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July 24, 2003

John L. Geesman, Commissioner and Presiding Member
William J. Keese, Chairman and Associate Member
California Energy Commission
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Subject: Docket Number 01-AFC-24, Comments on PMPD for Palomar Energy Project

Dear Commissioners Geesman and Keese:

Thank you for this opportunity to comment on the Presiding Members' Proposed Decision (PMPD) for the Palomar Energy Project (PEP). The CEC draft *2003 Environmental Performance Report* summarizes very effectively why Intervenor Powers and the Border Power Plant Working Group intervened in the PEP licensing process to advocate for the use of dry cooling at the site. The *Report* states *(pg. 90):*

Most of the state's surface water supplies currently experience both average year and drought year shortages, which are expected to increase by 2020 (DWR 1998). Additional shortages are likely to result not only from population increases, but also from increased water needed for environmental purposes, particularly for the north coast rivers and the Sacramento-San Joaquin Delta. Water deliveries across the state will be affected by these increased demands and will result in less water available for consumption. After years of California using more than its allotted amount of Colorado River water, the U.S. Department of the Interior has followed through on its promise to reduce California's entitlement to 4.4 AFY, creating a serious crisis for Southern California's Colorado River water users, and in turn, for power plant owners wishing to use that water.

The document further states under "Emergence of Alternative Cooling Technologies" (pg. 95):

The technology to reduce or avoid the use of fresh water for cooling has seen substantial increases in quality and decreased in cost. Since 1996, California has added two facilities (Crockett and Sutter) which generate power using dry cooling technology, and a third will be added when construction of Otay Mesa is completed, for a total of 1,290 MW of dry cooled generation added. The 500 MW Three Mountain Project was licensed with a parallel wet/dry cooling system, which will use dry cooling throughout average conditions, and employ wet cooling supplementation during hot weather. These projects minimize water use to the greatest extent possible, and provide a useful benchmark for new power plant development in a state facing long-term water supply problems.

It is important to note that the CEC is not the only branch of state government that is addressing the issue of power plant water use. Gov. Gray Davis has officially acknowledged the need to minimize water use in power plants as a co-signer of the June 2002 Border Governor's Conference Declaration which states: "*Promote the development of an environmental strategy for new electrical generation plants in the border region with the goal of protecting air quality, and, where possible, conserving water resources in the region."* California officials can point to this declaration by the Governor as a mandate to ensure that new power projects maximize water conservation.

San Diego County is perpetually short on water and the situation is getting worse. The only baseload power project the CEC has ever permitted in San Diego County is the Otay Mesa Project (2001), similar to PEP in all respects except that it will use dry cooling. The dry-cooled Otay Mesa Project is the appropriate, commonsense power plant model for plants built in San Diego County.

PEP could not be authorized to use potable water at the Escondido site if reclaimed water was not available. Therefore the reclaimed water consumed by PEP will not decrease the region's potable water demand. PEP will simply divert a tremendous quantity of reclaimed water that could be used for legitimate potable water displacement projects, and it will divert this water for 30 to 50 years.

The following paragraphs provide detailed comments on the PEP PMPD.

Ammonia Emissions from Cooling Towers

The PMPD states that the Applicant estimates 37.5 tons/year of ammonia emissions from the cooling towers (PMPD, pg. 113). The accuracy of the Applicant's estimate is uncertain and unverified. The Applicant had estimated no ammonia emissions from the cooling towers until the Intervenor demonstrated conclusively that there would be significant ammonia emissions from the towers. The Applicant then simultaneously demonstrated through a secondary PM_{10} formation modeling exercise, using an approach that was neither verified nor peer-reviewed, that the impact of these emissions on secondary PM_{10} formation would be insignificant.

The PMPD then quotes the FSA where Staff note they can not characterize the Escondido area as consistently "ammonia limited." Finally, Staff's expert witness is cited as testifying that both the Applicant and Intervenor Powers may have overestimated cooling tower ammonia emissions because the reaction between ammonia an chlorine in biocides added to the cooling tower would reduce the amount of ammonia available for stripping.

Clearly the PMPD is intent on dismissing the cooling tower ammonia issue. Serious scrutiny of this issue shows there are far more questions than answers. The Staff "expert" who testified about the reaction between ammonia and chlorine in biocides is a toxicologist, not a power plant water chemistry expert. He is not qualified to comment definitively on this issue and should not be cited in the PMPD as the Staff's expert witness on water chemistry. Approximately 10 mg/l

chlorine is necessary to "neutralize" each 1 mg/l of ammonia (Exhibit 106, p. 2) in the cooling water. PEP is proposing an average chlorine dosage rate of approximately 3 mg/l in a cooling tower with ammonia concentrations in the 20 to 30 mg/l range. The biocide dosage rate proposed by PEP (PMPD, pg. 185) is as little as $1/100^{th}$ the biocide dosage rate that will be needed to generate the desired "free chlorine" residual in the circulating cooling water. The CEC has evaluated a project that will store a 30-day supply of 2,500 gallons of sodium hypochlorite onsite. The CEC has not evaluated the implications of storing the much greater quantities of sodium hypochlorite onsite necessary to deal effectively with ammonia in the cooling water. The CEC has not evaluated the implications of up to 100 times the sodium hypochlorite truck traffic necessary to provide an adequate supply of sodium hypochlorite onsite. The CEC has not evaluated the very significant odor that would be caused by the high concentration of chloramines emitted from the cooling tower if PEP actually attempted to address the ammonia issue solely through the addition of copious amounts of sodium hypochlorite.

The expense of using sodium hypochlorite as a biocide in a cooling tower with an ammonia concentration of 20 to 30 mg/l would be prohibitive. This will not be the procedure used by PEP to address ammonia. Intervenor Powers covered this issue in a presentation given at the PEP alternative cooling options workshop in Escondido in October 2002 (Exhibit 91). The most likely solution is that either PEP or Escondido Public Works will have to add a nitrification-denitrification process step to remove the ammonia before it reaches the cooling tower. This has been done by a number of industrial reclaimed water users in the Los Angeles Basin. This is also what Sempra Energy did at a project similar to PEP in Mexicali, Mexico that uses reclaimed water for cooling.

The PMPD states (PMPD, pg. 155) that Condition of Certification PUBLIC HEALTH-1 will effectively address all of these doubts. This condition requires preparation of a monitoring plan at least 60 days prior to the commencement of operations, and periodic monitoring to confirm biological growth in the tower is minimized. This is an inadequate response. The fundamental function of the CEC licensing process is to ensure that the project is designed properly at the time it is certified. It is not appropriate for the CEC to certify a project that clearly <u>will not work</u> as proposed by the Applicant and hope that somehow it will be repaired on the fly by the time monitoring actually begins. Condition of Certification PUBLIC HEALTH-1 will be far too little and far too late to address a fundamental design flaw. The issue will have to be addressed. However, following the logic of the PMPD, this will occur after the project is certified and without the structured review that the CEC licensing process affords all interested parties.

Cumulative Impact of Using Reclaimed Water at PEP

The PMPD states (PMPD, pg. 236) that: *"The City's Director of Utilities testified there is ample supply of recycled water from the HARRF to suppy the needs of PEP without impacting other users. Even with the power plant's 3.6 Mgd (million gallons per day) use, daily flows to the various customers will remain below the 9 Mgd capacity of the system. The plant's use of recycled water will not prevent other currently identified customers from obtaining their full share of recycled water. . . Morever, if demand should increase in the future, the City's recycled*

water production capacity can be expanded, thereby ensuring that Palomar Energy will have a stable long-term supply of water without precluding other potential future users."

The PMPD relies exclusively on the City of Escondido to dismiss two viable options for HARRF reclaimed water, avocado grove irrigation and the San Pasqual Valley aquifer recharge project (PMPD, pg. 240). The City of Escondido has a financial interest in supporting use of reclaimed water at PEP and in undercutting competing uses. The study the City of Escondido relies on to reject use of reclaimed water in the City's avocado groves is flawed (Ex. 108, p. 12). The neighboring town, Ramona, uses reclaimed water for avocado grove irrigation. The U.S. Bureau of Reclamation, in addition to providing $17 million to build the HARRF reclaimed water facility, provided over $360,000 for studies designed to move the San Pasqual Valley aquifer project forward (Ex. 108, p. 12). Clearly the U.S. Bureau of Reclamation sees the San Pasqual Valley project as an excellent candidate for reducing pressure on Colorado River water imports.

The very cursory water resource cumulative impacts analysis summarized in the PMPD hardly supports the assertion that (PMPD, pg. 237): *". . . the overwhelming weight of the evidence establishes that use of recycled water for project cooling will not result in any significant adverse impacts to regional water supplies."* The PMPD focuses exclusively on Escondido, ignoring impacts on surrounding towns, the region, and the state. There is no mention of the fact that PEP, an optional water user given the dry cooling alternative, will deny 3.6 Mgd of reclaimed water to potential "water essential" users in the area. The only acknowledgement that demand for reclaimed water might grow over time is the passing commentary that production capacity can be expanded if necessary. The $65 million HARRF reclaimed water plant was built with U.S. Bureau of Reclamation grant funds (25%) and State Water Resources Control Board zero interest loans (75%). The initial 9 Mgd project was financed during a time of economic bounty and fiscal surpluses. We have entered into what appears to be a long period of unprecedented deficits. It is not realistic to suggest that if interest in reclaimed water grows the City will simply add a second phase. Where will the money come from? It would be much more appropriate to assume that the current 9 Mgd capacity is all the capacity the City will have for the foreseeable future, and to assure that all of this capacity goes to "water essential" uses that displace imported water demand.

The PMPD states that the San Diego County Water Authority indicated support for use of recycled water at PEP. It is not at all clear from the Water Authority letter (Exhibit 26) whether the Water Authority was even aware that PEP could not use potable water at the site if reclaimed water was not available. Use of reclaimed water at PEP will not displace one gallon of imported water supplies. This directly contradicts the goals of the 2000 Urban Water Management Plan described in the same letter, *". . . which proposes expansion of the recycled water customer base to help offset the need to import additional water supplies."*

Dry Cooling Alternative

The PMPD quotes the Applicant in describing the differences between wet and dry cooling (PMPD, p. 239). Much of what is cited was largely debunked during the evidentiary hearings.

The peak temperature at the site is 100 ^{o}F, not 110 ^{o}F (Ex. 109, p. 2). The site averages only 10 hours/year at or above 95 ^{o}F. Use of a 110 ^{o}F design temperature at PEP would result in an air-cooled condenser (ACC) significantly larger and more costly than necessary for the site.

The Applicant's assertions (PMPD, p. 239) against dry cooling were anticipated in CEC staff Recommendation D in the June 5, 2001 CEC Water Workshop Summary (Ex. 109, p. 17):

Staff recommends that the Energy Commission develop and implement a policy that requires new generation to maximize water conservation measures for power plant cooling. . . Staff believes this policy (SWRCB Resolution 75-58) does not adequately address the true costs of using fresh or even potable water for power plant cooling in California. . . . For example, due to the greater capital cost and efficiency penalty associated with dry cooling , the reliance on economic criteria will almost always favor wet cooling and ignores long term reliability concerns as well as issues of protection of a limited resource.

The greatest emphasis in such a policy should be given to the use of dry cooling because, although more expensive, dry cooling significantly reduces facilities' water demand, removes a major siting constraint and ensures facility reliability during emergencies and droughts.

The PMPD correctly notes that (PMPD, p. 241) *"Intervenor Powers argues that neither Applicant nor Staff used appropriate optimization criteria in considering the dry cooling alternative. . . Intervenor contends that Staff's failure to use the Otay Mesa project design as the model for analyzing the PEP project is a fatal flaw in the alternatives analysis since Otay is in San Diego County and about the same size (540 MW) as the PEP."* The PMPD attempts to dismiss Otay Mesa in a footnote stating that the Otay Mesa site has a different climate and topography compared with the PEP site. This statement is incorrect. The PEP and Otay Mesa site elevation and temperature profiles are essentially identical, as was stated clearly by Intervenor Powers at the evidentiary hearing.

The PMPD claims the dry cooling analysis performed by Staff met the "sufficiency" standard necessary for CEQA (PMPD, p. 242). The Staff assumed a ACC basecase where height and noise are not a concern, and then question the suitability of ACC based on concerns over height and noise. This is not "sufficient." The Otay Mesa design is an off-the-shelf ACC design approved by the CEC that is optimized for height and noise in a suburban environment. That is exactly the situation at PEP. The site elevation and temperature conditions at Otay Mesa are essentially identical to those at PEP. Otay Mesa is the only baseload power plant that has ever been licensed by the CEC in San Diego County. It is reasonable to assume that local citizens are familiar with the Otay Mesa design, which was highly publicized locally as the model of environmental sustainability when the plant was licensed by the CEC in 2001. The CEC hearing officer for PEP was also the hearing officer for Otay Mesa. Intervenor Powers has been asking the CEC to use Otay Mesa as the template for the PEP ACC since the initial PEP licensing workshop in Escondido in March 2002. Any of these reasons alone is sufficient for CEC Staff to use the Otay Mesa ACC as the template for PEP. Taken together they are overwhelming justification for using Otay Mesa as the template for PEP.

The statement is made (PMPD, p. 243) that *"It was Intervenor's burden, however, to prove the Otay Mesa design would have offered the more appropriate template for the dry cooling alternative. Rather than criticizing Staff's analysis, Intervenor had the opportunity to establish the validity of his contention but he failed to do so."* This statement is incorrect. The PMPD recognizes on p. 302 that Intervenor Powers did submit an analysis regarding the size and height of an optimized dry cooling proposal. The optimized design was entered into evidence as Exhibit 112. The capital and operating costs of the optimized ACC design were presented at the evidentiary hearing. These costs were compared to those of the ACCs evaluated by the Applicant and the CEC Staff in the Intervenor brief submitted following the evidentiary hearing. This cost comparison is included in this PMPD comment letter as Attachment A. As shown in Attachment A, there is essentially no cost difference between wet cooling and dry cooling at PEP over the life of the project.

The PMPD notes that (PMPD, p. 242) *". . . review of the dry cooling option was instigated by the Intervenor who indicated his belief that the majority of power plant projects in California should employ dry cooling technology as a matter of statewide conservation policy."* This statements appears to paint the Intervenor's position as radical, when in fact it is in harmony with Recommendation D of the June 5, 2001 CEC Water Workshop Summary and the draft *2003 Environmental Performance Report*. The PMPD goes on to dismiss any statewide considerations by pointing out that projects are reviewed on a case-by-case basis. This response underscores the legacy the CEC will leave following this period of rapid power plant development in the state – the Commission recognizes the water problems faced by the state of California, the Commission understands the statewide need to minimize power plant water use, and yet the Commission has been unable to effectively protect these water resources due to over-emphasis on a case-by-case licensing approach and an unwillingness to require Applicants to employ water conservation technologies if the Applicant(s) do not volunteer to do so.

As noted in the CEC's draft *2003 Environmental Performance Report* (Table III-10), nearly 50,000 acre-ft/year of potable groundwater, surface water, and fresh State Water Project water has been licensed by the CEC for use in new San Joaquin Valley power plants. This reflects poorly on California and implies that we are not serious about effectively conserving our water resources. The primary reasons that so many recent California power projects have been authorized by the CEC to use fresh water for cooling are the CEC's case-by-case approach to licensing and reticence to challenge Applicants. In contrast, all new power plants built in Nevada are dry-cooled, as are most new plants built in locations as diverse as Massachusetts, New York, and northern Mexico.

Visual Resources

The PMPD incorrectly identifies the heat recovery steam generators (HRSGs) as 85-feet tall. The Applicant identifies the HRSGs as 102-feet tall (Ex. 1, p. 2-15). The Applicant is aware that residents in surrounding neighborhoods are concerned about the height of structures at PEP (Ex. 35, p. 11). However, the Applicant also crossed an important ethical line to make the project appear less visually intrusive than it actually is. Elevation views and "Key Observation Point"

(KOP) photo-simulations in the AFC (Ex. 1, KOP-1, KOP-3) are distorted to make the HRSGs appear considerably shorter than they actually are. CEC Staff used the same distorted photo-simulations to assess the visual impacts of PEP in the FSA (Ex. 50, KOP-3). Knowingly submitting distorted schematics that present a "too good to be true" impression of visual impacts should at a minimum merit a strong rebuke from the CEC. The PMPD is silent on this issue. The entire evidentiary process is compromised when evidence is submitted that is clearly false or distorted and there are no repercussions. Equally disturbing, the PMPD cites the CEC Staff conclusion (PMPD, p. 294) based on the Applicant's distorted schematics and photo-simulations that *"the project is not expected to produce significant visual impacts."* How is such a conclusion reached when Staff is looking at distorted photo-simulations?

The PMPD notes that (PMPD, p. 302) *"According to the Applicant, a dry cooling system would be considerably taller and more massive than the plume-abated wet cooling system and not responsive to community concerns regarding visual impacts."* The Applicant responded (in part) to community concerns regarding visual impacts by distorting schematics and photo-simulations to make the project appear less visually intrusive. CEC Staff did not catch these distortions and based their conclusions on this incorrect information. The Intervenor responded by proposing an optimized ACC with a height as low as 70 feet, 32-feet lower than the HRSGs and comparable to that of the 65-foot plume abated tower. It is important to note that the plume abated tower will have a plume as high as 40 feet under certain atmospheric conditions. It would be difficult to make a credible argument that a 70-foot high ACC with no plume at any time is more visually intrusive than a 65-foot high cooling tower with periodic plumes.

Summary

We urge you to prepare a revised PMPD that adequately addresses the following critical PEP issues: 1) the huge discrepancy between the amount of sodium hypochlorite biocide usage proposed and what is needed to effectively address the ammonia in the reclaimed water, 2) the long-term local, regional, and state impact of diverting 3.6 Mgd of reclaimed water to PEP, 3) a fair assessment of dry cooling at PEP using Otay Mesa as a template, and 4) schematics and photo-simulations of the proposed project that accurately reflect reality.

Sincerely,

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Attachment A. Comparison of Cooling System Configuration, Capital, and O&M Costs[a]

Parameter	Proposed PEP Evaporative Cooling Tower	CEC Generic ACC	Optimized PEP ACC Using Otay Mesa Template[b]
Cooling System Configuration			
Cooling system height	65 ft., up to 40 ft. vapor plume in high humidity conditions	100 ft., no plume at any time	75 ft.[c], no plume at any time
Cooling system footprint	340 ft. by 55 ft., single block[d]	268 ft. by 191 ft., single 5x7 block	285 ft. by 128 ft. (each), two 3x6 blocks
Sound level, dBA	47 at 2,300 ft.	65 at 400 ft.	< 45 at 400 ft.
Capital Cost Estimates	**$14 to $18 million[e]**	**$30 to 35 million[f]**	**$30 million[g]**
O&M Cost Estimates			
Number of fans	7	35 - 40	36[h]
Fan power demand, kw	150	150	75
Parasitic load of fans, kw	1,050	5,250 – 6,000	2,700
Pump power demand, kw	1,790[i]	0	0
Parasitic power sum	2,840	5,250 – 6,000	2,700
Annual power cost at $0.03/kwh, with 90% capacity (7,884 hr/yr)	$670,000	$1,240,000 to $1,420,000	$640,000[j]
Water consumption	1.2×10^9 gal/yr (3,683 acre-ft/yr)	0	0
Unit water cost	$540/acre-ft	NA	NA
Annual water cost	$1,990,000	0	0
Annual cost of water treatment chemicals	$300,000[k]	0	0
Cooling system wastewater generation	0.3×10^9 gal/yr[l] (921 acre-ft/yr)	0	0
Annual cooling system wastewater disposal cost	not identified	0	0
ACC fuel efficiency penalty	base	1.77%	1.0 to1.5%[m]
Annual cost of fuel penalty	base	$1,300,000	$730,000 to $1,100,000
Sum of annual operating costs	$2,960,000	$2,540,000 to $2,720,000	$1,370,000 to $1,740,000
Cost Summary			
Capital Cost	$14 to $18 million	$30 to $35 million	$30 million
Present O&M worth (@ 8%, 30 years)	$33 million	$29 to $31 million	$15 to $20 million
Present worth	**$47 to $51 million**	**$59 to $66 million**	**$45 to $50 million**

Footnotes:

a. All costs shown in table are from pages 4.9-A33 to 4.9-A36 of FSA unless otherwise indicated.
b. All data from Exhibit 112. All three principal manufacturers of ACCs for power plants confirmed that a 36-cell ACC equipped with ultra-low noise 100 hp fans would maintain steam turbine backpressure at well under 8 inches Hg at maximum representative 1-hour site temperature of 101 ^{o}F.
c. A 70-foot overall height can readily be achieved by splitting the ACC into three 2x6 blocks. There is ample space at the PEP site for either the two 3x6 block ACC configuration or the three 2x6 block ACC configuration.
d. Figure 2.4-1, Application for Certification (Exhibit 1)
e. Applicant estimates a capital cost of approximately $18 million (Exhibit 90). The CEC generic evaporative tower estimate of $14 million.
f. Applicant estimated a cost of $31.5 million for the ACC (Exhibit 90).
g. Delivered equipment cost estimated at $600,000 per cell by Hamon Dry Cooling (Exhibit 112). Fifty (50) percent adder assumed for union labor installation, for an installed cost of $32 million. A $2 million credit is assumed for the less complex steam turbine used with the air-cooled condenser (Exhibit 96). Net installed capital cost of the air-cooled condenser alternative is $30 million.
h. Sempra Energy also estimates that 36 ACC cells would be necessary for the site (Exhibit 35).
i. The FSA incorrectly assumes the evaporative cooling tower proposed at PEP is a conventional tower. The proposed tower is a plume abatement tower with twice the pump head of conventional tower (55 ft. vs. 27 ft.). For this reason, pump power demand is double (1,790 kw) the FSA estimate of 895 kw.
j. Note there is essentially no difference in parasitic load between the wet cooling and optimized ACC options, therefore there is no lost revenue due to a parasitic load differential.
k. Palomar 2002b, submitted to CEC on November 14, 2002 (Exhibit 90).
l. April 2003 rebuttal response of Donald Shilling states four cycles of concentration will be used at PEP (ratio of makeup reclaimed water to cooling tower wastewater discharge is 4 to 1) – Exhibit 35.
m. CEC estimate of ACC fuel efficiency penalty at Sutter Power Plant Project is 1.5 percent (Exhibit 85). The Sutter ACC operates in a much hotter summertime climate regime than the Palomar site (Exhibit 96). It is reasonable to assume that the annual thermal efficiency penalty at Palomar will be significantly less than that at Sutter if an equally robust air-cooled condenser is used at Palomar. A 1.0 percent annual thermal efficiency penalty is assumed to represent the best case scenario for ACC thermal efficiency penalty at Palomar for the purposes of calculating the cost impact of the fuel efficiency penalty.