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US Nuclear Regulatory Commission
Washington DC 20555-0001

1/27/2010
75 FR 4427
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Dear Sirs:

The Santa Lucia Chapter of the Sierra Club submits these comments on the NRC's scoping of the Environmental Impact Statement for the renewal of the Diablo Canyon Nuclear Power Plant's operating licenses.

We have attached two documents:

- 1) Excerpts from the 2000 report "Licensed to Kill," prepared by the Nuclear Information Resource Service, Humane Society of the United States, Safe Energy Communication Council, and Standing for Truth About Radiation
- 2) An excerpt from the December 14, 2006, California Coastal Commission staff report on the appeal of a Coastal Development Permit issued to PG&E for the replacement of Diablo Canyon's steam generators.

Both documents detail the nature and history of environmental impacts of the power plant's cooling system. This history stands in marked contrast to the assertions contained in the Environmental Report submitted by PG&E with its license renewal application.

In particular we draw to your attention the documented history in "Licensed to Kill" of attempted suppression of evidence of the cooling system's environmental impacts **and** the assessment of fines against PG&E by the State of California for withholding that evidence. The attempt to minimize and mischaracterize the environmental impacts of the plant continues in PG&E's submitted Environmental Report, which reflects the arguments made by PG&E when attempting to refute the conclusions of the 1997 study overseen by the technical

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workgroup of the Central Coast Regional Water Quality Control Board. When the Water Board reviewed a report submitted by PG&E that attempted to refute the findings of the technical workgroup and support a finding of less severe, limited impacts, the Board rejected those arguments, reaffirming the findings of independent scientists that the impacts of the plant's cooling system on the marine environment are significantly greater than PG&E maintained. Despite this, PG&E continues to make the same arguments today.

In light of this history, we strongly urge the NRC to discard the reporting of PG&E and researchers in its employ in its self-assessment of the nature and extent of the plant cooling system's impacts. Instead, we urge the NRC to accept the independent evaluations of the Central Coast Regional Water Quality Control Board, the California Department of Fish and Game, and the California Coastal Commission, described herein, as the appropriate authorities on which to base an assessment of the impacts on the marine environment that would result from the relicensing of the Diablo Canyon Nuclear Power Plant and an appropriate mitigations for those impacts.

Additionally, the scope of your review should include the results of all seismic studies required by the state of California. Thank you for your attention to these issues.

Sincerely,

A handwritten signature in cursive script, appearing to read "Melody DeMeritt". The signature is written in dark ink and is positioned above the typed name.

Melody DeMeritt
Chapter Chair



Licensed TO KILL

How the nuclear power industry
destroys endangered marine wildlife and ocean habitat to save money



By: Linda Gunter, SECC and Paul Gunter, NIRS • Scott Cullen, STAR and Nancy Burton, Esq.

(entrained) into the plant's cooling canals through an intake canal or tunnel. Larger species, such as sea turtles and seals, have drowned or suffocated during entrainment. Others become impinged against trash rakes or net. Fish larvae, spawn, and fingerlings (young fish), are destroyed by their passage through the plant systems and, when discharged at the end of the cooling process, are described by the industry as "debris."

Endangered sea turtles, creatures that have lived in our oceans for 200 million years, are rapidly dwindling in numbers. Among the common victims at U.S. nuclear power plants are the Kemp's ridley sea turtle (the most severely endangered sea turtle species in the world), the loggerhead sea turtle, and the green sea turtle. Additionally, the endangered West Indian manatee and American crocodile, seals and sea lions, several species of large fish, and a variety of sea birds, some endangered or at risk, have also been found captured or dead in the circulating water systems at atomic reactors.

The coolant system discharge structure used by these same reactors presents additional hazards by expelling water warmed to a higher temperature than the water into which it flows. Recent research findings suggest that even small elevations in temperature over long periods can alter the abundance of many species of marine life.⁸ Consequently, indigenous species around reactor discharge systems are displaced and replaced by others unnatural to that environment. The warmer waters also attract sea turtles, fish, crabs, sea birds, and other organisms. Periodically, reactors are shut down, the flow of warm water stops, and the temperature of the waterway into which it flows abruptly drops. This can result in cold-stunning of the species occupying the waters. Warmer waters may also present other hazards. Studies have shown decreased reproduction and increased mortality in seabirds coinciding with warmer water.⁹

The degradation of the marine environment as a result of this technology could have serious, and potentially irreversible, repercussions if operation of once-through nuclear reactors is allowed to continue unchecked.

The degradation of the marine environment as a result of this technology could have serious, and potentially irreversible, repercussions if operation of once-through nuclear reactors is allowed to continue unchecked. Marine ecosystems are home to many kinds of living things that occur nowhere else. Marine species provide a livelihood for millions of people and food, medicines, raw materials, and recreation for billions worldwide; they are intrinsically important.¹⁰ The nuclear industry argues that its negative effects, if any, are localized and temporary, and therefore have no long-term or widespread impact on species. This view is vehemently contradicted by the California Department of Fish and Game:

The science of ecology has now generally recognized that the destruction or disturbance of vital life cycles or of the balance of a species of wildlife, even though initiated in one part of the world, may have a profound effect upon the health and welfare of people in distant parts; like pollution it does not cease to be of vital concern merely because the problem is created at a distant point.¹¹

Clearly, the depletion of these resources by nuclear power and other factors will ultimately harm not only the creatures themselves but the ability of humans to prosper and survive.

An additional hazard results from the cleaning methods used by once-through reactors. When the water intake and discharge pipes become restricted with marine organisms such as mollusks, impeding the plant's efficiency, they are cleansed to eliminate what the industry calls "biofouling." A chemical concentration—usually chlorine or other biocides—is flushed through the system to kill or flush out these impediments. This operation can have grave consequences for the survival of wildlife essential in the food web. For example, chlorines have been found to disrupt the endocrine system of marine animals, affecting reproductive capacity.

¹¹ California Department of Fish and Game, Legal Department, "In the Matter of WDR Order 90-09 Diablo Canyon Nuclear Power Plant," Memorandum to Regional Water Quality Control Board, February 29, 2000, p. 8.

The Magnuson Act established eight regional fisheries management councils that were charged with developing Fishery Management Plans for fisheries under their jurisdiction. For example, in New England, each state has its own set of fisheries regulations restricting gear, fishing areas, season, and licenses. Federal fisheries permit holders fishing in state waters must comply with federal fisheries regulations, unless state regulations are more restrictive or unless specifically exempted.⁵ Furthermore, fisheries management experts close areas of fishing grounds or prohibit fishing during certain seasons to reduce fishing activity and protect a specific spawning nursery area or a spawning season.⁶

Indeed, two very different regulatory regimes control the environmental impacts of commercial fisheries and the nuclear power industry.

In general, the commercial fishing industry is highly regulated as to the manner of catch, quantity, and frequency. Conversely, the nuclear power industry is required to take very few precautions to avoid impacts on fish stocks and the larvae of numerous near-shore species. Indeed, two very different regulatory regimes control the environmental impacts of commercial fisheries and the nuclear power industry. In theory, nuclear power plants are required to use water intake systems that "reflect the best technology available for minimizing adverse environmental impacts," according to the Clean Water Act (CWA). Yet, in the absence of all-inclusive federal regulations, not a single state has put limits on the number of fish that power plants are allowed to kill.

As the following case studies illustrate, the operation of once-through nuclear reactors has resulted in much larger impacts on fish stocks than anticipated. Fish species and the marine habitat remain inadequately protected by a flawed regulatory system. Efforts to enforce the CWA Section 316(b) requirement, mandating the use of the best technology available to minimize adverse environmental impacts of intake structures, have failed. This is due largely to the fact that utilities not only have embarked upon experimental projects with questionable and suspect environmental benefits but are also attempting to get this option generally accepted instead of installing technology that reduces damage to the marine environment. The regulatory system empowers utility owners with the responsibility for environmental monitoring, and agency review is based upon data submitted and potentially manipulated by the utility. The bias that can result when the "fox watches the hen house" creates the potential for misrepresentation of the facts. In fact, utilities have been eager to take advantage of these loopholes.

Showdown at Diablo Cove — A Utility Gets into Hot Water

A Cease and Desist Order Stirs Controversy

A recent, high-profile confrontation over the destruction and alteration of the marine environment by thermal discharge pollution is exemplified by events at Pacific Gas and Electric's (PG&E's) Diablo Canyon Power Plant near San Luis Obispo, CA. The two-unit nuclear power station, first fully operational in 1986, draws in and directly discharges 2.5 billion gallons of heated water a day into the rocky intertidal zone of Diablo Cove on the Pacific Ocean.

The controversy stems from allegations by the California Water Quality Control Board (WQCB), the California Department of Fish and Game (DFG), and a host of environmental groups who allege that PG&E has been violating its National Pollution Discharge Elimination System (NPDES) permits to the detriment of ocean aquatic life. In February and March 2000, the fish and game department and water board drafted a cease and desist order for Diablo's discharges into the ocean cove.

A memo from the fish and game department stated:

Overall, the effects of the discharge include loss and degradation of habitat, decreases in several species' diversity and density, and loss of entire species. It has been shown that the effects continue to expand beyond Diablo Cove and are greater than predicted. The discharge does not provide for the protection of propagation of species and does not provide habitat suitable for indigenous species.⁷

The proposed cease and desist order cites that 97 percent of the cove's surface kelp forest (Bull Kelp) has literally been clear cut from its former habitat, with more kelp forests potentially affected beyond the cove.⁸ As a result, the intertidal communities of Diablo Cove are now devoid of historically abundant quantities of perennial algae cover. Surfgrass, once the predominant plant thriving in continuous bands throughout the cove, survives only in isolated locations.

The Decline of the Abalone

Water temperatures in north Diablo Cove now prevent the successful developmental growth of black abalone and red abalone, both indigenous coastal water mollusk species. PG&E had first predicted that black abalone would not be at risk from the reactors. From 1988 to 1991, following reactor startup, the red and black abalone population in Diablo Cove declined by almost 90 percent as the result of withering syndrome, a chronic progressive disease exacerbated by elevated sea water temperatures. NMFS lists the black abalone as a "candidate species" under the Endangered Species Act.⁹ Further population declines in the black abalone could lead to listing as a threatened or endangered species. In 1997, the California Legislature imposed a moratorium, making it unlawful to take abalone for commercial purposes from San Francisco south.¹⁰ Furthermore, the statute defines *take* as including killing or attempting to kill.¹¹ The California courts have determined that the definition of take in the Fish and Game Code included killing and that nothing suggested that the proscribed killing must result from hunting or fishing.¹² The commercial nuclear power industry, however, has so far escaped penalty for its virtual elimination of abalone populations in its waters.

Water temperatures in north Diablo Cove now prevent the successful developmental growth of black abalone and red abalone, both indigenous coastal water mollusk species.

The Department of Fish and Game stated that, as a result of the routine operation of Diablo Canyon, mortality does occur in species found in Diablo Cove and that substantial decreases in formerly indigenous species continue to take place.¹³ The department concluded: "This is because the temperatures that are found in the affected areas are in excess of the upper temperature limits for survival, growth, and reproduction of several indigenous species."¹⁴

The agency concluded:

The question presented is whether the degradation of the marine environment near DCP [Diablo Canyon Power Plant] is acceptable to the Department of Fish and Game. Based on review of law and policies administered by the Department, and other laws requiring enhancement and protection of the marine ecosystem, the answer is no."¹⁵

The DFG maintained, based upon "the effects of elevated water temperature and the severe decrease in adult population densities below the recommended Department levels, that it is questionable whether or not abalone populations will recover naturally in Diablo Cove should temperatures return to normal."¹⁶

The state agency went on to add, "The black abalone was listed as a candidate species by the National Marine Fisheries Service on June 23, 1999 (Federal Register, Vol. 64; No.120) throughout the entire range (Oregon, California, Baja California)."17

Evidence of Discharge Destruction Suppressed by PG&E

Like all reactors' water discharges, Diablo Canyon's are regulated by both state agencies and a federal National Pollution Discharge Elimination System permit, certified by the Environmental Protection Agency and governed by the Clean Water Act. In 1982, prior to Diablo Canyon's operation, the state established effluent limitations for heat discharge into Diablo Cove. PG&E's permit stipulated that: (1) there shall be no degradation of indigenous species; (2) there shall be no degradation in marine communities, to include plants, invertebrate and vertebrate animals and; (3) the elevated temperatures of the receiving water shall not have any adverse effect on beneficiary uses, including shellfish harvesting and the marine habitat.¹⁸

The permit relied on a Thermal Discharge Assessment Report, prepared by PG&E. The report predicted very limited harm to a small percentage of the Diablo Cove habitat and its species. Also in 1982, PG&E submitted a report entitled "Assessment of Alternatives to the Existing Cooling Water System" that, after exploring options for reducing discharge water temperatures, concluded that all of the alternatives, including the installation of cooling towers and ponds, were economically prohibitive.¹⁹

Michael Thomas, WQCB project manager for the Diablo Canyon Studies, said: "It's essentially bare rock—what I call bare rock."

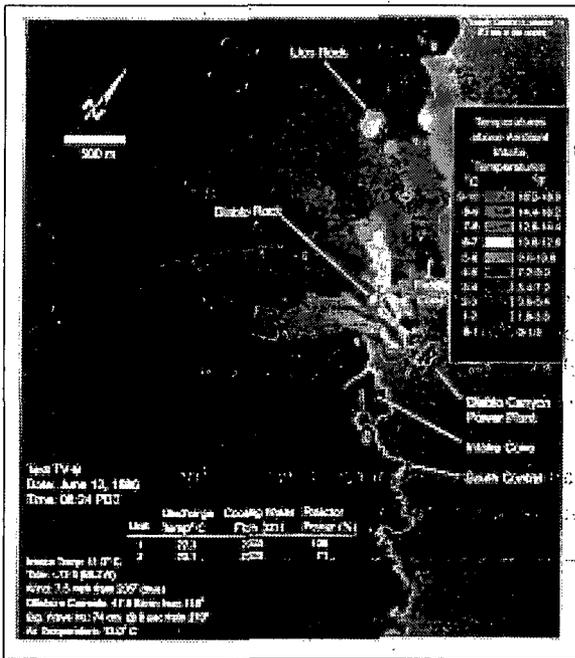
In approving the 1982 discharge permit, the WQCB considered the utility's high cost for a technological fix of its discharge problem and determined what were "reasonable" levels of environmental degradation in accepting a daily effluent discharge objective of 20 degrees F above ambient temperatures in the Diablo Cove and a periodical 100 degrees F above ambient discharge to kill mussel and barnacle infestations in the cooling system piping.²⁰ The WQCB recognized that, once the reactors were operational, their effects would be further studied and that additional regulation might be required if the effects were different from those predicted. The WQCB stipulated that, should the thermal effect limits prove inadequate, the regional regulator would have the authority to modify or revoke the permit in order to protect the beneficial uses of Diablo Cove.²¹

Defined as an "existing discharge" under state regulations, the NPDES permit issued in 1990 provided Diablo Canyon with a waiver to allow a maximum discharge temperature of 22 degrees F above the natural temperature of Diablo Cove. This is 2 degrees F higher than the stated water quality discharge objective. However, the 1990 discharge permit again stipulated that: "Waste discharge shall not individually or collectively cause temperature of the receiving water to adversely affect beneficial uses."²²

As part of the permit, the utility was required to environmentally monitor Diablo Cove to analyze the hot water discharge effects on the cove. In December 1997, PG&E submitted a study that determined that there were large, statistically significant, and ecologically important changes in habitat-forming species of surf grass, kelps, seaweeds, and algae with impacts on the rest of the cove community caused by the reactors. Collapse of these plant species affected many more species in the interrelated community of marine species that graze among the plants such as limpets, snails, abalone, sea urchins, fish species that feed on the algae, and invertebrates.

The study findings not only indicated that the utility prediction of impact on a variety of species was entirely wrong but also that PG&E failed to predict accurately how far and wide the hot water discharge

vehemently and successfully opposed by state agencies and several environmental groups. Additionally, allegations came to the attention of the California Office of the Attorney General that the utility had omitted information from a 1988 report, analyzing the effects of taking in 2.5 billion gallons of water a day from the cove and the entrainment of marine life in the reactor cooling system. PG&E eventually settled with California for \$14.04 million and was required to reanalyze the effects through an independent review. This fine was 7 times higher than any fine ever levied by the federal Nuclear Regulatory Commission for any violation.²⁵



An aerial infrared photo showing dispersion of the thermal plume on June 12, 1986. In its March 2000 testimony, during cease and desist hearings, the Regional Water Quality Control Board observed on exhibiting this photograph: "It should be noted that the infrared images in Figures 6 and 7 [shown] are dated 1986, but were not submitted to the Regional Board until 1996, about ten years after they were taken. PG&E's 1988 annual thermal effects report did include other plume maps which did not show the plume contacting the nearshore areas."

PG&E denies state allegations that it has violated its NPDES permit. In response to charges of environmental damage as a result of its discharges, the utility has argued that the WQCB should reconsider the economics of Diablo Canyon station operation when enforcing the NPDES permit and thus should relax enforcement of its regulations.²⁶ The state has countered that if it were to reconsider the economics of the power plant, it should not be limited to just the costs to the utility. The regional board responded that:

[S]uch analysis would have to explore issues including the cost of disposing of the DCPP radioactive waste, the market price for electricity being produced versus the cost of production by DCPP, and whether the electricity produced by DCPP is necessary to meet electrical demands of the community.²⁷

The board's deliberations on the DCPP cease and desist order took a sharp turn in favor of the utility on June 2, 2000. Without issuing a decision on the staff-supported order, the board and PG&E reached a broad tentative settlement agreement whereby the utility would pay \$4.5 million for marine restoration projects and preservation of coastal land owned by the company. Despite the unreconciled disagreement between the parties over the significance and extent of the cooling system's harmful impacts on the marine environment, the board sought to resolve the pollution issues to avoid a lengthy and expensive legal battle in utility appeals.²⁸ (For more details on this case, see chapter 4, this report.)

"You still gotta realize that you're taking in a square mile of water, to the depth of 14 feet, per day, and passing it through that power plant, killing every bit of plankton and some of the adult fishes contained in the cove every day."

Diablo Discharges Only One Piece of the Disaster

The issue of the thermal discharges is but one piece of the environmental problem caused by the wasteful once-through cooling system. The environmental consequences from the intake of large volumes of water into the system must also be taken into account. With the intake of large volumes of water into the nuclear power station cooling systems, the entrainment of wildlife and marine life has a significant, and at least equally disastrous, impact on the environment.

As California marine biologist and chemist Dr. Rimmon Fay pointed out at the Diablo Canyon hearings:

"You still gotta realize that you're taking in a square mile of water, to the depth of 14 feet, per day, and passing it through that power plant, killing every bit of plankton and some of the adult fishes contained in the cove every day."²⁹

Millstone Nuclear Power Station and Long Island Sound: Fishing Without a License

In the first 11 months of 2000, 43 arrests were made off the coast of Connecticut for fishing violations in Long Island Sound.³⁰ Those arrested were charged with an array of offenses, including catching undersize lobsters, exceeding quotas, fishing without a license, and failing to keep accurate log entries. Penalties for such violations may range from a \$25 fine or 30-day imprisonment or both; each illegal taking of a fish or crustacean is considered a separate offense.³¹ Commercial fishermen face potential license suspension for illegal takings and other violations.³²

The State of Connecticut Department of Environmental Protection (DEP) employs a staff of 13 full-time conservation officers to patrol the Long Island Sound; six officers and two supervisors are assigned to the area east of New Haven. These "harbor police" who are also certified police officers, are charged with enforcing state and federal laws governing all aspects of fishing in Long Island Sound, including commercial, sport, and recreational uses.³³ The regulations set limits for legal capture of fish and crustaceans as to season, size, age, number, and even gender. For example, Section 26-157c-1 of the Regulations of Connecticut State Agencies, entitled "Taking lobsters—general," provides as follows:

- (a) Lobsters may be taken only by lobster pots, traps, trawls or similar devices or by skin diving, including the use of self-contained underwater breathing apparatus, or by hand. The use of spears or hooks of any kind to take lobsters and the possession of lobsters taken by any method which pierces the shell are prohibited.
- (b) No person shall buy, sell, give away, offer for sale or possess (1) any female lobster, regardless where taken, with ova or spawn attached or from which the ova or spawn have been removed or (2) any female lobster, regardless where taken, bearing a v-shaped notch at least one-quarter inch in depth and tapering to a point in the flipper next to the right of the center flipper as viewed from the rear of the lobster, or (3) any lobster, regardless where taken, with a body shell (carapace) less than 3-1/4 inches. Such length shall be measured along the length of the body shell (carapace) parallel to the center line from the rear end of the eye socket to the rear end of the body shell (carapace). For the purposes of this subsection, any lobster specified in subdivision (2) of this subsection includes any female lobster which is mutilated in a manner which could hide, obscure or obliterate such a mark.
- (c) When caught, any lobster specified in subdivision (1), (2) or (3) of subsection (b) shall, without avoidable injury, be immediately returned to the waters from which taken.

Although commercial, sport, and recreational fishing are closely regulated, Millstone's fish kills are unregulated. There are no limits on Millstone's kills, by season, size, age, or number.

State regulations have tightened over the years, as biologists at the DEP's Marine Fisheries office in Old Lyme have documented the decline of fish species in the Sound. DEP fisheries biologists have directed particular attention to the decline in the Niantic River winter flounder population, a subspecies of indigenous fish believed to have inhabited the Niantic River Bay area for thousands of years. Winter flounder, once a staple of the local commercial fishing industry, return every winter to Niantic to breed

7 Joseph Milton, staff counsel, California Department of Fish and Game, Memorandum to California Regional Water Quality Control Board, Draft Cease and Desist Order for Pacific Gas and Electric National Pollution Discharge Elimination System Permit Order 90-09, February 29, 2000, p. 5.

8 Ibid., p. 3.

9 64 Federal Register 120, June 23, 1999.

10 Fish and Game Code § 5521; Stats. 1997, chapter 787, p. 2.

11 Fish and Game Code, p. 86.

12 *Department of Fish and Game v. Anderson-Cottonwood Irrigation District* (1992) 8 Cal.App.4th 1554.

13 Legal Office, California Department of Fish and Game, Memorandum, February 29, 2000, p. 1.

14 Ibid.

15 Legal Office, California Department of Fish and Game, Memorandum to Michael Thomas, RWQCB, February 28, 2000, p. 7.

16 California Department of Fish and Game, Memorandum to Roger Briggs, executive officer, RWQCB—Central Coast Region, February 29, 2000.

17 Ibid.

18 Jennifer Soloway, staff counsel, California Regional Water Quality Control Board—Central Coast Region, "Response to Legal Argument Opposing Adoption of Draft Cease and Desist Order 00-032 for Diablo Canyon Nuclear Power Plant, May 5, 2000, p. 2.

19 Ibid., p. 7.

20 Ibid., "Response," p. 8.

21 Staff Counsel, CRWQCB, "Legal Argument in Support of Adoption of Draft Cease and Desist Order 00-32 for PG&E's Diablo Canyon Nuclear Power Plant," March 1, 2000, p. 3.

22 Hearing Before the California Regional Water Quality Control Board, Central Coast Region, for Consideration of a Cease and Desist Order Against Pacific Gas and Electric Company's Diablo Canyon Nuclear Power Plant for Alleged Violations of the Facility's National Pollutant Discharge Elimination Permit System, *Transcript of the Proceedings*, San Luis Obispo, CA, March 30, 2000, line 24, p. 15—line 1, p. 16.

23 Ibid., lines 4-5, p. 79.

24 Michael Thomas, project manager, CRWQCB, Rebuttal Testimony in Support of Cease and Desist Order No. 00-032, May 5, 2000, p. 6.

25 NRC Office of Public Affairs, telephone conversation with Paul Gunter, December 7, 2000. In 1997, NRC levied a \$2.1 million fine on Millstone that currently stands as the agency's largest fine.

26 CRWQCB, Legal Argument, March 1, 2000, p. 14.

27 Ibid.

federal and state agencies has left a void in the patchwork of the regulated protection of fish stocks and their marine ecology.

28 David Sneed, "Diablo Settlement Reached," *The Tribune*, June 3, 2000.

29 CRWQCB, Hearing Transcript, lines 5-9, p. 299.

4-3. Diablo Canyon Nuclear Power Plant Pacific Gas and Electric Company, San Luis Obispo, CA

PG&E: Cover-ups, falsifications challenged—but money talks in the end.

The Diablo Canyon Nuclear Power Plant near San Luis Obispo, CA, operates two nuclear reactors, using the once-through cooling system. Their routine operation was determined to have a damaging effect on the coastal marine environment by the California Department of Fish and Game (DFG) and the California Regional Water Quality Control Board (RWQCB), Central Coast Region. Yet, like other utilities, Diablo Canyon's operating utility and licensee, PG&E, has long attempted to minimize and obfuscate the facts about its impact on the marine environment.

In 1982, PG&E, under its obligation to the water quality control board's San Luis Obispo office, submitted a series of reports about the plant's effect on the surrounding marine environment in Diablo Cove. However, in 1994 the regional board finally discovered, through revelations by the Department of Fish and Game, that PG&E's data contained only information that showed the plant had little or no effect on the marine environment around its reactors. "Evidence indicates PG&E omitted more than half of the actual test results which showed up to a 90 percent reduction in sea life as it passed through the cooling system," the state and federal environmental protection agencies said in a joint statement after the discovery that PG&E had suppressed data detrimental to its claims.¹

PG&E's track record of withholding data...on the reactors' actual discharge impacts has further undermined the company's credibility.

PG&E's track record of withholding data, for years and even decades, on the reactors' actual discharge impacts has further undermined the company's credibility. These revelations have led to extensive litigation between PG&E and state water authorities, revealing the lengths to which PG&E is willing to go to cover up facts, avoid mitigation, and stall or withdraw from negotiations. Meanwhile, Diablo Canyon's on-going operation further degrades the marine environment.

Chronology

PG&E fined for tampering with and withholding key data. In May 1997, in one of the largest environmental settlements reached since the 1989 Exxon Valdez disaster, PG&E was forced to pay out \$14.04 million for tampering with and withholding portions of studies that showed negative impacts on entrained marine life at Diablo Canyon.² Sued by California and U.S. Environmental Protections Agencies, the state and federal attorneys general offices and the RWQCB, Central Coast Region, PG&E was found to be in violation of the federal Clean Water Act. The utility's conclusions about the amount of sea life drawn into the system were found to be based on scientifically unsound data—measurements of the amount of fish and other organisms at the outflow of the cooling system.

PG&E refuses to admit guilt, despite overwhelming evidence. After the 1997 settlement, PG&E refused to admit guilt while the RWQCB conceded that the problem might be impossible to correct with the plant already in place. "It's not sure there would be anything that could actually be done the way the plant is currently built," said Paul Jagger, assistant executive officer at RWQCB's San Luis Obispo office.³ The government agencies that settled with PG&E issued scathing statements about the company, calling the conduct of its senior officials "rogue behavior" and saying its decision not to report findings at Diablo Canyon "lacked integrity."⁴

PG&E stalls mitigation agreements. The terms of the settlement included a new study to be done for Diablo Canyon by Moss Landing Marine Laboratory. Terms also stipulated that \$6.19 million of the

\$14.04 million penalty would be directed toward environmental enhancement projects. However, agreement on conservation programs between PG&E and the regional water board led to continual breakdowns in negotiations between the two parties, resulting in delays.

Water board submits to PG&E delaying tactics. By November 1999, the regional board was tired of waiting. Prior to a November 19 board meeting, the *San Luis Obispo Telegram-Tribune* reported that the board was considering issuing a cease and desist order against the utility company for violating its water discharge permit by damaging the marine environment.⁵ This would have obligated PG&E to submit an analysis and time line for modifying its water discharge system to prevent further degradation of near-shore habitat.⁶ At the meeting, PG&E showed a 10-minute video of abundant fish swimming in the cove near the plant, an effort that some board members dismissed as “fluff, misleading and without scientific value.”⁷ The fish flourishing in the cove were found not to be the indigenous species, but those attracted by the artificially warmed waters. Despite this, the board agreed to yet another delay, giving PG&E until March 30, 2000, to allow the utility to plan adequately for evidentiary hearings on the proposed cease and desist order.

The abundance-of-organisms argument has been shown to be flawed by ecologists and others. As award-winning Harvard Professor of Entomology and conservation scientist Edward O. Wilson pointed out in his landmark book, *The Diversity of Life*, numerical abundance of any species is not necessarily a guarantee of survival. “The age, health and breeding patterns of individuals have an important effect on the genetic trajectory of a population and eventually its very survival,” Wilson wrote.⁸ “Even if the woods and fields are swarming with plants and animals of a certain kind, the species might be destined for extinction.”⁹

Damage proven but PG&E argues against mitigation. By December 1999, PG&E’s own new study was made public in draft form. It revealed that Diablo Canyon was killing significant numbers of near-shore fish larvae.¹⁰ “One species of kelp fish suffers 24 percent larvae mortality, two species of sculpin larvae were reduced by 10 percent and 7 percent respectively and 14 percent of monkey-faced prickleback young are killed,” the study stated.¹¹ The study also found that about 90 percent of the black abalone that once inhabited the cove had succumbed to withering syndrome, a fatal disease that has also affected the red abalone. This disease has been attributed to the higher water temperatures created by the plant’s discharge system. Despite these numbers, the PG&E legal team continued to argue that “the plant’s impacts on the ocean are predictable, minimal and temporary, and no mitigation action is needed.”¹² The state Department of Fish and Game and the state Water Resources Control Board disagreed, and both submitted substantial testimony in support of a cease and desist order.

More delays as environmental damage continues. No decision was made at the March 30, 2000, meeting. Testimony and rebuttals from both sides were provided to the board for a decision at the next meeting, on June 2, 2000. In the interim, during evidentiary hearings, PG&E turned down one mitigation proposal from the state—to preserve in perpetuity the 12,000 acres surrounding the plant. Jeff Lewis, Diablo Canyon spokesman, said that handing over 14 miles of valuable coastal land was too high a price to pay. PG&E also declared as financially unacceptable the construction of cooling towers, the less destructive alternative to the once-through cooling system.¹³

Discovery of suppressed evidence shows extensive damage. In May 2000 during the evidentiary hearings, it was discovered that PG&E had withheld, since 1986, infrared images that showed the actual distribution patterns of the thermal plume and impact zones.¹⁴ PG&E had also withheld 20-year-time-series photographs of the monitoring stations. The extensive library of historical photos showed major deterioration of Diablo Cove.¹⁵ PG&E had also collected temperature-monitoring data during 1997

and 1998 from the area north of Diablo Cove. These data were not submitted until May 1, 2000 (even though annual monitoring reports were submitted in 1998 and 1999).¹⁶ The temperature-monitoring data only came to light during the discovery process. The state's testimony further documents that, during earlier evidentiary hearings for the cease and desist order, PG&E's legal counsel had argued "extensively" the degree of elevated temperatures in this same area was "unknown" while PG&E staff, aware of the data, remained silent.¹⁷

Water board buckles to PG&E pressure: Prior to the final June hearing, PG&E reportedly entertained negotiations with the RWQCB with an offer to spend \$75 million to build a deep-water intake and discharge system in lieu of paying any fines levied by the order.¹⁸ However, at the June hearing, the RWQCB instead succumbed to the utility when PG&E threatened protracted and costly law suits if faced with the issuance of a cease and desist order to mitigate fully for the damage it had caused. On October 27, 2000, the utility and the RWQCB settled for a meager \$4.5 million restoration package and the preservation of 5.7 miles of company-owned coastline habitat.

Without addressing the ongoing harmful thermal discharges, the settlement included:

- preservation of an unspecified amount of company-owned watersheds draining to the coastline from Fields Cove
- PG&E payment of \$4 million for unspecified marine restoration projects in the vicinity of the reactor
- opening of Diablo Canyon Power Plant biological research laboratories to educational organizations for a 10-year period
- payment of \$350,000 through company contributions for black abalone restoration through artificial cultivation and transplants
- reduction of PG&E's marine environment monitoring program for the Diablo Canyon discharges
- a narrow provision to protect the settlement against future changes in law, regulations, and permit conditions related to the settlement.

The public intervenors in the California case strenuously objected to the board's adoption of a settlement that failed to address the specific violations of the Diablo National Pollution Discharge System permit as documented by the board's own legal staff.¹⁹ The ongoing thermal discharges continue to violate the provisions of the water discharge permit that states that: (1) there shall be no degradation of indigenous species, (2) there shall be no degradation of marine communities, including plants and invertebrate and vertebrate animals, and also (3) the elevated temperature of the receiving water shall not have any adverse

effect on beneficiary uses. The intervenors also objected to the abdication of the board's regulatory responsibilities to protect water resources and marine life from the indisputable ongoing and growing damage from the generator's cooling system.

Had the board approved and issued a cease and desist order, PG&E could have faced fines of millions of dollars a day for the past 15 years.

Had the board approved and issued a cease and desist order, PG&E could have faced fines of millions of dollars a day for the past 15 years. Additionally, PG&E's proposal to extend the hot water discharges farther out into the cove or be-

yond, tantamount to constructing a superhighway on the ocean floor, would likely have caused new and as yet unexplored harmful environmental consequences and would have required an environmental impact statement. Furthermore, artificially cultivating black abalone and placing them back into the same environment in which they were destroyed, without reducing the rates or temperatures of the discharge water, fails to protect the species' long-term survival. This license to kill black abalone for the foreseeable future could mark the obliteration of the Diablo Cove population.

Notes

- ¹ Silas Lyons, "\$3.6 Million for Morro Estuary," *San Luis Obispo Telegram-Tribune*, May 28, 1997.
- ² See also: Glenn Roberts, Jr., "Estuary Program in the Right Place at the Right Time," *San Luis Obispo Telegram-Tribune*, May 29, 1997.
- ³ *Ibid.*
- ⁴ *Ibid.*
- ⁵ David Sneed, "Water Board Delays Sanctions," *San Luis Obispo Telegram-Tribune*, November 20, 1999.
- ⁶ *Ibid.*
- ⁷ *Ibid.*
- ⁸ Edward O. Wilson, *The Diversity of Life*, (New York: W.W. Norton and Company, 1999), p. 237.
- ⁹ *Ibid.*
- ¹⁰ David Sneed, "Study: Diablo Killing Fish Larvae," *San Luis Obispo Telegram-Tribune*, December 14, 2000.
- ¹¹ *Ibid.*
- ¹² David Sneed, "Warm-Water Outflow Has Altered Cove's Ecosystem - but Is That Bad?" *Telegram-Tribune*, January 16, 2000.
- ¹³ *Ibid.*
- ¹⁴ Michael Thomas, project manager, California Regional Water Quality Control Board—Central Coast Region, "Rebuttal Testimony in Support of Cease and Desist Order No. 00-032," May 5, 2000, p. 6.
- ¹⁵ *Ibid.*
- ¹⁶ *Ibid.*
- ¹⁷ *Ibid.*
- ¹⁸ *California Energy Market*, May 12, 2000, p. 7.
- ¹⁹ Jennifer Soloway, senior staff counsel, California Regional Water Quality Control Board, Central Coast Region, "Response to Legal Argument Opposing Adoption of Draft Cease and Desist Order 00-032 for Diablo Canyon Nuclear Power Plant," May 5, 2000, p. 1.

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Th6a-b

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Hearing Opened: May 11, 2006
Substantial Issue Found: May 11, 2006
Staff: Tom Luster-SF
Staff Report: 11/30/06
Hearing Date: 12/14/06

CONSOLIDATED STAFF REPORT
DE NOVO HEARING FOR APPEAL

AND

COASTAL DEVELOPMENT PERMIT APPLICATION

COMMISSION APPEAL NO.: A-3-SLO-06-017

APPLICATION FILE NO: E-06-011

LOCAL GOVERNMENT: County of San Luis Obispo

LOCAL DECISION: Approved with Conditions, March 7, 2006

APPLICANT: Pacific Gas and Electric Company

SUBSTANTIAL ISSUE: On May 11, 2006, the Commission found that the appeals of the local government action on this project raised substantial issue.

PROJECT DESCRIPTION: Remove Diablo Canyon Power Plant's existing steam generators and replace with new generators.

PROJECT LOCATION: Diablo Canyon Nuclear Power Plant, P.O. Box 56, Avila Beach 93424 (approximately 6 miles north of Avila Beach), County of San Luis Obispo.

APPELLANTS: Mothers For Peace / Sierra Club – Santa Lucia Chapter / Commissioners Reilly and Shallenberger

SUBSTANTIVE FILE DOCUMENTS: See Appendix A

STAFF RECOMMENDATION: Approval of De Novo Permit with Conditions and Approval of Regular Permit with Conditions

Adverse Impacts Caused by DCP's Cooling System: DCP uses up to about 2.6 billion gallons per day of seawater to cool its generating units¹⁰. The seawater is pulled in through an intake structure and then passes through thousands of feet of narrow tubes in the generating units, where it carries off heat from steam passing through another set of similar narrow tubes carrying water from a closed-loop system that carries steam and water to and from the reactor. The heated cooling water is then discharged into Diablo Cove. DCP's use of seawater for cooling, along with several other operational discharges, is permitted through an NPDES permit issued by the Central Coast Regional Board. DCP's most recent NPDES permit, issued in 1990, has been on administrative extension since 1995. The facility is authorized to discharge its cooling water at a temperature up to 20° F above the ambient seawater temperature.

DCP's use of seawater for cooling plant creates three main types of adverse impacts – entrainment, impingement, and thermal effects – each of which is described below, along with a brief description of studies conducted at DCP to determine the extent of these impacts.

- **Entrainment:** Entrainment occurs when small organisms, such as plankton, fish eggs, larvae, etc., are pulled into the intake. Once-through cooling systems like the one used at DCP are considered to cause essentially 100% mortality due to the organisms being subjected to high temperatures or high pressures within the system. Entrainment causes direct impacts by killing the small organisms that are pulled through the cooling system and causes indirect impacts to the larger marine community by altering the food web and removing part of the community's productivity. The loss of eggs and larvae due to entrainment may or may not result in losses of adult members of a given population; however, the losses from large cooling systems cause a loss or change in ecosystem resources and can cause alterations in community structure.

Determining Entrainment Impacts: Determining the scale and the extent of entrainment impacts generally requires a study that includes at least one year's worth of regular sampling data and application of any of several modeling approaches. The samples are taken from waters near the intake and from nearby source waters. Organisms captured are identified to the lowest possible taxon. In most cases, all organisms cannot be identified, so the known taxa serve as indicators or surrogates for the full set of affected species. Of the various models available, the most acceptable is known as the Empirical Transport Model (ETM). It is used to provide an estimate of the proportion of organisms lost due to entrainment compared to the overall number of organisms in a source water body. The ETM approach allows estimates of loss for each identified species, in part by recognizing that each species is subject to entrainment during particular life stages. Once the species subject to entrainment are identified, the ETM approach then determines what period of time each of the species are subject to entrainment – that is, based on local currents, it determines how many days an egg stage or larval stage of a particular species is subject to being pulled into the cooling system

¹⁰ To provide a comparison and a sense of scale, the 2.6 billion gallons of ocean water DCP uses each day is equal to about 8,000 acre-feet, or the amount of water that would cover 8,000 acres (more than 12 square miles) with a foot of water. Over the course of a year, DCP uses almost a trillion gallons of ocean water, or about 3 million acre-feet, which would cover over 4500 square miles up to a foot deep.

rather than be able to move away and escape from it. This period varies by species, ranging from just a few days to several weeks. It will also vary by whether it is calculated using the maximum or mean duration of larvae in the source water. As a very simple example, if individuals of a species are "entrainable" for the first five days of their lives and the average currents in the area move past the cooling system intake at half a mile per hour, that species has a source water area of sixty miles (5 days x 24 hours x 0.5 mph = 60 miles). Determining source water areas is complicated by seasonal changes in current speed or direction and whether the species are from nearshore or offshore areas, but the basic concept is the same.

The proportion of larvae lost to larvae in the source water (known as "proportional mortality") is then multiplied by the source water area to provide an estimate of how much overall production of the species in this area is lost due to entrainment. This result of this calculation, known as "habitat production foregone" (HPF) can be expressed in acres or in miles of shoreline. Even a low "proportional mortality" figure can result in a large impact if the loss occurs over a large stretch of shoreline. Using the example above, if 5% of the larval stage of that species is lost due to entrainment, that represents that species' production along about three miles of shoreline (0.05 x 60 miles = 3 miles). The HPF for the various species can be kept separate or can be combined as an overall average figure.

Entrainment at DCP: Applying ETM to the most recent entrainment studies at DCP have shown that the cooling system causes significant loss of production along many miles of coastline and over a relatively large offshore area. PG&E, in conjunction with the Regional Board and a technical workgroup including independent scientists, conducted an entrainment study in the late 1990s. The study identified about three dozen species or genera of both nearshore and offshore fish that represent over 90% of the sampled species. The "habitat production foregone" figures for many of the identified species range up to several dozen miles of shoreline or several hundred acres of offshore waters. For example, the study showed that the HPF for Pacific sardines ranged from 72 to 400 acres of offshore waters¹¹. For the clinid kelpfish, which is a nearshore species, the study showed that the HPF ranged from about 10 to 33 miles of nearby shoreline¹².

Results of entrainment studies such as this cannot reflect all the variables that may affect populations within a given area – for example, populations may decrease or increase due to seasonal or longer term changes, the habitat within the source water areas is likely to include characteristics that affect particular species and may be of variable quality within the same source water area, etc. These methods do, however, provide a good sense of scale of the overall impacts of a given cooling system. In the case of DCP, the entrainment sampling

¹¹ For mean larval duration, proportional mortality loss of 0.03% in a source water area covering 379 square miles resulted in an HPF about 72 acres. For maximum larval duration, a proportional mortality loss of 0.01% over 6,395 square miles resulted in an HPF of about 400 acres of offshore waters.

¹² For mean larval duration, the proportional mortality loss was 31% along a source water area of 33 miles of shoreline, which results in an HPF of about 10 miles of nearshore waters. For maximum larval duration, proportional mortality was 41% from a 78-mile source water body, representing an HPF of about 32 miles of nearshore waters.

process lasted for about two-and-a-half years rather than the standard one-year, and the habitat within many of its source water areas is of relatively good quality; therefore, the data may reflect actual entrainment impacts more accurately than studies done elsewhere for shorter times or for more variable habitats.

Overall, the entrainment study results show that DCPD causes a substantial loss of production in local and regional nearshore waters. When considering these losses together, the Regional Board's scientists have estimated that the number of organisms killed by the cooling system in a year is roughly equivalent to the organisms produced annually in 210 to 500 acres of reef and rocky substrate habitat—that is, when summed and averaged, the overall proportional mortality of DCPD would require about 210 to 500 acres of new reef and rocky habitat to produce and replace the number of organisms killed in the cooling system each year. In the offshore waters near DCPD, rocky reef habitat is considered highly productive, so this impact represents a substantial loss to the local and regional offshore environment.

- **Impingement:** Impingement occurs when fish or other organisms are caught on an intake's screening system and are either killed or injured. The impingement rate for an intake is primarily a function of water velocity. The current Clean Water Act regulations (at 40 CFR 125) applicable to cooling water systems establishes a maximum velocity of 0.5 feet per second as the required Best Available Technology. When velocities are below that level, fish are usually able to swim away from the pull of the intake. Impingement rates may also vary seasonally or when schools of fish get close to the intake.

A 1985-86 impingement study at DCPD showed that the cooling system impinged about 400 fish and 1,300 crabs during the one-year sampling period. This is a relatively insignificant impact when compared to impingement rates at other power plants; however, DCPD operates its intake at velocities greater than 0.5 feet per second and may be required to either make operational changes or provide impingement mitigation.

- **Effects of Thermal Discharge:** The cooling system causes an additional thermal impact when the heated water is discharged back in to the ocean. DCPD is permitted to discharge this water at temperatures up to 20°F above ambient seawater temperature.

In 1976, PG&E started biological monitoring in nearby marine waters, largely to identify baseline conditions, establish control areas, and to identify effects caused by DCPD's thermal discharge. In 1983, the State Water Resources Control Board issued Order WQ 83-1, which allowed PG&E to withdraw and discharge about 2.6 billion gallons per day of seawater, along with other facility-related discharges. The Order also identified a set of biological impacts predicted to be caused by the temperature increase, though it stated that while these impacts would somewhat degrade beneficial uses, they would still allow beneficial uses to be adequately supported, as required by the state water quality standards. In 1995, the Regional Board established a technical workgroup to start a comprehensive review of the monitoring program data. In 1997, the workgroup published a report identifying a number of impacts that exceeded those that had been predicted. In 1998, PG&E published its own report that came to different conclusions about many of these impacts. The Regional Board staff

reviewed these reports and concluded that these impacts represented a violation of PG&E's NPDES permit. They determined the following differences between predicted and actual impacts:

- Along the intertidal zone, the initial permit had predicted that thermal effects would occur along less than a mile of shoreline. The later review revealed impacts extending about 1.8 miles. There was also an unexpected increase in the amount of bare rock within Diablo Cove's intertidal areas.
- Within the nearby subtidal areas, initial predictions were that the discharge would affect about 40 acres. The actual impact turned out to include about 56 acres of bull kelp habitat, and up to about 105 acres of bull kelp habitat during El Nino events.
- The initial permit predicted that the community structure and population would change in about a third of Diablo Cove during a few months of the year. The actual impacts show continuous major reductions in species and populations within the Cove, including an almost complete loss of some fish and algae species. The thermal discharge has also apparently resulted in a substantial decline in black abalone populations due to an increased occurrence of withering syndrome.

In 2000, the Regional Board staff issued a draft Cease and Desist Order alleging that PG&E was violating several water standards and a provision of its NPDES Permit related to thermal discharges. The draft Order would have required PG&E to submit a report that described how it would modify DCP to meet conditions of its Permit or submit a proposed mitigation program to address the thermal discharge impacts. Later that year, the Board held a hearing on the draft Order. There were a number of differences between the positions of Board staff, PG&E, and various commenters. The Board did not adopt the Order, but directed its staff to work with PG&E to resolve their differences and to also consider additional mitigation measures that might be needed to address entrainment impacts. The Board staff has continued to evaluate both impacts and potential mitigation measures for DCP and has developed a draft Consent Judgment with PG&E; however, there are not yet any mitigation measures in place to address the identified impacts.

- **Cumulative Impacts:** DCP is one of 21 coastal power plants in California that use seawater or estuarine water for cooling. The total NPDES-permitted inflows for these plants is about 17 billion gallons per day. Although some of these plants operate only sporadically and most of the plants do not use their full-permitted amount of cooling water, each causes impacts similar to those described above and they cumulatively contribute to the ongoing long-term habitat decline in California's coastal waters¹³.

The discussion above illustrates the main impacts associated with DCP's cooling system. The proposed SGRP would result in the above adverse effects continuing about ten years beyond when they would end if not for the project – with the project, the impacts would end by about

¹³ See, for example the California Energy Commission's report, Issues and Environmental Impacts Associated With Once-Through Cooling At California's Coastal Power Plants, June 2005.

2025; without the project, they would end about 2014¹⁴. Additionally, due to predicted overall declines in ocean conditions in the coming years, those future effects would likely increase in severity¹⁵. The proposed project therefore represents approximately a decade's worth of continued significant adverse impacts.

4.4.2.4 Analysis of Conformity To Applicable Policies and Legal Requirements

Coastal Act Policies and LCP Provisions: The Coastal Act provisions cited above and applicable to development such as the SGRP maintain, enhance, and where feasible, restore marine resources. They also require that the marine environment be used in a manner that sustains biological productivity and maintains healthy populations of all marine species. Coastal Act Section 30231 specifically requires that biological productivity be maintained, and where feasible, restored, through various means, including by minimizing the adverse effects of entrainment. The LCP also requires development be protective of marine habitat, particularly kelp beds, offshore rocks and reefs, and intertidal areas.

Marine Mammal Impacts: The SGRP's steam generator delivery at the Diablo Intake Cove has a high potential to disturb marine mammals that use the Cove and nearby shoreline areas. The Cove is used as a seal haul-out site during most of the year and sea otters are often present. While these animals are likely used to some level of disturbance due to the ongoing DCPD activities, the steam generator deliveries could result in "take". **Special Condition 4** is intended to reduce the risk of "take" through development by PG&E of a marine mammal protection plan. The plan would include the measures and procedures that PG&E will implement to avoid interactions with marine mammals during vessel movements within 1000 feet of the Diablo Cove breakwater. The plan will require the use of at least two NMFS-approved monitors, will require reporting of any incidents that could be considered "take", and will include a description of the training that will be provided to project personnel on techniques to avoid harming or harassing marine mammals. With the imposition of **Special Condition 4**, the SGRP will be sufficiently protective of marine mammals to conform to this aspect of Coastal Act Sections 30230 and 30231.

¹⁴ In an October 19, 2006 letter, PG&E stated that DCPD could possibly operate until the end of its current license terms without the SGRP and that the Commission should therefore not consider the adverse effects associated with ongoing use of the DCPD cooling system. However, based on testimony provided by PG&E and other parties during the California PUC proceedings, it is evident that operating the existing generators beyond 2014 would increase safety risks and that it is PG&E's intent and its preferred option is to implement the project. We note that none of the parties to the PUC proceedings disputed PG&E's claim that the steam generators had to be replaced in order for DCPD to operate until the end of its current license periods. We note, too, that PG&E's testimony in those proceedings focused in part on the need for timely replacement of the generators, since delays would increase the risk of failure and would increase the repair and maintenance costs of the existing generators.

¹⁵ See, for example, Orr et. al., Anthropogenic Ocean Acidification Over the Twenty-First Century and its Impact on Calcifying Organisms, Nature, September 29, 2005; Dybas, Cheryl Lyn, On a Collision Course: Ocean Plankton and Climate Change, Bioscience, August 2006; and Vilchis, et. al., Ocean Warming Effects on Growth, Reproduction, and Survivorship of Southern California Abalone, Ecological Applications, April 2005.

Impacts Caused by the Proposed SGRP's Use of the DCPD Cooling System: As documented above, the SGRP's use of almost 2.6 billion gallons per day of ocean water for cooling would not conform to Coastal Act provisions requiring that marine biological resources be "maintained, enhanced, and where feasible, restored", and would not protect marine habitats as required by the LCP. The proposed project would cause ongoing and possibly increased adverse effects to marine resources along several miles of the California coast. Additionally, and as noted above, continuing degradation of the ocean environment due to causes beyond DCPD – such as global warming, ocean acidification, loss of fish stocks, etc. – suggest that the effects of future impacts associated with DCPD are likely to be more severe than they have been in the past. The proposed project's ongoing withdrawal of over two billion gallons per day of the habitat provided by seawater does not allow it to "maintain" biological resources or "sustain the biological productivity of coastal waters", as is required by Coastal Act Section 30230. Neither does its use of ocean water conform to the requirement that the adverse effects of entrainment be minimized, as is required by Coastal Act Section 30231. The only way the proposed SGRP could conform to these requirements would be through avoiding the use of once-through cooling.

Mitigating Impacts Caused by the SGRP's Use of the DCPD Cooling System: The studies cited above identifying the impacts of DCPD's cooling system have also resulted in consideration of a number of mitigation approaches to avoid, minimize, or provide compensatory mitigation for the cooling system's adverse effects.¹⁶ As noted previously, the Regional Board considered in 2003 a draft Consent Judgment to allow continued DCPD operations and to ensure adequate mitigation of its impacts. Most of the effort towards identifying mitigation options has been led

¹⁶ Mitigation sequencing: One of the main purposes of mitigation is to provide a functional replacement of the habitat or ecosystem functions that would be lost due to a proposed project; that is, to develop mitigation that results at minimum in "no net loss" of habitat or functions. The general approach to selecting and implementing an appropriate mitigation approach for a given project is to first avoid the impacts, to then minimize the impacts, and to finally compensate for the impacts that remain. The CEQA Guidelines at Section 15370 include a similar sequence for selecting mitigation. The third step, compensatory mitigation, also includes a preferred sequence – to first create environmental conditions similar to those being lost; to next restore or enhance conditions similar to those being lost; and to finally preserve or protect an area that provides habitat value. It is generally preferable to select "in-kind" mitigation; that is, to develop mitigation sites with habitat similar to that being adversely affected, rather than to develop "out-of-kind" mitigation. Similarly, it is generally considered better to develop mitigation on-site rather than off-site.

As the selection of an appropriate mitigation approach moves down through the mitigation sequence, the ratio of the amount of mitigation needed to compensate for lost habitat goes up. In most cases, the "no net loss" standard requires that the selected mitigation site be sized to provide more habitat or functions than those lost at a project site; that is, mitigation is often required to be provided at greater than a 1:1 ratio. This higher ratio is needed due to a number of mitigation characteristics. For example, it often takes years (or decades) for an enhanced or restored mitigation site to provide a similar level of ecosystem functions as that of the level at the project site. A higher ratio therefore makes up for the lost time when the mitigation habitat did not fully function. Similarly, when mitigation is needed to replace lost high-quality habitat, a restoration or enhancement mitigation site will often be larger than the project site to reflect the overall lower quality of the habitat that comes about through mitigation.

To reflect these characteristics, mitigation ratios can range from as low as 1:1 when mitigation is certain, immediate, and of equivalent value as the lost habitat, to 30:1 or higher for lower quality or delayed mitigation to make up for the loss of high-quality habitat. For example, if a proposed project results in the loss of 1 acre of high quality wetlands, the mitigation requirement could be that 30 acres of similar wetlands be preserved.

by the Board staff pursuant to establishing conformity to Clean Water Act requirements. The Board implemented a technical work group consisting of Board staff, staff from the Department of Fish and Game and PG&E, and several independent scientists to help determine what mitigation measures might be feasible to address the impacts identified above. The primary mitigation options were described and evaluated in Board staff reports and in Diablo Canyon Power Plant: Independent Scientists' Recommendations to the Regional Board Regarding "Mitigation" for Cooling Water Impacts, a report prepared by the technical work group's independent scientists. While Clean Water Act conformity involves a different set of requirements than the Coastal Act, the Board's efforts provide helpful guidance about how to determine appropriate and feasible mitigation for the proposed SGRP.

The Board has considered several variations of a mitigation "package" to address the range of DCPD impacts. Mitigation elements considered are described below.

- **Avoidance and minimization:** The Regional Board staff and its working group evaluated the feasibility of DCPD avoiding the impacts entirely through use of alternative systems that would use little or no seawater, such as cooling towers, dry cooling, and experimental methods such as fine mesh screens. They concluded, however, that alternative closed cooling systems were too costly (up to approximately \$1.3 billion) to be feasible. They also considered relocating the intake and outfall structures further offshore to reduce their biological effects, but again concluded that moving the structures would be too costly and would primarily change the location of many of the impacts. They considered the installation of fine mesh screens over the DCPD intake, but this, too, was considered infeasible, in large part because the technique is still experimental and the limited studies on the system suggest it may not be effective. The overall conclusion of these studies is that there are no feasible methods to avoid or minimize the entrainment and thermal impacts associated with the cooling system. Without avoiding or minimizing these impacts through use of an alternative cooling system, the SGRP would not maintain or enhance marine biological resources and would therefore not conform to Coastal Act Section 30230.
- **Compensatory mitigation:** The studies cited above also evaluated several forms of mitigation that might compensate for the cooling system impacts. The benefits and concerns of each are briefly discussed below.
 - **Artificial Reefs:** The coastal area near DCPD has a relatively high abundance of rocky tidal and subtidal habitat. As noted above, the Board's scientists determined that annual production losses caused by DCPD's entrainment impacts could be largely mitigated through creation of from 210 to 500 acres of artificial reef habitat. The cost estimates for creating this amount of reef would range from about \$10.6 million to \$26 million (in 2003). However, because the DCPD area has such a relatively high proportion of this habitat type, this option would require significant additional study to determine whether artificial reefs would provide meaningful mitigation. There may be few locations available where reefs could be placed or where they would result in the necessary level of mitigation.

This option, if part of an eventual settlement agreement between the Regional Board and PG&E, would require review and approval under a separate CDP application. PG&E has objected to this approach, in large part based on its contention that the economic costs of DCP's entrainment are only about \$26,000 per year and that the cost of the reefs would be "wholly disproportionate" to the costs of the impacts. This calculation is based largely on including only those costs associated with the potential value of adult fish that could have been caught had they not been entrained as eggs or larvae. This economic approach does not take into consideration the ecosystem and food web value of those eggs and larvae, and as such, is insufficient for determining feasibility or conformity for purposes of Coastal Act compliance.

- **Fish Hatchery:** This option was considered but rejected, since it would result in potential benefits to only a few of the many species adversely affected by entrainment. Using hatcheries for mitigation also raises concerns about whether the released fish will affect the genetic diversity of the base population.
- **Marine Habitat Restoration:** Although the marine habitat near DCP is largely in good condition, there are some opportunities to restore degraded areas. The primary option identified is along the shoreline of Montana de Oro State Park, just to the north of the Diablo Canyon lands. The main method of restoration proposed, however, would be to limit public access to this area of the shoreline. While the impacts of public access appear to be the primary cause of habitat degradation along the State Park's shoreline, limiting access would require a substantial change in the area's management and may run counter to Coastal Act provisions that largely support increased access to the shoreline. This option, too, would require additional study and would be subject to CDP review.
- **Abalone Research:** Because abalone is one of the significant species directly affected by DCP's thermal discharge, one of the mitigation options considered was to provide funding for abalone research. Again, this option would have limited benefit since it would benefit just one of the hundreds of types of organisms affected by the DCP cooling system. However, it is being given further consideration by the Department of Fish and Game in part to support their marine enhancement goals.
- **Use of PG&E Marine Labs:** One option considered is to allow the use of PG&E's marine laboratories by nearby educational groups; however, this option would not necessarily result in mitigation for the identified impacts.
- **Funding for Marine Reserves:** Marine reserves would likely provide mitigation for some of the DCP cooling system impacts, and some of this mitigation would likely be relatively high quality. While this mitigation option could result in substantial benefits, including direct benefits to some of the species entrained in DCP's cooling system, for purposes of Coastal Act conformity, the Commission generally does not consider funding in and of itself an adequate mitigation measure and so does not consider such a proposal sufficient. This option would require substantial additional planning to identify with certainty how the funds would be used and what benefits would accrue.

- **Funding for the CALCOFI Program:** The California Oceanic Cooperative Fisheries Investigation (CALCOFI) is a joint effort of several federal and state agencies studying California's marine environment. It has focused on identifying long-term trends in offshore plankton communities and their effects on various aspects of the marine ecosystem. Similar to the above issue, however, it would not necessarily result in appropriate mitigation for the impacts identified at DCP, as most of its data collection takes place further offshore and the data collection may not directly benefit the marine communities affected by DCP.
- **Funding for the Central Coast Ambient Monitoring Program:** This program provides several forms of monitoring of conditions in and along the nearshore waters in the Central Coast area. Again, similar to the above, however, neither funding nor ambient monitoring represent mitigation for the identified DCP impacts.
- **Conservation Easement:** The Regional Board considered including a form of conservation easement as part of its mitigation approach. The easement would have limited development within about 2,000 acres of shoreline and upland areas in the northern part of the Diablo Canyon lands between Fields Cove (just north of DCP) and Coon Creek (just south of the boundary with Montana de Oro State Park. The coastal trail approved by the Commission as part of DCP's ISFSI project is within this area. The easement would have allowed for ongoing agricultural practices and limited public access within this area. The draft agreement also called for protecting through Best Management Practices about 547 acres in the Coon Creek watershed to ensure that ongoing cattle grazing activities do not further degrade the nearshore environment. The draft agreement would have also required PG&E to provide a \$200,000 endowment for easement stewardship costs.

The agreement as proposed in the draft Consent Judgment mentioned above included provisions that would have limited the proposed easement's effectiveness. In a September 2005 letter, Commission staff identified several of these provisions as key deficiencies that would have resulted in conflicts with public access conditions of the CDP issued by the Commission for the ISFSI project. The proposed language also included a "termination clause" that would have allowed PG&E to opt out of the easement if any agency required any additional conditions affecting the power plant's cooling water system. While overall supportive of using a conservation easement to provide mitigation, Commission staff was concerned that this settlement language would fall short of providing an adequate level of protection or mitigation.

As noted above, these mitigation options have been considered as a part of a draft Order and draft Consent Judgment, but none have been implemented. There is still disagreement among the Board, PG&E, the Department of Fish and Game, and Commission staff about which mitigation measures are necessary and feasible. Although PG&E had agreed to the draft Consent Judgment, the Regional Board directed its staff to consider whether a different mix of mitigation measures might be more suitable. The agreement has also been on hold pending a decision in

federal court on a challenge to the U.S. EPA's recent rules about how once-through cooling intakes are to comply with the federal Clean Water Act. The Board has also deferred its decision to determine how the Commission will implement the public access requirement of PG&E's ISFSI project to allow coordination of the two agency's mitigation approaches and requirements. Board members have expressed less interest in the easement option in part due to concerns about how public access will mesh with the easement. However, the Commission's public access condition requires the access to be protective of the area's sensitive resources and is to be managed in part of a sensitive resource inventory of the area.

In 2005, Regional Board staff provided an update on the mitigation options, noting that there was still disagreement between the staff and PG&E on certain issues but that the involved parties were considering funding of marine protected areas as a main mitigation option. At this point, however, the adverse effects of DCP's cooling system remain largely unmitigated.

4.4.2.5 Conclusion

Regarding marine mammals, as noted above, with imposition of **Special Condition 4**, the SGRP will be adequately protective of marine mammals and therefore conform to this aspect of the marine resource protections of Coastal Act Sections 30230 and 30231.

Regarding cooling system-related impacts, results of the studies cited above show that the DCP's cooling system causes significant adverse and largely unmitigated impacts to the local and regional marine environment. The proposed SGRP would result in similar impacts and would cause those impacts to continue for at least ten years beyond when they would otherwise end.

As noted above, there have been several efforts to determine what mitigation measures would be feasible to avoid or minimize the cooling system's impacts. None of the avoidance or minimization options is considered feasible, so approval of the SGRP would require continued use of the cooling system. As noted above, only avoidance of once-through cooling effects would result in the proposed project's conformity to the provisions of Coastal Act Sections 30230 and 30231 requiring that marine resources be maintained, that biological productivity be sustained, and that the adverse effects of entrainment be minimized. Additionally, although some of the compensatory mitigation measures described above are feasible, none would provide the level of protection needed to "maintain, enhance, and where feasible, restore" those resources. Therefore, based on the studies cited and the information provided above, the Commission finds that the project as proposed does not conform to Coastal Act Sections 30230 and 30231 and to LCP Section 23.07.178. However, because DCP is considered a "coastal-dependent" industrial facility¹⁷, the Commission may therefore evaluate the proposed SGRP under Coastal Act Section 30260, which allows such projects to be approved in some instances even when they are found to be inconsistent with other Coastal Act provisions. The analysis and findings related to Section 30260 are in Section 4.4.7 of this report, below.

¹⁷ DCP is considered "coastal-dependent" pursuant to Coastal Act Section 30101, which defines a coastal-dependent development or use as that which "requires a site on or adjacent to the sea to be able to function at all."