DiabloCanyonCEm Resource

From: Rachel MacDonald [Rmacdona@energy.state.ca.us]
Sent: Monday, April 12, 2010 4:45 PM
To: Stuyvenberg, Andrew; Maier, Bill; DiabloCanyonEIS Resource
Cc: Barbara Byron
Subject: COMMENTS ON THE ENVIRONMENTAL SCOPE OF THE DIABLO CANYON NUCLEAR POWER PLANT (DCPP) UNITS 1 AND 2 LICENSE RENEWAL REVIEW(Federal Register Notice, Volume 75, No. 17, pp. 4427- 4428, January 27, 2010)
Attachments: DCPP NRC environmental scoping comments.1pm.final.final.final..pdf

On behalf of the Office of Commissioner and Vice Chair of the California Energy Commission, and the California State Liaison Officer to the Nuclear Regulatory Commission, James D. Boyd, attached are the comments on the Environmental Scope of the Diablo Canyon Nuclear Power Plant Units 1 & 2 License Renewal Review. (Federal Register Notice, Volume 75, No. 17, pp. 4427- 4428, January 27, 2010)

Please acknowledge receipt of this email.

Thank you,

Rachel A. MacDonald
Nuclear Policy Advisor
California Energy Commission
1516 9th Street MS-30 Sacramento, CA 95814
(916) 654-4862 office

Federal Register Notice: 75FR4427
Comment Number: 17

Mail Envelope Properties (4BC323E0.E889.007C.0)

Subject: COMMENTS ON THE ENVIRONMENTAL SCOPE OF THE DIABLO CANYON NUCLEAR POWER PLANT (DCPP) UNITS 1 AND 2 LICENSE RENEWAL REVIEW (Federal Register Notice, Volume 75, No. 17, pp. 4427- 4428, January 27, 2010)
Sent Date: 4/12/2010 4:45:04 PM
Received Date: 4/12/2010 4:45:28 PM
From: Rachel MacDonald

Created By: Rmacdona@energy.state.ca.us

Recipients:
"Barbara Byron" <Bbyron@energy.state.ca.us>
Tracking Status: None
"Stuyvenberg, Andrew" <Andrew.Stuyvenberg@nrc.gov>
Tracking Status: None
"Maier, Bill" <Bill.Maier@nrc.gov>
Tracking Status: None
"DiabloCanyonEIS Resource" <DiabloCanyonEIS.Resource@nrc.gov>
Tracking Status: None

Post Office: energy.state.ca.us

Files	**Size**	**Date & Time**
MESSAGE	608	4/12/2010 4:45:28 PM
DCPP NRC environmental scoping comments.1pm.final.final.final..pdf	141998	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

CALIFORNIA ENERGY COMMISSION
JAMES D. BOYD
COMMISSIONER and VICE CHAIR
1516 NINTH STREET, MS-34
SACRAMENTO, CA 95814-5512
(916) 654-3787
(916) 653-1279 FAX

April 12, 2010

Michael Lesar, Chief
Rulemaking and Directives Branch
Mailstop TWB-05-B01M
Division of Administrative Services
Office of Administration, Mailstop TWB 5B-01M
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Re: COMMENTS ON THE ENVIRONMENTAL SCOPE OF THE DIABLO CANYON NUCLEAR POWER PLANT (DCPP) UNITS 1 AND 2 LICENSE RENEWAL REVIEW (Federal Register Notice, Volume 75, No. 17, pp. 4427- 4428, January 27, 2010)

Dear Mr. Lesar:

We appreciate the opportunity to comment on the U.S. Nuclear Regulatory Commission's (NRC) Notice of Intent (NOI) in the Federal Register Notice referenced above to prepare an Environmental Impact Statement (EIS) related to the license renewal application and environmental scoping process for Diablo Canyon Nuclear Power Plant (DCPP) Units 1 and 2. Our enclosed comments identify issues that should be included in the plant-specific supplement to the NRC's "Generic Environmental Impact Statement (GEIS) for License Renewal of Nuclear Plants" (NUREG-1437) regarding the application for renewal of the DCPP Units 1 and 2 operating licenses for an additional 20 years.

If you have any questions regarding these comments, please contact Barbara Byron at 916-654-4976 (bbyron@energy.state.ca.us) or Rachel MacDonald at 916-654-4862 (rmacdona@energy.state.ca.us).

Sincerely,

JAMES D. BOYD
Commissioner and Vice Chair
California State Liaison Officer to the
Nuclear Regulatory Commission

cc: Paul Lohaus, NRC
Bill Maier, NRC

Enclosure

Enclosure

Comments on the Environmental Scope of the NRC's Plant-Specific Supplement to the "*Generic Environmental Impact Statement (GEIS) for License Renewal of Nuclear Plants*" (NUREG-1437) for the Applications for Renewal of the Diablo Canyon Nuclear Power Plant Units 1 and 2

California Energy Commission
April 12, 2010

Background

On November 23, 2009, Pacific Gas & Electric Company (PG&E) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the Operating License for Diablo Canyon Nuclear Power Plant (DCPP) Units 1 and 2. The current operating licenses for DCPP Units 1 and 2 expire on November 2, 2024, and August 26, 2025, respectively. NRC's license renewal process consists of a safety review, environmental review, plant inspections, and a separate review by the Advisory Committee on Reactor Safeguards. The safety review focuses on identifying and managing the detrimental effects of plant aging. The environmental review considers plant-specific impacts from license renewal, such as once-through cooling impacts.

The NRC will prepare an environmental impact statement (EIS) related to the review of the DCPP license renewal application and provide the public an opportunity to participate in the environmental scoping process, as defined in 10 CFR 51.29. PG&E submitted the environmental report (ER) as required in 10 CFR 51.53 and 10 CFR 54.23. NRC is required by 10 CFR 51.95 to prepare a supplement to the NRC's "Generic Environmental Impact Statement (GEIS) for License Renewal of Nuclear Plants" to review the plant-specific environmental impacts of the renewal of the DCPP Units 1 and 2 operating licenses for an additional 20 years.[1] The GEIS covers the impacts that are considered common to all or most nuclear power plants. NRC recently issued for public comment a draft Revised GEIS for License Renewal of Nuclear Power Plants.[2] PG&E's license renewal application will use the older GEIS issued in 1996, rather than the recently issued revised GEIS. Possible alternatives to the proposed action (license renewal) include no action and reasonable alternative energy sources.

Under the NRC's environmental protection regulations in 10 CFR Part 51, renewal of a nuclear power plant operating license is identified as a major federal action significantly affecting the quality of the human environment, and thus an EIS is required for a plant's license renewal review. The EIS requirements for a plant-specific license renewal review are specified in 10 CFR Part 51. The NRC's public health and safety

---

[1] *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Main Report,* NUREG-1437, U.S. Nuclear Regulatory Commission, Office of Nuclear Regulatory Research, 1996.

[2] *Update of the Generic Environmental Impact Statement for License Renewal of Nuclear Plants,* NUREG-1437, U.S. Nuclear Regulatory Commission, Office of Nuclear Regulatory Research, Revision 1, July 2009.

requirements that must be met for the renewal of operating licenses for nuclear power plants are found in 10 CFR Part 54. Operating licenses may be renewed for up to 20 years beyond the 40-year term of the initial license. There are no limitations on the number of times the license may be renewed.

The Director of the NRC's Office of Nuclear Reactor Regulation makes the final decision to either approve or deny the request to renew the license. State agencies can specify conditions or reject permits that are required by the applicant. For example, California State Water Resources Control Board approval is needed to receive a National Pollutant Discharge Elimination System (NPDES) permit that is required for the continued operation of the nuclear plant's once-through cooling system. Similarly, California Coastal Commission approval is needed for a Coastal Development Permit (CDP) that would be required for the continued operation of DCPP through a license renewal period.[3] As a result, the NRC confers with state agencies as part of the environmental review and defers to agencies with appropriate regulatory authority.

Part 54 requires license renewal applicants to perform specified types of evaluations and assessments of their facility and to provide sufficient information for the NRC to determine whether or not continued operation of the facility during the renewal term would endanger public health and safety or the environment. Specifically, licensees are required to assess the effect of age-related degradation on certain long-lived, passive systems, structures, and components of the plant that are within the scope of Part 54. The purpose of the California Energy Commission's comments is to identify the issues that should be addressed in the plant-specific supplement to the GEIS and identify the significant issues that PG&E and the NRC should analyze in depth regarding the possible environmental impacts that could occur from renewing the licenses of DCPP.

The Energy Commission requests that the following issues be addressed as part of the plant--specific environmental impact analyses by PG&E and the NRC during the environmental impact review for DCPP license renewal:

1. Seismic Risks

As noted in the 1996 GEIS, the NRC staff has reviewed or performed detailed probabilistic assessments of external events, such as earthquakes, fires, and sabotage, at a number of plants. The 1996 GEIS' analysis of external events included a study completed in 1990 and reported in NUREG-1150 ("Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants," NRC). This report analyzed the risks of severe accidents at a nuclear power plant from internal and external events. It noted that in cases where external event risk was shown to be a significant contributor to the overall risk, the majority of the estimated risk arose from large beyond design basis earthquakes.[4]

[3] A CDP is required by the Coastal Zone Management Act (CZMA), see 16 U.S.C. Section 1456(c)(3)(A) and 15 C.F.R. Section 930.60(a). Letter to James Becker, PG&E, from Tom Luster, California Coastal Commission, December 29, 2009.
[4] NUREG-1437, 1996, p. 5-17.

California's two operating nuclear power plants – Diablo Canyon Nuclear Power Plant and the San Onofre Nuclear Generating Station (SONGS) are located in highly seismically active areas on the Pacific Coast. The discovery in the late 1960s of a major offshore fault – the Hosgri Fault -- which is located 4.5 kilometers west of DCPP, resulted in years of investigations and hearings and the redesign and seismic retrofit of Diablo Canyon. That effort resulted in Unit 1 not becoming operational until 1984 -- about 15 years after work at the site began. In 1984, the NRC made it a condition of the operating license for Diablo Canyon that, "PG&E shall develop and implement a State-of-the-Art Program to revalidate the seismic design bases used for Diablo Canyon." In November 2008, PG&E and USGS announced the discovery of a previously unidentified offshore fault – called "the Shoreline Fault" – approximately one kilometer west of DCPP that has a capacity to generate a magnitude 6.5 earthquake. PG&E is working with the USGS to study earthquake hazards along the coastline in central and northern California, including in the vicinity of Diablo Canyon. The NRC and the USGS will conduct an independent review of PG&E's Long-Term Seismic Program (LTSP) in 2010.

In November 2008 the Energy Commission completed a comprehensive assessment of DCPP and SONGS, as required by Assembly Bill 1632 (Blakeslee, Chapter 722, Statutes of 2006). This assessment included a major consultant study by an interdisciplinary study team, public hearings, and review of academic, scientific, and government reports and data provided by California's nuclear plant owners. To assist with this seismic vulnerability assessment, the Energy Commission formed a Seismic Vulnerability Advisory Team made up of seismic safety experts from California's Seismic Safety Commission, California Geological Survey, and the California Coastal Commission.

The AB 1632 study confirmed that the Hosgri Fault is believed to pose the dominant seismic hazard for Diablo Canyon and can generate up to a magnitude 7.5 earthquake. The AB 1632 study also raised the possibility that ground motion at Diablo Canyon from the Hosgri Fault could be stronger than previously thought, based on recent research on near-source ground motion. In addition, just prior to completion of this study, PG&E announced the discovery of the Shoreline Fault less than half a mile offshore from Diablo Canyon, with an estimated maximum earthquake magnitude of 6.5. Moreover, the AB 1632 study found that important data on Diablo Canyon's seismic hazard and plant vulnerabilities were incomplete or outdated and that new seismic studies could resolve questions and might change conclusions about the seismic hazards for the plant and plant vulnerabilities. As a result of these uncertainties and the discovery of the Shoreline Fault, the Energy Commission adopted the AB 1632 study, as part of the Energy Commission's 2008 Integrated Energy Policy Report (IEPR), and recommended that PG&E conduct a number of additional advanced seismic hazard and plant vulnerability analyses. These studies include:

- Updated seismic/tsunami hazard studies, including using three- dimensional geophysical seismic reflection mapping and other advanced techniques to explore fault zones near Diablo Canyon;
- Assessments of the long-term seismic vulnerability and reliability of the plant, focusing on switchyards and other non-safety-related components;

- An evaluation of additional pre-planning or mitigation steps that the utility could take to minimize plant outage times following a major seismic event, such as the earthquake that struck the Kashiwazaki-Kariwa plant in Japan in 2007; and
- An evaluation of the adequacy of access roads to Diablo Canyon and surrounding roadways for allowing emergency personnel to reach the plant and local communities and plant workers to evacuate following a major earthquake.

PG&E plans to complete these advanced seismic studies in 2011- 2013, if the California Public Utilities Commission (CPUC) approves the utility's application for funding to support these studies. The CPUC directed PG&E to report on the major findings and conclusions from these studies as part of the utility's license renewal feasibility studies for Diablo Canyon.

PG&E's completion of these studies is particularly important in light of the recently discovered Shoreline Fault and the nearly 3-year outage of most units at the Kashiwazaki-Kariwa nuclear power plant following the 2007 magnitude 6.8 earthquake in Japan. These seismic studies are relevant to the NRC's evaluation of the environmental and safety implications of continuing to operate DCPP for an additional 20 years. For example, an updated seismic hazard assessment is needed to assess the vulnerability of aging plant components to a major earthquake. This is especially important for those aging reactor components, such as the reactor pressure vessel, that have experienced embrittlement due to neutron bombardment.

The tsunami hazard at Diablo Canyon should also be reexamined during license renewal reviews. The December 26, 2004, Sumatran earthquake that resulted in widespread and catastrophic tsunami impacts and loss of life around the Indian Ocean caused the automatic shut-down of the Kalpakkam nuclear power plant on the east coast of India. Currently available tsunami studies for DCPP are at least 10 years old and do not take advantage of modern tools and recent studies that could improve the quality of the assessments, such as new data from the National Oceanic and Atmospheric Administration, new probabilistic hazard assessments, and inundation modeling. In light of the new and significant seismic information that is available for the plant site since the original operating licenses for DCPP were issued, the seismic and tsunami hazards for nuclear power plants should be examined as plant-specific issues during license renewal reviews.

A significant increase in the seismic or tsunami hazard could have major ratepayer impacts. For example, the discovery of the Hosgri Fault after plant construction was well underway in the 1970s resulted in the subsequent seismic redesign of the Diablo Canyon plant and very costly plant retrofits. Similarly, the shutdown of the Kashiwazaki-Kariwa Nuclear Power Plant following the July 2007 earthquake in Japan will cost billions of dollars for plant retrofits and for purchases of replacement power. As such, the 2009 IEPR recommended that PG&E complete and report in a timely manner on all of the AB 1632 studies, including the three-dimensional seismic studies and the studies of the long-term seismic vulnerability and reliability of the plant, and make their findings available for consideration by the Energy Commission and available to the CPUC and the NRC during their reviews of the utilities' license renewal applications.

In light of the continuing and significant uncertainty about the seismic hazard at Diablo Canyon and the need to evaluate significant new information since the operating licenses for DCPP were first issued, the NRC, in cooperation with the Energy Commission and the CPUC, should require that these seismic studies be completed, independently peer reviewed, and made part of NRC's and PG&E's environmental assessment for DCPP license renewal studies, before the NRC takes any further action on DCPP license renewal. In addition, the plant-specific EIS should include an analysis of new significant seismological data for the Diablo Canyon site gathered since the plant was constructed.

Another concern is the potential for a major release of radioactive waste to the Pacific Ocean as the result of an accident or major event at Diablo Canyon. As noted by the California Regional Water Quality Control Board when the plant was originally licensed, "In your review of earthquake safety and design errors at this facility, we again request that you make sure that all structures and piping which may result in accidental or unauthorized discharge to the Pacific Ocean be thoroughly inspected and audited independently, and where necessary, brought up to the standards which will prevent chemical or radioactive contamination of the ocean."[5] The design and construction errors that were discovered at the plant associated with the seismic design of the plant were subjected to an Independent Design Verification Program so that its construction meets the approved seismic design criteria.[6] The NRC determined that the plant did not fall into the categories warranting more extensive consideration of Class 9 accidents because it did not fall into any of three categories: (1) high population density around the site, (2) A novel reactor design, and (3) a combination of a unique design and unique siting mode.

However, since the plant was licensed, the population density around the plant has increased. The NRC should reevaluate whether this increase would make the plant eligible for a more extensive consideration of Class 9 accidents. If it does qualify, a plant-specific evaluation for DCPP of the risk of Class 9 accident should be completed as part of the license renewal review taking into consideration the new seismic hazard studies for the site.

2. <u>Accumulation of At-Reactor Spent Nuclear Fuel</u>

Twenty additional years of plant operation will generate additional nuclear wastes of all classes (low, medium and high-level wastes), which would result in additional impacts from waste management, storage, transport and disposal. The long-term risk of at-reactor storage and accumulation of spent fuel on California's seismically active coastline should be reevaluated during license renewal reviews given the uncertainties of when a permanent repository or offsite interim storage facility will become available. The Obama Administration has ordered cessation of most activities relating to the licensing of the Yucca Mountain High-Level Nuclear Waste Repository. PG&E can no

[5] Letter to Chairman Nunzio Palladino, NRC, from Marit Evans, Chair, Central Coast Region, California Regional Water Quality Control Board, December 24, 1982, Docket Number 50-275 OL.

[6] Letter from Harold R. Denton, Director Office of Nuclear Reactor Regulation, Nuclear Regulatory Commission to Kenneth R. Jones, Executive Officer, California Regional Water Quality Control Board – Central Coast Region, July 21, 1982.

longer count on transferring spent fuel to a federal nuclear waste repository in the near or medium-term future. As a result, PG&E must continue indefinitely to store spent nuclear fuel at the reactor sites. For California, this means that about 6,700 assemblies of spent fuel (approximately 2,600 metric tons of uranium) that are currently being stored at operating and decommissioned nuclear plants in-state, combined with the spent fuel that will be generated in the coming years, will remain at these sites for the foreseeable future. The potential economic and environmental impacts from the long-term storage of nuclear wastes at Diablo Canyon, including low, medium, and high-level nuclear wastes, should be evaluated as part of the plant-specific license renewal environmental review. PG&E should describe the nuclear waste management plan for these wastes, including the plan for managing current and projected waste generated through the end of the 20-year license extension, and this plan should be evaluated in the plant-specific EIS.

3. Safeguards and Security

The 1996 GEIS analysis of the threat of sabotage and terrorist attack is severely outdated and inadequate. For example, p. 5-18 of the GEIS states that, "With regard to sabotage, quantitative estimates of risk from sabotage are not made in external event analyses because such estimates are beyond the current state of the art for performing risk assessments." This pre-9/11 analysis focuses on protection against malevolent use of vehicles, including land vehicle bombs, and mentions the NRC's requirement (amended 10 CFR Part 73) that licensees establish vehicle control measures, including vehicle barrier systems, to protect against vehicular sabotage. The GEIS does not take into consideration the risk of a possible air attack on a spent fuel storage pool or dry storage facilities and instead simply concludes that "the regulatory requirements under 10 CFR part 73 provide reasonable assurance that the risk from sabotage is small. Although the threat of sabotage events cannot be accurately quantified, the commission believes that acts of sabotage are not reasonably expected. Nonetheless, if such events were to occur, the commission would expect that resultant core damage and radiological releases would be no worse than those expected from internally initiated events."[7] Based on the above, the commission concluded that "the risk from sabotage and beyond design basis earthquakes at existing nuclear power plants is small and additionally, that the risks form [sic] other external events, are adequately addressed by a generic consideration of internally initiated severe accidents."

Clearly this discussion is out-of-date and inadequate in light of the September 11, 2001, attacks on the World Trade Center. A 2006 National Academy of Sciences Study on the safety and security of spent fuel storage concluded that, "it is not prudent to dismiss nuclear plants, including their spent fuel storage facilities, as undesirable targets by terrorists." [8] Also, "…attacks by knowledgeable terrorists with access to advanced weapons might cause considerable physical damage to a spent fuel storage facility, especially in a suicide attack." The NAS Committee further concluded that, "under some conditions, a terrorist attack that partially or completely drained a spent fuel pool could lead to a propagating zirconium cladding fire and the release of large quantities of

[7] NUREG-1437, 1996, p. 5-18.
[8] National Academies, *Safety and Security of Commercial Spent Nuclear Fuel Storage",* 2006, p.35

radioactive materials to the environment."[9] The NAS Committee also concluded that, "The potential vulnerabilities of spent fuel pools to terrorist attacks are plant-design specific. Therefore, specific vulnerabilities can be understood only by examining the characteristics of spent fuel storage at each plant."[10]

The NRC states that security issues are not tied to a license renewal action but are considered to be issues that need to be dealt with constantly as part of the current license.[11] However, extending a plant's license to allow it to operate an additional 20 years will change the spent fuel-related security threat because of the larger quantities of spent fuel stored at the reactor site. These additional quantities of spent fuel could pose a richer and more attractive target for potential terrorists. License renewal results in a far greater accumulation of spent fuel stored at a reactor than was envisioned when the plants were first licensed.

The plant-specific studies for the DCPP license renewal should recognize the increased potential for terrorist attacks on nuclear power plants and spent fuel storage facilities, including air attacks similar to those that occurred on Sept. 11, 2001. The plant-specific environmental impact review for the DCPP license renewal should include meaningful analyses of the potential risks and environmental impacts from large-scale terrorist attacks on spent fuel storage at DCPP, taking into consideration the potentially affected population (i.e., residents, businesses, and workers) and available transport routes. Although some of the security information pertaining to nuclear power plants must remain "safeguarded" information, an appropriate level of information should be provided to the public during the license renewal review to help ensure that all reasonable efforts are being made to minimize the risks and consequences of a potential terrorist attack.

4. Aging Plant Issues

The Energy Commission requests that PG&E and NRC's plant-specific EIS should describe the aging management programs for DCPP plant components and how these programs will be evaluated, at what frequency, and how quality assurance programs will be maintained at DCPP. In the license renewal proceeding for the Pilgrim Nuclear Station the NRC judged the adequacy of the plant's Aging Management Program simply on whether it provided "reasonable assurance" that the components would perform the functions outlined in 10 C.F.R. Section 54.4(a) (1) – (3)." This standard appears to be vague and insufficient to ensure reactor safety over a 20-year license renewal period. The basis for such a finding should be provided as part of the GEIS and environmental review. For example, the problem of substandard or counterfeit plant replacement parts, including defective welds such as the ones found in SONGS new steam generators, should be addressed within a plant's aging management plans. Aging plant management plans should include plans for guarding against the procurement of substandard or counterfeit parts and for detailed inspections of all new parts.

[9] Ibid, p. 57.
[10] Ibid. p. 58.
[11] NUREG-1437, 2009, p. 1-12.

In addition, as we enter an era of large numbers of aging and refurbished nuclear power plants, it is important that the NRC begin developing additional proactive methods for identifying age-related safety problems before they become significant. In NRC's license renewal application review, the DCPP should be evaluated in detail for aging issues and trends to identify preliminary or potential "anticipatory indicators" of safety problems related to plant aging. Trends could include steam generator tube cracking, vessel head corrosion, embrittlement, repeated unplanned reactor shutdowns, long-term problems, and/or repeated failures in safety-related equipment. These issues must be evaluated on a plant-specific basis rather than as part of the GEIS.

In the case of DCPP, which is located in a seismically active region, the combined effects of age-related degradation, including DCPP reactor pressure vessel embrittlement issues, and the risk and potential impacts of a major earthquake should be evaluated. For example, earthquakes are considered possible initiating events for the development of through-wall cracks that could challenge the integrity of a reactor pressure vessel. According to NUREG-1806, under NRC's old regulations for assessing the probability of a crack forming through the wall of a reactor pressure vessel, DCPP Unit 1 and nine other reactors would have exceeded the screening limit during a 20-year license extension.[12] If such a crack occurred, it could damage the reactor core and, in some cases, release radioactive materials into the environment.

The probability of crack formation relates directly to the extent of reactor pressure vessel embrittlement, which determines the ability of metals that make up the reactor pressure vessel to withstand stress without cracking. As such, these reactors would not have been eligible for license renewal unless they reduced the embrittlement rate or demonstrated that operating the reactor would not pose an undue public risk. Under NRC's new methodology, assessing the probability of a crack forming through the reactor pressure vessel wall results in a much lower calculated embrittlement for most reactors. Since DCPP Unit 1 has been identified as having significant reactor pressure vessel (RPV) embrittlement issues, the plant-specific DCPP EIS should examine the risk of a crack forming through the wall of an RPV at DCPP, explain the technical assumptions used in calculating RPV integrity, the frequency by which RPV integrity will be reevaluated over the remainder of the DCPP operating license (e.g., including the 20-year license extension period), and how new information from planned advanced seismic hazard studies for Diablo Canyon will be taken into consideration in these periodic reevaluations of RPV integrity.

[12] The NRC recently revised its regulations to provide licensees with a new alternative for assessing the probability of a crack forming through the wall of a reactor pressure vessel. The old regulations required licensees to demonstrate that reactor pressure vessel embrittlement would not exceed a screening limit corresponding to a one-in-200,000-year probability of through-wall crack formation. The NRC's recently adopted regulations expand this requirement to a one-in-a-million-year probability, while allowing for the use of a less conservative methodology for assessing the probability. Using the new methodology, reactor vessel pressure embrittlement is no longer expected to limit any U.S. reactor from obtaining a 20-year license renewal. (NUREG-1806, p. xxii and Appendix D.)

5. Emergency Response Planning

The NRC recently considered the need for a review of emergency planning issues in the context of license renewal and concluded that programs for emergency preparedness at nuclear plants apply to all licensees, that all operating licensees must keep up with changing demographics and other site-related factors,[13] and that there is, therefore, no need for a special review of emergency planning issues in the context of a plant-specific environmental review for license renewal.[14] However, the public has expressed considerable concern about the adequacy of evacuation plans and emergency preparedness plans at DCPP, particularly with regard to access to emergency routes in the event of an earthquake or terrorist attack. Although the NRC, state and local agencies, and utilities routinely conduct table-top exercises, people are concerned about the lack of real testing of these plans and whether such plans will work in an actual emergency. Some have expressed concern that the infrastructure and roadways are not adequate to evacuate communities in a timely manner. Another common concern is that evacuation routes might be blocked due to traffic congestion or damaged roads, for example, following a major earthquake.

Clearly the population potentially impacted by the release of radioactive materials following an accident or attack on a nuclear power plant and the viability of emergency preparedness plans vary from plant to plant. As such, the NRC should include an evaluation of emergency planning as a plant-specific issue and should evaluate it in the supplemental plant-specific evaluation for DCPP, including how an earthquake might impact plant worker and community evacuation timeliness and planning.

6. Plant Safety Culture

The NRC noted recently that the license renewal environmental review is confined to environmental matters relevant to the extended period of operation requested by the applicant and that safety and security matters are considered outside the scope of the license renewal review.[15] However, the license renewal review for DCPP should also include an evaluation of the plant's safety culture. It is not just the pieces of hardware that are important in predicting a plant's overall safety and performance – it is also the people who operate and maintain the plant. Assessing the safety culture of a plant at the time of license renewal is essential for predicting future plant performance and safety.

When plants malfunction or accidents occur, human error or a degrading safety culture at a plant is often to blame. As NRC Chairman Jaczko recently noted, NRC has "increasingly focused on safety culture in recent years for the simple reason that we have found that a deteriorating safety culture is often associated with safety problems. Sound rules and procedures are certainly necessary to further safety, but the NRC and

[13] NUREG-1437, 2009, p. 1-11.
[14] NUREG-1437, 2009, p. 1-12.
[15] NUREG-1437, 2009, p. A-95.

our licensees all need to continually work to cultivate the type of open, collaborative organizational culture that will best enable us to meet our safety and security goals."[16]

A plant-specific review of safety culture is essential to evaluating the safety of a plant operating an additional 20 years. Investigations of the Columbia Space Shuttle disaster (2003), the Davis-Besse incident (2002), and the Challenger Space Shuttle disaster (1986) disclosed major deficiencies in risk and safety assessments and management practices that developed over time. The "lessons learned" from investigative reports of these events identified additional factors that are important to consider during program reviews. These lessons seem highly relevant to our nation's aging nuclear power plants, given the current emphasis on increased plant efficiencies, production, and cost-cutting measures – sometimes at the expense of plant safety. NRC should incorporate these lessons learned, as appropriate, into its nuclear power plant license renewal programs and in its plant-specific license renewal review of DCPP.

In its Response to Comments in the GEIS,[17] the NRC staff noted improvements in the NRC's inspection and assessment procedures following the Davis-Besse reactor head degradation and enhancements to the NRC's Reactor Oversight Program to more fully address licensee safety culture. However, a plant's safety culture merits reexamination during license renewal reviews, similar to the need to reexamine thoroughly aging plant components and hardware during license renewal reviews. Therefore, an evaluation of DCPP's management and safety culture during the license renewal review and during plant inspections is necessary to obtain a complete and accurate assessment of the plant's overall predicted safety and performance during the 20-year license extension. An evaluation of the DCPP safety culture should be included in the NRC's and PG&E's assessments of the adequacy of the licensee's aging management plans and should be evaluated in the DCPP plant-specific supplemental environmental evaluation for license renewal.

7. Evaluation of Energy Alternatives

The 1996 GEIS' discussion and evaluation of energy alternatives to license renewal is deficient and out-of-date and should be updated. The alternatives considered in the GEIS included wind energy, photovoltaic (PV) cells, solar thermal energy, hydroelectricity, geothermal energy, incineration of wood waste and municipal solid waste (MSW), energy crops, coal, natural gas, oil, advanced light water reactors, and delayed retirement of existing non-nuclear plants. Similarly, the discussion of the uranium fuel cycle and waste management impacts including transportation, storage and disposal of nuclear waste is out-of-date and needs to be updated.

In addition, the types of replacement power available and the environmental impacts from alternative energy sources vary substantially from region to region. For example, a portion of the electricity generated by Diablo Canyon could be replaced by renewable resources located in central California and augmented by dispatchable gas-fired

[16] NRC News, "NRC Chairman Gregory B. Jaczko Remarks at Today's meeting on NRC Safety Culture Initiatives", March 30, 2010, No. 10-056, p. 1.
[17] NUREG-1437, 2009, Vol. 2, p. A-84 and A-85.

resources. The latter, capable of cycling up and down, unlike the DCPP, would facilitate the integration of the intermittent resources that are expected to contribute significantly to meeting California's renewable energy goals.

The NRC should require regional or site-specific lifecycle evaluations of nuclear power and alternative electricity sources, including wind, solar, biomass, geothermal, and energy efficiency. In some regions base load renewable resources or a combination of intermittent renewable resources and gas-fired generation or energy storage could replace large quantities of nuclear power. Evaluations of the environmental impacts of these power options during license renewal reviews should include "cradle-to-grave" or lifecycle environmental impacts. Therefore, the plant-specific EIS for DCPP should include an analysis of the environmental impacts of the alternatives for replacement power that are specific to the DCPP region.

8. Once-Through Cooling

The State Water Resources Control Board (SWRCB) released a draft policy in June 2009 and a final policy on March 23, 2010, on the use of the Pacific Ocean for power plant cooling.[18] The SWRCB found that DCPP and SONGS' cooling systems are responsible for a major portion of all Once Through Cooling (OTC)-related impingement mortality and entrainment losses along the California coast.[19] The proposed policy calls for coastal power plants to cut water intake by 93 percent to reduce the harmful impacts on marine life. Power plants are given several options: (1) to be retrofitted for closed-cycle wet cooling, dry cooling towers, or other cooling means, (2) to be repowered with a non-OTC technology, or (3) to be shut down. However, in recognition that previous studies have found that, for California's nuclear plants, these options would be very expensive and possibly infeasible from an engineering perspective, the two California nuclear plants are given special consideration in the proposed policy. Therefore, the proposed policy would allow these nuclear plants to be exempted from the on-site mitigation requirements if the utilities demonstrate that the costs of compliance are excessive. A new round of mitigation cost studies will be required to be completed within three years under the supervision of the SWRCB and an advisory committee. The nuclear plants could also be exempted if the utilities demonstrated that full compliance would result in a conflict with the NRC's safety requirements. In both circumstances, the SWRCB could impose less stringent on-site compliance requirements on the plants, but would then impose off-site compliance mitigation requirements. The draft policy requires that any gap between onsite requirements and the basic standard for OTC compliance "shall be fully mitigated." The deadline for DCPP compliance with these new OTC requirements is 2022.

---

[18] See [http://www.swrcb.ca.gov/water_issues/programs/npdes/cwa316.shtml].

[19] "Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling: Draft Substitute Environmental Document." State Water Resources Control Board and California Environmental Protection Agency, July 2009, page 47. http://www.swrcb.ca.gov/water_issues /programs/npdes/docs/cwa316/draft_sed.pdf ;State Water Resources Control Board (SWRCB), California Environmental Protection Agency. "Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling." SWRCB_1000_2008_001. March 2008, pages 13-16.

If the SWRCB's policy is approved (SWRCB meets May 4, 2010 to vote on the policy), the agency will direct PG&E and SCE to commission an independent study to assess the costs of alternative options for their facilities to meet the requirements of the SWRCB's policy. These studies and their consequences, in terms of compliance activities mandated by the SWRCB, should be coordinated with the studies required by NRC for license renewal.

9. Need for the NRC to Hold License Renewal Hearings near DCPP

NRC should provide an opportunity for the residents, plant workers, local officials, schools, and businesses located near DCPP to comment on the scope of the issues to be considered during the license renewal reviews. The NRC should conduct public meetings for the DCPP license renewal in the San Luis Obispo area both during the day and the evening to accommodate the work schedules of members of the public.

10. Public Comment Process

The NRC has stated that it will consider public comments that provide any information that is new and significant compared with that previously considered in the GEIS and will address these comments in the SEIS. The NRC should clearly explain what criteria are used to determine what is considered to be "new and significant information." In prior nuclear power plant license renewal proceedings, state representatives and members of the public have provided new and significant information related to seismic, emergency response, population demographics, the potential impacts particularly in largely populated areas from acts of sabotage or a terrorist attack, and other issues related to license renewal, and yet the NRC has found those issues to be non-admissible contentions. It is unclear why the NRC excludes from license renewal proceedings site-specific issues that clearly affect the safety and costs of the continued operation of a nuclear power plant.

Conclusions

California's two operating nuclear power plants provide about 14% of the state's total electricity generation and have operated approximately half of their 40-year initial license periods. PG&E has submitted a license renewal application to the NRC for Diablo Canyon and Southern California Edison Company is exploring the feasibility of seeking a 20-year license extension for SONGS. If granted, license renewals could keep Diablo Canyon and SONGS in operation until the mid-2040s. In past license renewal proceedings, the NRC has excluded an examination of seismic hazards, plant security, emergency preparedness, environmental review of spent fuel storage, and analysis of spent fuel storage options from the scope of NRC's license renewal review. The NRC's Office of Inspector General completed an audit of the license renewal process in September 2007 and concluded that NRC staff should improve their analyses and audits.[20] An important means for improving the NRC's license renewal process would be to revise the license renewal review to allow important site-specific

[20] *Audit Report: Audit of NRC's License Renewal Program,* Nuclear Regulatory Commission Office of Inspector General, OIG-07-A-15, September 6, 2007.

issues to be reexamined during this review rather than relying upon, as in the case of PG&E's license renewal review, an outdated GEIS (1996) that was published before the events of September 11, 2001, and before considerable new seismic research information has been developed. New and significant information has arisen since DCPP originally received its operating license and this information should be examined during its license renewal reviews.

The discovery, announced to the public in 2008, of a new Shoreline Fault near Diablo Canyon is an example of new and significant seismic information that should be reviewed during Diablo Canyon's license renewal review. The USGS and PG&E are conducting additional seismic research in the vicinity of Diablo Canyon, and the Energy Commission has recommended additional tsunami and seismic research at both Diablo Canyon and SONGS. The NRC and the USGS are beginning in January 2010 an independent assessment of Diablo Canyon's seismic research program. New and significant seismic research information resulting from these studies must be considered in Diablo Canyon's license renewal review. Seismic issues, particularly when new and significant seismic research information is available, should be considered plant-specific issues to be examined during license renewal review.

Plant safety culture has been an ongoing concern at plants throughout the U.S. and should receive as much scrutiny and attention during the NRC's license renewal review and plant-specific environmental impact assessment as attention is paid to the aging plant components, hardware, systems and materials. Plant management and plant workers' attitudes and strict adherence to proper maintenance and safety procedures are extremely important, particularly in aging reactors, as plant components and systems show signs of aging and stress.

We recommend that the NRC include seismic; emergency response planning; safety culture; evaluation of energy alternatives; once-through cooling; security issues; as well as at-reactor nuclear waste accumulation, transport, and disposal impacts among the plant-specific environmental impacts that will be addressed in NRC's and PG&E's analyses for DCPP license renewal. We also strongly urge the NRC to hold license renewal hearings in the vicinity of DCPP in the San Luis Obispo area.