



SOUTHERN CALIFORNIA
EDISON[®]

An EDISON INTERNATIONAL[®] Company

Dwight E. Nunn
Vice President

November 30, 2004

Mr. Akira Sawa
General Manager
Mitsubishi Heavy Industries, LTD
Kobe Shipyard & Machinery Works
1-1, Wadasaki-Cho 1-Chome
Hyogo-Ku
Kobe 652-8585
Japan

Dear Mr. Sawa:

Subject: Replacement Steam Generators
San Onofre Nuclear Generating Station, Units 2 & 3

Since I was unable to participate in the Replacement Steam Generator contract signing in September due to emergent problems at our facility, let me now express my appreciation for Mitsubishi Heavy Industries' willingness to partner with us on providing the replacement steam generators for San Onofre. This is an extremely important undertaking, not just for San Onofre, but for the entire Southern California Edison Company. Our detailed and exhaustive evaluation convinced us that Mitsubishi Heavy Industries was the best match for our needs.

This will be one of the largest steam generators ever built for the United States and represents a significant increase in size from those that Mitsubishi Heavy Industries has built in the past. It will require Mitsubishi Heavy Industries to evolve a new design beyond that which they currently have available. Such design evolutions require a careful, well thought approach that fully evaluates the risks inherent in creating a new and significantly larger steam generator. Such design evolutions tend to challenge the capability of existing models and engineering tools used for proven steam generator designs. Success in developing a new and larger steam generator design requires a full understanding of the risks inherent in this process and putting in place measures to manage these risks. Understanding the difficulty in transitioning from the standard Mitsubishi Heavy Industries steam generator design to a new and larger two-loop design, San Onofre has made it a goal to partner with Mitsubishi Heavy Industries and maintain a close relationship with your engineering and fabrication organization to assist them in this design evolution. To this end we are performing detailed, intrusive evaluations of your design documentation and your approach to design evolution on this job. A recent example of successful cooperation between our engineers is the design of the feedwater distribution system. San Onofre's concern with potential water hammer as a result of the design of the distribution ring has been address by Mitsubishi Heavy Industries by utilizing the J-tube design. Prudent questioning by San Onofre followed by an exhaustive evaluation by Mitsubishi Heavy Industries led to a design revision to address a potential risk to the success of the project. However, we recognize that we are not designers of steam generators and there are limitations to the assistance we can provide. Notwithstanding this fact and after working with your organization for almost two months, we have some observations that we'd like to share with you.

P.O. Box 128
San Clemente, CA 92674-0128
949-368-1480
Fax 949-368-1490

- A detailed and accurate calculation of Reactor Coolant System flow is critical to ensure the steam generators are designed to within limits required to satisfy our existing licensing basis of 106% of the original flow rate (as required by our Purchase Order). Failure to meet this requirement would have significant impact on the operation of San Onofre including a potential inability to operate the units. We understand that Mitsubishi Heavy Industries is currently in discussions with Westinghouse to develop a detailed loop model to perform this analysis. We support Mitsubishi Heavy Industries' sensitivity to the significance of this issue and the prudent course of action they are undertaking.
- Anti-Vibration Bar design (and installation) is by far one of the most challenging tasks that will face Mitsubishi Heavy Industries and San Onofre; in fact, it is in our opinion the single most significant task facing the industry for steam generators of our size today. Since the San Onofre steam generators are one of the largest steam generators ever built and large steam generators appear more susceptible to wear (in fact, our current steam generators have experienced a high percentage of plugged tubes due to wear), it is a paramount concern of ours that we ensure a reliable support design. We consider this engineering challenge perhaps the most critical issue at this time. Recent industry experience with Anti Vibration Bar supports has demonstrated the difficulty in developing a successful design (the recent experience at a United State's plant emphasized this point when more that 180 tubes were found to have wear indications after only one cycle of operations, some of these indications were up to 20% through wall). Our discussions with Mitsubishi Heavy Industries to date have not resulted in a plan that will successfully address this industry concern. Both San Onofre and Mitsubishi Heavy Industries are having difficulty in formulating such a plan.
- San Onofre is located in a high seismic zone. As Mitsubishi Heavy Industries is aware this creates significant design challenges, especially in light of the fact that the San Onofre steam generators are among the largest ever built in the United States and are the largest ever built by Mitsubishi Heavy Industries. We have been working very closely with your staff to assist them in any manner we can in this design effort. As part of this seismic design effort, Mitsubishi Heavy Industries developing a stick mass spring model for the new steam generators. In addition, Mitsubishi Heavy Industries is developing some localized three-dimensional models of the new steam generators to benchmark the stick model. However, these models aren't ready for use at this time and the design effort must proceed to meet the 2008 delivery date for the steam generators for Unit 2. 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). Should there be a significant difference in the seismic response of the old and new steam generators, changes in the steam generator design may be necessary. Therefore, it is imperative that adequate margin be provided in the replacement steam generator design to accommodate this possibility while simultaneously expediting the necessary new analysis (procurement of major components is currently in progress and purchase of new forging can't be accommodated in the schedule should it become necessary). The development of an accurate stick model, using conservative assumption and subsequent validation of this stick model

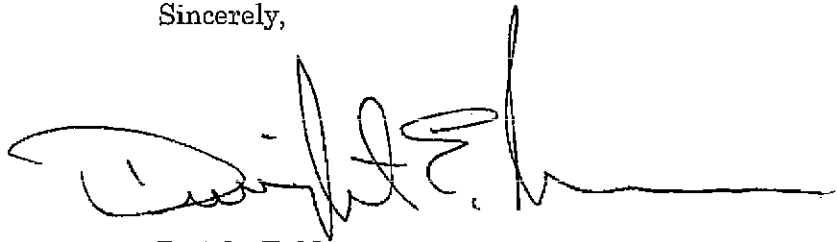
using results from the three dimensional models is essential to minimize the risk of any future design modification after the major forgings are procured and/or machined.

- The San Onofre steam generator moisture separator assembly will be the largest Mitsubishi Heavy Industries has ever designed. The configuration of the moisture separators and dryers and their ability to achieve the required performance remains a concern for San Onofre. **Scaling up an existing design is not necessarily a linear task and if not performed correctly may result in unsatisfactory performance at San Onofre.** Mitsubishi Heavy Industries is encouraged to consider using all available resources (such as being done with respect to the Reactor Coolant System flow analysis) in the design the steam generators to ensure acceptable performance.

Based upon these observations, **I am concerned that there is the potential that design flaws could be inadvertently introduced into the steam generator design that will lead to unacceptable consequences (e.g., tube wear and eventually tube plugging).** This would be a **disastrous outcome** for both of us and a result each of our companies desire to avoid. In evaluating this concern, it would appear that one way to avoid this outcome is to ensure that relevant experience in designing larger sized steam generators be utilized. It is my understanding the Mitsubishi Heavy Industries is considering the use of Westinghouse in several areas related to scaling up of your current steam generator design (as noted above). I applaud your effort in this regard and endorse your attempt to draw upon the expertise of other individuals and company's to improve the likelihood of a successful outcome for this project. I would encourage you to continue to draw upon those resources available to you to produce a design that will represent a Mitsubishi Heavy Industries steam generator capable of meeting not just San Onofre's, but the world's needs.

Should you have any questions or desire further discussion on this matter, I can be reached at (949) 368-1480. I look forward to visiting your facility again in the near future.

Sincerely,



Dwight E. Nunn
Vice President

cc: Y. Nishi
J. E. Hutter
H. Kaguchi
H. Hirano
M. Ida
M. A. Wharton
R. L. Park