears to have
13 succeeded in its motion to dismiss the claims in Public Service Electric & Gas's
14 lawsuit. The other lawsuits all settled.

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1 **Q. Did any utilities settle with Westinghouse without suing?**

2 A. Yes. Public evidence shows that a number of utilities, including Virginia Electric
3 and Power, Wisconsin Electric Power, and Southern Company, settled with
4 Westinghouse on steam generator issues without initiating lawsuits.

5 **Q. What were the terms of the settlements between Westinghouse and the**
6 **utilities that either sued or settled without suing?**

7 A. The specific terms of each of the settlements are confidential although there has
8 been some information in nuclear industry publications concerning the
9 compensation received by some of the suing utilities. For example, a June 1982
10 Associated Press report noted that Westinghouse had agreed to pay \$32.5 million
11 to Virginia Electric and Power Company, \$24 million of which was in cash with
12 the remainder in cancellation of invoices and credits for work performed.⁷⁴

13 A 1989 article in *Nucleonics Week* similarly reported that Westinghouse had
14 similarly paid \$35 million of the price of replacing the steam generators at Point
15 Beach Unit 1 in 1984.⁷⁵

16 An Associated Press article in 1998 similarly reported that Westinghouse had paid
17 the approximate \$70 million of the cost of building and shipping the replacement
18 steam generators for Carolina Power & Light Company's Harris nuclear plant as
19 part of the settlement between the two companies.⁷⁶

20 **Q. Have you reviewed the steam generator replacement "benchmarking"**
21 **studies that SCE has submitted as part of its application?**

22 A. Yes.

⁷⁴ Exhibit___DAS-24.

⁷⁵ "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-25.

⁷⁶ Exhibit___DAS-26,

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1 **Q. Do those studies show that SCE is making a reasonable effort to learn from**
2 **the experiences of other steam generator replacement projects?**

3 A. Yes. SCE appears to be making a strong effort to gather information on the
4 lessons learned from other steam generator replacement projects in order to plan,
5 manage and carry out the proposed SONGS 2 and 3 steam generator replacements
6 in an effective manner.

7 **Q. Do you believe that SCE's economic analyses considered all relevant**
8 **uncertainties associated with continued operation of SONGS?**

9 A. No. I think that the projected capacity factors examined in SCE's economic
10 analyses did not fully reflect the potential range of future possibilities. Therefore,
11 I have recommended that TURN witness Marcus prepare a number of additional
12 sensitivity studies which examine the economics of replacing the SONGS steam
13 generators assuming that the future capacity factors for the two SONGS units are
14 lower than the Company has estimated in its base case studies.

15 In particular, I recommended to Mr. Marcus that he examine scenarios in which
16 the average annual capacity factors of the two SONGS units will be 85 percent,
17 80 percent, or 75 percent.

18 I also have recommended that Mr. Marcus examine scenarios in which future
19 O&M expenditures experience real escalation of one percent or two percent; and
20 future capital additions expenditures are ten or twenty percent higher than SCE
21 now estimates. I also recommended that Mr. Marcus examine at least one scenario
22 in which each of the SONGS units experiences a year-long outage at some time
23 during its remaining service life. These additional studies reflect scenarios in
24 which the future contains unpleasant surprises that SCE does not now anticipate.
25 Such unpleasant surprises may be more likely as SONGS 2 and 3 age during the
26 remaining twenty or so years of their operating lives.

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1 **Q. Can you give an example of a recent “unpleasant surprise” that has the**
2 **potentially significantly affect the performance or costs of operating the**
3 **SONGS units?**

4 A. Yes. Along with many other nuclear power plant owners, SCE is now
5 considering the replacement of the reactor vessel heads of the SONGS units.
6 These replacements will cost tens of millions of dollars. In addition, the cost of
7 maintaining SONGS will be higher in future years before the reactor vessel heads
8 are replacement due to the need for additional inspections.

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

13 **Q. Are there any other “unpleasant surprises” visible on the planning horizon?**

14 A. By their very nature, such unpleasant surprises cannot be predicted in advance.
15 However, industry experience shows that such unpleasant surprises will happen.

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

19 A. As shown in Table 3 below, sixteen nuclear power plants have been shutdown
20 since January 1, 1990 for outages of twelve months or longer.

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1 **Table 3: Nuclear Power Plant Outages of Twelve Months or Longer Since**
2 **January 1, 1990**

<u>Plant</u>	<u>Period Shutdown</u>	<u>Outage Duration</u>
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

3

4 At least another six units have been shutdown for outages of between nine and
5 twelve months in duration during this same period.⁷⁷

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

9 **Q. Do any of the cases that you have recommended to Mr. Marcus represent**
10 **“worst case” scenarios?**

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

13 **Q. Does this complete your testimony?**

14 A. Yes.

⁷⁷ These units are Beaver Valley 2, Dresden 2, Indian Point 2, Kewaunee, Point Beach 1, and Point Beach 2