# CORRECTED CONCURRING AND DISSENTING OPINION

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I. Introduction and Summary of Conclusions

1. Edison and Mitsubishi entered into a contract governed by California law for Mitsubishi’s design and manufacture of four identical steam generators for use as replacement steam generators at the SONGS nuclear power plant in southern California. After 11 months of operation—less than 2.3% of the RSGs’ 40-year design life—the Unit 3 RSGs failed. The Unit 3 RSGs experienced tube wear so severe that Mitsubishi recommended over 4% of their tubes be plugged and taken out of service. This constituted over 50% of the total number of tubes that were permitted, by the RSG Contract and Edison’s license, to be plugged over the entire 40-year design life of the RSGs. Indeed, one of the tubes in the Unit 3 RSGs was so severely degraded that it wore all the way through and started leaking radioactive coolant into the secondary system of the plant at a maximum rate of 82 gallons per day. The leak resulted in the release of radioactive steam into the atmosphere of southern California. Upon inspection of the RSGs after the Unit 3 tube leak, the NRC determined that the RSGs were unsafe and unlicensable.

2. As a result of the immediate and unexpected failure of the RSGs, SONGS was rendered inoperable for an indefinite period of time. While Mitsubishi proposed a repair, Edison asserts that the repair would not have met the RSG Contract’s requirements, would have taken several years to test and had substantial risks of failing or being rejected by the NRC. The only alternative to a repair was a redesign and replacement of the RSGs, which Mitsubishi estimated would take at least seven years. Edison therefore decided, 18 months after the RSGs’ failure, that it was no longer economically viable to maintain SONGS in a state of operational readiness while Mitsubishi attempted a repair or replacement and permanently retired SONGS.

3. Edison alleges that, if the RSGs performed as Mitsubishi represented, Edison could have operated SONGS for approximately another 40 years. Edison therefore claims that its “benefit of the bargain” from the RSG Contract was over $6.5 billion. Edison also asserts that it would have been better off if it had refused to accept Mitsubishi’s RSG design, terminated the Purchase Order and paid the Termination Fee. Edison’s direct expenditures to replace the RSGs totaled over $1 billion, and included $678 million for installation, $403 million for engineering, fabrication and transportation and $267 million for project support, allocations and disposal. After the RSGs failed, Edison spent $227 million to examine and attempt to repair

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1 This Concurring and Dissenting Opinion assumes the reader’s familiarity with the Tribunal’s Award, including the Tribunal’s Statement of Facts, List of Defined Terms and Dramatis Personae.
4 JX 923, RSG Contract Rev. 4, at 156 (§ 3.9.1).
5 E.g., JX 1366, Tube Wear of Unit-3 RSG – Technical Evaluation Report Rev. 6 (Sept. 21, 2012), at 7, 9, 53.
6 E.g., JX 1868, NRC CAL Closeout Letter (Sept. 20, 2013), at 2; JX 1777, ASLB Memorandum and Order (May 13, 2013), at 2; JX 1264, NRC AIT Report (July 18, 2012), at 4-5.
7 E.g., Claimants’ Post-Hearing Memorial, at 60-137.
8 E.g., JX 1612, Ltr. from P. Dietrich to [Redacted] (Jan. 8, 2013); JX 1559, Ltr. from [Redacted] to E. Avella (Dec. 14, 2012).
9 E.g., JX 1883, SCE’s Decision to Retire San Onofre Units 2 & 3: Economic Considerations (Nov. 13, 2013).
10 E.g., Claimants’ Post-Hearing Memorial, at 1.
11 E.g., Claimants’ Post-Hearing Memorial, at 3.
them. Edison asserts that it could have avoided these losses if it terminated the Purchase Order, operated SONGS using the OSGs until they expired and then retired SONGS.

4. Mitsubishi asserts that Edison may not recover the monetary damages it seeks from Mitsubishi due to the provisions of the RSG Contract that (i) limit Edison’s remedy for breach of warranty to repair or replacement of the RSGs or their components, (ii) limit Mitsubishi’s liability to the purchase price, and (iii) mutually waive the parties’ right to recover consequential damages. Edison argues in response that California law and public policy do not permit Mitsubishi to enforce these limitations against Edison due to the nature of Mitsubishi’s breach of its contractual obligations. I agree with the Tribunal that Edison bore the risk of any consequential loss arising from Mitsubishi’s performance of the RSG Contract and thus cannot recover any consequential damages caused by the RSGs’ failure. However, for the reasons stated herein, I cannot join the Tribunal’s determination that the RSG Contract’s limitation of remedy and liability cap bar Edison from recovering the over $1 billion in direct costs Edison incurred in reliance on Mitsubishi’s performance of the RSG Contract.

5. The record demonstrates that Mitsubishi underpredicted the thermal-hydraulic conditions that were expected to occur in the RSGs. When the cumulative effect of Mitsubishi’s underpredictions is considered, Mitsubishi’s errors resulted in its delivery of RSGs containing a margin of safety against fluid-elastic instability and wear that was substantially smaller than the design Edison approved. As a result, contrary to Mitsubishi’s representations and unbeknownst to Edison, the RSGs contained a substantially greater risk of failure due to fluid-elastic instability than the design Edison approved. This risk materialized and resulted in the RSGs’ failure. Extensive analyses of the cause of the RSGs’ failure following the Unit 3 leak conducted by the NRC, Mitsubishi and third-party consultants concluded that Mitsubishi’s underprediction of the thermal-hydraulic conditions and associated margins of safety against fluid-elastic instability was the “major” or “primary” cause of the tube degradation that led to the leak. According to these reports, Mitsubishi’s RSG design—specifically, the combination of high power and a tightly packed bundle of 9,727 tubes inside a steam generator that operated at a temperature of about 600 degrees Fahrenheit—resulted in thermal-hydraulic conditions so severe that they caused the Unit 3 RSGs to fail after just 2.3% of their intended 40-year design life.

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14 Hearing Tr. 6009:16-6010:13 (Statement of P. Wald).
15 See Award §§ XVII, XVIII.
16 See infra §§ XIV, XV, XVII, XVIII.
18 See supra note 17 (citing, JX 1868 at 2, 25-33; JX 1393 at 17; JX 1366 at 7, 9, 53; JX 1264 at 4-5, 54-62; JX 1259 at 15; JX 1251 at 30, 155-55; P. Langford Dep. Tr.: 16:15-18; 118:1-3; 165:13-166:7).
19 E.g., JX 1366, Tube Wear of Unit-3 RSG – Technical Evaluation Report Rev. 6 (Sept. 21, 2012), at 7, 9, 53.
6. Mitsubishi’s proposed repair would not have corrected these problems, which clearly constitute “Defects” under section 1.2.13 of the RSG Contract. Instead, Mitsubishi’s proposed repair contemplated inserting new, thicker AVBs into the tube bundle. The thicker AVBs would have resulted in a positive contact force of at least 21 being applied to the tubes—which had a diameter of only 3/4 of an inch and wall thickness of 43/1000 of an inch—in an attempt to pin them in place. According to Mitsubishi, this positive contact force, which was not part of the RSGs’ design basis, would pin the tubes and prevent them from rubbing up against one another. Mitsubishi’s proposed repair could not have satisfied the requirements of section 1.17.1.3 of the RSG Contract, which requires Mitsubishi to correct all Defects in the RSGs and their “root causes” with “due diligence and dispatch,” or “demonstrate, to the Edison Representative’s satisfaction, that there is not a risk of the reoccurrence of such problem.” The purpose of the broad language in section 1.17.1.3 is to give Edison a high degree of confidence that a repair would eliminate the initiating cause of the problem so that Edison could operate its nuclear power plant safely and without interruption. In my view, the Tribunal’s determination that Mitsubishi’s proposed repair would have satisfied section 1.17.1.3 frustrates the purpose of this provision. The Tribunal’s reading permits the type of “band-aid” repair (and associated risk) that section 1.17.1.3 was meant to prohibit.

7. The record evidence indicating that the repair would not have been approved without confirmatory testing and had a significant risk of failure provides additional support to my view that the repair was inadequate. On May 13, 2013, the ASLB, the adjudicatory body of the NRC, issued a decision concluding that Edison’s proposal to restart Unit 2 for five months at 70% power was a “test or experiment” that required Edison to seek a license amendment and the NRC to hold a public hearing. The ASLB’s decision strongly indicates that Mitsubishi’s proposed Type 1 repair would also be considered a “test or experiment” because it had never before been attempted, and that the NRC would require tests or experiments to be undertaken before a restart of the RSGs would be approved. In addition to what the NRC would have required, Edison’s consultants, and Mitsubishi’s internal correspondence, expressed significant uncertainty as to whether the repair would have met RSG Contract’s requirements.

8. In light of the foregoing, I would find that the RSG Contract’s limitation of Edison’s remedy to repair or replacement is not enforceable under California law. It is the public policy of the state of California that a sales contract must contain remedies sufficient to provide

20 JX 923, RSG Contract Rev. 4, at 12 (§ 1.2.13).
21 E.g., Hearing Tr. 4712:2-7 (Russell); JX 1797, AREVA Independent Design Review of the Mitsubishi U-Bend Repair Report (May 30, 2013), at 8 (estimating over 800 Newton contact force).
22 E.g., JX 730, Evaluation of Tube Vibration (Jan. 28, 2008), at 14.
24 JX 1797, AREVA Independent Review of Type 1 Repair (May 30, 2013), at 4-6; JX 1351, Email from to (Sept. 7, 2012); JX 1238, Repair Plan Evaluation and Discussion (July 2, 2012), at 2.
the buyer with the “substantial value of the bargain.” This policy is implemented through section 2-719(2) of the California Commercial Code, which renders a limitation on the buyer’s remedy to repair or replacement invalid if it “fails of its essential purpose,” which is to provide the buyer with the product that meets the contract’s requirements within a reasonable period of time. Mitsubishi’s proposed Type 1 repair would not have met Mitsubishi’s obligations under section 1.17.1.3 of the RSG Contract and could not have provided Edison with the product that met the RSG Contract’s specifications within a reasonable period of time.

9. In the circumstances of this case, I would conclude that Mitsubishi’s errors resulted in a design that was so defective that a wholesale redesign of the RSGs would have been necessary. However, replacement could not have provided Edison with anything close to the “substantial value” of Edison’s bargain under the RSG Contract. In fact, it was utterly valueless to Edison because it would have taken at least seven years to implement. In this circumstance, only a monetary recovery would adequately compensate Edison for Mitsubishi’s breach.

10. Having determined that California law entitles Edison to recover monetary damages from Mitsubishi because the limitation to repair or replacement is invalid, the question remains whether the liability limitations in the RSG Contract are enforceable. To answer this question, California law requires the Tribunal to determine whether the losses Edison suffered due to Mitsubishi’s default were the result of a risk that Edison agreed to bear. This requires an examination of the relationship between the damages limitation at issue and the remainder of the contract to determine the role of the damages limitation in the parties’ risk allocation.

11. With respect to the RSG Contract’s mutual waiver of consequential damages, I agree with the Tribunal’s determination that Edison bore the risk of consequential loss “resulting from” Mitsubishi’s “performance or nonperformance of its obligations under the Purchase Order,” regardless of how severe Mitsubishi’s default may be. Thus, Edison cannot recover the consequential damages it claims it suffered due to the RSGs’ failure.

12. The liability cap, however, plays a significantly different role in the RSG Contract’s allocation of risk between the parties. The RSG Contract gave Edison the right to understand the expected thermal-hydraulic conditions and associated margins of safety in Mitsubishi’s RSG design before approving it. The RSG Contract required Mitsubishi to “prepare and submit for Edison’s approval a Performance Analysis Report documenting all thermal-hydraulic aspects of the RSG design.” In the Performance Analysis Report, Mitsubishi was to “assume [a] 40-year design life of the RSGs” and to “identify quantitatively available design Margins, where applicable.” If Edison did not agree to Mitsubishi’s design, Edison had the right to terminate the RSG Contract. And if Edison agreed to the proposed design, Edison had

32 See, e.g., Milgard, 703 F.3d at 708-09; RRX Indus., Inc. v. Lab-Con, Inc., 772 F.2d 543, 547 (9th Cir. 1985).
33 JX 923, RSG Contract Rev. 4, at 45-46 (§ 1.21.1).
34 JX 923, RSG Contract Rev. 4, at 152 (§ 3.8.2) (emphasis added).
35 JX 923, RSG Contract Rev. 4, at 152 (§ 3.8.2).
36 JX 923, RSG Contract Rev. 4, at 48 (§ 1.23).
the right to withhold Acceptance until Mitsubishi restored the RSGs to the design bases that Edison accepted, including the thermal-hydraulic conditions and margins of safety against tube instability, notwithstanding the cap on Mitsubishi’s liability to the purchase price.\textsuperscript{37}

13. The relationship between (1) Edison’s right to reject Mitsubishi’s design based on the expected thermal-hydraulic conditions and margin of safety and to withhold Acceptance until the RSGs conformed to the accepted design, on the one hand, and (2) the liability cap, on the other hand, is a critical element of risk allocation in the RSG Contract. Edison agreed to limit Mitsubishi’s liability to the purchase price subject to the conditions that Edison could reject Mitsubishi’s design if the design contained a risk of the RSGs’ failure that was too large for Edison and, if Edison agreed to the design, Edison could withhold Acceptance until Mitsubishi conformed the RSGs to the accepted design, notwithstanding the liability cap.

14. Mitsubishi’s miscalculations deprived Edison of its side of this bargain. Due to Mitsubishi’s misrepresentations to Edison regarding major design parameters and safety margins, Edison was never able to meaningfully determine whether it was willing to accept the risk of failure inherent in the RSGs that Mitsubishi delivered.\textsuperscript{38} In other words, Edison agreed to Mitsubishi’s design on the basis that the RSGs contained a margin of safety against instability that was sufficiently large such that the risk of failure was sufficiently small for Edison’s risk tolerance. Indeed, during the design process Mitsubishi repeatedly assured Edison that there was “no potential” for fluid-elastic instability in the RSGs.\textsuperscript{39} But, in fact, the risk of failure due to fluid-elastic instability was significantly higher than Mitsubishi represented.\textsuperscript{40} Edison never received the chance to meaningfully evaluate, and potentially reject, Mitsubishi’s design because, due to Mitsubishi’s misrepresentations, Edison was not apprised of the risks inherent in the design. Mitsubishi’s misrepresentations to Edison regarding the margin of safety against fluid-elastic instability in its RSG design were exacerbated by Mitsubishi’s failure to disclose to Edison that experienced consulting engineers reviewing Mitsubishi’s calculations had raised serious concerns that Mitsubishi may have been underpredicting the thermal-hydraulic conditions in the RSGs and the margin of safety against tube instability and wear. Mitsubishi’s conduct resulted in Edison’s unknowing acceptance of RSGs that had a serious risk of failure due to instability and that, in fact, failed after just 2.3% of their intended design life.

15. I would therefore find that enforcement of the liability cap against Edison in this case is unconscionable to the extent it prohibits Edison from recovering the costs it incurred in reliance on Mitsubishi’s representations regarding the safety and efficacy of the RSGs. In my view, Mitsubishi’s conduct deprived Edison of a critical right it had under the RSG Contract: to assess the risk of the RSGs’ failure and withhold Acceptance of the RSGs until the RSGs conformed with the safety margins Edison accepted. It would be unconscionable to, in light of Mitsubishi’s conduct, find that Mitsubishi may invoke the liability cap to prevent Edison from

\textsuperscript{37} JX 923, RSG Contract Rev. 4, at 12 (§ 1.2.17) (“Documentation”), 32 (§ 1.16.1.3) (“Acceptance”), 46 (§ 1.21.2(iii)) (exception to liability cap for “costs incurred by Supplier (and in the case of default hereunder, costs incurred by EMS or Edison) in achieving Acceptance of all of the Work”).

\textsuperscript{38} See supra notes 17-19 and accompanying text; infra section III.

\textsuperscript{39} See, e.g., JX 465, Technical Discussion Meeting of AVB Design Team (Sept. 16, 2005), at 36 (emphasis added); infra section III.

\textsuperscript{40} See supra notes 17-19 and accompanying text; infra section III.
recovering damages resulting from a risk that Edison never agreed to bear. Thus, in my view, Mitsubishi should bear the costs Edison incurred in reliance on Mitsubishi’s representations regarding the safety and efficacy of the RSGs—representations that Edison relied on when it Accepted the RSGs and spent over $1 billion to implement them.

16. While I have the utmost respect for the Tribunal, in my view the Tribunal’s determination that the RSG Contract’s limitation of remedy and liability cap are enforceable is predicated on misinterpretations of the RSG Contract and California law and is inconsistent with California public policy. As I will explain in further detail below, I disagree with the Tribunal’s determinations regarding (i) the nature of the Defects in the RSGs, (ii) whether a repair or replacement of the RSGs was an adequate remedy under California law and (iii) whether the liability cap is enforceable against Edison in the circumstances of this case.

17. The determination that a contractual limitation on the seller’s liability is unconscionable and invalid is a very serious matter. In the vast majority of cases, at least as between sophisticated parties, such limitations will likely be enforceable. However, the unique circumstances of this case require me to part ways from the Tribunal and conclude that the damages Edison suffered in reliance on Mitsubishi’s performance of its contractual obligations were not losses that arose from a risk that Edison agreed to bear. California law and public policy require the Tribunal to determine whether Mitsubishi’s default caused Edison to suffer losses that were not within the parties’ bargained-for allocation of risk. If so, the limitations on the seller’s liability are invalid to the extent they prevent Edison from recovering the losses. In my view, this is such a case, and the liability cap is therefore invalid.

II. The California Commercial Code Applies to the RSG Contract.

18. As a threshold matter, California law mandates application of the California Commercial Code (California’s adoption of the Uniform Commercial Code) to the RSG Contract. The RSG Contract is a fixed-price contract for Mitsubishi’s design, fabrication and delivery of four identical steam generators for immediate use at Edison’s plant. Under California law, this is a contract for the sale of goods to which the UCC applies.

19. The United States Court of Appeals for the Ninth Circuit has repeatedly applied the California Commercial Code (or identical provisions in other states’ laws) to contracts for the design, fabrication and delivery of custom manufactured goods, including a steam generator in a power plant, that are indistinguishable from the RSG Contract in this case.

20. The United States Court of Appeals for the Eleventh Circuit has held, in accord with the cases cited above, that a “significant services element (i.e., design and manufacturing) . . . does not remove the Contract from the category of agreements for specifically designed and

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41 See, e.g., Milgard, 703 F.3d at 708-09; RRX, 772 F.3d at 547.
42 E.g., Milgard, 902 F.2d at 708-09; RRX, 772 F.3d at 547.
manufactured equipment to which Article 2 applies.” In *BMC Industries*, the Eleventh Circuit held that a contract’s references to “buyer” and “seller,” its use of the term “purchase order,” “purchase” and “equipment” are all indicia of a contract for the sale of goods. Thus, the entire contract for the design and manufacture of custom eyeglass production machinery for use in the purchaser’s eyeglass factory was for a sale of goods and subject to the UCC.

21. The RSG Contract contains the same indicia identified in *BMC* which further confirms it is a contract for the sale of goods. The RSG Contract requires Mitsubishi to deliver to Edison four RSGs that are in “accordance with the requirements of the Purchase Order”, and refers to Edison as “Purchaser” and Mitsubishi as “Supplier.” The RSG Contract allocates more than 90% of the Purchase Order Price to Mitsubishi’s fabrication and delivery of the four RSGs to the Delivery Duty Paid Point, whereas less than 10% of the Purchase Order Price is allocated to Mitsubishi’s “engine[ing], design and licens[ing]” of the RSGs. The RSG Contract’s use of a Delivery Duty Paid Point and title and risk of loss provisions, provisions found only in a contract for the sale of goods, provide additional support to my view.

22. Mitsubishi relies on *TK Power, Inc. v. Textron, Inc.*, to support its argument that the UCC does not apply in to the RSG Contract. However, *TK Power* is clearly distinguishable on its facts. The contract at issue in *TK Power* was for the design of a prototype battery charger for electric golf carts. The contract required Textron, the designer, to provide, as part of the contract, five working prototypes to TK Power which incorporated a Textron-designed software algorithm. The court held that the “essence” of the contract was for Textron’s services because “most of the price was for the development of software code” and “even as to the prototypes, the purpose of the purchase order was not the sale of five chargers to be used by Textron or sold by Textron,” but rather for use in testing and evaluation in the laboratory.

23. The essence of the RSG Contract, by contrast, was the Mitsubishi’s delivery of four identical RSGs to be used by Edison in the normal course of Edison’s business as replacements for Edison’s original steam generators. In direct contrast to *TK Power*, over 90% of the Purchase Order Price was for the fabrication of the RSGs.

24. Therefore, even though the majority does not decide this issue on the basis that the majority finds Edison claim fails even if the California Commercial Code applies, deciding this issue *is* necessary to my determination. I would decide the issue in favor of Edison and find that the California Commercial Code applies to the entirety of the RSG Contract.

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44 *BMC Indus. v. Barth Indus., Inc.*, 160 F.3d 1322, 1332 (11th Cir. 1998).
45 *BMC Indus.*, 160 F.3d at 1332.
46 JX 923, RSG Contract Rev. 4, at 10 (§ 1.1).
47 JX 321, Purchase Order, at 4.
III. The Risk of the RSGs’ Failure Due to Fluid-Elastic Instability Was Substantially Greater than What Mitsubishi Represented to Edison.

A. Mitsubishi Assured Edison that its RSG Design Would Have “No Potential” for Fluid-Elastic Instability and a High Margin of Safety.

25. The RSGs were among the most important pieces of equipment in the entire SONGs nuclear plant. Each of the RSGs contained 9,727 individual tubes. Each tube was only 3/4 of an inch in diameter and had a wall thickness of only 43/1000 of an inch.50 The tubes were required to withstand cross flow velocities of several meters per second at almost 600 degrees Fahrenheit for a period of 40 years.51 The RSGs’ tubes represented the only barrier between the radioactive coolant that flowed through the tubes (the primary system) and the nonradioactive steam that powered the generators and was released into the atmosphere (the secondary system).52 Edison’s complete and accurate understanding of the margin of safety against fluid elastic instability and tube wear was essential to Edison’s understanding of the risks of failure of Mitsubishi’s RSG design (and, by extension, the entire SONGS plant).

26. Mitsubishi had design responsibility under the RSG Contract.53 However, the RSG Contract also required Mitsubishi to provide detailed information to Edison before Edison approved the RSG design to allow Edison to evaluate the risks of failure. The RSG Contract required Mitsubishi to “prepare and submit for Edison’s approval a Performance Analysis Report documenting all thermal-hydraulic aspects of the RSG design.”54 In the Performance Analysis Report, the RSG Contract required Mitsubishi to “assume [a] 40-year design life of the RSGs” and “identify quantitatively available design Margins, where applicable.”55 While Edison was not a steam generator designer or N-Stamp holder, Edison’s engineers did possess detailed knowledge of recirculating nuclear steam generators like the RSGs. Edison’s engineers were thus able to understand the risks inherent in major design parameters and safety margins if Mitsubishi accurately represented the parameters to Edison during the design stage.

27. The information the RSG Contract required Mitsubishi to provide to Edison in the Performance Analysis Report and other design-stage Documentation was a central element of Edison’s bargain under the RSG Contract. Edison had the right to reject Mitsubishi’s proposed design if Edison determined that the design presented an unacceptably high risk of failure.56 If the parties could not agree on a design, Edison had the right to terminate the RSG Contract.57 And, if the parties did agree on a design, Edison had the right to withhold Acceptance of the RSGs until Mitsubishi conformed the RSGs to the design, including the margins of safety against

52 E.g., JX 1868, NRC CAL Closeout Letter (Sept. 20, 2013), at 32; JX 1777, ASLB Memorandum and Order (May 13, 2013), at 27.
53 See Award ¶¶ 1379-84.
54 JX 923, RSG Contract Rev. 4, at 152 (§ 3.8.2) (emphasis added).
55 JX 923, RSG Contract Rev. 4, at 152 (§ 3.8.2).
56 JX 923, RSG Contract Rev. 4, at 152 (§ 3.8.2).
57 JX 923, RSG Contract Rev. 4, at 48-49 (§ 1.23).
fluid-elastic instability, that Edison accepted, **notwithstanding** the RSG Contract’s liability cap.\(^{58}\) However, the Performance Analysis Report and associated Documentation were the only means by which could Edison actually assess the risk of the RSGs’ failure. The accuracy of the Performance Analysis Report and other information provided by Mitsubishi to Edison prior to Edison’s acceptance of Mitsubishi’s design was therefore critical to Edison’s assessment of the risk of the RSGs’ failure and Edison’s decision to accept Mitsubishi’s design.

28. The record in this arbitration reflects that Mitsubishi repeatedly and consistently represented to Edison, both before the RSG Contract was signed and throughout the design process, that there was no potential for fluid-elastic instability in the RSGs. Indeed, even before the RSG Contract was signed, Mitsubishi assured Edison during negotiations that its design would “eliminate any vibration mechanism concerns,” “provide sufficient margin against fluid elastic vibration,” and “preclude FIV for the operating life of the RSGs.”\(^{59}\)

29. During the design process, Mitsubishi repeatedly made representations regarding the major thermal-hydraulic parameters in the RSGs as well as the margin of safety against fluid-elastic instability and resulting tube vibration and wear. These parameters included the flow velocity of the steam moving past the tubes, the void fraction of the steam (the ratio of liquid water to water vapor in the steam), and the stability ratio in the out-of-plane direction (a dimensionless ratio used to calculate the margin of safety to tube instability).

30. For example, Mitsubishi’s March 17, 2005 presentation to Edison listed “Flow-induced vibration (FIV) and Wear” as the first cause in a list of “causes of possible failure” of the u-bend region of the RSGs.\(^{60}\) The presentation also stated that “FIV is the dominant source of U-bend tube plugging.”\(^{61}\) Mitsubishi’s presentation, however, assured Edison that there was no risk of failure due to fluid-elastic instability. Mitsubishi made this representation by, in turn, representing that the stability ratio in the RSGs, at all locations, would be less than \(\) with one ineffective support.\(^{62}\) As the Mitsubishi presentation explained, calculating stability ratios assuming one ineffective support is the “conservative industrial standard.”\(^{63}\) Mitsubishi’s presentation represented that, “[w]ith conservative assumptions, the design basis should be less than \(\) tubes plugged in 40 years for wear (or something similar).”\(^{64}\)

31. Subsequent presentations by Mitsubishi during the design stage made claims consistent with the March 17, 2005 presentation. In these subsequent presentations, Mitsubishi provided additional detail regarding the expected thermal-hydraulic conditions in the RSGs. The

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58 JX 923, RSG Contract Rev. 4, at 12 (§ 1.2.17) (“Documentation”), 32 (§ 1.16.1.3) (“Acceptance”), 46 (§ 1.21.2(iii)) (exception to liability cap for “costs incurred by Supplier (and in the case of default hereunder, costs incurred by EMS or Edison) in achieving Acceptance of all of the Work”).
59 JX 294, MHI Technical Proposal to Edison Vol. 2 (Feb. 27, 2004), at 54; JX 293, MHI Technical Proposal to Edison Vol. 1 (Feb. 27, 2004), at 179 (“The combination of MHI R&D, design, manufacturing, installation and operating experience provides **conclusive results** that the AVBs will provide adequate support to the tubes to **preclude FIV and corrosion**, while at the same time minimizing negative thermal-hydraulic effects. **This applies for the operating life of the RSGs.**” (emphasis added)).
60 JX 380, SONGS RSG Design Plan and Direction on AVB Design (Mar. 17, 2005), at 3.
61 JX 380, SONGS RSG Design Plan and Direction on AVB Design (Mar. 17, 2005), at 3.
63 JX 380, SONGS RSG Design Plan and Direction on AVB Design (Mar. 17, 2005), at 15.
64 JX 380, SONGS RSG Design Plan and Direction on AVB Design (Mar. 17, 2005), at 7.
record reflects that the expected thermal-hydraulic conditions (velocity and void fraction) were independently considered by Edison, in addition to the overall stability ratio calculations, when Edison assessed the risk of the RSGs’ failure due to vibration. For example, at a September 16, 2005 design review meeting, Mitsubishi represented that the maximum flow velocity would be between and while the maximum void fraction would be between and , depending on the AVB configuration used in the final design. Mitsubishi reiterated that stability ratios for all tubes would be below with one ineffective support.

Notwithstanding Mitsubishi’s representations regarding the margin of safety regarding tube instability, the record reflects repeated requests by Edison to Mitsubishi to assure Edison that tube instability and wear would not occur. For example, in a July 11, 2005 technical discussion, Edison requested Mitsubishi to “[p]resent FIT-III tube bundle quality and void fraction distribution plots for other SG models for comparison with the SONGS plot” and “confirm that the FIT-III result of max void fraction is the maximum expected value considering the RSG operating temperature.” In response, Mitsubishi represented to Edison that the maximum void fraction would be to and assured Edison that “[f]or all tubes, stability ratio is less than 1.0 and has no potential of fluid elastic vibration.”

Consistent with its representations to Edison in intermediate design presentations, Mitsubishi’s contractually-required Performance Analysis Report represented that there was an extremely high margin of safety against fluid-elastic instability and tube wear. The Performance Analysis Report represented that the maximum stability ratio would be with one ineffective support (with the remaining eight tubes evaluated showing stability ratios between and with one ineffective support) and a maximum u-bend void fraction of .

B. Mitsubishi Assured Edison that There was “No Potential” for Fluid-Elastic Instability, but Did Not Disclose its Consultants’ Serious Concerns to Edison.

Despite Mitsubishi’s assurances to Edison that there was “no potential” of fluid-elastic vibration in the RSGs, and unbeknownst to Edison, experienced engineers who were hired as consultants by Mitsubishi during the design process were, at the same time, expressing serious concerns regarding the accuracy of Mitsubishi’s calculations.

In a July 23, 2005 meeting, Paul Langford, an experienced engineer at the time employed by Westinghouse and serving as a consultant to Mitsubishi, warned that Mitsubishi’s use of a total damping factor of 1.5 was “unconservative for the hot leg half of the U-bend” due to the high expected void fraction in the RSGs. Mr. Langford referred to data that he believed Mitsubishi possessed which indicated that total damping values were well below 1.5 at high void

65 JX 465, Technical Discussion Meeting of AVB Design Team (Sept. 16, 2005), at 10.
66 JX 465, Technical Discussion Meeting of AVB Design Team (Sept. 16, 2005), at 37.
67 JX 439, Record of Technical Discussion and Design Review Meetings (July 11, 2005), at 4.
68 JX 439, Record of Technical Discussion and Design Review Meetings (July 11, 2005), at 13.
69 JX 465, Technical Discussion Meeting of AVB Design Team (Sept. 16, 2005), at 36 (emphasis added).
71 JX 442, Robert M. ‘Con’ Wilson, Report of Meeting with P. Langford (July 23, 2005), at 2.
fractions, and that the “[u]se of a constant 1.5% masks the actual tube behavior.” Mr. Langford also testified that he “expected the SONGS void fraction to be somewhere in the plus percent range,” despite Mitsubishi’s use of a void fraction value of approximately as the design basis, and that Mr. Langford “communicated that view to Mitsubishi.”

36. On September 9, 2005, Mitsubishi consultant Robert Wilson wrote an email to Mitsubishi engineer stating that, in the u-bend region of the steam generator (the region of the steam generator that ultimately exhibited the tube degradation that caused the leak), FIT-III “was very far away from the data and most other codes came closer.”

37. The next month, in Mr. Langford’s October 15, 2005 comments on Mitsubishi’s Design Review of the Anti-Vibration Bar, Mr. Langford observed that “the overall gap velocity distributions” calculated by Mitsubishi’s FIT-III code “appear to be consistently lower than my expectations.” Mr. Langford warned that peak velocities of more than were observed in other steam generators but Mitsubishi’s code was predicting a peak velocity of only Mr. Langford recommended that Mitsubishi provide an incremental progression of its calculations showing how the features of Mitsubishi’s RSG design reduced velocities.

38. The concerns of Mitsubishi’s consultants regarding the accuracy of Mitsubishi’s prediction of the major thermal-hydraulic parameters in the RSGs were serious enough that, in a February 24, 2006 email, Mr. Wilson recommended analysis of the thermal-hydraulic conditions and potential for tube wear using other codes besides Mitsubishi’s FIT-III modeling software, including ATHOS. Mr. Wilson stated, “as it relates to vibration and wear analysis, I would not be surprised to see the size, location and magnitude of the maximum void fraction region differ between models – to the point that opposite tube wear results could occur.”

39. Despite the seriousness of the concerns expressed by these experienced engineers that were related to what Mitsubishi knew was a “cause of possible failure” of the RSGs, Mitsubishi never disclosed these engineers’ concerns to Edison. Rather, Mitsubishi continued to represent that there was “no potential” for fluid-elastic instability.

C. Mitsubishi Assured Edison that There was “No Potential” for Fluid-Elastic Instability, but in Fact There was a Serious Risk of Failure.

40. In my view, the record in this arbitration demonstrates that the risk of the RSGs’ failure due to fluid elastic instability and resulting wear was substantially higher than the risk of instability in the design that Edison accepted based on Mitsubishi’s representations.
41. As an initial matter, as Mitsubishi has admitted, Mitsubishi underpredicted the cross flow velocity during the design of the RSGs by a factor of 2.3. The stability ratio is the ratio of the local velocity to the critical velocity and is proportional, on a 1-to-1 basis, to the local velocity value. Thus, Mitsubishi underpredicted the stability ratios used in the design by a factor of more than double (230%). Considering the Gap Velocity Error alone (which is not the appropriate analysis, as design errors must be cumulatively considered) of the out-of-plane stability ratios calculated by Mitsubishi in the Performance Analysis Report would have been greater than 1.0 with one ineffective support, and of the stability ratios would have been greater with one ineffective support. In and of itself, the Gap Velocity Error puts the RSGs outside the margin of safety Edison accepted.

42. In my view, the record establishes that the Gap Velocity Error was not the only error that resulted in a reduction in the thermal-hydraulic margin in the RSGs. Subsequent analyses of the maximum void fraction in the RSGs by Mitsubishi, the NRC, and third-party consultants using ATHOS, a computer code used by the NRC and others to predict thermal-hydraulic conditions in steam generators, calculated a maximum void fraction of 99.6%. At this void fraction, there is over less liquid in the steam than the maximum u-bend void fraction used as the design basis for the RSGs in the Performance Analysis Report. The stability ratio is inversely proportional to the square root of the damping ratio, which decreases as the void fraction of the steam increases (i.e., there is less damping). Applying the total damping ratio recommended by the ASME Code for such void fractions (0.5) instead of the total damping ratio used by Mitsubishi in the Performance Analysis Report (1.5) increases the maximum stability ratios with one ineffective support by at least 40 percent. Applying the damping ratio that Paul Langford testified Westinghouse used at very high void fractions, increases the maximum stability ratios by approximately This increase would be in addition to the 230% increase to be applied as a result of the Gap Velocity Error.

43. Indeed, an analysis of the stability ratios in Unit 2 conducted by Westinghouse in the months after the tube leak determined that, at 100% power, certain tubes in Unit 2 had stability ratios of approximately 1.9 with all supports effective. This was almost the

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81 E.g., JX 1251, Westinghouse Preliminary Report, Flow Induced Vibration and Wear Analysis at the San Onofre Nuclear Generating Station Unit 2 Replacement Steam Generators Supporting Restart (July 8, 2012), at 59.
84 Design Review and Failure Analysis Expert Witness Statement of Dr. Harri Kytomaa and Dr. Timothy Morse, Exponent, Inc. (Oct. 23, 2015), at 111-12.
85 E.g., JX 1251, Westinghouse Preliminary Report, Flow Induced Vibration and Wear Analysis at the San Onofre Nuclear Generating Station Unit 2 Replacement Steam Generators Supporting Restart (July 8, 2012), at 59.
88 See Hearing Tr. 1728:8-17 (Langford).
89 JX 1251, Westinghouse Preliminary Report, Flow Induced Vibration and Wear Analysis at the San Onofre Nuclear Generating Station Unit 2 Replacement Steam Generators Supporting Restart (July 8, 2012), at 154-55.
maximum stability ratio and margin of safety with all supports effective that Mitsubishi had calculated and represented to Edison in the Performance Analysis Report.90

44. Mitsubishi also admitted that, even comparing void fractions calculated only using the ATHOS code (as opposed to comparing ATHOS calculations with FIT-III calculations) the void fraction calculated using ATHOS (99.6%) was “high compared to the [ ] void fraction (when steam quality is less than [ ] ) for the other SGs designed by MHI based on ATHOS computer code.”91 Thus, Mitsubishi essentially admitted that another representation to Edison during the design process, that the void fraction was within known industry experience, was materially false, even if the void fractions are compared using ATHOS results. As Mitsubishi’s root cause analysis stated, “[b]ecause this high void fraction is a potentially major cause of tube FEI, and consequently, unexpected tube wear,” Mitsubishi investigated the number and location of tubes with wear in specific regions of the u-bend.92 Mitsubishi found a very strong correlation between the tubes with wear and the flow velocity and void fraction in the RSGs.93

45. Moreover, the record shows that the tubes for which Mitsubishi calculated the stability ratios in the Performance Analysis Report to represent the margin of safety in the RSGs were not, in fact, the tubes that had the highest risk of failure. There were 9,727 tubes in each RSG, yet Mitsubishi only presented stability ratio calculations in the Performance Analysis Report for [ ] of the tubes.94 These stability ratios were presented in the Performance Analysis Report as the “maximum” stability ratios. Thus it would have been reasonable for Edison to assume that there were no tubes in the RSGs that had a greater potential for wear. However, an examination of the correlation between tube wear, velocity and void fraction in Mitsubishi’s Root Cause Analysis reveals that [ ] These tubes were strongly correlated to the void fraction distribution in the RSGs, a parameter that Mitsubishi itself admitted was not only underpredicted but also greater than the maximum value used in prior operational experience. In fact, none of the nine tubes that Mitsubishi used to represent the safety margin to Edison in the Performance Analysis Report overlapped with the eight tubes that failed the in situ pressure test.96

D. Mitsubishi’s Design Errors Resulted in its Design Containing a Substantial Risk of Failure Due to Fluid-Elastic Instability, Which Ultimately Materialized.

46. The record in this arbitration compels me to conclude that Mitsubishi grossly misrepresented the potential for tube vibration and wear caused by fluid-elastic instability in the RSGs to Edison, such that the risk of failure in Mitsubishi’s design was substantially and

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91 JX 1366, Tube Wear of Unit-3 RSG – Technical Evaluation Report Rev. 6 (Sept. 21, 2012), at 53.
92 JX 1366, Tube Wear of Unit-3 RSG – Technical Evaluation Report Rev. 6 (Sept. 21, 2012), at 53.
93 JX 1366, Tube Wear of Unit-3 RSG – Technical Evaluation Report Rev. 6 (Sept. 21, 2012), at 54.
materially higher than the risk Mitsubishi presented to Edison. Mitsubishi’s misrepresentation was exacerbated by the fact that Mitsubishi failed to disclose that experienced engineers had raised serious concerns that Mitsubishi may have been underpredicting the thermal-hydraulic conditions in the RSGs and thus underpredicting the margin of safety in the design.

47. On July 18, 2012, the NRC released a comprehensive report written by its Augmented Inspection Team, a team of experts formed to review the RSGs after the leak. Among the AIT’s findings were conclusions regarding the causes of the harmful tube wear that led to the leak. The AIT Report found that “[t]he combination of unpredicted, adverse thermal hydraulic conditions and insufficient contact forces in the upper tube bundle caused a phenomenon called ‘fluid-elastic instability’ which was a significant contributor to the tube to tube wear resulting in the tube leak.” 97 Elsewhere in the AIT Report, the AIT stated that “high velocities coupled with high void fractions were primary causal factors in the tube fluid-elastic instability and the excessive wear patterns observed in the Unit 3 steam generators.” 98 The AIT Report also found that Mitsubishi’s underprediction of non-conservative thermal-hydraulic parameters during the design process constituted “deficiencies” in the RSGs: “These results led Mitsubishi to conclude that margins to instability were significantly larger than they actually are. This assessment is based on eddy current data, NRC ATHOS analysis, Mitsubishi ATHOS analysis, and other thermal-hydraulic analyses completed by Westinghouse and AREVA that all identified significantly higher fluid velocities and void fractions than FIT-III.” 99

48. The AIT Report ultimately concluded that the RSGs “were not designed with adequate thermal-hydraulic margin to preclude the onset of fluid-elastic instability. Unless changes are made to the operation or configuration of the steam generators, high fluid velocities and high void fractions in localized regions of the u-bend will continue to cause excessive tube wear and accelerated wear that could result in tube leakage and/or tube rupture.” 100

49. Likewise, in the NRC’s September 20, 2013 CAL Closeout Letter addressed to Edison, the NRC concluded that “[t]he SCE steam generators were under-designed in regard to margin to vibration and that lack of margin was largely due to under-prediction of gap velocity and void fraction by the Mitsubishi FIT-III code analysis. . . . As a result, replacement steam generators were installed in San Onofre with a significant design deficiency, resulting in rapid tube wear of a type never before seen in recirculating steam generators.” 101

50. Mitsubishi’s own findings from its investigations after the leak are consistent with the NRC’s findings. In Mitsubishi’s September 5, 2012 Root Cause Analysis, Mitsubishi concluded that “the thermal-hydraulic conditions on the secondary side, namely high void fraction (steam quality) and high flow velocity, are the main causes of the excessive tube vibration and unexpected wear in the SONGS Unit 2 and Unit 3 SGs. The higher than typical void fraction is a result of a very large and tightly packed tube bundle with the high heat flux in the hot leg side.” 102 Likewise, Mitsubishi’s subsequent Technical Evaluation Report found that

98 JX 1264, NRC AIT Report (July 18, 2012), at 57.
99 JX 1264, NRC AIT Report (July 18, 2012), at 62.
100 JX 1264, NRC AIT Report (July 18, 2012), at 4, 62.
“the major contributor to the tube wear phenomenon in the SONGS SGs is the secondary side thermal-hydraulic conditions in the tube bundle U-bend region of interest at 100% reactor power. The major parameters making these conditions unfavorable from the tube wear perspective are high secondary fluid flow velocities and high void fractions (steam quality).”

51. The results of investigations conducted by third parties after the leak also support my view. James Begley, at the time a consultant for Edison, concluded that “[a]t 100% power, the thermal-hydraulic conditions in the u-bend region of the SONGS replacement steam generators exceed the past successful operational envelope for U-bend nuclear steam generators based on presently available data,” and that the “service performance of SONGS Unit 3 at 100% power shows that there is a boundary to the successful operational envelope.”

52. Despite this record evidence, including the NRC’s findings and Mitsubishi’s own contemporaneous statements that the thermal-hydraulic conditions in the RSGs were a “major” or “primary” cause of the tube wear that led to the leak, the Tribunal finds that Edison “failed to establish a requisite causal link between the proven design errors and the alleged damages sustained as a result of the Incident and subsequent shutdown at SONGS.” As an initial matter, I disagree with the Tribunal’s reasoning because it appears to evaluate each error in isolation rather than consider the cumulative effect of all of the errors. In addition, and more fundamentally, I disagree with the Tribunal’s reasoning because it does not appear to take into account the effect of Mitsubishi’s design errors on the safety margin to instability. The basis for Mitsubishi’s design—and Edison’s Acceptance of it—was Mitsubishi’s calculation of out-of-plane stability ratios that contained a margin of safety against instability which Mitsubishi represented showed that there was “no potential” for instability, whether in the out-of-plane or in-plane direction. In my view, the record in this arbitration demonstrates that Mitsubishi’s underprediction of the thermal-hydraulic conditions in the RSGs resulted in an underprediction of the margin of safety to both out-of-plane and in-plane fluid elastic instability, and that this underprediction was the cause of the in-plane fluid-elastic instability that, in turn, resulted in rapid tube degradation in the Unit 3 RSGs causing them to fail after only 11 months.

IV. The Underlying Design of the Tube Bundle and the Thermal-Hydraulic Conditions in the RSGs Are “Defects” Under Section 1.2.13 of the RSG Contract.

A. The Importance of the RSG Contract’s Definition of “Defect.”

53. After less than 11 months in operation (less than 2.3% of the RSGs’ 40-year service life), one of the RSGs in Unit 3 experienced tube wear that was so severe that one of its tubes wore all the way through and leaked 82 gallons of radioactive coolant into the secondary

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103 JX 1759, Tube Wear of Unit-3 RSG - Technical Evaluation Report Rev. 9 (June 13, 2013), at 84.
104 See JX 1393, AREVA, SONGS U2C17 Steam Generator Operational Assessment for Tube-to-Tube Wear (Sept. 25, 2012), at 17; JX 1251, Westinghouse, Flow Induced Vibration and Wear Analysis at the San Onofre Nuclear Generating Station Unit 2 Replacement Steam Generators Supporting Restart (July 8, 2012), at 234.
105 Award ¶ 2732.
106 See JX 1251, Westinghouse Preliminary Report, Flow Induced Vibration and Wear Analysis at the San Onofre Nuclear Generating Station Unit 2 Replacement Steam Generators Supporting Restart (July 8, 2012), at 154-55; Langford Dep. Tr. 165:2-25.
Upon inspection and testing, an unprecedented eight tubes in Unit 3 failed the in situ pressure test. Even for the tubes that did not fail the test, the tube wear in the Unit 3 RSGs was so severe that over 4% of the tubes in the RSGs were required to be plugged and taken out of service. This constituted over 50% of the total number of tubes that were permitted, by the RSG Contract and Edison’s license, to be plugged over the entire 40-year life of the RSGs. The NRC determined that the RSGs, as Mitsubishi designed them, were unsafe, inoperable and un-licensable. Indeed, James Begley, a consultant hired by Edison, concluded, in an analysis conducted a few months after the leak, that the Unit 3 RSGs were “arguably the worst case degraded steam generator in the history of domestic nuclear power.” The record makes clear, and the Tribunal acknowledges, that the RSGs contained at least one Defect.

The critical issue that must be decided for purposes of determining Mitsubishi’s liability, however, is not simply whether the RSGs contained Defects. Rather, the critical issue is what, precisely, the Defect or Defects in the RSGs were. The reason why the definition of “Defect” is central is because the determination that a particular design feature or condition in the RSGs constitutes a Defect triggers Mitsubishi’s obligation to correct the Defect and its root cause. To the extent that Mitsubishi’s proposed repair did not correct the root cause of a Defect, the proposed repair would be inadequate and may cause the limited repair remedy to fail of its essential purpose under California law and invalidate the contract’s limitation.

In other words, the RSG Contract’s limitation of Edison’s remedy to repair or replacement, on the one hand, and the RSG Contract’s definition of Defect and its associated warranty provisions, on the other hand, represent a bargained-for exchange. Edison agreed to limit its rights against Mitsubishi to repair or replacement. In exchange, Mitsubishi promised that such repair or replacement would correct all Defects and their root causes. As the United States Court of Appeals for the Ninth Circuit recognized in S.M. Wilson, if the seller is unable to provide the remedy that the seller agreed to provide in exchange for the buyer’s agreement to limit the buyer’s rights to repair or replacement, the buyer will have lost a “substantial benefit of the bargain” and the limitation of remedy is invalid under California law.

The RSG Contract’s Definition of Defect is Extremely Broad.

As explained above, each of the 9,727 tubes in the RSGs, with a diameter of only 3/4 inch and wall thickness of only 43/1000 of an inch, acted as the pressure boundary between the radioactive primary system and the non-radioactive secondary system of the plant. The continuous, safe operation of the RSGs was therefore critical to the continuous safe operation of

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107 E.g., JX 1366, Tube Wear of Unit-3 RSG – Technical Evaluation Report Rev. 6 (Sept. 21, 2012), at 7, 9, 53.
110 JX 923, RSG Contract Rev. 4, at 156 (§ 3.9.1).
111 E.g., JX 1868, NRC CAL Closeout Letter (Sept. 20, 2013), at 2; JX 1777, ASLB Memorandum and Order (May 13, 2013), at 2; JX 1264, NRC AIT Report (July 18, 2012), at 4-5.
113 JX 923, RSG Contract Rev. 4, at 35-36 (§ 1.17.1.3).
114 JX 923, RSG Contract Rev. 4, at 12 (§ 1.2.13), 35-36 (§ 1.17.1.3), 40 (§ 1.17.14).
115 S.M. Wilson, 587 F.2d at 1375.
SONGS. Any problem with the RSGs was likely to result in an outage of the plant, costing Edison millions of dollars per day. In light of the centrality of the RSGs to the continuous, safe operation of SONGs, Edison has argued, and Mitsubishi does not appear to dispute, that Edison insisted on a broad definition of “Defect” to ensure that any deficiency in the RSGs that affected the RSGs’ performance or safety was promptly corrected.

57. The RSG Contract’s definition of Defect includes all “defects or deficiencies in design, application, materials, manufacture or workmanship” that “would adversely affect” the “(a) the performance of the Apparatus under operating conditions consistent with those contemplated in the Purchase Order, (b) the continuous safe operation of the Apparatus during the Apparatus’s design life, or (c) the structural integrity of the Apparatus.”

58. “Defect” also includes any nonconformance with Applicable Standards or Applicable Laws, which the RSG Contract defines as all “laws, treaties, ordinances, judgments, decrees, injunctions, writs, orders, rules, regulations, and interpretations” of the NRC.

C. The Design of the Tube Bundle and the Thermal-Hydraulic Conditions in the RSGs Are “Defects” Under the Plain Language of Section 1.2.13.

59. In my view, it is clear from the record that the underlying design of the tube bundle itself and the thermal-hydraulic conditions in the RSGs constitute “Defects” under section 1.2.13 of the RSG Contract. As explained in section III, supra, the record strongly supports a finding that the RSGs’ tube bundle design caused the RSGs to operate at thermal-hydraulic conditions that were sufficiently high as to render hundreds of tubes unstable and subject to rapid wear. The NRC and Mitsubishi concluded that the thermal-hydraulic conditions were the “major” or “primary” cause of the tube degradation. These characteristics constitute “defects or deficiencies in the design in design, application, materials, manufacture or workmanship” that “adversely affect[ed]” the “performance of the Apparatus” under normal operating conditions and “adversely affect[ed]” the “continuous safe operation” of the RSGs.

60. The fact that there may have been other contributing factors to the ultimate tube wear, such as the lack of a positive contact force between the tubes and the AVBs, does not render the plain language of the RSG Contract’s definition of Defect inapplicable to the aspects of the design that the record establishes were main causes of the RSGs’ failure.

61. The fact that the thermal-hydraulic conditions were underpredicted during the design, and were less conservative than the values that formed the basis for the design, lends additional support to my view that the underlying design of the RSGs’ tube bundle, and the resulting thermal-hydraulic conditions, were themselves “defects or deficiencies in the design” of the RSGs that “adversely affect[ed]” the “performance of the Apparatus.”

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116 E.g., Hearing Tr. 33:2-5 (Statement of Mr. Heiden).
117 JX 923, RSG Contract Rev. 4, at 12 (§ 1.2.13).
118 JX 923, RSG Contract Rev. 4, at 12 (§ 1.2.13).
119 See supra section III.D.
120 See supra section III.C.
As explained previously, Mitsubishi repeatedly made representations to Edison during the design process regarding the major thermal-hydraulic parameters in the RSGs as well as the margin of safety against fluid-elastic instability and resulting tube vibration and wear.\textsuperscript{121} Mitsubishi represented that, based on its calculations that incorporated these parameters, there was “no potential” for fluid elastic vibration in the RSGs.\textsuperscript{122} Mitsubishi also represented to Edison that the thermal-hydraulic parameters (velocity and void fraction) that formed the basis for the design of the RSGs were within prior successful industry experience.\textsuperscript{123}

However, Mitsubishi underpredicted the thermal-hydraulic conditions in the RSGs such that its design, unbeknownst to Edison, contained a serious risk of failure due to fluid-elastic instability.\textsuperscript{124} Indeed, the NRC’s AIT Report explicitly referred to Mitsubishi’s underprediction of the thermal-hydraulic conditions in the RSGs during the design process as “deficiencies” in the RSGs’ design, concluding that: “These results led Mitsubishi to conclude that margins to instability were significantly larger than they actually are. This assessment is based on eddy current data, NRC ATHOS analysis, Mitsubishi ATHOS analysis, and other thermal-hydraulic analyses completed by Westinghouse and AREVA that all identified significantly higher fluid velocities and void fractions than FIT-III.”\textsuperscript{125}

To be clear, a departure from intended design values is not required for a “Defect” to exist under the plain language of section 1.2.13. That is because any characteristic of the RSGs that “adversely affects” the RSGs’ performance or safe operation is a Defect under the contractual definition, regardless of whether it was intended. However, the fact that the tube bundle design caused thermal-hydraulic conditions that were underpredicted provides additional support to my conclusion that the underlying tube bundle design is a Defect.

The Tribunal’s Definition of the “Defect” in the RSGs is Inconsistent with the Plain Language of the RSG Contract and the Record.

Despite significant evidence of a causal relationship between the design of the RSG tube bundle, the thermal-hydraulic conditions, and the ultimate tube wear that led to the Unit 3 tube leak, the Tribunal appears to conclude that there was one and only one Defect in the RSGs: “inadequate in-plane tube support from the AVBs.”\textsuperscript{126} The Tribunal reasons that, because the Tribunal has “found that the Claimants have established the existence of Defect(s) under the RSG Contract . . . it is not necessary to determine whether every one of the eighteen particularized Defects in the Claimants RPHM submission constitutes a Defect or not.”\textsuperscript{127}

In my view, the Tribunal’s determinations are flatly inconsistent with the plain language of section 1.2.13 of the RSG Contract and the record in this proceeding. As explained above, there is strong record evidence that the underlying design of the RSG tube bundle and the resulting thermal-hydraulic conditions (which were more severe than the design basis values)

\begin{thebibliography}{127}
\bibitem{121} See supra section III.A.
\bibitem{122} See supra section III.A.
\bibitem{123} See supra section III.A.
\bibitem{124} See supra sections III.C-D.
\bibitem{125} JX 1264, NRC AIT Report (July 18, 2012), at 53, 62.
\bibitem{126} Award ¶¶ 1991-2006.
\bibitem{127} Award ¶ 2004.
\end{thebibliography}
were the primary cause of the tube vibration which led to the tube wear and ultimately, to the leak. This, in and of itself, is sufficient to render the underlying design of the RSG tube bundle and the resulting thermal-hydraulic conditions “Defects” under section 1.2.13.

67. The fact that there may have been other contributing factors to the in-plane tube vibration and wear, including the lack of a positive contact force between the tubes and AVBs, does not somehow render the underlying design of the RSG tube bundle and resulting thermal-hydraulic conditions outside of the definition of “Defect” in the RSG Contract. There is nothing in the RSG Contract that permits the Tribunal to select one contributing factor to the tube wear, define that factor as the “Defect,” and then declare that the Tribunal does not need to decide if any other Defects exist or define what they are. Rather, the RSG Contract explicitly contemplates that there may be multiple Defects. Pursuant to the Design, Workmanship and Material Warranty, Mitsubishi warranted that that “the Apparatus shall be free from Defects,” and agreed to repair or replace “[a]ny Defect” with “due diligence and dispatch” by correcting the “root cause” or “demonstrat[ing], to the Edison Representative’s satisfaction, that there is not a risk of the reoccurrence of such problem.” The RSG Contract does not permit the Tribunal to, as the Tribunal does here, select one contributing factor to the ultimate wear, define that as the Defect, and ignore the evidence of other Defects in the RSGs.

68. The Tribunal does not cite any provision in the RSG Contract to support its conclusion that the Tribunal does not need to define, precisely, all of the Defects that existed in the RSGs. Nor does the Tribunal find that the underlying RSG tube bundle design or thermal-hydraulic conditions are not Defects. The Tribunal’s reasoning is inconsistent with section 1.2.13 of the RSG Contract, and deprive Edison of a critical right that Edison had under the RSG Contract: the right to Mitsubishi’s correction of the root cause of all “defects or deficiencies” in the RSGs that “adversely affect[]” the “performance of the Apparatus” under normal operating conditions and “adversely affect[]” the “continuous safe operation” of the RSGs.

69. By selectively addressing only one Defect, the Tribunal seeks to avoid addressing the inadequacy of the repair or replacement remedy with respect to the other indisputable Defects. I find no basis in California law to avoid the arbitral responsibility to find each Defect and to assess the adequacy or inadequacy of the related remedies.

V. The Type 1 Repair Proposed by Mitsubishi Did Not Satisfy Mitsubishi’s Obligations Under Section 1.17.1.3 of the RSG Contract.

A. The Importance of the RSG Contract’s Limited Warranty Remedy.

70. As explained above, the RSG Contract’s definition of Defect and its associated warranty provisions, including the Limited Warranty Remedy (§ 1.17.1.3) were an integral part of a bargained-for exchange between Edison and Mitsubishi: Edison agreed to limit its remedy against Mitsubishi to repair or replacement. However, in exchange, Mitsubishi promised that such repair or replacement would correct all Defects and their root causes.129

128 JX 923, RSG Contract Rev. 4, at 12 (§§ 1.17.1.1, 1.17.1.3).
129 JX 923, RSG Contract Rev. 4, at 35-36 (§ 1.17.1.3), 40 (§ 1.17.14).
71. Like the definition of Defect, the RSG Contract’s Limited Warranty Remedy is extremely broad. Section 1.17.1.3 unambiguously requires Mitsubishi to repair or replace “[a]ny Defect” or “damage to any other part of the Apparatus or other property resulting directly from such Defect” at Mitsubishi’s “sole expense” with “due diligence and dispatch.” The Limited Warranty Remedy also requires Mitsubishi to “undertake a technical analysis of the problem and correct the ‘root cause,’ unless [Mitsubishi] can demonstrate to the Edison Representative’s satisfaction that there is not a risk of the reoccurrence of such problem.”

72. I have determined that the RSGs’ tube bundle design and the resulting thermal-hydraulic conditions in the RSGs constitute “Defects” under section 1.2.13 of the RSG Contract. Thus, the next step in my analysis is to determine whether Mitsubishi’s proposed Type 1 repair would have satisfied Mitsubishi’s obligations under section 1.17.1.3 to correct all of the Defects and their root causes with due diligence and dispatch. This is because, under California law, a contractual limitation on the buyer’s remedy to repair or replacement is only enforceable if the seller is able to provide a repair that satisfies the purpose of that remedy.

73. For the reasons stated below, in my view the Type 1 repair does not satisfy Mitsubishi’s obligations under section 1.17.1.3 of the RSG Contract for two independent reasons: (i) it would not have corrected the Defects or their root causes with due diligence and dispatch and (ii) it would not have been licensable in a reasonable period of time.

B. The Type 1 Repair Did Not Correct the Defects or Their Root Causes.

74. Mitsubishi’s proposed Type 1 repair contemplated the insertion of thicker anti-vibration bars (AVBs) into the tube bundle. According to Mitsubishi, the thicker AVBs would have imposed a positive contact force, referred to as a “pinning” force, of approximately (approximately ) on the tubes in the RSGs. Mitsubishi has asserted that this positive pinning force would have prevented the in-plane fluid elastic instability and wear that, Mitsubishi concluded, was the cause of the Unit 3 tube leak.

75. Mitsubishi admits, however, that the Type 1 repair would not have changed the design or layout of the tube bundle itself. Thus, it would not have reduced the thermal-hydraulic conditions to either the values that formed the basis for the RSGs’ design or to values that could be shown to prevent harmful tube wear. Thus, Mitsubishi admits that the thermal-hydraulic conditions that Mitsubishi, as well as the NRC, determined to be the “main” or “primary” causes of the tube wear would remain even after repair. Mitsubishi’s Type 1 repair was based on the

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130 JX 923, RSG Contract Rev. 4, at 35-36 (§ 1.17.1.3).
131 JX 923, RSG Contract Rev. 4, at 36 (§ 1.17.1.3(c)).
134 JX 1735, Mitsubishi U-Bend Repair Report (Apr. 5, 2013), at 116. At the hearing, stated that the Type 1 repair would have resulted in a “minute” reduction of the thermal-hydraulic conditions. Hearing Tr. 2479:24-25.
premise that the introduction of a new, positive contact force on the tubes would have prevented the harmful in-plane tube vibration that resulted in the leak.

76. This positive contact force was not part of the RSGs’ design basis. The record in this arbitration demonstrates that the design basis of the RSGs was an “effective zero gap” between the tubes and the AVBs. In other words, entire design was based on the premise that there cannot be any positive force whatsoever on the tubes. This basic feature of the design was reflected in the RSG Contract itself, which required the statistical outer-most tube-to-AVB gaps not to exceed 0.021 inches. Design-stage presentations by Mitsubishi to Edison explained that the engineering justification for this requirement was to minimize the contact force on the tubes to prevent excessive stress, allow for tube expansion due to pressure and thermal expansion and prevent “lock up” of the tube bundle. This was consistent with prior industry experience, which provided that the anti-vibration bars were not designed to “lock” the tubes in place to prevent vibration, but rather to limit the amplitude of any vibration in the event very minor vibration occurred in the out-of-plane direction. Harmful wear was to be prevented by ensuring that the thermal-hydraulic conditions were sufficiently conservative.

77. In my opinion, it is clear that the Type 1 repair would not have corrected the Defects in the RSGs or their “root causes.” As I explained in section III, supra, the record evidence in this arbitration demonstrates that the design of the tube bundle resulted in thermal-hydraulic conditions (velocity and void fraction) that were much more severe than the conditions that formed the basis for the RSGs’ design. The lack of margin to instability resulted in the onset in-plane fluid elastic instability that first manifested itself in the form of the Unit 3 leak. Under section 1.2.13 of the RSG Contract, the design of the tube bundle and resulting thermal-hydraulic conditions satisfy the definition of “Defect” and trigger the Limited Warranty Remedy. The Type 1 repair would not have corrected these Defects or, in the case of the thermal-hydraulic conditions, their ultimate underlying cause: the layout of the tube bundle itself.

C. The Tribunal’s Determination that the Type 1 Repair was Contractually Adequate is Inconsistent with the RSG Contract and the Record.

78. The Tribunal’s determination that the Type 1 repair was adequate under section 1.17.1.3 of the RSG Contract is inconsistent with both the plain language and the purpose of Limited Warranty Remedy, and denies Edison its rights under the RSG Contract.

79. As an initial matter, as explained in Section IV above, the Tribunal’s determination that the “Defect” in the RSGs is “inadequate in-plane tube support from the AVBs” is inconsistent with section 1.2.13 of the RSG Contract. Contrary to the Tribunal’s determination, the design of the tube bundle itself and resulting thermal-hydraulic conditions are

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136 JX 923, RSG Contract Rev. 4, at 186.

137 See supra note 135 and accompanying text; see also JX 1797, AREVA Independent Design Review of the Mitsubishi U-Bend Repair Report (May 30, 2013), at 4, 16-17.
each Defects under section 1.2.13 of the RSG Contract. The Type 1 repair could not have corrected the root cause of these Defects and therefore was contractually inadequate.

80. The Tribunal appears to answer a different question: whether the Type 1 repair would have corrected the root cause of the leak. The Tribunal provides no contractual basis for its decision to address a different question (the root cause of the “leak”) from the issue that the Tribunal is directed by the parties to address (the root cause of the “Defect(s)”). In my view, the Tribunal’s decision to determine only the root cause of the “leak” is inconsistent with the RSG Contract, which requires Mitsubishi to correct all Defects as well as their root causes.

81. In other words, the Tribunal’s interpretation of the RSG Contract incorrectly presupposes that a repair is contractually adequate as long as the repair corrects the “root cause” of one ultimate manifestation of the Defects in the RSGs (in this case, the tube leak). However, that is not what the Limited Warranty Remedy in the RSG Contract requires. Rather, the Limited Warranty Remedy requires Mitsubishi to correct every Defect in the RSGs, as defined by section 1.2.13 of the RSG Contract, as well as every Defect’s root cause.

82. However, even accepting the Tribunal’s interpretation of the RSG Contract with respect to what “root cause” the Type 1 repair would be required to correct (i.e., the leak), the Tribunal’s determination that the Type 1 repair is adequate is inconsistent with the plain meaning of “root cause” as that phrase is used in section 1.17.1.3 of the RSG Contract.

83. The Tribunal relies on contemporaneous analyses written by both Edison and Mitsubishi after the leak to support its view. In these contemporaneous analyses, the authors posit that the in-plane tube wear that led to the leak was caused by a combination of thermal-hydraulic conditions and ineffective contact forces in the in-plane direction. The Tribunal concludes, based on these documents, that the “root cause” of the leak was the “combination of T/H conditions and insufficient tube support” and that a repair that corrected only one of these would be sufficient to meet the “root cause” requirement in section 1.17.1.3. In my opinion, the Tribunal’s determination permits the exact type of “band-aid” repair that section 1.17.1.3 of the RSG Contract was meant to prohibit by requiring correction of the “root cause.”

84. The plain meaning of “root cause” is the initiating cause of the chain of events. Considering this plain meaning leads me to the inescapable conclusion that the underlying design of the tube bundle and resulting thermal-hydraulic conditions were the “root cause.” It was these thermal-hydraulic conditions, which the Tribunal and Mitsubishi admit were underpredicted during design, that started the chain of events that caused the vibration and wear.

85. As explained above, the RSGs were designed based on two fundamental premises, or “design bases:” First, that in-plane fluid elastic instability would be prevented by ensuring that there was a sufficient margin of safety against out-of-plane instability. Second, that there would be zero contact force and an effective zero gap between the tubes and AVBs. In other words, there is no evidence that it was contemplated during the design stage that, in the event the RSGs were found to be susceptible to in-plane fluid elastic instability due to thermal-

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138 Award ¶¶ 2040-63.
139 Award ¶¶ 2040-63.
hydraulic conditions, the solution would be to apply a contact force on the tubes. Thus, I fail to see how the Tribunal can determine that “insufficient” contact forces are a “root cause” when the RSGs were designed not to have any contact force at all. Rather, “insufficient contact forces” may, at best, be viewed as a factor that contributed to the leak.

86. In my view, the Tribunal’s determination that the introduction of a positive contact force that was not part of the underlying basis of the original design, without correcting the underlying initiating cause of the harmful excitation and vibration, is sufficient to satisfy Mitsubishi’s obligations under the Limited Warranty Remedy, is inconsistent with section 1.17.1.3’s requirement that a repair correct the “root cause” of every Defect and deprives Edison of the type of repair that it bargained for under the RSG Contract.

87. In addition, while the issue of whether the Type 1 repair would have “worked” (as opposed to whether it would have corrected the root causes of the Defects, which is what section 1.17.1.3 of the RSG Contract requires) is not, in my view, the appropriate issue to be determined, the record shows that there was substantial uncertainty as to whether the Type 1 repair could have restored the RSGs to the specifications in the RSG Contract. This uncertainty provides further support to my view that the Type 1 repair was contractually inadequate. The purpose of the root cause requirement of section 1.17.1.3 was to prevent this uncertainty. As Mitsubishi’s expert James Olszewski admitted, in the nuclear industry there must be a “near 100 percent level of confidence” that the repair works. This is one of the key justifications for the requirement in the RSG Contract that a repair correct all Defects and their root causes.

88. At the outset, it is critical to observe that both of the Unit 3 RSGs were already, after only 11 months of operation, over half way to the RSG Contract’s maximum tube plugging limit of 8% of the tubes plugged over the 40-year service life of the RSGs. The record shows that Unit 3E088 required 4.4% of its tubes to be plugged, and Unit 3E089 required 4.0% of its tubes to be plugged. Because the Unit 3 RSGs would have had to operate for another 39 years and 1 month to achieve the RSG Contract’s specification of a 40-year service life, the Type 1 repair would have had to achieve a significantly more stringent plugging margin of less than 4% of the tubes plugged over the remaining ~39 year service life of the RSGs.

89. In my view, the record supports Edison’s position that the Type 1 repair, a first-of-a-kind repair that would have applied a new positive contact force to the tubes to prevent the vibration caused by the underlying thermal-hydraulic conditions in the RSGs, could not have been implemented with the “near 100 percent level of confidence” that Mitsubishi’s own witnesses admit was required for a repair in the nuclear industry. While it is impossible to know whether the repair would have worked, AREVA’s review of the Type 1 supports my view that there was not a “near 100 percent level of confidence” that the Type 1 repair could have restored the RSGs to their contractual requirements.

90. Internal Mitsubishi communications during the development of the Type 1 repair reflect Mitsubishi’s uncertainty as to whether the Type 1 repair would have lasted for 40-years

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140 Hearing Tr. 2743:11-15 (Olszewski).
with less than 4% of the remaining tubes plugged. An email by Mitsubishi engineer to on September 7, 2012 is illuminating. stated: “On one hand, it is a question mark as to whether the current MHI proposed repair could also stand up to a long term repair. If the T/H and velocity are not improved, no matter how much fiddling is done to the AVBs, it would simply be treating the symptoms. It is a design limit to begin with, and it would not be possible to dramatically improve the T/H. As for the design as well, if told to get 100 points at 100 percent power, honest opinions would be [steam generator replacement].” Similarly, in a July 2, 2012 presentation, Mitsubishi characterized the Type 1 repair as an “intermediate” repair that was designed to “maximize the unit operating time for a full fuel cycle without violating SG performance.” This was in contrast to the long term repair options to “restore 40 year service life,” which included redesign.

91. Observation is strong evidence that Mitsubishi understood that the thermal-hydraulic conditions in the RSGs constituted Defects under the RSG Contract and that their root cause was the layout of the tube bundle itself. It is also illustrative of the type of uncertainty that the RSG Contract’s Limited Warranty Remedy was intended to protect against. The reason why the RSG Contract does not permit treatment of only the “symptoms,” but rather requires correction of all Defects and their root causes, is to prevent the exact type of repair Mitsubishi proposed: a repair that would not correct the underlying causes of the Defects but instead introduce a new and untested element into the design.

92. The testimony of Mitsubishi’s witnesses regarding whether the Type 1 repair would have restored the RSGs to a 40-year service life was significantly qualified. For example, Mitsubishi’s witness Robert ‘Con’ Wilson stated that “the Repair’s ability to stop in-plane FEI and TTW for 40 years of projected RSG operation would have been confirmed by the operation of the repaired RSGs. Edison’s decision to decommission the plant prevent this form of validation.” In other words, Mr. Wilson opined that the effectiveness of the repair to restore the RSGs to the RSG Contract’s specifications would be shown by actually operating the plant for 40 years. The conclusions of and Dr. Begley relied on similar qualified reasoning regarding the effectiveness of the Type 1 repair over the 40-year service life.

93. Therefore, in my opinion, there was substantial uncertainty, supported by Mitsubishi’s own admissions, surrounding whether the Type 1 repair would have restored the RSGs to the required 40-year service life with less than 8% of the tubes plugged. To be sure, the RSG Contract itself does not specify the precise margin of safety to which a repair must restore the RSGs. The RSG Contract does, however, require the RSGs to operate for 40 years with less than 8% of their tubes plugged. The combination of the first of a kind nature of the Type 1 repair, the unprecedented and underpredicted thermal-hydraulic conditions in the RSGs, and the fact that the repaired RSGs would have to meet a tube plugging margin that was twice as stringent as the original tube plugging margin of the RSGs, strongly suggests that Mitsubishi

143 JX 1351, Email from to (Sept. 7, 2012).
144 JX 1238, Repair Plan Evaluation and Discussion (July 2, 2012), at 2.
147 JX 923, RSG Contract Rev. 4, at 156 (§ 3.9.1).
could not have achieved the “near 100 percent level of confidence” that Mitsubishi’s own expert witnesses admit was required to satisfy Mitsubishi’s repair obligations.

D. The Type 1 Repair Would Have Required a License Amendment and Confirmatory Testing to Be Approved by the NRC.

94. The Tribunal concludes that the RSG Contract required Mitsubishi to provide a repair that was licensable even though the Tribunal finds that there is no explicit support in the RSG Contract for this determination. However, I believe there is explicit support in the RSG Contract for this determination. Section 1.2.13 of the RSG Contract, the definition of Defect, provides that noncompliance with Applicable Standards or Applicable Laws constitutes a Defect. Section 1.2.5 of the RSG Contract defines “Applicable Laws” to include NRC regulations. Since Mitsubishi delivered RSGs that did not comply with NRC regulations, the RSGs contained a Defect that Mitsubishi was required by section 1.17.1.3 to correct. Thus, pursuant to section 1.17.1.3 of the RSG Contract, Mitsubishi was required to render a licensable repair. As such, I reach the same conclusion on this issue as the Tribunal but on a different basis.

95. However, I disagree with the Tribunal’s conclusion that the NRC would not have required Mitsubishi to conduct confirmatory testing prior to the NRC’s evaluation of the Type 1 repair, as well as the Tribunal’s conclusion that Edison, not Mitsubishi, bears the risk of any delay associated with a public hearing on the NRC’s approval of the repair.

96. On May 13, 2013, the Atomic Safety and Licensing Board (ASLB), the adjudicatory body of the NRC, issued a Memorandum and Order determining that Edison’s proposal to restart Unit 2 for five months at 70% power was a test or experiment that required Edison to seek a license amendment before the proposal could be evaluated. It is clear that the ASLB’s reasoning in the May 13, 2013 decision would also apply to any NRC review of the Type 1 repair. A plain reading of the ASLB decision shows that the NRC would not have approved the Type 1 repair without confirmatory testing under the expected conditions because (1) the Type 1 repair was a first of a kind repair that was not supported by experience and (2) the repair would have permitted the RSGs to operate outside of their design bases.

97. The ASLB found that the tube wear in Unit 3 was “unprecedented,” that the NRC’s findings revealed that the RSGs “have serious design and operational issues,” and that they were “beyond the envelope of experience with U-tube steam generators.” Consequently, the ASLB concluded that Unit 2 would be operating “outside the scope of its operating license” because the design of the RSGs “must be considered to be inconsistent with the steam generator design specifications assumed in the FSAR and supporting analysis.”

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148 Award ¶¶ 2258-66.
149 JX 923, RSG Contract Rev. 4, at 11 (§ 1.2.5), 12 (§ 1.2.13).
150 E.g., JX 1868, NRC CAL Closeout Letter (Sept. 20, 2013), at 2; JX 1777, ASLB Memorandum and Order (May 13, 2013), at 2; JX 1264, NRC AIT Report (July 18, 2012), at 4-5.
151 JX 1777, ASLB Memorandum and Order (May 13, 2013), at 33-37.
152 JX 1777, ASLB Memorandum and Order (May 13, 2013), at 25.
153 JX 1777, ASLB Memorandum and Order (May 13, 2013), at 32.
98. Importantly, the ASLB also concluded that the operation of Unit 2 for five months at 70% power would constitute a “test or experiment” requiring a license amendment, despite Edison’s representation that the reduction in power would bring the thermal-hydraulic conditions in Unit 2 back to within known successful operating experience. The ASLB’s decision concludes: “SCE’s analysis of the cause of the excessive tube wear and the measures it proposes to implement to preclude such wear are based on a theory as applied to U-tube steam generators, although that theory is not yet supported by actual experience.”

99. In my view, it follows from the reasoning of the decision that the ASLB’s decision would control with respect to the Type 1 repair and that the ASLB would have required Edison to seek a license amendment process and confirmatory testing prior to evaluating it.

100. As explained above, the RSGs were designed to operate with an effective zero gap and no contact force between the tubes and the AVBs. This design was standard in the nuclear industry. It was based on prior successful operational experience and had engineering justifications, including prevention of excessive stress, accounting for tube expansion due to pressure and thermal expansion, and prevention of “lock up” of the tube bundle. The RSGs were designed such that in-plane tube vibration was supposed to be controlled by ensuring, through an adequate safety margin, that the RSGs never experienced out-of-plane stability.

101. The Type 1 repair, by contrast, would have required a large (approximately of force) pinning force to be applied to the tube bundle by inserting thicker AVBs in between the tubes and, essentially, locking them together. Meanwhile, the thermal-hydraulic conditions, which the ASLB (as well as Mitsubishi, Edison and third party consultants) determined were “beyond the envelope of experience with U-tube steam generators,” would have remained. In other words, the RSGs would have relied on this large pinning force to counteract the instability caused by the thermal-hydraulic conditions.

102. Thus, in my view, a plain reading of the ASLB Decision shows that the Type 1 repair would have required a license amendment. As Mitsubishi admits, the Type 1 repair was a first-of-a-kind repair, and thus was “based on a theory” that was “not yet supported by actual experience.”

103. It is worth noting that AREVA’s May 30, 2013 Report is in accord. AREVA similarly found that the Type 1 repair does not space because to justify a change by 50.59 evaluation.

154 JX 1777, ASLB Memorandum and Order (May 13, 2013), at 33-34 & n.54.
155 JX 1777, ASLB Memorandum and Order (May 13, 2013), at 25; see, e.g., JX 1366, Tube Wear of Unit-3 RSG – Technical Evaluation Report Rev. 6 (Sept. 21, 2012), at 53.
156 E.g., JX 1571, Letter from to E. Avella (Dec. 20, 2012), at 3; Hearing Tr. 4712:2-7 (Russell); JX 1797, AREVA Independent Design Review of the Mitsubishi U-Bend Repair Report (May 30, 2013), at 4, 6.
157 JX 1777, ASLB Memorandum and Order (May 13, 2013), at 33-34 & n.54.
158 JX 1777, ASLB Memorandum and Order (May 13, 2013), at 32.
159 Hearing Tr. 4708:15-21 (Russell).
In other words, AREVA concluded that the Type 1 repair would have required a license amendment because it was a first of a kind design.

104. In addition, a plain reading of the ASLB decision indicates that the ASLB would have required confirmatory testing prior to approving the Type 1 repair. As the ASLB held, any license amendment request would require Edison to “validate the vibration analysis that will become part of the FSAR” and “assure the steam generator tubes do not fail prematurely due to tube-to-tube wear, and, thus, are able to satisfy their design basis.” This validation, the ASLB stated, would itself require tests and experiments. As the ASLB made plain, it was not adequate that SCE had made a “prediction” based on calculations that “accelerated tube wear will be precluded by plant operations limited to 70% power” because Edison’s prediction was “grounded on a theory that is not yet supported by actual experience.”

105. I also note that Eric Leeds, the official at the NRC who would have been responsible for making the ultimate determination regarding the Type 1 repair, testified that the NRC would have required confirmatory testing under the actual expected thermal-hydraulic conditions before evaluating the Type 1 repair. Mr. Leeds offered uncontradicted testimony that he communicated this view to Edison at the time that Mr. Leeds was at the NRC.

106. The Tribunal does not provide an adequate response to Mr. Leeds’ testimony. The Tribunal does not credit Mr. Leeds testimony and concludes that NRC staff engineers would have convinced Mr. Leeds that the Type 1 repair was viable and that Mr. Leeds would have changed his mind. However, Mr. Leeds has presented uncontradicted testimony that, at the time he was an official at the NRC, he informed Edison that testing was required. The Tribunal’s speculation as to what NRC staff would have done, and what Mr. Leeds would have done in response, is not supported by any evidence in the record. The Tribunal’s own view that Mr. Leeds would have changed his mind does not outweigh Mr. Leeds’ direct and uncontradicted testimony regarding Mr. Leeds’ contemporaneous communications to Edison.

107. Thus, in my view the record in the arbitration clearly establishes that the NRC would have required Edison to submit both (i) a license amendment request, which would have resulted in a public hearing, as well as (ii) the results of testing of the Type 1 repair because the Type 1 repair was a “theory” that was “not yet supported by actual experience.” This process would have taken several years even if the Type 1 repair would have ultimately been approved by the NRC (which, according to Mr. Leeds, it would not have).

108. I disagree with the Tribunal’s findings regarding the time that NRC approval of the Type 1 repair would have taken. As an initial matter, as the Tribunal acknowledges, the Tribunal’s analysis of the time frame does not consider the ASLB decision or the delay that would have resulted from a public hearing. The Tribunal also does not take into account the

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161 JX 1777, ASLB Memorandum and Order (May 13, 2013), at 35 n.55.
162 JX 1777, ASLB Memorandum and Order (May 13, 2013), at 33-34 & n.54.
164 Award ¶ 1914-78.
165 JX 1777, ASLB Memorandum and Order (May 13, 2013), at 33-34 & n.54.
166 Award ¶ 1978.
time for the necessary testing because the Tribunal finds, in my view incorrectly, that the NRC would not have required such testing. However, even if I were not to account for the ASLB decision and confirmatory testing, I would still conclude that the regulatory time frame that has been submitted by Mitsubishi’s experts is untenable. For example, in the six months following Edison’s response to the original CAL, the NRC issued multiple rounds of Requests for Additional Information (RAIs). As the ASLB Decision stated, by the time of the decision, the NRC had issued over 70 RAIs and Edison submitted eight responses, yet the NRC did not provide Edison with a time frame for its responses to Edison’s submissions. It was likely that the NRC would have requested more information before approving a restart of Unit 3 at 100% power, which, unlike the proposed restart of Unit 2, would not have restored the thermal-hydraulic conditions to the RSGs’ design basis and known successful experience.

109. The Tribunal does not, in fact, determine how long it would have taken for the NRC to approve the Type 1 repair. That is because the Tribunal does not determine how long a public hearing process on the required license amendment would have taken. According to the Tribunal, Edison “bore the risk of public hearings and any associated delay to the restart of Unit 3 since SCE is the utility subject to regulation.” I disagree with the Tribunal’s determination as inconsistent with the RSG Contract’s allocation of risk and California law.

110. The RSG Contract does not expressly allocate the risk of regulatory delay in the event the RSGs contain Defects and cannot be restarted without NRC approval of Mitsubishi’s proposed repair. However, in my opinion Mitsubishi bore the risk that, in the event the RSGs it delivered contained Defects, regulatory delay or non-approval of its proposed repair caused the limited repair-replacement remedy to fail under California law.

111. The RSG Contract required Mitsubishi to “guarantee in writing that the RSG design is licensable and provide all necessary support to achieve that end.” The RSG Contract’s definition of Defect includes noncompliance with Applicable Laws, which include all “laws, treaties, ordinances, judgments, decrees, injunctions, writs, orders, rules, regulations, and interpretations of any Governmental Authority to the extent having jurisdiction over Supplier, the Apparatus, SONGS, the Jobsite, generation or transmission of electricity, performance of the Work or the Purchase Order, including, without limitation, the design, construction or operation of the Apparatus.” In my view, it follows from the RSG Contract that, to the extent that Mitsubishi delivered RSGs that did not comply with these provisions, Mitsubishi undertook the risk that regulatory delay in approving the repair, including delay that was due to a petition by an environmental group for a public hearing, would render any repair inadequate.

112. I gain additional support for my view from the fact that, in contrast to the general provisions requiring Mitsubishi to provide licensable RSGs and repairs, when the parties intended for Edison to bear the risk of a regulatory action regarding the RSGs, the parties clearly specified this in the RSG Contract. For example, the RSG Contract permits Mitsubishi to charge

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167 E.g., JX 1588, Ltr. from J. Hall to P. Dietrich (Dec. 26, 2012).
168 JX 1777, ASLB Memorandum and Order (May 13, 2013), at 13.
169 Award ¶ 1959.
170 JX 923, RSG Contract Rev. 4, at 147 (§ 3.6.1.2).
171 JX 923, RSG Contract Rev. 4, at 12 (§ 1.2.13).
Edison for “the additional costs reasonable and necessarily incurred by Supplier to complete the Work as a result of a Change in Law that has an actual and demonstrable effect on the cost of the Work or in the completion of the Project.”\textsuperscript{172} The RSG Contract defines “Change in Law” as “any addition, amendment or modification in an Applicable Standard, the regulations or the NRC, or any final, non-appealable interpretation thereof, that requires or results or will require or will result in a change to the technical requirements of the Apparatus.”\textsuperscript{173}

113. However, the “Change in Law” provision only applies to a Change in Law prior to completion of the Project. A decision by the NRC declining to approve the Type 1 repair, or a delay of several years before approval is not a “Change in Law.” Rather, the years that it would have taken for the NRC to even review the Type 1 repair were on account of the RSGs’ non-compliance with NRC regulations. Indeed, the RSGs were actually never licensable because they were defective upon delivery, even though the Defects could not have been discovered until after the RSGs had operated for several months and a tube eventually leaked.

114. Finally, I find it necessary to comment on the Tribunal’s suggestion that political pressure, including from then-U.S. Senator Barbara Boxer of California, was the cause of the statement by the Chair of the NRC to Mr. Leeds not to allow an experiment to be conducted at SONGS for purposes of determining the acceptability of the Type 1 repair.\textsuperscript{174} While it is true that the tube leak (caused by the Defects in Mitsubishi’s design) attracted the interest of politicians, including then-Senator Boxer, the Tribunal does not cite a single piece of evidence that suggests that the ASLB’s decision, or the NRC Chair’s statement to Mr. Leeds that a test or experiment was not permitted in SONGS, was the result of political pressure. To the contrary, the ASLB’s determination that a restart of Unit 2 for five months at 70\% power was a “test or experiment” is an eminently reasonable interpretation of the plain language of the NRC’s own regulations. Under the reasoning of the ASLB’s decision, the Type 1 repair would also have been a “test or experiment” because this design had never been attempted.

E. Specific Responses to the Tribunal’s Analysis of the Type 1 Repair.

115. For the reasons stated above, I conclude, contrary to the Tribunal’s determination, that Mitsubishi’s proposed Type 1 repair did not meet the requirements for a repair specified in section 1.17.1.3 of the RSG Contract. However, I also find it necessary to specifically respond to certain determinations made by the Tribunal in connection with the repair.

1. Edison’s Repair Criteria Were Consistent with the RSG Contract.

116. The Tribunal finds that Edison’s repair screening criteria were “burdensome and unnecessary,” and that the criteria “appear to have left the Respondents with no choice but to transition to a replacement recommendation.”\textsuperscript{175} I disagree with this finding.

\textsuperscript{172} JX 923, RSG Contract Rev. 4, at 66 (§ 1.45.1).
\textsuperscript{173} JX 923, RSG Contract Rev. 4, at 11 (§ 1.2.9).
\textsuperscript{174} Award ¶¶ 1837-41.
\textsuperscript{175} Award ¶ 1800, 2734.
117. As stated above, Edison had the right, under sections 1.2.13 and 1.17.1.3 of the RSG Contract, to a repair that corrected all Defects in the RSGs as well as the root cause or root causes of each of the Defects. In my view, the record in this arbitration establishes that the underlying design of the tube bundle and the resulting thermal-hydraulic conditions in the u-bend of the RSGs were Defects. Correction of these Defects and their root causes would have required Mitsubishi to redesign the tube bundle to reduce thermal-hydraulic conditions back to the RSGs’ design basis and industry experience. Thus, in my view, Edison had the contractual right to insist on a repair that would correct the thermal-hydraulic conditions. The fact that a redesign was required to accomplish this was due to Mitsubishi’s own design flaws, not Edison’s repair screening criteria, which were consistent with the RSG Contract.

118. In the event that a proposed repair did not correct the root cause or causes of the Defects in the RSGs, the RSG Contract’s limited warranty remedy permitted Edison to require a “demonstrat[ion] to the Edison Representative’s satisfaction that there is not a risk of the reoccurrence of such problem.” Because the Type 1 repair would not have corrected the root causes of the Defects in the RSGs—indeed, it would not have corrected the Defects—Edison had the right, under section 1.17.1.3 of the RSG Contract, to require Mitsubishi to “demonstrate” to Edison’s satisfaction, that there was “not a risk of the reoccurrence of such problem.”

119. Section 1.17.1.3 of the RSG Contract is broad and gives Edison the right to insist on such a “demonstration” to its “satisfaction.” The reason is plain: The RSGs were complex pieces of equipment that were essential to the safe operation of SONGS. Any proposed repair that did not correct the root causes of any Defects created uncertainty with respect to whether it would work. The RSG Contract therefore gave Edison the right to insist on the demonstration contemplated by section 1.17.1.3 of the RSG Contract before accepting the repair.

120. While the parties and their experts diverge over whether the Type 1 repair would have actually worked, that is not the appropriate question when evaluating Edison’s rights under section 1.17.1.3 of the RSG Contract. In my view, what the record in this arbitration shows is that there was sufficient uncertainty regarding the effectiveness of the Type 1 repair to restore the RSGs to a 40-year service life with less than 8 percent of the tubes plugged such that it was reasonable for Edison to require, in the form of confirmatory testing, the “demonstration” that Edison had the right to require under section 1.17.1.3 of the RSG Contract.

121. To the extent that Edison’s repair criteria left Mitsubishi “no choice” but to transition to replacement, that was Mitsubishi’s fault. Edison’s repair criteria were consistent with the RSG Contract. The fact that a repair that corrected the Defects and their root cause was not possible was not Edison’s fault. Thus, while Edison’s repair criteria may well have left Mitsubishi with “no choice” except to propose replacement (or, to attempt the Type 1 repair after confirmatory testing), this was due to the failure of Mitsubishi’s design.

122. With respect to the type of testing that would have been required, it is my view that Edison reasonably asserted the right it had under the RSG Contract to a “demonstration, to the Edison Representative’s satisfaction, that there is not a risk of reoccurrence of the problem.” Edison had this right because the Defects in the RSGs were so severe that Mitsubishi was not

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176 JX 923, RSG Contract Rev. 4, at 35-36 (§ 1.17.1.3).
able to propose a repair that corrected the Defects or their root cause. The appropriate testing, and the methods by which such testing was conducted were Mitsubishi’s responsibility. I also note that the Tribunal’s determination that testing under the actual expected thermal-hydraulic conditions in the RSGs was “impossible” is contradicted by the testimony of Mitsubishi engineer __________ testified that Mitsubishi had the “ability” to perform testing and that Mitsubishi’s Takasago facility “can produce” the requisite void fraction.  

123. I also disagree with the Tribunal’s determination that Edison was engaged in “litigation position[ing]” during the time Mitsubishi was developing the Type 1 repair, and that this “calls into question” Edison’s actions with respect to the Type 1 repair. As explained above, Edison’s repair criteria were based on Edison’s express contractual rights. While Edison’s January 8, 2013 letter to Mitsubishi referred to Edison’s contractual rights and Edison’s belief that an outage spanning more than seven years “does not constitute a repair or replacement with ‘dispatch’ and far exceeds any reasonable repair period that was contemplated in the contract,” I disagree with the Tribunal’s apparent use of Edison’s insistence on a repair that met the requirements of the RSG Contract against Edison in this arbitration.

124. In fact, there is evidence that Mitsubishi was engaging in a litigation strategy months before Mr. Dietrich’s January 8, 2013 letter. In an August 23, 2012 email, Mitsubishi’s lead engineer who was stationed on-site at SONGS, emailed __________ and __________ stating that Mitsubishi “will never agree to bundle replacement” because “it is beyond the scope of our agreement.” Instead of dedicating its efforts to meeting its contractual obligations to repair or replace the RSGs with due diligence and dispatch, this email suggests that Mitsubishi was instead engaging in a litigation strategy to rely on the RSG Contract’s limitations on liability to force Edison to accept the Type 1 repair.

2. The Tribunal’s Analysis is Inconsistent with the RSG Contract.

125. The Tribunal spends significant time analyzing, and ultimately concluding, that Mitsubishi’s proposed Type 1 repair was “effective.” In support of this conclusion, the Tribunal “considers the question of whether that repair would prevent in-plane FEI and could be implemented within the confines of the steam generators.”

126. However, the Tribunal’s analysis is different from what section 1.17.1.3 of the RSG Contract requires. The questions that must be answered to determine whether the Type 1 repair satisfied Mitsubishi’s obligations under section 1.17.1.3 of the RSG Contract were not simply whether the Type 1 repair would have been “effective,” whether it would have prevented in-plane FEI, or whether it could have been physically implemented. The questions that must be answered are whether the Type 1 repair corrected the Defects and root causes of the Defects in the RSGs. That is what section 1.17.1.3 of the RSG Contract clearly and ambiguously requires. In my view, section 1.17.1.3 of the RSG Contract was meant to restrict Mitsubishi from doing...
exactly what it did in this case: proposing a repair that did not correct the Defects or their root cause, but was instead a first of a kind repair that was unproven by prior experience.

127. In addition, I disagree with the Tribunal’s determination that Edison’s willingness to consider an interim repair that required operation of the RSGs at a lower power level “casts a doubt on the requirements for testing and T/H improvements that Edison was demanding.” In other words, the Tribunal uses Edison’s willingness to consider alternative, interim repairs in an effort to restart the plant against Edison with respect to Edison’s evaluation of whether the Type 1 repair satisfied Mitsubishi’s obligations under section 1.17.1.3 of the RSG Contract.

128. Edison’s emails and testimony establish that Edison did not believe that an interim repair would have satisfied Mitsubishi’s contractual obligations. Edison’s willingness to consider interim repairs appears to be part of a good faith effort to get SONGS started again so that SONGS would be producing some power in the interim. Edison’s willingness to consider alternative, interim repairs is not somehow a concession by Edison that these repairs would have satisfied Mitsubishi’s contractual obligations. If anything, Edison’s actions show that Edison was acting in good faith and trying to get the plant restarted and not, as the Tribunal finds, acting strategically with an intent to “force” Mitsubishi to recommend a replacement.

3. Mitsubishi’s Witnesses Were Not Independent.

129. The engineering merits of the Type 1 repair are hotly contested in this arbitration. While, as I have explained above, it is not necessary to determine whether the Type 1 repair would have worked to determine that it was contractually inadequate, the fact that Mitsubishi’s key fact and expert witnesses lacked independence from Mitsubishi does, in my view, cast doubt on their credibility and their conclusions regarding the Type 1 repair.

130. William Russell submitted an expert witness statement for Mitsubishi regarding licensing of the Type 1 repair. Mr. Russell did not disclose any prior affiliation with Mitsubishi in his report. However, in response to questioning by the Tribunal, Mr. Russell revealed that he had been providing consulting services for Mitsubishi’s attorneys since September 2012 and was subsequently “converted” to being a testifying witness. Mr. Russell did not disclose this consulting agreement until near the end of the hearing, when Mitsubishi’s counsel introduced it as an exhibit. Mr. Russell’s failure to disclose this consulting agreement until the end of the hearing undermines his credibility on three central issues in this arbitration: whether the Type 1 repair was licensable, what the NRC would have required and the time for approval.

131. The Tribunal relies heavily on Mr. Russell’s witness statements and testimony, as well as the witness statements and testimony of Robert (Con) Wilson, James Begley, Donald Stewart and M.K. Au-Yang in the Tribunal’s determination that the Type 1 repair would have been effective and licensable by the NRC. Like Mr. Russell, Messrs. Wilson,
Begley, Stewart and Au-Yang were also not independent of Mitsubishi, despite the fact that they purport to offer expert testimony on behalf of Mitsubishi (though, unlike Mr. Russell, their affiliations with Mitsubishi were disclosed in their witness statements). Mr. Wilson had been a consultant for Mitsubishi for over ten years prior to the hearing.\footnote{Expert Witness Statement of Robert M. Wilson (Jan. 5, 2016), at 1.} Dr. Begley had been a consultant for Mitsubishi since the shortly after the SONGS shutdown in May 2013.\footnote{Expert Witness Statement of James Begley (Jan. 5, 2016), at 2.} is employed by Mitsubishi as an engineer.\footnote{Expert Witness Statement of (Jan. 5, 2016), at 1.} Mr. Stewart was retained by Mitsubishi starting in September, 2015 to provide draft “responses” to AREVA’s concerns in AREVA’s independent review of the Type 1 repair.\footnote{Expert Witness Statement of Donald Stewart (Jan. 6, 2016), at 2-3.} Dr. Au-Yang was retained by Mitsubishi starting in April 2013 as a consultant to review Mitsubishi’s Type 1 repair and prepare an internal repair report.\footnote{Expert Witness Statement of M.K. Au-Yang (Jan. 5., 2016), at 2.} While a lack of independence does not necessarily mean that these witnesses are not credible, the nature of the relationship between these witnesses and Mitsubishi, and the importance of this proceeding to Mitsubishi, weakens their credibility.

132. For example, in the months after the tube leak, Edison retained James Begley, who was at the time employed by AREVA, as a consultant to investigate the causes of the leak and possible repair options. In April 2012, Dr. Begley prepared a paper entitled “Conceptual Argument for Evaluation of Acceptable Inspection Interval for SONGS Units 2 and 3.”\footnote{See generally JX 1132, James Begley, Conceptual Argument for Evaluation of Acceptable Inspection Interval for SONGS Units 2 and 3 (Apr. 25, 2012).} Dr. Begley concluded that both Unit 2 and Unit 3 “exhibited significant wear at AVB and TSP locations,” and that the tube-to-tube wear experienced in Unit 3 as a result of in-plane fluid elastic instability arguably made Unit 3 “the worst case degraded steam generator in the history of domestic nuclear power.”\footnote{JX 1132, James Begley, Conceptual Argument for Evaluation of Acceptable Inspection Interval for SONGS Units 2 and 3 (Apr. 25, 2012), at 1.} Dr. Begley’s paper also observed that three other tubes in Unit 3, in addition to the tube that wore all the way through and leaked, “would have burst at normal operating conditions if tube to tube wear had decreased the wall thickness by another in the central portion of the wear scars.”\footnote{JX 1132, James Begley, Conceptual Argument for Evaluation of Acceptable Inspection Interval for SONGS Units 2 and 3 (Apr. 25, 2012), at 2.} Dr. Begley stated that a “rational safety cause for future operation” could be made if (1) no tube in the RSGs contained a stability ratio greater than one; (2) the probability of developing in-plane fluid elastic instability in any tube during the operating interval was acceptably low; and (3) there was “[d]efense in depth” to “mitigate consequences if in plane fluid elastic instability is unexpectedly encountered.”\footnote{JX 1132, James Begley, Conceptual Argument for Evaluation of Acceptable Inspection Interval for SONGS Units 2 and 3 (Apr. 25, 2012), at 3.}

133. Following the permanent retirement of SONGS in June 2013, Dr. Begley stopped consulting for Edison and was hired by Mitsubishi as a consultant.\footnote{Hearing Tr. 4211:13-4212:23 (Begley).} As of the date of the hearing, Mr. Begley was being paid by Mitsubishi as a consultant. At the hearing, Dr. Begley testified that the opinions he expressed in his contemporaneous evaluation of the RSGs in
April 2012 were overstated and that the RSGs were actually high quality steam generators.\textsuperscript{197} I find it difficult to credit Dr. Begley’s testimony, in light of the fact that it is in serious tension with his contemporaneous conclusions memorialized in his Conceptual Argument paper, and because Dr. Begley’s testimony occurred while he was a paid consultant for Mitsubishi.

VI. The Limited Warranty Remedy Failed of its Essential Purpose.

134. Having concluded that the Type 1 repair would not have satisfied Mitsubishi’s obligations under the RSG Contract to correct all Defects and their root causes, I must proceed to determine the consequences of Mitsubishi’s failure to provide a contractually adequate repair. For the reasons stated herein, and contrary to the Tribunal’s determination, I conclude that the RSG Contract’s limitation of Edison’s remedy “fail[ed] of its essential purpose” under section 2-719(2) of the California Commercial Code and is therefore not enforceable.

A. California Law and Public Policy

135. As a general matter, sophisticated parties to a sales contract governed by California law are free to agree to limitations on the buyer’s remedy to repair or replacement of a defective product. I do not question this general rule here. However, what is equally clear is that such a limitation to repair or replacement is only enforceable when repair or replacement is sufficient to provide the buyer with the “substantial value of the bargain.”\textsuperscript{198} The public policy underlying this limitation is the recognition that, when the buyer agrees to limit his remedy to repair or replacement, the agreement is based on the buyer’s assumption that, in the event of breach, repair or replacement of the product will be sufficient to provide the buyer with the “substantial value of the bargain.” In other words, the buyer does not give up its right to receive the value of its bargain—the reason why parties sign contracts in the first place—just because the buyer agrees to limit the remedy to which it is entitled to repair or replacement.\textsuperscript{199}

136. This public policy is reflected in section 2-719(2) of the California Commercial Code, which provides that where a limited remedy “fails of its essential purpose, remedies may be had as provided in this Code.” In other words, under section 2-719(2), if the circumstances of the parties’ performance of the contract do not permit the limited remedy to achieve its essential purpose, which is to provide the buyer with the product the buyer bargained for within a reasonable time,\textsuperscript{200} the buyer is entitled to the remedies generally available to buyers under the California Commercial Code, including monetary damages, as compensation.

137. It is important to appreciate that the “unconscionability” that is the subject of this analysis is not “procedural” unconscionability. Procedural unconscionability refers to contractual provisions that are oppressive at the time the contract is formed due to, for example, the parties’ relatively unequal bargaining strength or sophistication. Rather, the concept of unconscionability that underpins section 2-719(2) of the California Commercial Code is the recognition that a limitation on the buyer’s remedy, an “apparently fair and reasonable clause” at

\textsuperscript{197} Hearing Tr. 4243:18 (Begley).
\textsuperscript{198} Official Comments to Cal. Comm. Code 2-719; see S.M. Wilson, 587 F.2d at 1374-75.
\textsuperscript{199} See S.M. Wilson, 587 F.2d at 1374-75 (citing Eddy, 65 Calif. L. Rev. at 63).
\textsuperscript{200} See Milgard, 702 F.2d at 707-08; S.M. Wilson, 587 F.2d at 1374-75.
the time the contract was signed, may, because of changed circumstances, operate to deprive the buyer of the “substantial value of the bargain,” and become unconscionable.\textsuperscript{201} That is because it is against the public policy of the state of California to enforce a limitation on the seller’s liability if it permits the seller to default without an adequate remedy at law for the buyer.

138. In a line of cases beginning with \textit{S.M. Wilson}, the United States Court of Appeals for the Ninth Circuit, a federal appeals court whose jurisdiction includes California and Washington, has applied section 2-719(2) of the California Commercial Code (and the identical provision in Washington law) to claims by buyers for monetary damages based on the seller’s inability or unwillingness to repair or replace a defective product.

139. In \textit{S.M. Wilson}, the Court of Appeals for the Ninth Circuit held that a contractual limitation on the buyer’s remedy to repair or replacement “failed of its essential purpose” under section 2-719(2) when the tunnel boring machine that was the subject of the contract “did not perform as expected,” including that it “bored at a rate slower than the expected 2.5 feet per hour, overheated, broke down, and wore out blades faster than had been projected,” and could not be adequately repaired, despite attempts by the seller to repair the machine.\textsuperscript{202} As a result, the mining project for which the buyer purchased the machine took 210 days to complete instead of the expected 80 days. The Ninth Circuit’s analysis was “considerably aided” by a California Law Review article by Jonathan Eddy. As Mr. Eddy explained, “at least three assumptions” underlie the adequacy of a repair-replacement remedy: “that the warrantor will diligently make repairs, that such repairs will indeed ‘cure’ the defects, and that consequential loss in the interim will be negligible. So long as these assumptions hold true, the limited repair remedy appears to operate fairly and, as noted above, will usually withstand contentions of ‘unconscionability.’ But when one of these assumptions proves false in a particular case, the purchaser may find that the substantial benefit of the bargain has been lost.”\textsuperscript{203}

140. The Court of Appeals for the Ninth Circuit, applying Mr. Eddy’s reasoning, explained that “[t]wo of the assumptions suggested by Eddy allegedly have proven false in this case. The repairs did not ‘cure’ the defects and consequential damages are not negligible. However, the warrantor did attempt to repair the machine but was unable to do so. As a result, the buyer lost a substantial benefit of his bargain despite the seller’s efforts to provide the limited remedy.”\textsuperscript{204} Having identified “no California authority that requires a contrary view,” the Court held that the limitation on the buyer’s remedy was invalid under California law.\textsuperscript{205}

141. Subsequent decisions by the Court of Appeals for the Ninth Circuit, applying both section 2-719 of the California Commercial Code and the identical provision in Washington’s commercial code,\textsuperscript{206} have followed the reasoning of \textit{S.M. Wilson}. For example, in \textit{RRX Industries v. Lab-Con, Inc.}, the Ninth Circuit held that a limited repair or replacement remedy failed of its essential purpose when the seller attempted to repair the software system that

\begin{itemize}
  \item \textsuperscript{201} Official Comments to Cal. Comm. Code § 2-719(2); \textit{RRX Indus.}, 772 F.2d at 547.
  \item \textsuperscript{202} \textit{S.M. Wilson}, 587 F.2d at 1368.
  \item \textsuperscript{203} \textit{S.M. Wilson}, 587 F.2d at 1374-75 (quoting Eddy, 65 Calif. L. Rev. at 63).
  \item \textsuperscript{204} \textit{S.M. Wilson}, 587 F.2d at 1375.
  \item \textsuperscript{205} \textit{S.M. Wilson}, 587 F.2d at 1375.
  \item \textsuperscript{206} See Wash. Rev. Code § 62A.2-719.
\end{itemize}
it sold to the buyer but the system “never functioned as intended.”

Because the limited repair or replacement remedy failed, it was not enforceable under California law and the buyer was entitled to the general remedies available under the California Commercial Code. Likewise, in Milgard Tempering, Inc. v. Selas Corp. of America, the Court held that the seller’s inability to repair the glass tempering furnace the seller designed and manufactured for use in the buyer’s glass cutting facility caused the limited repair-replacement remedy to fail of its essential purpose, rendering it invalid. As the court explained in Milgard, “[a] contractual provision limiting the remedy to repair or replacement of defective parts fails of its essential purpose within the meaning of [the Washington law analogue to section 2-719(2)] if the breaching manufacturer or seller is unable to make the repairs within a reasonable period of time.”

It is “not necessary to show negligence or bad faith on the part of the seller, for the detriment to the buyer is the same whether the seller’s unsuccessful efforts were diligent, dilatory, or negligent.”

B. The Limited Warranty Remedy Failed of its Essential Purpose

Unbeknownst to Edison at the time of delivery, the RSGs contained latent defects causing the Unit 3 RSGs to fail after just 11 months of operation. As stated above, in my view the record in this arbitration shows that the underlying design of the tube bundle of the RSGs, as well as the resulting thermal-hydraulic conditions, constitute “Defects” under section 1.2.13 of the RSG Contract. Mitsubishi’s proposed repair would not have corrected these Defects, or their “root cause[s].” Instead, the Type 1 repair was a first of a kind repair that had never been attempted in a comparable nuclear steam generator. Moreover, the testing that the NRC would likely have required before permitting implementation of the Type 1 repair would have taken several years to conduct, in addition to the time for NRC review. Because the Type 1 repair would not have repaired the Defects in the RSGs, would not have corrected their “root cause[s]”, and would not have done so with “due diligence and dispatch,” I conclude that it was grossly insufficient to provide Edison with the “substantial value” of its bargain.

Nor was redesign and replacement of the RSGs sufficient to provide Edison with the “substantial value” of its bargain. As explained above, a redesign and replacement of the Unit 3 RSGs would have taken at least seven years to design, build and install. This minimum time frame, which was admitted by Mitsubishi, did not include the time for regulatory approval and did not include the time for redesign, replacement and installation of the Unit 2 RSGs, which had the same design, and thus the same Defects, as the Unit 3 RSGs.

Because the Defects in the RSGs were latent and undiscoverable until the RSGs were delivered, installed, turned on and operated for several months, the SONGs plant had to be shut down immediately and indefinitely when the RSGs failed. A redesign and replacement of the RSGs would have required Edison to maintain the SONGs plant in a state of operational readiness, at a cost of over $1 million per day, for over seven years, despite not producing any power, while Mitsubishi redesigned the RSGs and manufactured four new ones.

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207 RRX Indus., 772 F.2d at 546.
208 RRX Indus., 772 F.2d at 546-47.
209 Milgard, 902 F.2d at 707-08.
210 Milgard, 902 F.2d at 707-08.
211 Milgard, 902 F.2d at 708.
145. In the circumstances of this case, a replacement would not merely fail to provide Edison with the “substantial value” of its bargain. Replacement of the RSGs would provide Edison with nothing. As the United States Court of Appeals for the Third Circuit recognized in *Chatlos Systems, Inc. v. National Cash Register Corp.*, “[a] delay in supplying the remedy can just as effectively deny the purchaser the product he expected as can the total inability to repair. In both instances the buyer loses the substantial benefit of his purchase.”

146. I note that, in this case, the minimum seven year delay in supplying the replacement that Mitsubishi admitted would be required made Edison substantially worse off than if Mitsubishi had not delivered the RSGs at all, or, was delayed for several years in its initial delivery of the RSGs. That is because the original steam generators still had at least some useful life left in them at the time that the RSGs were installed. The latent defects in the RSGs required Edison to immediately shut down SONGS for an indefinite period of time, with no warning and no lead time to begin development of a redesign or other contingency plan.

147. The testimony of Mitsubishi’s chief contract negotiator supports my conclusion. admitted he “wasn’t thinking about any specific duration” of any outage when he negotiated the contract, and admitted that the parties never discussed a scenario in which a total redesign would be necessary to repair or replace the RSGs. also testified that, generally speaking, “unless otherwise, the plant has its own schedule for the outages or any shutdown driven by other reasons, then theoretically the plant keeps operating” while a replacement component is manufactured. In fact, testified that, in his experience, the design and manufacture of replacement steam generators “always” takes place while the plant is fully operational and “will not prevent the plant from running.”

148. In sum, while replacement of certain components or even the RSGs themselves may have been, in certain circumstances, sufficient to provide Edison with the “substantial value of the bargain” required by California law and thus adequate to serve the purpose of the limited repair or replacement remedy, the complete redesign and replacement necessitated by the latent design Defects that required an immediate shutdown of the plant was not.

C. Specific Responses to the Tribunal’s Analysis of the Limited Remedy.

149. The Tribunal concludes that the limitation on Edison’s remedy to repair or replacement did not fail of its essential purpose and was enforceable. I find it necessary to respond to certain findings the Tribunal makes to support its conclusion.

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212 *Chatlos Sys., Inc. v. Nat’l Cash Register Corp.*, 635 F.2d 1081, 1085 (3d Cir. 1980).
213 Hearing Tr. 2432:18-22.
214 Hearing Tr. 2443:17.
215 Hearing Tr. 2443:2-11.
216 Hearing Tr. 2443:5-10.
1. Replacement Was Not an Adequate Remedy.

150. The Tribunal relies on the fact that the limited warranty remedy provides for repair or replacement of the RSGs in support of its determination that the limited remedy did not fail of its essential purpose. In the Tribunal’s view, “the RSG Contract expressly anticipates that replacement might be of the entire ‘Apparatus,’ which term is defined in the RSG Contract as including both ‘RSG Units.’ Consequently, the explicit terms of the RSG Contract itself make clear that the Claimants should have appreciated that the Warranty includes the option of a total replacement of both Units 2 and 3 within a normal time frame of 3 to 5 years.”

151. I disagree with the Tribunal’s reasoning as inconsistent with California law and public policy. As stated above, the question that must be answered when evaluating whether a limited repair or replacement remedy failed under section 2-719(2) of the California Commercial Code is whether it could have provided the buyer with the “substantial value” of its bargain. A repair replacement remedy is not adequate merely because replacement would have been theoretically possible. Indeed, a complete redesign and replacement of a defective machine will almost always be possible if the seller were given unlimited time to complete it.

152. As stated above, in my view, considering the circumstances of this case, a replacement of the RSGs could not have given Edison the “substantial value” of the bargain because it would have required Edison to maintain SONGS in a state of operational readiness for over seven years while waiting for a redesign and replacement to occur. This scenario had never before occurred in the history of domestic nuclear power, and replacement under this scenario would have had no value to Edison whatsoever. Mitsubishi admits that it was not contemplated during the parties’ contract negotiations. Indeed, a review of the historical steam generator-related outages identified by Mitsubishi’s expert James Olszewski reveals an average outage length of 1.58 years and a standard deviation of 0.8 years. The seven year outage that would have been required in order to redesign and replace the RSGs, the direct result of Mitsubishi’s failure to deliver RSGs with an adequate margin of safety to prevent the onset of tube instability and harmful wear, is well beyond any reasonable outage length for Edison to bear.

2. There is No Remedy Available to Edison in the RSG Contract That Could Have Provided Edison with the Substantial Value of its Bargain.

153. In support of its determination that the limited repair or replacement remedy in the RSG Contract did not fail of its essential purpose, the Tribunal concludes: “The remedies available to the Claimants under the RSG Contract extended beyond the repair or replacement options, and included a back charge option and the ability to recover, a refund up to the Purchase Price under a default option. Consequently, the Warranty cannot be considered to have failed its essential purpose under the applicable California law.” According to the Tribunal, Edison could have, but “elected not to avail themselves of those options.”

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217 Award ¶ 2584.
219 Award ¶ 2574.
220 Award ¶¶ 2576, 2591.
154. The Tribunal’s reasoning is inconsistent with the RSG Contract and the public policy of California, which requires that the adequacy of a remedy be evaluated by determining whether it provides the buyer with the “substantial value” of its bargain.

155. First, to the extent the Tribunal’s findings rely on section 1.17.1.3(b) of the RSG contract, this remedy was not actually available to Edison. Section 1.17.1.3(b) is only available to Edison if Mitsubishi failed to act. The Tribunal does not find that Mitsubishi was not diligent in attempting a repair. Therefore, Edison could not have utilized section 1.17.3(b) of the RSG contract to declare Mitsubishi’s default and back-charge Mitsubishi. In addition, even if this remedy was available to Edison, Mitsubishi’s replacement time frame indicates that back-charging another supplier to redesign and manufacture four new steam generators would not have been an adequate remedy because it would have taken at several years.

156. Second, to the extent the draft findings rely on the liquidated damages available under the Performance Warranty (§ 1.17.2), the draft findings also contravene California law and public policy. The maximum liquidated damages available under the Performance Warranty in the event of a tube leak, $1.4 million, do not constitute a remedy that provides Edison with the substantial benefit of its bargain. As the Ninth Circuit explained in Milgard, the purpose of the limited repair-replacement remedy is to “ensure that the buyer will receive goods conforming to the contract specifications within a reasonable time period.” The liquidated damages available under the Performance Warranty are not a reasonable substitute for the restoration of the RSGs to the product Edison purchased. The $1.4 million available to Edison for primary-to-secondary leakage was intended to cover the cost of plugging the tube leak (i.e., meeting its Performance Warranty). $1.4 million would not give Edison anything close to what it bargained for.

3. Edison Was Not Required, and Would Not Have Been Authorized by the NRC, to Permit Mitsubishi to “Attempt” the Type 1 Repair.

157. As an additional ground in support of the Tribunal’s finding that the limited warranty remedy did not fail of its essential purpose, the Tribunal reasons that “[a] limited warranty remedy cannot be said to have failed its essential purpose unless a seller actually has had a fair and reasonable opportunity to attempt a repair.” According to the Tribunal, “[t]he cases that the Claimants rely on, in which a warranty was found to have failed of its essential purpose, all involved situations where the seller was actually allowed to attempt a repair at least once, and in some cases, multiple times.” In my view, the Tribunal’s reasoning is logically flawed and is inconsistent with the reasoning of the caselaw it relies on.

158. While it is true that, in all of the Ninth Circuit cases relied on by Edison, the seller was permitted to attempt a repair, none of those cases stated, expressly or impliedly, that a limited repair or replacement remedy cannot fail of its essential purpose unless the buyer permits

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221 See JX 923, RSG Contract Rev. 4, at 36 (§ 1.17.1.3(b)).
222 Award ¶¶ 2388-92.
223 See JX 923, RSG Contract Rev. 4, at 36-37 (§ 1.17.2), 58-59 (§ 1.29.2.1).
224 Milgard, 902 F.2d at 707.
225 Award ¶ 2579.
226 Award ¶ 2579.
the seller to attempt a repair.\textsuperscript{227} An examination of the reasoning of these cases demonstrates, in my opinion, that there is no such requirement under California law.

159. As an initial matter, as stated above, I conclude that the Type 1 repair that was proposed by Mitsubishi did not satisfy Mitsubishi’s obligations under section 1.17.1.3 of the RSG Contract to provide a repair that corrects the Defects in the RSGs as well as their root causes. In fact, the Type 1 repair is the type of “band-aid” repair that section 1.17.1.3 was meant to prevent, given the serious safety concerns associated with the RSGs. I also conclude that replacement had no value to Edison whatsoever, and certainly would not have been sufficient to restore Edison to the substantial value of its bargain. Thus, in my view there is sufficient evidence in the record to conclude that even if the Type 1 repair had been attempted, it would not have satisfied the purpose of the limited repair-replacement remedy.

160. In the Ninth Circuit cases cited by Edison, Mitsubishi and the Tribunal, by contrast, it was not alleged that the proposed repairs were insufficient on their face. Rather, the repairs were later determined to be insufficient when they failed to correct the defects.

161. In addition, none of the cases discussed herein concerned a defective machine provided to a buyer in a regulated industry, in which the repair would have been required to be approved by the buyer’s regulator prior to its implementation. As stated above, the Tribunal finds (and I do not disagree) that the RSG Contract requires Mitsubishi to provide a licensable repair. In addition, as stated above, I conclude that approval of the repair would have taken several years, and that the risk of such delay should be borne by Mitsubishi because the delay was caused by Mitsubishi’s defective machine (which was never licensable) not Edison. Such a delay would work to render the limited repair or replacement remedy insufficient to provide Edison with the substantial value of its bargain, as is required under California law.

4. A Limited Repair or Replacement Remedy May Fail of its Essential Purpose Even if the Provision is Not Procedurally Unconscionable.

162. On multiple occasions, the Tribunal states that its determination that the RSG Contract’s limitations of remedy and liability are enforceable under California law is supported by the fact that the RSG Contract was freely bargained for by sophisticated parties.\textsuperscript{228} For example, the Tribunal states, in connection with the limited warranty remedy, that because the remedy was “freely negotiated and accepted by both Parties at the time the RSG Contract was executed, it cannot be credibly argued that the freely bargained Warranty remedies failed their essential purpose or that the Claimants were deprived of their remedies.”\textsuperscript{229} In my view, the Tribunal’s reasoning is inconsistent with California law and public policy.

163. As explained above, the public policy underlying section 2-719(2) of the California Commercial Code is the assurance of “minimum adequate remedies” to the buyer such that, in the event that the seller defaults on its obligations, the buyer is entitled to recover

\textsuperscript{227} See Milgard, 902 F.2d at 707-08; RRX Indus., 772 F.2d at 547; S.M. Wilson, 587 F.2d at 1375.

\textsuperscript{228} Award ¶¶ 2577, 2595.

\textsuperscript{229} Award ¶ 2577.
the “substantial value” of the bargain. As the Ninth Circuit held in Milgard, when evaluating whether a limited repair or replacement remedy failed of its essential purpose, the inquiry is whether repair or replacement would have been able to provide the buyer with the product to which the buyer is contractually entitled in a reasonable time period.\(^{231}\) In other words, whether it would be able to provide the buyer with the substantial value of its bargain.

164. As the Ninth Circuit has repeatedly held, this inquiry does not depend on whether the limited remedy was freely negotiated and bargained for. As the Official Comments explain, a limited remedy may be “apparently fair and reasonable” at the time at which it was negotiated and agreed to, but is rendered unconscionable when a change of circumstances (such as the buyer’s delivery of a defective product) causes the limitation to “operate[] to deprive either party of the substantial value of the bargain.”\(^{232}\) The Ninth Circuit has recognized the meaning of this comment in relation to the public policy underlying section 2-719(2). As the Court held in RRX Industries, “[n]either bad faith nor procedural unconscionability is necessary under California Commercial Code § 2719(2). It provides an independent limit when circumstances render a damages limitation clause oppressive and invalid.”\(^{233}\)

165. The inquiry is therefore whether, in the circumstances of the case, the limited remedy operates to deprive the buyer of the substantial value of its bargain. If so, the limitation is unconscionable and unenforceable under California law. This determination does not depend on whether the limitation was initially procedurally unconscionable.

VII. The Liability Cap is Not Enforceable Under California Law.

A. California Law and Public Policy

166. As explained above, I conclude that, due to the nature of the Defects in the RSGs, repair or replacement of the RSGs could not provide Edison with the “substantial value” of its bargain. I must therefore determine the remedy to which Edison is entitled.

167. Section 2-719(2) of the California Commercial Code provides that “[w]here circumstances cause an exclusive or limited remedy to fail of its essential purpose, remedy may be had as provided in this Code.” As the Official Comments to the California Commercial Code explain, the purpose of section 2-719(2) is to ensure that the buyer receives the “substantial value of the bargain.” If repair or replacement is insufficient to provide the buyer with the substantial value of the bargain, a limitation on the buyer’s remedy to repair or replacement “will not be enforced.”\(^{234}\) In such a case, “the remedies provided in the Commercial Code govern as if the parties have not agreed to any remedy of their own.”\(^{235}\) In other words, in a case where, as here, repair or replacement is ineffective at restoring the buyer to the “substantial value” of the buyer’s

\(^{230}\) Official Comments to Cal. Comm. Code § 2-719; see RRX Indus., 772 F.2d at 547.

\(^{231}\) Milgard, 902 F.2d at 707.


\(^{233}\) RRX Indus., 772 F.2d at 547; see Fiorito Bros. v. Freuhauf Corp., 747 F.2d 1309, 1314-15 (9th Cir. 1984) (citing Official Comment 1, and explaining that “circumstances during performance,” as distinguished from procedural unconscionability, may render damages limitation clauses oppressive and invalid).


bargain, California public policy renders the limitation of the buyer’s remedy to repair or replacement unenforceable. The buyer is able to seek other remedies available to buyers under the California Commercial Code even through the contract had limited the remedy to repair or replacement. These remedies include damages caused by the seller’s breach.

168. However, the fact that a limited repair or replacement remedy fails of its essential purpose, thereby entitling the buyer to pursue other remedies available to buyers under the California Commercial Code, does not automatically invalidate other elements of risk allocation that may be contained in the parties’ contract, including limitations on the seller’s liability. Rather, the courts that have considered the issue instruct that the Tribunal must undertake an examination of (1) the parties’ allocation of risk in the contract at issue; and (2) the nature of the seller’s default on its obligations under the contract. If the nature of the seller’s default is such that it causes the buyer to suffer losses that are outside of the bargained-for allocation of risk—in other words, losses that arose from a risk that the buyer did not agree to bear—the contractual limitation on the seller’s liability may become “oppressive by changed circumstances” (i.e., the nature of the seller’s breach) and rendered invalid.

169. The public policy underlying the decisions that have considered the issue of the validity of damages limitations in the context of the seller’s default is similar to the public policy underlying the “failure of essential purpose” doctrine in the context of limitations of the buyer’s remedy to repair or replacement. If repair or replacement cannot serve the purpose of the limited remedy—which is to provide the buyer with goods conforming to the contract’s requirements within a reasonable time—enforcement of the remedy would deprive the buyer of the substantial value of its bargain under the contract and is not permitted. In that circumstance the buyer would be able to seek monetary damages for the losses caused by the seller’s default. Likewise, in the context of a limitation on the seller’s liability, if a limitation prevents the buyer from recovering losses that arise from a risk that the buyer did not agree to bear, this also deprives the buyer of the substantial value of its bargain under the contract and is not permitted. Stated another way, to determine whether enforcement of a liability limitation deprives the buyer of the substantial value of its bargain, one first needs to determine what that bargain is.

B. The Parties’ Risk Allocation in the RSG Contract.

170. The RSG Contract at issue in this arbitration contains two separate liability limitations: the mutual waiver of consequential damages and the liability cap. The mutual waiver of consequential damages prohibits both Edison and Mitsubishi from recovering any consequential damages from the other “resulting from a Party’s performance or nonperformance of its obligations under the Purchase Order, or in the event of suspension of the Work or termination of the Purchase Order.” It contains only two exceptions: the parties’ obligations to indemnify each other from claims by third parties, and costs incurred by Edison in the event of Mitsubishi’s default on its obligations under section 1.24 of the RSG Contract.

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236 See Milgard, 902 F.2d at 707-09; RRX Indus., 772 F.2d at 547; S.M. Wilson, 587 F.2d at 1375-76.
237 Compare S.M. Wilson, 587 F.2d at 1375-76, with Milgard, 902 F.2d at 707-09, and RRX Indus., 772 F.2d at 547.
238 JX 923, RSG Contract Rev. 4, at 45-46 (§ 1.21.1).
239 JX 923, RSG Contract Rev. 4, at 45-46 (§ 1.21.1).
171. The liability cap limits Mitsubishi’s liability to Edison to the purchase price Edison paid (approximately $138 million). The liability cap is not mutual and Mitsubishi’s potential recovery against Edison is not capped. In addition, in contrast to the mutual waiver of consequential damages, the liability cap does not apply to “costs incurred by [Mitsubishi] (and, in the case of default hereunder, costs incurred by EMS or Edison) in achieving Acceptance of all of the Work.” “Acceptance” is defined in section 1.16 of the RSG Contract. It includes that “[t]he RSG Units have been in operation for a sufficient period to demonstrate that they are capable of being operated safely, normally and continuously in accordance with the requirements of the Specification, the Purchase Order, all Applicable Laws, Applicable Standards and the Documentation associated therewith at all operating conditions and modes specified in the Specification, the Scope of Work or other applicable Documentation.”

172. “Documentation” is, in turn, defined in section 1.2.17 of the RSG Contract to include “Drawings (including Certified Drawings), specifications, procedures, instructions, lists, reports, test results, calculations, manuals, schedules, software, and other data to be furnished by [Mitsubishi], as stated in the Specification or elsewhere in the Purchase Order.” Such Documentation includes the Performance Analysis Report that, pursuant to section 3.8.2 of the RSG Contract, Mitsubishi was required to “prepare and submit for Edison’s approval” before Edison accepted Mitsubishi’s design and delivery of the RSGs. Section 3.8.2 of the RSG Contract requires the Performance Analysis Report to include extensive documentation of “all thermal-hydraulic aspects of the RSG design,” “assume [a] 40-year design life of the RSGs,” and “identify quantitatively available design Margins, where applicable.”

173. The RSG Contract therefore gave Edison the right to approve or reject Mitsubishi’s design based on Edison’s assessment of the risks of failure through review of the Performance Analysis Report and other Documentation. It also gave Edison the right to require Mitsubishi, prior to Edison’s Acceptance of the RSGs, to conform the RSGs to the agreed-upon design parameters, including the thermal-hydraulic conditions and safety margins against instability, that Mitsubishi represented the RSGs would achieve in the Performance Analysis Report. Edison’s rights under this provision were not subject to the liability cap.

174. The relationship between Edison’s rights to reject Mitsubishi’s design based on the expected thermal-hydraulic conditions and margin of safety and to require Mitsubishi to deliver RSGs that conform to the accepted design, on the one hand, and the liability cap, on the other hand, is a critical element of risk allocation in the RSG Contract. Edison agreed to limit Mitsubishi’s liability to the purchase price subject to the conditions that (1) Edison could reject Mitsubishi’s design if Mitsubishi’s design contained a risk of the RSGs’ failure that was too large for Edison, and (2) if Edison agreed to Mitsubishi’s design, Edison had the right to withhold Acceptance of the RSGs until Mitsubishi conformed the RSGs to the margin of safety of the agreed design notwithstanding the liability cap in the RSG Contract.

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240 JX 923, RSG Contract Rev. 4, at 46 (§ 1.21.2(iii)).
241 JX 923, RSG Contract Rev. 4, at 46 (§ 1.21.2(iii)).
242 JX 923, RSG Contract Rev. 4, at 32-35 (§ 1.16).
243 JX 923, RSG Contract Rev. 4, at 12 (§ 1.2.17).
244 JX 923, RSG Contract Rev. 4, at 152-55 (§ 3.8.2).
245 JX 923, RSG Contract Rev. 4, at 152-55 (§ 3.8.2).
C. The Circumstances of Mitsubishi’s Breach Render the Liability Cap Unconscionable and Therefore Unenforceable Against Edison.

175. Having determined the relationship between the RSG Contract’s limitations of liability and the risk allocation in the RSG Contract as a whole, the question remains whether any of the over $6.5 billion in damages Edison claims it suffered due to the RSGs’ failure arose from a risk that Edison did not agree to bear. If the damages arose from a risk that Edison had agreed to bear, it is not unconscionable to enforce the limitations of liability against Edison. If, however, due to the nature of Mitsubishi’s breach, the breach caused Edison losses that resulted from a risk that Edison did not agree to bear, the limitations of liability may be unconscionable under California law if the limitations prevent Edison from recovering such losses.

176. I would find, contrary to the Tribunal’s determination, that Edison suffered certain damages that arose from a risk that Edison did not agree to bear. Due to Mitsubishi’s design-stage miscalculations regarding the key thermal-hydraulic design parameters and safety margins, Edison was never actually able to exercise its contractual right to evaluate whether Edison was willing to accept the risk of failure inherent in the RSGs that Mitsubishi delivered. As a result, Edison unknowingly accepted an RSG design that had a substantial risk of failure.

177. As explained above, Edison had three important rights under the RSG Contract that were essential elements of the parties’ risk allocation. First, Edison had the right to understand the key thermal-hydraulic parameters in the RSGs, and the associated margins of safety with respect to fluid-elastic instability, prior to accepting Mitsubishi’s RSG design. Second, if Edison determined that the risk of failure of Mitsubishi’s RSG design was too high for Edison’s risk tolerance, Edison had the right to reject Mitsubishi’s design (including the PAR). If Edison and Mitsubishi could not agree on a design, Edison could terminate the RSG Contract. Third, if Edison accepted Mitsubishi’s design, Edison had the right to delivery of RSGs that conformed with the risk tolerances that Edison accepted (including those disclosed in the PAR). In the event the RSGs did not conform, Edison had the right to require Mitsubishi to correct such deficiencies prior to Acceptance of the RSGs, notwithstanding the liability cap.

178. Mitsubishi’s miscalculations and misstatements regarding the margin of safety in the RSGs’ design deprived Edison of the three rights identified above. Due to Mitsubishi’s misrepresentations, Edison never received the opportunity to meaningfully evaluate, and potentially reject, Mitsubishi’s design. This was exacerbated by Mitsubishi’s failure to disclose that experienced engineers had expressed serious concerns that Mitsubishi’s calculation of the thermal-hydraulic conditions in the RSGs were inaccurate. While Edison did provide Mitsubishi with notification of Edison’s Acceptance of the RSGs, Edison’s Acceptance was based on Mitsubishi’s representations regarding the margin of safety in the RSGs’ and their risk of failure, including Mitsubishi’s representation that there was “no potential” for fluid-elastic instability in the RSGs. Due to the latent nature of the Defects in the RSGs, Edison could not have discovered, at the time of Acceptance, that Mitsubishi’s representations were grossly inaccurate and that, in fact, Mitsubishi’s RSG design contained a serious risk of failure.

246 See supra section III.
247 See supra section III.B.
248 See JX 924, Ltr. from P. Coughlin to  (Sept. 21, 2010).
179. Based on its understanding of the risk of failure in Mitsubishi’s design, Edison
Accepted Mitsubishi’s design and installed the RSGs. As a result, Edison incurred direct costs
of over $1 billion after Acceptance of the RSGs that, my view, Edison would not have incurred if
Edison understood that the RSGs had a substantial risk of failure. These costs included $678
million for installation, $403 million for engineering, fabrication and transportation and $267
million for project support, allocations and disposal.249 Edison also spent approximately $227
million in its efforts to inspect and repair the RSGs after they failed.250

180. As explained above, in my view Mitsubishi’s performance in this case denied
Edison an essential contractual right that it bargained for in exchange for its acceptance of the
liability cap and associated risk. Edison had the right to require Mitsubishi to conform the RSGs
to the standards (including the thermal-hydraulic conditions and associated margins of safety) of
the design Edison approved pursuant to sections 1.16 and 3.8.2 of the RSG Contract,
notwithstanding the liability cap. This was a substantial element of Edison’s bargain under the
RSG Contract and a part of the allocation of risk under the RSG Contract. Mitsubishi’s
misrepresentations during the design stage, combined with the latent nature of the Defects in the
RSGs, deprived Edison of this right. This resulted in Edison’s unknowing acceptance of a
design that contained serious risks of failure that Edison did not agree to bear.

181. These risks were the precise risks that materialized and resulted in the RSGs’
failure. Thus, the losses Edison incurred in reliance on Mitsubishi’s misrepresentations,
including the $678 million that Edison incurred to install the RSGs and remove the OSGs, the
$403 million in engineering, fabrication and transportation costs associated with the replacement,
and the $227 million in costs associated with the efforts to repair the RSGs, cannot be said to fall
within the bargained-for allocation of risk in the RSG Contract. In my view, California public
policy, as interpreted by the Court of Appeals for the Ninth Circuit, requires Mitsubishi, not
Edison, to bear these losses, as they arose from the materialization of a risk Edison did not agree
to bear in the RSG Contract. Thus, I would find, contrary to the Tribunal’s determination, that
enforcement of the liability cap against Edison in this case is unconscionable.

182. The Ninth Circuit’s decision in Milgard strongly supports my view. Milgard
operated a glass cutting facility. Milgard entered into a contract with Selas pursuant to which
Selas designed and build a custom glass tempering furnace for use in Milgard’s facility. The
record in Milgard showed that, even though Selas viewed the design as “experimental,” Selas
marketed the furnace as a “working piece of equipment.”251 After the furnace was designed and
installed, it experienced problems and did not function as represented. Selas attempted repairs
but the repairs did not restore the furnace to the contract’s specifications.

183. The Ninth Circuit held that, in the circumstances of the case, Milgard could
recover its consequential damages caused by Selas’s default from Selas notwithstanding the
contract’s waiver of consequential damages. The Court explained that Washington law required
the court to “examine the remedy provisions and determine whether [the seller’s] default caused

251 Milgard, 902 F.2d at 705.
a loss which was not part of the bargained-for allocation of risk.”252 In the circumstances of the case, the court found, Milgard “agreed to purchase what Selas represented as a cutting edge glass furnace that would accommodate its needs after two months of debugging.”253 The severity of Selas’s default, when considered in light of the representations made by Selas as to the furnace’s capability, caused Milgard losses that Milgard did not agree to bear. Washington law permitted Milgard to recover the loss from Selas notwithstanding the limitation on liability.254

184. The Tribunal attempts to distinguish Milgard on the ground that, in the contract at issue in Milgard, the limitation on the buyer’s remedy to repair or replacement and the waiver of consequential damages were contained in the same provision.255 However nothing in the Milgard decision suggests that the location of the liability limitation that the Court found to be invalid was the justification underlying (or even a factor in) the Court’s decision. Rather, the decision was based on an analysis of the relationship between the breach and the contract’s limitation on liability to determine whether the losses suffered by the buyer arose from a risk that the buyer agreed to bear. The Court found that the buyer agreed to the contract (and hence, to the liability limitations) based on Selas’s representation that it could deliver a cutting edge glass furnace that required two months of debugging. In the Court’s view, Selas’s default—in other words, its delivery of an “experimental” furnace that never worked as intended and could not be repaired to the specifications promised to the buyer—was sufficiently total and fundamental that, in the circumstances of the case, the seller, not the buyer, must bear the loss.

185. The Tribunal’s reasoning, in my view, focuses too narrowly on the location of the RSG Contract’s liability cap. While the liability cap is located in a separate provision from the limited warranty remedy,256 this does not mean that the liability cap can be considered in isolation from the rest of the RSG Contract when conducting the analysis instructed by the Ninth Circuit in Milgard: to examine the contract’s risk allocation and determine whether the buyer’s loss arose from a risk that the parties had not allocated to the buyer. As explained above, I would conclude that the relationship between Mitsubishi’s representations—that there was “no potential” for fluid-elastic instability—and the RSGs that Mitsubishi delivered deprived Edison of a critical right it had under the RSG Contract that was central to the parties’ risk allocation: the right to understand the margins of safety to instability and the right to, if the RSGs did not comply with the represented margins, require correction notwithstanding the liability cap. The nature of Mitsubishi’s breach, in my opinion, was sufficiently fundamental and total that it resulted in the RSGs’ containing a risk of failure that Edison did not agree to bear. It was this risk that materialized and resulted in Edison actually being worse off than if Edison had never replaced the original steam generators, which still worked, with the RSGs.

186. I also disagree with the Tribunal’s reliance on the portion of the S.M. Wilson decision which held that the contract’s waiver of consequential damages was valid under the circumstances of that case and precluded the buyer’s recovery.257 In my view, the issues that the Ninth Circuit was required to consider in S.M. Wilson with respect to the contract’s waiver of

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252 Milgard, 902 F.2d at 709.
253 Milgard, 902 F.2d at 709.
254 Milgard, 902 F.2d at 709.
255 Award ¶ 2565.
256 See JX 923, RSG Contract Rev. 4, 35-36 (§ 1.17.1.3), 46 (§ 1.21).
257 See Award ¶¶ 2612-18.
consequential damages, as well as the nature of the seller’s breach of contract, are sufficiently
different than the issues the Tribunal must consider in this arbitration, such that the reasoning of
the Ninth Circuit in S.M. Wilson does not apply here. As an initial matter, there was no
allegation made in S.M. Wilson, nor did the Court consider whether, the contract required the
buyer to approve the key margins of safety in the design and, once approved, required the seller
to conform the machine to those standards notwithstanding the liability limitation.258

187. In addition, there was no allegation that the circumstances of the seller’s
performance resulted in the buyer bearing the loss arising from a risk that the buyer did not agree
to bear. Rather, the holding in S.M. Wilson was simply that a waiver of consequential damages
was not unconscionable even though it prevented the buyer from recovering consequential
damages the buyer suffered when the seller’s machine performed worse than was expected.259
Indeed, under my view of the record in this arbitration, the seller’s breach in S.M. Wilson cannot
reasonably be considered comparable to Mitsubishi’s breach here. The tunnel boring machine
delivered by the seller in S.M. Wilson worked, and was able to be utilized by the purchaser to
complete the tunnel in full, albeit taking 210 days to complete the rather than the 80-day
completion time contemplated under the contract.260 Perhaps, if Mitsubishi had delivered RSGs
that reached their tube wear limit in 15 years after installation, as opposed to the 40-year service
life, the reasoning of the S.M. Wilson decision might apply. It may well be that a foreseeable risk
to Edison at the time of contracting was that the RSGs’ tube wear rate might be faster (even
double) than Mitsubishi promised under the contract. However, the reasoning of S.M. Wilson
cannot reasonably be extended to this case, in which the RSGs, warranted to last for 40 years,
undisputedly failed after 11 months and left Edison with an inoperable plant.

188. In addition, there was no allegation in S.M. Wilson, as there is here, that the
seller’s breach of contract left the buyer worse off than if the seller had never performed at all
and instead repudiated the contract. In this case, by contrast, Edison spent $678 million to install
the RSGs and remove the old RSGs, which still had at least some useful life left in them, and in
total spent over $1 billion in direct reliance on Mitsubishi’s representations that there was “no
potential” of failure due to fluid-elastic instability. Mitsubishi’s breach, and its failure to
disclose material facts related to concerns raised by Mitsubishi’s consultants over the accuracy of
Mitsubishi’s calculations, left Edison with no meaningful ability to accurately assess the risk of
the RSGs’ failure. Edison accepted Mitsubishi’s RSG Design and reasonably relied, to the
detriment of over $1 billion, on Mitsubishi’s representations that there is “no potential” for
instability in the RSGs, despite the fact that, unbeknownst to Edison, there was a material risk of
failure. Because the buyer in S.M. Wilson did not have (or did not assert) the same contractual
rights as Edison had, the seller’s breach in S.M. Wilson was not of the same magnitude as
Mitsubishi’s breach, and the buyer in S.M. Wilson did not suffer the same types of damages as
Edison, in my opinion the Ninth Circuit’s holding in S.M. Wilson that the contract’s waiver of
consequential damages was not unconscionable has little relevance here.

258 See S.M. Wilson, 587 F.2d at 1365-76.
259 See S.M. Wilson, 587 F.2d at 1375-76.
260 See S.M. Wilson, 587 F.2d at 1368.
VIII. Conclusion

189. As explained above, the determination that a contractual limitation on the seller’s liability is unconscionable and invalid is a very serious matter. However, as the Court of Appeals for the Ninth Circuit has repeatedly recognized, the seller of a machine may breach its obligations under the contract to such a degree that the breach causes the buyer to suffer losses that were not part of the bargained-for allocation of risk in the contract. As the Ninth Circuit has explained, this determination requires a careful analysis of the relationship between (1) the parties’ allocation of risk in the specific contract at issue and (2) the nature and severity of the seller’s default on its obligations under the contract. If the nature and severity of the seller’s breach results in the buyer suffering losses that arose from a risk the buyer did not agree to bear, California law requires these losses to be borne by the seller, who was at fault and whose breach caused the loss, as opposed to the buyer, who did not agree to bear that risk.

190. This is such a case. Edison had the right to understand and evaluate the key thermal-hydraulic parameters in the RSGs and the associated margins of safety regarding fluid-elastic instability prior to accepting Mitsubishi’s RSG design. This right was a central element of the contract’s allocation of the risk of the RSGs’ failure. It gave Edison the right to decide whether it was willing to accept the risk of the RSGs’ failure, which both Edison and Mitsubishi knew would be catastrophic to the operation of SONGS. Mitsubishi’s misrepresentations to Edison during the design stage, which were exacerbated by Mitsubishi’s failure to disclose the concerns raised by engineers that Mitsubishi’s calculations may have been inaccurate, deprived Edison of any meaningful right to accurately assess the risks of failure in Mitsubishi’s RSG design. This resulted in Edison’s acceptance of an RSG design that had a serious risk of failure, without any meaningful opportunity to evaluate and accept this risk. This risk materialized and caused the RSGs to fail after just 11 months (2.3% of their intended design life).

191. While Mitsubishi attempted a repair, in my view the record in this arbitration shows that Mitsubishi’s proposed repair would not have satisfied the RSG Contract’s repair requirements. There was also substantial uncertainty surrounding its efficacy such that, even if Edison agreed to it, it would have taken years to test and approve. The only alternative that could have provided RSGs conforming to the RSG Contract’s specifications was a redesign and replacement of the RSGs’ tube bundles. But this would have taken at least seven years to implement. In these circumstances, due to Mitsubishi’s breach, repair or replacement of the RSGs could not have provided Edison with the “substantial value” of its bargain.

192. Thus, I would find, contrary to the Tribunal’s determination, that California law entitles Edison to recover the over $1 billion in costs it incurred in reliance on Mitsubishi’s representations regarding the risk of failure of the RSGs’ design. In my view, Edison would not have incurred these costs if Edison understood that Mitsubishi’s RSG design had a substantial risk of failure due to fluid-elastic instability and resulting vibration. In the circumstances of this case, California law requires Mitsubishi to bear the losses Edison suffered due to Mitsubishi’s default because these losses did not arise from a risk Edison agreed to bear.
Dated:   June 12, 2017

Mr. Jonathan D. Schiller
Arbitrator