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The Decommissioning Process: Life After SONGS

This is the second in a series of informational hearings regarding the closure of the San Onofre Nuclear Generation Station (SONGS). In June, this committee held its first hearing on the subject that covered grid stability and reliability issues as a consequence of the closure. This hearing will focus on the decommissioning process itself, which concerns the removal and decontamination of radioactive materials from the site, the long-term storage of nuclear waste, and the removal of buildings and facilities at the site. Nuclear power plant decommissioning is not a new subject to California. For a brief status of other closed reactors in California, see Attachment A, included with this document. Attachment A also covers a brief discussion of California's remaining operational nuclear power plant at Diablo Canyon.

The San Onofre Nuclear Generation Station (SONGS) is located south of San Clemente, within the Camp Pendleton military reserve and is owned by Southern California Edison (SCE – 78.2%), San Diego Gas & Electric (SDG&E – 20%), and City of Riverside Utilities Department (1.8%). SONGS consists of three nuclear powered electric generator units. Unit 1 was commissioned in 1968, but as the reactor aged it became less efficient and eventually was no longer cost-effective leading to its decommissioning in 1992. The reactor was dismantled as part of the decommissioning process and the waste fuel is stored on site. Units 2 and 3 started operation in 1983 and 1984, respectively, and both have been offline since January 2012. Units 2 and 3 together provided approximately 2,200 megawatts (MW) of power capacity.

Steam generators for SONGS Unit 2 were replaced in 2009 and those for Unit 3 in 2010. The generators were manufactured by Mitsubishi Heavy Industries and each contains over 9,000 tubes intended to carry high pressure, high velocity steam. During a scheduled refueling outage in January 2012, inspections revealed excessive wear on the Unit 2 steam tubes. On January 31, tubes in the Unit 3 steam generator failed and vented a small amount of radioactive steam within the containment dome. A small amount of material was released to the atmosphere during venting procedures.[1] Subsequent inspections showed that the Unit 3 steam generator also had significant tube wear similar to Unit 2. Units 2 and 3 have both been offline while SCE and the U.S. Nuclear Regulatory Commission (NRC) investigated the cause of the excessive wear and developed a plan for restarting the plant. Investigations by SCE determined that the cause of the tube wear was an unanticipated level of vibration between the tubes and the support structures, and between the tubes themselves.

[1] The amount of radiation released was reported to be approximately 0.0000452 mrem to a member of the public. The annual regulatory limit is 100 mrem per year. See SONGS inspection report NRC ADAMS #ML12188A748.

On June 7, 2013 the plant owners announced plans to permanently shut down and decommission the power plant. In a press release, SCE cited uncertainty relating to the plant restart as a reason for the decision and subsequently filed a Certification of Permanent Cessation of Power Operations with the NRC. This notice verifies the operator's intent to permanently close the facility and that it is currently not producing power. Accompanying the plant closure will be a series of employee layoffs, which has already begun with the elimination of 600 non-union jobs. There are 1,500 people employed at SONGS, and this workforce will be reduced to 400 by next year, leaving 1,100 people out of work.

The Decommissioning Process

The NRC Process

Nuclear power plants that no longer produce power still pose a risk to the public, because radioactive material is stored on-site. As such, they undergo an extensive process of decommissioning intended to remove radioactive materials, deconstruct the reactors, and potentially remove the facilities from the site. The NRC regulates the licenses for nuclear materials in the U.S. and oversees the process of decommissioning from a nuclear safety perspective. The NRC process is focused on the disposal and/or containment of radioactive materials and is completed with the license termination and a release of the property for unrestricted use. NRC regulations do not permit the release of property until the radiation that is distinguishable from background radiation is 25 millirems (mrem) or lower per year[2]. Background radiation from air and food sources make up about 240 mrem of yearly exposure.[3]

Reactor decommissioning is required by the NRC to be completed within 60 years of cessation of operation. Up to 50 years of this time can be spent in a state called SAFSTOR where the plant is placed in a stable condition and maintained until it is subsequently decontaminated to the NRC standard of safety. After some initial period of SAFSTOR, the plant enters DECON, which is an active decommissioning process that removes equipment and structures. Contaminated equipment and structures are sorted into low- and high-level radioactive waste (see below), and disposed of or stored on-site at the facility. A final option for nuclear power plants is known as ENTOMB where the plant is encased in a structurally long-lived substance to allow the radioactivity to decay until levels permit unrestricted release. The NRC reports that no U.S. plant has been placed in the ENTOMB status.

The NRC is responsible for monitoring nuclear safety during the decommissioning process of nuclear facilities, which is implemented in several stages. Initially the operator of the facility, known as the licensee by the NRC, submits a letter to NRC indicating that it will cease operations. SCE submitted the Certification of Permanent Cessation of Power Operations to NRC on June 12, 2013. This action begins a two-year clock for the licensee to develop a post-shutdown plan for decommissioning. Once the licensee notifies the NRC of shutdown and de-fuels the reactors, the NRC modifies the license from an "operation" status to a "possession" status, meaning the licensee is no longer authorized to operate a nuclear reactor at the site.

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[2] 10 CFR 20.1402

[3] http://www.epa.gov/radiation/understand/calculate.html

The licensee prepares and submits to the NRC a Post-Shutdown Decommissioning Activities Report (PSDAR) within two years of the initial shutdown. SCE is required to submit the PSDAR for SONGS by June 2015. The PSDAR describes the licensee's plan to remove low-level waste, manage spent fuel, and dismantle the nuclear reactor. The PSDAR also includes an estimate of decommissioning costs, and an assessment of the environmental impact of the decommissioning activities. The PSDAR is reviewed by the NRC, but authorization is not required to begin the outlined work. The NRC monitors the activities to ensure they are conducted safely and independently monitors radiation levels at the site.

The NRC does not regulate the activities except to ensure safety procedures are followed and to monitor radiation levels. The plant operators may decide, either at the direction of a state entity or upon agreement with owners of the land, to dismantle facilities. This may be a minimal deconstruction project or a complete "green-fielding". The NRC reports that some facilities across the US have been "green-fielded", meaning the buildings have all been removed and the landscape returned to its natural state. This process only leaves behind the on-site high-level waste storage site (Independent Spent Fuel Storage Installation – ISFSI). This level of landscape and habitat restoration is at the discretion of the licensee and/or state agencies.

Finally, the licensee issues a License Termination Plan (LTP) with the NRC two years before license termination outlining remaining decommissioning activities and modifying the license footprint to the ISFSI site for long term storage of spent fuel. The LTP is subject to NRC approval, unlike the PSDAR. After the license is terminated the NRC may release the property for unrestricted use, meaning it may be used for any purpose. The property will not be released unless radiation levels are below the 25 mrem per year predefined standard.

Jurisdiction of State Agencies

No local or state agency has jurisdiction over the physical decommissioning of the SONGS plant. The NRC's jurisdiction is limited the radioactive contamination of the site. The agency does not direct the use or reuse of the site except as it relates to the management of waste and remaining radioactivity. If the site is dismantled, construction and demolition of facilities and buildings and the transportation of radioactive waste would require permits from the California Coastal Commission (CCC). The California Energy Commission (CEC) is responsible for siting power plants within the state of California. However, in the case of nuclear power, their jurisdiction is deferred to the NRC. However, the California Public Utilities Commission (CPUC) would have fiscal oversight of utility funds and could exert jurisdiction concerning the use of the site in this manner.

In one instance the Legislature did intercede in the clean-up responsibility for the Santa Susana Field Laboratory which was established after World War II by the United States government to develop and test nuclear reactors and engines for missiles, spacecraft and rockets. Site clean-up was piece meal and in 2008 the Department of Toxic Substances Control was authorized to compel a responsible party or parties to take or pay for appropriate removal or remediation action. For more information, see Attachment A.

It may behoove the state to have a single agency oversee those activities that do not require federal oversight from the NRC. These may include dismantling facilities, including transmission facilities, monitoring groundwater contamination, transportation of low-level

nuclear waste off-site, security of long-term nuclear waste storage, and transition plans for SONGS employees. The state and SCE might also consider establishing a community advisory board, so that local residents may have input on the decommissioning process. This board would enhance communication between SCE, SDG&E, and Riverside Utilities and the various impacted communities.

US Marine Corps

The SONGS facility is located at Camp Pendleton, which is owned by the US Marine Corps. In 1963, Congress directed the Secretary of the Navy to grant an easement to SCE and SDG&E for the purpose of constructing a nuclear power facility. Since then, SONGS real estate rights are vested in nine easements issued by the Department of the Navy and two leases totaling 438 acres. Current real estate grants authorize the presence of SONGS until approximately 2024.[4]

SCE reports that current easements granted by USMC require that all buildings be removed from the site during decommissioning. This may include the transmission facilities at the power plant. If so, it could have a significant impact on grid reliability. SONGS is a connection point between the SCE and SDG&E territories, and the removal of the infrastructure there would limit the capability to move electricity through the region.

Costs of Decommissioning

Nuclear power plant owners are required by the NRC to collect funds for decommissioning while the plant is operating. According to SCE, the cost to decommission San Onofre Units 2 and 3 is estimated to be $4.1 billion and $3.6 billion has been collected to date from ratepayers of the three utility owners.[5] SCE plans to submit an updated decommissioning estimate to the utilities commission this summer to reflect the plant's permanent shutdown.

The CPUC also reviewed plant decommissioning costs and required SCE and SDG&E to place collected funds in dedicated trusts. Mellon Bank N.A. acts as the trustee for SDG&E, PG&E, and SCE Decommissioning Trusts by providing custody, record keeping, accounting, taxation, and reporting services on behalf of the trusts.

What isn't clear is what costs and schedule estimates were included when the collections were planned and authorized. The use of the physical site can vary significantly and therefore significantly affect the costs. The NRC requires that funds are sufficient for the activities related to the radioactive decontamination of the plant which may include dismantling. Are the funds sufficient for dismantling all plant infrastructure and the safe storage of the plant for decades to come?

In previous plant decommissioning programs, cost estimates increased over time. For example, in 1991, cost estimates of the Rancho Seco decommissioning were $281 million. Subsequent estimates increased, and in 2009 costs were estimated to be $503.9 million. A portion of the total Rancho Seco cost is due to activities that are not considered

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[4] *Integrated Natural Resources Management Plan [March 2012 - Update]*, Marine Corps Base Camp Pendleton

[5] http://www.songscommunity.com/decommissioning.asp

"decommissioning activities" by the NRC, including non-radiological dismantlement and spent fuel storage. Costs of these activities add up to $132.5 million and are dominated by spent fuel storage at the Rancho Seco ISFSI.[6] Similarly, the Humboldt Bay costs of decommissioning were initially estimated at $114.8 million in 1986, but had escalated to $494.3 million by 2006.[7] While both of these estimates are smaller than the estimated amount for SONGS decommissioning, it is important to note that SONGS had significantly more power generation capacity than either Humboldt Bay or Rancho Seco.

Nuclear Waste Management

Low-level Waste

Low-level waste includes items that have become contaminated with radioactive material or have become radioactive through exposure to neutron radiation. This waste typically consists of contaminated protective shoe covers and clothing, wiping rags, mops, filters, reactor water treatment residues, equipment and tools, luminous dials, medical tubes, swabs, injection needles, syringes, and laboratory animal carcasses and tissues. The radioactivity can range from just above background levels found in nature to very highly radioactive in certain cases such as parts from inside the reactor vessel in a nuclear power plant. Low-level waste is typically stored on-site by licensees, either until it has decayed away and can be disposed of as ordinary trash, or until amounts are large enough for shipment to a low-level waste disposal site in containers approved by the Department of Transportation.[8]

Low-level waste disposal occurs at commercially operated low-level waste disposal facilities that must be licensed to handle radioactive waste. The facilities must be designed, constructed, and operated to meet safety standards. The operator of the facility must also extensively characterize the site on which the facility is located and analyze how the facility will perform for thousands of years into the future. The Low-level Radioactive Waste Policy Amendments Act of 1985 gave the states responsibility for the disposal of their low-level radioactive waste. The Act encouraged the states to enter into compacts that would allow them to dispose of waste at a common disposal facility, which most states have done.[9] The NRC lists four disposal sites within the United States that are licensed to accept low-level radioactive. Facilities are located in Washington, Utah, Texas, and South Carolina.

High-level Waste

High-level radioactive wastes are the highly radioactive materials produced as a byproduct of the reactions that occur inside nuclear reactors. High-level wastes take one of two forms:

- Spent (*used*) reactor fuel when it is accepted for disposal; and
- Waste materials remaining after spent fuel is reprocessed.

Spent nuclear fuel is used fuel from a reactor that is no longer efficient in creating electricity, because its fission process has slowed. However, it is still thermally hot, highly radioactive, and

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[6] *Rancho Seco Report on Decommissioning Funding Status*, 2010, NRC, DPG-10-074

[7] *Decommissioning Funding Report for Humboldt Bay Power Plant Unit 3*, 2006, NRC, HBL-06-005

[8] http://www.nrc.gov/waste/low-level-waste.html

[9] http://www.nrc.gov/waste/llw-disposal.html

potentially harmful. Until a permanent national disposal repository for spent nuclear fuel is built, licensees must safely store this fuel at their reactors. Reprocessing extracts isotopes from spent fuel that can be used again as reactor fuel. Commercial reprocessing is currently not practiced in the United States, although it has been allowed in the past.

Because of their highly radioactive fission products, high-level waste and spent fuel must be handled and stored with care. Since the only way radioactive waste finally becomes harmless is through decay, which for high-level wastes can take hundreds of thousands of years, the wastes must be stored and finally disposed of in a way that provides adequate protection of the public for a very long time.

Nuclear waste is currently stored in a water pool before being transferred to dry casks, stored on-site. The water pool storage is necessary to cool the rods, which are both radioactively and thermally hot when they are removed from the reactor. The duration of storage in the pool depends on the initial temperature of the rods, and the cooling rate. It is often cited that this takes approximately five years. Moving spent fuel to dry casks reduces the strain on the pool storage, and allows the fuel to be dispersed more within the pool. The spent fuel continues to be air cooled when it is placed in dry casks. Dry cask storage is considered to have various advantages over pool storage including:

- Lower density of spent fuel rods compared to pool storage;
- Higher resilience to natural disasters; and
- In the case of an incident less radioactive matter is likely to be released.

The NRC has held a position that storage of nuclear waste on-site in both pool and dry casks is safe. In 2007, the NRC published a pilot risk assessment study on dry cask storage.[10] For the case study using a specific cask at a specific site, they estimated that cancer risks to the public were on the order of 10^{-14} per year. A separate review report from the American Physical Society (APS) found that there are no technical barriers to the safe and secure interim storage of spent fuel.[11] At SONGS, there are currently 2,776 fuel assemblies in spent fuel pools and about 800 fuel assemblies in dry cask storage. An additional 400 used fuel assemblies from the previously retired Unit 1 reactor are also stored in dry casks on-site.[12]

Role of the Federal Government

The federal government is responsible for the permanent storage and/or disposal of nuclear waste under the Nuclear Waste Policy Act of 1982, and was initially responsible to begin taking ownership of nuclear waste from nuclear generation stations in 1998. The Yucca Mountain site in Nevada was selected for the national repository of nuclear waste, but Congress defunded the project in 2010. Plant owners contribute to the Nuclear Waste Fund, which will eventually pay for the transition of nuclear waste to the federal government.

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[10] Bjorkman et al., *A Pilot Probabilistic Risk Assessment of a Dry Cask Storage System at a Nuclear Power Plant*, 2007, NRC, NUREG-1864

[11] *Consolidated Interim Storage of Commercial Spent Nuclear Fuel,* 2007, Panel on Public Affairs, APS Physics

[12] http://www.songscommunity.com/decommissioning.asp

President Obama and former Department of Energy Secretary Chu formed a Blue Ribbon Commission on America's Nuclear Future to examine the issue of nuclear power and, specifically, nuclear waste in the US. The commission issued its final report in January 2012 and included recommended actions for the administration.[13] A response to the Blue Ribbon Commission was prepared by the Department of Energy and issued in January 2013.[14] The DOE has constructed a plan of action for the next 10 years:

- Site, design and license, construct and begin operation of an interim storage facility by 2021 to accept waste from decommissioned reactors;
- Advance toward an additional interim storage facility to be operational by 2025; and
- Make demonstrable progress on characterizing sites for the availability of a geologic repository by 2048.

Senator Dianne Feinstein has begun developing federal legislation that would implement major recommendations from the Blue Ribbon Commission, including establishing a new federal agency to manage the nuclear waste program in place of the Department of Energy. The proposed legislation would also create a consent-based process for siting consolidated storage facilities and a long-term waste repository.[15]

Seismic Safety

Assembly Bill 1632 (Blakeslee, Statutes of 2006, Chapter 722) directed the CEC to assess the vulnerability of the state's operating nuclear power plants to a major seismic event and plant aging, potential impacts of disruption, impacts of the accumulation of nuclear waste, and other policy issues. The AB 1632 report was a one-time assessment of these issues and was completed in 2008. In the report, the CEC recommended that both PG&E and SCE conduct 3-dimensional seismic studies and tsunami hazard studies.

Earlier this year SCE initiated studies of the south coast to determine seismic vulnerability of SONGS. Scripps Institution of Oceanography is studying the Newport-Inglewood/Rose Canyon fault system as well as the Oceanside Blind Thrust fault. Even though the reactors at SONGS have now been de-fueled, seismic safety is still a concern. While the cooling pools were built to withstand earthquakes, the possibility still remains that a particularly large seismic event could damage the SONGS facility. However, the studies previously deemed necessary assumed a plant in full operation. Seismic safety issues for strictly stored waste are likely to require reconsideration.

Fukushima Daiichi

In March 2011, an earthquake caused a tsunami that hit the hit much of the Japanese coast, including the Fukushima Daiichi nuclear power plant (owned by Tokyo Electric Power Company – Tepco). The natural disaster caused water pumps to shut down; subsequently reactors at the plant overheated and caused various fires and explosions. In the days after the

[13] Accessible at: http://cybercemetery.unt.edu/archive/brc/20120620211605/http:/brc.gov//
[14] *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste*, 2013, DOE
[15] http://www.feinstein.senate.gov/public/index.cfm/press-releases?ID=e0715135-3434-4580-941f-5a1e7cff57c6

incident inspections found that the pools for waste storage saw an increase in temperature, while dry cask facilities showed no signs of damage.[16]

The ongoing containment and clean-up process at Fukushima has been a focus of attention, particularly because of the similar seismic hazards along the California coast. Most recently, it has been reported that the plant has contaminated groundwater, which is leaking out to the Pacific Ocean. High levels of radioactivity are currently measured only within the man-made harbor around the power plant. However, Tepco has not yet identified the source of the contamination.[17]

Acronyms and Abbreviations

CCC – California Coastal Commission
CEC – California Energy Commission
CPUC – California Public Utilities Commission
DCPP – Diablo Canyon Power Plant
DECON – Decommissioning process removing and/or decontaminating equipment and structures
DTSC – Department of Toxic Substance Control
ENTOMB – Plant is encased in a containment structure to allow radioactive decay
ISFSI – Independent Spent Fuel Storage Installation
NRC – U.S. Nuclear Regulatory Commission
PG&E – Pacific Gas & Electric
PSDAR – Post-Shutdown Decommissioning Activities Report
SAFSTOR – Plant status maintained in a stable condition until it is subsequently decontaminated
SCE – Southern California Edison
SONGS – San Onofre Nuclear Generation Station
Tepco – Tokyo Electric Power Company
USMC – U.S. Marine Corps

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[16] http://www.iaea.org/newscenter/news/2011/fukushima190311.html
[17] http://www.nytimes.com/2013/08/07/world/asia/leaks-into-pacific-persist-at-japan-nuclear-plant.html?ref=asia

Attachment A: Other Reactors in California

The **Santa Susana Sodium Reactor Experimental** was a small sodium-cooled experimental reactor built by Southern California Edison and Atomics International at the Santa Susana Field Laboratory, near Moorpark in Ventura County. It came on line in April 1957, began feeding electricity to the grid on July 12, 1957, and closed February 1964. This reactor used sodium rather than water as a coolant and produced a maximum of about 7.5 to 20 megawatts (electric). It was considered as the country's first civilian nuclear plant and the first "commercial" nuclear power plant to provide electricity to the public by powering the near-by city of Moorpark in 1957. On July 26, 1959, the SRE suffered a partial core meltdown. Ten of 43 fuel assemblies were damaged due to lack of heat transfer and radioactive contamination was released.

The Santa Susana Field Laboratory served as a test facility for rockets, missiles, ammunition, and nuclear power. While clean-up of various chemical and radioactive materials on the site progressed for years under various state and federal agencies, Senate Bill 990 (Kuehl, 2008) authorized the Department of Toxic Substance Control (DTSC) as the primary agency to oversee clean-up of the site. The DTSC reports that seven of 12 buildings have been demolished[18], and NASA (a part owner of the site) reports that it plans to remove 500,000 cubic yards of contaminated soil from the site[19]. Recently, consumer groups and environmental activists have filed a lawsuit against the DTSC claiming the state allowed low-level radioactive waste to be illegally disposed of in landfills instead of licensed waste disposal sites. The lawsuit was filed August 5, 2013.

The **Vallecitos Nuclear Power Plant** near Pleasanton, Calif., was jointly built by PG&E and General Electric Company and operated from 1957 to 1967. This was a small, 30 megawatt power plant. On October 19, 1957, Vallecitos connected to the electrical grid and became the first privately funded plant to supply power in megawatt amounts to the electric utility grid. The plant was shut down in December 1967. The plant is in SAFSTOR, and there are no plans for any significant dismantlement in the foreseeable future. All nuclear fuel has been removed from the site.

The 63 MW Boiling Water Reactor at the **Humboldt Bay Nuclear Power Plant** in Eureka was in operation by PG&E from August 1963 to July 1976. It was closed because the economics of a required seismic retrofit could not be justified following a moderate earthquake from a previously unknown fault just off the coast. It was permanently shut down July 2, 1976, and retired in 1985. The plant was then placed in SAFSTOR (with spent nuclear fuel rods stored in water pools on site) until anticipated full decommissioning in 2015. In December 2003, PG&E formally submitted a license application to the NRC for approval of a dry-cask Independent Spent Fuel Storage Installation (ISFSI) at the Humboldt Bay site. A license and a safety evaluation for the Humboldt Bay ISFSI were issued on November 17, 2005. The transfer of spent fuel from the fuel storage pool to the ISFSI was completed in December 2008, and limited decontamination and dismantlement of Humboldt Bay Unit 3 decommissioning commenced.[20]

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[18] http://www.dtsc.ca.gov/SiteCleanup/Santa_Susana_Field_Lab/upload/SantaSusanaStatement080613.pdf

[19] http://www.dtsc.ca.gov/SiteCleanup/Santa_Susana_Field_Lab/upload/SSFL_D-EIS.pdf

[20] http://www.nrc.gov/info-finder/decommissioning/power-reactor/humboldt-bay-nuclear-power-plant-unit-3.html

As part of the decommissioning process, a Community Advisory Board was formed in 1998 to act as an advisory panel and watchdog. The board was formed of experts and lay people from the community including residents, activists, and academics. The board has since engaged in dialog with both PG&E and the community at large over clean-up concerns.

Rancho Seco nuclear power plant, owned by Sacramento Municipal Utilities District (SMUD), initially went critical on September 16, 1974, and began commercial operation on April 18, 1975. Incremental decommissioning of the power plant began in early 1997 after being shut down by public referendum in 1989 and placed in SAFSTOR in 1995. Incremental decommissioning involved performing some decommissioning activities earlier than 2008, as described in the originally approved Decommissioning Plan. However, based upon the lack of suitable waste disposal options, SMUD elected to store Class B and C radioactive waste in an interim onsite storage building until a suitable disposal facility becomes available. SMUD was granted a license for an on-site ISFSI in 2000 and subsequently transferred all spent fuel from pool storage to dry cask storage. The SMUD license termination plan was approved in 2007, and most of the site was released for unrestricted use in 2009.

The **Diablo Canyon Power Plant** (DCPP) is owned and operated by PG&E and is located on California's central coast near San Luis Obispo. The plant has two nuclear reactor units. Unit 1 was commissioned in 1985 and has a license expiration date of 2024. Unit 2 was commissioned in 1986 and has a license expiration date of 2025. The two units have power capacities of 1,122 MW and 1,118 MW, respectively.

PG&E applied for a license renewal from NRC to extend the operating life of the plant beyond its current 2024 and 2025 expiration. In proceedings before the CPUC[21], PG&E estimated the cost of the license renewal process to be $85 million and submitted a further license renewal feasibility study. In the study, PG&E performed an aging analysis and assessed the costs of seismic studies and ongoing operations and maintenance of the Diablo Canyon facility through the life of the proposed license renewal. PG&E further assessed costs of alternative replacement power and by comparison deemed Diablo Canyon to be a cost-effective investment.

At the direction of the CPUC, PG&E suspended the license renewal process in order to complete a seismic study of the Diablo Canyon region. This study was prompted by the CEC's AB 1632 report and is not a requirement of the NRC license renewal process. PG&E has collected a wealth of seismic data from on-shore and off-shore studies. In order to detect deep fault lines, PG&E proposed to use high-intensity sound blasts off-shore that would penetrate several miles of earth. This proposal was rejected by the California Coastal Commission, who cited concerns over the impact of such high-intensity sound on local marine wildlife. As a result, PG&E is using data collected from less impactful studies in order to analyze the fault network of the region.

On June 26, 2013, maintenance workers noticed a small leak while working within the containment dome. The leak was located on the weld between two pipes, and leaked 3 drops of boric acid water per minute. The plant was powered down in order to fix the leak, which took a week to complete. The power plant was restarted and reached full power on the morning of July 4, 2013.

[21] CPUC A1001022