Comments of Pacific Gas and Electric Company
September 12, 2014

Alternative Cooling Technologies or Modifications to the Existing Once-Through Cooling (OTC) System for Diablo Canyon Power Plant

Prepared by Bechtel Power Corporation
for the
State Water Resources Control Board – Nuclear Review Committee

GENERAL COMMENTS

Costs

As requested in our earlier comments, Bechtel has incorporated PG&E projected additional owner's costs into the various options. While these costs still do not reflect the full cost of each option, as by design some of the costs do not include inflationary escalation factors, they do provide an overall sense of the magnitude of the initial project costs in current (2013) dollars which would be borne by our customers: $8.6 to $14.1 billion for freshwater wet or dry cooled towers, $6.2 to $8.0 billion for saltwater towers, and $456 to $675 million for the screening technology options.

However, the costs in the report represent project installation and other initial costs, but do not reflect ongoing additional costs due to increased annual plant operations and maintenance burdens, and replacement power due to generating unit derates (a reduction in net power to the grid due to parasitic load and reduced generating efficiency). For the freshwater tower options, these additional costs are estimated to be between $50 to $86 million annually, and for the saltwater tower option, this number is projected in the range of $98 to $120 million given the significant unit derates, higher routine maintenance costs due to salt drift, and the ongoing need to bus employees to the plant site due to the permanent loss of a significant portion of existing parking areas.

Bechtel also acknowledges that mitigation costs for these large-scale industrial projects are difficult to estimate and there are no consistent figures included within the report. However, Bechtel does state that costs in the range of 5% of project costs may be possible -- and this would suggest mitigation on the order of several hundred million dollars.

Permitting

As we have commented previously, Bechtel's estimate of roughly four to five years to develop permit applications and receive all the necessary approvals/authorizations is likely not sufficient. While these timeframes may make sense based on agency guidelines or some past experience, we believe that permitting any of the options will be a tremendous undertaking and thus, the estimated permitting schedules are at significant risk. All of the options, but especially the cooling tower options, will require detailed and time-consuming permit application documentation, many governmental approvals, and are likely to face substantial challenges from various organizations.

Although Bechtel does not agree, PG&E continues to believe that a Nuclear Operating License Amendment Request (LAR) would be necessary for all but the fine-mesh screening technology option -- and this will add time and complexity to the permitting process.

Additionally, developing permit applications and working with the various agencies through final approval is likely to cost more than twice what Bechtel estimates. PG&E's experience with permitting projects at Diablo Canyon suggests permitting costs on the order of $10 to $15 million - not $3 to $4 million.

Lastly, for the saltwater tower option, the ability to permit PM-10 emissions through offsets via road paving is speculative. While it has been done before, the number of tons projected to be offset at Diablo Canyon is substantially larger, and the San Luis Obispo County (SLO) Air District would need to go through an involved regulatory process to formally adopt a rule and a formula for determining how many miles of road would need to be paved to achieve the offset. This will be a lengthy and time-consuming process - and it is not at all clear that there are enough qualified unpaved roads in the county to meet the very substantial offset requirement.

COMMENTS ON EACH TECHNOLOGY

Fine Mesh Screens

Bechtel modified the final report text to reflect the revised Tenera Report (10/29/13) information but continues to suggest that this technology would be effective. While entrainment losses could theoretically be reduced by at most 39.7% for 1-mm slot sized screens, and only 8.4% for 2-mm slot sized screens, larval survivability after initial impingement is unclear. Bechtel does not address or acknowledge Tenera's additional report developed for the Review Committee (Evaluation of Fine-mesh Intake Screen System for the Diablo Canyon Power Plant [08/2013]) assessing larval survivability associated with this screening technology. This evaluation concludes that “studies at DCPP show that the vast majority of the fishes entrained were very small and based on other studies, the probability of these larvae surviving impingement, screen-wash systems and fish return would be very low.” Further, operational issues regarding biofouling and clogging have not been adequately addressed. PG&E believes that these issues, when evaluated together, demonstrate that this technology would not achieve the OTC policy's objective.

There also continues to be some difference of opinion regarding the seismic qualification of the plant intake structure, and what would be necessary to support the structure during the proposed modifications to implement the fine-mesh screen option. While PG&E believes that the best approach would be a 12-month dual-unit outage, there remains the possibility, as posed by Bechtel, that additional cross-bracing of the existing structure during modification may sufficiently resolve the concern and eliminate the need for dual-unit outages. However, this issue requires further engineering evaluation.

Wedgewire Screens

It must be noted that there are no existing open ocean installations of wedgewire screens and thus, there are serious concerns regarding operability and effectiveness of the technology at Diablo Canyon.

Bechtel has revised the report to adequately address permitting for the proposed technology Pilot Study. However, PG&E continues to believe that a Pilot Study must be conducted for at least two or more years in order to appropriately assess potential operability, debris loading, and corrosion issues in an open ocean saltwater environment. One year is simply not enough time to adequately evaluate these types of issues.

There continues to be a difference of opinion on the installation of the wedgewire screens. PG&E believes that an 8-month dual-unit outage is necessary, and thus substantial replacement power costs would also be incurred during project implementation. An outage of this magnitude would add $560 million in replacement power costs.

Closed-Cycle

Freshwater – North

PG&E continues to believe that these options are likely not feasible given the enormous cost and excavation. Permitting for the excavation and the installation will be incredibly difficult, if not impossible, given the tremendous environmental footprint and adverse impacts.

These options all essentially require the removal of a mountain – with excavation between 190 million and 316 million cubic yards – to create a 62 or 109 acre level pad for the cooling towers. To put the size of the proposed excavation in perspective, the Panama Canal required an excavation of approximately 240 million cubic yards for the 48-mile long passage. The excavation would require approximately 310 acres of canyon area north of the plant to be filled to a height of between 320 and 500 feet. Thus, at a minimum, these approaches would irreversibly impact roughly 400 acres north of the current plant site.

Further, though requested for evaluation by the committee, PG&E believes that the reclaimed water component of this option is unworkable. Given the state's drought situation, there are far better uses for this reclaimed water than providing less than 10% of the water needed for Diablo Canyon freshwater cooling towers, and the adverse environmental impacts of building the piping system must be considered as well.

Saltwater – South

Although less costly than the freshwater options, the estimated installation costs of between $6 – $8 billion, along with significant unit derates and permitting challenges, suggest that these options are likely not feasible at the Diablo Canyon site.

As noted in the general comments, air permitting for PM-10 presents a potentially significant challenge and the permitting process would take time for SLO-APCD to develop. While there are examples of air districts within California that have used road paving as an offset to PM-10 emissions, the scope of the examples are not similar to the proposed saltwater cooling tower

retrofit of Diablo Canyon, and the scale of emissions offsets approved are significantly less than what would be required. Additionally, many factors such as traffic counts, vehicle speed, and road composition must be estimated and evaluated to calculate the required road miles that must be paved to provide sufficient offsets. It is not realistic to use Mojave Desert area data to estimate needed road miles in San Luis Obispo County. Lastly, the process to develop and approve offsets at the local air district level would be considerable, and pre-construction approval of a Prevention of Significant Degradation of Air Quality (PSD) permit would require approval of Federal EPA.

The saltwater cooling tower installation would derate the power plant between 192 and 244 MWs. This is a significant derate, and would cost between $78 to 100 million (2013 dollars) in replacement power on an annual basis following retrofit.

The towers will contribute significant salt drift and the report notes only that there will be an "additional level of effort" needed to address detrimental effects. The actual impact of salt drift, including the potential for adverse impacts to generating unit operability in certain conditions, has not been fully defined. Though prevailing winds at the plant site are generally from the northwest, which would drive the salt plume away from the plant during those periods, 14-15% of the time during an average year the wind direction would drive the salt drift immediately over and onto the exposed high-voltage electrical system infrastructure of both Unit 1 and Unit 2, potentially causing plant trips due to flashover, and thereby adversely impacting reliability. Our estimates indicate that increased annual operations and maintenance costs, a significant portion of which would be required specifically to address the salt drift, would be at a minimum in the range of $9 million annually. Further, additional maintenance activities may not be sufficient to reduce elevated risks of electrical system flashovers and potential unit/reactor trips due to those faults.

The report does not address the total additional costs for ongoing plant operations following retrofit, which will likely be in the range of $98 to $120 million a year; including increased operations and maintenance, the replacement power costs for the significant plant derate noted above, and costs to shuttle employees to the site from offsite parking locations.