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Energy Commission Staff Response to Bimbo Bakery USA Comments on the Palomar Energy Center Chiller Amendment

Testimony of Matthew Layton
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Staff performed an independent assessment of the Application for Certification (AFC) of the Palomar Energy Project in 2002 and 2003 and concluded that the project impacts could be mitigated to a level of insignificance. Staff monitored project compliance with the conditions of certification during construction and commissioning activities.

Staff continues to monitor project operations. The most recent amendment request proposes to replace the existing combustion turbine inlet evaporative cooler with refrigeration inlet chillers. Staff has reviewed the request and provided an analysis. Staff found that the existing project was in compliance with its conditions of certification, and that the project's operations and impacts would not change with incorporation of the chillers, such that no changes were necessary to the Air Quality conditions of certification beyond the inclusion of a greenhouse gas reporting condition.

One business adjacent to the Palomar Energy Center (PEC), the Bimbo Bakery operated by Bimbo Bakery USA (BBU), filed a comment letter on the staff analysis and the amendment request. In brief, BBU believes that the current operation of the PEC is causing adverse conditions at their facility, which are degrading the quality of bakery goods. BBU suggests that the incorporation of the chillers "will only make a bad situation worse." In their comment letter, BBU state that a link has been "found" or "observed" between the existing cooling tower, staining on the bakery roof top and mold in their bakery and bakery goods.

Staff has had discussions with the bakery and power plant operator, visited both sites, reviewed power plant operations data and reports, and coordinated with a local air district investigation of a complaint about the PEC cooling tower. Staff did not find or observe a link between the cooling tower, the bakery roof staining and the alleged mold problem in the bakery and bakery goods. Staff does not believe the incorporation of the chillers into PEC will change current compliance of PEC with its conditions of certification, or cause significant impacts.

Chillers

The proposed PEC chillers can increase the efficiency of the combined cycle power plant operation, compared to no chilling or evaporative inlet cooling, during periods of elevated ambient temperatures. However, the chillers may decrease the efficiency of the combined cycle during periods of low ambient temperature.

The use of "chillers" to heat inlet air during low ambient temperatures is not intended to improve performance but prevents ice formation in the combustion turbine compressor inlet after the inlet filters. Ice (as well as other solid particles) can damage compressor blades.

The proposed chiller will not significantly change current conditions, as the conditions of certification currently limit annual water use and cooling tower PM10 emissions, thereby limiting total cooling tower evaporation and heat rejection. The plant already can and does operate at different levels depending on the time of day, week or year, resulting in variable stack emission rates and cooling tower heat rejection rates. Additionally, staff has looked at the design and compliance of the existing facility with the conditions of certification.

Staff does not agree that a potential increase in instantaneous evaporation described by BBU from the cooling tower is significant, especially with respect to allegations of any moisture and humidity impact on the bakery roof top, staining of the roof top, and mold issue in the bakery and on the product. BBU did not (and cannot) show that additional moisture on the roof, if any, will cause an immediate surge in roof staining and mold colonies in the bakery and on bakery products as alleged by BBU.

Drift Eliminators

The drift eliminator efficiency of 0.0005% was specified for particulate control from the cooling tower and not due to the use of recycled water for make up water as suggested by BBU. The combination of drift eliminators, limits on total dissolved solids (TDS) and circulating water flow place an upper limit on particulate matter less than 10 microns (PM10) emissions and the emission rate from the cooling tower. The PM10 emissions can be modeled and conditioned in an operating permit. Drift eliminators at 0.0005% efficiency are typically required for power plants licensed by the Energy Commission. A recent report¹ by the cooling tower manufacturer SPX Cooling Technologies, Inc², found that the cooling tower and internal components were in very good condition. Flow measurements and inspections indicated that the drift eliminators were installed and operating correctly, which indicates their operation within design specification (i.e., 0.0005% drift).

Staff also reviewed the water chemistry records and tests for the PEC cooling tower. Water chemistry and microbiology activity was within specifications and no Legionella activity was detected. Staff believes that PEC cooling tower drift is at or below 0.0005% and does not contain significant levels of mold or biological material. Concerns about the use of recycled or reclaimed water and potential biological constituents were raised and analyzed in great detail in the staff

¹ Inspection Report 2007-05-25, SPX Cooling Technologies, Inc.

² Marley was the manufacturer of the Palomar Energy Center cooling towers and plume abatement system. Marley is now part of SPX Cooling Technologies, which includes the cooling tower manufacturers of Balcke, Hamon Dry Cooling, and Marley.

assessment of the AFC. The Energy Commission encourages the use of reclaimed water for power plant cooling as a state policy. However staff always analyzes the potential constituents and public health implications, and conditions and monitors its use via a cooling tower water chemistry program. BBU incorrectly commented that staff had not considered the effects of recycled water.

Plume Abatement System

The plume abatement system and controls are a predictive control system that is fully automated regardless of the time of year or day. If the controller predicts ambient conditions that might result in a visible plume, the louvers in the abatement system are adjusted to minimize the formation of a visible plume. Time of day or year is not a factor in the operation of the automated system.

BBU suggests that observation and information obtained proves or suggests that the plume abatement system and controls are not adequate, or that the design point may be incorrect. Additionally BBU states that the existing plume abatement system may not be able to mitigate visible plume formation from the increased heat rejection with the addition of the chillers.

A recent report³ by the cooling tower manufacturer, SPX Cooling Technologies, Inc, found that the plume abatement portion of the cooling tower was in good condition, and flow velocity measurements were within design specifications. Note that the project and cooling tower and plume abatement system was designed to handle both base operations and duct burning operations, which can cause a 20 percent increase in cooling tower heat rejection and circulating water evaporation.

Wind Effects

Wind roses in the AFC for 1998, 1999 and 2000 indicate the prevailing winds are from the west, about 15 degrees off the longitudinal axis of the PEC cooling tower, at about 20 percent of the year. The second highest wind direction is from the WSW about 12 to 17 percent of the year, parallel to the longitudinal axis of the cooling tower. When combined with the winds from the east, the PEC cooling tower, as built, sees winds within 15 degrees of the longitudinal axis of the cooling tower about 60 to 70 percent of the year, depending on the year. If the cooling tower had been oriented east-west, as suggested by BBU to ensure that the inlets were parallel to the prevailing westerly winds, the cooling tower would have still seen winds within 15 degrees of the longitudinal axis of the cooling tower about 60 to 70 percent of the year, depending on the year.

This suggests that the PEC cooling tower is well oriented for wind conditions likely at PEC over the course of a year, given that most winds are within 15 degrees of the longitudinal axis of the tower on an annual basis. The cooling tower could have been oriented to optimize for the worst case (for heat rejection)

³ Inspection Report 2007-05-25, SPX Cooling Technologies, Inc.

conditions – hot Santa Ana winds generally from the ENE that often occur at the same time that regional electricity demand can peak. However, staff does not disagree with the speculation of BBU that noise may have also been one of the design considerations in the orientation of the tower. Note that the PEC cooling tower met its performance guarantees at commissioning, and the project owner has not reported any curtailment of power plant operations due to limits on heat rejection in the cooling tower (i.e., re-entrainment of the heated plume due to wind, which might degrade cooling tower performance) over a year and half of operation.

BBU raises the issue of tower orientation to prevailing winds to suggest cooling tower plume downwash or “lee side draw” may be occurring that results in the cooling tower plume concentrating its effect on the adjacent roof top of the Bimbo Bakery. The photograph supplied by BBU (II.H.) to illustrate the lee side draw does not contain a time and date stamp to correlate with meteorological conditions, so it is not useful in quantifying the potential for the PEC cooling tower to affect the adjacent buildings.

According to good cooling tower design practices, the PEC tower is correctly oriented with the prevailing winds and also to achieve maximum plume rise. Wind moving parallel to the line of fans (i.e., the eight cells in the PEC cooling tower) causes the separate effluents for each fan cylinder to ‘stack up’ one on another, forming a concentrated plume of greater buoyancy.⁴

BBU commented that the chiller building and chiller tank will change air flow around the cooling tower. Staff does not agree with this assertion, as the chiller building and tank are well below the height of the cooling tower and wall at the west end of the tower.

Modeling Moisture as an Air Pollutant

BBU asked whether staff considers moisture an air pollutant. Staff does not normally directly analyze cooling tower moisture and vapor as an air pollutant, but does so indirectly by analyzing cooling tower drift/particulate matter impacts, visible plumes and plant water use. In an effort to address concerns raised by BBU, staff compared the PEC cooling tower with other combined cycle cooling towers in the state. The cooling towers are similar with respect to size, heat rejection, air and water flow rates, and drift rate. Some differences include source water quality, allowable TDS levels and the use, or type, of plume abatement systems.

Staff believes that particulate matter is a good proxy for gauging relative moisture and plume impacts. Modeled particulate impacts provide a measure of location, intensity and duration of the cooling tower plume impacts. Staff found that the modeled impacts for PEC particulate matter were similar to other power plants.

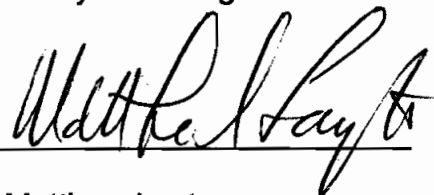
⁴ Cooling Tower Fundamentals, Second Edition, SPX Cooling Technologies, Inc, Overland Park, Kansas.

Therefore, we would expect any moisture or humidity impacts like those alleged by BBU to be occurring near other cooling towers. However, the Energy Commission has not registered any moisture or humidity impacts or complaints at any other power plants, even those in urban settings or those exposed to similar ambient meteorological conditions. Therefore, staff cannot conclude based upon the information analyzed to date that there is a cause and effect relationship between the PEC cooling tower and the Bimbo Bakery roof top staining and bakery product molding.

Bimbo Bakery Roof Top Staining and Bakery Product Mold Issues

BBU states that it has been observed and photographed that plumes from the cooling tower depositing moisture on the bakery facilities, that mold growth at the bakery has increased since the cooling tower operation started, and that the mold is causing problems with the bakery product quality and shelf life. To date BBU has not provided the documentation and observations that they suggest support their conclusions. Staff has not seen information or data that proves moisture is being deposited on the bakery, and that such moisture is causing mold on or in the bakery or bakery goods. Currently, all data and information possessed and relied upon by staff suggests that the cooling tower is correctly designed and in compliance with the conditions of certification.

I declare, under the laws of the State of California and under the Penalty of Perjury, that the statements and opinions contained herein are true and correct to the best of my knowledge and belief.

Signed 
Matthew Layton

Date 4 Dec 07