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From: Bill Hawkins [billlee123456@gmail.com]
Sent: Thursday, May 09, 2013 7:51 PM
Subject: San Onofre Sad Saga Continued - NRC/SCE/MHI/Independent Experts and Public Awareness Series

Follow Up Flag: Follow up
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Reference: Nuclear Regulatory Commission [Docket No. 50-361; NRC-2013-00701, Application and Amendment to Facility Operating License Involving Proposed No Significant Hazards Consideration Determination; San Onofre Nuclear Generating Station, Unit 2]

The NRC is covering for Edison at the public meeting as well, saying that the cause of the failure was excessive steam velocity without digging back to the ultimate root cause. Edison's many design changes are the obvious culprit, with NRC officials watching from start to finish, never speaking up to force SCE to use the normal license amendment process.

MHI/SCE AVB Team missed the boat and ignored the well-established and researched universal elementary principles of physics, SG tube vibrations, nucleate boiling, heat transfer and circulation ratios by refusing to lower the RSG void fractions - In 2003 Pakistani Researchers warned about fluid-structure interaction focusing on void fractions - In 1970's and 2006 Dr. Pettigrew warned about the fluid elastic instability, flow-induced vibrations, design interface and AVB flat bars.

Now, Mitsubishi says it and plant operator Southern California Edison did not take the articles into consideration in their design work, only realizing the significance in the aftermath of the January 2012 radiation leak and shutdown at San Onofre. The research papers were vetted for publication by the American Society of Mechanical Engineers, which maintains the U.S. building code for nuclear steam generators. A nuclear safety activist, told about the scientific articles by U-T Watchdog, was incredulous. "What's the purpose of doing the research if not to come up with information so that it doesn't happen in the field?" said Daniel Hirsch, a lecturer on nuclear policy at the University of California Santa Cruz. "Do you want to go to a doctor who doesn't read the journals and says, 'I wait until someone keels over?'" Mitsubishi acknowledges that it erred in assuming the front-to-back or "in-plane" vibrations would be taken care of by calculations for the more typical tube wear. "There was never an inkling of in-plane vibration being a problem," said Frank Gillespie, a senior vice president at Mitsubishi Nuclear Energy Systems, the Virginia-based U.S. vendor of nuclear parts and plants for the Japanese conglomerate. "And clearly that is what we (later) found to be the main issue. If we had designed for in-plane, then other things might have happened. It flat out was not — in-plane was not considered."

In various 2003 papers, Pakistani, Arabian and American Researchers state, "The importance of heat exchangers to the process industry is well known. Their design is a balance between trying to optimize the heat transfer characteristics and trying to avoid flow-induced vibrations that will cause premature wear or damage to the device. Flow-induced vibration is an extremely important phenomenon that has led to numerous failures in heat exchanger equipment. It has been a major cause of concern in the nuclear industry for several decades. Many incidents of failure of heat exchangers due to apparent flow-induced vibration have been reported through the USNRC incident reporting system. Flow-induced vibration in these heat exchangers leads to equipment breakdown and, hence, expensive repair and process shutdown. The resulting vibration mode is often referred to as fluid-elastic instability. This phenomenon, while not the only source of flow induced vibration, is the

more dangerous type present in heat exchanger operations, contributing to fretting wear and eventual mechanical failure. There is a strong need for establishing reliable design procedures for two-phase cross-flow tube bundle vibrations. This could be achieved by carrying out modeling and simulation of the system with fluid-structure interaction focusing on void fraction, and reliable experimental data. Test data on high pressure and temperature conditions are insufficient, therefore a potential challenge lies ahead."

The World's Foremost Renowned Professeur Titulaire, Michel J. Pettigrew, Ecole Polytechnique de Montreal, on the subject of fluid elastic instability and turbulence-induced vibration in 1970's states, "It is concluded that, although there are still areas of uncertainty, most flow-induced vibration problems can be avoided provided that nuclear components are properly analysed at the design stage and that the analyses are supported by adequate testing and development work when required. There has been no case yet where vibration considerations have seriously constrained the designer."

Violette R., Pettigrew M. J. & Mureithi N. W. state in a 2006 research paper, "In nuclear power plant steam generators, U-tubes are very susceptible to undergo fluid elastic instability because of the high velocity of the two-phase mixture flow in the U-tube region and also because of their low natural frequencies in their out of plane modes. In nuclear power plant steam generator design, flat bar supports have been introduced in order to restrain vibrations of the U-tubes in the out of plane direction. Since those supports are not as effective in restraining the in-plane vibrations of the tubes, there is a clear need to verify if fluid elastic instability can occur for a cluster of cylinders preferentially flexible in the flow direction. Almost all the available data about fluid elastic instability of heat exchanger tube bundles concerns tubes that are axisymmetrically flexible. In those cases, the instability is found to be mostly in the direction transverse to the flow. Thus, the direction parallel to the flow has raised less concern in terms of bundle stability."

Looks like SCE/MHI AVB Design Team did not do their research in 2005. Now, MHI and is trying to justifying the adverse safety and public relations consequences for SCE, which did not agree to lower the void fraction, because it would have delayed the project, triggered a NRC review, increased the costs and cut down the heat output and profits from the RSGs. But, these lame MHI/SCE excuses are not going to work. MHI needs to be fined by NRC for its ignorance and lack of research and misleading advertising. NRC needs to cancel SCE license to operate a nuclear power plant and MHI's license to supply nuclear power plant components for US Nuclear Reactors. SCE has destroyed Units 2 & 3 twice, starting first in 2001 by increasing the vibrations and tube plugging rate in the Original CE steam generators via the power uprate application and then again in 2005 by adding 11% heat transfer area and claiming to be ignorant about the implications of increased void fractions, lower steam generator pressures and lower circulation ratios on RSG tube vibrations. SCE has many heat exchanger experts in their nuclear design organization. One of them even said, "The contract for design, fabrication and delivery of the RSGs was awarded to Mitsubishi Heavy Industries Ltd. (MHI). As specified, the RSGs were supposed to be a replacement in-kind for the OSGs in terms of form, fit and function. At the same time, however, the RSG specification included many new requirements derived from both industry and SONGS operating experience, and the requirement to use the best and most suitable materials of construction. These requirements were aimed at improving the RSG longevity, reliability, performance and maintainability. Also, the specification called for very tight fabrication tolerances of the components and sub-assemblies, especially the tubesheet and the tube U-bend support structure. In addition, SONGS steam generators are one of the largest in the industry, which called for innovative design solutions and improved fabrication processes when working on the RSGs. Conceivably, the MHI and Edison project teams faced many tough challenges throughout the entire project in the design, manufacturing and QC areas, when striving to meet the specification requirements. Both teams jointly tackled all these challenges in an effective and timely manner. At the end, MHI delivered the RSGs, which incorporated all the latest improvements found

throughout the industry, as well as innovative solutions specific to the SONGS RSGs. In Unit 2, the RSGs were installed and tested in 2009/10 and in Unit 3 in 2010/11. The RSG post-installation test results met or exceeded the test acceptance criteria for all specified test parameters, thus properly rewarding the effort put into their fabrication.”

What did the other Edison and MHI Officers proudly told to the public about these “Innovative Replacement Steam Generators”?

Mike Wharton, Edison Manager of the steam-generator replacement project said, “The new steam generators are designed to last longer. They are designed for 40 years. We expect we’ll actually be able to get 60 years out of them ... better materials, better design. You learn over the course of years what works well and what doesn’t, and you try to build it into the next generation.” [December 24th, 2009 Source: OC Register.]

Pete Dietrich, SONGS Chief Nuclear Officer said in Jan 10 2012, “The plant’s largest components — steam generators — are just two years old and represent the safest, most efficient 21st century machinery.” [Source: Market Watch]

Ross Ridenoure, Southern California Edison senior vice president and chief nuclear officer, said, “The installation is “a major milestone in the station’s history. We’re committed to making sure it’s done right.” [Source: January 28th, 2009, LA Times]

John R. Fielder, Edison President said, “New steam generators are cheaper for ratepayers than building new power plants or buying power on the open market.” [Source: LA Times, December 16th, 2005]

Mitsubishi Heavy Industries, Ltd., manufacturer of these RSGs stated in December 2006, “There is no standard design for a replacement SG because the specifications and plant requirements vary among customers. By applying the following latest advanced technologies to all SGs, improvements were made which cope with all past problems such as tube corrosion, vibration and wear, fatigue, and water hammer, and products which satisfy customers’ advanced demands for heat transfer capability and moisture content are being supplied. (1) Tube material of high nickel alloy TT690 with excellent corrosion resistance, (2) Outstanding tube support plate design, tube expansion technology in tube sheets, (3) Tube support structure at U-bends with high support function. The tube support structure at a U-bend is a unique design with reduced flow resistance increasing the number of support points. Together with excellent assembly technology during manufacturing, high reliability against vibration and wear of heat transfer tubes is achieved, and (4) MHI has developed a small, high-performance moisture separator by optimizing the geometry of the parts based on extensive field pressure tests. As a result, replacement SGs corresponding to power up-rating and/or advanced moisture requirements can be designed. Source: Mitsubishi Heavy Industries, Ltd., Technical Review Vol. 43 No. 4 (Dec. 2006).

Ei Kadokami, the deputy manager of Mitsubishi Heavy Industries in an article in the March-April 2009 Edition of the Nuclear Plant Journal explained some of the changes and expectations in MHI steam generators, “Tube P/D (pitch/outer diameter) is narrower than others so that the tube bundle and the Steam Generator itself are smaller, which is the first feature. The second feature MHI would like to emphasize is that MHI has not experienced any significant degradation in recent design. Alloy 690 is used for almost all steam generators and has high resistance against corrosion, but some steam generators fabricated by other manufacturers have wear caused by tube vibration in the U bend region. No tube wear has been experienced in recent MHI steam generators because not only AVB and TSP are designed to have enough margin against fretting wear but also the manufacturing procedure is appropriate to control gaps between the tube and AVB. Nuclear Plant Journal, Plant Maintenance & Plant Life Extension Issue, March-April 2009 volume 27 No. 2, ISSN: 0892-2055”

NRC, SCE and three independent companies plus MHI with expertise in nuclear generation need to sharpen their pencils with "High-Energy Public Safety Wisdom Knives" to evaluate the unintended and adverse consequences of multiple and instantaneous SG tube ruptures due to fluid elastic instability, flow-induced random vibrations, tube wall thinning, metal fatigue, incubating cracks, and collapse of AVB Structure caused by Anticipated Operational Occurences and Design Basis Accidents with Unit 2, @70% Power Operation. Nuclear Power Plant Operation and Design is very serious business, and NRC Commission cannot simply ignore Billions of Dollars of Safety Mistakes committed by SCE/MHI Management and Engineers. The radiological doses from a Unit 2 Nuclear Meltdown will cause a Trillion Dollar ECO Disaster and undetermined causalities and cancer effects, and will destroy Southern California like Fukushima. Southern Californians do not want to flee their homes, businesses and schools because of SCE's false pretenses of starting dangerous Unit 2 to meet the summer months peak energy needs. Who wants to leave Southern California for SCE's profits, the land of one of the most majestic, entertaining, tourist, and pristine places in this World?

Press Reports state, "The stakes got even higher last week in the effort to determine the fate of the San Onofre Nuclear Generating Station. Edison chief Ted Craver says without a restart approval on Unit 2, Southern California Edison may shut down one or both of the reactors by the end of this year." In addition, the state electric grid operator says the chances of power outages has increased slightly if we go another summer without nuclear power. ISO cautions that heat waves complicated by higher than expected power plant outages in key areas of Southern California or transmission limitations triggered by wildfires or other reasons could challenge grid reliability, especially in the areas affected by the SONGS outage -- southern Orange and San Diego counties. During these peak periods, ISO operators will count on customers participating in local demand response and conservation programs to help out during rapidly changing grid conditions. "We ask consumers to watch for Flex Alerts on TV and radio and conserve electricity to ensure enough power for everyone," said ISO President and CEO Steve Berberich. "Californians can do their part to help relieve the stress on the system by reducing their electricity use during the afternoon peak created by air conditioning. We thank them in advance for responding when Flex Alerts are issued."

It is high time that NRC Commission stops wasting its time and denies permission to SCE for Unit 2 Restart and focusses its efforts on the safety of other US Nuclear Power Plants. Based upon acceptance by 8.4 Million Southern Californians, Edison either contracts Westinghouse to repair/rebuild the "defectively-designed and degraded" steam generators and replaces its Senior Management Team/Changes the Safety Conscious Work Environment, or closes its money-losing shops and Decommissions San Onofre Units 2 & 3. It is time for American Public to demand that MHI closes its shops to supply dangerous nuclear power plant components for US Nuclear Reactors.

San Onofre Edison... West Coast Radiation Crisis - Part 1- By Yoichi Shimatsu

<http://t.co/0uvQnYpMzo>

Beached in front of the San Onofre nuclear power plant, the carcass of a California sea lion was remarkable, for being an adult specimen. So far, throughout the six-week crisis for marine mammals along the Southern California coastline, all of the 2,000-plus sea lions, elephant seals and harbor seals suffering severe malnutrition have been pups deprived of breast milk from their emaciated or missing mothers. Is Edison quietly dumping low-level nuclear waste from its San Onofre nuclear facility in this hidden corner of Catalina, one of California's top destinations world-famous for ecological conservation? If so, Edison is being run more like the mafia than a public utilities corporation. The board of SCE is just begging to be busted. Final questions: Where is the state and federal Environmental Protection Agency in this regional radiation crisis? Is any government entity

monitoring the radioactivity in Southern California? Why is Jerry Brown, a self-proclaimed environmentalist, asleep at the wheel? Wake up, Governor, these are not moonbeams. SCE San Onofre is emitting death rays. I met an Old Man, an Expert Diver, who used to Dive in Ocean near San Onofre. He said, "I stopped diving, when I felt tingling in my legs and water tasted sour."

There is limited monitoring of radiation in the air, milk and water in California. And public access to the data is limited. Near real time radiation levels close to San Onofre are not available to the public.