Docket: I1210013
Exhibit Number: _____
Commissioner: Michel Florio
Admin. Law Judge: Melanie Darling
Witnesses: Gary Headrick, Ace Hoffman, Torgen Johnson, Raymond Lutz, Deanna Polk, Martha Sullivan

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Investigation on the Commission's Own Motion into the Rates, Operations, Practices, Services and Facilities of Southern California Edison Company and San Diego Gas and Electric Company Associated with the San Onofre Nuclear Generating Station Units 2 and 3.	Investigation 12-10-013 (Filed October 25, 2012 Irvine, CA)

COALITION TO DECOMMISSION SAN ONOFRE REBUTTAL TESTIMONY, PHASE 1 SAN ONOFRE OUTAGE INVESTIGATION

April 22, 2013

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THE COALITION TO DECOMMISSION SAN ONOFRE
REBUTTAL TESTIMONY, PHASE I

INTRODUCTION

The Coalition to Decommission San Onofre (CDSO) hereby submits its Rebuttal Testimony in Phase I of the Commission's Investigation into the San Onofre Outage (I.12-10-013), responding to Opening Testimony submitted by Women's Energy Matters (WEM) on March 29, 2013. CDSO seeks to provide additional perspective and detail to that offered by WEM, based upon our unique perspective as a grassroots project of Citizens Oversight, Inc., a 501(c)(3) public benefit corporation which encourages increased engagement by the public in the operation of their local, state and federal government to reduce waste, fraud and abuse by public officials.

I. WEM's Testimony on "Reasonableness of SONGSMA Expenditures" (Phase I Scoping Issue 2) *NOTE: The following analyses also apply to the Phase I Scoping Issue 1 --* ***"Nature and Effects of the Steam Generator Failures in order to assess the reasonableness of SCE's consequential actions and expenditures"***

A. The Case for Fraud *(Ace Hoffman)*

SCE's actions in pushing their Replacement Steam Generators (RSGs) for San Onofre Nuclear Generating Station (SanO) through the CPUC for continued ratepayer funding and through the Nuclear Regulatory Commission (NRC) for safety approval amounts to fraud. Represented as "like-for-like" replacements for the Original Steam Generators (OSGs), the RSGs were in fact significantly UNLIKE the OSGs -- and not only poorly designed by SCE but they both failed soon after being installed because they are UNSAFE. Now, SCEs actions have reached the level of criminal negligence, since with the lives and livelihoods of almost 9 million people who live and work within 50 miles of the plant at stake, they are still trying to restart Unit 2. Where an abundance of caution should have been used, SCE focused on shareholder profits.

1. SCE made false statements of material facts:

SCE claimed, falsely, that their RSGs as designed were a "like-for-like" replacement, and therefore they did not need to go through a detailed NRC review, which included a public review process. While SCE publicly disclosed that the RSGs would be made with a different alloy (Inconel 690), they only said it was more resistant to stress corrosion cracking (SCC),

fretting, and other forms of fatigue than the alloy used in the tubing of the OSGs (Inconel 600), whose corrosion-related problems plagued the industry's first generation of steam generators and is one of the reasons that led to the permanent shutdown of SanO Unit 1 in 1992. However, what SCE did not disclose is that the new alloy had another less desirable but very important property: Inconel 690's heat transfer coefficient is about 10% lower than Inconel 600's. This key factor necessitated numerous additional changes to the RSGs in order for them to generate the same amount of steam as the original OSG design, which was an SCE-ordered design requirement for their "like-for-like" replacement. These requirements required numerous unproven design changes, all of which were kept hidden from the public, but are now known to have included:

a) Much tighter spacing between the steam generator tubes (approximately 3/4 inch versus about one inch in the OSGs) in a triangular spacing pattern (versus the square spacing pattern in the OSGs).

b) Reducing the distance between tubes in the U-bend region to as little as 0.05 inches between some of the tubes. The industry norm is between 0.35 and 0.55 inches; the design or intended spacing was 0.25 inches. This tighter packing of the tubes in the u-bend region of the tube bundle allowed them to strike each other more easily. This increased wear damage caused the rupture on January 31st, 2012, which disabled Unit 3 and resulted in a release of radioactive primary coolant to the environment because, after the primary coolant flashed to steam through the rupture and then went through the secondary loop to the turbine to produce electricity, when the steam was condensed back to liquid in the condenser for reuse in the steam generator, radioactive noble gases in the steam don't condense. Those gases were detected in the turbine room after exiting the condenser.

c) Adding over 370 tubes per steam generator, which along with the tighter spacing reduced the entire flow area and changed the flow patterns in the secondary coolant loop and also reduced the open space above the u-bend of the tubes, which prevented the steam from properly exiting the top of the u-bend region before entering the swirl vane moisture separators.

d) Lengthening of the tubes by an average of nearly 2 1/2 feet per tube, which allowed the longer tubes to not only begin to vibrate at a lower level of turbulence but to do so with much higher amplitudes, which made it easier for these tubes to strike adjacent tubes with more force, which lead to accelerated damage. This may have also increased

the "Mitsubishi Flowering Effect," further weakening the tubes, especially just above the tube support plate (TSP) located at the top of the straight portion of the tubes just below the base of the u-bends.

e) Modifying the flow characteristics of the steam/water mixture in the entire secondary coolant loop. Brackets that were turned into "egg-crate" supports and other changes also altered the flow. Proper flow is required in order to transfer heat away from the primary coolant loop, which flows through the reactor at about 2,500 gallons per second, at about 2200 pounds per square inch of pressure, and exits the reactor at about 600 degrees Fahrenheit. These design changes caused steam "dry-out" in the steam/water secondary coolant loop. The dry-out conditions resulted in heat being transferred less efficiently, which in turn, also changed the flow characteristics of the RSGs. The result was a significantly increased flow rate in the secondary coolant loop's steam/water mixture within the U-tube bundle, and simultaneously, significantly reduced fluid damping of any tube movements caused by random vibration or any other reason.

f) Removal of the large "stay cylinder" in the center of the steam generator to make room for additional u-tubes, which may have also increased the tube vibration and thus caused additional premature tube fatigue.

Among other effects, these changes reduced the normal 'nucleate boiling' on the outer surfaces of the tubes due to excessively dry steam. This in turn caused additional thermal stress, cavitation, and fatigue when the remaining bubbles of steam "exploded" on the hot, dry tube surfaces. Damage from this phenomenon is not easily diagnosed and has not been properly inspected for, yet SCE is now putting pressure on NRC to restart the reactor by claiming to have done a "thorough" inspection of all the tubes -- even though much better inspection equipment is available which SCE has decided not to use. Because of this, fatigue damage specifically has barely been inspected for, while easier to see tube-to-tube wear has been focused upon, instead.

Initially, Edison also claimed that all four RSGs (two per reactor) were virtually identical, yet they now claim that the small differences in manufacturing procedures are just enough to make Unit 2's RSGs sufficiently different to be safely restarted. In reality the manufacturing differences were not significant. It was the operational differences between the two reactors that explain why Unit 3 suffered more extensive damage, faster, than Unit 2. But operating differences can be overcome during transients, and there is no way to overcome that problem at San Onofre. ***The units are unsafe because they are poorly designed.***

2. SCE knowingly made false statements:

a) SCE required MHI to withhold certain design safety improvements specifically to prevent a thorough NRC review process that would have also allowed public scrutiny of their new steam generator design. Thus, their claim that "safety is their highest priority" is blatantly untrue.

b) SCE has repeatedly stated that the nuclear waste problem is not a problem because of "Yucca Mountain." But the proposed Yucca Mountain storage facility was never a viable solution to the nuclear waste problem and was never even close to being placed into service, due to both the geology of Yucca Mountain specifically (earthquake faults, water seepage, etc.) and due to the intractable, destructive nature of nuclear waste generally. The fact is, ionizing radiation (by definition) can destroy any containment you put it in. Furthermore, as containments leak over time, vermin will move the waste away from the dump site, as will flowing groundwater, air, birds, wildlife, etc. The radiation will continue to be hazardous for many millennia as this happens.

c) SCE falsely claims that SanO can help reduce global warming because, according to them, it does not release greenhouse gases. This is untrue: The nuclear fuel cycle is extremely carbon-intensive during mining, milling, and enrichment of the uranium oxide fuel, during construction of the reactor (along with all its replacement parts), and during the decommissioning process. Carbon emissions occur throughout the operating life of the reactors as well, as approximately 1,500 people work at the plant, drive to work, etc.. After decommissioning, the radioactive trash (spent fuel) continues to release ozone-damaging and DNA-damaging ionizing radioactive particles, along with thermal heat. Guards, guns, and guard dogs will be needed for thousands of generations, at a cost of tens of millions of dollars per year per reactor. For these reasons nuclear power is not a solution to global warming, but instead is a significant part of the problem.

3. SCE intended to deceive the public and the regulators:

a) SCE stated to the NRC on 4/5/2013 that Southern California "needed" SanO for grid stability, voltage support, and to address customer demand for electricity. Yet the California Independent System Operator (Cal-ISO) has shown that there is plenty of electricity available and furthermore, SCE has undertaken NO attempt to replace SanO's

electricity with clean, green alternatives in the 16 months since the tube rupture made it apparent that Unit 3 could never, and Unit 2 should never, come back online in their present condition. In fact SCE appears to be hopeful that blackouts they could have prevented this summer will help justify their claim that SanO is "needed." The reality is that nuclear power plants are notorious for not staying online, and with only one reactor (at most) operating, an alternative energy plan SHOULD HAVE ALREADY been put in place by SCE. Yet no such plan is being implemented, as SCE keeps stalling while hoping for an extraordinarily hot summer, along with maybe a few downed high-power transmission lines. Any blackouts or brownouts, regardless of their cause, will be pointed to as "proof" that SanO is needed, even though they might have occurred anyway, and SanO might have gone down for a variety of reasons anyway. What SoCal really needs is additional wind energy, solar energy, demand response, and other clean alternatives.

1) ***Per the CA Energy Commission, despite increased population and more appliances consuming power in homes and businesses, energy efficiency standards have helped keep per capita electricity consumption in California flat for the past 30 years.*** California's per capita electricity consumption has remained constant at approximately 7,000 kilowatt-hours/year (kWh) for the last 30 years due in large part to strict standards for homes and appliances. The rest of the U.S. has increased 40 percent (to roughly 12,000 kWh/year per person). And there is even more savings to be gained through additional advances in energy efficiency as well as conservation by users. Not to mention the boom in rooftop solar installations, with San Diego County leading the state.

As of last summer, according to the CPUC, California generated 1,255 MW of electricity from 122,516 rooftops (more than one of the San Onofre Nuclear Reactors). Rooftop solar installation can be done in a matter of months, and the CA Air Resources Board estimates that 150 permanent jobs are created for each 100 megawatt (MW) of local solar added. As an indication of the growth potential of this job sector, in San Diego County, we have only installed 2% (or 140 MW) of rooftop and parking lot capacity -- this is a GROWTH industry!

Edison needs to stop with the Chicken Little routine -- the sky is NOT falling. The 21st Century is just moving forward.

2) If the U.S. ceases to burn coal, shuts down a quarter of existing nuclear reactors, and trims its use of natural gas by 2050, the resulting increased reliance on wind, solar and other renewables will not result in a less reliable electricity grid, according to a major new report prepared by Synapse Energy Economics, Inc., for the nonprofit Civil Society Institute (CSI). Report co-author Dr. Thomas Vitolo, analyst, Synapse Energy Economics, Inc.: "Put simply, the message today is this: It is a myth to say that the United States cannot rely on renewables for the bulk of its electricity generation. **This study finds that the projected mixes, based entirely on existing technology and operational practices, are capable of balancing projected load in 2030 and 2050 for each region--in nearly every hour of every season of the year."**

Grant Smith, senior energy analyst, Civil Society Institute said: "This study shows that the U.S. electricity grid could integrate and balance many times the current level of renewables with no additional reliability issues. Recent improvements in both renewable technologies themselves and in the technologies that are used to control and balance the grid have been proceeding at a rapid pace, and the incentives and rewards for success in this area continue to drive substantial progress. In contrast, the alternative--***continuing to rely on increasing combustion of fossil fuels to generate electricity, and producing ever-increasing levels of greenhouse gases--is far less feasible, and presents much more daunting technical, economic, and social challenges to human and environmental welfare.*** In comparison***, the challenge of integrating increasing levels of solar and wind power on the U.S. power grids requires only incremental improvements in technology and operational practices***."

Available online at http://www.civilsocietyinstitute.org/synapsereport

b) SCE's claim that grid stability will be compromised by too high a percentage of renewable energy has been proven false by, for example, Portugal's success with turning to renewables (now over 70%), and Germany's (over 25%). Germany's goal is 45% renewable energy by 2030, and 80% to 100% renewable energy by 2050. California can and should be a global leader in renewable energy.

c) SCE stated on 4/8/2013 that: "Operating [Unit 2] at 70 percent power prevents conditions that caused the tube-to-tube wear in Unit 3 that resulted in the nuclear plant being shut down since January 2012." This is a misleading statement and a

misrepresentation of fact. Firstly, SCE is only speculating and does not know for sure that Fluid Elastic Instability (FEI) can be prevented at 70% power. Secondly, SCE is completely ignoring dangerous tube behavior that can occur during operational transients (such as the opening or shutting of valves, start-up, shut-down, etc.), tsunamis, earthquakes, and/or during a Main Steam Line Break (MSLB) condition. Thirdly, ***describing a 70% power reduction at the turbine, while operating the reactor at approximately 100% (normal) power -- the true intent of SCE's plan -- is very misleading, and is intended to lull the public into thinking Unit 2 will just limp along quietly with no safety problems.***

d) In attempting to justify restart of Unit 2, SCE claimed to the public and the media that new "acoustic listeners" would help SCE avoid a repetition of the January 31, 2012 tube rupture and leak. But this claim was proven false when NRC questioning revealed that the listeners would only provide data to be analyzed later and would offer no real-time protection or early warning about tube wear problems. ***This was a purposeful obfuscation on the part of SCE to hoodwink the public into thinking SCE would be able to tell beforehand if there is tube damage which might cause a rupture.*** They can't tell, as proven by the fact that Unit 2 had one tube with 90% tube wall wear, and numerous tubes that had exceeded their safety limitation of 35% tube wall wear, and SCE had no knowledge of these facts until Unit 2's RSGs were re-inspected more carefully after the radiation leakage was discovered in Unit 3.

e) In 2004 when they applied to the CPUC to force ratepayers to cover the cost of the RSGs, SCE claimed that the project would somehow save about a billion dollars for ratepayers over a 20 year period -- about 50 million dollars a year. It has already cost ratepayers far more than that, and continues to cost ratepayers nearly 70 million dollars each MONTH while we wait for SCE to try and justify a restart. The RSGs in Unit 3 ran for less than a year and can never be used again, while the RSGs in Unit 2 ran for less than 2 years and should also never be used again.

f) As reported in the *San Diego Union-Tribune* on April 21, 2013:

"As a design team drew up plans for replacement steam generators at the San Onofre Nuclear Generating Station in 2005 and 2006, leading researchers were warning of a new threat to the safety of internal tubes coursing with radioactive water. The findings, published in an obscure-yet-authoritative trade journal on pressure vessel technology, have proved prophetic more than seven years later, as engineers strive to understand what caused the failure at the twin-reactor plant in northern San Diego County. San Onofre has been shut down for 14 months, with the cost for repairs and lost electricity approaching $600 million. Determinations about the cause could affect warranty liabilities, insurance claims and who ultimately shoulders the expenses — customers or

stockholders. San Diego Gas & Electric Co. owns 20 percent of the plant, and its customers typically shoulder that share of San Onofre costs.

"Two research articles, published in 2005 and 2006, described a potential blind spot in the prevailing design of generators. Reactors at the time commonly accounted for — and protected against — side-to-side vibrations of the tubes. ***The articles warned that, in laboratory simulations, a new kind of front-to-back vibration was detected that might lead to rapid wear on tubing, and protections from side-to-side vibrations might be of little use."***
utsandiego.com/news/2013/apr/20/someone-saw-san-onofre-issue-coming/

SCE should have foreseen these problems specifically, and other problems generally, and included such costs in their analysis. If they had, no one would have approved the replacement steam generator project.

B. Split Shutdown Scenario (Raymond Lutz)

In D.05-12-040 of December 15, 2005, regarding the Steam Generator Replacement Project (SGRP) at the San Onofre Nuclear Generating Station (SONGS), the Commission considered the viability of the Split Shutdown Scenario.[1]

In its original application, Southern California Edison (SCE) assumed that if the SGRP was not performed, then Units 2 and 3 would be shut down at the same time. The Commission's Office of Ratepayer Advocates (ORA) recommended that a split shutdown scenario be considered. A split shutdown scenario is where the SGRP is not performed and each unit is shut down as it reaches the NRC imposed plugging limit. At that time, Unit 2 had more tube degradation than Unit 3. Therefore, under the split shutdown scenario, Unit 2 would likely shut down first and Unit 3 would remain in operation for a longer period.[2]

Steam generator tube degradation forecasts are expressed as the percent probability that a unit (its steam generators) will exceed the plugging limit. San Diego Gas & Electric Company (SDG&E) stated, based on steam generator tube degradation forecasts prepared by Dominion Engineering, Inc. (DEI) for SCE, that (without performing the SGRP) there was a 67% probability that Unit 2 would have operated until Refueling Outage (RFO 17) in 2011 and a 56% probability that Unit 3 would have continued to operate until RFO 20 in 2016.[3]

The Commission concluded that without the SGRP, there was approximately a 50% probability that Unit 2 would have operated until mid-2012, and that Unit 3 would have operated until the

1 Decision **05-12-040** page 35.
2 Decision **05-12-040** page 35.
3 Decision **05-12-040** page 8.

beginning of 2016.[4] Thus, the commission adopted the estimate of continued operation without the SGRP such that Unit 3 continue to operate for about 3.5 to four years after Unit 2 was shut down.

SCE also represented that the NRC would require mid-cycle outages once one of the units is shut down, which would increase the RFO O&M (Operation and Maintenance) expenses. In other words, shutting one unit down reduces the O&M expenses by less than half.[5]

SCE stated that if the SGRP was not performed, because of these higher O&M expenses, it would be more cost-effective to shut both units down when one of them reaches the plugging limit than to keep the remaining unit running.[6] In Finding of Fact 153 of D.05-12-040, the Commission agreed: “The split shutdown scenario is more costly than shutting both units down when one unit reaches the plugging limit."

At this time, Unit 2 and 3 are both not operating due to unexpected steam generator tube wear that was noticed in January, 2012. Because the degradation to Unit 3 is more extensive, fuel has been removed from that Unit, as is standard procedure during an extended outage, and according to SCE, the Unit "will not be started indefinitely."[7]

Therefore, at this time, SONGS is in a similar situation as would have been the case if no SGRP had ever been attempted (and the two units continued to operate using the Original Steam Generators "OSGs"), as follows:

Operational Parameter	No SGRP	Current Situation
Unit 2 Status	OSGs would likely have reached their tube plugging limit by mid-2012.	SCE proposes to operate at 70% power with an extensive inventory of tubes plugged.
Unit 3 Status	OSGs may have been able to operate until 2016, another 3 years.	Sustained tube failure due to design deficiencies that resulted in unexpected fluid-elastic instability (FEI) and therefore the Unit "will not be started indefinitely."
Total operational capability.	50%	35%
Will Steam generators be soon replaced?	No, per assumption (no SGRP)	No. This has not been proposed.

4 Decision **05-12-040** page 84.
5 Decision **05-12-040** page 36.
6 Decision **05-12-040** page 36.
7 SCE statements provided in the San Gabriel Council of Governments, Special Meeting of the SGVCOG Governing Board, April 18, 2013, Item #8, Page 1: http://www.sgvcog.org/documents/1..4-18-13-gov-bd-packet-revised-special.pdf

O&M Costs	>50% original O&M	>>50% original O&M because of additional testing required by NRC.
Mid fueling cycle outages?[8]	Midcycle outages would be required per SCE statements to perform steam generator tube inspections.	More outages than in No SGRP case. Proposal is to run only five months and then perform inspections of steam generator tube wear, which is about twice as often as the No SGRP case.
Grid Reliability	Does not contribute to overall grid reliability because the single unit will have to be shut down during each RFO and other generation will be required during that time.	

Conclusion: Since the Commission agreed with SCE in D.05-12-040 that that with no SGRP, it would not be economically viable to run just one of the two units if the other reached its plugging limit, then it is reasonable to expect that if one of the two units can no longer be run due to design deficiencies and the plant can only be run at 35% or less of the original plant capacity, then it is also not economically viable to run the other unit alone.

All actions by SCE to restart Unit 2 after Unit 3 was placed in an indefinite shutdown mode are unreasonable. This includes all engineering studies, applications and interaction with the Nuclear Regulatory Commission (NRC) and other agencies, and all other related costs related to any and all attempts to restart one of the units with the understanding that both units would not be restarted.

The removal of nuclear fuel from Unit 3 was announced in August, 2012[9], to be completed in September 2012. At that time, SCE should have been discussing either complete restart of both units, or complete shutdown of both units, per the facts already agreed to in the original SGRP findings of the Commission in D.05-12-040. Instead, on October 4, 2012, SCE proceeded to propose to the NRC the operation of Unit 2 at 70% power without also operating Unit 3,[10] and has continued to pursue the operation of Unit 2 without Unit 3 also in operation despite the fact that it is not economically viable to do so.

8 RFOs occur at approximately 18 month intervals for each unit, per D.05-12-040 page 8 (footnote #9), and each last about one month, according to the Nuclear Engineering Institute (http://www.nei.org/resourcesandstats/nuclear_statistics/fuelrefuelingoutages)

9 http://www.kpbs.org/news/2012/aug/27/san-onofre-preparing-empty-radioactive-fuel-one-re/ "San Onofre Preparing To Empty Radioactive Fuel From One Reactor" (2012-08-27)

10 http://www.reuters.com/article/2012/10/04/energy-edison-sanonofre-idUSL3E8L45L620121004 "San Onofre nuclear restart plan faces lengthy review"

In light of its stated position in 2005 and the Commission's Finding of Fact 153 in D.05-12-040 agreeing with it, SCE's actions and expenditures associated with doing so cannot be considered reasonable and must be disallowed by the Commission.

C. Major Capital Expenditures Related to SanO (Martha Sullivan)

On February 7. 2013, the CDSO and Ruth Henricks protested SCE Advice Letter 2838-E and SDG&E Advice Letter 2450-E in accordance with G.O. 96-B. Both of these Advice Letters sought to comply with the Commission's Order in I.12-10-013 (at Ordering Paragraph 4):

- *SCE and SDG&E shall each file and serve, no less than five days before a utility management final decision to proceed with a major project, a Tier 1 informational Advice Letter with the Energy Division Director before making any major capital expenditures related to SONGS. For this purpose, a major capital expenditure is any amount in excess of $10 million (total expenditure before allocation to SCE, SDG&E and City of Riverside).*

CDSO and Ruth Henricks joined in the Protests filed on February 1, 2013, by the Alliance for Nuclear Responsibility (A4NR) of these same Advice Letters, citing material omissions as grounds thereof pursuant to GO 96-B's General Rule 7.4.2. CDSO and Ruth Henricks joined in A4NR's requests that the Energy Division reject SCE's Advice Letter 2838-E and SDG&E's Advice Letter 2450-E without prejudice pursuant to GO 96-B's General Rule 7.1 until these deficiencies are corrected.

CDSO and Ruth Henricks observed that ALJ Darling's Ruling in December (Question 12) required extensive reporting on the capital projects underway for San Onofre, and this Advice Letter filing "in an abundance of caution" by SCE appeared to be an attempt to create a "baseline" that they have been approved by Edison management prior to the Commission's OII 12-10-013. However, as A4NR points out in its Protests of these Advice Letters, no date of SCE management approval for these capital projects is given in the Advice Letters (nor in SCE's Testimony in Reply to ALJ Darling's Question 12).

CDSO and Ruth Henricks additionally protested these Advice Letters due to the pendency of the U.S. Nuclear Regulatory Commission's (NRC) approval of SCE's

proposal to restart the San Onofre Unit 2 reactor at 70% power for 5 months, and the fact that SCE has removed the fuel from the San Onofre Unit 3 and has stated publicly that it has no short-term plan to restart it.

Specifically, Item 7 in SCE's Advice Letter 2838-E (which SDG&E's Advice Letter 2450-E incorporates by reference) is predicated upon "if and when U2 (Unit 2) is returned to service."

> *"7) CCW Heat Exchangers – U2 & U3*
>
> *"The Component Cooling Water (CCW) heat exchangers provide the primary means of removing the heat loads from plant primary system components, during normal and emergency operation, to the ultimate heat sink — the Pacific Ocean. The heat exchanger is accomplished through Saltwater Cooling (SWC) pumps — four pumps per unit, of which two are in service during normal operating conditions, and the other two pumps are on standby. By the SONGS U2 & U3 operating NRC license, all four of the pumps associated with a unit must be operable to keep a unit on-line.*
>
> *"SCE is in the process of a planned replacement of the pumps for U2, so that the U2 CCW Heat Exchanger will be operable and in compliance with the SONGS operating license,* ***if and when U2 is returned to service.*** *SCE has postponed and has not yet rescheduled the repair or replacement of the heat exchangers for U3 pending its continuing analysis of the outage at U3 and its determination of how to address that outage.*
>
> *"The total cost of this project collectively for both units is estimated to be $19.9 million (2012$, 100% Level). "*

CDSO emphatically repeats its declaration in our Protest of these advice letters that SCE should NOT be spending additional ratepayer money in order to be ready to restart one or both San Onofre nuclear reactor units when the U.S. Nuclear Regulatory Commission (NRC) has not even decided on SCE's proposal to restart Unit 2, and has announced it will not decide until May or June of this year at the earliest.

As stated in the Protest of these advice letters, this is yet another example of SCE's imprudent management of ratepayer monies in its operation of the San Onofre Nuclear Reactors and plant – spending tens of millions of ratepayer dollars in advance of required government approvals.

For full disclosure to SCE and SDG&E ratepayers, SCE as operator should be required to report to the Commission all the expenditures that are necessary to make Unit 2 ready to return to service and justify why such expenditures should be undertaken in advance of required government approvals.

On February 13, 2013, the CPUC's Energy Division advised in writing that these advice letters are being suspended for a period of up to 120 days beginning February 14, 2013 to allow Energy Division to review them. On April 22, 2013, the Energy Division advised me that these advice letters are still under review.

On April 19, 2013, ALJ Darling ruled in I.12-10-013 that the Emergency Motion by Friends of the Earth and World Business Academy to determine the cost effectiveness of a Unit 2 restart is "denied as ***premature because no restart plan has been approved by the NRC, and may include modifications and conditions to the SCE proposal, if eventually authorized."*** Hence, agreeing with one of the bases for CDSO/Ruth Henricks' protest of these advice letters: that SCE should NOT be spending additional ratepayer money in order to be ready to restart one or both San Onofre nuclear reactor units when the U.S. Nuclear Regulatory Commission (NRC) has not even decided on SCE's proposal to restart Unit 2, and has announced it will not decide until May or June of this year at the earliest.

D. Additional Consequences of Uneconomic Restart of Unit 2 (Martha Sullivan)

In disregarding its own position which it effectively argued and the Commission agreed with in D.05-12-040 (see subsection B herein regarding the "Split Operations Scenario) and pursuing restart of the defective Unit 2 nuclear reactor alone, SCE also takes on many other substantial expenses required by its continued operation of SanO. One of the most significant of these is compliance with the State Water Resources Control Board's 2010 policy on Once-Through-Cooling.

On May 4, 2010 the State Water Board adopted a Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling (Policy). The administrative record for the Policy was approved by the Office of Administrative Law (OAL) on September 27, 2010. The Policy became effective on October 1, 2010 when the California Environmental Quality Act Notice of Decision was submitted to the Secretary of Resources.

The Policy establishes technology-based standards to implement federal Clean Water Act section 316(b) and reduce the harmful effects associated with cooling water intake structures on marine and estuarine life. The Policy applies to the 19 existing power plants (including two nuclear plants) that currently have the ability to withdraw over 15 billion gallons per day from the State's coastal and estuarine waters using a single-pass system, also known as once-through cooling (OTC). Closed-cycle wet cooling has been selected as Best Technology Available (BTA). Permittees must either reduce intake flow and velocity (Track 1) or reduce impacts to aquatic life comparably by other means (Track 2).

The Policy is implemented through an adaptive management strategy by which the standards can be achieved without disrupting the critical needs of the State's electrical generation and transmission system. A Statewide Advisory Committee on Cooling Water Intake Structures (SACCWIS) has been established to review implementation plans and schedules and provide recommendations to the State Water Board at least annually. The State Water Board will consider SACCWIS's recommendations and make modifications to the Policy, as appropriate. The permittees' NPDES permits will be reissued or modified to conform with the Policy.

The Statewide Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling (Policy) contains special provisions for the existing nuclear-fueled power plants that use once-through cooling water technology, including the San Onofre Nuclear Power Plant (SONGS), which is operated by Southern California Edison, and the Diablo Canyon Power Plant (DC), which is operated by Pacific Gas and Electric Company (PG&E). These Policy provisions require the owner or operator of a nuclear facility to undertake specials studies to investigate alternatives for the facility to meet Policy requirements. The Policy requires the establishment of a Review Committee to oversee the special studies.

The Review Committee was convened by the Executive Director of the State Water Board (as required by the Policy) to oversee the special studies, which will investigate ability, alternatives, and cost for two nuclear-fueled power plants to meet the Policy requirements. The special studies will be conducted by an independent third party with engineering experience with nuclear power plants, selected by the Executive Director of the State Water Board, and paid for by the two nuclear-fueled power plants subject to the Policy. The Review Committee includes representatives from the SACCWIS agencies, the nuclear power companies, the environmental community, and staffs of the State Water Board and appropriate Regional Water Boards.

The Review Committee was required to provide a report for public comment by October 11, 2011 detailing the scope of the special studies, including the degree to which existing, completed studies can be relied upon. ***The Review Committee shall provide a final report describing the results of the special studies and shall present the report to the State Water Board by October 1, 2013. The State Water Board shall consider the results of the special studies, and evaluate the need to modify the Policy with respect to the nuclear-fueled power plants.***

SCE's own Feasibility Study in 2009 on implementing the Best Practice adopted by the Policy identified substantial land use constraints, ***initial costs exceeding $3.0 billion dollars and annual costs exceeding $85 million***, considerable losses in generation during conversion and during post-retrofit operation, significant adverse environmental impacts, and likely insurmountable permitting obstacles which would be encountered if SCE were to attempt to retrofit SONGS with closed-loop cooling.

It is clear from the State Water Board's commitment to implementing this Policy that SCE will have to do something substantial, if not to retrofit it with closed-loop cooling, to reduce the impact of SanO on marine life in California – the 2nd highest of all power plants, after the other nuclear power plant, Diablo Canyon.
http://sanonofresafety.files.wordpress.com/2013/04/sierraclubonce-thrucoolingbrochuregiant-fish-blenders.pdf

Continuing to undertake such a large financial obligation with the restart of a single reactor at 70% power for 5 months, representing only 35% of SanO's generation capacity, seems extremely foolish with ratepayer funds. ***The Commission MUST consider the additional financial burdens to ratepayers consequential to the continued operation of SanO at reduced power.***

E. Plant safety, public health, and environmental risks (Raymond Lutz and Martha Sullivan)

In the Commission's original approval of the SGRP (D.05-12-040), the Commission listed Findings of Fact, including:

> *86. Inclusion of nuclear power plant safety, public health, and environmental risks and effects, if they could be quantified, would decrease the cost-effectiveness of the SGRP.*

87. Nothing in the record places a dollar amount on nuclear power plant safety, public health, and environmental risks and effects.

159. Since the record does not quantify any other safety, public health, and environmental risks and effects associated with SONGS, we do not include these factors in the NPV calculation.

191. On July 13, 2005, CEC filed a motion to reopen the record for the limited purpose of receiving into the record the executive summary of a document entitled "Safety and Security of Commercial Spent Nuclear Fuel Storage: Public Report" prepared by the National Academy of Sciences. The report addresses potential safety and security risks of spent fuel storage at commercial reactors,
and potential remedies.

One of the most important reasons for the existence of government and its various agencies is safety, public health, and environmental risks and effects. To ignore these issues simply because nothing has been contributed to the record is unfortunate. Therefore ***the CDSO respectfully contributes the following information to be included in the record as the Commission assesses the reasonableness of SCE's consequential actions and expenditures after the start of the outage as well as the reasonableness and effectiveness of SCE's actions and expenditures for Community Outreach and Emergency Preparedness related to the SONGS outages***.

We submit, by reference, the entirety of the following documents into the record.

1. "**Safety and Security of Commercial Spent Nuclear Fuel Storage: Public Report**", The Committee on the Safety and Security of Commercial Spent Nuclear Fuel Storage of the Board on Radioactive Waste Management, Division on Earth and Life Studies, National Research Council of the National Academies (2006)
http://www.nap.edu/openbook.php?record_id=11263

This report is based on a classified report that was developed at the request of the U.S. Congress with sponsorship from the Nuclear Regulatory Commission and the Department of Homeland Security.

In summary, this report provides independent scientific and technical advice on the safety and security of commercial spent nuclear fuel storage in the United States, specifically with respect to the following:

- Potential safety and security risks of spent nuclear fuel presently stored in cooling pools at commercial nuclear reactor sites.
- Safety and security advantages, if any, of dry cask storage versus wet pool storage at these reactor sites.
- Potential safety and security advantages, if any, of dry cask storage using various single-, dual-, and multipurpose cask designs,
- The risks of terrorist attacks on these materials and the risk these materials might be used to construct a radiological dispersal device.

We note on Page 42 that:

U.S. commercial nuclear power plants are not required by the Nuclear Regulatory Commission to defend against air attacks. The Commission believes that it is the responsibility of the U.S. government to implement security measures to prevent such attacks. The commercial nuclear industry shares this view.

2. Alvarez, Robert. "Spent Nuclear Fuel Pools in the U.S.: Reducing the Deadly Risks of Storage." Institute for Policy Studies. May 2011.

http://www.ips-dc.org/files/3200/spent_nuclear_fuel_pools_in_the_US.pdf

Of special note are the following passages:

U.S. reactors have generated about 65,000 metric tons of spent fuel, of which 75 percent is stored in pools, according to Nuclear Energy Institute data. Spent fuel rods give off about 1 million rems (10,00Sv) of radiation per hour at a distance of one foot — enough radiation to kill people in a matter of seconds. There are more than 30 million such rods in U.S. spent fuel pools. No other nation has generated this much radioactivity from either nuclear power or nuclear weapons production. ...

The 69 Pressurized Water (PWR) reactors [such as those at San Onofre and Diablo Canyon in California] operating in the U.S. lack proper containment and several have large cavities beneath them which could exacerbate leakage.

For nearly 30 years, Nuclear Regulatory Commission (NRC) waste-storage requirements

have remained contingent on the opening of a permanent waste repository that has yet to materialize. Now that the Obama administration has canceled plans to build a permanent, deep disposal site at Yucca Mountain in Nevada, spent fuel at the nation's 104 nuclear reactors will continue to accumulate and are likely remain onsite for decades to come.2

Over the past 30 years, there have been at least 66 incidents at U.S. reactors in which there was a significant loss of spent fuel water. Ten have occurred since the September 11, 2001, terrorist attacks, after which the government pledged that it would reinforce nuclear safety measures. Over several decades, significant corrosion has occurred of the barriers that prevent a nuclear chain reaction in a spent fuel pool — some to the point where they can no longer be credited with preventing a nuclear chain reaction. For example, in June 2010, the NRC fined Florida Power and Light $70,000 for failing to report that it had been exceeding its spent fuel pool criticality safety margin for five years at the Turkey Point reactor near Miami. Because of NRC's dependency on the industry self-reporting problems, it failed to find out that there was extensive deterioration of neutron absorbers in the Turkey Point pools and lengthy delays in having them replaced.3

One thing, however, is clear, whether we like it or not: the largest concentrations of radioactivity on the planet will remain in storage at U.S. reactor sites for the indefinite future. In protecting America from nuclear catastrophe, safely securing the spent fuel by eliminating highly radioactive, crowded pools should be a public safety priority of the highest degree.

3. "HEALTH RISKS FROM EXPOSURE TO LOW LEVELS OF IONIZING RADIATION" AKA "**Biologic Effects of Ionizing Radiation VII (BEIR VII)**", Committee to Assess Health Risks from Exposure to Low Levels of Ionizing Radiation, Board on Radiation Effects Research, Division on Earth and Life Studies, National Research Council of the National Academies, 2006. http://www.nap.edu/openbook.php?isbn=030909156X

The BEIR VII report concludes that ***the current scientific evidence is consistent with the hypothesis that, at the low doses of interest in this report, there is a linear dose-response relationship between exposure to ionizing radiation and the development of solid cancers in humans.*** It is unlikely that there is a threshold below which cancers are not induced, but at low doses the number of radiation-induced cancers will be small.

4. John E. Ten Hoeve & Mark Z. Jacobson, "**Worldwide health effects of the Fukushima Daiichi nuclear accident**", Department of Civil and Environmental Engineering, Stanford University, Journal of The Royal Society of Chemistry 2012, http://www.stanford.edu/group/efmh/jacobson/TenHoeveEES12.pdf

This research is of particular use to the Commission because of the simulation of a Fukushima-type accident at the Diablo Canyon plant.

> Simulations with an identical emission profile to Fukushima were run for hypothetical nuclear releases from the Diablo Canyon Power Plant in California, USA. Two simulations were run, one beginning in March and one beginning in September, to study the impact of location and background meteorology on the health effects of a nuclear accident. Fig. 7 and 8 show the evolution of the I-131 plume for simulations beginning in March and September, respectively. The evolution of the Cs-137 plume for the March and September simulations is shown in ESI Figs. 1 and 2.† Table 3 shows the range in health effects between the two simulations. Projected worldwide mortalities and morbidities for all exposure pathways for the simulation beginning in March were 170 (24–1400) and 250 (38–2300), respectively, and were 140 (11–1600) and 190 (20–2700) for the simulation beginning in September. This results in a total range of 11–1600 mortalities and 20–2700 morbidities over both simulations. In both simulations, a large majority of the total health effect was local to the United States.
>
> ***Even though the population density of California is roughly one fourth that of Japan, Table 3 indicates that a Diablo Canyon release identical to Fukushima could surpass Fukushima in terms of excess mortalities and morbidities by 25% for best estimates.*** This is because the bulk of radioactive emissions at Fukushima were advected westward over the Pacific Ocean, where they decayed or became diluted and removed, ***whereas in the Diablo Canyon simulations, radioactivity was trapped by an inversion as it was slowly transported along the California coastline over populated regions of Los Angeles and San Diego before it was transported offshore.***
>
> Due to the lower latitude storm track in March, radioactivity was dispersed over a larger area in March than in September. In March, fast-moving storms carried radioactivity to the east but some radioactivity was also carried to the southwest along the south side of

the Pacific High (Fig. 7). In September, the bulk of the radioactivity was transported slowly to the southwest, along the Pacific High. Lower wind speeds hampered the vertical and horizontal dispersion of radionuclides and clear skies prevented wet removal, keeping radioactivity over nearby populated regions for a longer time relative to March (Fig. 8). Fig. 9 shows total deposition of Cs-137 over the month-long March and September simulations. ***In the March simulation, 51% of total worldwide deposited Cs-137 was deposited over land areas compared with 33% in the September simulation. Population-weighted Cs-137 deposition was also higher in the March simulation by about a factor of four. The higher total Cs-137 deposition over land areas in the March simulation was due to higher wet deposition rates in eastward-moving winter storms.***

Consequently, ground concentrations of Cs-137 averaged over the United States were also higher in March than in September (Fig. 10).

Inhalation, ground-level external exposure, and ingestion exposure comprised 37%, 40%, and 23%, respectively of best estimate mortalities in the March Diablo Canyon simulation and 78%, 13%, and 8%, respectively of best estimate mortalities in the September simulation. *The higher relative inhalation exposure in September was due to lower wet deposition rates and slower winds keeping atmospheric concentrations high in nearby populated areas.* The range in the health effect was larger in September due to the higher uncertainty associated with inhalation risk coefficients compared with external exposure risk coefficients. ***Overall, these results suggest that the geographic location, as well as the background meteorology and season, may substantially impact the potential health risk from a nuclear accident.***

Furthermore, in the conclusion of that study:

A hypothetical accident at the Diablo Canyon Nuclear Power Plant, in California, USA was simulated to analyze the influence of location and background meteorology on health effects resulting from a nuclear accident. Two simulations, one beginning in March and one beginning in September, were run with identical emissions to the Fukushima accident. We estimate total excess mortalities of 160 (11–1600) and morbidities of 220 (20–2700) over both Diablo Canyon simulations. Similar to Fukushima, a large majority of the health effect is local. Averaged over both Diablo Canyon simulations, we find 25% more mortalities compared with the Fukushima simulation for best estimates. The larger projected health effect occurs despite a lower

local population density in California relative to Japan, and is attributed to differences in meteorological conditions between the two simulated accidents. In the Diablo Canyon simulations, radiation was capped in a shallow layer near the surface and was slowly advected over nearby populated areas whereas in the Fukushima simulation, much of the radiation was quickly advected offshore where it was diluted and removed.

...

The future of the nuclear energy industry relies on the contention that nuclear energy is safe. Here, we find that the Fukushima nuclear accident may cause nontrivial cancer mortality and morbidity assuming an LNT model of human exposure, and hypothetical accidents at the Diablo Canyon Power Plant of comparable magnitude may cause similar health effects despite having one fourth the local population density as Fukushima.

This study suggests that impact of Fukushima-like disaster would be about 25% more deadly at the Diablo Canyon Nuclear Plant because much of the radiation at the Fukushima location was blown out to sea, but in California, it would be held under an inversion layer and blown down the coast to highly populated areas. But because the population density is much less in that area of California, the impact of the disaster would be comparable.

By extension, a similar disaster at the San Onofre Nuclear Generating Station would likely also result in a larger impact due to the proximity of the plan to dense population centers, unlike the Diablo Canyon site, which is located in a relatively remote location.

There are other differences between the Fukushima plant and San Onofre, since the Fukushima reactors use the older Mark -I Boiling Water design, with spent fuel pools about 100 ft above ground level. San Onofre and Diablo Canyon are Pressurized Water Reactors and they have a different set of failure modes, and the spent fuel pools are not raised in elevation, but still are vulnerable because they are not in hardened containment buildings. ***Although the risk factors are different, this study will allow the economic impact due to the Fukushima disaster to be considered by the California Public Utilities Commission.***

5. "**Fukushima Cleanup Could Cost up to $250 Billion**" NewsOnJapan.com. 6 Nov. 2012 <http://newsonjapan.com/html/newsdesk/article/89987.php>

It will be some time before the exact economic impact of the Fukushima disaster and cleanup can be completely understood. ***At this time, we reference a number of estimates which can allow the potential impact in California to be estimated.*** This article said that:

> A private think tank says the accident at the Fukushima Daiichi nuclear plant could cost Japan up to 250 billion dollars over the next 10 years. The estimate is part of the Nuclear Safety Commission's ongoing survey of opinions on the disaster from nuclear and other experts. Kazumasa Iwata, president of the Japan Center for Economic Research, gave the estimate on Tuesday. He said the costs of the accident could range from nearly 71 to 250 billion dollars. The figure includes 54 billion to buy up all land within 20 kilometers of the plant, 8 billion for compensation payments to local residents, and 9 to 188 billion to scrap the plant's reactors.
>
> Iwata said a drastic review of the government's nuclear energy policy is necessary to fund the cleanup.
>
> ***He said the government could channel about 71 billion dollars to the necessary fund over the next decade by freezing research and development projects linked to the nuclear fuel cycle. Another 150 billion could come from Tokyo Electric Power Company's reserve fund, and the government's nuclear energy-related budgets.***

6. Gundersen, Arnie & Caldicott, Helen. "The Ongoing Damage and Danger at Fukushima." Fairewinds Energy Education. Web. 6 Nov. 2012. <http://fairewinds.org/content/ongoing-damage-and-danger-fukushima>

This independent estimate of the total economic impact of the Fukushima disaster put the cost at up to $500 billion.

Given that the Stanford simulation based on Fukushima referenced in Item 4 herein found that the impact of a similar accident at Diablo Canyon would be larger, it would be conservative for the Commission to use a number of at least $250 billion in its calculations for economic viability of the decisions appropriate for this investigation.

II. WEM's Testimony on "Emergency Preparedness", "Community Outreach", and "SCE's Emergency Planning Materials Paint a False Picture of What a Nuclear Disaster in California Would Look Like – Ratepayers, Who Pay for This Material, Deserve a More Realistic Assessment."

NOTE: This Testimony addresses Phase I Scoping Issue 3 – "The reasonableness and effectiveness of SCE's actions and expenditures for community outreach and emergency preparedness related to the SONGS outages."

A. Inadequacies in the Community Outreach and Emergency Preparedness for a Large-Scale Radiological Event at the San Onofre Nuclear Generating Station (Deanna Polk RN, MSHS)

Southern California, including San Diego, Orange, and Los Angeles Counties have been on the cutting edge of Emergency Preparedness and Disaster Response, and contribute to a national and global effort in this regard. Innovations in interagency collaboration, emerging technologies, and highly trained planners and responders, have made us one of the most prepared regions in the country. Reverse 911, web-based technologies, and highly dedicated personnel have proven themselves to be effective in saving lives and property, and in keeping our communities resilient as demonstrated in numerous wildfires and other natural disasters.

However, despite these efforts, when it comes to responding to a large-scale radiological disaster, there are gaps in our preparedness. Having been involved in these efforts for the past 15 years I feel it is incumbent on me to address some of these inadequacies in our preparedness for the safety of our community, especially in light of witnessing Southern California Edison's attempt to bypass an adjudicated hearing with independent experts, under oath, in order to restart the San Onofre Nuclear Generation Station which has had a series of unresolved problems. My deepest respect goes out to all of our Emergency Planners and Responders in trying to keep our community safe.

- Most of our hospitals do not have radiological detectors, nor trained personnel, to respond to a large-scale radiological event.

- As the former Emergency Preparedness Coordinator for the San Diego Council of Community Clinics, I can testify that our Community Clinics do not have the training, personnel, or equipment to handle a large-scale radiological event. Nor do most of our

skilled nursing facilities or group homes for the mentally or physically challenged.

- Our K-12 public and private schools do not have the trained personnel, nor equipment to respond to a large-scale radiological event. Our public and private colleges and universities do not have adequate personnel, training or equipment to handle students on campus at the time of the event, nor how to shelter in place dormitories.

- Emergency response plans do not adequately address the notification of a large, multi-ethnic population that includes 85 spoken languages.

- Emergency response plans fail to address the needs of the disabled population in the event of an evacuation. Plans only include registered people on disability, many are unregistered.

- Emergency response plans fail to adequately address notification and evacuation of a large farm-worker population.

- Emergency response plans fail to adequately address a large, transient homeless population.

- We still do not know how to decontaminate our ambulances or other emergency response vehicles involved in a mass evacuation during a large-scale radiological event. The plans do not address personal protection needs of first responders who are mandated to respond to such an event, especially those involved in traffic management and evacuation.

- The plans fail to instruct on how to shelter-in-place people at outdoor events such as sporting events, including professional, college, high school, K-8, intramural and other organized sporting events.

- The plans fail to adequately address the notification and evacuation needs of the part of the population that may be at the beach, our marinas, and parks, including tourists from out of town.

- The emergency response plans fail to address the complexity of evacuation of international citizens which would require State Department involvement, including international students at our local colleges and universities.

- Our local colleges and universities do not have adequate personnel, training or equipment to handle students on campus at the time of the event, or how to shelter in place dormitories.

- With major gas lines located on the property (SDG&E map) next to Interstate 5, if there was an earthquake, or other event that caused those lines to rupture, the ensuing fire/and or gas leaks would cause the shutdown of Interstate 5, eliminating one of the two major routes out of San Diego County.

B. SCE's Actions and Expenditures for Community Outreach and Emergency Preparedness are NOT Effective Nor Reasonable (Torgen Johnson and Martha Sullivan)

In the wake of the Fukushima nuclear power plant disaster over 2 years ago, which the Japanese government has found to be "entirely manmade" due to gaps in emergency preparedness and community outreach, SCE has had more than adequate notice of the prudence and imperative to address similar gaps (including those enumerated above) for the San Onofre Nuclear Generating Station, located in the midst of 8.5 million residents and directly impacting the 5th-largest economy in the world (California).

As reported in *Science* (October 2012), it was only 20% of the Fukushima Disaster's radioactive plume that traveled over the mainland of Japan while 80% of that disaster was blown away from land over the Pacific Ocean. http://www.sciencemag.org/content/338/6106/480.summary?sid=96bdcb46-e2b1-4f8f-b099-7107f530a949 By comparison, a nuclear accident at San Onofre with its prevailing onshore winds would most likely experience a nuclear accident that spreads most of its fallout downwind over urbanized and agricultural areas of Southern California. *(For more analysis of this difference, see Section I.E.4 herein.)*

The areas in and around Fukushima Japan that have been contaminated by radioactive fallout at levels that should require evacuation (http://enenews.com/areas-with-10000-bqm%c2%b2-of-

radioactivity-considered-highly-contaminated-by-study-over-30000-square-kilometers-in-japan-exceed-that-level-8-of-nation) are approximate in size to the area of Los Angeles, Orange, and San Diego Counties combined.

According to the 2010 U.S. Census the value of ***owner-occupied homes*** in:

Los Angeles County = $788.6 billion
Orange County = $364.4 billion
San Diego County = $293.5 billion
TOTAL = $1.446 Trillion

This number does not include commercial properties, public property, public institutions, or private institutions such as colleges, universities, and research facilities. The $1.446 Trillion dollar figure also does not include public and private infrastructure such as freeways and the Port of Los Angeles that handles a majority of all containerized goods entering in the U.S., which would have to be abandoned if heavily contaminated by a nuclear accident at San Onofre. Potential economic impacts to ratepayers and the public would far exceed the per incident cap of the Price Anderson Fund, estimated at approximately $12.6 Billion. It is important to note that 33 to 40 percent of our nation's wealth is manifest in the built environment which is land improvements and infrastructure. (http://www.chrisleinberger.com/docs/About_CL/LeinbergerProfile_Green_Quotient_050109.pdf) These are the very things that are reduced to zero value by nuclear disasters.

The private residences in San Clemente alone are valued at $20.8 Billion, which is just one small city next to the power plant and the figure does not include commercial properties or public infrastructure that would be rendered worthless if the area is highly contaminated. In other words, the fund is much too small to handle the impacts of a severe nuclear accident at San Onofre.

The other thing to note is that some assets do not have a replacement value such as the Port of Los Angeles or the bio-medical research district in La Jolla. Those functions cannot be relocated or recreated elsewhere without tremendous cost as the geography, interconnected industries, and infrastructure that supports those functions are site-specific. The Price Anderson Fund views urbanized areas as if they were products on a shelf whose loss and destruction could be compensated by some monetary amount.

Of course, if radiation contamination standards are increased enough (as currently proposed by the Obama Administration), then the industry can claim that no one is impacted by a severe nuclear accident.

C. SCE's Actions and Expenditures for Community Outreach Serve to Suppress the Communication of Realistic Assessments and Information to the Communities Most Impacted (Gary Headrick)

When I inquired about San Clemente Green getting a booth at the 2013 Earth Day event in San Clemente, the city nearest SanO, organized by the Watershed Task Force, I was told that this year they had to ask SCE for additional funds and that our concerns about safety at the nuclear power plant would make things awkward for them. However, if we just wanted to talk about plastic bags,that would be okay. They were supposed to get back to me, but never did.

I have learned to expect this kind of thing based on our past experience at the Ocean Festival (see next paragraph), but it still doesn't make it right. So rather than participate in the organized Earth Day events above the San Clemente Pier at Parque Del Mar on Saturday, April 20, 2013, we celebrated Earth Day down on the beach by the pier from 10:00 a.m. to 2:00 p.m. with our banners and posters.

It was Sunday morning on the 17th of July, 2011, a little before 6:30 am when I arrived at the sign-in station for the sand sculpture contest during the Ocean Festival in San Clemente. I paid my $25 fee and took my place, front and center in the first designated space where the most traffic would be. I left a few things at the space to hold my place and rushed home for my other supplies returning at 7:15. I unloaded my sand tools and "evacuation signs" I had prepared for the event as part of our awareness campaign. The San Clemente Times ran an article making reference to this campaign before the Ocean Festival.
I set up a table with some leaflets and signup sheets. Then I placed our evacuation signs around our perimeter and began work on our project, a replica of our local nuke plant, cracked and smoldering as if in a meltdown mode. A woman that works for the City of San Clemente or the non-profit organizer for the event (not sure, but in official looking attire) came over to tell me I could not have a table, signs or leaflets on the beach. Her reason was that this was a "permitted" event that had been paid for by the sponsor (who happened to be SCE), and that

“the usual freedom of speech rights did not apply here”. By then a few volunteers had shown up and witnessed this.

I said I would comply and started to go through the motions until she had left. I had taken down the table but left the evacuation signs up. About a half hour later, a police officer approached me and demanded that I take down the signs unless I wanted to be arrested. I complied reluctantly because I didn’t want to make a fuss, at least not until the sand sculpture was more complete and more people would be around. I figured the whole project would have been a lost cause if I had continued to challenge the authorities by resisting too soon.

SCE actively marginalizes and suppresses independent community outreach that does not conform with its marketing message, co-opting and misusing public resources and venues.

APPENDIX A:
QUALIFICATIONS AND PREPARED TESTIMONY

QUALIFICATIONS AND PREPARED TESTIMONY OF GARY HEADRICK

Q1. Please state your name and business address.

A1. My name is Gary Headrick. My business address is 2837 Penasco, San Clemente CA 92673.

Q2. By whom are you employed and in what capacity?

A2. I am founder of San Clemente Green, an environmental group representing 2000+ citizens concerned about the San Onofre Nuclear Generating Station.

Q3. Please describe your educational background and professional experience.

A3. Art Center-College of Design, 1977 to 1979. My career in Architectural Illustration allowed me to grow my business into a 40 person firm which was sold to my partners in 2003. Since then, my wife and I have scaled back the architectural presentation business to allow us to give back to the community. In 2007, we set out to establish a Sustainability Action Plan which was approved by San Clemente City Council in 2010. We intended to wrap up San Clemente Green and move on to other things when we were contacted by whistleblowers from San Onofre Nuclear Generating Station who said the new steam generators being installed were not being tested properly, amongst other things. Now our citizen's group has grown to over 2000 people who want to be sure lessons have been learned from Fukushima.

Q4. What is the purpose of your testimony?

A4. I am sponsoring part of CDSO’s rebuttal testimony on community outreach and emergency preparedness, assessing the reasonableness and effectiveness of SCE's actions and expenditures therefor.

Q5. Does this complete your testimony?

A5. Yes, it does.

QUALIFICATIONS AND PREPARED TESTIMONY OF ACE HOFFMAN

Q1. Please state your name and business address.

A1. My name is Ace Hoffman. My business address is P.O. Box 1936, Carlsbad, CA 92018.

Q2. By whom are you employed and in what capacity?

A2. I am the owner and sole employee of The Animated Software Company, developers of college-level educational software, now in its 29th year (quite possibly the oldest continuously operating educational software company and certainly the oldest continuously operating 'animated' educational software company). The animations are informative, such as cut-away drawings of pumps, the human heart, etc.. Relevant programs I wrote and programmed include "All About Pumps" and "The Animated Periodic Table of the Elements." I also programmed "Statistics Explained," a college-level course in statistical analysis, and "The Heart: The Engine of Life" which was shown in a military medical museum in Washington DC many years ago. These programs have been featured by industry and educational trade magazines, and have won several awards.

Q3. Please describe your educational background and professional experience.

A3. My education level includes some college and a whole lot of self-training, which has resulted in the above-mentioned programs, which are used in thousands of universities and colleges, as well as by industry, military training units of several countries, and individuals. I have presented my concepts on animated computer education to a national meeting of grant recipients of the National Science Foundation. I have also been involved in public education related to the San Onofre Nuclear Generating Station since 1992 when I moved to the area, and intensely since 2001 after San Onofre dropped a crane they were lifting in the turbine room, but declared to the media that it was the activists who "don't understand the laws of physics."

Q4. What is the purpose of your testimony?

A4. I am sponsoring part of CDSO's rebuttal testimony on the "nature and effects of the steam generator failures in order to assess the reasonableness of SCE's consequential actions and expenditures". To bring to light the dangers of restarting San Onofre, based on what I have learned since the January 31, 2012 tube rupture, through my own research of available documents, as well as through conversations with other researchers. I have spent hundreds of hours studying technical reports from SCE, MHI, AREVA, Westinghouse and NRC on the steam generator project, as well as the reports of John Large, Joram Hopenfeld, Arnie Gundersen,

Michel Pettigrew and others, and I am also in touch with a number of San Onofre "whistleblowers" who are very knowledgeable about the particulars of this incident.

Q5. Does this complete your testimony?

A5. Yes.

QUALIFICATIONS AND PREPARED TESTIMONY OF TORGEN JOHNSON

Q1. Please state your name and business address.

A1. My name is Torgen Johnson. My business address is P. O. Box 246, Solana Beach, California 92075.

Q2. By whom are you employed and in what capacity?

A2. I am the principal of Johnson Design.

Q3. Please describe your educational background and professional experience.

A3. I received a B-Arch. professional architecture degree from the University of Southern California and I hold two graduate urban planning degrees from Harvard University. I have worked in disaster reconstruction and economic revitalization projects since the 1990s, and also design custom residential projects. I have been a community based planner in Southern California since 2005 focusing on the community impacts of proposed infrastructure projects. I have also been involved in public education and outreach related to emergency planning for communities within the 50 mile radius around the San Onofre Nuclear Generating Station.

Q4. What is the purpose of your testimony?

A4. I am sponsoring part of CDSO's rebuttal testimony on community outreach and emergency preparedness, assessing the reasonableness and effectiveness of SCE's actions and expenditures therefor.

Q5. Does this complete your testimony?

A5. Yes, it does.

QUALIFICATIONS AND PREPARED TESTIMONY OF RAYMOND LUTZ

Q1. Please state your name and business address.

A1. My name is Raymond Lutz. My business address is 771 Jamacha Rd #148, El Cajon, CA 92019

Q2. By whom are you employed and in what capacity?

A2. I am the principal of Cognisys, Inc, an engineering firm, and the National Coordinator of Citizens Oversight, Inc., a 501(c)3 nonprofit organization DBA Coalition to Decommission San Onofre.

Q3. Please describe your educational background and professional experience.

A3. I received a Master's Degree in Electrical Engineering from San Diego State University (1984) and have held numerous professional positions for the past 33 years. Recently, I have participated as an intervenor in the NRC License Amendment Request by Southern California Edison for San Onofre Nuclear Generating Station, published in the Federal Register on August 16, 2012.

Q4. What is the purpose of your testimony?

A4. I am sponsoring part of CDSO's rebuttal testimony on a) the "nature and effects of the steam generator failures in order to assess the reasonableness of SCE's consequential actions and expenditures;" and b) community outreach and emergency preparedness, assessing the reasonableness and effectiveness of SCE's actions and expenditures therefor. The primary focus of my testimony deals with the economic viability of the San Onofre Nuclear Generating Station (SONGS) when operating with only one unit and with the economic impact of public safety concerns, including terrorist attacks and Fukushima-like disasters.

Q5. Does this complete your testimony?

A5. Yes, it does.

QUALIFICATIONS AND PREPARED TESTIMONY OF DEANNA POLK, R.N.

Q1. Please state your name and business address.

A1. My name is Deanna Polk. My business address is 4921 Santa Cruz Ave.

San Diego, CA 92107

Q2. By whom are you employed and in what capacity?

A2. I am an independent consultant on Emergency Preparedness/Disaster Response, Public Health, and Homeland Security issues.

Q3. Please describe your educational background and professional experience.

A3. I am a registered nurse with a Master's of Science in Homeland Security from SDSU, and all but thesis for a Master's of Science in Public Health for Global Emergency Preparedness and Response. My work during the past 15 years has encompassed preparing and responding to disasters on a local, federal and global level, from direct clinical response to helping to design, conduct, and evaluate disaster exercises including the first online, international disaster exercises utilizing social media. My thesis work was based on civilian/military collaboration for humanitarian assistance and disaster response, and involved helping to develop a cloud-based web platform used to communicate during disasters, the template of which the Red Cross of San Diego County now uses for their Emergency Response Center. I was charged with forming the first hospital decontamination response team at Scripps La Jolla Hospital in 2002. My work tries to bridge the gap between Public Health and Homeland Security, and is focused on inter-agency collaboration and resiliency on a domestic as well as global level.

Q4. What is the purpose of your testimony?

A4. I am sponsoring part of CDSO's testimony on community outreach and emergency preparedness, assessing the reasonableness and effectiveness of SCE's actions and expenditures therefor. My concerns with safety issues at San Onofre, the attempts of Southern California Edison to avoid procedural safety measures, and gaps in our ability to respond adequately to a high impact event at San Onofre, have motivated me to speak out on this most critical issue.

Q5. Does this complete your testimony?

A5. Yes, it does.

QUALIFICATIONS AND PREPARED TESTIMONY OF MARTHA SULLIVAN

Q1. Please state your name and business address.

A1. My name is Martha Sullivan. My business address is 2354 Carmel Valley Road, Del Mar CA, 92014.

Q2. By whom are you employed and in what capacity?

A2. I am the owner of Apply Liberally Enterprises, LLC and Organizer for Citizens Oversight, Inc., a 501(c)3 nonprofit organization DBA Coalition to Decommission San Onofre.

Q3. Please describe your educational background and professional experience.

A3. I received a Bachelor's Degree in Urban Studies from San Francisco State University (1981) and worked for the California Public Utilities Commission until 1998, attaining the level of Project and Program Supervisor. At the CPUC, I worked on human resources, budgeting, facilities management, information technology management, telecommunications and energy utility regulation, and environmental impact assessment and mitigation monitoring. In 1998, I joined an environmental consulting firm as a principal, growing its utility infrastructure practice substantially. Since 2003, I have been a community organizer in San Diego County, and in 2007, formed my company, Applly Liberally Enterprises LLC, a small business based in San Diego offering fine art and collectibles for sale and event planning and production services.

Q4. What is the purpose of your testimony?

A4. I am sponsoring part of CDSO's rebuttal testimony on a) the "nature and effects of the steam generator failures in order to assess the reasonableness of SCE's consequential actions and expenditures;" and b) community outreach and emergency preparedness, assessing the reasonableness and effectiveness of SCE's actions and expenditures therefor.

Q5. Does this complete your testimony?

A5. Yes, it does.