



# Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions

October 12, 2012

Elmo Collins, Jr., Regional Administrator  
U.S. Nuclear Regulatory Commission Region IV  
1600 East Lamar Boulevard  
Arlington, TX

**Subject: San Onofre Unit 2 Steam Generator Root Cause Report and  
Proposed Restart Compensatory Measures**

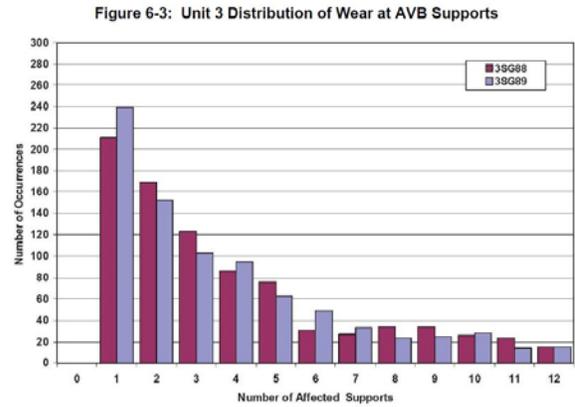
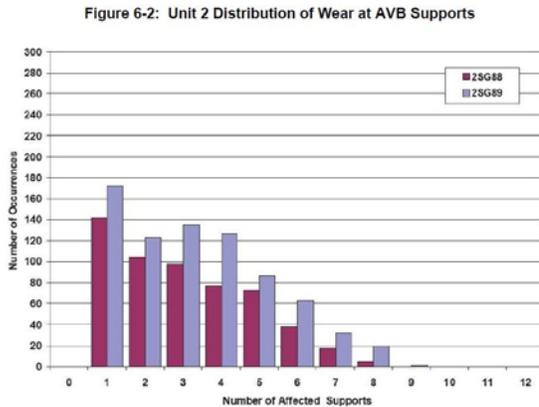
Dear Mr. Collins:

On behalf of the Union of Concerned Scientists, let me belatedly commend you and the Nuclear Regulatory Commission (NRC) staff for issuing the Confirmatory Action Letter (CAL) dated March 27, 2012, (ADAMS Accession No. ML12087A323). This CAL required the owner of the San Onofre nuclear plant to submit to the NRC its report on the root cause of degradation to the replacement steam generator tubes and to keep both reactors shut down until the NRC reviewed and agreed with the root cause determination. Less than a year ago, another NRC region permitted Davis-Besse with similarly unexpected degradation to restart the reactor and submit the root cause report weeks later. We stated then and restate now that when reactor safety problems rise to the point where an owner must submit a formal root cause report to the NRC, it is a prudent public health practice that these reports be submitted *prior* to restarting the affected reactors. If the cause of the degradation has not been properly identified, then the solutions applied to the wrong cause may not adequately protect the public. We applaud Region IV's action placing safety ahead of production.

I have reviewed the owner's 80-plus page report dated October 3, 2012, describing the causes of the steam generator tube degradation and proposing compensatory measures if the NRC permits Unit 2 to restart. Below I provide the several comments and observations on that report. I hope the NRC will consider these comments as part of its evaluation process leading to its decision about whether Unit 2 should be restarted and under what conditions.

1. Figures 6-2 and 6-3 of Enclosure 2 chart the wear distribution found in the four replacement steam generators. Figure 6-2 presents the data for the two replacement steam generators on Unit 2 while Figure 6-3 presents this data for the Unit 3 replacement steam generators. Figure 6-3 shows that the two replacement steam generators on Unit 3 exhibited similar wear patterns in that the number of wear indications is roughly the same for the number of supports. But Figure 6-2 shows something different. Unit 2 replacement steam generator 2SG89 has significantly more wear indications per number of supports than does replacement

steam generator 2SG88. Until the reason for this marked difference between the wear degradation for the Unit 2 replacement steam generators is understood, the operational assessment performed for future operation is suspect.



- Table 6-1 of Enclosure 2 provides the tube inspection results for the Unit 2 and 3 replacement steam generators. Each Unit 3 replacement steam generator had over 400 indications of tube-to-tube wear (TTW). But only one of the Unit 2 replacement steam generators had TTW indications and it only had two such indications. Since all four replacement steam generators came from the same manufacturer, were of the same design, made of the same materials, assembled using the same procedures, and operated under nearly identical conditions in twin reactors, the reason for this marked difference is unclear. The text below Table 7-1 of Enclosure 2 contends that “Manufacturing process improvements” between the fabrication of the Unit 2 replacement steam generators and the Unit 3 replacement steam generators resulted in the latter having “smaller average tube-to-AVB contact force” making them “more susceptible to in-plane vibration.” However, this explanation is not well documented and therefore appears to be more convenient than factual.

**Table 6-1: Steam Generator Wear Depth Summary**

SG 2E-088							
TW Depth	AVB Wear Indications	TSP Indications	TTW Indications	Retainer Bar Indications	Foreign Object Indications	Total Indications	Tubes with Indications
TW ≥ 50%	0	0	0	1	0	1	1
35 - 49%	2	0	0	1	0	3	3
20 - 34%	86	0	0	0	2	88	74
10 - 19%	705	108	0	0	0	813	406
TW < 10%	964	117	0	0	0	1081	600
<b>Total</b>	<b>1757</b>	<b>225</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>1986</b>	<b>734*</b>
SG 2E-089							
TW Depth	AVB Wear Indications	TSP Indications	TTW Indications	Retainer Bar Indications	Foreign Object Indications	Total Indications	Tubes with Indications
TW ≥ 50%	0	0	0	1	0	1	1
35 - 49%	0	0	0	1	0	1	1
20 - 34%	78	1	0	3	0	82	67
10 - 19%	1014	85	2	0	0	1101	496
TW < 10%	1499	53	0	0	0	1552	768
<b>Total</b>	<b>2591</b>	<b>139</b>	<b>2</b>	<b>5</b>	<b>0</b>	<b>2737</b>	<b>861*</b>
SG 3E-088							
TW Depth	AVB Wear Indications	TSP Indications	TTW Indications	Retainer Bar Indications	Foreign Object Indications	Total Indications	Tubes with Indications
TW ≥ 50%	0	117**	48	0	0	165	74
35 - 49%	3	217	116	2	0	338	119
20 - 34%	156	506	134	1	0	797	197
10 - 19%	1380	542	98	0	0	2020	554
TW < 10%	1818	55	11	0	0	1884	817
<b>Total</b>	<b>3357</b>	<b>1437</b>	<b>407</b>	<b>3</b>	<b>0</b>	<b>5204</b>	<b>919*</b>
SG 3E-089							
TW Depth	AVB Wear Indications	TSP Indications	TTW Indications	Retainer Bar Indications	Foreign Object Indications	Total Indications	Tubes with Indications
TW ≥ 50%	0	91**	26	0	0	117	60
35 - 49%	0	252	102	1	0	355	128
20 - 34%	45	487	215	0	0	747	175
10 - 19%	940	590	72	0	0	1602	450
TW < 10%	2164	94	1	0	0	2259	838
<b>Total</b>	<b>3149</b>	<b>1514</b>	<b>416</b>	<b>1</b>	<b>0</b>	<b>5080</b>	<b>887*</b>

\* This value is the number of tubes with a wear indication of any depth at any location. Since many tubes have indications in more than one depth category, the total number of tubes with wear indications is not the additive sum of the counts for the individual depth categories.

\*\* All TSP indications ≥50% TW were in tubes with TTW indications.

- Section 8.1 of Enclosure 2 states that the owner will “administratively limit Unit 2 to 70% reactor power prior to a mid-cycle” outage to inspect the replacement steam generators. What are the legal consequences if the reactor power were to increase to 75%, 85% or 100% power? The NRC has licensed San Onofre Unit 2 to operate at 100% power. What would legally prevent the owner from restarting Unit 2 and increasing its output to the NRC-licensed limit? The NRC’s enforcement program includes sanctions when its regulations are violated, but nothing for broken promises. If the NRC agrees that reactor operation at less than 100 percent power is warranted, it should enforce that reduction with an order or comparable legally-enforceable document.
- Table 8-1 of Enclosure 2 and its accompanying text attempt to explain how operating Unit 2 at 70% power will prevent the tube-to-tube wear (TTW) experienced on Unit 3 by comparing it to an anonymous reactor (called Plant A). The owner contends that Plant A operated for two cycles without experiencing TTW indications. But Table 6-1 reports that the only TTW indications found in the San Onofre Unit 2 replacement steam generators after one cycle

were in the 10 to 19% depth range. Figure 6-6 reports that the probability of detecting wear in the 10 to 19% depth range is roughly 63 to 97% using a bobbin probe. Thus, there is a reasonable chance that TTW indications did exist but were simply not detected in Plant A. Section 6.3.2 of Enclosure 2 states that “Following the discovery of TTW in Unit 3, **additional Unit 2 inspections** identified two tubes with TTWE indications” in a Unit 2 replacement steam generator [emphasis added]. This implies that but for the heightened awareness prompted by the discovery of TTW indications on Unit 3, the TTW indications on Unit 2 may not have been identified at this stage. Thus, reliance on one suspect data point (Plant A) is hardly solid justification for operation and 70% power being acceptable.

5. Section 8.3 of Enclosure 2 states “To provide additional safety margin, the Unit 2 inspection interval has been limited to 150 days of operation at or above 15% power.” How was 150 days selected as the limit? Why not 120 or 160 days? There is no justification in this 80-plus page document for an operating duration of 150 days.
6. As with Comment No. 3, there are no legal means compelling the plant’s owner to shut down Unit 2 after 150 days of operation at or above 15% power. If the NRC agrees that reactor operation of less than one full operating cycle is warranted, it should enforce that condition with an order or other legally-enforceable document.
7. Section 9.2 of Enclosure 2 states that a temporary nitrogen-16 radiation detection system will be installed prior to the Unit 2 startup. However, there is no commitment to use it after startup, or to keep it in service should it stop functioning . The detection system is proposed as a defense-in-depth measure, but there is no assurance it will be operated. Consequently, the NRC should give no credit to this system unless it requires that the system be functional via an order or other legally-enforceable document.
8. Attachment 6 to Enclosure 2 has proprietary information redacted. Section 1.4 of Enclosure 2 states that the owner used AREVA, Westinghouse Electric Company LLC, and Intertek/APTECH to review the operational assessment. At least one of these companies manufactures replacement steam generators and would therefore be a competitor to Mitsubishi Heavy Industries (MHI), which made the replacement steam generators for San Onofre. If the owner did not withhold the proprietary information from MHI’s competitors, why withhold it at all? If SCE did withhold the proprietary information from these reviewers, what is the value of their independent, but limited, review?

We hope to see these issues addressed in the document NRC releases with its decision on the Unit 2 restart.

Sincerely,

A handwritten signature in black ink that reads "David A. Lochbaum". The signature is written in a cursive, flowing style.

David Lochbaum  
Director, Nuclear Safety Project  
PO Box 15316  
Chattanooga, TN 37415  
(423) 468-9272, office  
(423) 488-8318, cell