

**PALOMAR ENERGY PROJECT (01-AFC-24)  
CEC STAFF DATA REQUEST NUMBER 7**

**Technical Area: Air Quality**

**Response Date: April 8, 2002**

**REQUEST:**

Please describe how the emission levels for startups (AFC p. 5.2-20) adequately characterize the anticipated emissions. The discussion should explain what data was used to develop the proposed emission rates and address whether vendor-specified or site-specific factors were considered in the estimates.

**RESPONSE:**

The emission levels during plant start-up were calculated by considering the different types of start-ups (with the HRSG and steam turbine cold, warm, and hot), the different operating modes of the plant during each type of start-up, the duration at each operating mode, the gas turbine load during each operating mode, and the efficiency of the SCR and oxidation catalyst systems during each operating mode. Using this information combined with estimated part load emissions information for the gas turbines as obtained from the gas turbine manufacturer and estimated SCR and oxidation catalyst control efficiency curves as obtained from SCR and oxidation catalyst vendors, the emissions for each type of start-up were estimated.

Since Palomar is located in a non-attainment area for ozone, special consideration was given to reducing NO<sub>x</sub> emissions during the plant start-up. These special considerations include specialized equipment to reduce overall time required during start-up to get the gas turbines loaded to the point that they are operating at their optimal emissions generation mode and to allow hold points in the start-up sequence to be at gas turbine loads that generate a minimum of NO<sub>x</sub>. These types of start-ups are not as practical or economical as normal start-ups for this type of facility.

It should be noted that the emissions indicated in the application for start-up are only the emissions generated prior to the point where the gas turbines are operating at their optimal emissions generation mode (around 50% load) and the emissions control devices are fully functional. All operation beyond this point is considered normal continuous operation.

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In order to determine if the Palomar startup emissions are realistic, the startup emissions for several of the similar projects before the CEC were reviewed. When standardized to a per turbine, pound (lb) per event emission rate, cold start emissions from the six projects reviewed ranged from 160 to 400 lb/event of NO<sub>x</sub>, 400 to 2,706 lb/event of CO, and 20 to 68 lb/event of VOC. In the AFC, the Palomar levels were 100 lb/event of NO<sub>x</sub>, 500 lb/event of CO and 50 lb/event of VOC.

Other GE 7FA projects had cold start emissions of 160 to 240 lb/event of NO<sub>x</sub>, which is higher than the 100 lb/event assumed for Palomar. The Palomar NO<sub>x</sub> startup emission rates are aggressive, but are considered achievable with a well operated and controlled power plant. The Palomar VOC emission rate is consistent with the other plants reviewed. Data on VOC emissions during startup is extremely limited and hence very uncertain.

The CO startup emission rate for several other GE 7FA projects was 1,800 to 2,706 lb/event, which is significantly higher than the 500 lb/event assumed for Palomar. Based on this review, Palomar has concluded that an emission rate of 1,800 lb/event is a more realistic emission rate during a cold start. An increase of the CO emission rate would proportionately increase the modeled maximum CO impacts as presented in AFC Table 5.2-16. However, the increased CO impacts are still well below the applicable standards. The 1-hour maximum CO becomes 16,370 µg/m<sup>3</sup>, including background, in relation to the 23,000 µg/m<sup>3</sup> 1-hour CO CAAQS, and the 8-hour maximum becomes 7,520 µg/m<sup>3</sup>, including background, compared to the 10,000 µg/m<sup>3</sup> 8-hour CO CAAQS.

No other regulatory requirements would be triggered by this increase.

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