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APPENDIX 8.1C

Modeling Protocol

July 24, 2001

Mr. Brian Krebs
Sacramento Metropolitan AQMD
777 12th Street
Sacramento, CA 95814-1908

Dear Mr. Krebs:

SMUD will be applying to the Sacramento Metropolitan AQMD for a Permit to Construct and a Determination of Compliance (PTC/DOC) for a new power plant located near the former Rancho Seco nuclear power plant, Sacramento County. The new project will be subject to the CEC and District requirements for air quality modeling analyses. Attached for your review and approval is a description of the analytical approach that will be used to comply with District modeling requirements for the project. We intend to file an application for certification with the California Energy Commission and an application for a PTC/DOC with the District by early September of this year. Consequently, we are requesting approval of the enclosed modeling protocol as soon as possible.

We would be pleased to meet with you and your staff to discuss this protocol if such a meeting would be useful. We look forward to working with you. If you have any questions, please do not hesitate to call.

Sincerely,

Tom Andrews

cc: Paul Richins, CEC
Keith Golden, CEC
Bob Nelson, SMUD
Dick Wallace, SMUD
Stuart Husband, SMUD

Protocol for Evaluating Ambient Air Quality Impacts for the Proposed Cosumnes Power Plant

Introduction

SMUD is planning to construct a new power plant near the site of the former Rancho Seco nuclear power plant in south Sacramento County. The proposed new Cosumnes Power Plant (CPP) will be comprised of four new combustion turbines, each rated at 175 megawatts (MW) (nominal) at ISO conditions, each equipped with an unfired heat recovery steam generator (HRSG). Incidental equipment will include two induced mechanical draft cooling towers. Natural gas will be the only fuel used at the facility.

The applicant will submit an air quality impact analysis to both the Sacramento Metropolitan Air Quality Management District (SMAQMD or District) and the California Energy Commission (CEC). The modeling analysis will include pollutants for which emissions exceed the District's NSR rule (Rule 202) evaluation thresholds as well as emissions of those pollutants that exceed the District's PSD Rule (Rule 203) thresholds (shown in Table 1). The purpose of this document is to establish the procedure for meeting the SCAQMD and CEC air quality modeling requirements for the proposed project.

Although the project area is classified as attainment for SO_2 and NO_2, both are considered nonattainment pollutants under the District NSR regulations, as they are precursors to PM_{10}. In addition, NOx is a precursor to ozone. As a result of the above, both the NSR and PSD regulations apply to the SOx and NOx emissions associated with the project. The NSR rule requires best available control technology (BACT), modeling (at the discretion of the Air Pollution Control Officer), and emission offsets for subject emission sources. Similar to the NSR program, Rule 203, which adopts the federal PSD regulation (Title 40, Part 52, Section 52.21) by reference, also requires BACT and modeling, and it requires preconstruction ambient monitoring for facilities that trigger review. The modeling analysis required by the PSD regulation also includes performing an increment consumption analysis.

Table 1 NSR and PSD Threshold Values		
Requirement	Pollutant	Threshold
PSD Regulations		
Major Source Threshold	NOx, CO, SOx, PM_{10}, VOC	250 tons/yr
Significant Emission Increase Threshold	CO	100 tons/yr
	NOx, SOx, VOC	40 tons/yr
	PM_{10}	15 tons/yr
NSR Regulations		
BACT Thresholds	CO	550 lb/day
	NOx, CO, SOx, PM_{10}, VOC	10 lb/day
Offset Thresholds	CO	49,500 lb/qtr
	SOx	13,650 lb/qtr
	VOC, NOx, PM_{10}	7,500 lb/qtr

The project is expected to result in a net emission increase that will exceed the PSD significance threshold for NOx. In addition, the project is expected to result in emission increases that will trigger review under the District NSR regulations for NOx, CO, PM_{10}, SOx, and VOC. Consequently, for NOx, the project will be subject to review under both the PSD and NSR regulations. The project also is expected to require CEC modeling analyses for cumulative impacts and construction impacts. Modeled ambient impacts are expected to be well below the levels at which PSD preconstruction monitoring is required. Consequently, it is not expected that onsite preconstruction monitoring will be required for the project. The results of the modeling analysis will be presented in detail in the CEC application for certification (AFC) and the application for an Authority to Construct.

Project Location

The Project is located near the site of the existing (now undergoing decommissioning) Rancho Seco nuclear power plant, in southeast Sacramento County, south of Twin Cities Road (State Highway 104) and about two miles east of Clay Station Road. The Project site is at an elevation of approximately 160 feet above sea level. The terrain in the vicinity of the site slopes downhill gradually from northeast to southwest. The nearest residences are approximately one mile to the west and southwest, and there is a single dwelling approximately 1,000 feet from the project site. Further west, for about 12 miles, there are few residences or other structures between the project site and State Highway 99 (at the Dillard Road interchange). About 12 miles north of the site, across a series of low hills (300 ft maximum elevation) and streams, the nearest residential area is Rancho Murieta. About 11 miles east of the project site, across hills as high as 500 feet, lies the town of Ione, at an elevation of 290 feet. Between the project site and Lockeford, the nearest town to the south (about 12 miles away), the terrain consists of low hills (200 feet) and streams, with few residences or other structures. The UTM coordinates of the site are 4,245.5 kilometers northing, 664.3 kilometers easting (NAD 27, Zone 10), at 38 degrees 20.7 minutes North latitude and 121 degrees 07.2 minutes West longitude.

The overall climate at the Project site is dominated by the semi-permanent eastern Pacific high pressure system centered off the coast of California. This high is centered between the 140° west (W) and 150° W meridians, and oscillates in a north-south direction. Its position governs California's weather. In the summer, the high moves to its northernmost position, which results in a strong subsidence inversion and clear skies inland; along the coast, the weather is dominated by coastal stratus and fog caused by the cooler and more homogeneous ocean surface temperature. Often in the summer, fog comes onshore during late afternoon and persists until the middle of the following morning.

In the winter, the high moves southwestward toward Hawaii, which allows storms originating in the Gulf of Alaska to reach northern California, bringing wind and rain. About 80 percent of the region's annual rainfall (10 to 30 inches, depending on altitude and proximity to the ocean) occurs between November and March.[1] Average precipitation at the Project site is about 16 inches per year. Between storms, skies are fair, winds are light, and temperatures are moderate.

The marine climate influences mixing heights. Often, the base of the inversion is found at the top of a layer of marine air, because of the cooler nature of the marine environment. Inland areas, where the marine influence is absent, often experience strong ground-based inversions, which inhibit mixing and can result in high pollutant concentrations. Smith, et al, (1984) reported that at Sacramento, the nearest upper-level meteorological station (located approximately 24 miles NW of the project site), 50th percentile <u>morning</u> mixing heights for the period 1979–80 were on the order of 440 feet (135 meters) in winter, 625 feet (190 meters) in spring, 510 feet (155 meters) in summer, and 490 feet (150 meters) in fall. The 50th percentile <u>afternoon</u> mixing heights were 1,295 feet (395 meters) in winter, 3,395 feet (1,035 meters) in spring, 3,675 feet (1,120 meters) in summer, and 2,770 feet (845 meters) in fall. Smith, et al, (1984) reported that at Sacramento, the nearest upper-level meteorological station (located approximately 24 miles NW of the project site), 50th percentile <u>morning</u> mixing heights for the period 1979–80 were on the order of feet (135 meters) in winter, (190 meters) in spring, (155 meters) in summer, and (150 meters) in fall. The 50th percentile <u>afternoon</u> mixing heights were (395 meters) in winter, (1035 meters) in spring, (1120 meters) in summer, and (845 meters) in fall.[2] Such mixing heights provide generally favorable conditions for the dispersion of pollutants.

Meteorological Data and Site Representation

EPA defines the term "on-site data" to mean data that would be representative of atmospheric dispersion conditions at the source and at locations where the source may have a significant impact on air quality. Specifically, the meteorological data requirement originates in the Clean

1 "Climate of the States—California," U.S. Department of Commerce, Weather Bureau, December 1959.
2 "Application of Climatological Analysis to Minimize Air Pollution Impacts in California", Final Report on ARB Agreement A2-119-32, Smith, T.B., W.D. Sanders, and D.M. Takeuchi, August 1984.

Air Act at Section 165(e)(1), which requires an analysis "of the ambient air quality at the proposed site and in areas which may be affected by emissions from such facility for each pollutant subject to regulation under [the Act] which will be emitted from such facility." This requirement and EPA's guidance on the use of on-site monitoring data are also outlined in the On-Site Meteorological Program Guidance for Regulatory Modeling Applications (1987). The representativeness of meteorological data is dependent upon (1) the proximity of the meteorological monitoring site to the area under consideration; (2) the complexity of the topography of the area; (3) the exposure of the meteorological sensors; and (4) the period of time during which the data are collected. As discussed below, we believe that meteorological data collected at the Sacramento Executive Airport site approximately 38 km from the project site would satisfy the definition of on-site data. As there are no nearby (localized) terrain features that would influence the project site, no site-specific bias exists that would limit the use of the Sacramento Executive Airport data set for the proposed CPP project. The same large-scale topographic features that influence the Sacramento Executive Airport meteorological site also influence the proposed project site in the same manner.

Diurnal wind regimes markedly affect the horizontal transport of air in the project area. Wind patterns in an area are greatly influenced by the large-scale terrain features. Given the lack of nearby large-scale terrain features in the project area, the meteorological data measured at Sacramento Executive Airport are considered representative of the general meteorological conditions in the project area, and can correctly characterize the important atmospheric dispersion conditions at the project site.

Representativeness has been defined in the document "Workshop on the Representativeness of Meteorological Observations" (Nappo et. al., 1982) as "the extent to which a set of measurements taken in a space-time domain reflects the actual conditions in the same or different space-time domain taken on a scale appropriate for a specific application." Judgments of representativeness should be made only when sites are climatologically similar, as the Sacramento Executive Airport and project site locations clearly are. Representativeness also has been defined in the PSD Monitoring Guideline as data that characterize the air quality for the general area in which the proposed project would be constructed and operated.

In determining the representativeness of the Sacramento Executive Airport meteorological data set for use at the project site, the following considerations were addressed:

- X *Aspect ratio of terrain, which is the ratio of the height of terrain to the width of the terrain at its base* - The ratio of terrain heights to base widths is constant for the terrain surrounding the project site and the Sacramento Executive Airport meteorological site. Any larger-scale upslope/downslope flow from the larger terrain features surrounding the project site would be identified on the Sacramento Executive Airport meteorological data set and would be representative of the CPP project site.

- X *Slope of terrain* - The slope of the terrain in the project area is similar to the slope of terrain in the vicinity of the meteorological site. The surface roughness of the terrain in the area is also similar.

- X *Ratio of terrain height to stack/plume height* - Final plume height (stack height plus plume rise) was calculated for D stability, 3 meter/second wind speed at 700 feet (estimated 140-foot stack height, 560-foot plume rise) above the stack base. At this final height, terrain effects on plume dispersion would be similar at locations throughout the regional area, and the plume would disperse in an identical manner to the dispersion conditions monitored at the Sacramento Executive Airport site.

- X *Correlation of terrain features to prevailing meteorological conditions* - The orientation of terrain in the region is identical to and correlates well with the prevailing wind field in the Sacramento Region. Thus, wind flow at the Sacramento Executive Airport site would be similar to that at the project site. No local terrain features exist that would distort the local wind field.

It is our assessment that the meteorological data collected at Sacramento Executive Airport would be identical to data collected at the project site. No terrain or other steering mechanisms exist that would have an effect on the meteorology at the project site. The surface roughness, height, and length of the large-scale terrain features are consistent throughout the area, and play a large role in the effect on the horizontal and vertical wind patterns. There is no slope or topographical aspect in the vicinity of the site that would reasonably affect the wind direction or speed. The final plume height from the proposed project will impact the highest terrain for most meteorological conditions, regardless of location.

Since the overall purpose of gathering meteorological data is to collect measurements that are representative of the general state of the atmosphere in the area of interest, we believe that the Sacramento Executive Airport meteorological data set would satisfy this requirement for the CPP project site. This data set would also satisfy the definition of on-site data, as defined in the PSD Monitoring Guidelines (1990) and the On-site Meteorological Program Guidance for Regulatory Modeling Applications (1987).

Preparation of the Meteorological Data Set

Meteorological data collected at Sacramento Executive Airport in 1985-1989, approximately 38 km northwest of the project site, are proposed to be used for the modeling of the CPP project. The SMAQMD has provided the data in a preprocessed form that can be used directly in the Industrial Source Complex—Short-Term, Version 3 (ISCST3) model. As the data have been preprocessed by the SMAQMD, no modifications to this data set are proposed. Mixing heights were provided in the SMAQMD data set.

Ambient Air Quality Models

The ambient air quality modeling analysis will be performed in several steps. The first step will be to determine which combination of potential turbine operating loads and ambient conditions will produce the highest modeled impacts. This worst-case operating scenario for the turbines will be determined using the ISCST3 model and the 1985-1989 Sacramento Executive Airport meteorological data to model ambient impacts of NOx, SOx, PM_{10}, and CO under all of the potential operating cases.

Operating loads will range from minimum load to full load. Ambient conditions for evaluating turbine operations will range from minimum to maximum expected ambient temperatures. The Building Profile Input Program (BPIP) will be used to determine direction-specific building dimensions so that building downwash effects will be evaluated. Based on the above screening analysis, the turbine parameters, operating loads, and ambient temperatures will be selected for the refined modeling analysis. A Good Engineering Practice (GEP) analysis will also be performed for each stack.

The second step of the ambient air quality modeling analysis will be the refined modeling analysis that will evaluate the maximum modeled impacts from the proposed project, including the turbines (operating in the worst-case scenario as described above) and the forced draft cooling towers. Maximum emission rates will be identified for short-term and annual time periods for modeling (including turbine startups and shutdowns, as appropriate).

The SCREEN3 model will be used to evaluate fumigation impacts for all short-term averaging periods (24 hours or less). The methodology in EPA 454/R-92-019 (Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised) will be followed for this analysis.

If maximum impacts are calculated in intermediate or complex terrain, then the CTSCREEN dispersion model may be used to assess these impacts if they exceed standards or increments.

All modeling results will be compared to the following:

- PSD preconstruction monitoring trigger level for CO, NOx, PM_{10}, and SO_2;
- PSD ambient impact significance levels for NO_2, PM_{10}, and SO_2;
- PSD increments for NO_2, PM_{10}, and SO_2;
- State and federal ambient air quality standards.

Receptor Grids

The current plan for both the initial (screening) and final refined modeling analyses, using ISCST3, is to place receptors within 10 km of the project location in all directions. The spacing of the receptors will be 250 meters. A refined grid of receptors spaced at 30 meters will be used in areas where the coarse grid analyses indicate modeled maxima will be located. Receptors will be placed at 25 meters along the facility fenceline. Digital Elevation Model (DEM) data will be used to select the receptor elevations. All receptor grids will be expanded as necessary to identify the maximum impacts.

Model Options

The ISCST3 model allows the selection of a number of options that affect model output. The regulatory default options will be used, as listed below.

- Final plume rise
- Buoyancy-induced dispersion
- Stack tip downwash
- Rural dispersion coefficients
- Calms processing on
- Default wind profile exponents (based on rural dispersion)
- Default vertical temperature gradients

Ambient Air Quality Impact Analysis

In evaluating the impacts of the proposed project on ambient air quality, we will model the ambient impacts of the project, add those impacts to background concentrations, and compare the results to the state and federal ambient standards for SO_2, NO_2, PM_{10}, and CO. Ambient concentrations of ozone are recorded at a monitoring station in Sloughhouse, about 20 kilometers northwest of the project site. Nitrogen dioxide has been recorded since 1993 at Elk Grove, about 25 kilometers west of the project site. Ambient levels of CO are monitored at a station at T Street in downtown Sacramento, about 43 kilometers northwest of the project site. PM_{10} levels are recorded at a monitoring station on Branch Center Road in Sacramento, about 31 kilometers northwest of the project site. SO_2 levels are monitored at Del Paso Manor in Sacramento, about 38 kilometers northwest of the project site. All of these stations are operated by the District with the exception of the downtown Sacramento station that is operated by the California Air Resources Board.

The Ozone Limiting Method (OLM), implemented in the ISC3-OLM model, will be used to convert hourly modeled NOx concentrations to NO_2, as appropriate. Ozone data collected at the Sloughhouse monitoring station in 1999 site will be used in conjunction with the 1985-1989 Sacramento Executive Airport met data to make the correction. It is likely that ozone concentrations are high enough in this part of the SMAQMD region that virtually complete conversion of NOx to NO_2 will usually occur, at least in the daytime.

Background concentrations of CO will be the highest values monitored at CARB's T Street monitoring station in Sacramento during the last three years (1998-2000). Background concentrations of SO_2, NO_2, and PM_{10} will be the highest values monitored at the SMAQMD's Del Paso Manor, Elk Grove, and Branch Center Road monitoring stations, respectively, during the last three years (1998-2000).

In accordance with EPA guidance (40 CFR part 51, Appendix W, Sections 11.2.3.2 and 11.2.3.3), the highest modeled concentration will be used to demonstrate compliance with annual standards while the highest second-highest modeled concentrations will be used to demonstrate compliance with standards based on averaging periods of 24 hours or less.

Increments Analysis

Increments are the maximum allowable increases in concentration that are allowed to occur above baseline concentrations for each pollutant for which an increment has been established: currently NO_2, SO_2, and PM_{10}. The baseline concentrations are defined for each pollutant and averaging time, and are the ambient concentrations of each pollutant existing at the time that the first complete PSD application affecting the area is submitted. Applicable ambient significance levels and increments for SO_2, NO_2, and PM_{10} are shown in Table 2.

Table 2
PSD Ambient Impact Significance Levels and Increments (ug/m^3)

Pollutant	Averaging Time	Significance Level	Class I Increment	Class II Increment
SO_2	Annual	1	2	20
	24-hour	5	5	91
	3-hour	25	25	512
PM_{10}	Annual	1	4	17
	24-hour	5	8	30
NO_2	Annual	1	2.5	25

Federal and SMAQMD PSD regulations require that an increment analysis be performed only for pollutants with ambient impacts exceeding the significance levels shown in Table 2. In the case of the proposed project, a PSD air quality impact analysis is expected to be required only for NO_2. If preliminary modeling shows that the NO_2 significance level is exceeded, a supplemental protocol will be provided to the District for any required increments analysis.

PSD Preconstruction Monitoring Requirements

Code of Federal Regulations Title 40, Part 52, Section 21(m) requires an applicant's air quality analysis to contain preconstruction ambient air quality monitoring data for purposes of establishing background pollutant concentrations in the impact area of the proposed facility. However, an applicant may be exempted from the requirement for preconstruction monitoring and may, at the Air Pollution Control Officer's discretion, rely on existing continuous air quality monitoring data collected at District-approved monitoring stations to satisfy the requirement for preconstruction monitoring.

As discussed earlier, modeled ambient concentrations of pollutants from the facility are expected to be well below the preconstruction monitoring thresholds shown in
Table 3.

Table 3
PSD Preconstruction Monitoring Thresholds

Pollutant/Averaging Time	Thresholds (ug/m^3)
CO (8-hour average)	575
PM_{10} (24-hour average)	10
NO_2 (annual average)	14
SO_2 (24-hour average)	13

If one or more of these *de minimis* levels is exceeded in the final modeling analysis, the applicant proposes to use data from the following monitoring stations to meet this requirement.

Site ID	CARB#	Pollutants
Elk Grove	3400310	NO_2
Sacramento – Branch Ctr.	3400283	PM_{10}
Sacramento – Sloughhouse	3400312	Ozone
Sacramento – T Street	3400305	CO
Sacramento – Del Paso	3400295	SO_2

Additional Impacts Analysis

For those pollutants emitted in significant amounts, the applicant will prepare an additional impacts analysis for growth, soils and vegetation, and visibility. Visibility impacts will be evaluated based on the criteria in the PSD regulations.

Impacts on Class I Areas

As required by the PSD regulations (40 CFR 52.21), the applicant will prepare an analysis to determine whether the proposed project will result in emissions that would have an adverse impact on air quality related values, including visibility and regional haze, in Class I areas. An analysis will be conducted to determine the proposed project's impact on visibility in the following Class I areas that are within 100 km of the project site:

- Desolation Wilderness Area
- Mokelumne Wilderness Area

40 CFR 52.21 also requires a demonstration that emissions from a project located within 10 km (6.2 miles) of a Class I area will not cause or contribute to the exceedance of any national ambient air quality standard or any PSD increment there. None of the above Class I areas are within 10 km of the project site.

The appropriate federal land managers (FLMs) will be contacted to obtain information on the procedures required to calculate impacts to Air Quality Related Values (AQRVs) and to determine the appropriate Levels of Acceptable Change (LAC). Impacts to visibility and regional haze at the Class I areas will be determined as well.

SMAQMD Toxic Risk Policy

A screening level health risk assessment will be performed to determine the expected impact of the toxic air pollutant emissions for the new equipment. The ISCST3 model will be used to determine the maximum toxic air pollutant impacts at each receptor. The same coarse and fine receptors grids discussed above for the criteria pollutant modeling will be used for the toxic air pollutant modeling analysis. After the modeled concentrations are determined, the ARB/OEHHA Health Risk Assessment Program will be used to evaluate the carcinogenic, chronic, and acute health risks through inhalation and non-inhalation pathways. The results of the health risk assessment will be summarized and compared to the SMAQMD Supplemental Risk Assessment Guidelines for New and Modified Stationary Sources health risk thresholds.

Additional Analyses Required by the CEC

The CEC may also require analyses of inversion breakup fumigation impacts, cumulative air quality impacts, construction impacts, and short-term impacts during turbine startups and during turbine commissioning. The procedures to be used in evaluating construction impacts are discussed below. A separate protocol will be prepared for the cumulative impacts analysis.

Construction Impacts Analysis

The potential ambient impacts from air pollutant emissions during the construction of the CPP project will be evaluated by air quality modeling that will account for the construction site location and the surrounding topography; the sources of emissions during construction, including vehicle and equipment exhaust emissions; and fugitive dust.

Site Description - The dispersion modeling analysis will include a description of the physical setting of the facility and surrounding terrain. A map showing the plant location, fence lines, and model receptors will be included, as well as a plot plan of the plant site indicating heights of nearby structures above a common reference point.

Types of Emission Sources - Construction of the proposed CPP project will be undertaken in two nominal 500 MW phases. Each phase of construction will utilize the following processes: (1) site preparation; (2) construction of foundations; and (3) installation and assembly of mechanical and electrical equipment. The construction impacts analysis will include a schedule for construction operation activities. Site preparation is expected to include site excavation, excavation of footings and foundations, and backfilling operations. After site preparation is finished, the construction of the foundations will begin. Once the foundations are finished, the installation and assembly of the mechanical and electrical equipment will begin.

Fugitive dust emissions from the construction of the project result from (1) dust entrained during excavation and grading at the construction site; (2) dust entrained during onsite travel on paved and unpaved roads and across the unpaved construction site; (3) dust entrained during aggregate and soil loading and unloading operations; (4) dust entrained from raw material transfer to and from material stockpiles; and (5) wind erosion of areas disturbed during construction activities. Heavy equipment exhaust emissions result from (1) the heavy equipment used for excavation, grading, and construction of onsite structures; (2) a water truck used to control construction dust emissions; (3) Diesel welding machines, gasoline-powered generators, air compressors, and water pumps; and (4) gasoline-powered pickup trucks and Diesel flatbed trucks used onsite to transport workers and materials around the construction site. Diesel and gasoline truck exhaust emissions will result from transport of mechanical and electrical equipment to the project site and transport of rubble and debris from the site to an appropriate landfill. Diesel exhaust emissions may also result from transport of raw materials to and from stockpiles.

Emissions from a worst-case day will be calculated for each of the three main construction processes and only the process with the highest emissions will be used to model short-term impacts (24 hours or less). The annual average equipment schedule (equipment mix and operating levels) will be used to calculate annual average emission levels during the construction phase(s) of the project. These annual emissions levels will be used to model annual average construction impacts.

Existing Ambient Levels – The same ambient NO_2, SO_2, CO, and PM_{10} air quality data from monitoring stations discussed above for the modeling analysis of project operating impacts will also be used in the analysis of project construction impacts.

Model Type - The ISCST3 model will be used to estimate ambient impacts from construction emissions. The modeling options and meteorological data described above will be used for the modeling analysis.

The construction site will be represented as an area source in the modeling analysis. Emissions will be divided into two categories: exhaust emissions and dust emissions. For exhaust emissions, a plume height of 4.6 meters (15 feet) will be used. Plume height refers to the distance measured from ground level to the center line of the emissions plume. For dust emissions, a release height of two meters will be used due to the ambient plume temperatures and negligible plume velocities.

For the construction modeling analysis, the receptor grid discussed above to model normal plant operation will be used for the construction modeling analysis.