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From: Vinod Arora [vinnie48in@gmail.com]
Sent: Tuesday, May 28, 2013 5:23 PM
Subject: San Onofre Sad Saga Continued - SCE/MHI/NRC and Public Education Series
Attachments: Operational Difference between SONGS Units Bill Rev 8 Rev6Ace5D.docx

Lessons Learnt: SCE/MHI threw the "critical questioning attitude" in the dangerous profits ditch and destroyed \$1 Billion Dollars 21st Century Safest and Innovative Steam Machines in less than 2 years of operation by subverting the NRC Regulatory Process. Now SCE wants to restart the Unit 2 degraded steam generators at 70% power without understanding the causes, which destroyed these steam generators. NRC cannot permit this unapproved experiment and risk the health and safety, environment and economy of 8.4 Million Southern Californians for SCE to continue on its dangerous Profits Making Scheme. Restart of Unit 2 degraded steam generators without proper repairs/replacement by SCE would be a violation of the NRC Safety Mission, ASLB Ruling, Federal Regulations, His Excellency, The President Of United States Open Government Initiative and the safety concerns of 8.4 Million Southern Californians as expressed by Honorable Senator Barbara Boxer.

By Associated Press, Updated: Tuesday, May 28, 8:24 AM

LOS ANGELES — U.S. Sen. Barbara Boxer wants the Justice Department to investigate if California utility executives deceived federal regulators about an equipment swap at the San Onofre nuclear power plant that eventually led to a radiation leak, The Associated Press has learned. The California Democrat obtained a 2004 internal letter written by a senior Southern California Edison executive that she said "leads me to believe that Edison intentionally misled the public and regulators" to avoid a potentially long and costly review of four replacement steam generators before they went into service.

Operational Differences between Units 2 & 3 - NRC AIT report shows significantly different operating conditions between Units 2 & 3, which are consistent with SONGS operating procedures. However, Southern California has provided incorrect operating conditions for Units 2 & 3 to MHI, AREVA and Westinghouse. As shown in the attached paper, this conflicting information has resulted in determination of incorrect Root Causes for Units 2 & 3 RSG degradation. Based on an SCE Internal Investigation in 2012, this confirms that Edison is intentionally misleading the public and its Independent Experts to justify restart of degraded Unit 2 and to avoid a potentially long and costly review of four replacement steam generators before they went into service. The former San Onofre internal investigator was trying to assist the San Onofre Senior Leadership Team to determine the true root causes for the San Onofre Steam Generator degradation. But, instead the San Onofre Senior Leadership Team discriminated, intimidated, harassed, insulted and retaliated the former San Onofre internal investigator to hide the \$1 Billion replacement steam generator mistakes. NRC Office of Inspector General, NRC Region IV Allegation Coordinator, California Department of Fair Employment Housing and US EEOC are investigating these charges. Several other former San Onofre employees have been discriminated, intimidated, harassed, insulted and retaliated for expressing nuclear safety concerns. In Democratic America, let us see what these agencies do to

protect the rights of San Onofre workers in accordance with the Federal Regulations and expose the truth behind this \$1 Billion Debacle.

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From: Vinod Arora [vinnie48in@gmail.com]
Sent: Tuesday, May 28, 2013 8:33 PM
Subject: San Onofre Sad Saga - Edison making fool of Edison or NRC and Public?

Internal SCE letter reveals Edison knew of defects at crippled reactors but misled federal regulators to get expedited license. Dwight Nunn was let go from Edison due to unspecified charges like Ross Ridenoure. According to SONGS Insiders, Ted Craver will be making more changes in SCE Senior Leadership team pretty soon, unless Sweet-talking and Smiling Pete convinces NRC Commission of the Safety of Unit 2. We will have to wait and see what NRC Commissioners do to overrule ASLB ruling and pacify 8.4 Million Southern Californians.

A. Edison said in a statement that the letter showed that the company was taking care to make sure Mitsubishi addressed potential design issues. The company disputed the assertion that the design differences between the new and old steam generators -- which included adding hundreds more tubes and making changes to the support structures -- should have triggered a license amendment.

Edison wrote defective specifications and selected a cheap manufacturer, which lacked skills, tools, technology and qualified SG Experts to build such complex CE generators. On the top of that, MHI was not given time to think and research but was told to avoid the 10CFR 50.90 Process (No NRC Approval). Like for Like does not mean that it looks the the old one from outside and fits like the old one, but what it really MEANS THAT THE DESIGN FUNCTIONS ARE NOT ADVERSALLY AFFECTED. The adverse design and operational changes are shown below, which should have triggered a License Amendment, and any Engineer with Elementary knowledge of 10CFR 50.59 should have known that. But all rules were broke, because profits was the controlling criteria.

1. One San Onofre long-term Manager said, "The safety was ignored to add more tubes to maximize the heat out of the generators."

Comments: What Edison did not tell anybody that besides 377 tubes, SCE added the equivalent of 650 new tubes by increasing the average length of heated tubes by 50 inches to increase the heat transfer surface area by 11% to maximize the thermal output from and profit from RSGs. These were SCE demands, which forced MHI to build an extremely tall U-tube bundle. Combined with higher RCS flows, lower steam generator pressures, the heat transfer coefficient of the SG got exceeded in middle of Unit 3 tube bundle and flow changed from nucleate boiling to film boiling.

2. One San Onofre Root Cause Leader said, "I wish that San Onofre Engineers would have tested these unapproved design changes, "one by one" to ensure they work."

Comments: In this case the San Onofre SG designers were in a rush from the beginning for speedy construction and profits, so they sacrifice safety, did not perform proper scaling and mock-up testing up to correctly define the and design and operational parameters, and threw the “critical question attitude in the ditch.” Then the end result is obvious, no production, loss of \$1 Billion Dollars Rate and public/regulator trust.

3. One San Onofre long-term Project Manager Said, “I wish that San Onofre Engineers would have duplicated the Palo Verde Replacement Steam Generators, they would not be in this mess and begging for NRC Mercy and Public Approval.”

B. Here is the summary of San Onofre Tube-to-AVB Contact Forces and Accident Scenarios:

1. High Void fractions of 99.6%, high steam flows (film boiling), higher thermal reactor power per RSG (RCS Flows, 76 Million lbs./hr, 1737 MWt plus), high in-plane fluid velocities (35-50 feet/sec), circulation ratios of 3.3, narrow tube to pitch tube diameter, excessive number of 9,727 tubes, extremely tall tubes (average length of heated tube increased by 50 inches, equivalent to the addition of ~650 tubes), 116,000 square feet of tube heat transfer area (increased from 104,000 in the OSGs), lack of in-plane restraints, steam generator operation at too low a pressure (833 psi), insufficient tube-to-AVB contact forces (< 1N per MHI) and loose supports (larger tube-to-AVB Gaps, Based on SCE Incomplete ECT Results) caused FEI, Flow-Induced Random Vibrations and Mitsubishi Flowering Effect in Unit 3 @100%RTP. The flow regime in Unit 3 changed from nucleate boiling to film boiling because the Unit 3 RSG heat transfer coefficient was exceeded and the change was attributed to more than 5MWt of SG output in Unit 3 in 4% of the SG U-tube bundle high region of wear on the hot-leg side due to higher RCS flows and lower SG Pressure Operation in Unit 3 RSGs.

2. Unit 2 – The design of Unit 2 and Unit 3 is the same as described above. Operational difference only discussed here. Moderate Void fractions of (98-98.9%), lower steam flows compared to Unit 3 (nucleate boiling), lower thermal reactor power per RSG compared to Unit 3 (RCS Flows, 74 Million lbs./hr, 1727 MWt plus), high out of-plane fluid velocities (25 feet/sec), circulation ratios of 3.3, steam generator operation at 942 psi (consistent with NRC AIT Report and SONGS SGM procedure) caused Flow-Induced Random Vibrations and Mitsubishi Flowering Effect in Unit 2 @100%RTP. Unit 2 operation at higher steam pressures, lower steam flows compared to Unit 3 (nucleate boiling), lower thermal reactor power per RSG compared to Unit 3 (RCS Flows, 74 Million lbs./hr, 1727 MWt plus) prevented FEI in Unit 2. The double Unit 2 tube-to-AVB contact forces compared with Unit 3 (~ 2N vs. < 1N per MHI) and better supports (smaller tube-to-AVB gaps in Unit 2 compared to Unit 3 based on SCE Incomplete Tube ECT Evaluation) in Unit 2 compared with Unit 3 for preventing FEI in Unit 2 is an ill-conceived story invented by SCE to deceive MHI, Westinghouse, AREVA, Independent Public Safety Experts and 8.4 Million Southern Californians as shown below.

3. Even though SCE, MHI and AREVA claim that operating and thermal-hydraulic conditions were the same in both units, Unit 2 did not experience tube-to-tube wear because of lower reactor thermal power and higher steam generator pressure operation and NOT double tube-to-AVB contact forces and better supports because of inadvertent accidental Unit 2 AVB design as explained by SCE and MHI. FEI did not occur in Unit 2, which is consistent with Westinghouse report. The NRC AIT Report noted in error and without thorough investigation that the operational differences did not have any effect on the degradation mechanisms between Units 2 & 3. Throughout this entire paper, we will review SCE, MHI and AREVA claims: (1) About Unit 2 double tube-to AVB contact forces and better

supports because of inadvertent accidental design, and (2) About Unit 3 insufficient tube-to AVB contact forces and loose supports because of intentional precision manufacturing.

4. According to MHI/ AREVA, a Tube-to-AVB Contact Force of 10N is required to prevent FEI@100%RTP. It is noted that Tube-to-AVB clearances are significantly larger than the SONGS steam generator design clearance of 2 mils diametral. After instability develops, the amplitude of in-plane motion continuously increases and the forces needed to prevent in-plane motion at any given AVB location become relatively large. Hence shortly after instability occurs, U-bends begin to swing in Mode 1 and overcome hindrance at any AVB location. Calculation of the probability of the onset of in-plane fluid-elastic instability requires information in three areas: stability ratios, contact forces at AVB locations and a criteria for deciding whether AVB supports are effective or ineffective in terms of in-plane support. Stability ratios need to be known as a function of position in the bundle, number of consecutive ineffective supports and power level. Contact forces at AVB locations cannot be determined deterministically since the dispersion of gaps between tubes and AVB supports is random, and thus probabilistic in nature. The primary source of tube-to-AVB contact forces is the restraint provided by the retaining bars and bridges, reacting against the component dimensional dispersion of the tubes and AVBs. Contact forces are vary between both cold and hot pressurized tube-bundle conditions. Contact forces significantly increase at normal operating temperature and pressure due to diametric expansion of the tubes and thermal growth of the AVBs. MHI has calculated the response of a large U-bend with AVB supports subjected to turbulence and fluid-elastic excitation forces. Various gap (clearance) conditions were included along with contact forces ranging from 1N to 10N. An equal contact force was applied at all 12 AVB locations. Given the uncertain nature of fluid-elastic excitation forces, a direct application of the selected excitation function to SONGS at 100% power is problematic. However the scale of the contact force that prevented in-plane vibration is highly useful. A contact force of 1N did not resist in-plane motion but a force of 10N was completely effective.

5. According to Mitsubishi recent testing data, additional thicker tubes with contact forces in excess of 30N are required to prevent adverse effects of FEI @100%RTP.

6. Based on the best available evidence, existing Unit 2 AVBs have a significantly smaller contact force (2N) than the 30N force required to prevent FEI.

7. During AOO and MSLB events, Unit 2 at 70% power will experience void fractions of 100%, high steam flows (film boiling), high in-plane fluid velocities (35-50 feet/sec) and jet impingement from flashing feedwater. With contact forces of 2N, Unit 2 tube bundle would not be able to prevent the adverse effects of FEI, Flow-Induced Random Vibrations and Mitsubishi Flowering Effect. Multiple tube-ruptures can occur due to tube-tube wear, full circumferential rupture of tubes can occur due to incubating cracks and the entire degraded Anti-vibration structure can collapse.

C. Friends of the Earth: 'Restart is Dead'

WASHINGTON, D.C. – Sen. Barbara Boxer has released a private 2004 letter from Southern California Edison that reveals the utility knew of major problems in its radically redesigned replacement steam generators at the San Onofre Nuclear Generating Station that could lead to a “disastrous outcome,” but the company knowingly misrepresented its failed design as a “like-for-like” replacement to sidestep a more thorough license review by the Nuclear Regulatory Commission. The

leaked letter confirms accusations of the nuclear watchdog group Friends of the Earth. Its release, said the group, means Edison's restart plan is dead.

"This letter from Edison management is truly shocking," said Damon Moglen, climate and energy director for Friends of the Earth. "It shows definitively that Edison was more concerned with keeping to a construction schedule and making money than with assuring safe operation of their reactors. It raises serious questions about their honesty and about the NRC's handling of the San Onofre license.

"The restart of San Onofre reactors is now off the table. No one can possibly argue for the further operation of these crippled reactors when such an experiment places the lives and livelihoods of millions of Southern Californians at risk."

The letter, which Boxer released to the Associated Press, was sent by Edison Vice President Dwight Nunn to his counterpart, General Manager Akira Sawa, at Mitsubishi Heavy Industries, which fabricated the replacement steam generators according to Edison's specifications. The letter states that serious problems with the replacement steam generators could lead to "unacceptable consequences (e.g. tube wear and eventually tube plugging). This would be a disastrous outcome for both of us."

In addition, the letter reveals that Edison was fully aware that the new generators, which failed in less than two years and caused a release of radiation, was not a like-for-like replacement despite their assurances to federal and state regulators. Edison's Nunn writes: "Consequently, the design of the new steam generators is currently proceeding using the existing steam generator seismic response based on a like-for-like replacement concept (although the old and new steam generators will be similar in many respects they aren't like-for-like replacements)."

Sen. Boxer said that she believes "Edison intentionally misled the public and regulators" and is providing the correspondence to "federal and state officials, including the U.S. Department of Justice so they can determine whether Edison engaged in willful wrongdoing."

Release of the letter follows a May 13 ruling by the NRC's Atomic Safety and Licensing Board in which the three-judge panel unanimously ruled that Edison's plans to restart the damaged reactors would be an "experiment" for which they had inadequate experience and which would be outside both their technical specifications and licensing requirements.

"Friends of the Earth accused them, the ASLB judged them and now Edison has confessed," said Dave Freeman, former head of the federal Tennessee Valley Authority and senior advisor to Friends of the Earth. "The San Onofre restart plan is now deader than a doornail. It's over."