KRCD
Kings River Conservation District

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October 11, 2007

Gerardo Rios
Mail Code: Air-3
U.S. EPA, Region IX
75 Hawthorne Street
San Francisco, CA 94105

Re: Kings River Conservation District Community Power Plant (KRCD CPP) - Application for a Prevention of Significant Deterioration (PSD) Permit

Dear Mr. Rios:

Kings River Conservation District (KRCD) hereby submits this application for a PSD permit for the KRCD CPP, a nominal 565 megawatt (MW) natural gas-fired combined cycle base load power plant to be located near the City of Parlier in Fresno County, California. This PSD application is being submitted in conformance with the provisions of 40CFR52.21.

Three (3) hard copies of the PSD application and one electronic copy on compact disk are attached. Please contact me at (559) 237-5567 or our consultant Thor Hibbeler at (415) 831-4121, if you have any questions this PSD application.

Sincerely,

David Orth
General Manager

DO/as

Enclosures: PSD Application (hardcopies and compact disk)

File: 536.02.06
L07-0313

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APPLICATION
FOR
PREVENTION OF
SIGNIFICANT DETERIORATION PERMIT

Prepared for the:

KRCD COMMUNITY
POWER PLANT
Energy for our Future

Submitted to:
The United States Environmental Protection Agency
Region 9
75 Hawthorne Street
San Francisco CA 94105

Submitted by:
Kings River Conservation District
4886 East Jensen Avenue
Fresno CA 93725

OCTOBER 2007

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CHAPTER 1 APPLICANT INFORMATION & INTRODUCTION

1.1 APPLICANT INFORMATION

Applicant Name: Kings River Conservation District (KRCD)

Address: 4886 East Jensen Avenue, Fresno CA 93725

Telephone #: (559) 237-5567

Fax #: (559) 237-5560

Owner/Operator: Same as above

Signature of Responsible KRCD Official:

Signature

David Orth, General Manager

Printed Name/Title

10/12/07

Date

1.2 INTRODUCTION

This application for a Prevention of Significant Deterioration (PSD) permit is being submitted for the Kings River Conservation District Community Power Plant (KRCD CPP). The KRCD CPP will consist of a state-of-the-art, nominal 565 megawatt (MW) combined-cycle electric power generating plant configured using two natural-gas-fired turbines and one steam turbine. Ancillary facilities associated with the KRCD CPP include an overhead electric transmission line, a natural gas pipeline, a water supply pipeline, a potable water source and a sewer interconnection.

The primary objective of the KRCD CPP is to provide the greater Fresno area, a Local Capacity Area that is currently deficient for generating resources,[1] with additional reliable and inexpensive in-area gas-fired generation. KRCD proposes to construct and operate the KRCD CPP on a schedule to provide power to the California grid in the second quarter of 2011, contingent upon successful and timely permitting and continued support.

[1] California Independent System Operator, 2008 Local Capacity Technical Analysis Report and Study Results, Updated April 3, 2007.

As a combined cycle power plant, the KRCD CPP is considered to be one of the 28 named PSD source categories, i.e., a fossil fuel-fired steam electric plant of more than 250 million British thermal units (BTUs) per hour heat input. The KRCD CPP will emit more than 100 tons per year (tpy) of one or more PSD criteria pollutants, and therefore is classified as a major new source, which is subject to the PSD permit program per the requirements of 40 Code of Federal Regulations (CFR) 52.

CHAPTER 2 PROJECT LOCATION

2.1 PROJECT SITE LOCATION

The KRCD CPP will be located in central California (see Figure 1). Specifically, the KRCD CPP will be located between the cities of Parlier and Selma, in Fresno County, California. As shown on Figure 2, the cities of Parlier and Selma are located approximately 15-20 miles southeast of Fresno. The KRCD CPP site consists of approximately 32 acres of agricultural land and is located on South Bethel Avenue between East Dinuba and East Manning avenues. The project site, which has the street address of 9664 South Bethel Avenue, Selma, CA 93662-9755, is just south of and adjacent to the City of Parlier Wastewater Treatment Plant (WWTP). Figure 3, shows the location of the project site.

2.2 PROXIMITY TO FEDERAL CLASS I AREAS

The PSD Class I analysis addresses impacts to national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreational, scenic, or historic value that have been specifically identified as Class I areas. Several Class I areas are located near the KRCD CPP project site. The Class I areas within approximately 200 km of the KRCD CPP are listed in Table 1.

Table 1
Federal Class I Areas within 200 kilometers (km) of the KRCD CPP

Wilderness Area	Distance and Direction from Source
Kings Canyon National Park	55.7 km east north-east
Sequoia National Park	59.7 km east north-east
John Muir Wilderness Area	70.0 km north-east
Kaiser Wilderness Area	76.5 km north north-east
Ansel Adams Wilderness Area	92.7 km north north-east
Yosemite National Park	100.7 km north
Dome Land Wilderness Area	131.9 km south-east
Pinnacles Wilderness Area	142.6 km west
Hoover Wilderness Area	161.6 km north
Ventana Wilderness Area	162.0 km west south-west
Emigrant Wilderness Area	163.0 km north
San Rafael Wilderness Area	180.4 km south south-west
Mokelumne Wilderness Area	213.7 km north

CHAPTER 3 PROJECT DESCRIPTION

3.1 OVERVIEW

The KRCD CPP will be a nominal 565 MW net combined-cycle generating plant configured using two natural-gas-fired turbines and one steam turbine. The KRCD CPP will connect to the Pacific Gas and Electric Company (PG&E) electrical transmission system via a new double circuit 230 kilovolt (kV) radial transmission line running to the PG&E McCall substation, located on the west side of Leonard Avenue, north of Manning Avenue and approximately 5 miles to the west of the project site. Fuel for the KRCD CPP will be natural gas supplied from a new approximately 26-mile long 20-inch underground pipeline interconnection to the Southern California Gas Company (SCG) Line 7000 near the City of Visalia, California. The gas pipeline closely follows existing road right-of-way corridors. The natural gas will be compressed and filtered on the KRCD CPP plant site to meet applicable pressure requirements.

The primary source of process makeup water for the KRCD CPP will be secondarily reclaimed water delivered by new underground pipeline interconnections to the City of Parlier WWTP and the City of Sanger WWTP effluent percolation and evaporation ponds located on Lincoln Avenue (i.e. Lincoln Ponds). Approximately 3,100 acre-feet per year (AFY) is required for power plant cooling. The secondarily recycled water will be treated on site to meet tertiary water standards. The Parlier WWTP is located adjacent to the north of the plant site, and the interconnection will be located at the northern plant site boundary. The proposed interconnection to Lincoln Ponds is approximately five miles north and will be located primarily in public right-of-way. Currently two options are being considered for the water pipeline interconnection to Lincoln Ponds. Up to four shallow wells recovering percolated effluent will also provide a back-up cooling water supply. Reclaimed water will be utilized for cooling at the KRCD CPP, cycling through the steam condenser and cooling tower until mineral concentration requires that it be rejected from the tower as cooling tower blowdown. The expected number of cycles before rejection is expected to range from three to ten, depending upon the quality of the incoming reclaimed water. The blowdown will be concentrated and the water reclaimed onsite using a zero-liquid discharge (ZLD) system.

Potable water for domestic use will be supplied by a new groundwater well to be installed on the project site. Sanitary sewer disposal will be provided by the City of Parlier WWTP via a sewer interconnection at the project site fence line.

3.1.1 Equipment Selection

At this time, the specific combustion turbine (CT) manufacturer and model to be used for the KRCD CPP has not yet been selected by KRCD. The two CTs under consideration are the General Electric (GE) 7FA and the Siemens SGT6-5000F. The CTs and related equipment will

be the most important and most costly components of the KRCD CPP. Selection will require comprehensive comparison of cost and benefits of the alternatives under a competitive solicitation and negotiation process. The CT selection process should be completed sometime in 2008.

In order for KRCD to preserve its decision making flexibility and negotiating strength with these two potential suppliers, this PSD permit application is being submitted for approval of both the GE and Siemens CT options. The performance characteristics of these CTs are significantly different. Table 2 summarizes some key differences between the two units.

Table 2
Characteristics of CTs Under Consideration

Characteristic	GE 7FA	Siemens SGT6-5000F
Net Plant Output at Annual Average Temperatures	497 MW	565 MW
Peak Winter Output	530 MW	614 MW
Air Emissions	Modeled	Modeled - Worst Case Larger

If the Siemens CT is used, the KRCD CPP will have higher output and higher air emissions than if the GE CT is utilized. Although the Siemens option will produce higher air emissions rates, it is not clear that resulting impacts from the Siemens option will be greater than those from the GE option. Therefore, the air dispersion modeling for this PSD permit application has been performed for each of the two CT options.

3.2 GENERATING FACILITY DESCRIPTION, DESIGN, AND OPERATION

3.2.1 Site Arrangement and Layout

The general arrangement is shown on Figure 4 and typical elevation views on Figures 5 through 7 illustrate the location and size of the proposed KRCD CPP. Access to the site will be provided via South Bethel Avenue on the west side of the parcel.

3.2.2 Process Description

The KRCD CPP will include two CTs equipped with dry, low oxides of nitrogen (NOx) combustors and steam injection power augmentation capability; two heat recovery steam generators (HRSGs); one condensing steam turbine generator (STG); a deaerating surface condenser; an eight-cell mechanical-draft cooling tower and associated support equipment. Total net generating capacity is estimated to be 565 MW[2] at annual average ambient conditions.

Each CT will generate approximately 170-187-MW (depending upon the CT) at base load under average ambient conditions. The CT exhaust gases will be used to generate steam in the HRSGs.

[2] Net output based on Siemens SCT6-5000F.

The HRSGs will use a reheat design without duct firing. Steam from the HRSGs will be admitted to a condensing STG. Approximately 180 to 205 MW (depending upon the CT selected) will be produced by the STG when the combustion turbine generators (CTGs) are operating at base load at average ambient conditions with no steam injection. The KRCD CPP is expected to have an overall annual availability of 92 to 98 percent.

3.2.3 Generating Facility Cycle

The CTG combustion air flows through the inlet air filter and fogging section and associated air inlet ductwork, is compressed in the gas turbine compressor section, and then flows to the CTG combustor. Natural gas fuel is injected into the compressed air in the combustor and ignited. The hot combustion gases expand through the power turbine sections of the CTG, causing it to rotate and drive the electric generator and CTG compressor. The hot combustion gas exits the turbine section at approximately 1,100 degrees Fahrenheit (°F) and enters the HRSG associated with that CTG. In the HRSG, boiler feedwater is converted to superheated steam and delivered to a common STG. Steam is delivered at three pressures: high-pressure (HP), intermediate-pressure (IP), and low-pressure (LP). The use of multiple steam delivery pressures increases cycle efficiency and flexibility. High-pressure steam expands through the HP section of the STG. This expanded steam, referred to as cold reheat steam, is combined with the IP steam and returned to the reheater section of the HRSGs. This mixed, reheated steam, referred to as hot reheat, is then expanded in the IP STG section. Steam exiting the IP section of the STG is mixed with LP steam and expanded in the LP steam turbine section. Steam leaving the LP section of the STG enters the surface condenser where it is condensed. The heat energy of the condensing steam transfers to a circulating water loop, which, in turn, rejects heat to the atmosphere by means of a mechanical draft cooling tower.

3.2.4 Combustion Turbine Generators, Heat Recovery Steam Generators, Steam Turbine Generator and Condenser

Electricity is produced by the two CTs and one STG. The following paragraphs describe the major components of the KRCD CPP.

3.2.4.1 Combustion Turbine Generators

Thermal energy is produced in the CTGs through the combustion of natural gas, which is converted into mechanical energy required to drive the combustion turbine compressors and electric generators. The CTGs will be supplied by either Siemens or GE.

Each CTG system consists of a stationary CTG, supporting systems, and associated auxiliary equipment. The CTGs will have power augmentation capability by use of steam injection upstream of the power turbine section.

The CTGs will be equipped with the following required accessories to provide safe and reliable operation:

- Inlet air foggers;
- Inlet air filters;
- Metal acoustical enclosure;
- Lube oil system, including coolers and filters;
- Generator coolers;
- Starting system;
- Control system;
- Gas fuel system;
- Dry low NOx (DLN) combustion system;
- Compressor wash system;
- Fire detection and protection system; and
- Fuel heating system.

The CTGs and accessory equipment will be placed in metal acoustical enclosures and located outdoors.

3.2.4.2 Heat Recovery Steam Generators

The HRSGs provide for the transfer of heat from the exhaust gases of the CTGs to the feedwater, which is turned into steam. The two HRSGs will be three-pressure, natural circulation units equipped with inlet and outlet ductwork, insulation, lagging, and separate exhaust stacks.

Major components of each HRSG include an LP economizer, LP drum, LP evaporator, LP superheater, IP economizer, IP evaporator, IP drum, IP superheaters/reheaters, HP economizers, HP evaporator, HP drum, and HP superheaters. The LP economizer receives condensate from the condenser hot well via the condensate pumps. The LP economizer is the final heat transfer section to receive heat from the combustion gases prior to their exhausting to the atmosphere. From the LP economizer, the condensate is directed to the LP drum where it is available to generate LP steam and supply condensate to the boiler feed pumps. The boiler feed pumps draw suction from the LP drum and provide additional pressure to serve the separate IP and HP sections of the HRSG.

Feedwater from the boiler feed pumps is sent to the HP section of the HRSG. High-pressure feedwater flows through the HP economizer where it is preheated prior to entering the HP steam drum. Within the HP steam drum, a saturated liquid state will be maintained. The saturated water will flow through downcomers from the HP steam drum to the inlet headers at the bottom of the HP evaporator. Saturated steam will form in the tubes as energy from the CT exhaust gas

is absorbed. The HP-saturated liquid/vapor mixture will then return to the steam drum where the two phases will be separated by the steam separators in the drum. The saturated water will return to the HP evaporator, while the vapor continues on to the HP superheater. Within the HP superheater, the temperature of the HP steam will be increased above its saturation temperature, or "superheated" prior to being admitted to the HP section of the STG.

Feedwater will also be sent to the IP section of the HRSG by an interstage bleed from the boiler feed pumps. Similar to the HP section, feedwater will be preheated in the IP economizer and steam will be generated in the IP evaporator. The saturated IP steam will pass through an IP superheater and then be mixed with "cold reheat" steam from the discharge of the STG HP section. The blended steam will then pass through two additional IP superheaters reheating the steam to a superheated state. The "hot reheat" steam will then be admitted to the STG IP section.

Condensate will be preheated by the LP economizer prior to entering the LP steam drum. Similar to the HP and IP sections, steam will be generated in the LP evaporator and superheated in the LP superheater. The superheated LP steam will then be admitted to the LP section of the STG along with the steam exhausting from the STG IP section.

The HRSG will be equipped with a Selective Catalytic Reduction (SCR) emission control system that will use ammonia vapor in the presence of a catalyst to reduce NOx in the exhaust gases. The catalyst module will be located within the HRSG casing. Diluted ammonia (NH3) vapor will be injected into the exhaust gas stream via a grid of nozzles located upstream of the catalyst module. The subsequent chemical reaction will reduce NOx to nitrogen and water.

An oxidation catalytic converter will also be installed within the HRSG casing to reduce the concentration of carbon monoxide (CO) in the exhaust gas emitted to atmosphere. Exhaust from each HRSG will be discharged from individual 150-foot-tall, 18-foot diameter exhaust stacks.

3.2.4.3 Steam Turbine Generator

The steam turbine system consists of a condensing STG with reheat, gland steam system, lubricating oil system, hydraulic control system, and steam admission/induction valving.

Steam from the HRSG HP, IP, and LP superheaters enters the STG sections through the inlet steam system. The steam expands through multiple stages of the turbine, driving the generator. Upon exiting the STG, the steam is directed into the deaerating surface condenser.

3.2.4.4 Plant Cooling Systems

The steam cycle heat rejection system will consist of a deaerating steam surface condenser, cooling tower, and circulating water system. The heat rejection system will receive exhaust

steam from the low-pressure steam turbine and condense it to water for reuse. The surface condenser will be a shell-and-tube heat exchanger with the steam condensing on the shell side and the cooling water flowing in one or more passes inside the tubes. The condenser will be normally operated at sub-atmospheric pressure, ranging from two to three inches of mercury, absolute (Hga), depending on ambient temperature and operating load. It will remove between 600 and 1,500 million British thermal units per hour (MMBtu/hr) of heat, depending on ambient temperature and operating load. Approximately 125,000 gallons per minute (gpm) of circulating cooling water is required to condense the steam at maximum load.

The circulating water will circulate through a counter-flow mechanical draft cooling tower, which will use electric-motor-driven fans to move the air in a direction opposite to the flow of the water. The heat removed in the condenser will be discharged to the atmosphere by heating the air and through evaporation of some of the circulating water. Maximum drift, which is the fine mist of water droplets entrained in the warm air leaving the cooling tower, will be limited to 0.0005 percent of the circulating water flow. This cooling tower drift carries with it solids (e.g., total dissolved solids) and these solids are assumed to contribute to the emissions of fine particulate matter 10 micrograms diameter and smaller (PM10) and particulate matter 2.5 micrograms diameter and smaller (PM2.5).

A closed-loop auxiliary cooling system will be provided for cooling equipment other than the steam condenser. Equipment served by the auxiliary cooling water system includes the CTG and STG lube oil coolers, STG generator cooler, STG hydraulic control system cooler, boiler feed pump lube oil and seal water coolers, air compressor, vacuum pump seal coolers, and sample coolers. Auxiliary cooling water pumps will pump circulating water from the cooling tower basin through heat exchangers to remove heat from the closed loop system.

3.2.5 Natural Gas Fuel System

The CTs will be designed to burn natural gas. The natural gas requirement for average annual base load operation is approximately 3,900 MMBtu/hr (higher heating value (HHV) basis). Maximum natural gas requirements during peak winter load operation are approximately 4,200 MMBtu/hr (HHV basis).

Natural gas will be delivered to the site via a new pipeline. At the site, the natural gas will flow through gas scrubbing/filtering equipment, a gas pressure control station, a fuel gas heater, and a flow-metering station prior to entering the CTs. Low-pressure gas for the emergency generator and the auxiliary boiler will be provided by a central pressure reduction station and an LP gas distribution system.

Historical data indicates that the pressure on the SCG Line 7000 will vary. At times when the pressure at the site fence line drops below 450 pound(s) per square inch gauge (psig), three electric motor-driven gas compressors will be provided to boost the plant pressure. Each compressor will be sized to delivery 50 percent of the plant fuel needs.

3.2.6 Auxiliary Equipment – Auxiliary Boiler, Emergency Generator & Diesel Fire Pump

The KRCD CPP will also include an auxiliary boiler to provide steam for minor processes whenever steam is not available from the HRSGs. The auxiliary boiler, which will be fired only on natural gas, will be capable of producing approximately 45,000 pounds per hour (lbs/hr) of 160 psig (saturated) steam.

The KRCD CPP will have an emergency standby generator to supply power for critical electrical loads in the event that power is not available from either the main generators or the grid. The emergency generator will be natural gas-fired and have an output capacity of approximately 1,350 kilowatts (kW).

The fire protection system will include a diesel driven fire pump to ensure system availability in the event of loss of electrical power to the project site. The diesel fire pump will use low sulfur diesel as fuel and have an output of approximately 210 kW.

3.2.7 Emissions Control and Monitoring

Air emissions from the combustion of natural gas in the CTs will be controlled using state-of-the-art systems. Emissions that will be controlled include NOx, CO, volatile organic compounds (VOCs), fine particulate matter and sulfur dioxide (SO2).

3.2.7.1 NOx Emissions Control

SCR will be used to control NOx concentrations in the CT/HRSG exhaust gas emitted to the atmosphere to 2.0 parts per million-dry volume (ppmvd) referenced at 15 percent oxygen (O2). The SCR process will use aqueous ammonia. Ammonia slip, or the concentration of unreacted ammonia in the exhaust gas, will be limited to 5 ppmvd at 15 percent O2 from the CT/HRSD. The SCR equipment will include a reactor chamber, catalyst modules, ammonia storage system, ammonia vaporization and injection system, and monitoring equipment and sensors. NOx emissions from the auxiliary boiler will be controlled to 9 ppmvd at 3 percent oxygen.

3.2.7.2 CO & VOC Emissions Control

An oxidizing catalytic converter (or oxidation catalyst) will be used to reduce the CO concentration in the exhaust gas emitted to the atmosphere from the CT/HRSGs to 2 ppmvd at 15 percent O2. The oxidation catalyst will also limit the VOC concentration in the exhaust gas to ppmvd at 15 percent O2.

3.2.7.3 Particulate & SO2 Emissions Control

Emissions of PM10, PM2.5 and SO2 from the CT/HRSGs will be controlled by the use of natural gas as the sole fuel. Natural gas is low in particulates and sulfur, resulting in low emissions of PM10, PM2.5 and SO2.

3.2.7.4 Continuous Emission Monitoring

The CT/HRSGs will include a Continuous Emission Monitoring System (CEMS) for NOx and CO. The CEMS will sample, analyze, and record fuel gas flow rate, NOx and CO concentration levels, and percentage of O2 in the exhaust gas from the two HRSG stacks. This system will generate reports of emissions data in accordance with permit requirements and will send alarm signals to the plant distributed control system (DCS) when the emissions approach or exceed pre-selected limits.

3.3 Air Pollutant Emissions Points

Sources of KRCD CPP air emissions are comprised of the following:

- The two CT/HRSG exhaust stacks;
- The exhaust stack of the auxiliary boiler;
- The exhaust stack of the emergency generator;
- The exhaust stack of the diesel fire pump; and
- The eight cells of the evaporative cooling tower (particulate matter only).

3.4 Project Construction

Construction of the KRCD CPP, from site preparation and grading to commercial operation, is expected to take from 24 to 27 months. Major milestones are listed in Table 3.

Table 3
Major Milestones

Activity	Date (Months)
Begin Construction	Second Quarter 2009
Startup and Test	First Quarter 2011
Commercial Operation	Second Quarter 2011

CHAPTER 4 BEST AVAILABLE CONTROL TECHNOLOGY ANALYSIS

4.1 Introduction

With respect to the implementation of Best Available Control Technology (BACT), the KRCD CPP was evaluated under the requirements of 40 CFR 52.21 (Prevention of Significant Deterioration (PSD) of Air Quality) and the San Joaquin Valley Air Pollution Control District (SJVAPCD) BACT policy. In addition to the major air emissions sources of the KRCD CPP

(i.e., the two CTs) which are the focus of the PSD BACT evaluation, the BACT analysis in this section also considers secondary air emissions sources (i.e., the auxiliary boiler, emergency generator, diesel fire pump and cooling tower).

Through its BACT Policy and its Rule 2201, the SJVAPCD requires the application of BACT to all emissions units which are subject to its New Source Review (NSR) rule and result in a potential to emit greater than the applicable BACT threshold levels. For the KRCD CPP, the applicable BACT threshold levels are:

- NOx – 2 pounds per day (lbs/day)
- CO – 200,000 pounds per year (lbs/yr)
- VOCs – 2 lbs/day
- PM10 – 2 lbs/day
- SO2 – 2 lbs/day

For those pollutants for which BACT is triggered, a BACT analysis is performed to ensure that the appropriate level of emissions control is applied to the source. The SJVAPCD defines this appropriate level of emissions control (i.e., BACT) as the most stringent limitation or control technique of the following:

- Achieved in practice for such emissions unit and class of source; or
- Contained in any State Implementation Plan (SIP) approved by the United States Environmental Protection Agency (USEPA) for such emissions unit category and class of source. A specific limitation or control technique shall not apply if the owner or operator of the proposed emissions unit demonstrates to the satisfaction of the Air Pollution Control Officer (APCO) that such limitation or control technique is not presently achievable; or
- Contained in an applicable federal New Source Performance Standard (NSPS); or
- Any other emission limitation or control technique, including process and equipment changes of basic or control equipment, found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source.

The general method for performing a BACT analysis is based on the USEPA top-down approach which is described in the USEPA *New Source Review Workshop Manual* (October 1990). This approach requires identification of the most stringent control available. This control level/technology is selected as BACT unless the applicant can show that it is not available, not achievable or not cost effective.

Identification of possible control technology options is generally accomplished through a review of the USEPA Reasonably Available Control Technology (RACT)/BACT/Lowest Achievable Emission Rate (LAER) Clearinghouse (or RBLC) and/or other BACT Clearinghouses. In this case, the other BACT clearinghouses used were the SJVAPCD BACT Guidelines and the California Air Resources Board (CARB) BACT Clearinghouse. CARB's "Guidance For Power Plant Siting and Best Available Control Technology" document (July 1999) was also reviewed. For natural gas-fired CTs such as those being used for the KRCD CPP, the control technologies involved are well established, although the control levels applied to different projects vary. Therefore, the BACT analysis for the CTs focuses on a review, via the clearinghouses and guidelines, of the recent control level determinations.

4.2 BACT Analysis for Combustion Turbines

Given the BACT threshold levels listed in Section 4.1 above as well as the size and anticipated operations of KRCD CPP (i.e., 565 MW output, baseload/year-round operation), the CTs will trigger BACT for NOx, CO, VOCs, PM10 and SO2.

4.2.1 NOx

In reviewing the USEPA & CARB Clearinghouse data for NOx (see Tables 4 and 5 below), the NOx BACT levels ranged from 2 to 3.5 parts per million (ppm) (USEPA) and 2 to 2.5 ppm (CARB). The most stringent control level was found to be 2.0 ppm based on the use of low NOx combustors (e.g., DLN combustors) in combination with SCR. This BACT is in keeping with the CARB Guidance document as well as SJVAPCD BACT Guideline 3.4.2. The former notes 2.0 ppm with a 3-hour averaging period as BACT for NOx emissions from combined cycle CTs fueled by natural gas. The latter notes 2.0 ppm averaged over 1-hour as technologically feasible, although it is not classified as having been achieved in practice or contained within a SIP.

Table 4
USEPA RBLC - Recent NOx Limits for Combined-Cycle Gas Turbine Projects

Emission Limit[1]	Control Technology	RBLC ID #/Permit Issuance Date	Company Name and Location	Equipment
3 ppm	Low NOx Burners w/ SCR	CO-0056 5/06	Rocky Mountain Energy Center, Colorado	300 MW CT
2.5 ppm, 24-hour	DLN Burners w/ SCR	NC-0101 9/05	Forsyth Energy Projects, North Carolina	1844.3 MMBtu/hr CT
2 ppm, 3-hour rolling	SCR	NV-0035 8/05	Tracey Substation Expansion Project, Nevada	306 MW CT
2 ppm, 3-hour	DLN & SCR	OR-0041 8/05	Wanapa Energy Center, Oregon	2384.1 MMBtu/hr Fuel Input

Table 4
USEPA RBLC - Recent NOx Limits for Combined-Cycle Gas Turbine Projects

Emission Limit[1]	Control Technology	RBLC ID #/Permit Issuance Date	Company Name and Location	Equipment
2.5 ppm on natural gas, 10 ppm on oil	SCR	FL-0265 6/05	Hines Power Block 4, Florida	530 MW Output
3 ppm, annual average	Low NOx Burners w/ SCR	LA-0192 6/05	Cresent City Power, Louisiana	2006 MMBtu/hr Fuel Input
2.5 ppm	DLN & SCR	MI-0366 4/05	Berrien Energy, Michigan	1584 MMBtu/hr Fuel Input
2 ppm	DLN & SCR	FL-0263 2/05	FPL Turkey Point Power Plant, Florida	170 MW Output
2.5 ppm, 3-hour	DLN & SCR	WA-0328 1/05	BP Cherry Point Cogeneration Project	GE 7FA
3 ppm, 3-hour	DLN & SCR	OH-0252 12/04	Duke Energy Hanging Rock Energy Facility, Ohio	GE 7 FA
2 ppm, 3-hour	Low NOx Burners & SCR	AZ-0047 12/04	Wellton Mohawk Generating Station, Arizona	GE 7FA
3.5 ppm, 3-hour	SCR	MS-0073 11/04	Reliant Energy Choctaw County, Mississippi	230 230 MW Output
3.5 ppm	Low NOx Burners & SCR	NV-0033 8/04	El Dorado Energy, Nevada	475 MW Output

Notes:
1. Emissions limits are in ppm and referenced at 15 percent O2, unless noted otherwise.

Table 5
CARB BACT Clearinghouse - Recent NOx Limits for Combined-Cycle Gas Turbine Projects

Emission Limit[1]	Control Technology	Permit Issuance Date	Company Name and Location	Equipment
2.5 ppm, 1-hour average	SCR	3/03	Elk Hills Power Project, SJVAPCD	GE 7FA
2 ppm, 1-hour	SCR	12/03	Western Midway Sunset Power Project, SJVAPCD	GE 7FA or Westinghouse 501F
2 ppm, 3-hour	SCR	5/03	Magnolia Power Project, South Coast Air Quality Management District (AQMD)	GE 7FA
2.5 ppm, 1-hour	SCR	10/03	Three Mountain Power, Shasta County AQMD	GE 7FA or Westinghouse 501F

Notes:
1. Emissions limits are in ppm and referenced at 15 percent O2, unless noted otherwise.

DLN combustors reduce NOx formation in the combustion zone by pre-mixing fuel and air to avoid the development of hot spots within the combustion area. The SCR process injects ammonia into the exhaust stream in the presence of a catalyst to further reduce NOx emissions. While there other technologies, e.g., SCONOx, Xonon, that can be applied to CTs for the reduction of NOx emission, none of these other approaches can provide a lower emissions limit than that achieved through the use of DLN combustion in combination with SCR and more importantly, none of these other technologies has been applied to the size or class of CTs to be used for the KRCD CPP.

These conclusions regarding other NOx control methods are mirrored in other Applications for Certification for various similar projects, e.g., South Bay Replacement Project, San Joaquin Energy Center, as well as in the CARB's May 2004 Report to the Legislature on Gas-Fired Power Plant NOx Emissions Controls and Related Environmental Impacts. As noted in CARB's report, neither SCONOx nor Xonon have been applied to F Class combustion turbines. Applications of SCONOx have been limited to smaller units (40-50 MW). Similarly, Xonon, which appears capable of achieving 3 ppm rather than 2 ppm NOx, has only been applied to small CTs (e.g., less than 20 MW).

Therefore, the proposed BACT for NOx emissions from the KRCD CPP natural gas-fired CTs is the use of DLN combustion in combination with SCR to limit NOx to 2.0 ppmdv at 15 percent O2. The averaging time proposed is 3 hours.

4.2.2 CO

A review of the USEPA & CARB Clearinghouse data for CO (see Tables 6 and 7, below) indicated CO BACT levels which ranged from 2 to 18 ppm (USEPA) and from 2 to 4 ppm (CARB). The most stringent control level was found to be 2.0 ppm based on the use of an oxidation catalyst. This level is within the limits of CARB BACT guidance which notes 6 ppm. SJVAPCD BACT Guideline 3.4.2 shows 6 ppm as achieved in practice or contained within a SIP, and 4 ppm, as technologically feasible.

Table 6
USEPA RBLC - Recent CO Limits for Combined-Cycle Gas Turbine Projects

Emission Limit[1]	Control Technology	RBLC ID #/ Permit Issuance Date	Company Name and Location	Equipment
3 ppm	Oxidation Catalyst	CO-0056 5/06	Rocky Mountain Energy Center, Colorado	300 MW Output
11.6 ppm, 3-hour	Good Combustion Practices	NC-0101 9/05	Forsyth Energy Projects, North Carolina	1844.3 MMBtu/hr Fuel Input
3.5 ppm, 3-hour rolling	Oxidation Catalyst	NV-0035 8/05	Tracey Substation Expansion Project, Nevada	306 MW Output

Table 6
USEPA RBLC - Recent CO Limits for Combined-Cycle Gas Turbine Projects

Emission Limit[1]	Control Technology	RBLC ID #/ Permit Issuance Date	Company Name and Location	Equipment
2 ppm, 3-hour	Oxidation Catalyst	OR-0041 8/05	Wanapa Energy Center, Oregon	2384.1 MMBtu/hr Fuel Input
8 ppm on natural gas, 12 ppm on oil	Good Combustion Practices	FL-0265 6/05	Hines Power Block 4, Florida	530 MW Output
4 ppm, annual average	Good Combustion Practices	LA-0192 6/05	Cresent City Power, Louisiana	2006 MMBtu/hr Fuel Input
2 ppm, 3-hour	Oxidation Catalyst	MI-0366 4/05	Berrien Energy, Michigan	1584 MMBtu/hr Fuel Input
8 ppm	Good Combustion Practices	FL-0263 2/05	FPL Turkey Point Power Plant, Florida	170 MW Output
2 ppm, 3-hour	Oxidation Catalyst	WA-0328 1/05	BP Cherry Point Cogeneration Project	GE 7FA
6 ppm, 24-hour average	Good Combustion Practices	OH-0252 12/04	Duke Energy Hanging Rock Energy Facility, Ohio	GE 7 FA
3 ppm, 3-hour	Oxidation Catalyst	AZ-0047 12/04	Wellton Mohawk Generating Station, Arizona	GE 7FA
18.36 ppm, 3-hour	Good Combustion Practices	MS-0073 11/04	Reliant Energy Choctaw County, Mississippi	230 MW Output
2.6 ppm	Oxidation Catalyst	NV-0033 8/04	El Dorado Energy, Nevada	475 MW Output

Notes:
1. Emissions limits are in parts per million-dry volume & referenced at 15 percent O2, unless noted otherwise.

Table 7
CARB BACT Clearinghouse - Recent CO Limits for Combined-Cycle Gas Turbine Projects

Emission Limit[1]	Control Technology	Permit Issuance Date	Company Name and Location	Equipment
4 ppm, 3-hour	Oxidation Catalyst	3/03	Elk Hills Power Project, SJVAPCD	GE 7FA
4 ppm, 3-hour	Oxidation Catalyst	12/03	Western Midway Sunset Power Project, SJVAPCD	GE 7FA or Westinghouse 501F
2 ppm, 1-hour	Oxidation Catalyst	5/03	Magnolia Power Project, South Coast AQMD	GE 7FA
4 ppm, 3-hour	Oxidation Catalyst	10/03	Three Mountain Power, Shasta County AQMD	GE 7FA or Westinghouse 501F

Notes:
1. Emissions limits are in ppmvd and referenced at 15percent O2, unless noted otherwise.

Based on this information, the proposed BACT for CO emissions from the KRCD CPP natural gas-fired CTs is the use of an oxidation catalyst to limit CO to 2.0 ppmdv at 15 percent O2. The averaging time proposed is 3 hours.

4.2.3 VOCs

In reviewing the clearinghouse data for VOCs (see Tables 8 and 9, below), the USEPA RBLC data ranged from 1.1 ppm (based on annual averaging) to 4 ppm (3-hour averaging). Alternatively, some of the BACT determinations for VOCs in the USEPA database were expressed as mass emissions rates rather than concentrations. In these instances the VOC limit ranged from 3 to 6 lbs/hr. The concentrations, which appear to be lower than the mass emissions rates, rely on the use of an oxidation catalyst. CARB BACT data for VOCs ranged from 0.7 to 2 ppm. The most stringent control level was based on the use of an oxidation catalyst. CARB BACT guidelines indicate 2 ppm averaged over 1 hour, except for the Western Midway Sunset project, which shows 1.4 ppm over 3 hours. The SJVAPCD's BACT Guideline 3.4.2 notes 2 ppm as achieved in practice or contained within a SIP, and 1.5 ppm, as technologically feasible.

Based on discussions with SJVAPCD personnel, this 1.5 ppm VOC limit was proposed for the Midway Sunset project. However, this facility was never constructed and therefore, the 1.5 ppm level has not been achieved in practice. For longer averaging times (e.g., an annual basis), VOC concentrations of less than 2 ppm are achievable. However, for shorter periods (such as 3 hours), 2 ppm appears to be the lowest VOC emissions concentration attained.

Table 8
USEPA RBLC - Recent VOC Limits for Combined-Cycle Gas Turbine Projects

Emission Limit[1]	Control Technology	Permit Issuance Date	Company Name and Location	Equipment
0.0029 lbs/MMBtu	Oxidation Catalyst	CO-0056 5/06	Rocky Mountain Energy Center, Colorado	300 MW CT
4 ppm, 3-hour rolling	Oxidation Catalyst	NV-0035 8/05	Tracey Substation Expansion Project, Nevada	306 MW CT
No Limit Specified	Oxidation Catalyst	OR-0041 8/05	Wanapa Energy Center, Oregon	2384.1 MMBtu/hr Fuel Input
1.1 ppm, annual average	Oxidation Catalyst	LA-0192 6/05	Cresent City Power, Louisiana	2006 MMBtu/hr Fuel Input
3.2 lbs/hr	Oxidation Catalyst	MI-0366 4/05	Berrien Energy, Michigan	1584 MMBtu/hr Fuel Input
1.3 ppm	Good Combustion Practices	FL-0263 2/05	FPL Turkey Point Power Plant, Florida	170 MW Output

Table 8
USEPA RBLC - Recent VOC Limits for Combined-Cycle Gas Turbine Projects

Emission Limit[1]	Control Technology	Permit Issuance Date	Company Name and Location	Equipment
No Limit Specified	Oxidation Catalyst	WA-0328 1/05	BP Cherry Point Cogeneration Project	GE 7FA
3.2 lbs/hour	Good Combustion Practices	OH-0252 12/04	Duke Energy Hanging Rock Energy Facility, Ohio	GE 7 FA
3 ppm, 3-hour	Oxidation Catalyst	AZ-0047 12/04	Wellton Mohawk Generating Station, Arizona	GE 7FA
3.64 ppm, 3-hour	Good Combustion Practices	MS-0073 11/04	Reliant Energy Choctaw County, Mississippi	230 230 MW Output
5.2 lbs/hr	Good Combustion Practices	NV-0033 8/04	El Dorado Energy, Nevada	475 MW Output

Notes:
1. Emissions limits are in ppm and referenced at 15 percent O2, unless noted otherwise.

Table 9
CARB BACT Clearinghouse - Recent VOC Limits for Combined-Cycle Gas Turbine Projects

Emission Limit[1]	Control Technology	Permit Issuance Date	Company Name and Location	Equipment
2 ppm, 3-hour average	Oxidation Catalyst	3/03	Elk Hills Power Project, SJVAPCD	GE 7FA
1.4 ppm, 3-hour	Oxidation Catalyst	12/03	Western Midway Sunset Power Project, SJVAPCD	GE 7FA or Westinghouse 501F
2 ppm, 1-hour	Oxidation Catalyst	5/03	Magnolia Power Project, SCAQMD	GE 7FA
2 ppm, 1-hour	Oxidation Catalyst	10/03	Three Mountain Power, Shasta County Air Quality Management District	GE 7FA or Westinghouse 501F

Notes:
1. Emissions limits are in ppm and referenced at 15% O2, unless noted otherwise.

Based on this information, the proposed BACT for VOCs from the KRCD CPP natural gas-fired CTs is the use of an oxidation catalyst to limit VOCs to 2 ppm averaged over 3 hours.

4.2.4 PM10

In reviewing the BACT Guideline and Clearinghouse data for PM10, the most stringent control level was found to be the use of California Public Utility Commission (CPUC) regulated natural gas. CARB BACT Guidelines note the use of natural gas with a sulfur content of no more than 1.0 grains per 100 standard cubic feet (scf) as BACT for PM10. The use of natural gas as BACT for PM10 appears in SJVAPCD BACT Guidelines (Guideline 3.4.2) as having been achieved in

practice or contained in a SIP. In addition, the SJVAPCD also defines PM10 BACT for this class of emissions source as including an air inlet cooler/filter and a lube oil vent coalescer.

Therefore, CPUC regulated natural gas in combination with an air inlet cooler/filter and a lube oil vent coalescer is considered as the most effective BACT for PM10 emissions from the KRCD CPP CTs. This BACT will limit stack emissions of PM10 from each CT to approximately 10.0 lbs/hr (Siemens) or 9.0 lbs/hr (GE).

4.2.5 SO2

In reviewing the BACT Guideline and Clearinghouse data for SO2, the most stringent control level was found to be the use of CPUC regulated natural gas. CARB's BACT Guidelines also note the use of natural gas with a sulfur content of no more than 1.0 grains per 100 scf as BACT for PM10. The use of CPUC regulated natural gas (or alternatively, natural gas with a sulfur content of no more than 0.75 grains per 100 scf) as BACT for SO2 appears in the SJVAPCD BACT Guideline 3.4.2 as having been achieved in practice or contained in a SIP.

Therefore, CPUC regulated natural gas is considered as the most effective BACT for SO2 emissions and will be used as the fuel for the KRCD CPP CTs. Information from the natural gas supplier indicates that, while the average sulfur content of the fuel is on the order of 0.1 grains per 100 scf, the maximum sulfur content reaches approximately 0.3 grains per 100scf. This latter sulfur content will limit stack emissions of SO2 from each CT to approximately 1.7 lbs/hr (Siemens) or 1.5 lbs/hr (GE).

4.3 BACT FOR ANCILLARY AND STANDBY EQUIPMENT

In addition to the two CTs, other air emissions sources for the KRCD CPP will include an auxiliary boiler, a natural-fired emergency generator, a diesel driven fire pump and an evaporative cooling tower. BACT for each of these equipment pieces is discussed below.

4.3.1 Auxiliary Boiler

A relatively small package boiler will be used to maintain necessary steam loads during periods of CT startup & shutdown or non-operation. The auxiliary boiler, which will capable of generating approximately 45,000 lbs/hr of 160 psig saturated steam, is anticipated to operate at full load for more than 24 consecutive hours and up to 2,315 hours annually. Given its relatively small size, the auxiliary boiler will fire at full load when operating.

Given this operating profile, the auxiliary boiler will trigger BACT for NOx, VOCs, and PM10, but not CO or SO2.

Given the operational profile of the auxiliary boiler, SJVAPCD BACT Guidelines were used to make a BACT determination. Guideline 1.1.2, which relates to natural gas-fired boilers of greater than 20 MMBtu/hr fuel input (base loaded or with small load swings), notes the following as achieved in practice or contained in the SIP:

- NOx – an emissions concentration of no more than 9 ppmdv at 3 percent O2 (ultra low-NOx main burner system); and
- VOCs & PM10 – use of natural gas fuel.

Based on this information, the following are proposed as BACT for the auxiliary boiler:

- NOx – Combustion system (e.g., ultra-low NOx main burners) that achieves 9 ppmdv at 3 percent O2 for NOx.;
- VOCs & PM10 – use of natural gas fuel.

4.3.2 Emergency Generator (Natural Gas-Fired)

The KRCD CPP requires a natural gas-fired internal combustion (IC) engine as an emergency generator. Although Rich Burn IC engines were reviewed, a Lean Burn IC engine will be used due to the size (1,800 – 2,000 horsepower) required. The emergency generator is not anticipated to run for more than 30 minutes in a 24-hour period (no more than 26 hours annually) and then only for maintenance purposes. However, the SJVAPCD criterion for determining BACT applicability for emergency or standby equipment is to assume up to 24 hours of continuous operation. Based on this assumption, a BACT evaluation for the emergency generator is triggered for NOx, VOCs and PM10, but not CO or SO2.

Given the limited operational profile of the emergency generator, SJVAPCD BACT Guidelines were used to make a BACT determination. Guideline 3.1.8, which applies to Lean Burn natural gas-fired emergency IC engines of more than 250 horsepower, notes the following as achieved in practice or contained in the SIP:

- NOx & VOCs – no more than 1.0 grans per break horsepower hour (g/bhp-hr); and
- PM10 - use of natural gas fuel.

VOC Guideline 3.1.8 also notes a 90 percent effective oxidation catalyst as technically feasible. This guideline further notes the following as alternative basic equipment:

- NOx – Rich Burn engine with 90 percent effective non-selective catalytic reduction (NSCR); and

- VOCs - Rich Burn engine with 50% effective NSCR.

Based on this information, the following are proposed as BACT for the natural gas-fired emergency generator:

- NOx & VOCs – no more than 1.0 g/bhp-hr;
- PM10 – use of natural gas fuel.

Note that cursory calculations based on simple capital cost indicate that the addition of a 90 percent effective oxidation catalyst for additional VOC control is not cost effective. On an annual basis the emergency generator will emit less than 0.04 tpy of VOCs. Using SJVAPCD VOC cost effectiveness thresholds of $5,000/ton and their default factors for determining an annualized capital cost (e.g., interest rate of 10%, 10 year catalyst life), the capital cost of the oxidation catalyst must be less than approximately $1,105 in order for this application to be cost effective.

Similar cursory calculations indicate that the use of a Rich Burn engine with a) 90 percent effective NOx control and b) 50 percent effective VOC control, both via NSCR, in lieu of a Lean Burn engine would not be cost effective. On an annual basis the (Lean Burn) emergency generator will emit less than 0.06 and 0.04 tpy of NOx and VOCs, respectively. Assuming a Rich Burn engine with NSCR could reduce these annual emissions rates by 90 percent and 50 percent, respectively, and using SJVAPCD NOx and VOC cost effectiveness thresholds of $9,700 and $5,000/ton as well as their default factors for determining an annualized capital cost (e.g., interest rate of 10%, 10 year catalyst life), the capital cost of the Rich Burn engine must be less than approximately $3,827 (based on the use of a Multi-Pollutant Cost Effectiveness Threshold (MCET) approach) in order for the NSCR application to be cost effective.

In each instance the capital cost would exceed the amounts noted above and application would not be cost effective.

4.3.3 Fire Pump (Diesel-Fired)

The fire pump is not anticipated to run for more than 30 minutes in a 24-hour period (no more than 26 hours annually) and then only for maintenance purposes. However, SJVAPCD criterion for determining BACT applicability for emergency or standby equipment is to assume up to 24 hours of continuous operation. Based on this assumption, a BACT evaluation is triggered for the diesel fire pump for NOx, VOCs, PM10 and SO2, but not CO.

Given the limited operational profile of the diesel fire pump, SJVAPCD BACT Guidelines were used to make a BACT determination. Guideline 3.1.4, which applies to emergency diesel

internal combustion engines driving fire pumps, notes the following as achieved in practice or contained in the SIP:

- NOx – an emissions rate of no more than 6.9 g/bhp-hr;
- VOCs – positive crankcase ventilation (unless this voids the Underwriters Laboratories (UL) certification);
- PM10 – 0.1 g/bhp-hr (if Toxics BACT (TBACT) is applicable) or 0.4 g/bhp-hr (if TBACT is not applicable); and
- SO2 – low sulfur diesel fuel (500 ppm by weight sulfur or less) or very low sulfur diesel fuel (15 ppmw sulfur or less), if available.

Guideline 3.1.4 also notes catalytic oxidation as technically feasible for control of VOCs. Based on this information, the following are proposed as BACT for the diesel fire pump:

- NOx – no more than 6.9 g/bhp-hr;
- VOCs – positive crankcase ventilation, provided this does not void an Underwriters Laboratories certification (Note that a cursory calculation, based on simple capital cost, indicates that the addition of catalytic oxidation is not cost effective. On an annual basis the diesel fire pump will emit 0.002 tpy of VOCs. Using SJVAPCD VOC cost effectiveness threshold of $5,000/ton and their default factors for determining an annualized capital cost, e.g., interest rate of 10 percent, 10 year catalyst life, the actual capital cost must be less than approximately $62.00 for the installation of catalytic oxidation to be cost effective. The capital cost for catalytic oxidation equipment would certainly be greater than this amount.)
- PM10 – 0.4 g/bhp-hr (note the KRCD CPP will not be a Major Air Toxics Source, as defined in SJVAPCD Rule 2520; therefore, TBACT does not apply);
- SO2 - very low sulfur diesel fuel if available, alternatively low sulfur diesel fuel.

If available in the size required, the Diesel Fire Pump will be specified as a Tier III engine as mandated by the federal Clean Air Act, or alternatively, as a Tier II engine.

4.3.4 Cooling Tower

In addition to PM10 emissions from the CTs, the evaporative cooling tower will emit relatively minor amounts of PM10 through the cooling tower drift which entrains PM10. The cooling tower will have a circulating water flow rate of up to approximately 125,200 gpm. This flowrate is greater than the 10,000 gpm permitting and BACT exemption level for cooling towers as provided in SJVAPCD Rule 2020 (Permit) Exemptions Part 6.2. Therefore, the cooling tower is subject to BACT for its PM10 emissions.

SJVAPCD BACT Guideline 8.3.10 (Cooling Tower – Induced Draft, Evaporative Cooling) lists cellular type drift eliminators as technologically feasible, although not achieved in practice or contained in a SIP. The intent of this guideline is to minimize cooling tower drift since reduced PM10 emissions from cooling towers are achieved through minimization of drift. The cooling tower will be designed to include drift eliminators that reduce drift to no more than 0.0005% of the circulating water flow. This is the proposed BACT for PM10 emissions from the cooling tower.

4.4 SUMMARY OF BACT

Tables 10 and 11, below summarize the proposed BACT and associated emissions limits for the KRCD CPP.

Table 10
Summary of Proposed BACT for the KRCD CPP CTs

	Proposed BACT	Proposed Emission Limitation[1]	
		GE	Siemens
NOx	DLN with SCR	2.0 ppm averaged over 3 hrs[2]	2.0 ppm averaged over 3 hrs[2]
CO	Oxidation Catalyst	2.0 ppm averaged over 3 hrs[2]	2.0 ppm averaged over 3 hrs[2]
VOCs	Oxidation Catalyst	2.0 ppm averaged over 3 hrs[2]	2.0 ppm averaged over 3 hrs[2]
PM10	Use of Natural Gas Fuel	9.0 lbs/hr	10.0 lbs/hr
SO2	Use of Natural Gas Fuel	1.5 lbs/hr[3]	1.7 lbs/hr[3]

Notes:
1. Not to apply during periods of startup and shutdown.
2. ppmvd referenced at 15 percent O2; NH3 slip is limited to no more than 5 ppm.
3. Based on a fuel sulfur content of 0.30 grains per 100 scf.

Table 11
Summary of Proposed BACT for KRCD CPP Ancillary Equipment

	Proposed BACT/ Emissions Limitation			
	Auxiliary Boiler	Emergency Generator	Diesel Fire Pump	Cooling Tower
NOx	9 ppm[1]	1.0 g/bhp-hr	6.9 g/bhp-hr	NA
CO	NA	NA	NA	NA
VOCs	Natural Gas Fuel	1.0 g/bhp-hr	Positive Crankcase Ventilation[2]	NA
PM10	Natural Gas Fuel	Natural Gas Fuel	0.4 g/bhp-hr[3]	0.0005% Cooling Tower Drift
SO2	NA	NA	Low sulfur fuel[4]	NA

Notes:
1. 9 ppmdv at 3 percent O2.
2. Provided this does not void a UL certification.
3. Assumes that TBACT is not triggered.
4. If available very low sulfur fuel will be used.

CHAPTER 5 PROJECT EMISSIONS

5.1 CRITERIA POLLUTANT EMISSIONS

The KRCD CPP will use natural gas as the only fuel from its CTs. Table 12 provides the anticipated natural gas fuel composition. Emissions of criteria pollutants from the KRCD CPP CTs include NOx, CO, VOCs, PM10, PM2.5 and SO2, which are products of natural gas combustion. Relatively smaller amounts of these emissions also result natural gas firing in the auxiliary boiler and emergency generator, and low sulfur fuel oil firing in the diesel fire pump. The KRCD CPP's evaporative cooling tower will produce relatively small amounts of PM10 and PM2.5 emissions. The PM emissions result from solids being carried away from the towers as part of their drift, i.e., un-evaporated water.

Lead (Pb) is also considered as a PSD criteria pollutant. However, Pb emissions from the CTs and emergency generator are assumed as negligible (e.g., no Pb emissions factors for this equipment were found in AP-42, (USEPA, 2000)). Similarly, Pb emissions from the cooling tower are assumed as negligible, as Pb was not found as a constituent of the cooling tower makeup water. AP-42 does list a Pb emissions factor for the type of auxiliary boiler which the KRCD CPP will use. While there is no AP-42 Pb emissions factor for the diesel fire pump, the Ventura County Air Pollution Control District (VCAPCD), in Southern California, does have such an emissions factor. Although these Pb emissions rates (and the resulting KRCD CPP emissions of Pb) are small, they are provided below.

CT emissions of NOx and CO can be large if uncontrolled. However, the KRCD CPP CTs will use SCR and an oxidation catalyst to minimize emissions of NOx and CO, respectively. The oxidation catalyst will also serve to reduce VOC emissions as well. As previously described in Section 4.0, these emissions control systems were determined as BACT.

Table 12
Natural Gas Fuel Composition

Methane	Ethane	Propane	I_Butane	N_Butane	I_Pentane	N_Pentane	C6	Nitrogen Gas	Carbon Dioxide
94.67%	2.68%	0.59%	0.09%	0.09%	0.03%	0.02%	0.02%	0.55%	1.26%

Notes:
1. Sulfur content reported as varying from 0.042 to 0.322 grains per 100 scf. However, for emission calculations the KRCD CPP assumes approximately 0.3 grains/100 scf. Energy content = 1,032 million British thermal units per standard cubic feet higher heating value BTU/scf (HHV).
2. Specific Gravity = 0.592.
3. Data is for So Cal Gas Pixley Station (1/1/06-11/20/06).

5.2 CRITERIA POLLUTANT EMISSIONS RATES

Three operating modes need to be considered when determining worst-case emissions levels: normal or steady-state operations (under a number of ambient conditions and operating modes); startup/shutdown mode; and the initial commissioning period. While the subsections below provide an overview of KRCD CPP air emissions during operations, a detailed description is in presented in Appendix 1 (Criteria Pollutant Emissions Data – GE and Siemens Scenarios).

Emissions rates for Pb emissions from the auxiliary boiler and diesel fire pump are not included in Appendix 1. They are provided here instead given the relatively small amounts of Pb emissions involved. For the auxiliary boiler an emissions rate of 4.9E-07 lbs/MMBtu (based on Table 1.4-2 of AP-42 (USEPA, 2000)) is assumed and for the diesel fire pump an emissions rate of 0.0083 lbs/1,000 gallons is assumed. Based on the auxiliary boiler fuel consumption of 61.23 MMBtu/hr and up to 2,315 hour/yr of operation, Pb emissions from the auxiliary boiler are estimated as 3.0E-05 lbs/hr and 6.9E-02 lbs/yr. Based on the diesel fire pump fuel consumption of 17.2 gallons/hr and 26 hrs/yr of operation, the estimated Pb emissions are 1.43E-04 lbs/hr and 3.72E-03 lbs/yr. Total KRCD CPP Pb emissions would therefore be 1.73E-04 lbs/hr and 7.3E-02 lbs/yr. The latter number is well below the PSD trigger of 0.6 tons/yr (1,200 lbs/yr).

5.2.1 Steady-State Operation

The KRCD CPP is expected to operate primarily at full load with occasional partial load operating levels. Performance data for both the GE and Siemens CT options were developed to encompass KRCD CPP minimum, maximum and annual average ambient conditions. The following five full load ambient/operational scenarios were used as the basis for ensuring that the overall range of possible emissions rates were considered for the assessment of possible impacts:

- Scenario A – 26F/60 percent Relative Humidity (RH), Fogger-Off, Steam Injection-Off
- Scenario B – 63F/40 percent RH, Fogger-On, Steam Injection-Off
- Scenario C – 63F/40 percent RH, Fogger-Off, Steam Injection-Off
- Scenario D – 103F/20.1 percent RH, Fogger-On, Steam Injection-On
- Scenario E – 103F/20.1 percent RH, Fogger-Off, Steam Injection-Off

The fogger represents the CT air inlet evaporative cooling system which is used as needed to cool the CT inlet air for increased CT output. Steam injection involves injecting steam into the turbine section of the CT, which is used during peak electric demand periods for enhanced output.

A sixth ambient/operational scenario (Scenario F) was developed for CT partial load operation, which although not common, may occur from time to time. For the GE CT option, partial load operation can occur down to as low as approximately 50 percent of full load. For the Siemens option, partial load goes down to approximately 60 percent of full load. In either case, CT partial

load operation would involve only one of the two CTs at partial load with the second CT either off or at full load. This is more fuel efficient than running both CTs at partial load. The partial load ambient/operational scenario was:

- Scenario F – 63F/40 percent RH, Fogger-Off, Steam Injection-Off

Appendix 1 contains emissions rates tables (for both the GE and Siemens options) for each of the five full load ambient/operational scenarios as well as the partial load scenario.

5.2.2 Startup/Shutdown Operation

During startup and shutdown sequences, the emissions rates of some CT pollutants are higher than in the steady-state operating mode. Therefore, impacts from startup and shutdown operations are assessed along with those due to steady-state operation. In general, these higher startup and shutdown emissions rates result because the emissions control equipment cannot fully function immediately upon startup or continue to function fully through the shutdown period.

For both the GE and Siemens CT options, startup sequences are divided into three categories: cold, warm and hot. Emissions tables for cold, warm ant startups as well as shutdowns are provided in Appendix 1. As cold startups assume a prior shutdown of more than 64 hours and the KRCD CPP will not be off-line for this amount of time (or if it is, the auxiliary boiler will maintain a warm/hot standby status), only hot and warm startup sequences were used in the impact assessment.

5.2.3 Commissioning Period

Commissioning emissions rates which will occur within the first month or two of KRCD CPP operations are shown in Appendix 1. These must be factored into the assessment of worst case emissions, as during this one-time commissioning period, CT emissions control equipment (i.e., the SCR and oxidation catalyst) will not be operational at all times. Subsequent first year operating emissions need not account for commissioning emissions, since the allowable first year steady-state operating hours of the KRCD CPP will be reduced to the extent that commissioning emissions occur.

5.2.4 Maximum Emissions Rates

Maximum emissions rates tables were developed for the full load steady-state, startup/shutdown, commissioning and partial load steady-state emissions profiles and cross-referenced to each of the applicable impact assessment averaging times (i.e., the 1-hour, 3-hour, 8-hour, 24-hour & annual averaging periods). These maximum emissions rate tables, which serve as the basis for the Air Quality Impact Assessment described below, are provided in Appendix 1.

As shown in Appendix 1, KRCD CPP emissions of NOx, CO and PM10 are greater than the applicable PSD Significant Emissions Rates (SERs).

5.3 NON-CRITERIA POLLUTANT EMISSIONS

In addition to the criteria pollutants discussed above, under the PSD regulations there are nine non-criteria pollutants, which have SERs. These are:

- Asbestos (SER = 0.007 tpy);
- Beryllium (SER = 0.0004 tpy);
- Mercury (SER = 0.1 tpy);
- Vinyl Chloride (SER = 1 tpy);
- Fluorides (SER = 3 tpy);
- Sulfuric Acid Mist (SER = 7 tpy);
- Hydrogen Sulfide (SER = 10 tpy);
- Total Reduced Sulfur (SER = 10 tpy); and
- Reduced Sulfur Compounds (SER = 10 tpy).

KRCD CPP emissions of these non-criteria pollutants are expected to be negligible and in any case well below the PSD SERs.

5.4 HAZARDOUS AIR POLLUTANTS (HAPS)

Emissions estimates of HAPs from the KRCD CPP are provided in Appendix 2. For the CTs, emissions of relatively small amounts of these substances result from the combustion of natural gas. For the cooling tower, emissions (which are based on the composition of the water being used), are due to trace amounts being carried away in the tower's drift. Relatively small amounts of non-criteria pollutant emissions from the auxiliary boiler and emergency (standby) generator result from their use of natural gas fuel. Similarly, small amounts of non-criteria pollutant emissions are emitted by combustion of diesel fuel in the fire pump.

The estimates in Appendix 2 show that KRCD CPP will not be a major source of HAPs, i.e., the KRCD CPP will not emit greater than or equal to 10 tpy of any single HAP or greater than or equal to 25 tpy of all HAPs combined.

CHAPTER 6 EXISTING AIR QUALITY DATA

6.1 TOPOGRAPHY

The KRCD CPP will be located near the City of Parlier, south of Fresno. The project vicinity is within the flat San Joaquin Valley. The base elevation in the area immediately surrounding the project site is approximately 327 feet above sea level (FASL). The San Joaquin Valley is

bordered by the Coast Ranges to the west, the Sierra Nevada to the east, and the Tehachapi Mountains to the south.

6.2 CLIMATE AND METEOROLOGY

The climate of the San Joaquin Valley includes hot, dry summers and mild winters. The hottest days generally occur in July. The 30-year average temperature for July is 81 degrees Fahrenheit (°F). The average maximum daily temperature is 99 °F. The coldest temperatures occur in December. The 30-year average temperature for December is 45 °F, with average maximum daily temperatures around 53 °F. Rainfall typically occurs during November through April. A dense fog, known as a Tule fog is a frequent wintertime occurrence. Precipitation can be variable from year to year, but is generally around 11 inches.

Winds within the San Joaquin Valley generally fall into four categories, up valley (northerly winds flowing through the Sacramento Delta) down valley/drainage (southerly winds flowing into the Sacramento Delta), southerly, and northerly (no marine air). These flow patterns are summarized in Figure 1 of Appendix 3. Annual and quarterly wind roses, geographical representations of wind flow, for the 1989 data from Fresno Airport can be found in Figures 2 through 6 of Appendix 3. The winds are predominantly from the northwest all year. Southwesterly winds show a secondary predominance during the rainy season. Annually, calm winds occurred 11 percent of the time.

Temperature inversions are a frequent occurrence in Fresno. A temperature inversion occurs when temperature increases with height, instead of the typical decrease in temperature with height. An increase in temperature with height creates a stable atmosphere, which limits the vertical mixing of the air and can contribute to elevated pollution concentrations. Annually, inversions have been measured 99 percent of the time at 5 am, 89 percent of the time at 10 am, and 57 percent of the time at 3 pm (CARB, 1990).

6.3 AIR QUALITY STANDARDS

Air quality standards have been developed to protect the public health and welfare. The federal Clean Air Act (CAA) established National Ambient Air Quality Standards (NAAQS) for several criteria pollutants, including O3, nitrogen dioxide (NO_2), CO, sulfur dioxide (SO2), PM10, PM2.5, and Pb.

O3

O3 is formed at ground level by a chemical reaction between NOx and VOCs in the presence of sunlight and heat. Sources of O3 include motor vehicles, industrial sources, gasoline vapors, and chemical solvents. Health effects associated with elevated O3 levels include breathing difficulties and lung damage (CARB, 2001).

NO2

NO2 is formed when fuels are burned at high temperatures. Nitrogen oxides (i.e., NO2 + NO) are major components in O3 formation and react to form nitrate particles and acid aerosols. Motor vehicles make up almost half of NOx emissions, with electric utilities comprising approximately 25 percent of NOx emissions. NOx can also contribute to respiratory problems (USEPA, 2003a).

CO

CO is formed when the carbon in fuel is not burned completely. The majority of CO emissions come from mobile sources, both on-road vehicles (cars, trucks, etc.) and off-road vehicles (construction equipment, airplanes, etc.). Industrial processes, including power generation contribute a much smaller percentage of the total CO emissions (USEPA, 2003b). CO is most serious for people with heart disease and can contribute to other cardiovascular problems. Higher levels of CO can cause headaches, nausea, and reduced mental alertness (USEPA, 2003b; CARB, 2001).

SO2

SO2 is formed when fuels containing sulfur are burned, gasoline is extracted from oil, or metals are extracted from ore. Approximately two thirds of all SO2 emissions originate from electric utilities (USEPA, 2003c), especially those that burn coal and oil. Natural gas contains very low amounts of sulfur; consequently SO2 emissions from natural-gas fired power plants are low. Health effects from high SO2 concentrations include difficulty breathing and over time can cause respiratory illness and aggravate existing heart problems. Additionally, SO2 can cause decay of building materials and paints. Chemical reactions of SO2 and NO_2 can form acid rain, which can damage vegetation, lakes, and streams. Formation of sulfate particles caused by chemical reactions of SO2 can contribute to visibility impairment (USEPA, 2003c).

PM10 and PM2.5

Particulate is the term for particles found in the air. Some particles are directly emitted into the air, such as those emitted from motor vehicle exhaust, agricultural tilling, industrial sources, wood burning, or wind-blown dust. Other particles are formed from chemical reactions when burning fuels react with sunlight and water vapor. Damage from particulate matter includes respiratory health effects, visibility impairment, and atmospheric deposition onto the soil, water, or structures (USEPA, 2003d).

Pb

Pb is a metal found naturally in the environment as well as in manufactured products. The major sources of Pb emissions have historically been motor vehicles (such as cars and trucks) and industrial sources. Due to the phase out of leaded gasoline, metals processing is the major source of Pb emissions to the air today. People, animals, and fish are mainly exposed to Pb by

breathing and ingesting it in food, water, soil, or dust. Pb accumulates in the blood, bones, muscles, and fat. Infants and young children are especially sensitive to even low levels of Pb (USEPA, 2007).

6.3.1 Classification of KRCD CPP Site Area

The KRCD CPP is located within the SJVAPCD, in a region that has been classified as non-attainment of the O3 and PM2.5 NAAQS. The USEPA recently designated the San Joaquin Valley as attainment of PM10 NAAQS (Federal Register, 2006). The KRCD CPP project area is in attainment or unclassified (with the latter being equivalent to attainment) for the remaining NAAQS. A summary of the NAAQS can be found in Table 13.

Table 13
NAAQS and PSD - Regulatory Standards and Significance Levels

Pollutant	Averaging Period	SER (ton/yr)	All Areas	Class II Areas		Class I Areas		
			NAAQS (µg/m3 ppm)	PSD Increment (µg/m3)	SIL (µg/m3)	PSD Increment (µg/m3)	EPA SIL (µg/m3)	Significant Monitoring Concentrations (µg/m3)
O3	1-hour		--					
	8-hour		157 (0.08)					
NO2	Annual	40	100 (0.053)	25	1	2.5	0.1	14
	1-hour		--					
SO2	Annual	40	80 (0.030)	20	1	2	0.1	
	24-hour		365 (0.14)	91	5	5	0.2	13
	3-hour		1300 (0.5)	512	25	25	1.0	
	1-hour		--					
PM10	Annual	15	--	17	1	4	0.2	
	24-hour		150	30	5	8	0.3	10
CO	8-hour	100	10000 (9)		500			575
	1-hour		40000 (35)		2000			
Pb	Calendar Quarter	0.6	1.5					0.1
	30-day		--					
Visibility Reducing Particles	8-hour		--					
Hydrogen sulfide	Annual	10	--					
Vinyl Chloride	24-hour		--					
Fluorides	Annual	3						
	24-hour							0.25
Sulfuric Acid Mist	Annual	7						
	1-hour							0.2
Total reduced sulfur	Annual	10						
	1-hour							
Reduced sulfur compounds	Annual	10						
	1-hour							10

6.4 EXISTING AIR QUALITY

Air quality data for the area near the KRCD CPP site is presented in Table 14, below. The KRCD CPP project site is located approximately 3.5 miles west-southwest of the Parlier air quality monitoring site. The KRCD CPP project site and monitoring sites are both rural sites in agricultural areas.

Data collected at the Parlier monitoring site include NO2 and O3. Air Quality data are available on the California Air Resources Board (CARB) website (http://www.arb.ca.gov/adam/welcome.html) and the EPA website (http://www.epa.gov/air/data/reports.html) for the years 2003-2005.

CO, SO2, PM10, PM2.5, and Pb are not measured at the Parlier monitor. Other monitoring sites have collected air quality data that would be representative or conservative of conditions at the KRCD CPP site.

CO data from the Fresno-Drummond station is used as a conservative representation of the KRCD CPP project site. This Fresno monitor is located 14 miles northwest of the KRCD CPP in the southern portion of Fresno in an urban setting, so CO concentrations from this site would be expected to be a conservative measure of CO background concentrations at the KRCD CPP.

Background SO2 concentrations are available in 2003 from two sites in Fresno; at Fremont School and Mobile. The other most recent SO2 data were collected in Bakersfield in 1999-2001. Data from all of these sites would be conservative estimates of the existing SO2 concentrations in the KRCD CPP area. On the CARB Community Health Air Pollution System (CHAPIS) website (http://www.arb.ca.gov/gismo/chapis_v01_6_1_04/), SO2 emissions (based on the 2001 emissions inventory) were greater in the cities of Fresno and Bakersfield than around Parlier. Site monitoring data were obtained from the CARB CD "California Ambient Air Quality Data 1980-2004" and the USEPA air data website.

PM10 data measured at the Fresno-Drummond station over the years 2003-2005 is used to conservatively represent background PM10 concentrations for the KRCD CPP site area. Sources of particulate emissions would be greater around the Fresno-Drummond monitoring site than the KRCD CPP site (as seen on the CARB CHAPIS website). Appendix 4, the air dispersion modeling protocol, includes figures which show the emissions inventory information from CHAPIS.

PM2.5 data from 2003-2005 are available from the Fresno-Hamilton/Winery and Fresno-First Street stations. Based on data for PM10 presented on the CHAPIS website, either of these sites

would be a conservative representation of the background PM2.5 data at the KRCD CPP project site.

Quarterly and 24-hour Pb data are available at the Fresno-First Street monitor for the years 2000 – 2002.

Table 14
Baseline Air Quality (Pollutant Concentrations[1]) in the Region

		Parlier			Fresno Drummond			Fresno First Street						Fresno Hamilton			Bakersfield			Fresno Fremont	Fresno Mobile
Pollutant	**Averaging Time**	**2003**	**2004**	**2005**	**2003**	**2004**	**2005**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2003**	**2004**	**2005**	**1999**	**2000**	**2001**	**2003**	2003
O3	8-hour	.116	.090	.100																	
NO2	Annual	.012	.011	.011																	
CO	1-hour 8-hour				3.6 2.6	3.5 2.7	2.8 2.3														
SO2	1-hour 24-hour Annual																.011 .006 .003	.019 .003 .002	.030 .005 .002	.009 .004 .002	.019 .004 .001
PM10	24-hour (National) Annual (National)				92 43.4	79 40.0	102 38.7														
PM2.5	24-hour Annual (National)										63 17.7	71 16.4	86 16.9	52.2 17.9	66.1 17.0	79.0 17.0					
Pb	24-hour Quarterly							.02 .01	.02 .01	.02 .01											

[1] Concentration units are in ppm for O3, NO2, CO, and SO2 and micrograms/cubic meter (µg/m3) for PM10, PM2.5 and Pb.

Source:
California Air Resources Board. California Ambient Air Quality Data 1980-2004, PTSD-06-021-CD. January 2006.
California Air Resources Board. http://www.arb.ca.gov/adam/welcome.html. Retrieved July 31, 2006.

CHAPTER 7 AIR QUALITY IMPACT ANALYSIS (AQIA)

7.1 ANALYSIS METHODOLOGY

A modeling protocol for the KRCD CPP was submitted to the USEPA for review on August 23, 2006. The protocol was revised with comments from the USEPA and is included as Appendix 4.

7.1.1 Ambient Air Quality Standards and PSD Class II Increment

The impacts of KRCD CPP emissions on air quality concentrations were calculated using the USEPA Industrial Source Complex (ISCST3 version 02035) air dispersion model. The ISCST3 model is a straight-line, steady-state Gaussian dispersion model, capable of calculating pollution concentrations from several different types of sources. The stack plume concentrations would be highest along the centerline of the plume, and decrease towards the plume edges. The ISCST3 model calculates concentrations through the plume including numerous factors: atmospheric stability, wind speed, terrain, nearby buildings, downwind distance, to name some examples. Required inputs to this model include stack parameters (for stack sources these include locations, stack heights, exit velocities, diameters, exit temperatures), emission rates, modeling options, receptor information, and meteorological data.

The modeling included emissions from the two CTs, one auxiliary boiler, an 8-cell cooling tower, natural-gas-fired emergency generator, and a diesel fire pump. Since the CTs may be supplied by either Siemens or GE, air quality modeling analyzed both options. As previously discussed in Section 5.2.1, the five normal CT operational scenarios as well as a partial load scenario were included in the modeling. The stack parameters for the other pieces of equipment were assumed to remain the same throughout the year.

Stack parameters input to the ISCST3 model for the different modeling scenarios are listed in Table 15.

Table 15
Stack Parameters

Scenario	Source	Height Meters	Stack Diameter Meters	Exit velocity Meters per second	Temperature °Kelvin
	Auxiliary Boiler	30.48	1.07	10.31	435.9
	Cooling Tower (per cell)	24.38	7.92	15.07	300.4
	Emergency Generator	13.72	0.45	34.05	803.2
	Diesel Fire Pump	13.72	0.13	45.51	755.4
			Siemens		
A	CT	45.72	5.49	23.70	363.7
B	CT	45.72	5.49	22.52	362.0
C	CT	45.72	5.49	21.97	360.9
D	CT	45.72	5.49	22.28	359.8

Table 15 Stack Parameters					
Scenario	**Source**	**Height Meters**	**Stack Diameter Meters**	**Exit velocity Meters per second**	**Temperature °Kelvin**
E	CT	45.72	5.49	19.78	360.4
F	CT	45.72	5.49	15.74	358.7
GE					
A	CT	45.72	5.49	21.33	360.9
B	CT	45.72	5.49	20.34	360.9
C	CT	45.72	5.49	19.85	359.8
D	CT	45.72	5.49	20.32	359.3
E	CT	45.72	5.49	17.98	359.3
F	CT	45.72	5.49	13.16	355.4

The ISCST3 model was run using the default regulatory mode. The modeling analysis included downwash calculations. Downwash building height and width dimensions were computed using the USEPA BPIP program (version 95086). The buildings and corresponding input file are contained in Appendix 5, air dispersion modeling data.

In accordance with USEPA Modeling Guidelines, an analysis of surrounding land use was conducted in order to determine whether urban or rural dispersion coefficients should be used in the modeling. The land-use typing scheme developed by Auer (Journal of Applied Meteorology 17:636-643) was applied to areas within 3 km of the project site. According to USEPA guidance, if more than 50 percent of this area falls within Auer land use types I1, I2, C1, R2, and R3, then urban coefficients should be used. Otherwise, rural coefficients should be used. A geographic information system (GIS) analysis was used to evaluate the Land Use Land Cover data. The analysis showed that 91 percent of the area has rural classifications. As a result, use of rural dispersion coefficients is appropriate.

Receptors were spaced at 25 meter increments along the project site fence line. Receptor data for the remaining off-site receptors were obtained from Digital Elevation Model (DEM) data. These data have 30 meter spacing. Initial runs included spacing of 30 meters out at least 200 meters from the project site, 90 meters out to 5 km from the project site and 240 meter spacing from 5 km to 10 km from the project site. All impacts occurred within the area of the 30 meter grid spacing, so no additional refinements were necessary. The terrain within 10 km of the source is essentially flat. The base height at the project site is 327 feet. The maximum terrain height is 367 feet which occurs approximately 8.5 km to 10 km to the northeast of the KRCD CPP. The terrain slopes gradually downward toward the southwest with a minimum terrain elevation of 262 feet. Appendix 5 provides figures, which illustrates the receptor locations used as input to the ISCST3 model.

The SJVAPCD provided meteorological data from Fresno airport from 1987-1991 for the air quality analysis. The SJVAPCD has processed the meteorological data into the required ISCST3 format, so data from these years were the most readily available for analyses.

A sample ISCST3 input file is included in Appendix 5. Electronic versions of all modeling inputs are being provided separately.

7.1.2 PSD Class I Analysis

The PSD Class I analysis addresses the impacts to national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreational, scenic, or historic value that have been specifically identified as a Class I area. Several Class I areas are located near the project site. The Class I areas within approximately 200 km from the KRCD CPP were previously identified in Table 1.

The impacts assessed within PSD Class I analyses include increment consumption and air quality related values (AQRVs). Analyzed AQRVs included visibility and deposition. PSD Class I increments have been established for NO2, SO2, and PM10. Project emissions of SO2 would fall below the significant emission rate of 40 tpy for SO2, so further analysis of SO2 increment consumption is not required. However, SO2 emissions are included in the calculation of visibility and deposition impacts.

The closest Class I area is approximately 60 km from the project site. The ISCST3 model is not appropriate for air quality modeling beyond distances of 50 km. The USEPA-approved CALPUFF long-range transport model would be the appropriate model to calculate increment consumption, visibility, and deposition impacts in the Class I areas.

The CALPUFF model (version 5.711a) was run in a screening mode (CALPUFF-lite). Meteorological data for the screening mode requires the same information as ISCST but precipitation data are also needed. As recommended by USEPA guidelines from the Interagency Workgroup on Air Quality Modeling (IWAQM) (USEPA, 1998), five years of meteorological data were input to the analysis. Surface data from Fresno Airport from 1986-1990 (SAMSON format) were compiled in the CPRAMMET preprocessor with concurrent upper air data from Oakland airport. Also following IWAQM guidelines, polar receptor rings were generated for each Class I area, each ring at distances equal to the closest distance to each Class I area, with 2-degree spacing along each ring.

Additional emissions data were input to CALPUFF for sulfates (SO4), condensable particulate matter, and filterable particulate matter. Based on guidance provided by National Park Service (2006) for CTs when SO4 emissions are not known, one third of the SO2 emissions, corrected

for molecular weight, are categorized as SO4. Twenty five percent of the emitted PM10 was assumed to be filterable (elemental carbon (EC)), and 75 percent was assumed to be condensable. SO4 emissions are subtracted from the condensable portion to determine secondary organic aerosol (SOA). These assumptions were also applied to the auxiliary boiler.

Emission rates used for visibility and 24-hour increment consumption analyses were based on 24-hour emission rates from the KRCD CPP, while annual emission rates were used for deposition and annual increment analyses. Preliminary modeling showed that CALPUFF-lite results were impacted more by the magnitude of the emissions than differences in stack parameters. Therefore, since Scenario A provided the largest NOx emissions, it was used in the short-term CALPUFF analyses.

Calculation of PM10 increment consumption included the sum of PM10, sulfate mass (multiplied by 1.375 to convert to ammonium sulfate) and nitrate mass (multiplied by 1.29 to convert to convert to ammonium nitrate). Total deposition is calculated as the sum of wet and dry components of nitrogen (N) or sulfur (S) deposition. N deposition is calculated as the sum of SO4 (multiplied by 0.292 to convert ammonium sulfate to N), NOx (multiplied by 0.304 to convert NO2 to N), HNO3 (multiplied by 0.222 to convert HNO3 to N), and NO3 (multiplied by 0.452 to convert ammonium nitrate to N). S deposition is calculated as the sum of SO2 (multiplied by 0.500 to convert SO2 to S) and SO4 (multiplied by 0.333 to convert SO4 to S). These conversions were made within the POSTUTIL program, which adjusts the concentrations, wet deposition fluxes, and dry deposition fluxes calculated within CALPUFF.

Monthly background O3 data is a required input to CALPUFF. Where available, observed O3 data were input to CALPUFF, otherwise the default value of 80 parts per billion was used. Monthly O3 data were calculated from the most recent five years of available O3 data measured at Yosemite National Park, Sequoia National Park, and Pinnacles Wilderness (http://12.45.109.6/pls/portal/data_request.mainplot).

Monthly RH factors (f(RH)) were used in the visibility analysis as part of the CALPUFF post-processor program CALPOST. These data were obtained from the USEPA (2003) document, *Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Program.*

These data are summarized in Appendix 5.

7.2 AQIA RESULTS

7.2.1 AAQS and PSD Class II

Tables 16 and 17, below, summarize the modeling results from the ISCST3 modeling of the CTs. Table 16 presents the predicted concentrations for the Siemens CTs and other sources for various

operating scenarios and averaging times. Table 17 shows the concentrations for each pollutant under the various operating scenarios and averaging times for the GE CTs and other sources. The emissions data for the various operational cases referenced in Tables 16 and 17 can be found in Appendix 1.

Table 18, below, summarizes the maximum impacts from either the Siemens or GE CTs, including the highest measured background concentration for the most recent three years of data. The analysis shows that KRCD CPP impacts would be below applicable USEPA significance levels for all pollutants and thus would not be expected to cause or contribute to any violations of any AAQS. Additionally, the projected concentrations are below all preconstruction monitoring thresholds. As can be seen in Figures 7-1-15 through 7-1-22 in Appendix 5, the maximum impacts occur close (within 150 meters) to the project fenceline.

The KRCD CPP is in an area that is designated as Class II for USEPA PSD regulations. Since the KRCD CPP impacts would be below the SILs listed in Table 16 and 17, no additional increment analysis or cumulative analysis is needed for those pollutants (NO2, CO, PM10, and PM2.5).

Table 16
Predicted Concentrations From Siemen's CTs Under Various Operating Scenarios

	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E	Scenario F
Case 1a (1-hour maximum normal)[1]						
CO (ug/m3)	467.8	467.7	467.7	467.7	467.7	467.7
UTM location, x, y, z (meters)	269760, 4052790, 99	269760, 4052790, 99	269760, 4052790, 99	269760, 4052790, 99	269760, 4052790, 99	269760, 4052790, 99
Date	88112221	88112221	88112221	88112221	88112221	88112221
Case 1b (1-hour commissioning)[2]						
CO (ug/m3)	130.5	142.7	149.2	147.1	174.3	277.0
UTM location, x, y, z (meters)	270180, 4053060, 100	270180, 4053060, 100	270180, 4053060, 100	270180, 4053060, 100	270180, 4053030, 100	270120, 4052970, 100
Date	88022723	88022723	88022723	88022723	88022723	88022723
Case 1c (1-hour partial load)[3]						
CO (ug/m3)	--	--	--	--	--	467.6
UTM location, x, y, z (meters)						269760, 4052790, 99
Date						88112221
Case 3a (8-hour maximum normal)[4]						
CO (ug/m3)	41.6	43.9	45.2	45.0	50.3	68.6
UTM location, x, y, z (meters)	270000, 4052550, 99	270000, 4052550, 99	270000, 4052550, 99	270000, 4052550, 99	270000, 4052550, 99	270000, 4052550, 99
Date	91121908	91121908	91121908	91121908	91121908	91121908
Case 3b (8-hour commissioning)[2]						
CO (ug/m3)	--	--	--	--	--	90.1

Table 16
Predicted Concentrations From Siemen's CTs Under Various Operating Scenarios

	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E	Scenario F
UTM location, x, y, z (meters)						270180, 4052640, 100
Date						91111416
Case 3c (8-hour partial load)[5]						
CO (ug/m3)	--	--	--	--	--	13.9
UTM location, x, y, z (meters)						269777.19, 4052851.25, 99.7
Date						89031008
Case 3d (8-hour auxiliary boiler)						
CO (ug/m3)	29.4					
UTM location, x, y, z (meters)	270000, 4052670, 99					
Date	89022008					
Case 4a (24-hour maximum normal)[6]						
PM10 (ug/m3)	1.67	1.77	1.88	1.86	2.06	2.59
UTM location, x, y, z (meters)	270270, 4052640, 100	270270, 4052640, 100	270270, 4052640, 100	270270, 4052640, 100	270270, 4052640, 100	270270, 4052640, 100
Date	91050824	91050824	91050824	91050824	91050824	91050824
PM2.5 (ug/m3)	0.59	0.59	0.59	0.59	0.59	0.59
UTM location, x, y, z (meters)	270300, 4052700, 101	270300, 4052700, 101	270300, 4052700, 101	270300, 4052700, 101	270300, 4052700, 101	270300, 4052700, 101
Date	91041024	91041024	91041024	91041024	91041024	91041024
Case 4b (24-hour commissioning)[7]						
PM10 (ug/m3)	--	--	--	--	--	1.50
UTM location, x, y, z (meters)						270270, 4052610, 100
Date						91050824
PM2.5 (ug/m3)	--	--	--	--	--	0.15
UTM location, x, y, z (meters)						270300, 4052700, 101
Date						91041024
Case 4c (24-hour partial load)[8]						
PM10 (ug/m3)	--	--	--	--	--	2.32
UTM location, x, y, z (meters)						270270, 4052640, 100
Date						91050824
PM2.5 (ug/m3)	--	--	--	--	--	0.16

Table 16 Predicted Concentrations From Siemen's CTs Under Various Operating Scenarios						
	Scenario A	**Scenario B**	**Scenario C**	**Scenario D**	**Scenario E**	**Scenario F**
UTM location, x, y, z (meters)						270300, 4052700, 101
Date						91041024
Case 4d (24-hour auxiliary boiler)						
PM10 (ug/m3)	2.95					
UTM location, x, y, z (meters)	270000, 4052670, 99					
Date	89022024					
PM2.5 (ug/m3)	0.10					
UTM location, x, y, z (meters)	270000, 4052670, 99					
Date	89022024					
Case 5 (annual impacts)[9]						
Year	1987	1988	1989	1990	1991	
NOx (ug/m3)	0.13	0.15	0.20	0.23	0.30	
UTM location, x, y, z (meters)	270180.84, 4052728.25, 99.7	270180.84, 4052728.25, 99.7	270180, 4052700, 100	270240, 4052640, 100	270240, 4052640, 100	
PM10 (ug/m3)	0.06	0.15	0.11	0.14	0.18	
UTM location, x, y, z (meters)	270270, 4052640, 100	270180.84, 4052728.25, 99.7	270270, 4052640, 100	270240, 4052610, 100	270270, 4052610, 100	
PM2.5 (ug/m3)	0.005	0.007	0.008	0.010	0.011	
UTM location, x, y, z (meters)	271620, 4051620, 101	271620, 4051710, 101	271530, 4051710, 101	271440, 4051710, 101	270270, 4052640, 100	

Table 16
Predicted Concentrations From Siemen's CTs Under Various Operating Scenarios

	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E	Scenario F

Notes:
1. Two Siemens CTs, auxiliary boiler, natural gas emergency generator. Cooling tower emissions are PM only.
2. Commissioning runs one turbine.
3. One CT runs partial load (Scenario F), another CT runs in steady state (Scenario B). Includes auxiliary boiler and natural gas emergency generator.
4. Siemens CTs, 3-hour auxiliary boiler, 30 minutes natural gas emergency generator.
5.One CT runs partial load (Scenario F), another CT runs in steady state (Scenario B). Includes auxiliary boiler (three hours) and natural gas emergency generator.
6. CTs, four hours auxiliary boiler, 24 hours cooling tower, 30 minutes diesel fire pump. PM10, SO2, and PM2.5 impacts higher from fire pump than emergency generator.
7. Commissioning runs one turbine, 24 hours cooling tower.
8. One CT runs partial load (Scenario F), one turbine steady state (Scenario B), four hours auxiliary boiler, 24 hours cooling tower, 30 minutes diesel fire pump.
9. 8760 hours combustion turbines, 2315 hours auxiliary boiler, 8760 hours cooling tower, 26 hours natural gas emergency generator, 26 hours fire pump.

Acronyms:
ug/m3 = micrograms per cubic meter
UTM = Universal Transverse Mercator

Table 17
Predicted Concentrations From GE CTs Under Various Operating Scenarios

	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E	Scenario F
Case 1a (1-hour maximum normal)[1]						
CO (ug/m3)	467.8	467.7	467.7	467.7	467.7	644.1
UTM location, x, y, z (meters)	269760, 4052790, 99	269760, 4052790, 99	269760, 4052790, 99	269760, 4052790, 99	269760, 4052790, 99	270180, 4053060, 100
Date	88112221	88112221	88112221	88112221	88112221	88022723
Case 1b (1-hour commissioning)[2]						
CO (ug/m3)	155.9	166.8	174.0	168.8	207.2	365.3
UTM location, x, y, z (meters)	270180, 4053060, 100	270180, 4053060, 100	270180, 4053030, 100	270180, 4053060, 100	270120, 4052940, 100	270120, 4052970, 100
Date	88022723	88022723	88022723	88022723	88022723	88022723
Case 1c (1-hour partial load)[3]						
CO (ug/m3)	--	--	--	--	--	467.6
UTM location, x, y, z (meters)						269760, 4052790, 99
Date						88112221
Case 3a (8-hour maximum normal)[4]						
CO (ug/m3)	45.6	47.4	49.1	48.0	55.7	90.3
UTM location, x, y, z (meters)	270000, 4052550, 99	270000, 4052550, 99	270000, 4052550, 99	270000, 4052550, 99	270000, 4052550, 99	270000, 4052580, 99
Date	91121908	91121908	91121908	91121908	91121908	91121908
Case 3b (8-hour commissioning)[2]						
CO (ug/m3)	--	--	--	--	--	127.4
UTM location, x,						270030, 4052700,

Table 17
Predicted Concentrations From GE CTs Under Various Operating Scenarios

	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E	Scenario F
y, z (meters)						99
Date						91121908
Case 3c (8-hour partial load)[5]						
CO (ug/m3)	--	--	--	--	--	13.9
UTM location, x, y, z (meters)						269777.19, 4052851.25, 99.7
Date						89031008
Case 3d (8-hour auxiliary boiler)						
CO (ug/m3)	29.4					
UTM location, x, y, z (meters)	270000, 4052670, 99					
Date	89022008					
Case 4a (24-hour maximum normal)[6]						
PM10 (ug/m3)	1.78	1.86	1.91	1.89	2.09	3.16
UTM location, x, y, z (meters)	270270, 4052640, 100	270270, 4052640, 100	270270, 4052640, 100	270270, 4052640, 100	270270, 4052640, 100	270270, 4052640, 100
Date	91050824	91050824	91050824	91050824	91050824	91050824
PM2.5 (ug/m3)	0.59	0.59	0.59	0.59	0.59	0.60
UTM location, x, y, z (meters)	270300, 4052700, 101	270300, 4052700, 101	270300, 4052700, 101	270300, 4052700, 101	270300, 4052700, 101	270300, 4052700, 101
Date	91041024	91041024	91041024	91041024	91041024	91041024
Case 4b (24-hour commissioning)[7]						
PM10 (ug/m3)	--	--	--	--	--	1.80
UTM location, x, y, z (meters)						270240, 4052640, 100
Date						91050824
PM2.5 (ug/m3)	--	--	--	--	--	0.15
UTM location, x, y, z (meters)						270300, 4052700, 101
Date						91041024
Case 4c (24-hour partial load)[8]						
PM10 (ug/m3)	--	--	--	--	--	2.57
UTM location, x, y, z (meters)						270240, 4052640, 100
Date						91050824
PM2.5 (ug/m3)	--	--	--	--	--	0.17
UTM location, x,						270240, 4052610,

Table 17
Predicted Concentrations From GE CTs Under Various Operating Scenarios

	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E	Scenario F
y, z (meters)						100
Date						91041024
Case 4d (24-hour auxiliary boiler)						
PM10 (ug/m3)	2.95					
UTM location, x, y, z (meters)	270000, 4052670, 99					
Date	89022024					
PM2.5 (ug/m3)	0.10					
UTM location, x, y, z (meters)	270000, 4052670, 99					
Date	89022024					
Case 5 (annual impacts)[9]						
Year	1987	1988	1989	1990	1991	
NOx (ug/m3)	0.17	0.19	0.27	0.29	0.36	
UTM location, x, y, z (meters)	270180, 4052700, 100	270180.84, 4052728.25, 99.7	270270, 4052640, 100	270240, 4052640, 100	270270, 4052640, 100	
PM10 (ug/m3)	0.09	0.12	0.16	0.18	0.23	
UTM location, x, y, z (meters)	270270, 4052640, 100	270270, 4052640, 100	270270, 4052640, 100	270240, 4052610, 100	270270, 4052640, 100	
PM2.5 (ug/m3)	0.006	0.007	0.010	0.010	0.014	
UTM location, x, y, z (meters)	271620, 4051620, 101	271620, 4051620, 101	270270, 4052640, 100	270270, 4052610, 100	270270, 4052640, 100	

Notes:
1. Two Siemens CTs, auxiliary boiler, natural gas emergency generator. Cooling tower emissions are PM only.
2. Commissioning runs one turbine.
3. One CT runs partial load (Scenario F), another CT runs in steady state (Scenario B). Includes auxiliary boiler and natural gas emergency generator.
4. Siemens CTs, 3-hour auxiliary boiler, 30 minutes natural gas emergency generator.
5. One CT runs partial load (Scenario F), another CT runs in steady state (Scenario B). Includes auxiliary boiler (three hours) and natural gas emergency generator.
6. CTs, four hours auxiliary boiler, 24 hours cooling tower, 30 minutes diesel fire pump. PM10, SO2, and PM2.5 impacts higher from fire pump than emergency generator.
7. Commissioning runs one turbine, 24 hours cooling tower.
8. One CT partial load (Scenario F), one turbine steady state (Scenario B), four hours auxiliary boiler, 24 hours cooling tower, 30 minutes diesel fire pump.
9. 8760 hours CTs, 2315 hours auxiliary boiler, 8760 hours cooling tower, 26 hours natural gas emergency generator, 26 hours fire pump.

Table 18
Total Project Impacts

Pollutant	Averaging Period	Significance Level (µg/m3)	Concentration (µg/m3)	UTM East (meters)	UTM North (meters)	Elevation (meters)	Background Concentration (µg/m3)	Total Impacts (µg/m3)	NAAQS (µg/m3)
NO_2	Annual	1.0	0.36	270270	4052640	100	23	23	100
CO	1	2000	644.1	270180	4053060	100	4114	4758	40,000
	8	500	127.4	270030	4052700	99	3086	3213	10,000
PM10	24	5.0	3.2	270270	4052640	100	106	109	150
	Annual	1.0	0.2	270270	4052640	100	44	44	--
PM2.5	24		0.6	270300	4052700	101	86	87	35
	Annual		0.01	270270	4052640	100	20	20	15
Pb1	Calendar Quarter		0.005	270090	4052700	99	0.01	0.01	1.5

Notes:

1. Conservatively assumed that 24-hour lead impacts represent calendar quarter and diesel fire pump and auxiliary boiler run for 24-hours/day. 30-day background concentration represented by 24-hour measured background concentration.

7.2.2 PSD Class I Analysis

Tables 19 and 20 contain summaries of the impacts of the KRCD CPP on Class I increment, visibility and deposition for the Siemens and GE CTs, respectively. Note that San Rafael and Mokelumne Wilderness Areas were removed from the analysis since the results showed impacts decreasing with distance and below significance levels for the closer Class I areas.

Concentrations of NO2 and PM10 are predicted to be below the Class I significant impact levels, so no additional increment analysis would be required. As mentioned, SO2 emissions would be below the significant emission rate of 40 tpy, so it does not need to be included in the increment analysis.

Table 19
PSD Class I Analysis (Siemens)

		Visibility (% change in extinction)				Class I Concentrations (ug/m3)			Annual Deposition			
		All receptors		Shrunken arc		NOx	PM10	PM10	N		S	
Class I Area	Distance from KRCD CPP (km)	% change	Number of days > 5%	% change	Number of days > 5%	Annual	24-hr	Annual	g/m2-sec	kg/ha/yr	g/m2-sec	kg/ha/yr
Kings Canyon	55.7	11.28	168	10.74	36	3.06E-02	2.79E-01	4.22E-02	2.70E-11	0.0085	6.79E-12	0.0021
Sequoia	59.7	10.65	142	10.04	33	2.76E-02	2.61E-01	3.90E-02	2.46E-11	0.0078	6.21E-12	0.0020
John Muir	70	9.38	88	8.57	23	2.06E-02	2.16E-01	3.17E-02	1.95E-11	0.0061	5.01E-12	0.0016
Kaiser	76.5	8.34	59	7.58	8	1.77E-02	1.94E-01	2.85E-02	1.71E-11	0.0054	4.43E-12	0.0014
Ansel Adams	92.7	7.48	20	6.32	7	1.21E-02	1.76E-01	2.25E-02	1.26E-11	0.0040	3.42E-12	0.0011
Yosemite	100.7	7.15	15	7.15	15	1.03E-02	1.67E-01	2.01E-02	1.10E-11	0.0035	3.03E-12	0.0010
Dome Land	131.9	6.13	3	4.31	0	4.99E-03	1.49E-01	1.41E-02	6.64E-12	0.0021	2.02E-12	0.0006
Pinnacles	142.6	5.38	1	5.38	1	5.55E-03	1.16E-01	1.17E-02	6.45E-12	0.0020	1.78E-12	0.0006
Hoover	161.6	4.83	0	4.83	0	3.50E-03	1.07E-01	1.00E-02	4.71E-12	0.0015	1.47E-12	0.0005
Ventana	162	4.76	0	4.76	0	4.20E-03	1.01E-01	9.77E-03	5.14E-12	0.0016	1.47E-12	0.0005
Emigrant	163	4.69	0	4.69	0	3.42E-03	1.05E-01	9.87E-03	4.63E-12	0.0015	1.45E-12	0.0005
SIL						0.1	0.3	0.2				

Acronyms:
g/m2-sec = grams per square meter per second
kg/ha/yr = kilograms per hectare per year

Table 20
PSD Class I Analysis (GE)

		Visibility				Class I Concentrations (ug/m3)			Deposition			
		All receptors		Shrunken arc		NOx	PM10	PM10	N		S	
Class I Area	Distance from KRCD CPP (km)	% change	Number of days > 5%	% change	Number of days > 5%	Annual	24-hr	Annual	g/m2-sec	kg/ha/yr	g/m2-sec	kg/ha/yr
Kings Canyon	55.7	10.87	139	10.26	28	2.66E-02	2.68E-01	3.81E-02	2.34E-11	0.0074	6.14E-12	0.0019
Sequoia	59.7	9.81	118	9.58	24	2.40E-02	2.51E-01	3.51E-02	2.13E-11	0.0067	5.62E-12	0.0018
John Muir	70	9.07	76	8.19	17	1.78E-02	2.09E-01	2.86E-02	1.69E-11	0.0053	4.53E-12	0.0014
Kaiser	76.5	8.07	47	7.24	5	1.53E-02	1.83E-01	2.57E-02	1.48E-11	0.0047	4.01E-12	0.0013
Ansel Adams	92.7	6.97	16	6.02	6	1.05E-02	1.63E-01	2.03E-02	1.09E-11	0.0034	3.09E-12	0.0010
Yosemite	100.7	6.65	9	6.65	7	8.86E-03	1.54E-01	1.81E-02	9.51E-12	0.0030	2.74E-12	0.0009
Dome Land	131.9	5.85	1	4.12	0	4.29E-03	1.41E-01	1.27E-02	5.73E-12	0.0018	1.82E-12	0.0006
Pinnacles	142.6	5.15	1	5.15	1	4.80E-03	1.10E-01	1.06E-02	5.58E-12	0.0018	1.61E-12	0.0005
Hoover	161.6	4.60	0	4.60	0	3.02E-03	1.01E-01	8.98E-03	4.06E-12	0.0013	1.32E-12	0.0004
Ventana	162	4.53	0	4.53	0	3.62E-03	9.58E-02	8.77E-03	4.44E-12	0.0014	1.32E-12	0.0004
Emigrant	163	4.47	0	4.47	0	2.95E-03	1.00E-01	8.86E-03	3.99E-12	0.0013	1.31E-12	0.0004
Significant Impact Level						0.1	0.3	0.2				

7.3 IMPACTS RESULTING FROM GROWTH ASSOCIATED WITH THE KRCD CPP

During the 1990s, Fresno County's population increased at an average annual rate of 1.82 percent, while that of the City of Fresno increased by 1.91 percent and the cities of Parlier and Selma increased by 3.45 percent and 2.80 percent, respectively. The average annual growth rate for the period 2000-2005 was 2.02 percent for Fresno County and 1.68 percent for the City of Fresno. The cities of Parlier and Selma increased by 2.66 percent and 2.88 percent per year, respectively, during the same period. Fresno County's growth rate during this period exceeded that of the State of California (1.63 percent). Historically, the County's growth rate has been increasing at a higher rate than that of the state. That trend is expected to continue through 2030.[3]

These increases in population result in impacts to all sectors of the community (e.g., commercial, residential, industrial) and require increased levels of both public and private support services, including a reliable supply of electrical power. The KRCD CPP, which will supply 500-600 MW of electrical power to local communities in the Fresno area, is being developed in response to a need to provide a stable, lower cost source of energy. The increasing demand for this energy already exists. Therefore, the KRCD CPP will not induce growth related impacts, as it is a response to, rather than a cause of this growth.

CHAPTER 8 ADDITIONAL IMPACT ANALYSES

8.1 METHODOLOGY

Refer to the AQIA methodology described in Section 7.

8.2 ADDITIONAL IMPACT ANALYSES RESULTS

8.2.1 Visibility

Tables 19 and 20 summarize the results of the CALPUFF visibility impacts analysis at the Class I areas for the Siemens and GE CTs, respectively. As established for Best Available Retrofit Technology (BART) CALPUFF analyses, 98 percent of the visibility impacts should fall below a 5 percent change in light extinction to be considered insignificant. Thus, for the 5-year period of analysis, as many as 36.5 days could have changes in extinction above 5 percent. Furthermore, only those receptors within +/- 90 degrees of the Class I area (shrunken arc) need to be considered in the visibility analysis (Irwin and Notar, 2001). As shown in Tables 19 and 20, no Class I areas would exceed these criteria.

[3] Application for Certification, Kings River Conservation District Community Power Plant, Chapter 8.13, Socioeconomics, September 2007.

8.2.2 Soils & Vegetation (Deposition)

Tables 19 and 20 summarize the results of the CALPUFF analysis of wet and dry deposition fluxes at the Class I areas for the Siemens and GE CTs, respectively.

For N and S deposition, deposition analysis thresholds (DAT's) of 0.005 kilograms per hectare per year (kg/ha/yr) have been established. The DAT is the additional amount of deposition that triggers a management concern, not necessarily the amount that constitutes an adverse impact to the environment (National Park Service and US Fish and Wildlife Service, 2002). Although no definitive "critical load" of S and N deposition has been agreed upon, research in the Pacific Northwest suggests that total N deposition (from all sources) in the region should be below 5 kg/ha/yr and total S deposition should be below 3 kg/ha/yr (E&S Environmental Chemistry, Inc and Pacific Northwest Research Station USDA Forest Service, 1994). S deposition is far below the DAT for both CT options and at all Class I areas analyzed. The DAT for N was exceeded at the closest boundary of Kings Canyon, Sequoia, and John Muir Class I areas under the GE and Siemens CT options. Additionally, N deposition at the closest boundary of Kaiser was greater than 0.005 kg/ha/yr under the Siemens CT option.

Further analysis at these Class I areas at the median distance and the farthest boundary, showed that the N deposition would fall below the DAT by the median distance and closer. Figure 8 shows the variation of N deposition with distance for both CT options. For the Siemens CTs, N deposition falls below 0.005 kg/ha/yr at approximately 80 km downwind. For the GE CTs, N deposition falls below 0.005 kg/ha/yr at a distance of approximately 73 km downwind. At Kings Canyon, less than 7 percent of the park is within 80 km of the project site and less than 3 percent is within 73 km. At Sequoia, approximately 28 percent of the park is within 80 km of the project site and 13 percent within 73 km. At John Muir, less than 8 percent of the park is within 80 km of the Project site and less than 1 percent is closer than 73 km. Kaiser has 30 percent of the park within 80 km of the project site.

The average total N deposition monitored at Sequoia/Kings Canyon over the years 1999, 2001, 2003, and 2004 was 3.2 kg/ha/yr (http://www.epa.gov/castnet/sites/sek402.html). For the Siemens CT option, the maximum N deposition at Kings Canyon of 0.0085 kg/ha/yr and at Sequoia of 0.0078 kg/ha/yr would be 0.27 percent and 0.24 percent of the monitored level, respectively. Assuming this monitoring data would also be applicable to John Muir and Kaiser, Siemens CT option N deposition would be 0.19 percent and 0.17 percent of existing levels, respectively. For the GE CT option, at Kings Canyon and Sequoia, KRCD CPP N deposition would be 0.23 percent and 0.21 percent of measured levels, and at John Muir, KRCD CPP N deposition would be 0.17 percent of background concentrations. Note that the DAT of 0.005 kg/ha/yr is 0.16 percent of these monitored concentrations. Additionally, KRCD plans to offset

NOx emissions by 1.3 or 1.5 tons for every 1 ton of NOx emitted, depending on the distance of the offsets from the project site.

8.3 IMPACTS RESULTING FROM GROWTH ASSOCIATED WITH THE PROJECT

As previously described in Section 7.3, the KRCD CPP will not induce growth related impacts.

CHAPTER 9 ENVIRONMENTAL DOCUMENTS

As part of the permitting process for the KRCD CPP, an Application For Certification (AFC) was submitted to California Energy Commission (CEC) on September 27, 2007. The CEC has state level authority for the permitting of power plants of 50 MW or more in capacity. The CEC certification process satisfies the requirements of the California Environmental Quality Act (CEQA) with the AFC functioning as an Environmental Impact Report (EIR). An electronic copy of the KRCD CPP AFC is being provided under separate cover.

CHAPTER 10 COMPLIANCE WITH OTHER REGULATIONS

10.1 APPLICABLE LAWS, ORDINANCES, REGULATIONS & STANDARDS (LORS)

Federal, state and local LORS that are potentially applicable to the KRCD CPP are summarized in Table 21 and in the following paragraphs.

Table 21
Summary of Applicable LORS
KRCD CPP

Regulation/Program	Regulatory/ Administering Agency	Air Quality Concern	Description/Project Applicability/Conformance
Federal			
Federal Clean Air Act (CAA), and implementing regulations, e.g., 40 CFR 51 & 52 - PSD review	US EPA, Region IX	Maintenance of NAAQS and air quality related values	The construction of new major sources or major modifications to existing major sources, requires PSD review. (Note: PSD only applies to criteria pollutants for which ambient concentrations do not exceed the NAAQS). A PSD review and the associated permit are required for the KRCD CPP, as the project's emissions of any one PSD pollutant exceed the applicable trigger level of 100 tpy. The KRCD CPP is filing a PSD application with Region IX of the USEPA to comply with this requirement.
Federal CAA, and implementing regulations, e.g., 40	SJVAPCD with review oversight by the USEPA	Maintenance of NAAQS	New or modified major stationary sources requires pre-construction, review and permitting.

Table 21
Summary of Applicable LORS
KRCD CPP

Regulation/Program	Regulatory/ Administering Agency	Air Quality Concern	Description/Project Applicability/Conformance
CFR 51 & 52 - NSR			The KRCD CPP will meet NSR requirements through its compliance with the SJVAPCD NSR rule (see below).
Federal CAA, and implementing regulations, e.g., 40 CFR 60 - New Source Performance Standards (NSPS)	SJVAPCD with review oversight by the USEPA	Maintenance of NAAQS	The NSPS mandate standards of performance for specific categories of equipment to limit the emissions of criteria pollutants (i.e., pollutants for which NAAQS have been established). The applicable NSPS for the KRCD CPP is Subpart KKKK (Standards of Performance for Stationary Combustion Turbines). If applicable, the KRCD CPP will also meet the NSPS for Subpart IIII (Standards of Performance for Stationary Compression Ignition Internal Combustion Engines). The KRCD CPP will meet the NSPS requirement(s) through its compliance with the SJVAPCD NSR rule (see below).
Federal CAA, and implementing regulations, e.g., 40 CFR 63 – National Emissions Standards for Hazardous Air Pollutants (NESHAPs)	SJVAPCD with review oversight by the USEPA	Control of Hazardous Air Pollutants (HAPs)	The NESHAPs defines HAPs and sets emissions limits for major sources of HAPs. The KRCD CPP will not be a major source of HAPs.
Federal CAA, and implementing regulations, e.g., 40 CFR 70 - Title V (Operating Permit Program)	SJVAPCD with review oversight by the USEPA	Need for a uniform nationwide operating permit program for major stationary sources.	Establishes a program for major stationary sources to have an operating permit, which identifies all federal requirements for emissions performance, operations, emissions monitoring and recordkeeping/reporting. KRCD will file a Title V permit application with the SJVAPCD within 12 months of initial operation.
Federal CAA, and implementing regulations, e.g., 40 CFR 72 - Title IV (Acid Rain Program)	SJVAPCD with review oversight by the USEPA	Reduction of impacts due to acidic rain	Requires monitoring of NOx and SO2 emissions as well as the acquisition of annual SO2 allowances.

Table 21
Summary of Applicable LORS
KRCD CPP

Regulation/Program	Regulatory/ Administering Agency	Air Quality Concern	Description/Project Applicability/Conformance
			KRCD will comply with Title IV requirements as part of its Title V compliance (see below).
		State	
California CAA, Health & Safety Code 39000, et seq.	SJVAPCD with review oversight by CARB	Maintenance of NAAQS and CAAQS	Requires local air districts to either attain or maintain NAAQS and CAAQS. The KRCD CPP will comply with the requirements of the California CAA through its compliance with SJVAPCD NSR rule (see below).
SIP, Health & Safety Code 39500, et seq.	SJVAPCD with review oversight by CARB	Attainment and maintenance of NAAQS	Requires local air districts to develop and implement regulations to either maintain compliance with NAAQS, or if in non-attainment, to reach attainment status. KRCD will comply with SIP requirements through its compliance with applicable SJVAPCD regulations (see below).
Toxic Air Contaminant Program, Health & Safety Code 39650, et seq.	CARB and the Office of Environmental Health Hazard Assessment (OEHHA)	Control of Toxic Air Contaminants (TACs)	Identifies TACs, as determined by state agencies, and develops control measures to limit their emissions. There are no control measures developed under this program that are applicable to the KRCD CPP
Air Toxics Hot Spots Program, Health & Safety Code 44300, et seq.	SJVAPCD with review oversight by CARB	Control of TACs	Requires facilities with TAC emissions to identify and quantify these emissions and to perform a Health Risk Assessment (HRA) based on the emissions identified. KRCD will comply with these requirements by performing an HRA.
		Local	
Rule 1080, Stack Monitoring	SJVAPCD	Maintenance of BACT, conformance with federal acid rain program requirements	Provides requirements for CEMS. KRCD, which will have a CEMS at the KRCD CPP, will construct and operate the CEMS per the requirements of this rule.

Table 21
Summary of Applicable LORS
KRCD CPP

Regulation/Program	Regulatory/ Administering Agency	Air Quality Concern	Description/Project Applicability/Conformance
Rule 1081, Source Sampling	SJVAPCD	Verification on emissions limits	Provides requirements for stack (source) testing. KRCD, which will be required to perform periodic source testing, will construct and operate the applicable stacks per the requirements of this rule.
Rule 2010, Permits Required	SJVAPCD	Maintenance of NAAQS and CAAQS	Requires that sources of air emissions obtain an Authority To Construct permit and subsequently (after start of operation) a Permit To Operate. KRCD will comply with the requirements of this rule by obtaining a Determination Of Compliance in lieu of an ATC and subsequently obtaining a PTO.
Rule 2201, New and Modified Stationary Source Review Rule	SJVAPCD	Maintenance of NAAQS and CAAQS	For new and modified sources requires pre-construction review, including BACT, an AQIA and emissions offsets. KRCD will comply with the requirements of this rule through its application of BACT, AQIA demonstration and acquisition of Emissions Reduction Credits (ERCs).
Rule 2520, Federally Mandated Operating Permits	SJVAPCD	Need for a uniform nationwide operating permit program for major stationary sources.	Establishes a permitting program for applicable sources to comply with all federal requirements for emissions performance, operations, emissions monitoring and recordkeeping/reporting. KRCD will file a Title V permit application with the SJVAPCD within 12 months of initial operation.
Rule 2540, Acid Rain Program	SJVAPCD	Reduction of impacts due to acidic rain	Requires monitoring of both NOx and SO2 emissions as well as the acquisition of annual SO2 allowances. KRCD will comply with Title IV requirements as part of its Title V compliance (see below).

Table 21
Summary of Applicable LORS
KRCD CPP

Regulation/Program	Regulatory/ Administering Agency	Air Quality Concern	Description/Project Applicability/Conformance
Rule 4001, New Source Performance Standards	SJVAPCD	Maintenance of NAAQS	Limits the emissions from specific source categories through the incorporation of federal NSPS requirements. KRCD will comply with the requirements of this rule through its application of application of BACT.
Rule 4002, National Emissions Standards for Hazardous Air Pollutants	SJVAPCD	HAPs	Imposes controls and limits the emissions of HAPs for major sources through the incorporation of federal NESHAPs requirements. KRCD will not be a major source of HAPs.
Rule 4101, Visible Emissions	SJVAPCD	Control of visible air emissions	Limits the opacity of air emissions. KRCD will comply with the requirements of this rule through the use of natural gas and low sulfur liquid fuel.
Rule 4102, Nuisance	SJVAPCD	Control of air emissions that may cause injury or annoyance	Prevents the emitting of substances that would result in injury or serve as a nuisance to the public. The KRCD AQIA demonstrates compliance with the requirements of this rule.
Rule 4201, Particulate Matter Concentration	SJVAPCD	Control of particulate emissions	Limits the concentration of particulate emissions. KRCD will comply with the requirements of this rule through the use of natural gas and low sulfur liquid fuel.
Rule 4202, Particulate Matter Emission Rate	SJVAPCD	Control of particulate emissions	Limits the rate of particulate emissions. KRCD will comply with the requirements of this rule through the use of natural gas and low sulfur liquid fuel.
Rule 4301, Fuel Burning Equipment	SJVAPCD	Control of emissions from fuel burning equipment	Limits emissions of various pollutants. KRCD will comply with the requirements of this rule through the implementation BACT.

Table 21
Summary of Applicable LORS
KRCD CPP

Regulation/Program	Regulatory/ Administering Agency	Air Quality Concern	Description/Project Applicability/Conformance
Rule 4304, Equipment Tuning Procedure for Boilers, Steam Generators and Process Heaters	SJVAPCD	Visible, NOx & CO emissions	Provides requirements for equipment tuning procedures. KRCD will comply with the requirements of this rule, if applicable, through the incorporation of the mandated tuning procedures in the KRCD CPP operating procedures.
Rule 4306, Boilers, Steam Generators and Process Heaters – Phase 3	SJVAPCD	NOx and CO emissions	Limits NOx and CO emissions from boilers. KRCD will comply with the requirements of this rule through the implementation of BACT for the auxiliary boiler.
Rule 4623, Storage of Organic Liquids	SJVAPCD	VOC emissions	Limits VOC emissions from the storage of organic liquids (e.g., fuel oil) if the on-site amount is 1,100 gallons or more. KRCD will comply with the requirements of this rule through appropriate design, construction and operations procedures.
Rule 4625, Wastewater Separators	SJVAPCD	VOC emissions form wastewater separators	Limits VOC emissions from wastewater separators. KRCD will comply with the requirements of this rule, if applicable, through appropriate design, construction and operations procedures.
Rule 4702, Internal Combustion Engines – Phase 2	SJVAPCD	NOx, CO & VOC emissions from internal combustion engines	Limits the emissions of NOx, CO & VOCs from stationary internal combustion engines. KRCD will comply with the requirements of this rule through the implementation BACT.
Rule 4703, Stationary Gas Turbines	SJVAPCD	Control of emissions from stationary gas turbines	Limits the emissions of various pollutants from stationary gas turbines. KRCD will comply with the requirements of this rule through the implementation BACT.

Table 21
Summary of Applicable LORS
KRCD CPP

Regulation/Program	Regulatory/ Administering Agency	Air Quality Concern	Description/Project Applicability/Conformance
Rule 4801, Sulfur Compounds	SJVAPCD	Control of sulfur compound emissions	Limits the amount of SO2 emitted in sulfur compound emissions. The KRCD CPP will comply with the requirements of this rule through the use of natural gas low sulfur liquid fuel.
Rule 7012, Hexavalent Chromium – Cooling Towers	SJVAPCD	Control of cooling tower emissions of chromium	Limits the emissions of chromium from cooling towers. KRCD will comply with the requirements of this rule by not adding hexavalent chromium compounds to the cooling tower circulating water.
Rule 8011, General Requirements	SJVAPCD	Control of fugitive dust	Limits fugitive dust emissions through the imposition of mitigation. KRCD will comply with the requirements of this rule through implementation of the mitigation measures for fugitive dust from construction.
Rule 8021, Construction, Demolition, Excavation, Extraction and Other Earthmoving Activities	SJVAPCD	Control of fugitive dust	Limits fugitive dust emissions through the imposition of mitigation. KRCD will comply with the requirements of this rule through implementation of the mitigation measures for fugitive dust from construction.
Rule 8031, Bulk Materials	SJVAPCD	Control of fugitive dust	Limits fugitive dust emissions from the outdoor storage, handling & transport of bulk materials, if 100 cubic yards or more of soil are involved. KRCD will comply with the requirements of this rule through implementation of the mitigation measures for fugitive dust from construction.
Rule 8041, Carryout and Trackout	SJVAPCD	Control of fugitive dust	Limits fugitive dust emissions through the imposition of mitigation. KRCD will comply with the requirements of this rule through implementation of the mitigation measures for fugitive dust from

Table 21 Summary of Applicable LORS KRCD CPP			
Regulation/Program	**Regulatory/ Administering Agency**	**Air Quality Concern**	**Description/Project Applicability/Conformance**
			construction.
Rule 8051, Open Areas	SJVAPCD	Control of fugitive dust	Limits fugitive dust emissions through the imposition of mitigation. KRCD will comply with the requirements of this rule through implementation of the mitigation measures for fugitive dust from construction.
Rule 8061, Paved and Unpaved Roads	SJVAPCD	Control of fugitive dust	Limits fugitive dust emissions through the imposition of mitigation. KRCD will comply with the requirements of this rule through implementation of the mitigation measures for fugitive dust from construction.
Rule 8071, Unpaved Vehicle/Equipment Traffic Areas	SJVAPCD	Control of fugitive dust	Limits fugitive dust emissions through the imposition of mitigation. KRCD will comply with the requirements of this rule through implementation of the mitigation measures for fugitive dust from construction.

10.1.1 Federal

Federal air quality law is administered by the USEPA. The federal Clean Air Act (CAA) (as amended through 1990) and its implementing regulations, e.g., 40 CFR 51 & 52, provide for the maintenance of NAAQS and air quality related values, e.g., visibility, through an evaluation process for the construction of new major sources or major modifications to existing major sources. This PSD review process is performed by the US EPA either directly or via delegation to a state level agency. PSD only applies to criteria pollutants for which ambient concentrations do not exceed the NAAQS.

40 CFR 51 & 52 require a NSR evaluation or new or modified major stationary sources. The NSR process, which focuses on a BACT evaluation and air quality impact analysis, is usually delegated by the USEPA to a state agency.

40 CFR 60 establishes NSPS. The NSPS mandate standards of performance for specific categories of equipment to limit the emissions of criteria pollutants. The applicable NSPS for the KRCD CPP is Subpart KKKK (Standards of Performance for Stationary Combustion Turbines),

and if applicable, the KRCD CPP Subpart IIII (Standards of Performance for Stationary Compression Ignition Internal Combustion Engines).

40 CFR 63 establishes National Emissions Standards for Hazardous Air Pollutants (NESHAPs). This section of the federal CAA defines HAPs, and requires Maximum Achievable Control Technology (MACT) for major sources of HAPs. A major source is defined as one which emits 10 tpy of any single HAP or 25 tpy of total HAPs.

40 CFR 70 implements the federal operating permit program as required per Title V of the federal CAA. This section of the CAA provides for a uniform nationwide operating permit program for major stationary sources, which identifies all federal requirements for emissions performance, operations, emissions monitoring and recordkeeping/reporting.

40 CFR 72 implements the federal acid rain program, as required per Title IV of the federal CAA, which is intended to reduce the adverse impacts to soils, vegetation and health resulting from acidic rain. This section of the CAA requires monitoring of NOx and SO2 emissions as well as the acquisition of annual SO2 allowances.

10.1.2 State

The CARB is responsible for overseeing the implementation of state air quality law, including the 1988 California CAA. State air quality law is codified in the California Health & Safety Code, Division 26, Air Resources (Sections 39000 through 44999). As noted in Table 21, Division 26 addresses both criteria and non-criteria (toxic) emissions through compliance with both the NAAQS and CAAQS as well as the identification of toxic air contaminants (TAC Program) and their inventory and assessment (Air Toxics Hot Spots Program). Division 26 also establishes the bases for the state's Air Pollution Control Districts and Air Quality Management Districts, which are responsible for direct implementation of state air quality law.

10.1.3 Local

The SJVAPCD is responsible for implementing state air quality programs as well as much federal air quality law in the San Joaquin Valley air basin. As shown in Table 21, the KRCD CPP is subject to a number of SJVAPCD rules. The most significant of which is the NSR rule, which mandates compliance with BACT requirements, an AQIA, the procurement of ERCs and the equivalence of the CEC AFC process with the SJVAPCD ATC process. The KRCD CPP is also subject to a number of SJVAPCD prohibitory rules (i.e., rules that limit emissions for specific pollutants or equipment categories).

10.2 OTHER REQUIRED PERMITS

Other air quality permits required as well as the schedules for obtaining these permits are shown in Table 22.

Table 22
Required Permits – Air Quality

Permit	Regulatory/ Administering Agency	Schedule
Determination of Compliance (DOC) *	CEC/SJVAPCD	The DOC will be obtained as part of the Site Certificate from the CEC, i.e., prior to construction.
Federal Operating (Title V) Permit	SJVAPCD	The application will be filed no later than 12 months after initial operation and the permit obtained subsequently.
Acid Rain (Title IV) Permit	SJVAPCD	The permit will be obtained as part of Title V permit.
*Usually the SJVAPCD would issue the required air permit (Authority To Construct). However, since the CEC has overall permitting authority in the AFC process for state agencies, air quality permitting is accomplished through the SJVAPCD acting as a consultant to the CEC and issuing a DOC in lieu of the ATC. The DOC is functionally equivalent to an ATC.		

10.3 COMPLIANCE STATUS OF OTHER FACILITIES WITHIN CALIFORNIA OWNED OR OPERATED BY THE APPLICANT

All other facilities within California, which are subject to air pollution regulation and are either owned or operated by the Applicant (KRCD), are in compliance with their respective permits. The only other facility included in this category is the KRCD Malaga Peaking Plant (Malaga Plant), which is located in the Community of Malaga near Fresno, CA. The Malaga Plant is a 95-99 MW natural gas-fired combustion turbine peaking plant. Due to its size, operating hours and emissions, the Malaga Plant was not subject to a PSD review. However, it did require an ATC permit from the SJVAPCD.

CHAPTER 11 ENDANGERED SPECIES

In accordance with Section 7 of the Endangered Species Act, a Biological Assessment (BA) is being prepared by KRCD and will be submitted to the USEPA under separate cover. At this time it is anticipated that the BA will be completed and submitted by the end of October 2007.

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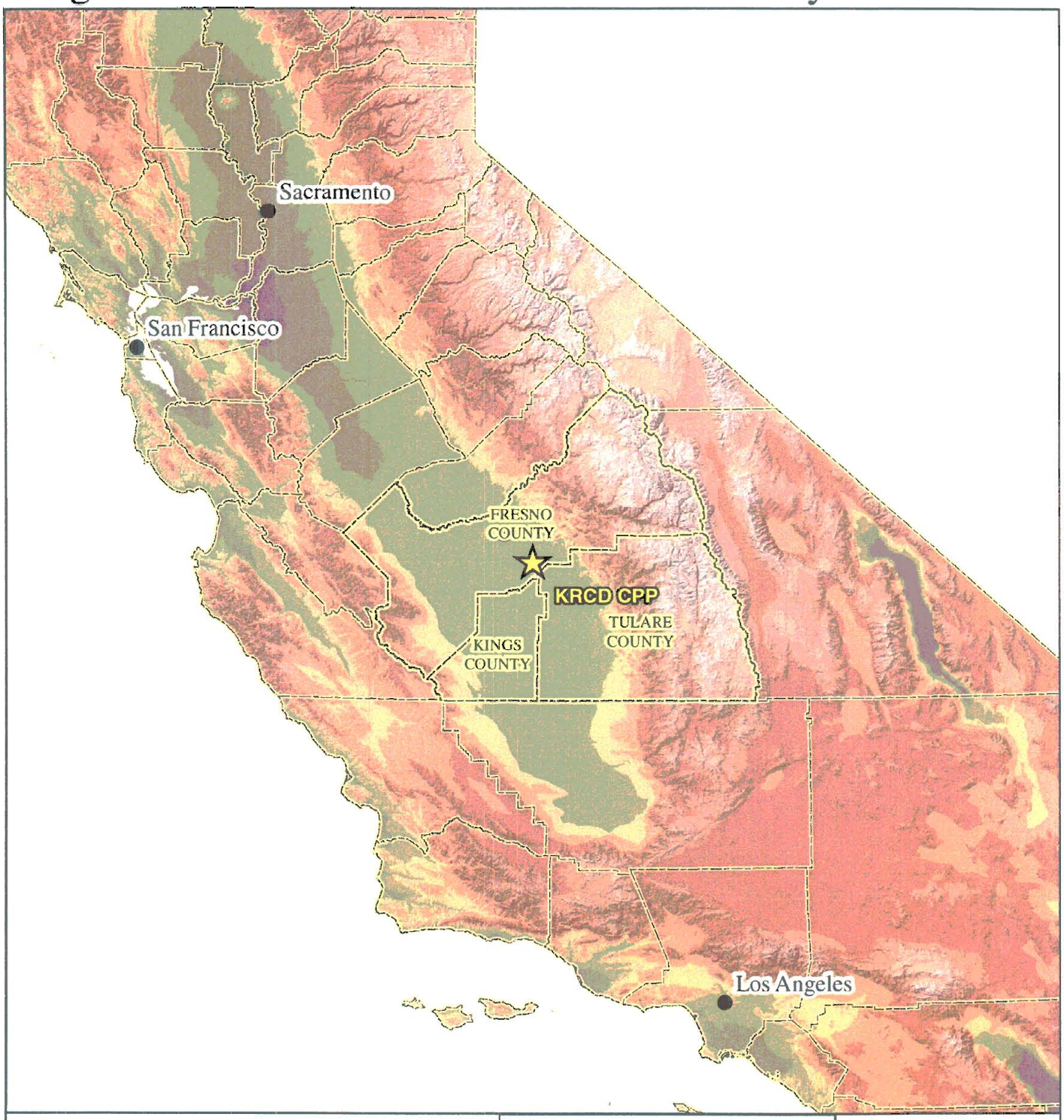
Kings River Conservation District Community Power Plant



KRCD Community Power Plant

City

County Boundary Line

FIGURE: 1

Regional Area

N 0 25 50 Miles

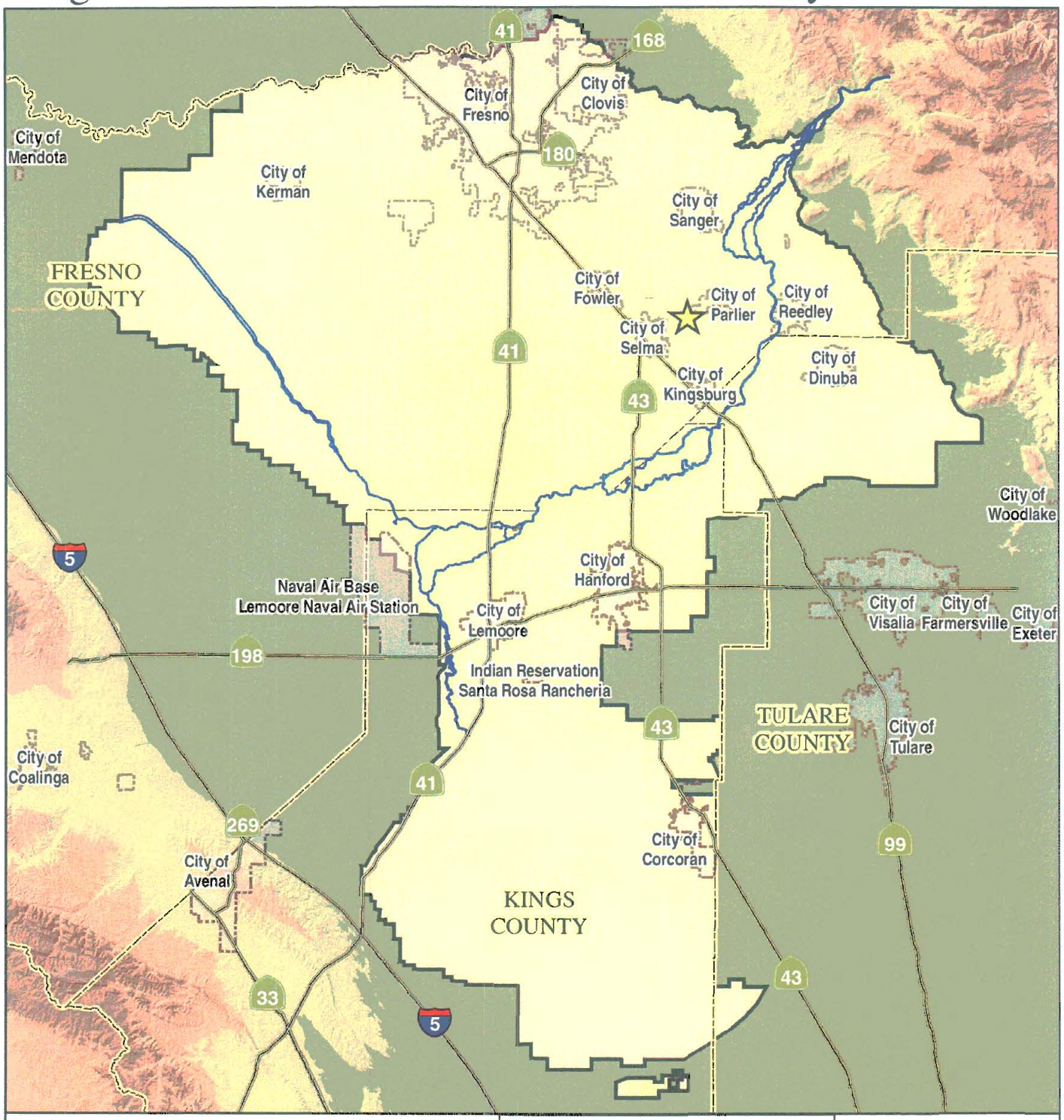
1:3,500,000 Scale

2007-06-13 - Rev:[2]

KRCD COMMUNITY POWER PLANT

Energy for our Future

Kings River Conservation District Community Power Plant



KRCD Community Power Plant

Freeway

Kings River

KRCD Boundary

City Boundary

County Boundary Line

FIGURE: 2

KRCD Service Territory

N

0 2 4 6 8 10 Miles

1:600,000 Scale

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KRCD COMMUNITY POWER PLANT

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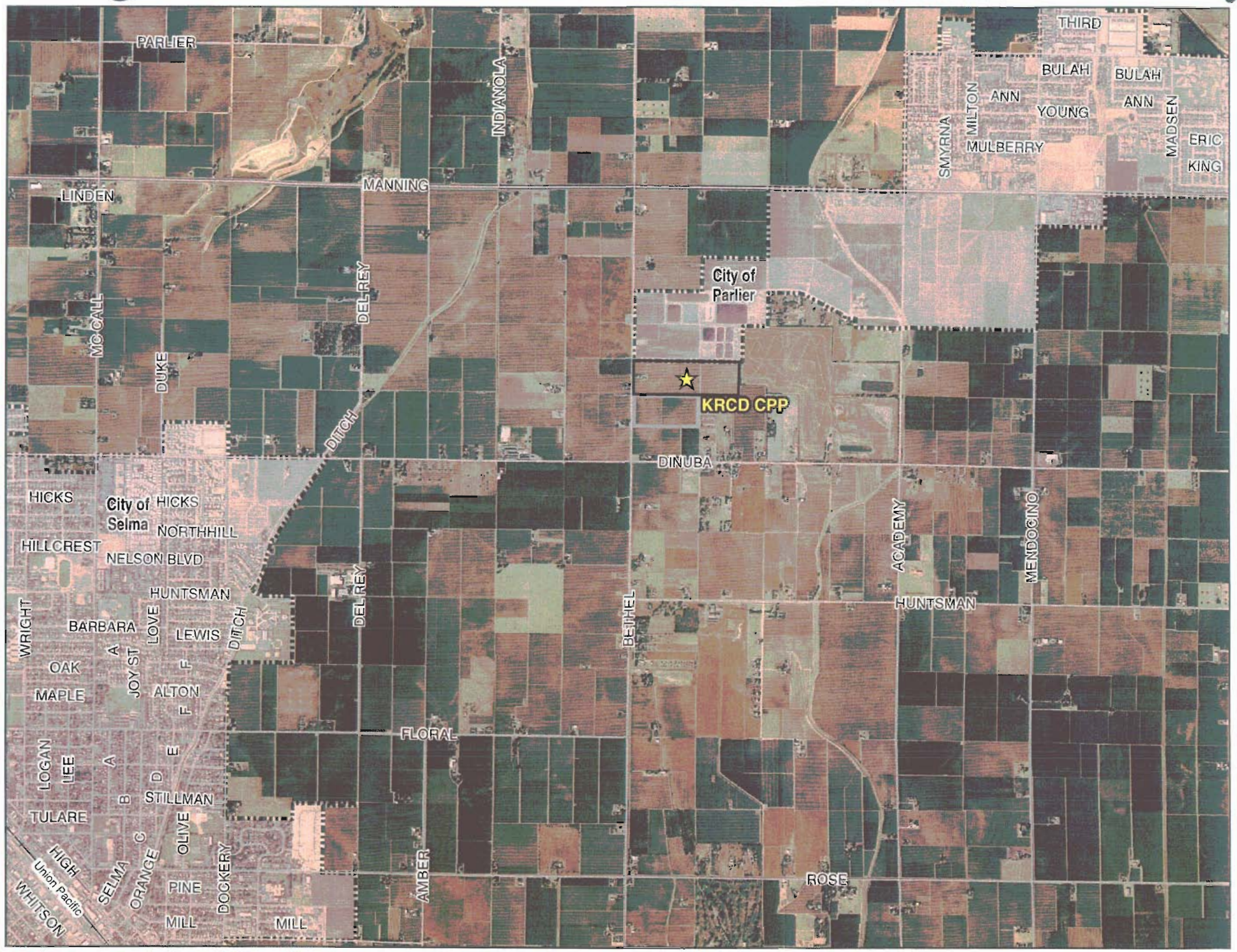
Kings River Conservation District Community Power Plant



KRCD COMMUNITY POWER PLANT

Energy for our Future

FIGURE: 3

Project Location

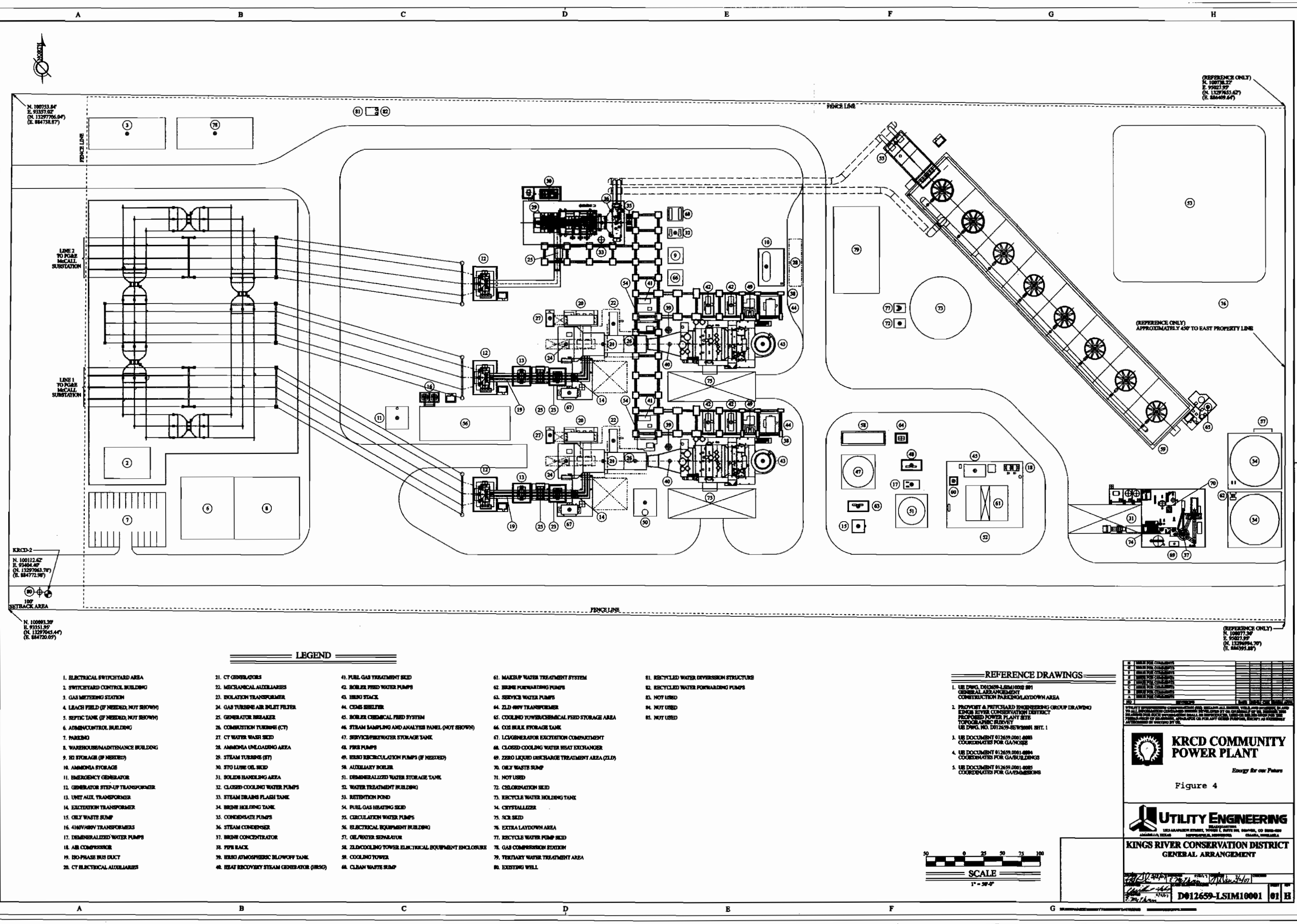
- KRCD Community Power Plant
- KRCD CPP Project Site
- KRCD CPP Project Laydown
- Street
- Railroad
- City Boundary

NOTE: Potable Water and Sewer Connections are on the project site.

N 0 0.25 0.5 0.75 1 Mile

1:24,000 Scale 1 Inch equals 2,000 Feet

2007-07-12- Rev:[10]



LEGEND

1. ELECTRICAL SWITCHYARD AREA
2. SWITCHYARD CONTROL BUILDING
3. GAS METERING STATION
4. LEACH FIELD (IF NEEDED; NOT SHOWN)
5. SEPTIC TANK (IF NEEDED; NOT SHOWN)
6. ADMIN/CONTROL BUILDING
7. PARKING
8. WAREHOUSE/MAINTENANCE BUILDING
9. H2 STORAGE (IF NEEDED)
10. AMMONIA STORAGE
11. EMERGENCY GENERATOR
12. GENERATOR STEP-UP TRANSFORMER
13. UNIT AUX. TRANSFORMER
14. EXCITATION TRANSFORMER
15. OILY WASTE SUMP
16. 4160V/480V TRANSFORMERS
17. DEMINERALIZED WATER PUMPS
18. AIR COMPRESSOR
19. ISO-PHASE BUS DUCT
20. CT ELECTRICAL AUXILIARIES
21. CT GENERATORS
22. MECHANICAL AUXILIARIES
23. ISOLATION TRANSFORMER
24. GAS TURBINE AIR INLET FILTER
25. GENERATOR BREAKER
26. COMBUSTION TURBINE (CT)
27. CT WATER WASH SKID
28. AMMONIA UNLOADING AREA
29. STEAM TURBINE (ST)
30. STG LUBE OIL SKID
31. SOLIDS HANDLING AREA
32. CLOSED COOLING WATER PUMPS
33. STEAM DRAINS FLASH TANK
34. BRINE HOLDING TANK
35. CONDENSATE PUMPS
36. STEAM CONDENSER
37. BRINE CONCENTRATOR
38. PIPE RACK
39. HRSG ATMOSPHERIC BLOWOFF TANK
40. HEAT RECOVERY STEAM GENERATOR (HRSG)
41. FUEL GAS TREATMENT SKID
42. BOILER FEED WATER PUMPS
43. HRSG STACK
44. CEMS SHELTER
45. BOILER CHEMICAL FEED SYSTEM
46. STEAM SAMPLING AND ANALYSIS PANEL (NOT SHOWN)
47. SERVICE/FIREWATER STORAGE TANK
48. FIRE PUMPS
49. HRSG RECIRCULATION PUMPS (IF NEEDED)
50. AUXILIARY BOILER
51. DEMINERALIZED WATER STORAGE TANK
52. WATER TREATMENT BUILDING
53. RETENTION POND
54. FUEL GAS HEATING SKID
55. CIRCULATION WATER PUMPS
56. ELECTRICAL EQUIPMENT BUILDING
57. OIL/WATER SEPARATOR
58. ZLD/COOLING TOWER ELECTRICAL EQUIPMENT ENCLOSURE
59. COOLING TOWER
60. CLEAN WASTE SUMP
61. MAKEUP WATER TREATMENT SYSTEM
62. BRINE FORWARDING PUMPS
63. SERVICE WATER PUMPS
64. ZLD 480V TRANSFORMER
65. COOLING TOWER/CHEMICAL FEED STORAGE AREA
66. CO2 BULK STORAGE TANK
67. LCI/GENERATOR EXCITATION COMPARTMENT
68. CLOSED COOLING WATER HEAT EXCHANGER
69. ZERO LIQUID DISCHARGE TREATMENT AREA (ZLD)
70. OILY WASTE SUMP
71. NOT USED
72. CHLORINATION SKID
73. RECYCLE WATER HOLDING TANK
74. CRYSTALLIZER
75. SCR SKID
76. EXTRA LAYDOWN AREA
77. RECYCLE WATER PUMP SKID
78. GAS COMPRESSION STATION
79. TERTIARY WATER TREATMENT AREA
80. EXISTING WELL
81. RECYCLED WATER DIVERSION STRUCTURE
82. RECYCLED WATER FORWARDING PUMPS
83. NOT USED
84. NOT USED
85. NOT USED

REFERENCE DRAWINGS

1. UE DWG. D012659-LSIM10002 SH1
   GENERAL ARRANGEMENT
   CONSTRUCTION PARKING/LAYDOWN AREA
2. PROVOST & PRITCHARD ENGINEERING GROUP DRAWING
   KINGS RIVER CONSERVATION DISTRICT
   PROPOSED POWER PLANT SITE
   TOPOGRAPHIC SURVEY
   UE DWG. NO. D012659-SUR10001 SHT. 1
3. UE DOCUMENT 012659.0001-0003
   COORDINATES FOR GA/NOISE
4. UE DOCUMENT 012659.0001-0004
   COORDINATES FOR GA/BUILDINGS
5. UE DOCUMENT 012659.0001-0005
   COORDINATES FOR GA/EMISSIONS

SCALE
50 0 25 50 75 100
1" = 50'-0"

REV	DESCRIPTION	DATE	DRN	CHK	APP
H	ISSUED FOR CONSTRUCTION				
G	ISSUED FOR CONSTRUCTION				
F	ISSUED FOR CONSTRUCTION				
E	ISSUED FOR CONSTRUCTION				
D	ISSUED FOR CONSTRUCTION				
C	ISSUED FOR CONSTRUCTION				
B	ISSUED FOR CONSTRUCTION				
A	ISSUED FOR CONSTRUCTION				

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KRCD COMMUNITY POWER PLANT

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Figure 4

UTILITY ENGINEERING

HEADQUARTERS
1515 ARAPAHOE STREET, TOWER 1, SUITE 900, DENVER, CO 80202-2126
AMARILLO, TEXAS · MINNEAPOLIS, MINNESOTA · OMAHA, NEBRASKA

KINGS RIVER CONSERVATION DISTRICT
GENERAL ARRANGEMENT

DRAWN	DESIGNED	CHECKED	APPROVED
STAFF			

D012659-LSIM10001 | 01 | H

KRCD COMMUNITY POWER PLANT

Figure 5

UTILITY ENGINEERING

KINGS RIVER CONSERVATION DISTRICT
ELEVATIONS, SECTIONS, ISOMETRICS
NORTH SITE ELEVATION

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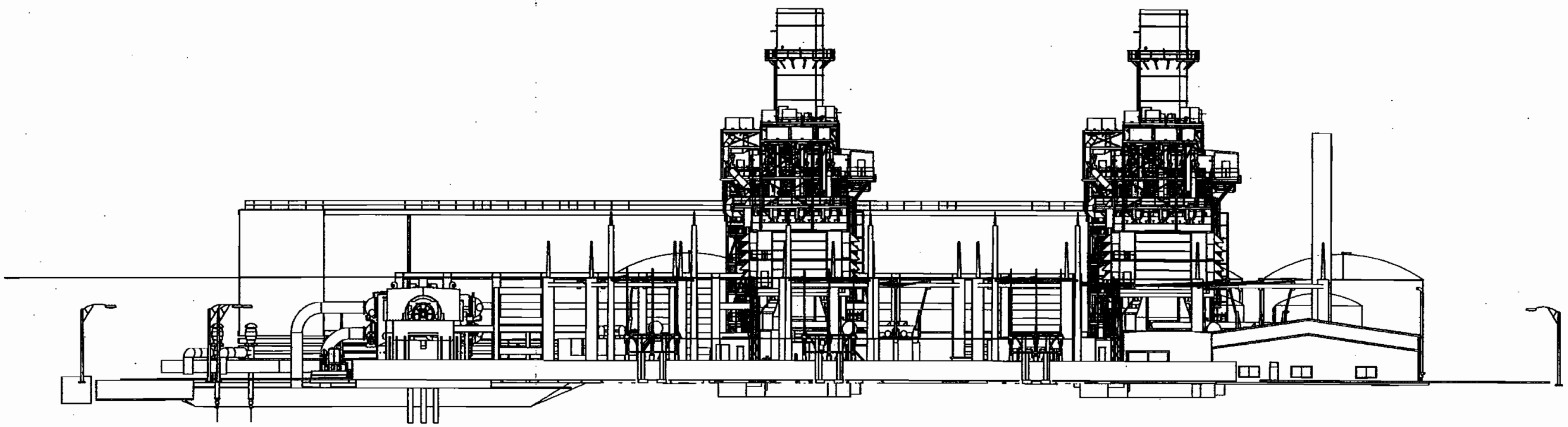

SCALE

KRCD COMMUNITY POWER PLANT

Energy for our Future

Figure 6

UTILITY ENGINEERING

KINGS RIVER CONSERVATION DISTRICT
ELEVATIONS, SECTIONS, ISOMETRICS
EAST SITE ELEVATION

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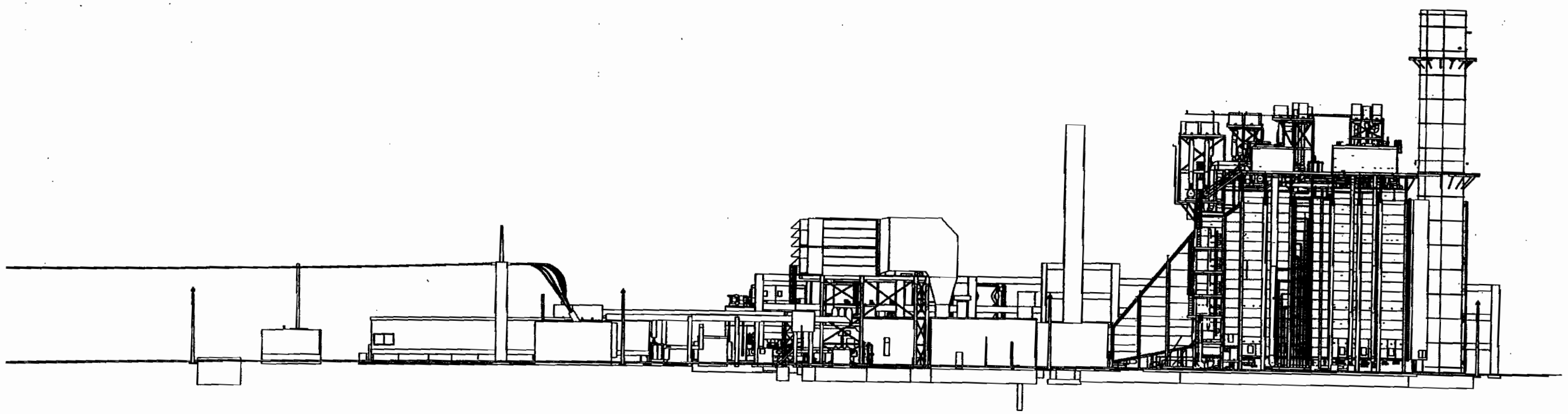


SCALE

KRCD COMMUNITY POWER PLANT

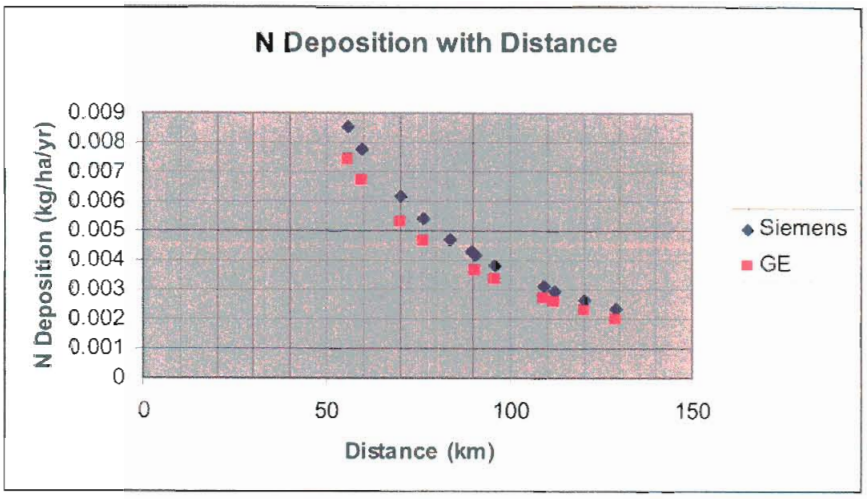
Figure 7

UTILITY ENGINEERING

KINGS RIVER CONSERVATION DISTRICT
ELEVATIONS, SECTIONS, ISOMETRICS
NORTH ELEVATION POWER BLOCK

D012659-LSIM10005 | 01 | C

Figure 8
N Deposition at Four Closest Class I Areas



		Deposition (kg/ha/yr)	
Class I Area	Distance (km)	Siemens	GE
Kings Canyon	55.7	0.0085	0.0074
	95.6	0.0039	0.0033
	112.3	0.0030	0.0026
Sequoia	59.7	0.0078	0.0067
	90.5	0.0042	0.0036
	120.0	0.0026	0.0023
John Muir	70.0	0.0061	0.0053
	109.0	0.0031	0.0027
	128.8	0.0023	0.0020
Kaiser	76.5	0.0054	0.0047
	83.6	0.0047	n/a
	89.2	0.0043	n/a

Appendix 1

Criteria Pollutant Emissions Data

Appendix 1a (emissions based on the use of GE combustion turbines)

Appendix 1b (emissions based on the use of Siemens combustion turbines)

APPENDIX 1a
KRCD CPP
MODELING PARAMETERS & EMISSIONS RATES – GE CASE

Note the text in bold is used to indicate where differences exist between the GE and Siemens cases.

A. STACK PARAMETERS

	North CT	South CT	Cooling Tower	Emergency Generator	Diesel Fire Pump	Aux. Boiler
Stack Location[1]	N13296550..73' E885971.72'	N13296400.71' E885968.60'	See Note 1	N13296457.23' E885489.54'	N13296391.26' E886162.47'	N13296351.03' E885813.14'
Stack Height (feet)	150	150	80	45	45	100
Elevation at Base of Stack (FASL)[2]	327	327	327	327	327	327
Stack Exit Temperature (degrees F)[3]	**Scenario A -190** **Scenario B -190** **Scenario C -188** **Scenario D -187** **Scenario E -187** **Scenario F – 180**	**Scenario A -190** **Scenario B -190** **Scenario C -188** **Scenario D -187** **Scenario E -187** **Scenario F - 180**	81	986	900	325
Stack Exit Velocity (feet/min)[4]	**Scen. A – 4,198.6** **Scen. B – 4,004.8** **Scen. C– 3,907.3** **Scen. D – 4,000.9** **Scen. E – 3,538.4** **Scen. F – 2,590.0**	**Scen. A – 4,198.6** **Scen. B – 4,004.8** **Scen. C– 3,907.3** **Scen. D – 4,000.9** **Scen. E – 3,538.4** **Scen. F – 2,590.0**	2,967	6,703	8,959	2,030
Stack Cross-sectional Area (square feet)[5]	254.47	254.47	530.93 (per cell)	1.713	0.14	9.62

Notes

1. Given in UTM coordinates (feet). The approximate coordinates of the 8 cooling tower cells (centers) are:

Cell A – N13296742.00; E886210.17 (most NW cell)
Cell B – N13296700.85; E886249.64
Cell C – N13296659.71; E886289.10
Cell D – N13296618.57; E886328.57
Cell E – N13296577.41; E886368.04
Cell F – N13296536.27; E886407.51
Cell G – N13296495.12; E886446.97
Cell H – N13296453.99; E886486.45 (most SE cell)

2. The site FASL is given as 327.

3. The first 5 HRSG stack exit temperatures shown correlate to the 5 sets of ambient conditions, i.e., Scenarios A through E, used to envelope CT performance and represent the following performance cases, which were supplied on **10/25/06 by NCI as Rev. 2 of the GE** performance data:

Scenario A = Case 5 – 26F/60%RH, Fogger-Off, Stm Inj.-Off
Scenario B = Case 4 – 63F/40%RH, Fogger-On, Stm Inj.-Off
Scenario C = Case 13 – 63F/40%RH, Fogger-Off, Stm Inj.-Off
Scenario D = Case 2 – 103F/20.1%RH, Fogger-On, Stm Inj.-On
Scenario E = Case 12 – 103F/20.1%RH, Fogger-Off, Stm Inj.-Off

The stack exit temperature for the sixth scenario (F) comes from Case 14 of the CT performance data and is for partial load, startup/shutdown and commissioning operations.

Scenario F = Case 14 – 63F/40%RH, Fogger-Off, Stm Inj.-Off

The exit temperature for the cooling towers is assumed as the temperature of the air leaving the cooling towers, which is 80.97F for the 63F ambient annual average case.

4. The 5 HRSG stack exit velocities shown correlate to the 5 sets of ambient conditions, i.e., Scenarios A through E, used to envelope CT performance and represent the performance cases listed in Note 3 above. The 5 HRSG stack exit velocities are based on the stack diameter of 254.47 sq. feet (per Note 5 below) and the following **GE** performance data:

Scenario A = Case 5 – 1,068,414 acfm
Scenario B = Case 4 – 1,019,102 acfm
Scenario C = Case 13 – 994,289 acfm
Scenario D = Case 2 – 1,018,114 acfm
Scenario E = Case 12 – 900,404 acfm

The stack exit velocity for partial load operation, startup/shutdown and commissioning operations (Scenario F) is based on the stack diameter and the stack exhaust flow of **659,061 acfm, which is from Case 14 of the GE** performance data

The cooling tower number is based on a flow rate of 1,575,240 acfm per cell (CT Case 4, 63F ambient annual average). The emergency generator number is based on a flow rate of 11,484 acfm. The diesel fire pump number is based on a flow rate of 1,265 acfm. The aux. boiler number is based on a flow rate of 19,532 acfm.

5. Based on CT stack diameters of 18 feet each. Cooling tower cell cross sectional areas are based on each of the 8 cells having a diameter of 26 feet. The stack diameter of the emergency generator is 1.477 feet. The stack diameter of the diesel fire pump is 0.424 feet. The stack diameter of the aux. boiler is 3.5 feet.

B. FENCELINE

The KRCD CPP fence line is a rectangle, although it is not on a true N/S line. The coordinates (UTM in feet not meters) for the four fence line corners are given below:

NE Corner	N13296824.89, E887114.46
SE Corner	N13296170.20, E887092.76
SW Corner	N13296231.29, E885074.65
NW Corner	N13296885.87, E885093.31

C. MAJOR STRUCTURES

1. Inside the KRCD CPP Fence Line

The table below provides the dimensions for major structures inside the fence line as well as their identifying number from the General Arrangement drawing. UTM coordinate data for these structures in provided in Appendix 7-1.

Structure Description	Item # on GA Drawing	Dimensions – L x W x H (feet)
Switchyard Control Bldg.	2	70 x 60 x 20
Admin. Bldg.	6	100 x 60 x 24
Warehouse Maintenance Bldg.	8	100 x 80 x 24
CT1 Elec. Auxiliaries Structure	20.1	44 x 20 x 16
CT2 Elec. Auxiliaries Structure	20.1	44 x 20 x 16
CT1 Mech. Auxiliaries Structure	22.1	30 x 10 x 16
CT2 Mech. Auxiliaries Structure	22.1	30 x 10 x 16
CT1 Air Inlet Structure	24.1	70 x 50 x 62
CT2 Air Inlet Structure	24.2	70 x 50 x 62
CT1	26.1	116 x 44 x 20
CT2	26.2	116 x 44 x 20
Steam Turbine	29	121 x 36 x 34
Brine Holding Tank (north)	34	65 diam. x 34 high
Brine Holding Tank (south)	34	65 diam. x 34 high
Steam Condenser	36	34 x 50 x 35
HRSG1	40.1	165 x 62 x 95
HRSG2	40.2	165 x 62 x 95
Service/Firewater Storage Tank	47	40 diam. x 40 high
Aux. Boiler	50	30 x 22 x 12
Demin. Water Storage Tank	51	35 diam. x 32 high
Water Treatment Bldg.	52	100 x 85 x 22
Elec. Equip. Bldg.	56	118 x 44 x 20
ZLD/Cooling Tower Elec. Equip. Enclosure	58	58 x 18 x 12
Cooling Tower	59	460 x 76 x 80

ZLD Treatment Area	69	84 x 75 x 22
Recycle Water Holding Tank	73	80 diam. x 40 high

Other structures & equipment are not included, as they are either short or not solid.

2. Beyond the KRCD CPP Fence Line

Based on a review of an aerial photo of the project site and surrounding area, the terrain is relatively flat farmland and there are no significant structures in the vicinity.

D. OPERATING SCENARIOS

1. CTs in Full Load Operation (Steady-state)

Both CTs at full load

Aux. Boiler on (at full load)

Cooling Tower on (at full load)

Emergency Generator on (but only for 30 min./week & non simultaneous with the diesel fire pump)

Diesel Fire Pump on (but only for 30 min./week & non simultaneous with the emergency generator)

The following 5 ambient/operational scenarios will be assessed for CT steady-state operation:

Scenario A = Case 5 – Siemens/GE performance data – 26F/60%RH, Fogger-Off, Stm Inj.-Off
Scenario B = Case 4 – Siemens/GE performance data – 63F/40%RH, Fogger-On, Stm Inj.-Off
Scenario C = Case 13 – Siemens/GE performance data – 63F/40%RH, Fogger-Off, Stm Inj.-Off
Scenario D = Case 2 – Siemens/GE performance data – 103F/20.1%RH, Fogger-On, Stm Inj.-On
Scenario E = Case 12 – Siemens/GE performance data– 103F/20.1%RH, Fogger-Off, Stm Inj.-Off

This 5 case subset of the 20 cases of performance provided for the CTs should envelope the other 15 cases.

2. CT in Startup or Shutdown Mode

CT Startup

1 CT in startup mode for approximately **30 minutes** before the 2nd CT initiates startup

Aux. Boiler on (at full load)

Cooling Tower on (at full load)

Emergency Generator off

Diesel Fire Pump off

CT Shutdown

Both CTs in shutdowm mode simultaneously

Aux. Boiler on (at full load)

Cooling Tower on (at full load)

Emergency Generator off

Diesel Fire Pump off

3. CTs Not Operating

Both CTs off

Aux. Boiler on (at full load)

Cooling Tower on (at full load – This is conservative, but the cooling tower may need to operate at some load during this time.)

Emergency Generator on (but only for 30 min./week & non simultaneous with the diesel fire pump)

Diesel Fire Pump on (but only for 30 min./week & non simultaneous with the emergency generator)

4. CTs in Partial Load Operation

1 CT at partial load (apprx. **50.2% for GE**)

The other CT at full load

Aux. Boiler on (at full load)

Cooling Tower on (at full load)

Emergency Generator on (but only for 30 min./week & non simultaneous with the diesel fire pump)

Diesel Fire Pump on (but only for 30 min./week & non simultaneous with the emergency generator)

One ambient temperature/operational scenario is available for the assessment of CT partial load operation:

Scenario F = Case 14 – CT performance data – 63F/40%RH, Fogger-Off, Stm Inj.-Off

5. Hours of annual operation

CTs – 6,807 hpy of steady-state + 154 hot starts (@ **1 hr, 13 min./start**) + 27 warm starts (@ **1 hr, 57 min./start**) + 181 shutdowns (@ **60 min./shutdown**). Annual emissions from this annual CT operating scenario should be compared with those for the CTs operating at full load for 8,760 hpy and the highest emissions for each pollutant used for estimating max. annual emissions.

Aux. Boiler – 2,315 hpy (based on 8,760-6,807=1,953 hpy when the CTs are not in steady-state operation + 2 x 181=362 hpy for 1 hr overlap with CT steady-state before and after each start/stop cycle)

Cooling Tower – 8,760 hpy

Emergency Generator – 26 hpy (but not when diesel fire pump is on)

Diesel Fire Pump – 26 hpy (but not when emergency generator is on)

6. CT Commissioning

CTs – assume only 1 CT will operate during the commissioning period at any time.

Aux. boiler off

Cooling Tower on (at full load)

Emergency Generator off

Diesel Fire Pump off

E. EMISSIONS RATES

1. Steady-State

There are 5 sets of steady-state emissions rates. These 5 sets of CT emissions rates, which are associated with the five ambient temperature conditions noted in Section D (Operating Scenarios A through E), in essence govern all steady-state emissions scenarios.

The 5 sets of steady-state emissions rates are shown in Tables 1 through 5. Peak hourly emissions, based on the coldest (design) ambient temperature (Scenario A), are provided in Table 1. Annual average emissions are represented by the emissions rates in Tables 2 & 3 (Scenarios B & C). The emissions rates at the maximum ambient (design) temperature are provided in Tables 4 & 5 (Scenarios D & E).

Note that the emissions rates for the cooling tower and aux. boiler are assumed to be constant across the range of operating conditions. Max. hourly emissions during steady-state assume operation of both CTs, the cooling tower, aux. boiler and emergency generator or the diesel fire pump (depending upon which of these two pieces of equipment has the higher emissions for a given scenario).

2. Startup/Shutdown

CT cold startup, warm startup, hot startup and shutdown sequence emissions rates are shown in Tables 6 through 9, respectively.

The startup emissions rates do not directly account for multiple (failed) startup sequences. However, for warm and hot startups (and cold as well, although cold starts are not included in this project's operating scenarios because of the use of an aux. boiler), a failed start for either the 1st or 2nd CT in the start sequence would not alter the max. hourly emissions rates shown in Tables 6 through 8. Instead, a failed start of one of the CTs would extend the number of hours during which the max. emissions rates shown in Tables 6 through 8 would occur. To address the potential issue of failed start sequences, 2 failed start attempts, each of 30 minutes, are assumed. This has the effect of extending the hot, warm or cold startup period by 1 hour. **For GE the max. startup periods are: hot 73 + 60 = 133 min. & warm 117 + 60 = 177 min.**

(Note that the startup/shutdown emissions rates for the cooling tower and aux. boiler are assumed to be the same as those for steady-state.)

3. Partial Load

Table 10 provides emissions rates for CT partial load operation. **For GE partial load operation is at approximately 50.2% of full load output.** Partial load operation should be evaluated for short term impacts, but not for long term (i.e., annual), as full load operation produces greater emissions. Since it is likely that a) 1 CT would be in partial load operation and the other CT off or b) one CT would be in partial load operation and the other CT at full load, but unlikely that both CTs would operate at partial load, the partial load assessment will assume 1 CT at partial load and the other at full load (both at annual average ambient conditions).

4. Commissioning

CT commissioning emissions rates, which will occur within the first few months of project operation and are shown in Table 11, must be factored into the assessment of short-term impacts. Long-term (annual) impacts need not account for commissioning emissions, since in the 1st year of operation the allowable amount of normal operation is assumed to be reduced by and to the extent that commissioning operations occur.

(Note that the commissioning emissions rates for other equipment are assumed to be the same as those for steady-state.)

TABLE 1
MAXIMUM HOURLY EMISSIONS RATES (LBS/HR)
STEADY-STATE OPERATION[1]

	One CT	Both CTs	Cooling Tower[2]	Emergency Generator	Diesel Fire Pump	Aux. Boiler
NOx[3]	**13.6**	**27.2**	NA	4.01	4.07	0.72
CO[4]	**6.9**	**13.8**	NA	10.43	0.31	2.27
VOCs[5]	**2.0**	**4.0**	NA	2.65	0.19	0.37
PM10	**9.0**	**18.0**	**0.52**	0.64	0.14	0.61
PM2.5[6]	**0.52**	**1.04**	**0.13**	0.01	0.02	0.02
SO2	**1.5**[7]	**3.0**	NA	0.01[7]	0.12[8]	0.05[7]

Notes:

1. Based on CT operation at an ambient temperature of 26 degrees F, Fogger-Off, STIG-Off.
2. PM10 is the only emission from this equipment. Cooling tower PM 10 emissions are based on: a circ. water rate of **57,366,384 lbs/hr (6,906,881 gal/hr)**; a TDS conc. of 1,800 mg/l; and a drift rate of 0.0005%.
3. CT NOx emissions are based on SCR to 2 ppmdv @ 15% O2; aux. boiler emissions are based on 9 ppmdv @ 3% O2.
4. CT CO emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
5. CT VOC emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
6. CT PM2.5 emissions rate based on an emissions factor of 0.00028 lbs/MMBtu and **1,852 MMBtu/hr** fuel input per CT. Aux. bolier PM2.5 emissions rate based on an emissions factor of 0.00028 lbs/MMBtu and fuel input of 61.23 MMBtu/hr. Emergency generator PM2.5 emissions rate based on an emissions factor of 0.00028 lbs/MMBtu and fuel input of 13 MMBtu/hr. Diesel fire pump PM2.5 emissions factors based on an emissions factor of 0.004 lbs/MMBtu and fuel

input of 3 MMBtu/hr. Cooling tower PM2.5 emissions rate assumes PM2.5 is 25% of the PM10 emissions rate.

7. Based on 0.3 grains S/100 scf.
8. Based on 0.05% fuel sulfur content.

TABLE 2
AVERAGE HOURLY EMISSIONS RATES (LBS/HR)
STEADY-STATE OPERATION[1]

	One CT	Both CTs	Cooling Tower[2]	Emergency Generator	Diesel Fire Pump	Aux. Boiler
NOx[3]	**12.9**	**25.8**	NA	4.01	4.07	0.72
CO[4]	**6.4**	**12.8**	NA	10.43	0.31	2.27
VOCs[5]	**2.0**	**4.0**	NA	2.65	0.19	0.37
PM10	**9.0**	**18.0**	**0.52**	0.64	0.14	0.61
PM2.5[6]	**0.52**	**1.04**	**0.13**	0.01	0.02	0.02
SO2	**1.5**[7]	**3.0**	NA	0.01[7]	0.12[8]	0.05[7]

Notes:

1. Based on an ambient temperature of 63 degrees F, Fogger-On, STIG-Off.
2. PM10 is the only emission from this equipment. Cooling tower PM 10 emissions are based on: a circ. water rate of **57,366,384 lbs/hr (6,906,881 gal/hr)**; a TDS conc. of 1,800 mg/l; and a drift rate of 0.0005%.
3. CT NOx emissions are based on SCR to 2 ppmdv @ 15% O2; aux. boiler emissions are based on 9 ppmdv @ 3% O2.
4. CT CO emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
5. CT VOC emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
6. PM2.5 emissions rates assume those used for the 26F ambient case.
7. Based on 0.3 grains S/100 scf.
8. Based on 0.05% fuel sulfur content.

TABLE 3
AVERAGE HOURLY EMISSIONS RATES (LBS/HR)
STEADY-STATE OPERATION[1]

	One CT	Both CTs	Cooling Tower[2]	Emergency Generator	Diesel Fire Pump	Aux. Boiler
NOx[3]	**12.7**	**25.4**	NA	4.01	4.07	0.72
CO[4]	**6.4**	**12.8**	NA	10.43	0.31	2.27
VOCs[5]	**2.0**	**4.0**	NA	2.65	0.19	0.37
PM10	**9.0**	**18.0**	**0.52**	0.64	0.14	0.61
PM2.5[6]	**0.52**	**1.04**	**0.13**	0.01	0.02	0.02
SO2	**1.5**[7]	**3.0**	NA	0.01[7]	0.12[8]	0.05[7]

Notes:

1. Based on an ambient temperature of 63 degrees F, Fogger-Off, STIG-Off.
2. PM10 is the only emission from this equipment. Cooling tower PM 10 emissions are based on: a circ. water rate of **57,366,384 lbs/hr (6,906,881** gal/hr); a TDS conc. of 1,800 mg/l; and a drift rate of 0.0005%.
3. CT NOx emissions are based on SCR to 2 ppmdv @ 15% O2; aux. boiler emissions are based on 9 ppmdv @ 3% O2.

4. CT CO emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
5. CT VOC emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
6. PM2.5 emissions rates assume those used for the 26F ambient case.
7. Based on 0.3 grains S/100 scf.
8. Based on 0.05% fuel sulfur content.

TABLE 4
HOURLY EMISSIONS RATES (LBS/HR)
STEADY-STATE OPERATION[1]

	One CT	Both CTs	Cooling Tower[2]	Emergency Generator	Diesel Fire Pump	Aux. Boiler
NOx[3]	**12.8**	**25.6**	NA	4.01	4.07	0.72
CO[4]	**6.1**	**12.2**	NA	10.43	0.31	2.27
VOCs[5]	**2.0**	**4.0**	NA	2.65	0.19	0.37
PM10	**9.0**	**18.0**	**0.52**	0.64	0.14	0.61
PM2.5[6]	**0.52**	**1.04**	**0.13**	0.01	0.02	0.02
SO2	**1.5**[7]	**3.0**	NA	0.01[7]	0.12[8]	0.05[7]

Notes:
1. Based on an ambient temperature of 103 degrees F, Fogger-On, STIG-On.
2. PM10 is the only emission from this equipment. Cooling tower PM 10 emissions are based on: a circ. water rate of **57,366,384 lbs/hr (6,906,881** gal/hr); a TDS conc. of 1,800 mg/l; and a drift rate of 0.0005%.
3. CT NOx emissions are based on SCR to 2 ppmdv @ 15% O2; aux. boiler emissions are based on 9 ppmdv @ 3% O2.
4. CT CO emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
5. CT VOC emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
6. PM2.5 emissions rates assume those used for the 26F ambient case.
7. Based on 0.3 grains S/100 scf.
8. Based on 0.05% fuel sulfur content.

TABLE 5
HOURLY EMISSIONS RATES (LBS/HR)
STEADY-STATE OPERATION[1]

	One CT	Both CTs	Cooling Tower[2]	Emergency Generator	Diesel Fire Pump	Aux. Boiler
NOx[3]	**11.3**	**22.6**	NA	4.01	4.07	0.72
CO[4]	**5.8**	**11.6**	NA	10.43	0.31	2.27
VOCs[5]	**2.0**	**4.0**	NA	2.65	0.19	0.37
PM10	**9.0**	**18.0**	**0.52**	0.64	0.14	0.61
PM2.5[6]	**0.52**	**1.04**	**0.13**	0.01	0.02	0.02
SO2	**1.5**[7]	**3.0**	NA	0.01[7]	0.12[8]	0.05[7]

Notes:
1. Based on an ambient temperature of 103 degrees F, Fogger-Off, STIG-Off.
2. PM10 is the only emission from this equipment. Cooling tower PM 10 emissions are based on: a circ. water rate of **57,366,384 lbs/hr (6,906,881** gal/hr); a TDS conc. of 1,800 mg/l; and a drift rate of 0.0005%.

3. CT NOx emissions are based on SCR to 2 ppmdv @ 15% O2; aux. boiler emissions are based on 9 ppmdv @ 3% O2.
4. CT CO emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
5. CT VOC emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
6. PM2.5 emissions rates assume those used for the 26F ambient case.
7. Based on 0.3 grains S/100 scf.
8. Based on 0.05% fuel sulfur content.

TABLE 6
EMISSIONS RATES (LBS/HR)
COLD STARTUP MODE[1]

	One CT[2]	Both CTs[2]	Cooling Tower[3]	Emergency Generator[3]	Diesel Fire Pump[3]	Aux. Boiler[3]
NOx	**89.6**	**179.2**	NA	4.01	4.07	0.72
CO	**166.6**	**333.2**	NA	10.43	0.31	2.27
VOCs	**13.4**	**26.8**	NA	2.65	0.19	0.37
PM10	**9.0**[3]	**18.0**[3]	**0.52**	0.64	0.14	0.61
PM2.5[4]	**0.52**	**1.04**	**0.13**	0.01	0.02	0.02
SO2	**1.5**[5]	**3.0**	NA	0.01	0.12	0.05

Notes:
1. For the CTs conventional, not fast or rapid, startup capability is assumed. The emissions rates in this cold startup mode table are not used for assessing impacts, as the warm and hot startup modes cover the various operating scenarios.
2. **For a cold startup cycle the total time required is 231 minutes (3 hrs, 51 minutes) for both CTs. Since it is assumed that CT2 would start approximately 30 minutes after the start of CT1, the highest hourly emissions will occur not in the first hour of startup (when CT2 is off for the first 30 minutes), but in the 2nd, 3rd & 4th hours of the 3 hr, 51 minute sequence, as both CTs will be on and emitting at the cold startup rate for a full 60 minutes in the 2nd, 3rd & 4th hours.**
3. The emissions rates are the same as for steady-state operation.
4. PM2.5 emissions rates assume those used for the 26F ambient case.
5. This emissions rate is assumed as the same as for steady-state operation in the 26 degree F ambient case.

TABLE 7
EMISSIONS RATES (LBS/HR)
WARM STARTUP MODE[1]

	One CT[2]	Both CTs[2]	Cooling Tower[3]	Emergency Generator[3]	Diesel Fire Pump[3]	Aux. Boiler[3]
NOx	**83.9**	**167.8**	NA	4.01	4.07	0.72
CO	**502.2**	**1,004.4**	NA	10.43	0.31	2.27
VOCs	**30.0**	**60.0**	NA	2.65	0.19	0.37
PM10	**9.0**[3]	**18.0**[3]	**0.52**	0.64	0.14	0.61
PM2.5[4]	**0.52**	**1.04**	**0.13**	0.01	0.02	0.02
SO2	**1.5**[5]	**3.0**	NA	0.01	0.12	0.05

Notes:
1. For the CTs conventional, not fast or rapid, startup capability is assumed.

2. **For a warm startup cycle the total time required is 117 minutes (1 hr, 57 min.) for both CTs. Since it is assumed that CT2 would start 30 minutes after the start of CT1, the highest hourly emissions will occur not in the first 30 minutes of startup (when CT2 is off), but immediately after this 30 minute period when both CTs will be on and emitting at the warm startup rate for a full 60 minutes.**
3. The emissions rates are the same as for steady-state operation.
4. PM2.5 emissions rates assume those used for the 26F ambient case.
5. This emissions rate is assumed as the same as for steady-state operation in the 26 degree F ambient case.

TABLE 8
EMISSIONS RATES (LBS/HR)
HOT STARTUP MODE[1]

	One CT[2]	Both CTs[2]	Cooling Tower[3]	Emergency Generator[3]	Diesel Fire Pump[3]	Aux. Boiler[3]
NOx	**87.2**	**174.4**	NA	4.01	4.07	0.72
CO	**208.6**	**417.2**	NA	10.43	0.31	2.27
VOCs	**17.5**	**35.0**	NA	2.65	0.19	0.37
PM10	**9.0[3]**	**18.0[3]**	**0.52**	0.64	0.14	0.61
PM2.5[4]	**0.52**	**1.04**	**0.13**	0.01	0.02	0.02
SO2	**1.5[5]**	**3.0**	NA	0.01	0.12	0.05

Notes:
1. For the CTs conventional, not fast or rapid, startup capability is assumed.
2. **For a hot startup cycle the total time required is 73 minutes (1 hr, 13 min.) for both CTs. It is assumed that CT2 would start 13 minutes after the start of CT1, & therefore the highest hourly emissions will occur in the last 60 minutes of the hot start cycle when both CTs will be on and emitting at the hot startup rate for a full 60 minutes.**
3. The emissions rates are the same as for steady-state operation.
4. PM2.5 emissions rates assume those used for the 26F ambient case.
5. This emissions rate is assumed as the same as for steady-state operation in the 26 degree F ambient case.

TABLE 9
EMISSIONS RATES (LBS/HR)
SHUTDOWN MODE[1]

	One CT[2]	Both CTs[2]	Cooling Tower[3]	Emergency Generator[3]	Diesel Fire Pump[3]	Aux. Boiler[3]
NOx	**43.4**	**86.8**	NA	4.01	4.07	0.72
CO	**241.8**	**483.6**	NA	10.43	0.31	2.27
VOCs	**12.0**	**24.0**	NA	2.65	0.19	0.37
PM10	**9.0[3]**	**18.0[3]**	**0.52**	0.64	0.14	0.61
PM2.5[4]	**0.52**	**1.04**	**0.13**	0.01	0.02	0.02
SO2	**1.5[5]**	**3.0**	NA	0.01	0.12	0.05

Notes:
1. For the CTs, conventional, not fast or rapid, startup capability is assumed.

2. **For a shutdown cycle the total time required is assumed as 1.0 hr (60 minutes) for both CTs. Since it is assumed that both CTs can be in shutdown at the same time, the hourly emissions rates for the CTs are calculated as follows: 0 – 30 minutes both CTs in shutdown mode; minute 31 & beyond both CTs off.**
3. The emissions rates are the same as for steady-state operation.
4. PM2.5 emissions rates assume those used for the 26F ambient case.
5. This emissions rate is assumed as the same as for steady-state operation in the 26 degree F ambient case.

TABLE 10
EMISSIONS RATES (LBS/HR)
PARTIAL LOAD OPERATION[1]

	One CT	Both CTs	Cooling Tower[2]	Emergency Generator	Diesel Fire Pump	Aux. Boiler
NOx[3]	**8.0**	**16.0**	NA	4.01	4.07	0.72
CO[4]	**4.2**	**8.4**	NA	10.43	0.31	2.27
VOCs[5]	**2.0**	**4.0**	NA	2.65	0.19	0.37
PM10	**9.0**	**18.0**	**0.52**	0.64	0.14	0.61
PM2.5[6]	**0.52**	**1.04**	**0.13**	0.01	0.02	0.02
SO2	**1.5**[7]	**3.0**	NA	0.01	0.12[8]	0.05[7]

Notes:
1. Based on an ambient temperature of 63 degrees F, Fogger-Off, STIG-Off. Output is approximately **50.2% of full load.**
2. PM10 is the only emission from this equipment. Cooling tower PM 10 emissions are based on: a circ. water rate of **57,366,384 lbs/hr (6,906,881** gal/hr); a TDS conc. of 1,800 mg/l; and a drift rate of 0.0005%.
3. CT NOx emissions are based on SCR to 2 ppmdv @ 15% O2; aux. boiler emissions are based on 9 ppmdv @ 3% O2.
4. CT CO emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
5. CT VOC emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
6. PM2.5 emissions rates assume those used for the 26F ambient case.
7. Based on 0.3 grains S/100 scf.
8. Based on 0.05% fuel sulfur content.

TABLE 11
EMISSIONS RATES
COMMISSIONING MODE[1]

	CT Commissioning Emissions Rates (lbs/hr) Per CT[2]						Cooling Tower[3]
	HRSG Cleanup, 0% Load	ST Stm Checks/Stm Blows @ 50% Load; DLN Tuning @ 50% Load	DLN Tuning @ 20% Load	DLN Tuning @ 80% Load	NH3 Tuning @ 50% Load	NH3 Tuning & Stm Inj. Tuning @ 100% Load	
NOx	**125.0**	**153.0**	**174.4**	**149.1**	**8.1**	**13.6**	NA
CO	**180.0**	**358.9**	**284.1**	**236.9**	**4.1**	**6.9**	NA
VOCs	**17.0**	**19.8**	**23.5**	**10.7**	**1.2**	**2.0**	NA

PM10[4]	9.0	9.0	9.0	9.0	9.0	9.0	0.52
PM2.5[4]	0.52	0.52	0.52	0.52	0.52	0.52	0.13
SO2[4]	1.5	1.5	1.5	1.5	1.5	1.5	NA

Notes:

1. During commissioning it is assumed that the cooling tower will be in operation, but not the aux. boiler, emergency generator or diesel fire pump.
2. Each of the two CTs will be commissioned separately. Therefore, when comparing commissioning emissions rates with other scenarios, assume only one CT in commissioning mode as compared with two CTs in steady-state or startup/shutdown mode.
3. Emissions from this equipment is the same as for steady-state operation.
4. PM10, PM2.5 & SO2 emissions rates for the CTs are assumed as the same as for steady-state operation and based 26F ambient.

F. MODELING SCENARIOS

1. 1-hr Impacts (NOx, CO & SO2)

a. Based on maximum 1-hr emissions for normal operation (assess for Scenarios A through F)

CTs – 1 warm startup (both CTs in warm start mode for 60 min. simultaneously).

The warm start sequence, including 2 assumed failed start attempts of 30 min. each, is of long enough duration to provide for 60 min. of simultaneous warm startup mode emissions. One hr of warm startup produces greater emissions than hot start, steady-state or shutdown operation. (Emissions rates for all pollutants except NOx are highest in warm startup mode. Hot startup has a slightly higher NOx emissions rate, but the warm startup sequence, including on 2 x 30 min. failed starts, produces the highest NOx emissions.)

Aux. Boiler – 1 hr of operation at CT startup

Cooling Tower – 1 hr of operation

Emergency Generator (EG)– 30 min. of operation **OR** Diesel Fire Pump (DFP) – 30 min. of operation

Use Table 12 emissions rates and assess the 1-hr impacts from normal operation for Scenarios A through F. For NOx & SO2 worst case impacts the DFP operates; for CO worst case impacts the EG operates.

TABLE 12
EMISSIONS RATES (LBS/HR)
FOR
ASSESSING 1-HR IMPACTS
FROM NORMAL OPERATIONS[1]

	One CT	Both CTs	Cooling Tower[3]	Emergency Generator	Diesel Fire Pump	Aux. Boiler
NOx	**83.9**	**167.8**	NA	2.01	2.04	0.72
CO	**502.2**	**1,004.4**	NA	5.22	0.16	2.27
VOCs	**30.0**	**60.0**	NA	1.33	0.10	0.37
PM10	**9.0**	**18.0**	**0.52**	0.32	0.07	0.61

PM2.5	**0.52**	**1.04**	**0.13**	0.005	0.01	0.02
SO2	**1.5**	**3.0**	NA	0.005	0.06	0.05

Notes:

1. Emissions rates are directly from Table 7 except for the Emergency Generator and Diesel Fire Pump, which are 50% of their Table 7 rates, since either of these pieces of equipment will only operate for 30 min. in an hour.

b. Based on CT commissioning (Use Scenarios A through F CT stack parameters)

Only 1 CT – Assume 1 hr of continuous commissioning. Use the highest commissioning emissions rates for each pollutant.

Aux.Boiler – off

Cooling Tower – 1 hr of operation

EG - off & DFP - off

Use the emissions rates in Table 13 along with Scenarios A through F CT stack parameters to assess the 1-hr impacts for the commissioning mode.

TABLE 13
MAXIMUM EMISSIONS RATES (LBS/HR)
FOR
COMMISSIONING MODE

	One CT – Commissioning[1]	Cooling Tower
NOx	**174.4**	NA
CO	**358.9**	NA
VOCs	**23.5**	NA
PM10	**9.0**	**0.52**
PM2.5	**0.52**	**0.13**
SO2	**1.5**	NA

Notes:
1. Emissions rates are the highest for each pollutant from Table 11. Only one CT will operate in commissioning mode at a time.

c. Based on Partial Load Operation

CT1 – 1 hr in steady-state (partial load) mode. (Use Scenario F CT stack parameters & Table 10 emissions rates.)

CT2 – 1-hr in steady-state mode (full load) mode. (Use Scenario B CT stack parameters & Table 2 emissions rates.)

Aux. Boiler – 1 hrs of operation (for conservatism)

Cooling Tower – 1 hr of operation

Emergency Generator (EG)– 30 min. of operation **OR** Diesel Fire Pump (DFP) – 30 min. of operation

Use Table 14 emissions rates to assess the 1-hr impacts from partial load operation. For CT1 use Scenario F CT stack parameters, and for CT2 use Scenario B CT stack parameters. For NOx & SO2 worst case impacts the DFP operates; for CO worst case impacts the EG operates.

TABLE 14
EMISSIONS RATES (LBS/HR)
FOR
ASSESSING 1-HR IMPACTS
FROM PARTIAL LOAD OPERATIONS

	CT1[1]	CT2[2]	Cooling Tower[4]	Emergency Generator[3]	Diesel Fire Pump[3]	Aux. Boiler[4]
NOx	**8.0**	**12.9**	NA	2.01	2.04	0.72
CO	**4.2**	**6.4**	NA	5.22	0.16	2.27
VOCs	**2.0**	**2.0**	NA	1.33	0.10	0.37
PM10	**9.0**	**9.0**	**0.52**	0.32	0.07	0.61
PM2.5	**0.52**	**0.52**	**0.13**	0.005	0.01	0.02
SO2	**1.5**	**1.5**	NA	0.005	0.06	0.05

Notes:
1. CT1 in partial load operation; emissions rates from Table 10.
2. CT2 in full load operation; emissions rates from Table 2.
3. Normal emissions rates are divided by 2, since this piece of equipment will only operate for 30 min. in an hour.
4. Normal emissions rates for this piece of equipment.

2. 3-hr Impacts (SO2)

a. Based on maximum 3-hr emissions for normal operation (assess for Scenarios A through E)

CTs – 1 warm startup, including 2 x 30 min. failed start attempts for 1 CT (87 min. both CTs in simultaneous warm start mode + 90 min. of 1 CT in warm start mode & the other CT in steady-state mode + 3 min. of 1 CT in warm start & the other CT off);

Aux. Boiler – 3 hrs of operation at CT startup

Cooling Tower – 3 hrs of operation

DFP – 30 min. of operation for worst case SO2 impacts

Use the emissions rates in Table 15 to assess the 3-hr impacts from normal operation for Scenarios A through E.

TABLE 15
EMISSIONS RATES (LBS/HR)
FOR
ASSESSING 3-HR IMPACTS
FROM NORMAL OPERATIONS

	CT1[1]	CT2[1]	Cooling Tower[2]	Emergency Generator[3]	Diesel Fire Pump[3]	Aux. Boiler[4]
NOx	**Scenario A -65.7** **Scenario B – 65.5** **Scenario C – 65.4** **Scenario D –65.5** **Scenario E – 65.1**	**Scenario A -65.7** **Scenario B – 65.5** **Scenario C – 65.4** **Scenario D –65.5** **Scenario E – 65.1**	NA	0.67	0.68	0.72
CO	**Scenario A -374.2** **Scenario B -374.1** **Scenario C -374.1** **Scenario D -374.0** **Scenario E -373.9**	**Scenario A -374.2** **Scenario B -374.1** **Scenario C -374.1** **Scenario D -374.0** **Scenario E -373.9**	NA	1.74	0.06	2.27
VOCs	**Scenario A -22.8** **Scenario B – 22.8** **Scenario C – 22.8** **Scenario D – 22.8** **Scenario E – 22.8**	**Scenario A -22.8** **Scenario B – 22.8** **Scenario C – 22.8** **Scenario D – 22.8** **Scenario E – 22.8**	NA	0.45	0.04	0.37
PM10	**Scenario A – 9.0** **Scenario B – 9.0** **Scenario C – 9.0** **Scenario D – 9.0** **Scenario E – 9.0**	**Scenario A – 9.0** **Scenario B – 9.0** **Scenario C – 9.0** **Scenario D – 9.0** **Scenario E – 9.0**	**0.52**	0.11	0.03	0.61
PM2.5	**All Scenarios - 0.52**	**All Scenarios - 0.52**	**0.13**	0.002	0.003	0.02
SO2	**All Scenarios - 1.5**	**All Scenarios - 1.5**	NA	0.002	0.02	0.05

Notes:
1. The emissions rates for the CTs are based on taking the total amount of emissions from both CTs for the 3-hr period and splitting these totals evenly between the two CTs.
2. Normal Cooling Tower emissions rates, since the cooling tower operates for 3 out of 3 hrs.
3. Normal EG & DFP emissions rates are divided by 6, since either the EG or DFP operates for only 30 min. of the 3 hrs.
4. Normal Aux. Boiler emissions rates, since the Aux. Boiler operates for 3 out of the 3 hrs.

b. Based on CT commissioning (Use only Scenario F CT stack parameters) *(Do not need to model this case because the results, which pertain to SO2 only, are covered by F.2.a & F.2.c.)*

Only 1 CT – Assume 3 hrs of continuous commissioning. Use the highest commissioning emissions rates for each pollutant.

Aux.Boiler – off

Cooling Tower – 3 hrs of operation

EG – off & DFP off

Use the emissions rates in Table 13 along with Scenario F CT stack parameters to assess 3-hr impacts for commissioning mode.

c. Based on Partial Load Operation

CT1 – 3 hrs in steady-state (partial load) mode. (Use Scenario F CT stack parameters & Table 10 emissions rates.)

CT2 – 3-hrs in steady-state mode (full load) mode. (Use Scenario B CT stack parameters & Table 2 emissions rates.)

Aux. Boiler – 3 hrs of operation (for conservatism)

Cooling Tower – 3 hrs of operation

DFP – 30 min. of operation for worst case SO2 impacts

Use Table 16 emissions rates to assess the 3-hr impacts from partial load operation. For CT1 use Scenario F CT stack parameters, and for CT2 use Scenario B CT stack parameters.

TABLE 16
EMISSIONS RATES (LBS/HR)
FOR
ASSESSING 3-HR IMPACTS
FROM PARTIAL LOAD OPERATIONS

	CT1[1]	CT2[2]	Cooling Tower[3]	Emergency Generator[4]	Diesel Fire Pump[4]	Aux. Boiler[3]
NOx	**8.0**	**12.9**	NA	0.67	0.68	0.72
CO	**4.2**	**6.4**	NA	1.74	0.06	2.27
VOCs	**2.0**	**2.0**	NA	0.45	0.04	0.37
PM10	**9.0**	**9.0**	**0.52**	0.11	0.03	0.61
PM2.5	**0.52**	**0.52**	**0.13**	0.002	0.003	0.02
SO2	**1.5**	**1.5**	NA	0.002	0.02	0.05

Notes:
1. CT1 in partial load operation; emissions rates from Table 10.
2. CT2 in full load operation; emissions rates from Table 2.
3. Normal emissions rates for this piece of equipment.
4. Normal EG & DFP emissions rates are divided by 6, since either the EG or DFP operates for only 30 min. of the 3 hrs.

3. 8-hr Impacts (CO)

a. Based on maximum 8-hr emissions for normal operation (assess for Scenarios A through E)

CTs – 1 warm startup, including 2 x 30 min. failed start attempts for 1 CT (87 min. both CTs in simultaneous warm start mode + 90 min. of 1 CT in warm start mode & the other CT in steady-state mode + 30 min. of 1 CT in warm start mode and the other off + 273 min. of both CTs in steady-state mode)

Aux. Boiler – 3 hrs of operation at CT startup

Cooling Tower – 8 hrs of operation

EG– 30 min. of operation for worst case CO impacts

Use the emissions rates in Table 17 to assess the 8-hr impacts from normal operation for Scenarios A through E.

TABLE 17
EMISSIONS RATES (LBS/HR)
FOR
ASSESSING 8-HR IMPACTS
FROM NORMAL OPERATIONS

	CT1[1]	CT2[1]	Cooling Tower[2]	Emergency Generator[3]	Diesel Fire Pump[3]	Aux. Boiler[4]
NOx	**Scenario A -34.7** **Scenario B – 34.3** **Scenario C – 34.1** **Scenario D –34.2** **Scenario E – 33.2**	**Scenario A -34.7** **Scenario B – 34.3** **Scenario C – 34.1** **Scenario D –34.2** **Scenario E – 33.2**	NA	0.26	0.26	0.27
CO	**Scenario A -158.4** **Scenario B -158.1** **Scenario C -158.1** **Scenario D -157.9** **Scenario E -157.7**	**Scenario A -158.4** **Scenario B -158.1** **Scenario C -158.1** **Scenario D -157.9** **Scenario E -157.7**	NA	0.66	0.02	0.86
VOCs	**Scenario A -10.6** **Scenario B – 10.0** **Scenario C – 10.6** **Scenario D – 10.6** **Scenario E – 10.6**	**Scenario A -10.6** **Scenario B – 10.0** **Scenario C – 10.6** **Scenario D – 10.6** **Scenario E – 10.6**	NA	0.17	0.02	0.14
PM10	**Scenario A – 9.0** **Scenario B – 9.0** **Scenario C – 9.0** **Scenario D – 9.0** **Scenario E – 9.0**	**Scenario A – 9.0** **Scenario B – 9.0** **Scenario C – 9.0** **Scenario D – 9.0** **Scenario E – 9.0**	**0.52**	0.04	0.01	0.23
PM2.5	**All Scenarios - 0.52**	**All Scenarios - 0.52**	**0.13**	0.001	0.001	0.01
SO2	**All Scenarios - 1.5**	**All Scenarios - 1.5**	NA	0.001	0.008	0.02

Notes:
1. The emissions rates for the CTs are based on taking the total amount of emissions from both CTs for the 8-hr period and splitting these totals evenly between the two CTs.
2. Normal Cooling Tower emissions rates, since the cooling tower operates for 8 out of 8 hrs.
3. Normal EG & DFP emissions rates are divided by 16, since either the EG or DFP operates for only 30 min. of the 8 hrs.
4. Normal Aux. Boiler emissions rates multiplied by 3/8, since the Aux. Boiler operates for 3 out of the 8 hrs.

b. Based on CT commissioning (Use only Scenario F CT stack parameters)

Only 1 CT – Assume 8 hrs of continuous commissioning. Use the highest commissioning emissions rates for each pollutant.

Aux.Boiler – off

Cooling Tower – 8 hrs of operation

EG - off & DFP - off

Use the emissions rates in Table 13 along with Scenario F CT stack parameters to assess 8-hr impacts for commissioning mode.

c. Based on Partial Load Operation

CT1 – 8 hrs in steady-state (partial load) mode. (Use Scenario F CT stack parameters & Table 10 emissions rates.)

CT2 – 8-hrs in steady-state mode (full load) mode. (Use Scenario B CT stack parameters & Table 2 emissions rates.)

Aux. Boiler – 3 hrs of operation at CT startup

Cooling Tower – 8 hrs of operation

EG– 30 min. of operation for worst case CO impacts

Use Table 18 emissions rates to assess the 8-hr impacts from partial load operation. For CT1 use Scenario F CT stack parameters, and for CT2 use Scenario B CT stack parameters.

TABLE 18
EMISSIONS RATES (LBS/HR)
FOR
ASSESSING 8-HR IMPACTS
FROM PARTIAL LOAD OPERATIONS

	CT1[1]	CT2[2]	Cooling Tower[3]	Emergency Generator[4]	Diesel Fire Pump[4]	Aux. Boiler[5]
NOx	**8.0**	**12.9**	NA	0.26	0.26	0.27
CO	**4.2**	**6.4**	NA	0.66	0.02	0.86
VOCs	**2.0**	**2.0**	NA	0.17	0.02	0.14
PM10	**9.0**	**9.0**	**0.52**	0.04	0.01	0.23
PM2.5	**0.52**	**0.52**	**0.13**	0.001	0.001	0.01
SO2	**1.5**	**1.5**	NA	0.001	0.008	0.02

Notes:
1. CT1 in partial load operation; emissions rates from Table 10.
2. CT2 in full load operation; emissions rates from Table 2.
3. Normal emissions rates for this piece of equipment.
4. Normal EG & DFP emissions rates are divided by 16, since either the EG or DFP operates for only 30 min. of the 8 hrs.
5. Normal AB emissions rates are multiplied by 3/8, since the AB operates for only 3 of the 8 hrs.

d. Based on Aux. Boiler only Operation

Both CTs – off

Aux. Boiler – 8 hrs of operation

Cooling Tower – off

Emergency Generator – off & DFP - off

Use full aux. boiler emissions rates (e.g., from Table 1)

4. 24-hr Impacts (NOx – for Class I, PM10, PM2.5, SO2)

a. Based on maximum 24-hr emissions for normal operation (assess for Scenarios A through E)

CTs – 1 warm startup, including 2 x 30 min. failed start attempts for 1 CT, & 1 shutdown (87 min. both CTs in simultaneous warm start mode + 90 min. of 1 CT in warm start mode & the other CT in steady-state mode + 30 min. of 1 CT in warm start mode and the other off + 1,173 min. of both CTs in steady-state mode + 60 min. of both CTs in shutdown mode).

Aux. Boiler – 2 hrs of operation at CT startup, and 2 hrs at CT shutdown (1 hr during shutdown & 1 hr post-shutdown) = 4 hrs total

Cooling Tower – 24 hrs of operation

DFP – 30 min. of operation for worst case PM10, PM2.5 & SO2 impacts

Use the emissions rates in Table 19 to assess the 24-hr impacts from normal operation for Scenarios A through E.

TABLE 19
EMISSIONS RATES (LBS/HR)
FOR
ASSESSING 24-HR IMPACTS
FROM NORMAL OPERATIONS

	CT1[1]	CT2[1]	Cooling Tower[2]	Emergency Generator[3]	Diesel Fire Pump[3]	Aux. Boiler[4]
NOx	**Scenario A -21.9** **Scenario B – 21.3** **Scenario C – 21.1** **Scenario D –21.2** **Scenario E – 20.0**	**Scenario A -21.9** **Scenario B – 21.3** **Scenario C – 21.1** **Scenario D –21.2** **Scenario E – 20.0**	NA	0.09	0.09	0.12
CO	**Scenario A -67.2** **Scenario B -66.8** **Scenario C -66.8** **Scenario D -66.5** **Scenario E -66.3**	**Scenario A -67.2** **Scenario B -66.8** **Scenario C -66.8** **Scenario D -66.5** **Scenario E -66.3**	NA	0.22	0.006	0.38
VOCs	**Scenario A -5.3** **Scenario B – 5.3** **Scenario C – 5.3** **Scenario D – 5.3** **Scenario E – 5.3**	**Scenario A -5.3** **Scenario B – 5.3** **Scenario C – 5.3** **Scenario D – 5.3** **Scenario E – 5.3**	NA	0.06	0.004	0.07
PM10	**Scenario A – 9.0**	**Scenario A – 9.0**	**0.52**	0.013	0.003	0.11

	Scenario B – 9.0 **Scenario C – 9.0** **Scenario D – 9.0** **Scenario E – 9.0**	**Scenario B – 9.0** **Scenario C – 9.0** **Scenario D – 9.0** **Scenario E – 9.0**				
PM2.5	**All Scenarios - 0.52**	**All Scenarios - 0.52**	**0.13**	0.0003	0.0005	0.01
SO2	**All Scenarios - 1.5**	**All Scenarios - 1.5**	NA	0.0003	0.003	0.01

Notes:
1. The emissions rates for the CTs are based on taking the total amount of emissions from both CTs for the 24-hr period and splitting these totals evenly between the two CTs.
2. Normal Cooling Tower emissions rates, since the cooling tower operates for 24 out of 24 hrs.
3. Normal EG & DFP emissions rates are divided by 48, since either the EG or DFP operates for only 30 min. of the 24 hrs.
4. Normal Aux. Boiler emissions rates divided by 6, since the Aux. Boiler operates for 4 out of the 24 hrs.

b. Based on CT commissioning (Use only Scenario F CT stack parameters)

Only 1 CT –Assume 24 hrs of continuous commissioning. Do not use the highest commissioning emissions rates for each pollutant, as these do not necessarily apply for the 24 hours of continuous commissioning operation, which is assumed to take place only for HRSG cleanup (0% load) commissioning.

Aux.Boiler – off

Cooling Tower – 24 hrs of operation

EG – off & DFP - off

Use the emissions rates in Table 20 along with Scenario F CT stack parameters to assess 24-hr impacts for commissioning mode.

TABLE 20
EMISSIONS RATES (LBS/HR)
FOR
24-HR COMMISSIONING MODE[1]

	One CT - Commissioning	Cooling Tower
NOx	**125.0**	NA
CO	**180.0**	NA
VOCs	**17.0**	NA
PM10	**9.0**	**0.52**
PM2.5	**0.52**	**0.13**
SO2	**1.5**	NA

Notes:
1. CT emissions rates are from Table 11 for the 0% load case.

c. Based on Partial Load Operation

CT1 – 24 hrs in steady-state (partial load) mode. (Use Scenario F CT stack parameters & Table 10 emissions rates.)

CT2 – 24-hrs in steady-state mode (full load) mode. (Use Scenario B CT stack parameters & Table 2 emissions rates.)

Aux. Boiler – 2 hrs of operation at CT startup, and 2 hrs at CT shutdown (1 hr during shutdown & 1 hr post-shutdown) = 4 hrs total

Cooling Tower – 24 hrs of operation

DFP – 30 min. of operation for worst case PM10, PM2.5 & SO2 impacts

Use Table 21 emissions rates to assess the 24-hr impacts from partial load operation. For CT1 use Scenario F CT stack parameters, and for CT2 use Scenario B CT stack parameters.

TABLE 21
EMISSIONS RATES (LBS/HR)
FOR
ASSESSING 24-HR IMPACTS
FROM PARTIAL LOAD OPERATIONS

	CT1[1]	CT2[2]	Cooling Tower[3]	Emergency Generator[4]	Diesel Fire Pump[4]	Aux. Boiler[5]
NOx	**8.0**	**12.9**	NA	0.09	0.09	0.12
CO	**4.2**	**6.4**	NA	0.22	0.006	0.38
VOCs	**2.0**	**2.0**	NA	0.06	0.004	0.07
PM10	**9.0**	**9.0**	**0.52**	0.013	0.003	0.11
PM2.5	**0.52**	**0.52**	**0.13**	0.0003	0.0005	0.01
SO2	**1.5**	**1.5**	NA	0.0003	0.003	0.01

Notes:
1. CT1 in partial load operation; emissions rates from Table 10.
2. CT2 in full load operation; emissions rates from Table 2.
3. Normal emissions rates for this piece of equipment.
4. Normal EG & DFP emissions rates are divided by 48, since either the EG or DFP operates for only 30 min. of the 24 hrs.
5. Normal AB emissions rates are multiplied by 1/6, since the AB operates for only 4 of the 24 hrs.

d. Based on Aux. Boiler only Operation

Both CTs – off

Aux. Boiler – 24 hrs of operation

Cooling Tower – off

Emergency Generator – off & DFP - off

Use full aux. boiler emissions rates (e.g., from Table 1)

5. Annual Impacts

a. Based on 6,807 hpy of CT operation & 181 startups/shutdowns *(5.a is not a modeling case per se, but is used along with 5.b to determine maximum emissions rates on a pollutant by pollutant basis.)*

Each CT - 6,807 hpy of steady-state operation (Use Table 2 CT emissions rates and Scenario B CT stack parameters)

Each CT – 154 hot starts (use Table 8 emissions rates x **1.22 hrs/start** x 154 starts) + 27 warm starts (use Table 7 emissions rates x **1.95 hrs/start** x 27 starts) + 181 shutdowns (use Table 9 emissions rates x **1 hr/shutdown** x 181 shutdowns) (Use Scenario B CT stack parameters.)

Aux. Boiler – 2,315 hpy (Use Table 2 emissions rates)

Cooling Tower 8,760 hpy (Use Table 2 emissions rates)

Emergency Generator – 26 hpy (Use Table 2 emissions rates)

Diesel Fire Pump – 26 hpy (Use Table 2 emissions rates)

b. Based on 8,760 hpy of CT operation (Use Table 2 emissions rates) *(5.b is not a modeling case per se, but is used along with 5.a to determine maximum emissions rates on a pollutant by pollutant basis.)*

Each CT - 8,760 hpy of steady-state operation (Use Scenario B CT stack parameters.)

Aux. Boiler – 2,315 hpy

Cooling Tower 8,760 hpy

Emergency Generator – 26 hpy

Diesel Fire Pump – 26 hpy

Since maximum annual emissions for some CT pollutants (e.g., NOx, CO & VOCs) may occur in 5.a and maximum annual emissions for other CT pollutants (e.g., PM10) may occur in 5.b, use the Table 22 emissions rates, which are the maximum for each pollutant, to assess annual impacts. Use the Scenario B CT stack parameters.

TABLE 22
EMISSIONS RATES (TONS/YR)
FOR
ASSESSING ANNUAL IMPACTS

	One CT	Both CTs	Cooling Tower[1]	Emergency Generator[2]	Diesel Fire Pump[2]	Aux. Boiler[3]
NOx	**58.233**[4]	**116.466**	NA	0.052	0.053	0.833
CO	**76.482**[4]	**152.964**	NA	0.136	0.004	2.628
VOCs	**10.327**[4]	**20.654**	NA	0.034	0.002	0.428
PM10	**39.420**[1]	**78.840**	**2.278**	0.008	0.002	0.706
PM2.5	**2.278**[1]	**4.556**	**0.569**	0.0002	0.0003	0.023
SO2	**6.570**[1]	**13.140**	NA	0.0002	0.002	0.058

Notes:
1. Based on 8,760 hpy of operation.
2. Based on 52 half-hour periods = 26 hpy of operation.

3. Based on 2,315 hpy of operation.
4. Based on 6,807 hpy of steady-state operation + 181 startup/shutdowns.

APPENDIX 1b
KRCD CPP
MODELING PARAMETERS & EMISSIONS RATES – SIEMENS CASE

Note the text in bold is used to indicate where differences exist between the GE and Siemens cases.

A. STACK PARAMETERS

	North CT	South CT	Cooling Tower	Emergency Generator	Diesel Fire Pump	Aux. Boiler
Stack Location[1]	N13296550..73' E885971.72'	N13296400.71' E885968.60'	See Note 1	N13296457.23' E885489.54'	N13296391.26' E886162.47'	N13296351.03' E885813.14'
Stack Height (feet)	150	150	80	45	45	100
Elevation at Base of Stack (FASL)[2]	327	327	327	327	327	327
Stack Exit Temperature (degrees F)[3]	**Scenario A -195** **Scenario B -192** **Scenario C -190** **Scenario D -188** **Scenario E -189** **Scenario F - 186**	**Scenario A -195** **Scenario B -192** **Scenario C -190** **Scenario D -188** **Scenario E -189** **Scenario F - 186**	81	986	900	325
Stack Exit Velocity (feet/min)[4]	**Scen. A - 4,666.1** **Scen. B – 4,432.1** **Scen. C– 4,325.3** **Scen. D – 4,386.1** **Scen. E – 3,892.8** **Scen. F – 3,099.0**	**Scen. A - 4,666.1** **Scen. B – 4,432.1** **Scen. C– 4,325.3** **Scen. D – 4,386.1** **Scen. E – 3,892.8** **Scen. F – 3,099.0**	2,967	6,703	8,959	2,030
Stack Cross-sectional Area (square feet)[5]	254.47	254.47	530.93 (per cell)	1.713	0.14	9.62

Notes

1. Given in UTM coordinates (feet). The approximate coordinates of the 8 cooling tower cells (centers) are:

Cell A – N13296742.00; E886210.17 (most NW cell)
Cell B – N13296700.85; E886249.64
Cell C – N13296659.71; E886289.10
Cell D – N13296618.57; E886328.57
Cell E – N13296577.41; E886368.04
Cell F – N13296536.27; E886407.51
Cell G – N13296495.12; E886446.97
Cell H – N13296453.99; E886486.45 (most SE cell)

2. The site FASL is given as 327.

3. The first 5 HRSG stack exit temperatures shown correlate to the 5 sets of ambient conditions, i.e., Scenarios A through E, used to envelope CT performance and represent the following performance cases, which were supplied on **10/25/06 by NCI as Rev. 3 of the Siemens** performance data:

Scenario A = Case 5 – 26F/60%RH, Fogger-Off, Stm lnj.-Off
Scenario B = Case 4 – 63F/40%RH, Fogger-On, Stm Inj.-Off
Scenario C = Case 13 – 63F/40%RH, Fogger-Off, Stm Inj.-Off
Scenario D = Case 2 – 103F/20.1%RH, Fogger-On, Stm Inj.-On
Scenario E = Case 12 – 103F/20.1%RH, Fogger-Off, Stm Inj.-Off

The stack exit temperature for the sixth scenario (F) comes from Case 14 of the CT performance data and is for partial load, startup/shutdown and commissioning operations.

Scenario F = Case 14 – 63F/40%RH, Fogger-Off, Stm Inj.-Off

The exit temperature for the cooling towers is assumed as the temperature of the air leaving the cooling towers, which is 80.97F for the 63F ambient annual average case.

4. The 5 HRSG stack exit velocities shown correlate to the 5 sets of ambient conditions, i.e., Scenarios A through E, used to envelope CT performance and represent the performance cases listed in Note 3 above. The 5 HRSG stack exit velocities are based on the stack diameter of 254.47 sq. feet (per Note 5 below) and the following **Siemens** performance data:

Scenario A = Case 5 – 1,187,377 acfm
Scenario B = Case 4 – 1,127,830 acfm
Scenario C = Case 13 – 1,100,652 acfm
Scenario D = Case 2 – 1,116,135 acfm
Scenario E = Case 12 – 990,595 acfm

The stack exit velocity for partial load operation, startup/shutdown and commissioning operations (Scenario F) is based on the stack diameter and the stack exhaust flow of **788,591 acfm, which is from Case 14 of the Siemens** performance data

The cooling tower number is based on a flow rate of 1,575,240 acfm per cell (CT Case 4, 63F ambient annual average). The emergency generator number is based on a flow rate of 11,484 acfm. The diesel fire pump number is based on a flow rate of 1,265 acfm. The aux. boiler number is based on a flow rate of 19,532 acfm.

5. Based on CT stack diameters of 18 feet each. Cooling tower cell cross sectional areas are based on each of the 8 cells having a diameter of 26 feet. The stack diameter of the emergency generator is 1.477 feet. The stack diameter of the diesel fire pump is 0.424 feet. The stack diameter of the aux. boiler is 3.5 feet.

B. FENCELINE

The KRCD CPP fence line is a rectangle, although it is not on a true N/S line. The coordinates (UTM in feet not meters) for the four fence line corners are given below:

NE Corner	N13296824.89, E887114.46
SE Corner	N13296170.20, E887092.76
SW Corner	N13296231.29, E885074.65
NW Corner	N13296885.87, E885093.31

C. MAJOR STRUCTURES

3. Inside the KRCD CPP Fence Line

The table below provides the dimensions for major structures inside the fence line as well as their identifying number from the General Arrangement drawing. UTM coordinate data for these structures in provided in Appendix 7-1.

Structure Description	Item # on GA Drawing	Dimensions – L x W x H (feet)
Switchyard Control Bldg.	2	70 x 60 x 20
Admin. Bldg.	6	100 x 60 x 24
Warehouse Maintenance Bldg.	8	100 x 80 x 24
CT1 Elec. Auxiliaries Structure	20.1	44 x 20 x 16
CT2 Elec. Auxiliaries Structure	20.1	44 x 20 x 16
CT1 Mech. Auxiliaries Structure	22.1	30 x 10 x 16
CT2 Mech. Auxiliaries Structure	22.1	30 x 10 x 16
CT1 Air Inlet Structure	24.1	70 x 50 x 62
CT2 Air Inlet Structure	24.2	70 x 50 x 62
CT1	26.1	116 x 44 x 20
CT2	26.2	116 x 44 x 20
Steam Turbine	29	121 x 36 x 34
Brine Holding Tank (north)	34	65 diam. x 34 high
Brine Holding Tank (south)	34	65 diam. x 34 high
Steam Condenser	36	34 x 50 x 35
HRSG1	40.1	165 x 62 x 95
HRSG2	40.2	165 x 62 x 95
Service/Firewater Storage Tank	47	40 diam. x 40 high
Aux. Boiler	50	30 x 22 x 12
Demin. Water Storage Tank	51	35 diam. x 32 high
Water Treatment Bldg.	52	100 x 85 x 22
Elec. Equip. Bldg.	56	118 x 44 x 20

ZLD/Cooling Tower Elec. Equip. Enclosure	58	58 x 18 x 12
Cooling Tower	59	460 x 76 x 80
ZLD Treatment Area	69	84 x 75 x 22
Recycle Water Holding Tank	73	80 diam. x 40 high

Other structures & equipment are not included, as they are either short or not solid.

4. Beyond the KRCD CPP Fence Line

Based on a review of an aerial photo of the project site and surrounding area, the terrain is relatively flat farmland and there are no significant structures in the vicinity.

D. OPERATING SCENARIOS

1. CTs in Full Load Operation (Steady-state)

Both CTs at full load

Aux. Boiler on (at full load)

Cooling Tower on (at full load)

Emergency Generator on (but only for 30 min./week & non simultaneous with the diesel fire pump)

Diesel Fire Pump on (but only for 30 min./week & non simultaneous with the emergency generator)

The following 5 ambient/operational scenarios will be assessed for CT steady-state operation:

Scenario A = Case 5 – Siemens/GE performance data – 26F/60%RH, Fogger-Off, Stm Inj.-Off
Scenario B = Case 4 – Siemens/GE performance data – 63F/40%RH, Fogger-On, Stm Inj.-Off
Scenario C = Case 13 – Siemens/GE performance data – 63F/40%RH, Fogger-Off, Stm Inj.-Off
Scenario D = Case 2 – Siemens/GE performance data – 103F/20.1%RH, Fogger-On, Stm Inj.-On
Scenario E = Case 12 – Siemens/GE performance data– 103F/20.1%RH, Fogger-Off, Stm Inj.-Off

This 5 case subset of the 20 cases of performance provided for the CTs should envelope the other 15 cases.

2. CT in Startup or Shutdown Mode

CT Startup

1 CT in startup mode for **30 minutes** before the 2nd CT initiates startup

Aux. Boiler on (at full load)

Cooling Tower on (at full load)

Emergency Generator off

Diesel Fire Pump off

CT Shutdown

Both CTs in shutdowm mode simultaneously

Aux. Boiler on (at full load)

Cooling Tower on (at full load)

Emergency Generator off

Diesel Fire Pump off

3. CTs Not Operating

Both CTs off

Aux. Boiler on (at full load)

Cooling Tower on (at full load – This is conservative, but the cooling tower may need to operate at some load during this time.)

Emergency Generator on (but only for 30 min./week & non simultaneous with the diesel fire pump)

Diesel Fire Pump on (but only for 30 min./week & non simultaneous with the emergency generator)

4. CTs in Partial Load Operation

1 CT at partial load (apprx. **60.5% for Siemens**)

The other CT at full load

Aux. Boiler on (at full load)

Cooling Tower on (at full load)

Emergency Generator on (but only for 30 min./week & non simultaneous with the diesel fire pump)

Diesel Fire Pump on (but only for 30 min./week & non simultaneous with the emergency generator)

One ambient temperature/operational scenario is available for the assessment of CT partial load operation:

Scenario F = Case 14 – CT performance data – 63F/40%RH, Fogger-Off, Stm Inj.-Off

5. Hours of annual operation

CTs – 6,807 hpy of steady-state + 154 hot starts (**@ 2 hrs, 27 min./start**) + 27 warm starts (**@ 2hrs, 52 min./start**) + 181 shutdowns (**@ 1hr, 2 min./shutdown**). Annual emissions from this

annual CT operating scenario should be compared with those for the CTs operating at full load for 8,760 hpy and the highest emissions for each pollutant used for estimating max. annual emissions.

Aux. Boiler – 2,315 hpy (based on 8,760-6,807=1,953 hpy when the CTs are not in steady-state operation + 2 x 181=362 hpy for 1 hr overlap with CT steady-state before and after each start/stop cycle)

Cooling Tower – 8,760 hpy

Emergency Generator – 26 hpy (but not when diesel fire pump is on)

Diesel Fire Pump – 26 hpy (but not when emergency generator is on)

6. CT Commissioning

CTs – assume only 1 CT will operate during the commissioning period at any time.

Aux. boiler off

Cooling Tower on (at full load)

Emergency Generator off

Diesel Fire Pump off

E. EMISSIONS RATES

1. Steady-State

There are 5 sets of steady-state emissions rates. These 5 sets of CT emissions rates, which are associated with the five ambient temperature conditions noted in Section D (Operating Scenarios A through E), in essence govern all steady-state emissions scenarios.

The 5 sets of steady-state emissions rates are shown in Tables 1 through 5. Peak hourly emissions, based on the coldest (design) ambient temperature (Scenario A), are provided in Table 1. Annual average emissions are represented by the emissions rates in Tables 2 & 3 (Scenarios B & C). The emissions rates at the maximum ambient (design) temperature are provided in Tables 4 & 5 (Scenarios D & E).

Note that the emissions rates for the cooling tower and aux. boiler are assumed to be constant across the range of operating conditions. Max. hourly emissions during steady-state assume operation of both CTs, the cooling tower, aux. boiler and emergency generator or the diesel fire pump (depending upon which of these two pieces of equipment has the higher emissions for a given scenario).

2. Startup/Shutdown

CT cold startup, warm startup, hot startup and shutdown sequence emissions rates are shown in Tables 6 through 9, respectively.

The startup emissions rates do not directly account for multiple (failed) startup sequences. However, for warm and hot startups (and cold as well, although cold starts are not included in this project's operating scenarios because of the use of an aux. boiler), a failed start for either the 1st or 2nd CT in the start sequence would not alter the max. hourly emissions rates shown in Tables 6 through 8. Instead, a failed start of one of the CTs would extend the number of hours during which the max. emissions rates shown in Tables 6 through 8 would occur. To address the potential issue

of failed start sequences, 2 failed start attempts, each of 30 minutes, are assumed. This has the effect of extending the hot, warm or cold startup period by 1 hour. **For Siemens the max. startup periods are: hot 147 + 60 = 207 min. & warm 172 + 60 = 232 min.**

(Note that the startup/shutdown emissions rates for the cooling tower and aux. boiler are assumed to be the same as those for steady-state.)

3. Partial Load

Table 10 provides emissions rates for CT partial load operation. **For Siemens partial load operation is at approximately 60.5% of full load output.** Partial load operation should be evaluated for short term impacts, but not for long term (i.e., annual), as full load operation produces greater emissions. Since it is likely that a) 1 CT would be in partial load operation and the other CT off or b) one CT would be in partial load operation and the other CT at full load, but unlikely that both CTs would operate at partial load, the partial load assessment will assume 1 CT at partial load and the other at full load (both at annual average ambient conditions).

4. Commissioning

CT commissioning emissions rates, which will occur within the first few months of project operation and are shown in Table 11, must be factored into the assessment of short-term impacts. Long-term (annual) impacts need not account for commissioning emissions, since in the 1st year of operation the allowable amount of normal operation is assumed to be reduced by and to the extent that commissioning operations occur.

(Note that the commissioning emissions rates for other equipment are assumed to be the same as those for steady-state.)

TABLE 1
MAXIMUM HOURLY EMISSIONS RATES (LBS/HR)
STEADY-STATE OPERATION[1]

	One CT	Both CTs	Cooling Tower[2]	Emergency Generator	Diesel Fire Pump	Aux. Boiler
NOx[3]	**15.1**	**30.2**	NA	4.01	4.07	0.72
CO[4]	**9.2**	**18.4**	NA	10.43	0.31	2.27
VOCs[5]	**3.0**	**6.0**	NA	2.65	0.19	0.37
PM10	**10.0**	**20.0**	**0.56**	0.64	0.14	0.61
PM2.5[6]	**0.59**	**1.17**	**0.14**	0.01	0.02	0.02
SO2	**1.66**[7]	**3.32**	NA	0.01[7]	0.12[8]	0.05[7]

Notes:

9. Based on CT operation at an ambient temperature of 26 degrees F, Fogger-Off, STIG-Off.
10. PM10 is the only emission from this equipment. Cooling tower PM 10 emissions are based on: a circ. water rate of **62,342,384 lbs/hr (7,505,989 gal/hr)**; a TDS conc. of 1,800 mg/l; and a drift rate of 0.0005%.
11. CT NOx emissions are based on SCR to 2 ppmdv @ 15% O2; aux. boiler emissions are based on 9 ppmdv @ 3% O2.
12. CT CO emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
13. CT VOC emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
14. CT PM2.5 emissions rate based on an emissions factor of 0.00028 lbs/MMBtu and **2,087.5 MMBtu/hr** fuel input per CT. Aux. bolier PM2.5 emissions rate based on an emissions factor of 0.00028 lbs/MMBtu and fuel input of 61.23 MMBtu/hr. Emergency generator PM2.5 emissions

rate based on an emissions factor of 0.00028 lbs/MMBtu and fuel input of 13 MMBtu/hr. Diesel fire pump PM2.5 emissions factors based on an emissions factor of 0.004 lbs/MMBtu and fuel input of 3 MMBtu/hr. Cooling tower PM2.5 emissions rate assumes PM2.5 is 25% of the PM10 emissions rate.

15. Based on 0.3 grains S/100 scf.
16. Based on 0.05% fuel sulfur content.

TABLE 2
AVERAGE HOURLY EMISSIONS RATES (LBS/HR)
STEADY-STATE OPERATION[1]

	One CT	Both CTs	Cooling Tower[2]	Emergency Generator	Diesel Fire Pump	Aux. Boiler
NOx[3]	**14.2**	**28.4**	NA	4.01	4.07	0.72
CO[4]	**8.8**	**17.6**	NA	10.43	0.31	2.27
VOCs[5]	**2.0**	**4.0**	NA	2.65	0.19	0.37
PM10	**10.0**	**20.0**	**0.56**	0.64	0.14	0.61
PM2.5[6]	**0.59**	**1.17**	**0.14**	0.01	0.02	0.02
SO2	**1.66**[7]	**3.32**	NA	0.01[7]	0.12[8]	0.05[7]

Notes:

9. Based on an ambient temperature of 63 degrees F, Fogger-On, STIG-Off.
10. PM10 is the only emission from this equipment. Cooling tower PM 10 emissions are based on: a circ. water rate of **62,342,384 lbs/hr (7,505,989 gal/hr)**; a TDS conc. of 1,800 mg/l; and a drift rate of 0.0005%.
11. CT NOx emissions are based on SCR to 2 ppmdv @ 15% O2; aux. boiler emissions are based on 9 ppmdv @ 3% O2.
12. CT CO emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
13. CT VOC emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
14. PM2.5 emissions rates assume those used for the 26F ambient case.
15. Based on 0.3 grains S/100 scf.
16. Based on 0.05% fuel sulfur content.

TABLE 3
AVERAGE HOURLY EMISSIONS RATES (LBS/HR)
STEADY-STATE OPERATION[1]

	One CT	Both CTs	Cooling Tower[2]	Emergency Generator	Diesel Fire Pump	Aux. Boiler
NOx[3]	**14.0**	**28.0**	NA	4.01	4.07	0.72
CO[4]	**8.4**	**16.8**	NA	10.43	0.31	2.27
VOCs[5]	**2.0**	**4.0**	NA	2.65	0.19	0.37
PM10	**10.0**	**20.0**	**0.56**	0.64	0.14	0.61
PM2.5[6]	**0.59**	**1.17**	**0.14**	0.01	0.02	0.02
SO2	**1.66**[7]	**3.32**	NA	0.01[7]	0.12[8]	0.05[7]

Notes:

9. Based on an ambient temperature of 63 degrees F, Fogger-Off, STIG-Off.
10. PM10 is the only emission from this equipment. Cooling tower PM 10 emissions are based on: a circ. water rate of **62,342,384 lbs/hr (7,505,989** gal/hr); a TDS conc. of 1,800 mg/l; and a drift rate of 0.0005%.

11. CT NOx emissions are based on SCR to 2 ppmdv @ 15% O2; aux. boiler emissions are based on 9 ppmdv @ 3% O2.
12. CT CO emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
13. CT VOC emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
14. PM2.5 emissions rates assume those used for the 26F ambient case.
15. Based on 0.3 grains S/100 scf.
16. Based on 0.05% fuel sulfur content.

TABLE 4
HOURLY EMISSIONS RATES (LBS/HR)
STEADY-STATE OPERATION[1]

	One CT	Both CTs	Cooling Tower[2]	Emergency Generator	Diesel Fire Pump	Aux. Boiler
NOx[3]	**14.4**	**28.8**	NA	4.01	4.07	0.72
CO[4]	**8.8**	**17.6**	NA	10.43	0.31	2.27
VOCs[5]	**2.0**	**4.0**	NA	2.65	0.19	0.37
PM10	**10.0**	**20.0**	**0.56**	0.64	0.14	0.61
PM2.5[6]	**0.59**	**1.17**	**0.14**	0.01	0.02	0.02
SO2	**1.66**[7]	**3.32**	NA	0.01[7]	0.12[8]	0.05[7]

Notes:
9. Based on an ambient temperature of 103 degrees F, Fogger-On, STIG-On.
10. PM10 is the only emission from this equipment. Cooling tower PM 10 emissions are based on: a circ. water rate of **62,342,384 lbs/hr (7,505,989** gal/hr); a TDS conc. of 1,800 mg/l; and a drift rate of 0.0005%.
11. CT NOx emissions are based on SCR to 2 ppmdv @ 15% O2; aux. boiler emissions are based on 9 ppmdv @ 3% O2.
12. CT CO emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
13. CT VOC emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
14. PM2.5 emissions rates assume those used for the 26F ambient case.
15. Based on 0.3 grains S/100 scf.
16. Based on 0.05% fuel sulfur content.

TABLE 5
HOURLY EMISSIONS RATES (LBS/HR)
STEADY-STATE OPERATION[1]

	One CT	Both CTs	Cooling Tower[2]	Emergency Generator	Diesel Fire Pump	Aux. Boiler
NOx[3]	**12.2**	**24.4**	NA	4.01	4.07	0.72
CO[4]	**7.4**	**14.8**	NA	10.43	0.31	2.27
VOCs[5]	**2.0**	**4.0**	NA	2.65	0.19	0.37
PM10	**10.0**	**20.0**	**0.56**	0.64	0.14	0.61
PM2.5[6]	**0.59**	**1.17**	**0.14**	0.01	0.02	0.02
SO2	**1.66**[7]	**3.32**	NA	0.01[7]	0.12[8]	0.05[7]

Notes:
9. Based on an ambient temperature of 103 degrees F, Fogger-Off, STIG-Off.

10. PM10 is the only emission from this equipment. Cooling tower PM 10 emissions are based on: a circ. water rate of **62,342,384 lbs/hr (7,505,989** gal/hr); a TDS conc. of 1,800 mg/l; and a drift rate of 0.0005%.
11. CT NOx emissions are based on SCR to 2 ppmdv @ 15% O2; aux. boiler emissions are based on 9 ppmdv @ 3% O2.
12. CT CO emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
13. CT VOC emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
14. PM2.5 emissions rates assume those used for the 26F ambient case.
15. Based on 0.3 grains S/100 scf.
16. Based on 0.05% fuel sulfur content.

TABLE 6
EMISSIONS RATES (LBS/HR)
COLD STARTUP MODE[1]

	One CT[2]	Both CTs[2]	Cooling Tower[3]	Emergency Generator[3]	Diesel Fire Pump[3]	Aux. Boiler[3]
NOx	**41.7**	**83.4**	NA	4.01	4.07	0.72
CO	**233.9**	**467.8**	NA	10.43	0.31	2.27
VOCs	**20.2**	**40.4**	NA	2.65	0.19	0.37
PM10	**8.8**	**17.6**	**0.56**	0.64	0.14	0.61
PM2.5[4]	**0.59**	**1.17**	**0.14**	0.01	0.02	0.02
SO2	**1.66[5]**	**3.32**	NA	0.01	0.12	0.05

Notes:

6. For the CTs conventional, not fast or rapid, startup capability is assumed. The emissions rates in this cold startup mode table are not used for assessing impacts, as the warm and hot startup modes cover the various operating scenarios.
7. **For a cold startup cycle the total time required is 262 minutes (4 hrs, 22 minutes) per CT. Since it is assumed that CT2 would start 30 minutes after the start of CT1, the highest hourly emissions will occur not in the first hour of startup (when CT2 is off for the first 30 minutes), but in the 2nd, 3rd & 4th hours of the 4 hr, 22 minute sequence, as both CTs will be on and emitting at the cold startup rate for a full 60 minutes in the 2nd, 3rd & 4th hours.**
8. The emissions rates for these pieces of equipment are the same as for steady-state operation.
9. PM2.5 emissions rates assume those used for the 26F ambient case.
10. This emissions rate is assumed as the same as for steady-state operation in the 26 degree F ambient case.

TABLE 7
EMISSIONS RATES (LBS/HR)
WARM STARTUP MODE[1]

	One CT[2]	Both CTs[2]	Cooling Tower[3]	Emergency Generator[3]	Diesel Fire Pump[3]	Aux. Boiler[3]
NOx	**57.6**	**115.2**	NA	4.01	4.07	0.72
CO	**362.5**	**725.0**	NA	10.43	0.31	2.27
VOCs	**30.7**	**61.4**	NA	2.65	0.19	0.37
PM10	**9.1**	**18.2**	**0.56**	0.64	0.14	0.61
PM2.5[4]	**0.59**	**1.17**	**0.14**	0.01	0.02	0.02
SO2	**1.66[5]**	**3.32**	NA	0.01	0.12	0.05

Notes:

6. For the CTs conventional, not fast or rapid, startup capability is assumed.
7. **For a warm startup cycle the total time required is 172 minutes (2 hrs, 52 min.) per CT. Since it is assumed that CT2 would start 30 minutes after the start of CT1, the highest hourly emissions will occur not in the first hour of startup (when CT2 is off for the first 30 minutes), but in the 2nd hour, as both CTs will be on and emitting at the warm startup rate for a full 60 minutes in the 2nd hour.**
8. The emissions rates for these pieces of equipment are the same as for steady-state operation.
9. PM2.5 emissions rates assume those used for the 26F ambient case.
10. This emissions rate is assumed as the same as for steady-state operation in the 26 degree F ambient case.

TABLE 8
EMISSIONS RATES (LBS/HR)
HOT STARTUP MODE[1]

	One CT[2]	Both CTs[2]	Cooling Tower[3]	Emergency Generator[3]	Diesel Fire Pump[3]	Aux. Boiler[3]
NOx	**65.4**	**130.8**	NA	4.01	4.07	0.72
CO	**423.7**	**847.4**	NA	10.43	0.31	2.27
VOCs	**35.6**	**71.2**	NA	2.65	0.19	0.37
PM10	**9.0**	**18.0**	**0.56**	0.64	0.14	0.61
PM2.5[4]	**0.59**	**1.17**	**0.14**	0.01	0.02	0.02
SO2	**1.66[5]**	**3.32**	NA	0.01	0.12	0.05

Notes:

6. For the CTs conventional, not fast or rapid, startup capability is assumed.
7. **For a hot startup cycle the total time required is 147 minutes (2 hrs, 27 min.) per CT. Since it is assumed that CT2 would start 30 minutes after the start of CT1, the highest hourly emisslons will occur not in the first hour of startup (when CT2 is off for the first 30 minutes), but in the 2nd hour, as both CTs will be on and emitting at the hot startup rate for a full 60 minutes in the 2nd hour.**
8. The emissions rates for these pieces of equipment are the same as for steady-state operation.
9. PM2.5 emissions rates assume those used for the 26F ambient case.
10. This emissions rate is assumed as the same as for steady-state operation in the 26 degree F ambient case.

TABLE 9
EMISSIONS RATES (LBS/HR)
SHUTDOWN MODE[1]

	One CT[2]	Both CTs[2]	Cooling Tower[3]	Emergency Generator[3]	Diesel Fire Pump[3]	Aux. Boiler[3]
NOx	**50.0**	**100.0**	NA	4.01	4.07	0.72
CO	**336.0**	**672.0**	NA	10.43	0.31	2.27
VOCs	**27.0**	**54.0**	NA	2.65	0.19	0.37
PM10	**8.3**	**16.6**	**0.56**	0.64	0.14	0.61
PM2.5[4]	**0.59**	**1.17**	**0.14**	0.01	0.02	0.02
SO2	**1.66[5]**	**3.32**	NA	0.01	0.12	0.05

Notes:

6. For the CTs, conventional, not fast or rapid, startup capability is assumed.
7. **For a shutdown cycle the total time required is approximately 1 hr (62 minutes) per CT. Since it is assumed that both CTs can be in shutdown at the same time, the hourly emissions rates for the CTs are calculated as follows: 0 – 60 minutes both CTs in shutdown mode; minute 61 & beyond both CTs off.**
8. The emissions rates for these pieces of equipment are the same as for steady-state operation.
9. PM2.5 emissions rates assume those used for the 26F ambient case.
10. This emissions rate is assumed as the same as for steady-state operation in the 26 degree F ambient case.

TABLE 10
EMISSIONS RATES (LBS/HR)
PARTIAL LOAD OPERATION[1]

	One CT	Both CTs	Cooling Tower[2]	Emergency Generator	Diesel Fire Pump	Aux. Boiler
NOx[3]	**9.6**	**19.2**	NA	4.01	4.07	0.72
CO[4]	**5.8**	**11.6**	NA	10.43	0.31	2.27
VOCs[5]	**2.0**	**4.0**	NA	2.65	0.19	0.37
PM10	**10.0**	**20.0**	**0.56**	0.64	0.14	0.61
PM2.5[6]	**0.59**	**1.17**	**0.14**	0.01	0.02	0.02
SO2	**1.66**[7]	**3.32**	NA	0.01	0.12[8]	0.05[7]

Notes:

9. Based on an ambient temperature of 63 degrees F, Fogger-Off, STIG-Off. Output is approximately **60.5% of full load.**
10. PM10 is the only emission from this equipment. Cooling tower PM 10 emissions are based on: a circ. water rate of **62,342,384 lbs/hr (7,505,989** gal/hr); a TDS conc. of 1,800 mg/l; and a drift rate of 0.0005%.
11. CT NOx emissions are based on SCR to 2 ppmdv @ 15% O2; aux. boiler emissions are based on 9 ppmdv @ 3% O2.
12. CT CO emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
13. CT VOC emissions are based on an oxidation catalyst to 2 ppmdv @ 15% O2.
14. PM2.5 emissions rates assume those used for the 26F ambient case.
15. Based on 0.3 grains S/100 scf.
16. Based on 0.05% fuel sulfur content.

TABLE 11
EMISSIONS RATES
COMMISSIONING MODE[1]

	CT Commissioning Emissions Rates (lbs/hr) Per CT[2]						Cooling Tower[3]
	HRSG Cleanup, 0% Load	ST Stm Checks/Stm Blows @ 50% Load; DLN Tuning @ 50% Load	DLN Tuning @ 20% Load	DLN Tuning @ 80% Load	NH3 Tuning @ 50% Load	NH3 Tuning & Stm Inj. Tuning @ 100% Load	
NOx	**140.9**	**172.5**	**196.6**	**168.1**	**9.0**	**15.1**	NA

CO	**202.9**	**404.4**	**320.1**	**267.0**	**5.5**	**9.2**	NA
VOCs	**19.2**	**22.3**	**26.5**	**12.1**	**1.8**	**3.0**	NA
PM10[4]	**10.0**	**10.0**	**10.0**	**10.0**	**10.0**	**10.0**	**0.56**
PM2.5[4]	**0.59**	**0.59**	**0.59**	**0.59**	**0.59**	**0.59**	**0.14**
SO2[4]	**1.66**	**1.66**	**1.66**	**1.66**	**1.66**	**1.66**	NA

Notes:

5. During commissioning it is assumed that the cooling tower will be in operation, but not the aux. boiler, emergency generator or diesel fire pump.
6. Each of the two CTs will be commissioned separately. Therefore, when comparing commissioning emissions rates with other scenarios, assume only one CT in commissioning mode as compared with two CTs in steady-state or startup/shutdown mode.
7. Emissions from this equipment is the same as for steady-state operation.
8. PM10, PM2.5 & SO2 emissions rates for the CTs are assumed as the same as for steady-state operation and based 26F ambient.

F. MODELING SCENARIOS

1. 1-hr Impacts (NOx, CO & SO2)

a. Based on maximum 1-hr emissions for normal operation (assess for Scenarios A through F)

CTs – 1 hot startup (both CTs in hot start mode for 60 min. simultaneously); 1 hr of hot startup produces greater emissions than either steady-state, warm start or shutdown operation.

Aux. Boiler – 1 hr of operation at CT startup

Cooling Tower – 1 hr of operation

Emergency Generator (EG)– 30 min. of operation **OR** Diesel Fire Pump (DFP) – 30 min. of operation

Use Table 12 emissions rates and assess the 1-hr impacts from normal operation for Scenarios A through F. For NOx & SO2 worst case impacts the DFP operates; for CO worst case impacts the EG operates.

TABLE 12
EMISSIONS RATES (LBS/HR)
FOR
ASSESSING 1-HR IMPACTS
FROM NORMAL OPERATIONS[1]

	One CT	Both CTs	Cooling Tower[5]	Emergency Generator	Diesel Fire Pump	Aux. Boiler
NOx	**65.4**	**130.8**	NA	2.01	2.04	0.72
CO	**423.7**	**847.4**	NA	5.22	0.16	2.27
VOCs	**35.6**	**71.2**	NA	1.33	0.10	0.37
PM10	**9.0**	**18.0**	**0.56**	0.32	0.07	0.61
PM2.5	**0.59**	**1.17**	**0.14**	0.005	0.01	0.02
SO2	**1.66**	**3.32**	NA	0.005	0.06	0.05

Notes:

2. Emissions rates are directly from Table 8 except for the Emergency Generator and Diesel Fire Pump, which are 50% of their Table 8 rates, since either of these pieces of equipment will only operate for 30 min. in an hour.

b. Based on CT commissioning (Use Scenarios A through F CT stack parameters)

Only 1 CT – Assume 1 hr of continuous commissioning. Use the highest commissioning emissions rates for each pollutant.

Aux.Boiler – off

Cooling Tower – 1 hr of operation

EG - off & DFP - off

Use the emissions rates in Table 13 along with Scenarios A through F CT stack parameters to assess the 1-hr impacts for the commissioning mode.

TABLE 13
MAXIMUM EMISSIONS RATES (LBS/HR)
FOR
COMMISSIONING MODE

	One CT – Commissioning[1]	Cooling Tower
NOx	**196.6**	NA
CO	**404.4**	NA
VOCs	**26.5**	NA
PM10	**10.0**	**0.56**
PM2.5	**0.59**	**0.14**
SO2	**1.66**	NA

Notes:
1. Emissions rates are the highest for each pollutant from Table 11. Only one CT will operate in commissioning mode at a time.

c. Based on Partial Load Operation

CT1 – 1 hr in steady-state (partial load) mode. (Use Scenario F CT stack parameters & Table 10 emissions rates.)

CT2 – 1-hr in steady-state mode (full load) mode. (Use Scenario B CT stack parameters & Table 2 emissions rates.)

Aux. Boiler – 1 hrs of operation (for conservatism)

Cooling Tower – 1 hr of operation

Emergency Generator (EG)– 30 min. of operation **OR** Diesel Fire Pump (DFP) – 30 min. of operation

Use Table 14 emissions rates to assess the 1-hr impacts from partial load operation. For CT1 use Scenario F CT stack parameters, and for CT2 use Scenario B CT stack parameters. For NOx & SO2 worst case impacts the DFP operates; for CO worst case impacts the EG operates.

TABLE 14
EMISSIONS RATES (LBS/HR)
FOR
ASSESSING 1-HR IMPACTS
FROM PARTIAL LOAD OPERATIONS

	CT1[1]	CT2[2]	Cooling Tower[4]	Emergency Generator[3]	Diesel Fire Pump[3]	Aux. Boiler[4]
NOx	**9.6**	**14.2**	NA	2.01	2.04	0.72
CO	**5.8**	**8.8**	NA	5.22	0.16	2.27
VOCs	**2.0**	**2.0**	NA	1.33	0.10	0.37
PM10	**10.0**	**10.0**	**0.56**	0.32	0.07	0.61
PM2.5	**0.59**	**0.59**	**0.14**	0.005	0.01	0.02
SO2	**1.66**	**1.66**	NA	0.005	0.06	0.05

Notes:
1. CT1 in partial load operation; emissions rates from Table 10.
2. CT2 in full load operation; emissions rates from Table 2.
3. Normal emissions rates are divided by 2, since this piece of equipment will only operate for 30 min. in an hour.
4. Normal emissions rates for this piece of equipment.

2. 3-hr Impacts (SO2)

a. Based on maximum 3-hr emissions for normal operation (assess for Scenarios A through E)

CTs – 1 hot startup, including 2 x 30 min. failed start attempts for 1 CT (117 min. both CTs in simultaneous hot start mode + 63 min. of 1 CT in hot start mode & the other CT in steady-state mode);

Aux. Boiler – 3 hrs of operation at CT startup

Cooling Tower – 3 hrs of operation

DFP – 30 min. of operation for worst case SO2 impacts

Use the emissions rates in Table 15 to assess the 3-hr impacts from normal operation for Scenarios A through E.

TABLE 15
EMISSIONS RATES (LBS/HR)
FOR
ASSESSING 3-HR IMPACTS
FROM NORMAL OPERATIONS

	CT1[1]	CT2[1]	Cooling Tower[2]	Emergency Generator[3]	Diesel Fire Pump[3]	Aux. Boiler[4]

NOx	**Scenario A -56.6** **Scenario B – 56.45** **Scenario C – 56.41** **Scenario D –56.48** **Scenario E – 56.1**	**Scenario A -56.6** **Scenario B – 56.45** **Scenario C – 56.41** **Scenario D –56.48** **Scenario E – 56.1**	NA	0.67	0.68	0.72
CO	**Scenario A -351.17** **Scenario B -351.1** **Scenario C -351.03** **Scenario D -351.1** **Scenario E -350.85**	**Scenario A -351.17** **Scenario B -351.1** **Scenario C -351.03** **Scenario D -351.1** **Scenario E -350.85**	NA	1.74	0.06	2.27
VOCs	**Scenario A -29.90** **Scenario B – 29.72** **Scenario C – 29.72** **Scenario D – 29.72** **Scenario E – 29.72**	**Scenario A -29.90** **Scenario B – 29.72** **Scenario C – 29.72** **Scenario D – 29.72** **Scenario E – 29.72**	NA	0.45	0.04	0.37
PM10	**Scenario A – 9.18** **Scenario B – 9.18** **Scenario C – 9.18** **Scenario D – 9.18** **Scenario E – 9.18**	**Scenario A – 9.18** **Scenario B – 9.18** **Scenario C – 9.18** **Scenario D – 9.18** **Scenario E – 9.18**	**0.56**	0.11	0.03	0.61
PM2.5	**All Scenarios - 0.59**	**All Scenarios - 0.59**	**0.14**	0.002	0.003	0.02
SO2	**All Scenarios - 1.66**	**All Scenarios - 1.66**	NA	0.002	0.02	0.05

Notes:
1. The emissions rates for the CTs are based on taking the total amount of emissions from both CTs for the 3-hr period and splitting these totals evenly between the two CTs.
2. Normal Cooling Tower emissions rates, since the cooling tower operates for 3 out of 3 hrs.
3. Normal EG & DFP emissions rates are divided by 6, since either the EG or DFP operates for only 30 min. of the 3 hrs.
4. Normal Aux. Boiler emissions rates, since the Aux. Boiler operates for 3 out of the 3 hrs.

b. Based on CT commissioning (Use only Scenario F CT stack parameters) *(Do not need to model this case because the results, which pertain to SO2 only, are covered by F.2.a & F.2.c.)*

Only 1 CT – Assume 3 hrs of continuous commissioning. Use the highest commissioning emissions rates for each pollutant.

Aux.Boiler – off

Cooling Tower – 3 hrs of operation

EG – off & DFP off

Use the emissions rates in Table 13 along with Scenario F CT stack parameters to assess 3-hr impacts for commissioning mode.

c. Based on Partial Load Operation

CT1 – 3 hrs in steady-state (partial load) mode. (Use Scenario F CT stack parameters & Table 10 emissions rates.)

CT2 – 3-hrs in steady-state mode (full load) mode. (Use Scenario B CT stack parameters & Table 2 emissions rates.)

Aux. Boiler – 3 hrs of operation (for conservatism)

Cooling Tower – 3 hrs of operation

DFP – 30 min. of operation for worst case SO2 impacts

Use Table 16 emissions rates to assess the 3-hr impacts from partial load operation. For CT1 use Scenario F CT stack parameters, and for CT2 use Scenario B CT stack parameters.

TABLE 16
EMISSIONS RATES (LBS/HR)
FOR
ASSESSING 3-HR IMPACTS
FROM PARTIAL LOAD OPERATIONS

	CT1[1]	CT2[2]	Cooling Tower[3]	Emergency Generator[4]	Diesel Fire Pump[4]	Aux. Boiler[3]
NOx	**9.6**	**14.2**	NA	0.67	0.68	0.72
CO	**5.8**	**8.8**	NA	1.74	0.06	2.27
VOCs	**2.0**	**2.0**	NA	0.45	0.04	0.37
PM10	**10.0**	**10.0**	**0.56**	0.11	0.03	0.61
PM2.5	**0.59**	**0.59**	**0.14**	0.002	0.003	0.02
SO2	**1.66**	**1.66**	NA	0.002	0.02	0.05

Notes:
1. CT1 in partial load operation; emissions rates from Table 10.
2. CT2 in full load operation; emissions rates from Table 2.
3. Normal emissions rates for this piece of equipment.
4. Normal EG & DFP emissions rates are divided by 6, since either the EG or DFP operates for only 30 min. of the 3 hrs.

3. 8-hr Impacts (CO)

a. Based on maximum 8-hr emissions for normal operation (assess for Scenarios A through E)

CTs – 1 hot startup, including 2 x 30 min. failed start attempts for 1 CT (117 min. both CTs in simultaneous hot start mode + 90 min. of 1 CT in hot start mode & the other CT in steady-state mode + 30 min. of 1 CT in start mode and the other off + 243 min. of both CTs in steady-state mode)

Aux. Boiler – 3 hrs of operation at CT startup

Cooling Tower – 8 hrs of operation

EG– 30 min. of operation for worst case CO impacts

Use the emissions rates in Table 17 to assess the 8-hr impacts from normal operation for Scenarios A through E.

TABLE 17
EMISSIONS RATES (LBS/HR)
FOR
ASSESSING 8-HR IMPACTS
FROM NORMAL OPERATIONS

	CT1[1]	CT2[1]	Cooling Tower[2]	Emergency Generator[3]	Diesel Fire Pump[3]	Aux. Boiler[4]
NOx	**Scenario A -33.18** **Scenario B – 32.64** **Scenario C – 32.52** **Scenario D –32.76** **Scenario E – 31.44**	**Scenario A -33.18** **Scenario B – 32.64** **Scenario C – 32.52** **Scenario D –32.76** **Scenario E – 31.44**	NA	0.26	0.26	0.27
CO	**Scenario A -161.76** **Scenario B -161.52** **Scenario C -161.28** **Scenario D -161.52** **Scenario E -160.68**	**Scenario A -161.76** **Scenario B -161.52** **Scenario C -161.28** **Scenario D -161.52** **Scenario E -160.68**	NA	0.66	0.02	0.86
VOCs	**Scenario A -14.93** **Scenario B – 14.33** **Scenario C – 14.33** **Scenario D – 14.33** **Scenario E – 14.33**	**Scenario A -14.93** **Scenario B – 14.33** **Scenario C – 14.33** **Scenario D – 14.33** **Scenario E – 14.33**	NA	0.17	0.02	0.14
PM10	**Scenario A – 9.32** **Scenario B – 9.32** **Scenario C – 9.32** **Scenario D – 9.32** **Scenario E – 9.32**	**Scenario A – 9.32** **Scenario B – 9.32** **Scenario C – 9.32** **Scenario D – 9.32** **Scenario E – 9.32**	**0.56**	0.04	0.01	0.23
PM2.5	**All Scenarios - 0.59**	**All Scenarios - 0.59**	**0.14**	0.001	0.001	0.01
SO2	**All Scenarios - 1.66**	**All Scenarios - 1.66**	NA	0.001	0.008	0.02

Notes:
1. The emissions rates for the CTs are based on taking the total amount of emissions from both CTs for the 8-hr period and splitting these totals evenly between the two CTs.
2. Normal Cooling Tower emissions rates, since the cooling tower operates for 8 out of 8 hrs.
3. Normal EG & DFP emissions rates are divided by 16, since either the EG or DFP operates for only 30 min. of the 8 hrs.
4. Normal Aux. Boiler emissions rates multiplied by 3/8, since the Aux. Boiler operates for 3 out of the 8 hrs.

b. Based on CT commissioning (Use only Scenario F CT stack parameters)

Only 1 CT – Assume 8 hrs of continuous commissioning. Use the highest commissioning emissions rates for each pollutant.

Aux.Boiler – off

Cooling Tower – 8 hrs of operation

EG - off & DFP - off

Use the emissions rates in Table 13 along with Scenario F CT stack parameters to assess 8-hr impacts for commissioning mode.

c. Based on Partial Load Operation

CT1 – 8 hrs in steady-state (partial load) mode. (Use Scenario F CT stack parameters & Table 10 emissions rates.)

CT2 – 8-hrs in steady-state mode (full load) mode. (Use Scenario B CT stack parameters & Table 2 emissions rates.)

Aux. Boiler – 3 hrs of operation at CT startup

Cooling Tower – 8 hrs of operation

EG– 30 min. of operation for worst case CO impacts

Use Table 18 emissions rates to assess the 8-hr impacts from partial load operation. For CT1 use Scenario F CT stack parameters, and for CT2 use Scenario B CT stack parameters.

TABLE 18
EMISSIONS RATES (LBS/HR)
FOR
ASSESSING 8-HR IMPACTS
FROM PARTIAL LOAD OPERATIONS

	CT1[1]	CT2[2]	Cooling Tower[3]	Emergency Generator[4]	Diesel Fire Pump[4]	Aux. Boiler[5]
NOx	**9.6**	**14.2**	NA	0.26	0.26	0.27
CO	**5.8**	**8.8**	NA	0.66	0.02	0.86
VOCs	**2.0**	**2.0**	NA	0.17	0.02	0.14
PM10	**10.0**	**10.0**	**0.56**	0.04	0.01	0.23
PM2.5	**0.59**	**0.59**	**0.14**	0.001	0.001	0.01
SO2	**1.66**	**1.66**	NA	0.001	0.008	0.02

Notes:
1. CT1 in partial load operation; emissions rates from Table 10.
2. CT2 in full load operation; emissions rates from Table 2.
3. Normal emissions rates for this piece of equipment.
4. Normal EG & DFP emissions rates are divided by 16, since either the EG or DFP operates for only 30 min. of the 8 hrs.
5. Normal AB emissions rates are multiplied by 3/8, since the AB operates for only 3 of the 8 hrs.

d. Based on Aux. Boiler only Operation

Both CTs – off

Aux. Boiler – 8 hrs of operation

Cooling Tower – off

Emergency Generator – off & DFP - off

Use full aux. boiler emissions rates (e.g., from Table 1)

4. 24-hr Impacts (NOx – for Class I, PM10, PM2.5, SO2)

a. Based on maximum 24-hr emissions for normal operation (assess for Scenarios A through E)

CTs – 1 hot startup, including 2 x 30 min. failed start attempts for 1 CT, & 1 shutdown (117 min. both CTs in simultaneous hot start mode + 90 min. of 1 CT in hot start mode & the other CT in steady-state mode + 30 min. of 1 CT in start mode and the other off + 1,143 min. of both CTs in steady-state mode + 60 min. of both CTs in shutdown mode).

Aux. Boiler – 2 hrs of operation at CT startup, and 2 hrs at CT shutdown (1 hr during shutdown & 1 hr post-shutdown) = 4 hrs total

Cooling Tower – 24 hrs of operation

DFP – 30 min. of operation for worst case PM10, PM2.5 & SO2 impacts

Use the emissions rates in Table 19 to assess the 24-hr impacts from normal operation for Scenarios A through E.

TABLE 19
EMISSIONS RATES (LBS/HR)
FOR
ASSESSING 24-HR IMPACTS
FROM NORMAL OPERATIONS

	CT1[1]	CT2[1]	Cooling Tower[2]	Emergency Generator[3]	Diesel Fire Pump[3]	Aux. Boiler[4]
NOx	**Scenario A -22.58** **Scenario B – 21.84** **Scenario C – 21.68** **Scenario D –22.0** **Scenario E – 20.19**	**Scenario A -22.58** **Scenario B – 21.84** **Scenario C – 21.68** **Scenario D –22.0** **Scenario E – 20.19**	NA	0.09	0.09	0.12
CO	**Scenario A -73.67** **Scenario B -73.34** **Scenario C -73.01** **Scenario D -73.34** **Scenario E -72.19**	**Scenario A -73.67** **Scenario B -73.34** **Scenario C -73.01** **Scenario D -73.34** **Scenario E -72.19**	NA	0.22	0.006	0.38
VOCs	**Scenario A -7.98** **Scenario B – 7.15** **Scenario C – 7.15** **Scenario D – 7.15** **Scenario E – 7.15**	**Scenario A -7.98** **Scenario B – 7.15** **Scenario C – 7.15** **Scenario D – 7.15** **Scenario E – 7.15**	NA	0.06	0.004	0.07
PM10	**Scenario A – 9.71** **Scenario B – 9.71** **Scenario C – 9.71** **Scenario D – 9.71** **Scenario E – 9.71**	**Scenario A – 9.71** **Scenario B – 9.71** **Scenario C – 9.71** **Scenario D – 9.71** **Scenario E – 9.71**	**0.56**	0.013	0.003	0.11
PM2.5	**All Scenarios - 0.59**	**All Scenarios - 0.59**	**0.14**	0.0003	0.0005	0.01
SO2	**All Scenarios - 1.66**	**All Scenarios - 1.66**	NA	0.0003	0.003	0.01

Notes:
1. The emissions rates for the CTs are based on taking the total amount of emissions from both CTs for the 24-hr period and splitting these totals evenly between the two CTs.
2. Normal Cooling Tower emissions rates, since the cooling tower operates for 24 out of 24 hrs.
3. Normal EG & DFP emissions rates are divided by 48, since either the EG or DFP operates for only 30 min. of the 24 hrs.
4. Normal Aux. Boiler emissions rates divided by 6, since the Aux. Boiler operates for 4 out of the 24 hrs.

b. Based on CT commissioning (Use only Scenario F CT stack parameters)

Only 1 CT –Assume 24 hrs of continuous commissioning. Do not use the highest commissioning emissions rates for each pollutant, as these do not necessarily apply for the 24 hours of continuous commissioning operation, which is assumed to take place only for HRSG cleanup (0% load) commissioning.

Aux.Boiler – off

Cooling Tower – 24 hrs of operation

EG – off & DFP - off

Use the emissions rates in Table 20 along with Scenario F CT stack parameters to assess 24-hr impacts for commissioning mode.

TABLE 20
EMISSIONS RATES (LBS/HR)
FOR
24-HR COMMISSIONING MODE[1]

	One CT - Commissioning	Cooling Tower
NOx	**140.9**	NA
CO	**202.9**	NA
VOCs	**19.2**	NA
PM10	**10.0**	**0.56**
PM2.5	**0.59**	**0.14**
SO2	**1.66**	NA

Notes:
1. CT emissions rates are from Table 11 for the 0% load case.

c. Based on Partial Load Operation

CT1 – 24 hrs in steady-state (partial load) mode. (Use Scenario F CT stack parameters & Table 10 emissions rates.)

CT2 – 24-hrs in steady-state mode (full load) mode. (Use Scenario B CT stack parameters & Table 2 emissions rates.)

Aux. Boiler – 2 hrs of operation at CT startup, and 2 hrs at CT shutdown (1 hr during shutdown & 1 hr post-shutdown) = 4 hrs total

Cooling Tower – 24 hrs of operation

DFP – 30 min. of operation for worst case PM10, PM2.5 & SO2 impacts

Use Table 21 emissions rates to assess the 24-hr impacts from partial load operation. For CT1 use Scenario F CT stack parameters, and for CT2 use Scenario B CT stack parameters.

TABLE 21
EMISSIONS RATES (LBS/HR)
FOR
ASSESSING 24-HR IMPACTS
FROM PARTIAL LOAD OPERATIONS

	CT1[1]	CT2[2]	Cooling Tower[3]	Emergency Generator[4]	Diesel Fire Pump[4]	Aux. Boiler[5]
NOx	**9.6**	**14.2**	NA	0.09	0.09	0.12
CO	**5.8**	**8.8**	NA	0.22	0.006	0.38
VOCs	**2.0**	**2.0**	NA	0.06	0.004	0.07
PM10	**10.0**	**10.0**	**0.56**	0.013	0.003	0.11
PM2.5	**0.59**	**0.59**	**0.14**	0.0003	0.0005	0.01
SO2	**1.66**	**1.66**	NA	0.0003	0.003	0.01

Notes:
1. CT1 in partial load operation; emissions rates from Table 10.
2. CT2 in full load operation; emissions rates from Table 2.
3. Normal emissions rates for this piece of equipment.
4. Normal EG & DFP emissions rates are divided by 48, since either the EG or DFP operates for only 30 min. of the 24 hrs.
5. Normal AB emissions rates are multiplied by 1/6, since the AB operates for only 4 of the 24 hrs.

d. Based on Aux. Boiler only Operation

Both CTs – off

Aux. Boiler – 24 hrs of operation

Cooling Tower – off

Emergency Generator – off & DFP - off

Use full aux. boiler emissions rates (e.g., from Table 1)

5. Annual Impacts

a. Based on 6,807 hpy of CT operation & 181 startups/shutdowns *(5.a is not a modeling case per se, but is used along with 5.b to determine maximum emissions rates on a pollutant by pollutant basis.)*

Each CT - 6,807 hpy of steady-state operation (Use Table 2 CT emissions rates and Scenario B CT stack parameters)

Each CT – 154 hot starts (use Table 8 emissions rates x **2.45 hrs/start** x 154 starts) + 27 warm starts (use Table 7 emissions rates x **2.87 hrs/start** x 27 starts) + 181 shutdowns (use Table 9 emissions rates x **1 hr/shutdown** x 181 shutdowns) (Use Scenario B CT stack parameters.)

Aux. Boiler – 2,315 hpy (Use Table 2 emissions rates)

Cooling Tower 8,760 hpy (Use Table 2 emissions rates)

Emergency Generator – 26 hpy (Use Table 2 emissions rates)

Diesel Fire Pump – 26 hpy (Use Table 2 emissions rates)

b. Based on 8,760 hpy of CT operation (Use Table 2 emissions rates) *(5.b is not a modeling case per se, but is used along with 5.a to determine maximum emissions rates on a pollutant by pollutant basis.)*

Each CT - 8,760 hpy of steady-state operation (Use Scenario B CT stack parameters.)

Aux. Boiler – 2,315 hpy

Cooling Tower 8,760 hpy

Emergency Generator – 26 hpy

Diesel Fire Pump – 26 hpy

Since maximum annual emissions for some CT pollutants (e.g., NOx, CO & VOCs) occur in 5.a and maximum annual emissions for other CT pollutants (e.g., PM10) occur in 5.b, use the Table 22 emissions rates, which are the maximum for each pollutant, to assess annual impacts. Use the Scenario B CT stack parameters.

TABLE 22
EMISSIONS RATES (TONS/YR)
FOR
ASSESSING ANNUAL IMPACTS

	One CT	Both CTs	Cooling Tower[1]	Emergency Generator[2]	Diesel Fire Pump[2]	Aux. Boiler[3]
NOx	**67.424**[4]	**134.848**	NA	0.052	0.053	0.833
CO	**154.334**[4]	**308.668**	NA	0.136	0.004	2.628
VOCs	**17.155**[4]	**34.31**	NA	0.034	0.002	0.428
PM10	**43.8**[1]	**87.6**	**2.453**	0.008	0.002	0.706
PM2.5	**2.584**[1]	**5.168**	**0.613**	0.0002	0.0003	0.023
SO2	**7.271**[1]	**14.542**	NA	0.0002	0.002	0.058

Notes:
1. Based on 8,760 hpy of operation.
2. Based on 52 half-hour periods = 26 hpy of operation.
3. Based on 2,315 hpy of operation.
4. Based on 6,807 hpy of steady-state operation + 181 startup/shutdowns.

Appendix 2

Hazardous Air Pollutant Emissions Data

Appendix 2, Table 1a (Siemens)	**Inputs are in bold text.**				
Non-Criteria Emissions from the KRCD CPP Combustion Turbines - Siemens Scenario					
Max Hourly Fuel Input - One CT (MMBtu/hr-HHV) =			**2087.5**	(Note 1)	
Av. Annual Hourly Fuel Input - One CT (MMBtu/hr-HHV) =			**1,973**	(Note 1)	
Av. Annual Hourly Ammonia Emiisions Rate (lbs/hr) =			**11.9**		
Max. CT Annual Operating Hrs =			**8760**		
		Emission	Emission	Emission	Emission
	Emission	Rate	Rate	Rate	Rate
	Factor	One CT	Both CTs	One CT	Both CTs
Pollutant	lbs/MMBtu	lbs/hr	lbs/hr	tons/yr	tons/yr
	(Note 2)				
Ammonia (Note 3)	5 ppm	**12.50**	25.00	52.12	104.24
Propylene	**7.56E-04**	1.58	3.16	6.53	13.07
Hazardous Air Pollutants					
Acetaldehyde	**4.00E-05**	0.0835	0.167	0.34567	0.691339
Acrolein	**6.40E-06**	0.01336	0.02672	0.055307	0.110614
Benzene	**1.20E-05**	0.02505	0.0501	0.103701	0.207402
1,3 Butadiene	**4.30E-07**	0.000898	0.001795	0.003716	0.007432
Ethylbenzene	**3.20E-05**	0.0668	0.1336	0.276536	0.553071
Formaldehyde	**3.55E-04**	0.741063	1.482125	3.067818	6.135635
Hexane	**2.54E-04**	0.530225	1.06045	2.195002	4.39000
Naphthalene	**1.30E-06**	0.002714	0.005428	0.011234	0.022469
PAHs (Note 4)	**6.48E-07**	0.001353	0.002705	0.0056	0.01120
Propylene Oxide	**2.90E-05**	0.060538	0.121075	0.25061	0.501221
Toluene	**1.30E-04**	0.271375	0.54275	1.123426	2.246852
Xylene	**6.40E-05**	0.1336	0.2672	0.553071	1.106143
Totals HAPs		1.93	3.86	7.99	15.98
Totals HAPs + Ammonia & Propylene		16.01	32.02	66.65	133.29

Notes:

1. Max. hourly based on 4,175 MMBtu/hr for both CTs. Av. annual based on 3,946 MMBtu/hr for both CTs.
2. Emission factors are from AP-42 Table 3.1-3 of USEPA AP-42 (5th Ed., as revised through 4/00) except for ammonia (from the CT supplier) & proplyene, hexane & PAHs, which are California Air Toxics Emissions Facors (CATEF) in lbs/MMscf. The CATEF are divided by 1,020 Btus/ft3, a conservative (i.e., low) value for the fuel energy content. Only the formaldehyde emissions rate is reduced (by 50%) to reflect the use of an oxidation catalyst, although other emissions rates will be reduced considerably as well.
3. The hourly ammonia emissions rate is based on operation at 26F. The tpy of ammonia is based on its emissions rate at annual average conditions (63F).
4. PAHs = Polycyclic Aromatic Hydrocarbons.

Appendix 2, Table 1b (GE)		Inputs are in bold text.				
Non-Criteria Emissions from the KRCD CPP Combustion Turbines - GE Scenario						
Max Hourly Fuel Input - One CT (MMBtu/hr-HHV) =				**1,852**	(Note 1)	
Av. Annual Hourly Fuel Input - One CT (MMBtu/hr-HHV) =				**1,767**	(Note 1)	
Av. Annual Hourly Ammonia Emiisions Rate (lbs/hr) =				**10.8**		
Max. CT Annual Operating Hrs =				**8760**		
			Emission Rate	Emission Rate	Emission Rate	Emission Rate
		Emission Factor	One CT	Both CTs	One CT	Both CTs
Pollutant		lbs/MMBtu	lbs/hr	lbs/hr	tons/yr	tons/yr
		(Note 2)				
Ammonia (Note 3)		5 ppm	**11.30**	22.60	47.30	94.61
Propylene		**7.56E-04**	1.40	2.80	5.85	11.70
Hazardous Air Pollutants						
Acetaldehyde		**4.00E-05**	0.07408	0.14816	0.309491	0.618982
Acrolein		**6.40E-06**	0.011853	0.023706	0.049519	0.099037
Benzene		**1.20E-05**	0.022224	0.044448	0.092847	0.185694
1,3 Butadiene		**4.30E-07**	0.000796	0.001593	0.003327	0.006654
Ethylbenzene		**3.20E-05**	0.059264	0.118528	0.247593	0.495185
Formaldehyde		**3.55E-04**	0.65746	1.31492	2.746731	5.493462
Hexane		**2.54E-04**	0.470408	0.940816	1.965267	3.930533
Naphthalene		**1.30E-06**	0.002408	0.004815	0.010058	0.020117
PAHs (Note 4)		**6.48E-07**	0.0012	0.0024	0.005014	0.010028
Propylene Oxide		**2.90E-05**	0.053708	0.107416	0.224381	0.448762
Toluene		**1.30E-04**	0.24076	0.48152	1.005845	2.01169
Xylene		**6.40E-05**	0.118528	0.237056	0.495185	0.990371
Totals HAPs			1.71	3.43	7.16	14.31
Totals HAPs + Ammonia & Propylene			14.41	28.83	60.31	120.62

Notes:

1. Max. hourly based on 3,704 MMBtu/hr for both CTs. Av. annual based on 3,533 MMBtu/hr for both CTs.
2. Emission factors are from AP-42 Table 3.1-3 of USEPA AP-42 (5th Ed., as revised through 4/00) except for ammonia (from the CT supplier) & proplyene, hexane & PAHs, which are California Air Toxics Emissions Facors (CATEF) in lbs/MMscf. The CATEF are divided by 1,020 Btus/ft3, a conservative (i.e., low) value for the fuel energy content. Only the formaldehyde emissions rate is reduced (by 50%) to reflect the use of an oxidation catalyst, although other emissions rates will be reduced considerably as well.
3. The hourly ammonia emissions rate is based on operation at 26F. The tpy of ammonia is based on its emissions rate at annual average conditions (63F).
4. PAHs = Polycyclic Aromatic Hydrocarbons.

Appendix 2, Table 2 **Inputs are in bold text.**

Non-Criteria Emissions from the KRCD CPP Cooling Tower

HAP or TAC (Note 1)	Pollutant Conc. (mg/l) (Note 2)	Circ. Water Rate per Cell (gpm) (Note 3)	Cooling Tower Drift Rate (%)	Max. Annual Operating Hours	Emission Rate One Cell (lbs/hr)	Emission Rate **8 Cells** (lbs/hr)	Emission Rate One Cell tons/yr	Emission Rate **8 Cells** tons/yr
Aluminum	**2.62**	**15,560**	**0.0005**	**8760**	0.000102	8.16E-04	0.000447	0.003576
Ammonia	**54.98**	**15,560**	**0.0005**	**8760**	0.002142	1.71E-02	0.00938	0.07504
Arsenic	**0.01**	**15,560**	**0.0005**	**8760**	3.9E-07	3.12E-06	1.71E-06	1.36E-05
Barium	**0.13**	**15,560**	**0.0005**	**8760**	5.06E-06	4.05E-05	2.22E-05	0.000177
Copper	**0.44**	**15,560**	**0.0005**	**8760**	1.71E-05	1.37E-04	7.51E-05	0.000601
Fluoride	**0.5**	**15,560**	**0.0005**	**8760**	1.95E-05	1.56E-04	8.53E-05	0.000682
Manganese	**0.18**	**15,560**	**0.0005**	**8760**	7.01E-06	5.61E-05	3.07E-05	0.000246
Phosphorus	**22.49**	**15,560**	**0.0005**	**8760**	0.000876	7.01E-03	0.003837	0.030696
Silica	**149.95**	**15,560**	**0.0005**	**8760**	0.005841	4.67E-02	0.025583	0.204662
Zinc	**0.49**	**15,560**	**0.0005**	**8760**	1.91E-05	1.53E-04	8.36E-05	0.000669
TOTALS					0.009029	0.072229	0.039545	0.316363

Notes

1. Hazardous Air Pollutant per federal Clean Air Act or Toxic Air Contaminant per AB2588.
2. Based on 5 cycles of concentration.
3. The Siemens circ. water rate is used for both the Siemens and GE scenarios, as this circ. water rate (125,200 gpm/ 8 cells) provides for the greater emissions rates.

Appendix 2, Table 3				
Non-Criteria Emissions from the KRCD CPP Auxiliary Boiler				
	Inputs are in bold text.			
Max & Av. Annual Fuel Input (MMBtu/hr-HHV) =			**61.23**	
Max. Annual Operating Hrs =			**2,315**	
	Emission Factor lbs/MMBtu (Note 1)	Emission Rate lbs/hr	Emission Rate tons/yr	
Pollutant				
Propylene	**5.20E-04**	3.18E-02	3.69E-02	
Hazardous Air Pollutants				
Acetaldehyde	**3.04E-06**	1.86E-04	2.15E-04	
Acrolein	**2.65E-06**	1.62E-04	1.88E-04	
Benzene	**7.80E-04**	4.78E-02	5.53E-02	
Ethylbenzene	**6.77E-06**	4.15E-04	4.80E-04	
Formaldehyde	**1.21E-05**	7.41E-04	8.58E-04	
Hexane	**4.51E-06**	2.76E-04	3.20E-04	
Naphthalene	**2.94E-07**	1.80E-05	2.08E-05	
PAHs (Note 2)	**9.80E-08**	6.00E-06	6.95E-06	
Toluene	**2.60E-05**	1.59E-03	1.84E-03	
Xylene	**1.93E-05**	1.18E-03	1.37E-03	
Totals-HAPs		5.23E-02	6.06E-02	
Totals HAPs + Propylene		8.42E-02	9.74E-02	
Notes:				
1. Based on Ventura County APCD AB2588 Combustion Emissions Factors in lbs/MMscf and and fuel energy content of 1,020 Btus/ft3.				
2. Excludes naphthalene.				

Appendix 2, Table 4			Inputs are in bold text.			
Non-Criteria Emissions from the KRCD CPP Natural Gas-Fired emergency Generator						
Max Fuel Input (MMBtu/hr-HHV) =		**12.87**				
Max. Annual Operating Hrs (Note 1) =		**26**				
Pollutant	Emission Factor lbs/MMBtu (Note 2)	Calculated Emission Rate (lbs/hr)	Actual Hourly Emission Rate (lbs/hr) (Note 3)	Emission Rate tons/yr		
Propylene	**5.28E-03**	6.79E-02	3.40E-02	8.83E-04		
Hazardous Air Pollutants						
1,1,2,2-Tetrachloroethane	**4.00E-05**	5.15E-04	2.57E-04	6.69E-06		
1,1,2-Trichloroethane	**3.18E-05**	4.09E-04	2.05E-04	5.32E-06		
1,3-Butadiene	**3.60E-04**	4.63E-03	2.32E-03	6.02E-05		
1,3-Dichloropropene	**2.64E-05**	3.40E-04	1.70E-04	4.42E-06		
2-Methylnaphthalene	**3.32E-05**	4.27E-04	2.14E-04	5.55E-06		
2,2,4-Trimethylpentane	**2.50E-04**	3.22E-03	1.61E-03	4.18E-05		
Acenaphthene	**1.48E-07**	1.90E-06	9.52E-07	2.48E-08		
Acenaphthylene	**5.15E-07**	6.63E-06	3.31E-06	8.61E-08		
Acetaldehyde	**5.19E-04**	6.68E-03	3.34E-03	8.68E-05		
Acrolein	**5.78E-05**	7.44E-04	3.72E-04	9.67E-06		
Benzene	**2.14E-04**	2.75E-03	1.38E-03	3.58E-05		
Benzo(b)fluoranthene	**4.01E-08**	5.16E-07	2.58E-07	6.71E-09		
Benzo(e)pyrene	**4.15E-07**	5.34E-06	2.67E-06	6.94E-08		
Benzo(g,h,i)perylene	**7.39E-09**	9.51E-08	4.75E-08	1.24E-09		
Biphenyl	**2.12E-04**	2.73E-03	1.36E-03	3.55E-05		
Carbon Tetrachloride	**3.67E-05**	4.72E-04	2.36E-04	6.14E-06		
Chlorobenzene	**3.04E-05**	3.91E-04	1.96E-04	5.09E-06		
Chloroform	**2.85E-05**	3.67E-04	1.83E-04	4.77E-06		
Chrysene	**1.40E-08**	1.80E-07	9.01E-08	2.34E-09		
Ethylbenzene	**6.97E-05**	8.97E-04	4.48E-04	1.17E-05		
Eythylene Dibromide	**4.43E-05**	5.70E-04	2.85E-04	7.41E-06		
Fluoranthene	**2.85E-07**	3.67E-06	1.83E-06	4.77E-08		
Fluorene	**4.26E-07**	5.48E-06	2.74E-06	7.13E-08		
Formaldehyde	**4.62E-03**	5.94E-02	2.97E-02	7.73E-04		
Methanol	**2.50E-03**	3.22E-02	1.61E-02	4.18E-04		
Methylene Chloride	**2.00E-05**	2.57E-04	1.29E-04	3.35E-06		
n-Hexane	**1.11E-03**	1.43E-02	7.14E-03	1.86E-04		
Naphthalene	**2.45E-05**	3.15E-04	1.58E-04	4.10E-06		
PAH	**2.69E-05**	3.46E-04	1.73E-04	4.50E-06		
Phenanthrene	**1.81E-06**	2.33E-05	1.16E-05	3.03E-07		
Phenol	**2.40E-05**	3.09E-04	1.54E-04	4.01E-06		
Pyrene	**1.83E-07**	2.35E-06	1.18E-06	3.06E-08		
Styrene	**2.36E-05**	3.04E-04	1.52E-04	3.95E-06		
Tetrachloroethane	**2.48E-06**	3.19E-05	1.60E-05	4.15E-07		
Toluene	**2.34E-04**	3.01E-03	1.51E-03	3.91E-05		
Vinyl Chloride	**1.49E-05**	1.92E-04	9.59E-05	2.49E-06		
Xylene	**6.33E-04**	8.15E-03	4.07E-03	1.06E-04		
Totals-HAPs	0.0112	0.1440	0.0720	0.0019		
Totals HAPs + Propylene	0.0165	0.2119	0.1060	0.0028		
Notes:						
1. The emergency generator is anticipated to operate for 30 minutes/week for 52 weeks annually.						
2. Emissions factors from AP-42 (5th Ed., 7/00) Table 3.2-2 (Lean Burn) and CATEF data base.						
3. The actual hourly emissions rate is 50% of the calculated rate, as the emergency generator will only operate for 30 minutes in an hour.						

Appendix 2 Table 5

Non-Criteria Emissions from the KRCD CPP Diesel Fire Pump

Inputs are in bold text.

Max Fuel Input (MMBtu/hr-HHV) =	**2.4083**		(Note 1)
Max. Annual Operating Hrs (Note 1) =	**26**		(Note 2)

Pollutant	Emission Factor lbs/MMBtu (Note 2)	Calculated Emission Rate (lbs/hr)	Actual Hourly Emission Rate (lbs/hr) (Note 3)	Emission Rate tons/yr
Diesel Particulates	**2.79E-02**	6.72E-02	3.36E-02	8.73E-04

Notes:

1. The diesel fire pump is anticipated to operate for 30 minutes/week for 52 weeks annually.
2. Based on Ventura County APCD AB2588 Diesel Combustion Emissions Factors (internal combustion) in lbs/1,000 gallons. The total of all the applicable VCAPCD emissions factors, which is assumed to envelope diesel particulate emissions, is 3.911 lbs/1,000 gallons. Based on diesel fire pump fuel consumption of 17.2 gallons/hr and 2.4083 MMBtu/hr, and an output of 284 hp, the effective emissions factor is 0.107 g/bhp-hr or 2.79E-2 lbs/MMBtu.
3. The actual hourly emissions rate is 50% of the calculated rate, as the diesel fire pump will only operate for 30 minutes in an hour.

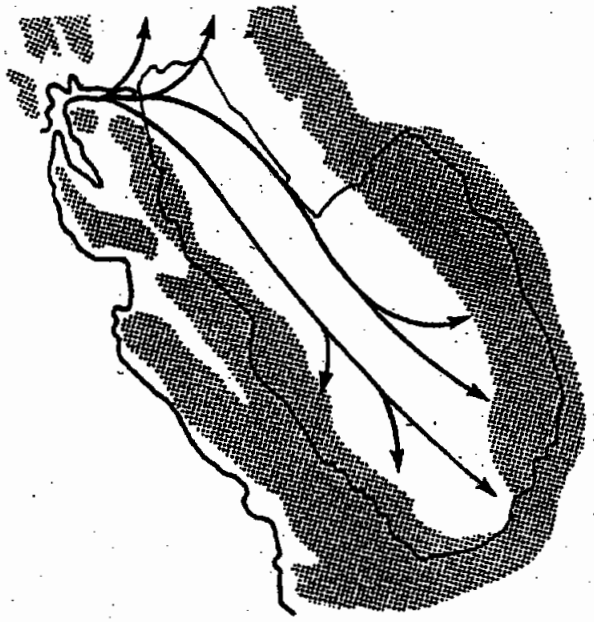
Appendix 3

San Joaquin Valley Air Flow Pattern Types and Quarterly and Annual Windrose Data for Fresno - 1989

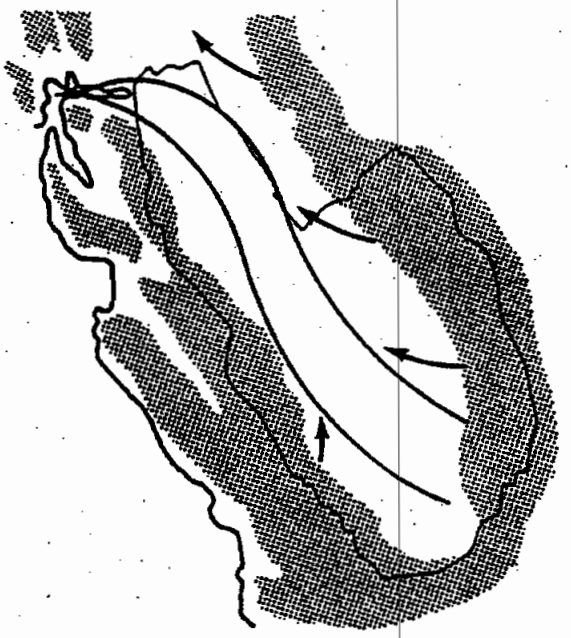
Figure 1

San Joaquin Valley Air Flow Pattern types

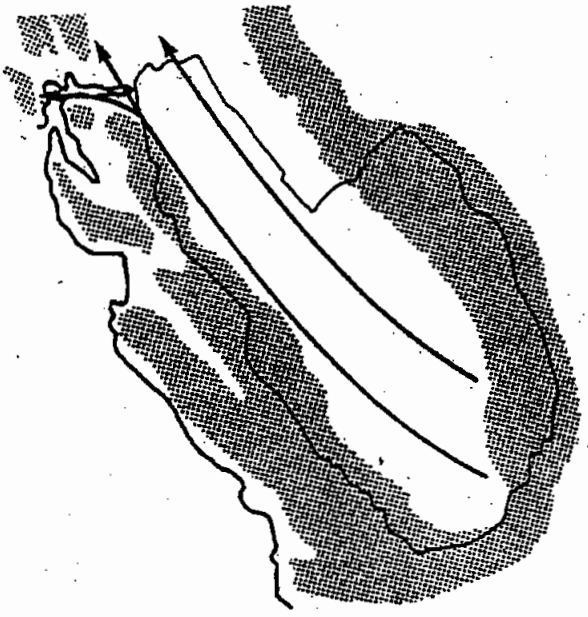
SAN JOAQUIN VALLEY AIR FLOW PATTERN TYPES



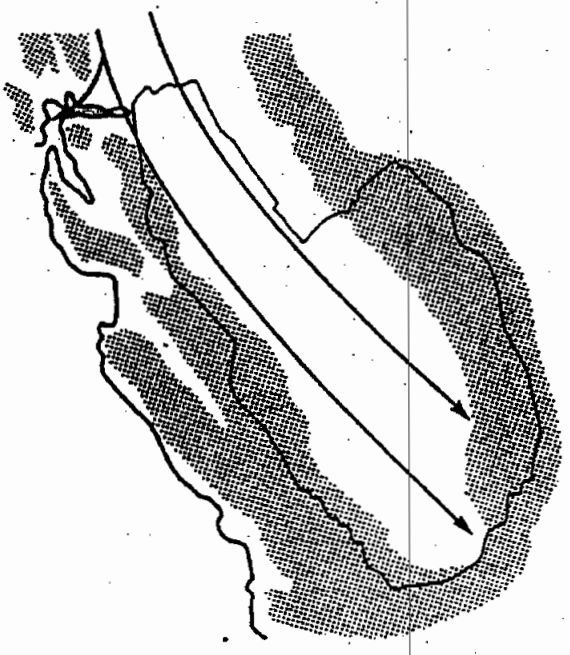
I Upvalley



II Downvalley / Drainage



III Southerly



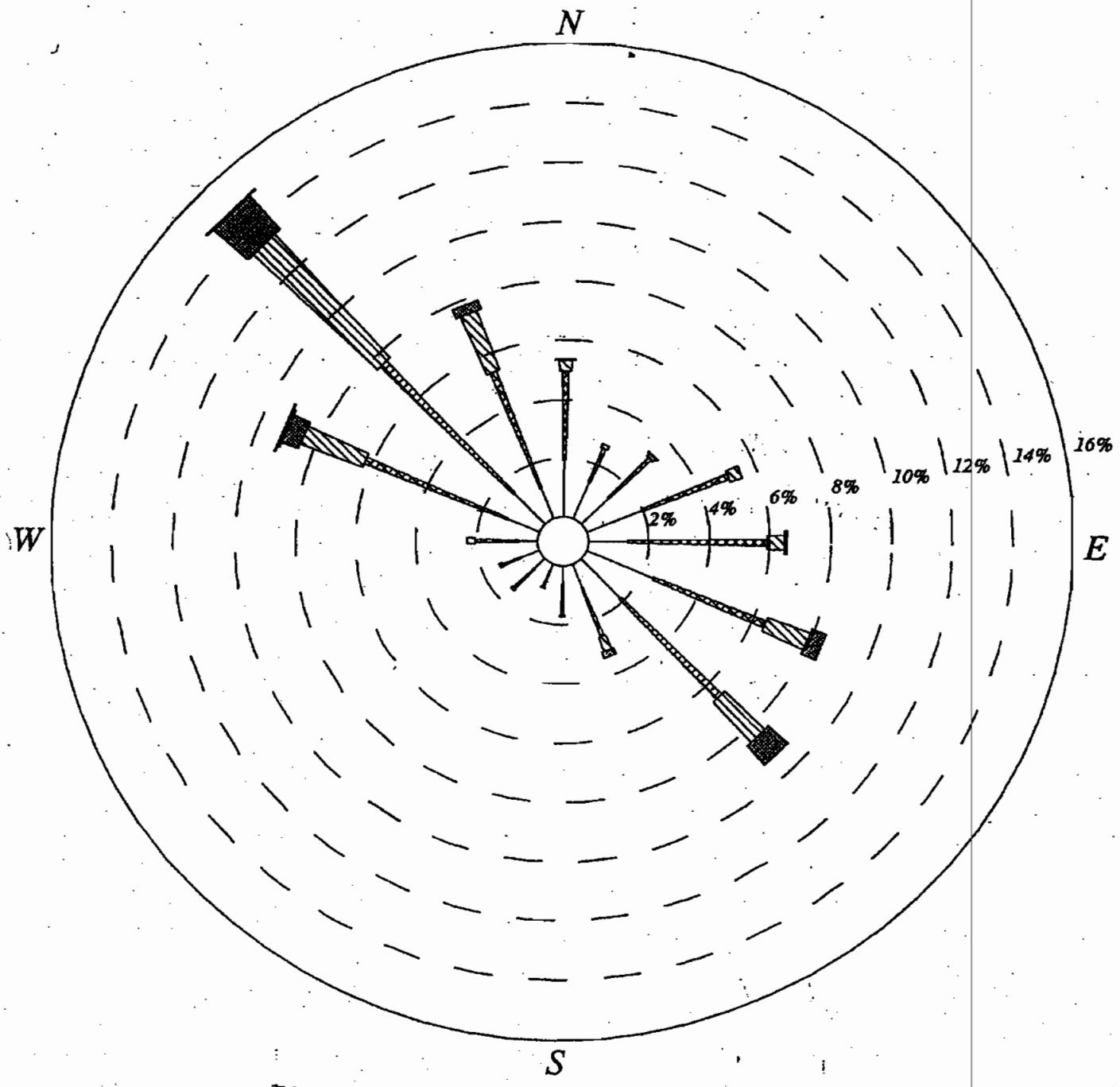
IV Northerly (No Marine Air)

Figures 2 through 6

Quarterly and Annual Windrose Data for Fresno 1989

FRESNO 1989 1ST QUARTER

January 1-March 31; Midnight-11 PM



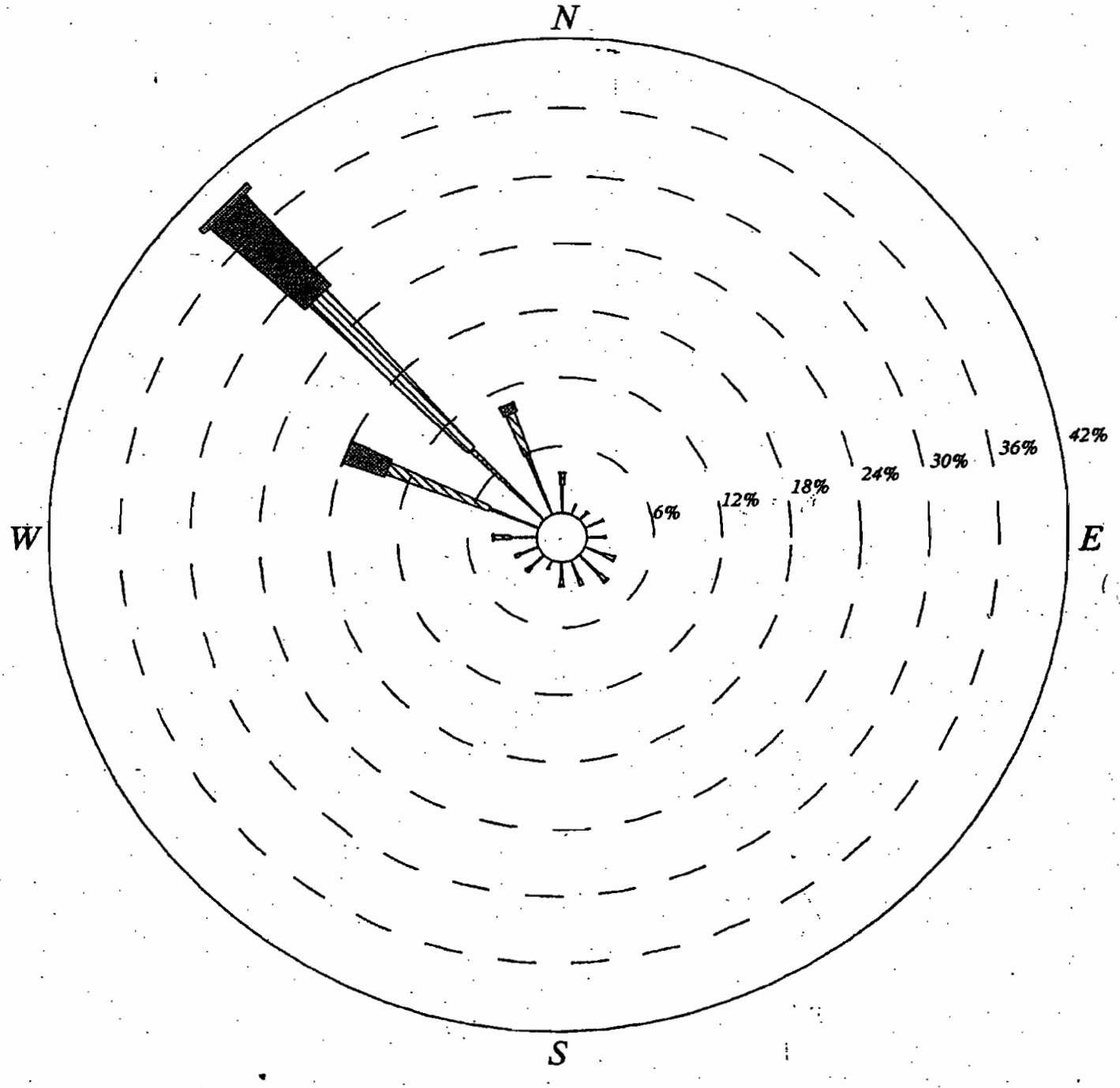
CALM WINDS 15.69%

NOTE: Frequencies indicate direction from which the wind is blowing.

WIND SPEED (KNOTS)

FRESNO 1989 2nd QUARTER

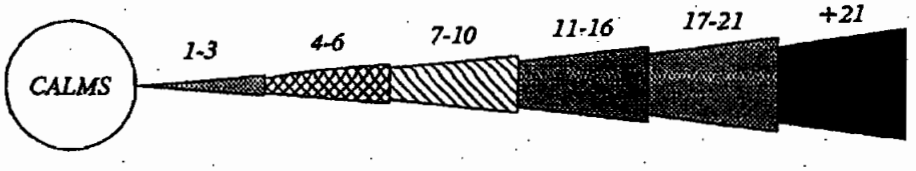
April 1-June 30; Midnight-11 PM



CALM WINDS 2.47%

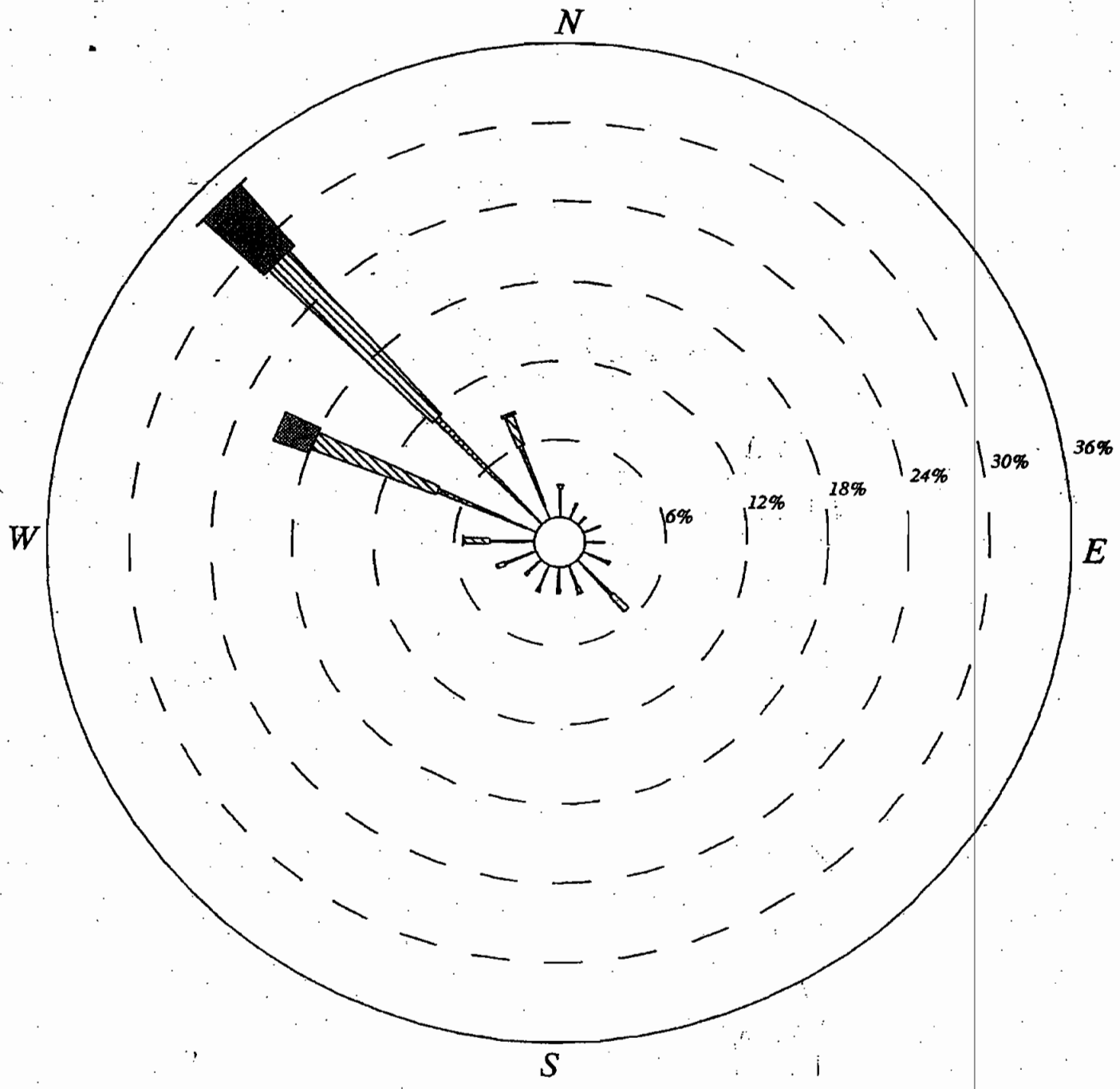
NOTE: Frequencies indicate direction from which the wind is blowing.

WIND SPEED (KNOTS)



FRESNO 1989 3rd QUARTER

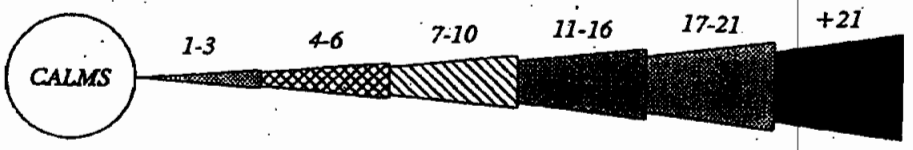
July 1-September 30; Midnight-11 PM



CALM WINDS 4.57%

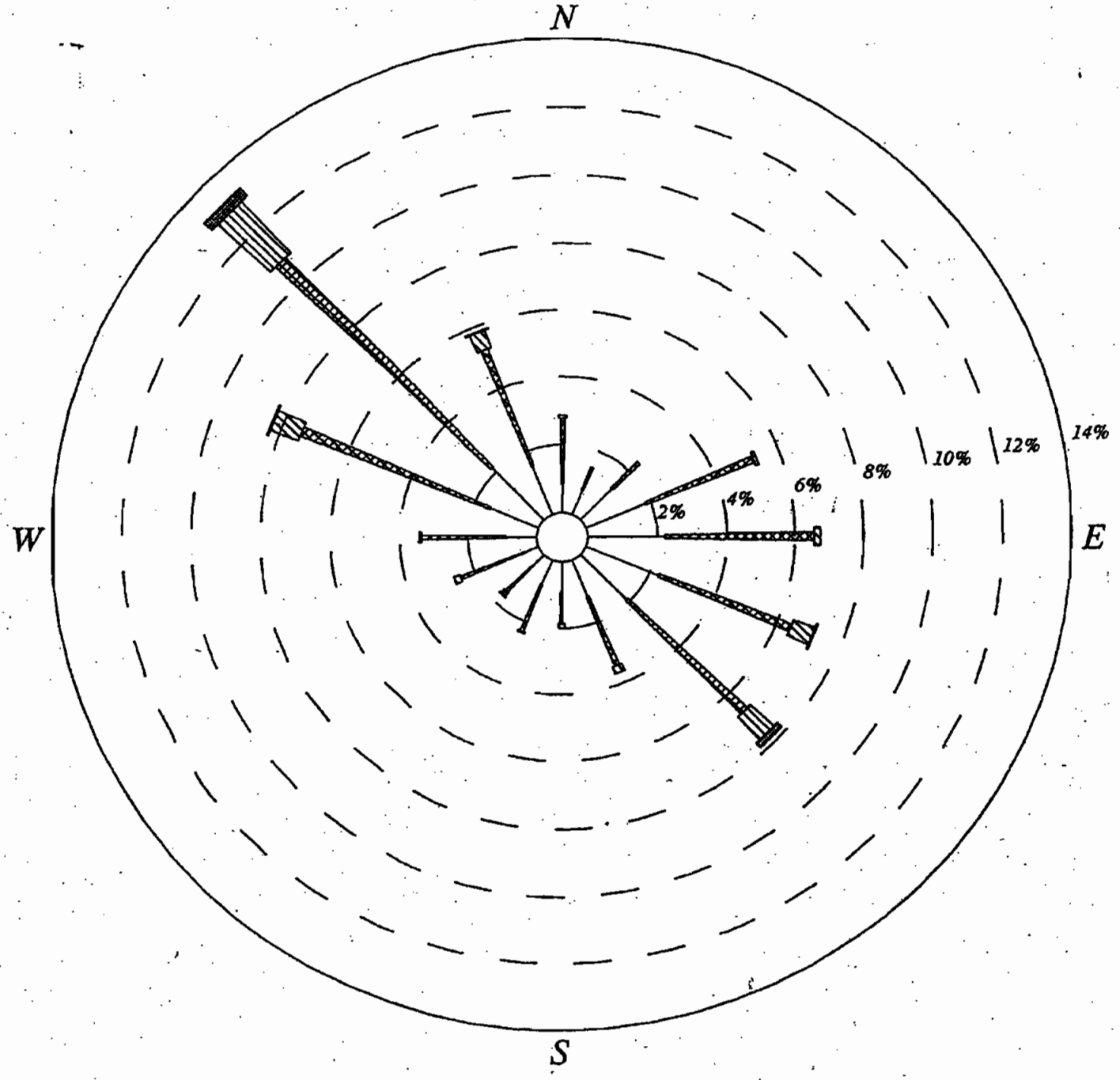
NOTE: Frequencies indicate direction from which the wind is blowing.

WIND SPEED (KNOTS)



FRESNO 1989 4th QUARTER

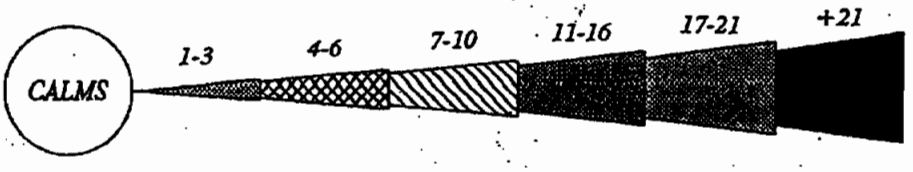
October 1-December 31; Midnight-11 PM



CALM WINDS 23.05%

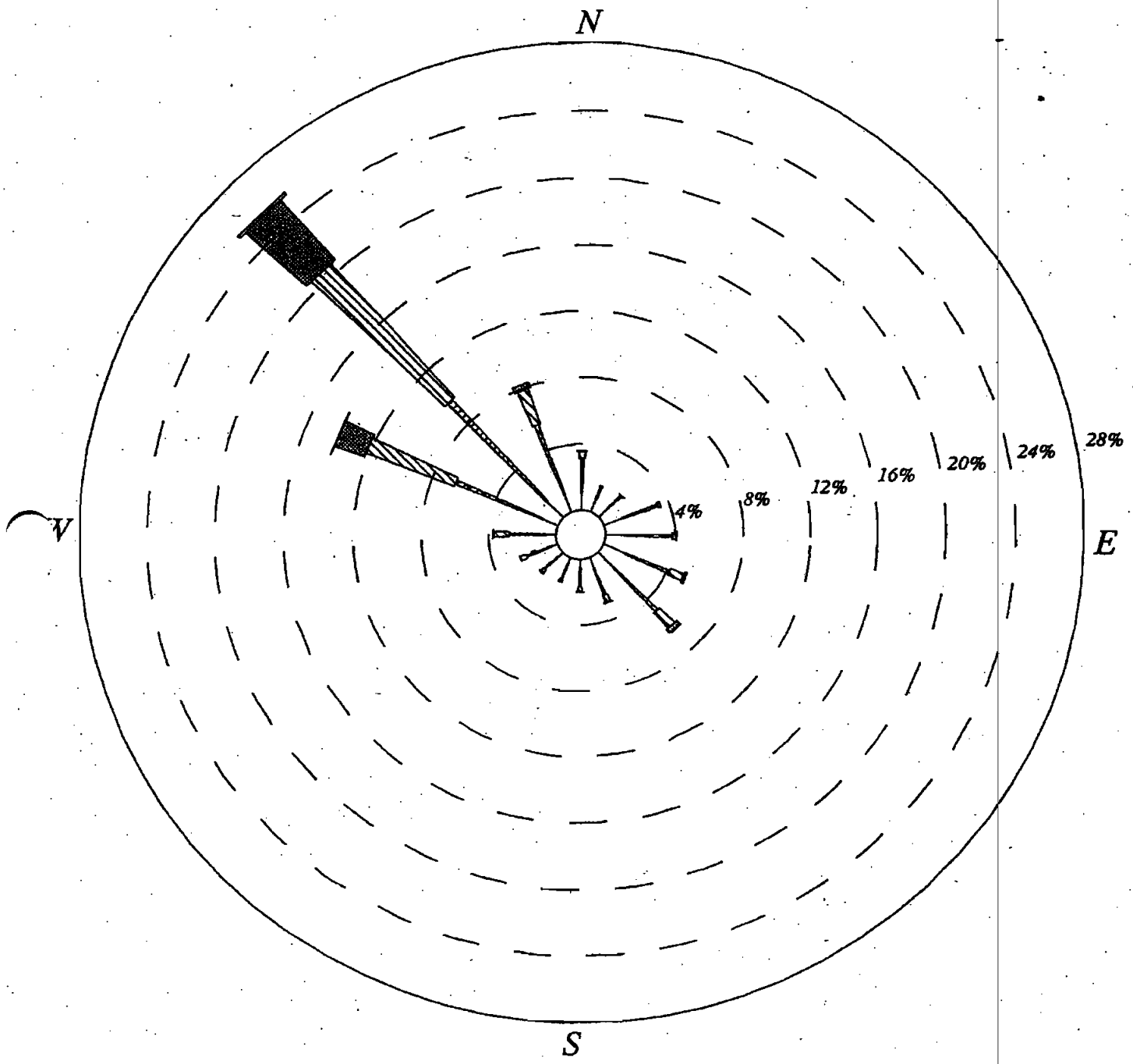
NOTE: Frequencies indicate direction from which the wind is blowing.

WIND SPEED (KNOTS)



FRESNO 1989

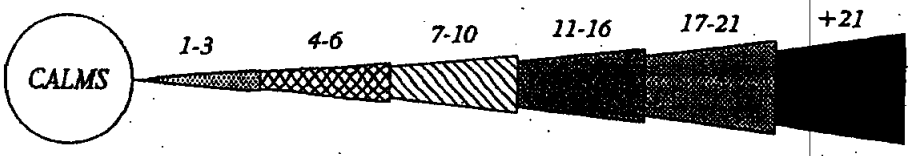
January 1-December 31; Midnight-11 PM



CALM WINDS 11.45%

NOTE: Frequencies indicate direction from which the wind is blowing.

WIND SPEED (KNOTS)



Appendix 4

Air Dispersion Modeling Protocol

PREVENTION OF SIGNIFICANT DETERIORATION (PSD) MODELING PROTOCOL FOR A POWER GENERATION FACILITY LOCATED IN FRESNO COUNTY

1.0 INTRODUCTION

This air dispersion modeling protocol is being submitted for a baseload power generating facility, the Kings River Conservation District Community Power Plant (KRCD CPP or Project). The Project will be located within Fresno County between the towns of Parlier and Selma (see Figure 1). The proposed Project, which will be owned by the Kings River Conservation District (KRCD), will be a natural gas-fired, combustion turbine (CT)-based, combined-cycle power generation facility. It will consist of two large combustion turbine-generator sets (e.g., GE Frame 7F, Siemens 501F) and one condensing steam turbine along with ancillary balance of plant equipment. Depending on the CT type selected, the Project is anticipated to have a nominal electric generating capacity of approximately 510-565 megawatts (MW) (net).

Air dispersion modeling will be performed to calculate the pollutant concentrations of both criteria and non-criteria air contaminants resulting from the Project. Modeling results for criteria pollutants will be compared to the applicable National Ambient Air Quality Standards (NAAQs) and PSD increments. These standards are summarized in Table 1. Additionally, air quality analyses for Air Quality Related Values (AQRV) including a visibility analysis and impacts on vegetation will be performed. The project's emissions also will be compared to New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAPS).

2.0 SOURCE DATA

2.1 *Emissions*

Emissions data for nitrogen oxides (NOx), carbon monoxide (CO), sulfur dioxide (SO2), particulate matter (PM10), and fine particulate matter (PM2.5) will be used to assess potential Project impacts. (Similarly, emissions data for PSD non-criteria pollutants will be used, as applicable, to assess potential impacts). Emissions will vary with season, depending on the ambient conditions (temperature and relative humidity affect turbine performance). Two separate cases of emissions data will be used to model the Project's potential impacts. The first case will consist of the peak hourly emissions, which occur during winter design conditions. The emissions estimated under these conditions will be the basis for the air quality modeling assessment of ambient concentration impacts for averaging times of 24 hours or less. The second case will consist of emissions under the annual average ambient conditions. These average hourly emissions will be used for the annual average air quality impact assessment.

CT emissions from the appropriate number of startup and shutdown sequences (e.g., number of sequences per day and per year) will be factored into both the peak hourly and annual average emissions calculations to ensure that worst case emissions are used. Similarly, CT emissions during partial load operation, as applicable, will be included as will the Project's emissions during the initial commissioning period. Emissions from the Project's smaller sources, e.g., cooling tower PM10 emissions, standby equipment, will also be included.

2.2 *Stack Parameters*

Stack parameters will be identified for modeling. This will include the stack coordinates, elevation of the stack base, stack height, exit cross-sectional area, exit velocities, and exit temperatures.

2.3 *Building Downwash Parameters*

The EPA computer model BPIP (Building Profile Input Program), version 04112, will be run to develop wind-direction-specific building downwash parameters for input to the U.S. EPA Short-Term Industrial Source Complex (ISCST3) model.

2.4 *Topography*

USGS 7.5-minute topographic maps will be used to develop a base map of the Project site and surrounding area and to develop modeling receptor locations and elevations.

3.0 DISPERSION MODELING METHODOLOGY

Air dispersion modeling will be performed to assess the Project impacts on NAAQS, PSD increments, and AQRV. Different air quality models will be used to perform these analyses based on the distance from the source to the calculated impacts. For short-range impacts (< 50 km), air dispersion modeling will be performed for the Project using the ISCST3 model. For long-range impacts (>50 km) the CALPUFF model will be used.

Other increment consuming sources which may have impacts within the Project's significant impact area would be included in the PSD increment analysis. Coordination with the EPA and SJVAPCD will be necessary to gather stack parameters and emissions from other increment consuming sources.

As noted above, the Project has not finalized its selection of combustion turbines, and at the request of the California Energy Commission (CEC), from which the Project is applying for a Site Certificate in parallel with this PSD permitting process, the Project has agreed to perform individual sets of air dispersion modeling runs for each of the two potential combustion turbine suppliers, i.e. GE and Siemens, for the air quality impact work associated with the CEC permitting process. In order to maintain modeling uniformity, The Project will similarly perform separate modeling for the GE and Siemens equipment for this PSD permitting process.

3.1 *NAAQS and PSD Increment*

The ISCST3 model (version 02035) will be used to compare Project impacts to NAAQS and PSD Class II increments. The Guidelines on Air Quality Models (GAQM) established AERMOD as the preferred air dispersion model on November 9, 2005, effective December 9, 2005. However, as stated in the GAQM, during the one-year period following promulgation of this guideline, protocols for modeling with ISCST3 may be approved.

The ISCST3 model was chosen for modeling of the Project's impacts because the inputs required for use of the AERMOD model are not yet available. The Project is obtaining a Site Certificate from the California Energy Commission (CEC) in parallel with this PSD permitting process. For air quality impact assessment, the CEC is working with the San Joaquin Valley Air Pollution

Control District (SJVAPCD), in which the Project is located. The SJVAPCD has indicated that it wants to compile the necessary AERMOD meteorological data rather than having individual projects do this on their own. While this approach will impose uniformity on the AERMOD data set, the SJVAPCD will not have the necessary data ready until sometime in or after December 2006. In order to maintain modeling uniformity and for the Project to maintain its schedule for PSD permitting, (i.e., protocol approval and initiation of modeling prior to December 9, 2006), the EPA and the Project have agreed that the use of ISCST3 rather than AERMOD makes the most sense in these circumstances.

Initial review of Class I areas shows that all areas are 50 km or further from the Project. Consequently, Class I increments need to be assessed with a long-range model, as discussed in Section 3.2

3.1.1 Modeling Options/Inputs

For pollutants with emissions greater than the Significant Emission Rates (see Table 1), the EPA ISCST3 (version 020305) will be used to calculate the concentrations of SO2, NO2, CO, PM10, and PM2.5 as well as non-criteria air pollutants. The ISCST3 model has the ability to predict pollutant concentrations for numerous sources in simple and complex terrain.

TABLE 1
NAAQS and PSD: Regulatory Standards and Significance Levels

			All Areas	Class II Areas		Class I Areas		
Pollutant	Averaging Period	SER	NAAQS	PSD Increment	SIL	PSD Increment	EPA SIL	Significant Monitoring Concentrations
		ton/yr	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3
NO2	Annual	40	100	25	1	2.5	0.1	14
SO2	Annual	40	80	20	1	2	0.1	
	24-hour		365	91	5	5	0.2	13
	3-hour		1300	512	25	25	1.0	
PM10	Annual	15	50	17	1	4	0.2	
	24-hour		150	30	5	8	0.3	10
PM2.5	Annual		15					
	24-hour		65					
CO	8-hour	100	10000		500			575
	1-hour		40000		2000			
Lead	Calendar Quarter	0.6	1.5					0.1
Fluorides	Annual	3						
	24-hour							0.25
Sulfuric Acid Mist	Annual	7						
	1-hour							0.2
Hydrogen sulfide	Annual	10						
	1-hour							0.2
Total reduced sulfur	Annual	10						
	1-hour							
Reduced sulfur	Annual	10						

compounds									
	1-hour								10
notes: SER (Significant Emission Rate)									
NAAQS (National Ambient Air Quality Standards)									
PSD (Prevention of Significant Deterioration)									
SIL (Significant Impact Level)									

The ISCST3 model will be run with the regulatory default option. The land-use typing methodology described by Auer (1978. Correlation of Land Use and Cover with Meteorological Anomalies. *Journal of Applied Meteorology*, 17(5): 636–643) will be used to assess whether urban or rural dispersion coefficients will be used as input.

The model will be used to predict airborne concentrations of criteria and non-criteria pollutants. Point source emission rates of 1 gm/second will be input to ISCST3. The Project's emissions rates for each pollutant of interest can be multiplied by the resulting "normalized" concentrations from the model to provide the Project's predicted pollutant concentrations.

3.1.2 Receptors

A Cartesian coordinate system will be used for receptor placement. Receptor locations and elevations will be gathered from the USGS 7.5-minute topographic maps from Digital Elevation Model (DEM) files. The smallest available spacing for 7.5-minute DEM files in STDS format for the Project region is at 30 meters. Initial runs will include spacing of 90 meters out to 5 km from the facility and 240 meter spacing from 5 km to 10 km from the facility. Fenceline receptors will be spaced at intervals of 25 meters.

If the peak concentrations are predicted in coarse grid areas, additional modeling runs will be conducted with a receptor grid spacing of 30 meters surrounding the peak concentration extending out to the next grid point in flat terrain or extending two grid points in complex terrain. Alternatively, in complex terrain, 30 meter grid spacing will be located between the peak concentration (highest first high – H1H) and the next highest concentration (highest second high –H2H) if the H1H and H2H concentrations are located in close proximity to each other.

Figures will be provided that show the receptor locations relative to the Project.

3.1.3 Meteorological Data

Based on PSD regulations, which require five years of readily available meteorological data, the Project will use Fresno meteorological data for the years 1987 through 1991. The SJVAPCD has compiled Fresno surface data with Oakland upper air data into an ISCST3-ready format for these data. This is the most recent five year data set available from the SJVAPCD, the air district in which the Project is located. For non-PSD modeling (e.g., New Source Review), the SJVAPCD has identified 1989 as the worst-case meteorological data set and generally requires the use of this one year of data rather than five years. Therefore, the use of the five year data set 1987 – 1991, which includes the SJVAPCD's worst case data set is the most reasonable means of complying with the PSD requirement for five years of meteorological data.

3.1.4 Ambient Concentrations

The Project site will be located approximately 3.5 miles west-southwest of the Parlier air quality monitoring site. The Project and monitoring sites are both rural sites in agricultural areas. Data collected at the Parlier monitoring site include nitrogen dioxide (NO2) and ozone (O3). Data are available on the California Air Resources Board (CARB) website (http://www.arb.ca.gov/adam/welcome.html) for the years 2003-2005.

Carbon monoxide (CO), sulfur dioxide (SO2), particulate matter (PM10), fine particulate (PM2.5), and lead (Pb) are not measured at the Parlier monitor. Other monitoring sites have collected air quality data that would be representative or conservative of conditions at the Project site. Figure 2 illustrates the location of the other monitoring sites, the 2001 emissions inventory, and Parlier. (Source CARB CHAPIS website: http://www.arb.ca.gov/gismo/chapis_v01_6_1_04/).

Carbon monoxide data from the Fresno-Drummond station will be used as a conservative representation of the site. This Fresno monitor is located 14 miles northwest of the Project site in the southern portion of Fresno in an urban setting, so CO concentrations from this site would be expected to be a conservative measure of CO background concentrations at the Project site. The most recent three years of data with 1- and 8-hour CO data available are 2002-2004. These data were obtained from the CARB CD "California Ambient Air Quality Data 1980-2004".

Background SO2 concentrations are available in 2003 from two sites in Fresno, at Fremont School and Mobile. The other most recent SO2 data were collected in Bakersfield in 1999-2001. Data from all of these sites would be conservative estimates of the existing SO2 concentrations in the Project area. On the CARB Community Health Air Pollution System (CHAPIS) website, SO2 emissions (based on 2001 emissions inventory) were greater in the Cities of Fresno and Bakersfield than around Parlier. Site monitoring data were obtained from the CARB CD "California Ambient Air Quality Data 1980-2004".

PM10 data measured at the Fresno-Drummond station over the years 2003-2005 will be used to conservatively represent background PM10 concentrations from the Project. Sources of particulate emissions would be greater around the Fresno-Drummond monitoring site than the Project site (see Figure 2 from CARB CHAPIS website).

PM2.5 data from 2003-2005 are available from the Fresno-Hamilton/Winery and Fresno-First Street stations. Based on data for PM10 presented on the CHAPIS website, either of these sites would be a conservative representation of the background PM2.5 data at the Project site.

Monthly lead data are available at the Fresno-First Street monitor for the years 2000 – 2002. These data will be used to conservatively estimate the quarterly lead concentrations in the Project area.

3.1.5 Criteria Pollutant Emissions

ISCST3 modeling will be performed for SO2, NO2, PM10, PM2.5, and CO. Peak hourly emission rates, calculated from winter design conditions, will be used to calculate 1-hour average concentrations (CO impacts), 3-hour average impacts (SO2), 8-hour average impacts (CO), and 24-hour concentration increases (SO2, PM10, and PM2.5). Emissions derived for annual ambient conditions will be used to assess annual impacts (SO2, NO2, PM10, and PM2.5).

3.1.5.1 NO_2 Modeling

For the initial modeling run for NOx, all emissions will be assumed to be emitted as NO2. However, if the predicted NO2 concentrations show significant impacts and violations of the AAQS, then more refined analyses will be performed.

The first level assumes all NOx emissions will be emitted as NO2. The second level assumes that 75 percent of the NOx emissions are emitted as NO2. The third step uses the ozone limiting method (OLM).

Two levels exist within the OLM calculations. The first of these calculations is applicable to annual NO2 impact only. This method is described by the following equation:

$$[NO_2]_{ann} = \{(0.1) \times [NO_x]_{pred}\} + MIN\{(0.9) \times [NO_x]_{pred}, \text{ or } (46/48) \times [O_3]_{bkgd}\}$$

Where:

$[NO_2]_{ann}$	is the predicted annual NO_2 concentration
$[NO_x]_{pred}$	is the model-predicted annual NO_x concentration
MIN	means the minimum of the two quantities within the brackets
$[O_3]_{bkgd}$	is the representative annual average ambient O3 concentration
(46/48)	is the molecular weight of NO_2 divided by the molecular weight of O_3

If the annual NO2 impacts are above the AAQS, then the next step would be to use the ISC3_OLM model, which includes a concurrent set of hourly ozone data. This model is not an EPA guideline model, but its use has been allowed by the SJVAPCD. Hourly ozone data from 1989 would be used. The SJVAPCD will be consulted prior to starting this analysis to confirm an acceptable choice of ozone data. The draft guidelines "Representative Ozone Data for Ozone Limiting Method" (OLM/ARM Work Group, 1997) will be followed in the preparation of the ozone data file.

3.2 *PSD Class I Increment and AQRVs*

The CALPUFF Lite model (version 5.711a) will be used to assess potential long range impacts from the Project including increment consumption, visibility, and AQRVs in Class I areas. Figure 3 provides a schematic of the flow of the CALPUFF modeling and its postprocessors to obtain concentrations, visibility impairment, and deposition.

3.2.1 Modeling Options/Inputs

The CALPUFF model (version 5.711a) will be run in a screening mode. The options listed in Tables 2 through 8 will be used as input to the CALPUFF model and its postprocessors, POSTUTIL, and CALPOST.

BCKNH3	Ammonia background (ppb)	10
BCKO3	Ozone default (ppb) (Use only for missing data)	60
CSPEC	Names of species modeled (for MESOPUFF II chemistry)	SO2
		SO4
		NOx
		HNO3
		NO3
		PM10
ICON	Output concentrations? (1 = Yes)	1
IDRY	Output dry deposition flux? (1 = Yes)	1
ILANDUIN	Land use type for domain (20 = Urban; 40 = Forested)	
IVIS	Output RH for visibility calculations (1 = Yes)	1
IWET	Output wet deposition flux? (1 = Yes)	1
MCHEM	MESOPUFF-II Chemistry? (1 = Yes)	1
MCTADJ	Terrain adjustments to plume path (3 = Plume path)	3
MDISP	Method for dispersion coefficients (3 = PG & MP)	3
MDRY	Model dry deposition? (1 = Yes)	1
METFM	Format of input meteorology (1 = CALMET, 2 = ISC)	2
MPARTL	Model partial plume penetration? (0 = No)	1
MROUGH	Adjust PG for surface roughness? (0 = No)	0
MTIP	Treat stack tip downwash? (1 = Yes)	1
MTRANS	Model transitional plume rise? (1 = Yes)	1
MWET	Model wet deposition? (1 = Yes)	1
NSE	Number of species emitted	
NSPEC	Number of species modeled (for MESOPUFF II chemistry)	6
RNITE1	Nighttime SO2 loss rate (%/hr)	0.2
RNITE2	Nighttime NOx loss rate (%/hr)	2.0
RNITE3	Nighttime HNO3 loss rate (%/hr)	2.0
WSCALM	Minimum wind speed (m/s)	0.5
XMAXZI	Maximum mixing height (m)	3000
XMINZI	Minimum mixing height (m)	50

NFILES	Number of CALPUFF data files	1
NSPECINP	Number of species to process from CALPUFF runs	6
NSPECOUT	Number of species to write to output file	6
NSPECCMP	Number of species to compute from those modeled	1
MNITRATE	Recompute the HNO3/NO3 partition for concentrations?	0
	The following NSPECINP species will be processed	
ASPECI	SO2	SO2
	SO4	SO4
	NOX	NOX
	HNO3	HNO3
	NO3	NO3
	PM10	PM10
	The following NSPECOUT species will be written out	
ASPECO	SO2	SO2
ASPECO	SO4	SO4
ASPECO	NOX	NOX
ASPECO	HNO3	HNO3
ASPECO	NO3	NO3
ASPECO	PMC	PMC
CSPECCMP	Following species computed from processed input species:	PMC
	SO2	0
	SO4	1.375
	NOX	0
	HNO3	0
	NO3	1.29
	PM10	1.0

NFILES	Number of CALPUFF data files	1
NSPECINP	Number of species to process from CALPUFF runs	6
NSPECOUT	Number of species to write to output file	8
NSPECCMP	Number of species to compute from those modeled	3
MNITRATE	Recompute the HNO3/NO3 partition for concentrations?	0
	The following NSPECINP species will be processed	
ASPECI	SO2	SO2
	SO4	SO4
	NOX	NOX
	HNO3	HNO3
	NO3	NO3
	PM10	PM10
	The following NSPECOUT species will be written out	
ASPECO	SO2	SO2
	SO4	SO4
	NOX	NOX
	HNO3	HNO3
	NO3	NO3
	SOA	SOA
	EC	EC
	SOIL	SOIL
CSPECCMP	Following species computed from processed input species:	SOA
	SO2	0.0
	SO4	0.0
	NOX	0.0
	HNO3	0.0
	NO3	0.0
	PM10	0.25
CSPECCMP	Following species computed from processed input species:	EC
	SO2	0.0
	SO4	0.0
	NOX	0.0
	HNO3	0.0
	NO3	0.0
	PM10	0.23
CSPECCMP	Following species computed from processed input species:	SOIL
	SO2	0.0
	SO4	0.0
	NOX	0.0
	HNO3	0.0
	NO3	0.0
	PM10	0.52

NFILES	Number of CALPUFF data files	2
NSPECINP	Number of species to process from CALPUFF runs	6
NSPECOUT	Number of species to write to output file	2
ASPECI	The following NSPECINP species will be processed	SO2
		SO4
		NOX
		HNO3
		NO3
		PM10
	The following NSPECOUT species will be written out	
ASPECO	Nitrogen	N
	Sulfur	S
CSPECCMP	Following species computed from processed input species:	N
	SO2	0
	SO4	0.292
	NOX	0.304
	HNO3	0.222
	NO3	0.452
	PM10	
CSPECCMP	Following species computed from processed input species:	S
	SO2	0.500
	SO4	0.333
	NOX	0
	HNO3	0
	NO3	0
	PM10	0

ASPEC	Species to process (separate runs for PM10, NOx, SO2)	By species
ILAYER	Layer/deposition code (1 = CALPUFF concentrations; -3 = wet+dry deposition fluxes)	1
LBACK	Add Hourly Background Concentrations/Fluxes?	F
	Averaging time(s) reported	
L1HR	1-hr averages	F
L3HR	3-hr averages	as required
L24HR	24-hr averages	as required
LRUNL	Run lengtyh (annual)	T
LT50	Top 50 table for each averaging time selected	T

ASPEC	Species to process		VISIB
ILAYER	Layer/deposition code (1 = CALPUFF concentrations; -3 = wet+dry deposition fluxes)		1
RHMAX	Maximum relative humidity (%) used in particle growth curve		95
	Modeled species to be included in computing the light extinction		
LVSO4	Include SO4?		T
LVNO3	Include NO3?		T
LVOC	Include Organic Carbon?		T
LVPMC	Include Coarse Particles?		F
LVPMF	Include Fine Particles?		T
LVEC	Include Elemental Carbon?		T
LVBK	when ranking for TOP-N, TOP-50, and Exceedance tables include BACKGROUND?		T
SPECPMC	Species name used for particulates in MODEL.DAT file: COARSE =		PMC
SPECPMF	Species name used for particulates in MODEL.DAT file: FINE =		SOIL
	Extinction Efficiencies (1/Mm per ug/m**3)		
EEPMC	PM COARSE =		0.6
EEPMF	PM FINE =		1.0
EEPMCBK	Background PM COARSE		0.6
EESO4	SO4 =		3.0
EENO3	NO3 =		3.0
EEOC	Organic Carbon =		4.0
EESOIL	Soil =		1.0
EEEC	Elemental Carbon =		10.0
MVISBK	Method for background light extinction (2 = Hourly RH adjust; 6 = FLAG seasonal f(RH))		2
RHFAC	Monthly RH adjustment factors from FLAG (unique for each Class I area)		yes if 6
	Background monthly extinction coefficients (FLAG) unique for each Class I area		
BKSO4	All hygroscopic as SO4 (raw extinction value without scattering efficiency adjustment)		0.2
BKNO3			0
BKPMC			0
BKOC			0
BKSOIL	Assume all non-hygroscopic species as Soil		4.5
BKEC			0
BEXTRAY	Extinction due to Rayleigh scattering		10.0
	Averaging time(s) reported		
L1HR		1-hr averages	F
L3HR		3-hr averages	F
L24HR		24-hr averages	T
LRUNL		Run lengtyh (annual)	F

ASPEC	Species to process (separate runs for S and N)	N or S
ILAYER	Layer/deposition code (1 = CALPUFF concentrations; -3 = wet+dry deposition fluxes)	-3
LBACK	Add Hourly Background Concentrations/Fluxes?	F
	Averaging time(s) reported	
L1HR	1-hr averages	F
L3HR	3-hr averages	F
L24HR	24-hr averages	F
LRUNL	Run length (annual)	T
LT50	Top 50 table for each averaging time selected	T

3.2.2 Receptors

The model will be used to predict the increment consumption at Class I areas within 100 km and slightly beyond 100 km. Table 9 lists the Class I areas within 200 km of the project. Initial PSD modeling will include Class I areas within 150 km. Based on these results, the additional Class I areas may be included up to 200 km. Receptor rings, each ring at distances equal to the distance to each Class I area will be entered as discrete receptor locations, with 2-degree spacing along each ring. Receptor elevations will be set to the highest elevation within the Class I area.

Table 9. Class I Wilderness Areas within 200 km from Project

Wilderness Area	Distance and Direction from Source
Dome land Wilderness Area	120 km SE
Emigrant Wilderness Area	115 km N
Hoover Wilderness Area	150 km N
John Muir Wilderness Area	65 km NE
Kaiser Wilderness Area	70 km NNE
Kings Canyon NP	60 km E
Minarets Wilderness Area	110 km NNE
Mokelumme Wilderness Area	200 km NNW
Pinnacles Wilderness Area	135 km W
San Rafael Wilderness Area	180 km SSW
Sequoia NP	50 km ESE

Table 9. Class I Wilderness Areas within 200 km from Project	
Ventana Wilderness Area	160 km WSW
Yosemite NP	90 km N

3.2.3 Meteorological Data

As recommended in the Interagency Workbook on Air Quality Modeling (IWAQM, 1998), five years of meteorological data will be used as input to the CALPUFF model. The data will be input as an extended ISCST meteorological data set. Fresno Airport meteorological data (in SAMSON format) and corresponding upper air data from Oakland Airport for the years 1986-1990 will be processed by CPRAMMET. Table 10 lists the input parameters and values that will be used by the preprocessor program.

Table 10. Site Characteristics

Description	Value
Minimum Monin-Obukhov Length (L) stable conditions	15 m
Anemometer Height	10 m
Surface Roughness (Z0) at meteorological site	0.25 m
Surface Roughness (Z0) over domain (forested)	1.0 m
Noon-time Albedo (r) for forested-agricultural terrain	0.15
Bowen Ratio (B0) for forested-agricultural terrain	1.0
Anthropogenic Heat Flux	0.0 W/m2
Fraction of Net Radiation Absorbed at Ground	0.15

3.3 *Data Bases and Other Files*

All data used in performing the air quality modeling will be submitted in electronic format. These data will include meteorological data, input files, output files, and any other data bases included in the modeling. The data will be provided on CD-ROM. Documentation will be provided that identifies each file.

4.0 MODELING RESULTS

4.1 *Criteria Pollutants*

The modeled concentrations will be added to the ambient concentrations. The resulting total concentrations will be compared to the applicable AAQS. These results will be summarized. If the existing concentrations already show a violation of the AAQS, the Project impacts will be compared to EPA-significant impact levels, as shown in Table 1. Isopleth drawings will be provided that show the areas of significant impact of the Project.

4.2 *Non-Criteria Pollutants*

For those non-criteria pollutants with significant emission rates, modeled concentrations will be compared to significant monitoring concentrations. The use of natural gas as a fuel is expected to minimize emissions of non-criteria pollutants.

4.3 *Visibility and AQRVs*

Although official standards are not available to assess the Project's impacts on visibility and other AQRVs, some recommendations are available. The Federal Land Managers' Air Quality Related Values Work Group (FLAG) has provided a framework for evaluation of these impacts in their Phase I Report (2000). For visibility, initially the Project will compare its change in extinction with a 5 percent threshold. If the change in extinction is below 5 percent no further analysis will be required. Deposition Analysis Thresholds (DATs) have been established for nitrogen and sulfur by the National Park and Fish and Wildlife Services. The DAT is the additional amount of deposition that triggers a management concern, not necessarily the amount that constitutes an adverse impact to the environment. The Project will compare its deposition rates with the western Class I area DAT of 0.005 Kg/ha/yr for nitrogen and sulfur.

Figure 1. Project Location

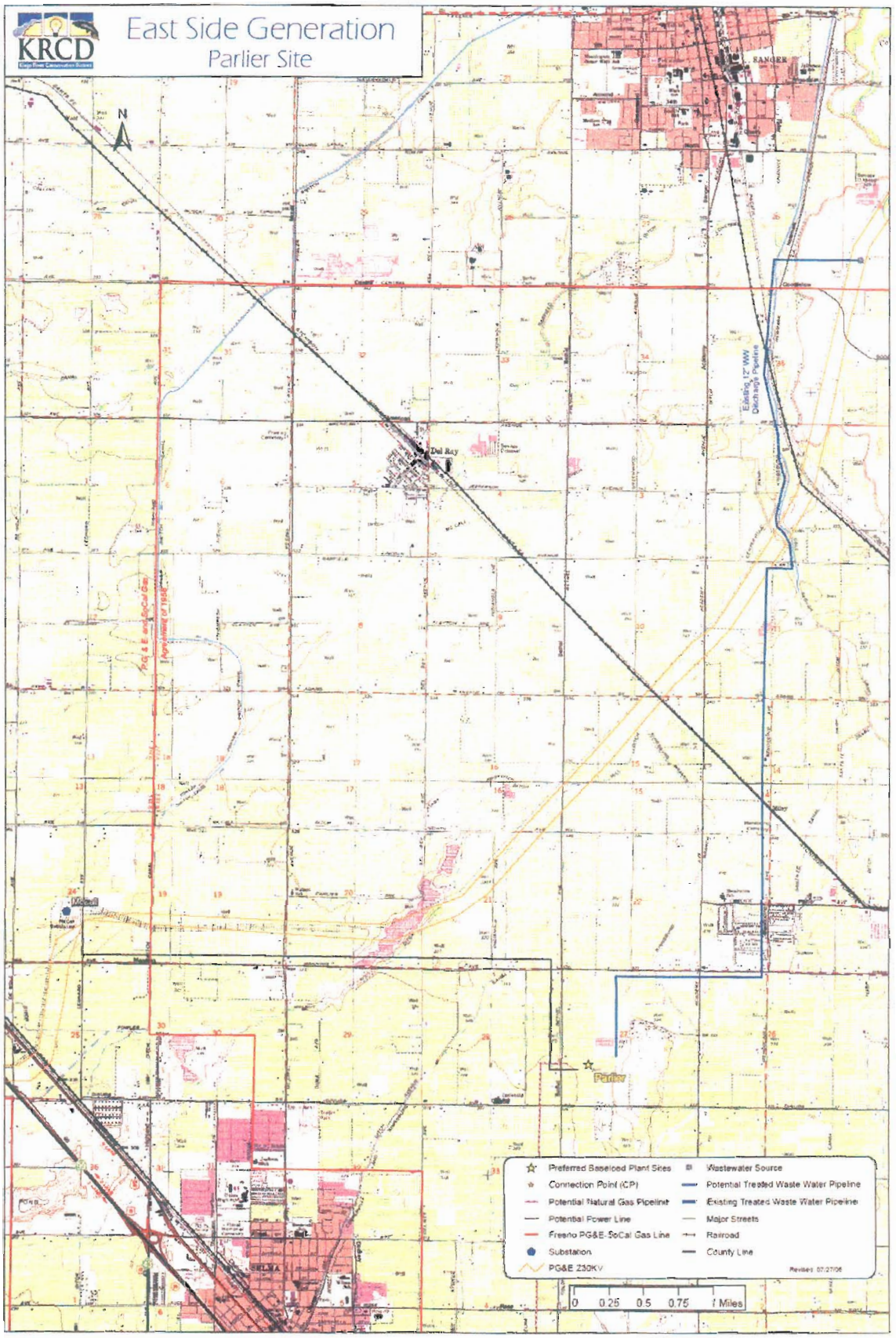
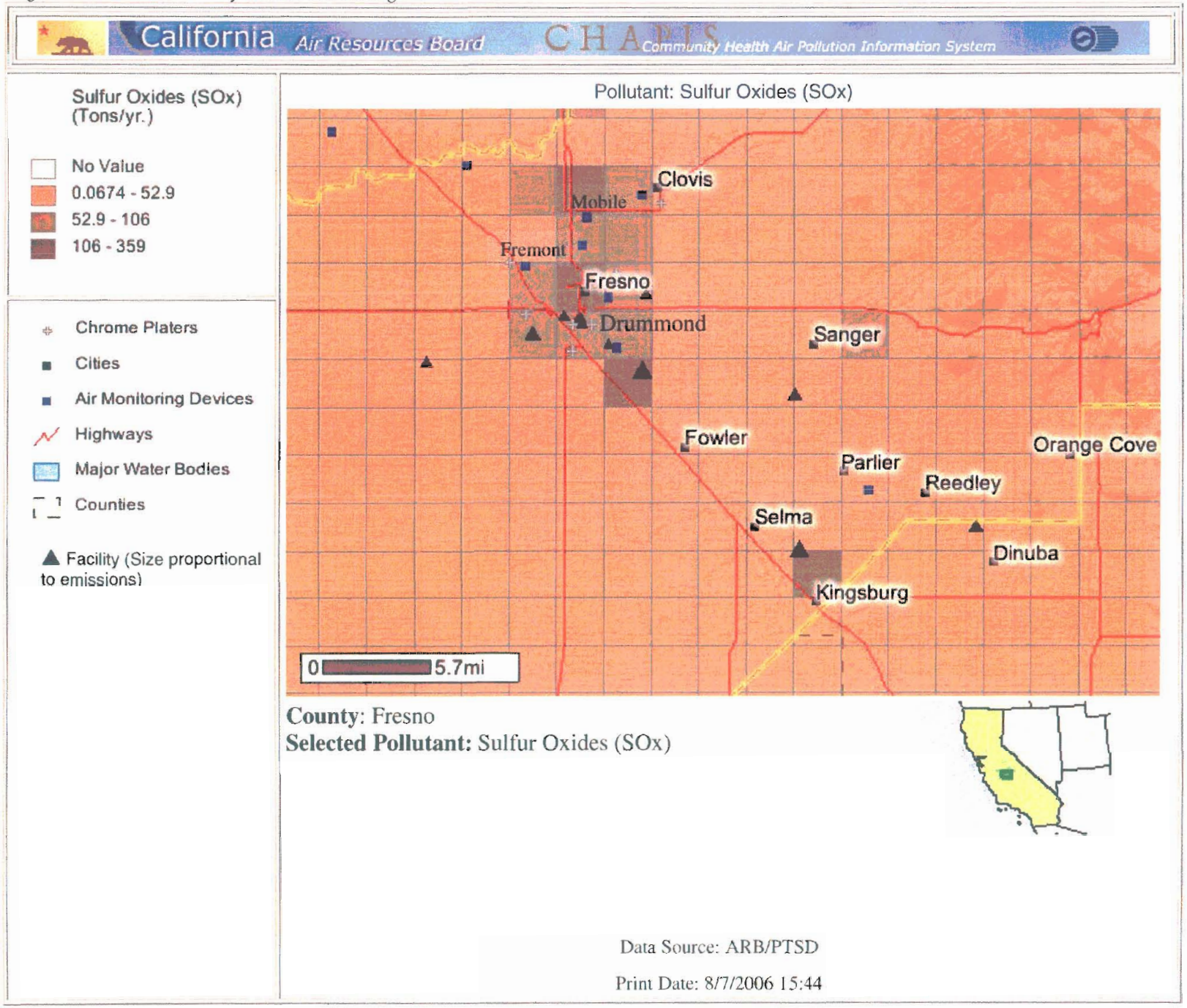
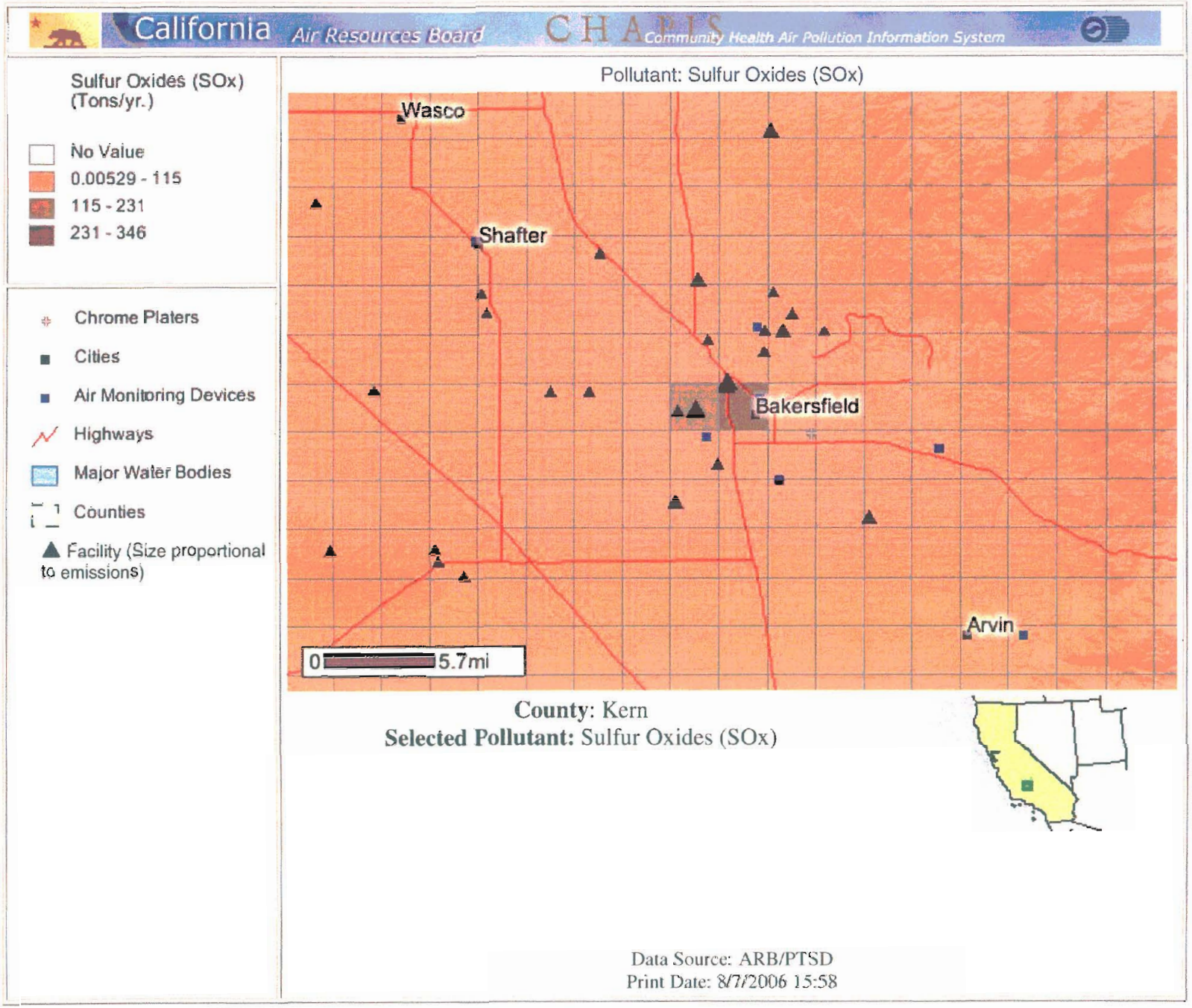
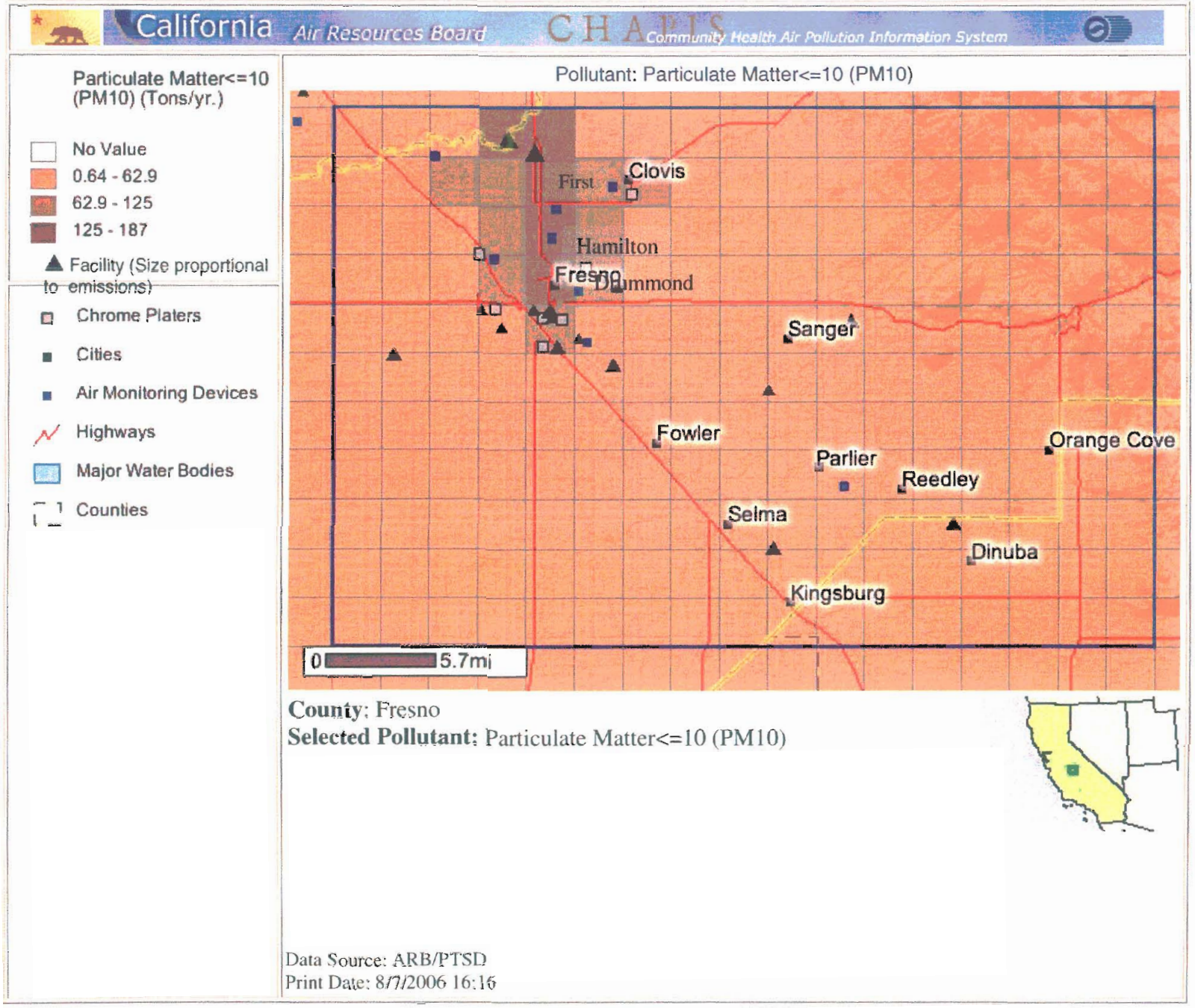
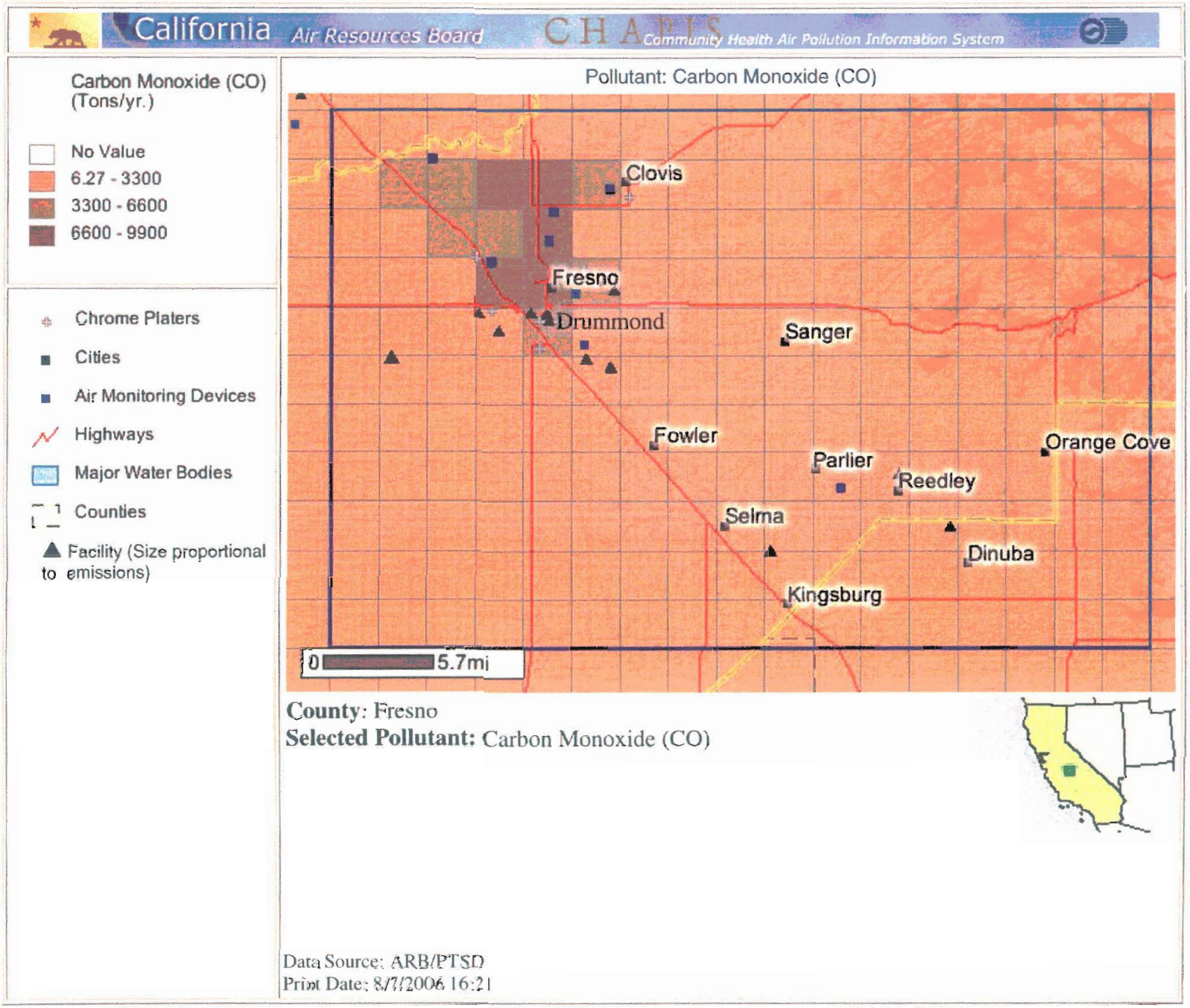


Figure 2. Emissions Inventory and Air Monitoring Station Locations




California Air Resources Board
CHAPIS
Community Health Air Pollution Information System
Sulfur Oxides (SOx) (Tons/yr.)
No Value
0.00529 - 115
115 - 231
231 - 346
Chrome Platers
Cities
Air Monitoring Devices
Highways
Major Water Bodies
Counties
Facility (Size proportional to emissions)
Pollutant: Sulfur Oxides (SOx)
Wasco
Shafter
Bakersfield
Arvin
0
5.7mi
County: Kern
Selected Pollutant: Sulfur Oxides (SOx)
Data Source: ARB/PTSD
Print Date: 8/7/2006 15:58


California Air Resources Board
CHALLS
Community Health Air Pollution Information System
Particulate Matter<=10 (PM10) (Tons/yr.)
No Value
0.64 - 62.9
62.9 - 125
125 - 187
Facility (Size proportional to emissions)
Chrome Platers
Cities
Air Monitoring Devices
Highways
Major Water Bodies
Counties
Pollutant: Particulate Matter<=10 (PM10)
Clovis
First
Hamilton
Fresno
Drummond
Sanger
Fowler
Parlier
Orange Cove
Reedley
Selma
Dinuba
Kingsburg
0
5.7mi
County: Fresno
Selected Pollutant: Particulate Matter<=10 (PM10)
Data Source: ARB/PTSD
Print Date: 8/7/2006 16:16


California Air Resources Board
CHAPIS
Community Health Air Pollution Information System
Carbon Monoxide (CO) (Tons/yr.)
No Value
6.27 - 3300
3300 - 6600
6600 - 9900
Chrome Platers
Cities
Air Monitoring Devices
Highways
Major Water Bodies
Counties
Facility (Size proportional to emissions)
Pollutant: Carbon Monoxide (CO)
Clovis
Fresno
Drummond
Sanger
Fowler
Parlier
Reedley
Orange Cove
Selma
Dinuba
Kingsburg
0
5.7mi
County: Fresno
Selected Pollutant: Carbon Monoxide (CO)
Data Source: ARB/PTSD
Print Date: 8/7/2006 16:21

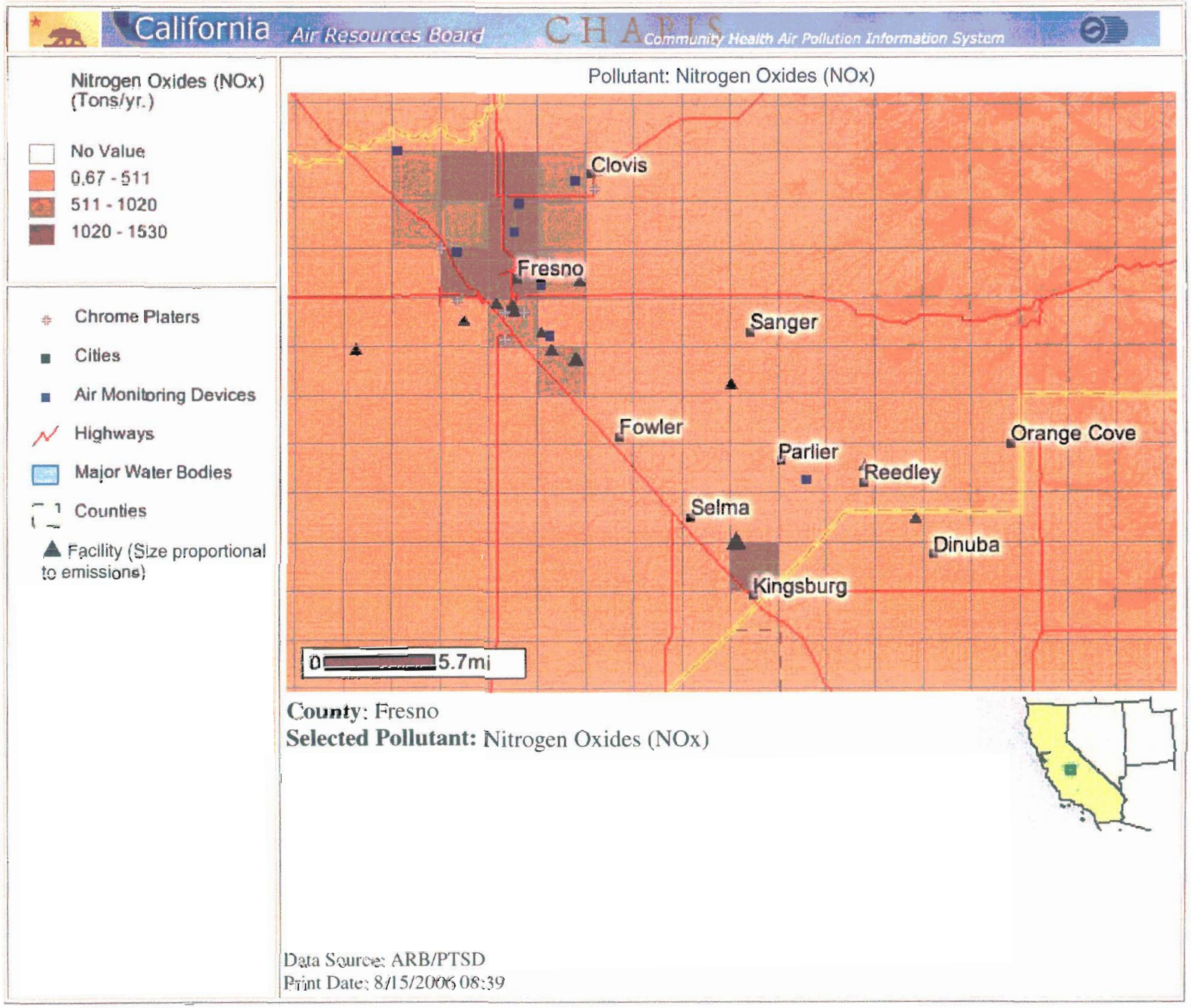
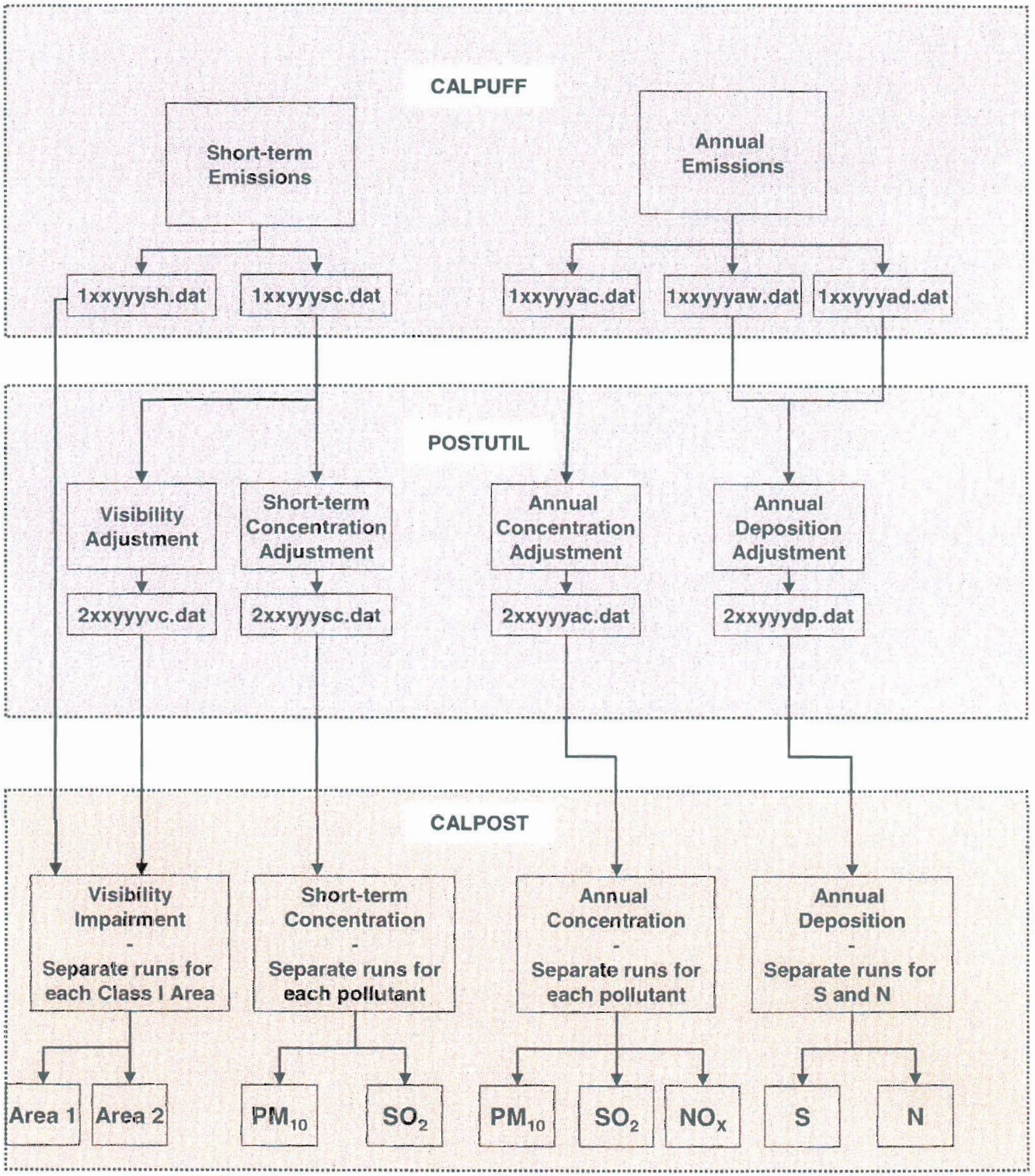

California Air Resources Board
CHAPIS
Community Health Air Pollution Information System
Nitrogen Oxides (NOx) (Tons/yr.)
No Value
0.67 - 511
511 - 1020
1020 - 1530
Chrome Platers
Cities
Air Monitoring Devices
Highways
Major Water Bodies
Counties
Facility (Size proportional to emissions)
Pollutant: Nitrogen Oxides (NOx)
Clovis
Fresno
Sanger
Fowler
Parlier
Orange Cove
Reedley
Selma
Dinuba
Kingsburg
0
5.7mi
County: Fresno
Selected Pollutant: Nitrogen Oxides (NOx)
Data Source: ARB/PTSD
Print Date: 8/15/2006 08:39

Figure 3. Calpuff Lite: Class I PSD Increment and AQRV Analysis Visibility Analysis



Appendix 5

Air Dispersion Modeling Data

This appendix contains sample input and output data for the air dispersion modeling of the Project's criteria pollutant emissions. A complete version of the modeling information is being provided electronically.

The information in this appendix consists of the following:

- Sample ISCST3 Input File
- BPIP Input File (including Figure A7-1-1, Buildings Used in Downwash Analysis)
- PSD Class I Areas (Figures A7-1-2 through A7-1-13)
- Sample CALPUFF Input File – Partial Listing
- POSTUTIL Sample Input File – Deposition
- CALPOST Sample Input File - Visibility
- Appendix Table 7-1-1 Class I F (RH) Values
- Appendix Table 7-1-2 Monthly MEAN O3 (PPB)
- Figure A7-1-14 ISCST3 Receptors
- Figures A7-1-15 through A7-1-22 Class II Impact Results
- GE Modeling Output Summary
- Siemens Modeling Output Summary
- CALPUFF Modeling File List

SAMPLE ISCST3 INPUT FILE

```
CO STARTING
CO TITLEONE CPP NOx annual IMPACTS
CO TITLETWO FRESNO 1990, GE CT, AUX BOILER, NG EMERG GEN, FIRE PUMP
CO MODELOPT CONC   RURAL   DFAULT
CO AVERTIME ANNUAL
CO POLLUTID OTHER
CO DCAYCOEF    .000000
CO TERRHGTS ELEV
CO RUNORNOT RUN
** CO ERRORFIL ERRORS.OUT
CO FINISHED

SO STARTING
SO ELEVUNIT METERS
SO EMISUNIT    .100000E+07 (GRAMS/SEC)          (MICROGRAMS/CUBIC-METER)

**  12/04/06
**  CPP NAT GAS COMBUSTION TURBINES SIEMENS

** Source Location Cards:
**          SRCID SRCTYP        XS       YS            ZS

SO LOCATION  CTN   POINT  270047.465 4052837.944  99.7
SO LOCATION  CTS   POINT  270046.514 4052792.219  99.7
SO LOCATION  AuxBoil   POINT   269999.128 4052777.077   99.7
SO LOCATION  EGEN   POINT   269900.494 4052809.446  99.7
SO LOCATION  DFP   POINT    270105.604 4052789.339   99.7

** Source Parameter Cards:
** POINT:   SRCID       QS     HS         TS          VS         DS
** VOLUME:  SRCID       QS     HS       SYINIT      SZINIT
** AREA:    SRCID       QS     HS        XINIT

SO SRCPARAM  CTN    1.68     45.72   360.94     20.34        5.49
SO SRCPARAM  CTS    1.68     45.72   360.94     20.34        5.49

SO BUILDHGT CTN        28.96   28.96   28.96   28.96   28.96   28.96
SO BUILDHGT CTN        28.96   28.96   28.96   28.96   28.96   28.96
SO BUILDHGT CTN        28.96   28.96   28.96   28.96   28.96   28.96
SO BUILDHGT CTN        28.96   28.96   28.96   28.96   28.96   28.96
SO BUILDHGT CTN        28.96   28.96   24.38   28.96   28.96   28.96
SO BUILDHGT CTN        28.96   28.96   28.96   28.96   28.96   28.96
SO BUILDWID CTN        52.81   53.72   53.00   50.67   46.80   41.51
SO BUILDWID CTN        34.96   72.21   18.90   72.54   34.96   41.51
SO BUILDWID CTN        46.80   50.67   53.00   53.72   52.81   50.29
SO BUILDWID CTN        52.81   53.72   53.00   50.67   46.80   41.51
SO BUILDWID CTN        34.96   72.21  117.37   72.54   34.96   41.51
SO BUILDWID CTN        46.80   50.67   53.00   53.72   52.81   50.29

SO BUILDHGT CTS        28.96   28.96   28.96   28.96   28.96   28.96
SO BUILDHGT CTS        28.96   28.96   28.96   28.96   28.96   28.96
SO BUILDHGT CTS        28.96   28.96   28.96   28.96   28.96   28.96
SO BUILDHGT CTS        28.96   28.96   28.96   28.96   28.96   28.96
SO BUILDHGT CTS        28.96   28.96   24.38   28.96   28.96   28.96
SO BUILDHGT CTS        28.96   28.96   28.96   28.96   28.96   28.96
SO BUILDWID CTS        52.81   53.72   53.00   50.67   46.80   41.51
SO BUILDWID CTS        34.96   72.21   18.90   72.54   34.96   41.51
SO BUILDWID CTS        46.80   50.67   53.00   53.72   52.81   50.29
SO BUILDWID CTS        52.81   53.72   53.00   50.67   46.80   41.51
SO BUILDWID CTS        34.96   72.21  117.37   72.54   34.96   41.51
```

```
SO BUILDWID CTS        46.80   50.67   53.00   53.72   52.81   50.29

** Source Parameter Cards:
** POINT:   SRCID       QS      HS        TS          VS         DS
** VOLUME:  SRCID       QS      HS      SYINIT      SZINIT
** AREA:    SRCID       QS      HS       XINIT
** auxboil 100 ft stack

SO SRCPARAM  AuxBoil    0.024     30.48   435.94      10.31        1.07

SO BUILDHGT AuxBoil   28.96   28.96   28.96   28.96   28.96   28.96
SO BUILDHGT AuxBoil   28.96   28.96    3.66    3.66   18.90   18.90
SO BUILDHGT AuxBoil   18.90   18.90   18.90   18.90   28.96   28.96
SO BUILDHGT AuxBoil   28.96   28.96   28.96   28.96   28.96   28.96
SO BUILDHGT AuxBoil   28.96   28.96    3.66    3.66   18.90   18.90
SO BUILDHGT AuxBoil   18.90   18.90   18.90   18.90   28.96   28.96
SO BUILDWID AuxBoil   52.81   53.72   53.00   50.67   46.80   41.51
SO BUILDWID AuxBoil   34.96   72.21    9.14   10.16   25.27   26.10
SO BUILDWID AuxBoil   26.14   25.39   23.86   21.62   52.81   50.29
SO BUILDWID AuxBoil   52.81   53.72   53.00   50.67   46.80   41.51
SO BUILDWID AuxBoil   34.96   72.21    9.14   10.16   25.27   26.10
SO BUILDWID AuxBoil   26.14   25.39   23.87   21.62   52.81   50.29

**    NAT GAS EMERGENCY GENERATOR

** Source Parameter Cards:
** POINT:   SRCID       QS      HS        TS          VS         DS
** VOLUME:  SRCID       QS      HS      SYINIT      SZINIT
** AREA:    SRCID       QS      HS       XINIT

SO SRCPARAM  EGEN    0.0015   13.72   803.16     34.05        0.45

SO BUILDHGT EGEN       0.00    0.00    0.00    6.10    6.10    6.10
SO BUILDHGT EGEN       6.10    6.10    6.10    6.10    6.10    6.10
SO BUILDHGT EGEN       6.10    6.10    0.00    0.00    0.00    0.00
SO BUILDHGT EGEN       0.00    0.00    0.00    6.10   18.90   28.96
SO BUILDHGT EGEN      28.96   28.96   28.96   28.96   18.90    6.10
SO BUILDHGT EGEN       6.10    6.10    0.00    0.00    0.00    0.00
SO BUILDWID EGEN       0.00    0.00    0.00   36.17   33.39   29.60
SO BUILDWID EGEN      24.90   19.45   13.41   19.45   24.90   29.60
SO BUILDWID EGEN      33.39   36.17    0.00    0.00    0.00    0.00
SO BUILDWID EGEN       0.00    0.00    0.00   36.17   26.14   41.51
SO BUILDWID EGEN      34.96   72.21   18.90   72.54   25.27   29.60
SO BUILDWID EGEN      33.39   36.17    0.00    0.00    0.00    0.00

**  CPP DIESEL FIRE PUMP

**  11/29/06


** Source Parameter Cards:
** POINT:   SRCID       QS      HS        TS          VS         DS
** VOLUME:  SRCID       QS      HS      SYINIT      SZINIT
** AREA:    SRCID       QS      HS       XINIT

SO SRCPARAM  DFP      .0015  13.72   755.38     45.5         0.13

NO ECHO

SO BUILDHGT DFP   24.38   24.38    9.75    9.75   12.19   12.19
SO BUILDHGT DFP   24.38   28.96   24.38   28.96   28.96   28.96
SO BUILDHGT DFP   28.96   28.96   28.96    9.75    9.75   24.38
```

```
SO BUILDHGT DFP   24.38   24.38   24.38   24.38   24.38   24.38
SO BUILDHGT DFP   24.38   28.96   24.38   28.96   28.96   28.96
SO BUILDHGT DFP   28.96   28.96   28.96    9.75    9.75   24.38
SO BUILDWID DFP  126.80  135.98   14.57   15.03   17.17   16.65
SO BUILDWID DFP  137.77   72.21  117.37   72.54   34.96   41.51
SO BUILDWID DFP   46.80   50.67   53.00   13.67   12.36  113.77
SO BUILDWID DFP  126.80  135.98  141.03  141.79  141.55  141.82
SO BUILDWID DFP  137.77   72.21  117.37   72.54   34.96   41.51
SO BUILDWID DFP   46.80   80.79   76.69   13.67   12.36  113.77

SO SRCGROUP ALL
SO FINISHED

RE STARTING
RE ELEVUNIT METERS
RE INCLUDED ISC90FNC.REC
RE INCLUDED ISC240MR.REC
RE INCLUDED FNC.DAT
RE INCLUDED FNC30.REC
RE FINISHED

ME STARTING
ME INPUTFIL  c:\projects\KRCD_CPP\isc\FAT90.ASC
ME ANEMHGHT   10.000 METERS
ME SURFDATA  93193  1990            FRESNO
ME UAIRDATA  23230  1990            OAKLAND
ME STARTEND 90 01 01  90 12 31

ME FINISHED

OU STARTING
OU RECTABLE  ALLAVE FIRST SECOND
OU PLOTFILE  ANNUAL ALL C:\PROJECTS\KRCD_CPP\G0NOAN.DAT
OU FINISHED
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BPIP INPUT FILE

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'KRCD CPP - turbines'
'ST'
'METERS' 1.0
'UTMY' 360.
21
'Switchya' 1 0.0
4 6.10
269702.78 4053005.71
269702.78 4053024.00
269724.12 4053024.00
269724.12 4053005.71
'Adm/wrhs'  1     0.0
4 7.32
269737.18 4052944.00
269737.18 4052974.48
269779.24 4052974.11
269779.24 4052943.63
'CT1 Air '1 0.0
4 18.90
269887.94 4053038.45
269887.94 4053059.78
269903.18 4053059.78
269903.18 4053038.45
'CT2 Air ' 1 0.0
4 18.90
269886.98   4052992.72
269886.98   4053014.06
269902.22   4053014.06
269902.22   4052992.72
'CT1' 1 0.0
4 6.10
269915.60 4053037.87
269915.60 4053051.28
269929.39 4053051.28
269929.39 4053037.87
'CT2' 1 0.0
4 6.10
269914.65 4052992.15
269914.65 4053005.56
269928.44 4053005.56
269928.44 4052992.15
'Steam Tu' 1 0.0
4 10.36
269882.69 4053082.78
269882.69 4053093.75
269909.23 4053093.75
269909.23 4053082.78
'NBrine H' 1 0.0
4 10.36
270152.53 4052977.28
270152.53 4052997.09
270172.35 4052997.09
270172.35 4052977.28
'SBrine H' 1 0.0
4 10.36
270152.06 4052954.42
270152.06 4052974.23
270171.87 4052974.23
270171.87 4052954.42
'SteamCon' 1 0.0
4 10.67
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269909.23 4053082.22
269909.23 4053097.46
269919.59 4053097.46
269919.59 4053082.22
'HRSG1' 1 0.0
4 28.96
269929.39 4053037.58
269929.39 4053056.48
269979.68 4053056.48
269979.68 4053037.58
'HRSG2' 1 0.0
4 28.96
269928.44 4052991.86
269928.44 4053010.76
269978.73 4053010.76
269978.73 4052991.86
'Service/' 1 0.0
4 12.19
269997.27 4052979.94
269997.27 4052992.13
270009.46 4052992.13
270009.46  4052979.94
'Aux BlrB' 1 0.0
4 3.66
269914.92 4052975.94
269914.92 4052985.08
269921.62 4052985.08
269921.62 4052975.94
'Demin. W' 1 0.0
4 9.75
270019.05 4052965.02
270019.05 4052975.68
270029.72 4052975.68
270029.72 4052965.02
'Water Tr' 1 0.0
4 6.71
270038.25 4052963.55
270038.25 4052989.46
270068.73 4052989.46
270068.73 4052963.55
'Elec. Eq' 1 0.0
4 6.10
269828.65 4053002.03
269828.65 4053015.44
269864.62 4053015.44
269864.62 4053002.03
'ZLD/Cool' 1 0.0
4 3.66
269996.91 4052996.54
269996.91 4053002.03
270014.58 4053002.03
270014.58 4052996.54
'Cooling ' 1 0.0
4 24.38
270121.58 4052992.59
270024.52 4053093.77
270041.24 4053109.96
270138.29 4053008.77
'ZLD Trea' 1 0.0
4 6.71
270116.26 4052954.40
270116.26 4052977.26
```

```
270141.87 4052977.26
270141.87 4052954.40
'Recycle ' 1 0.0
4 12.19
270025.42 4053037.10
270025.42 4053061.48
270049.80 4053061.48
270049.80 4053037.10
13
'CTN'       0. 45.72  269966.61  4053036.81
'CTS'       0. 45.72  269965.66  4052991.08
'Aux Boil' 0. 30.48  269918.27  4052975.94
'Cool A'    0. 24.38  270039.29  4053095.11
'Cool B'    0. 24.38  270051.32  4053082.57
'Cool C'    0. 24.38  270063.35  4053070.03
'Cool D'    0. 24.38  270075.38  4053057.49
'Cool E'    0. 24.38  270087.41  4053044.94
'Cool F'    0. 24.38  270099.44  4053032.40
'Cool G'    0. 24.38  270111.47  4053019.86
'Cool H'    0. 24.38  270123.50  4053007.32
'E.Diesel' 0. 13.72  269819.63  4053008.31
'Fire Pum' 0. 13.72  270024.75  4052988.20
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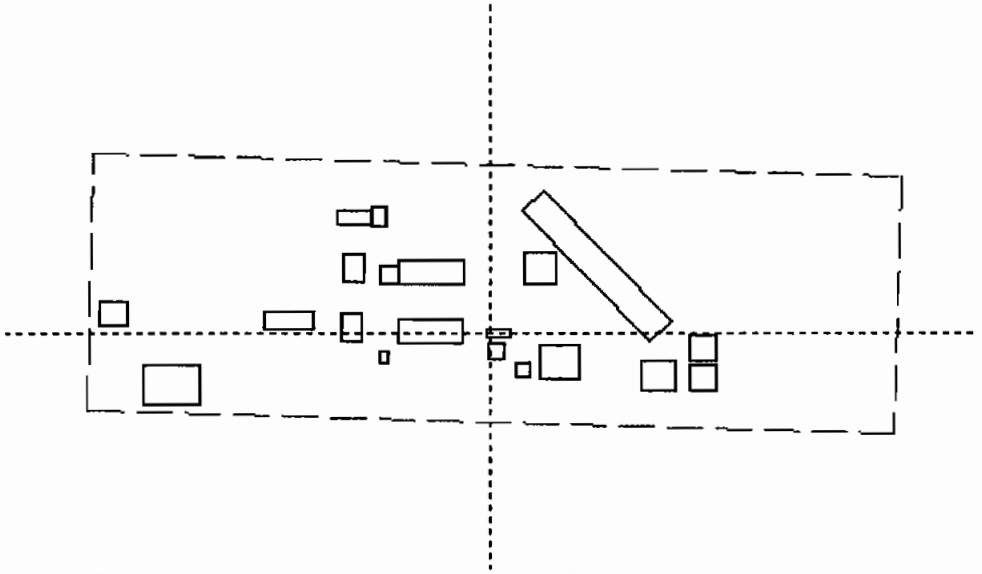

Figure A7-1- 1 BUILDINGS USED IN DOWNWASH ANALYSIS

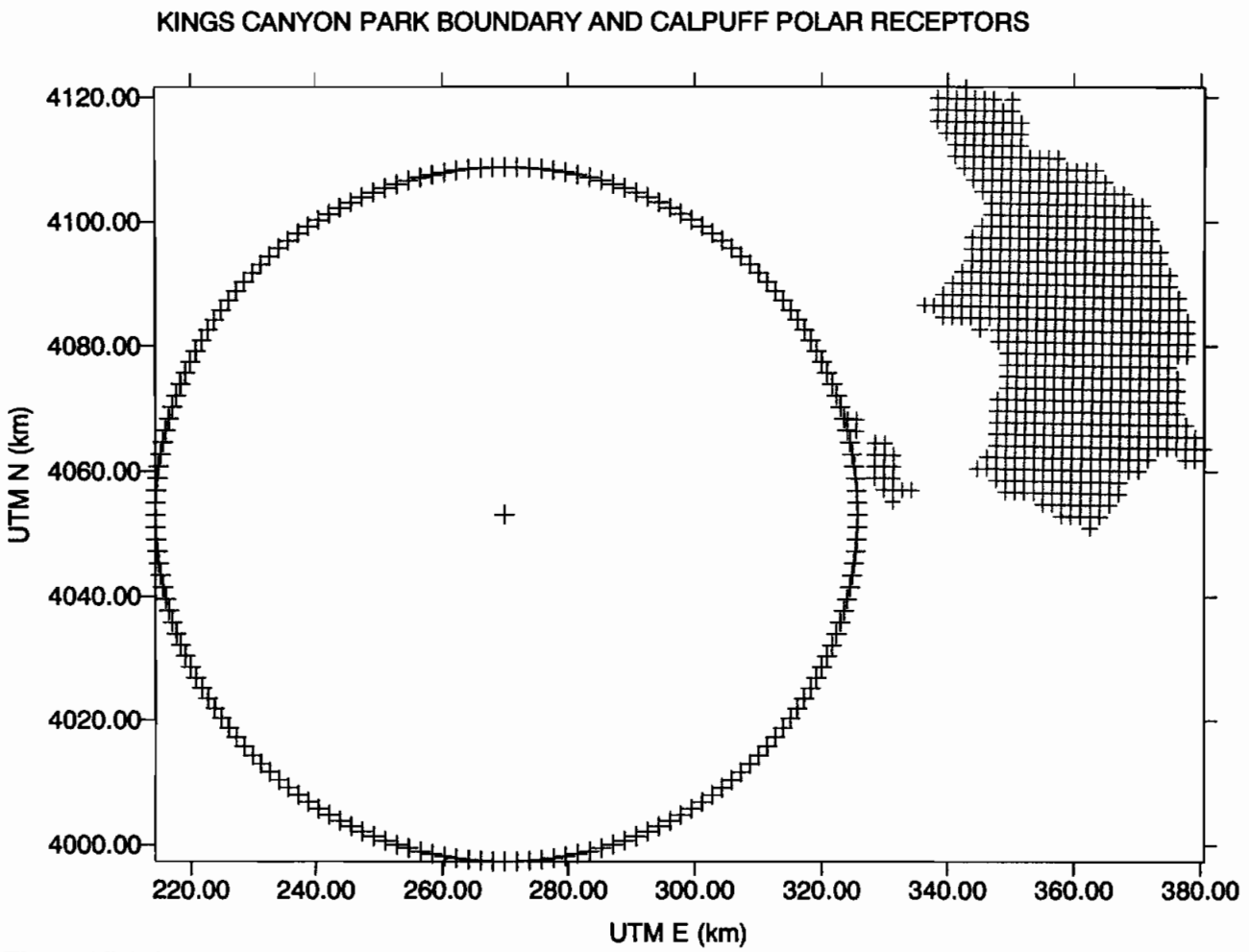
KINGS CANYON PARK BOUNDARY AND CALPUFF POLAR RECEPTORS
4120.00
4100.00
4080.00
4060.00
4040.00
4020.00
4000.00
UTM N (km)
220.00
240.00
260.00
280.00
300.00
320.00
340.00
360.00
380.00
UTM E (km)

Figure A7-1- 2

SEQUOIA PARK BOUNDARY AND CALPUFF POLAR RECEPTORS

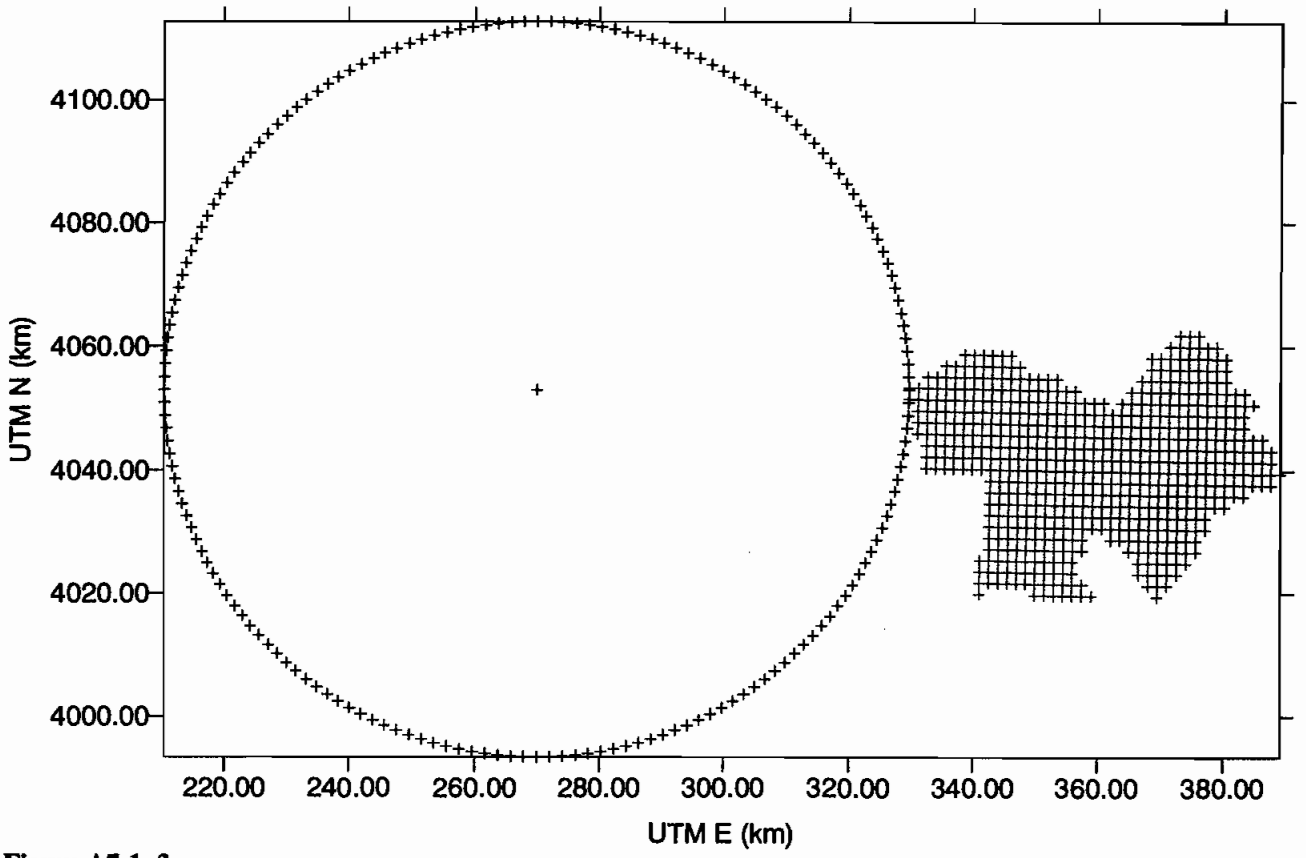

Figure A7-1- 3

JOHN MUIR PARK BOUNDARY AND CALPUFF POLAR RECEPTORS

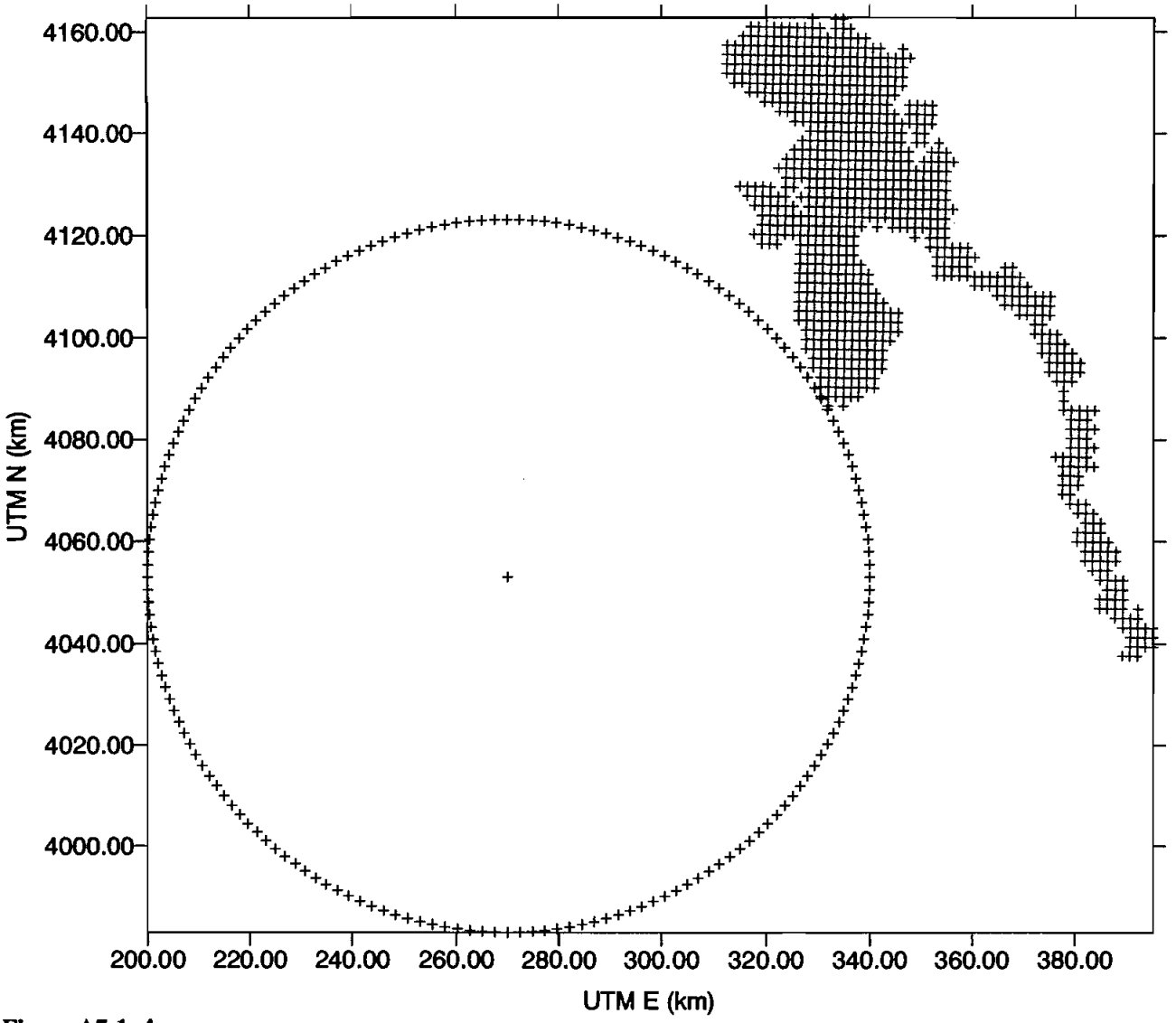

Figure A7-1- 4

KAISER PARK BOUNDARY AND POLAR RECEPTORS

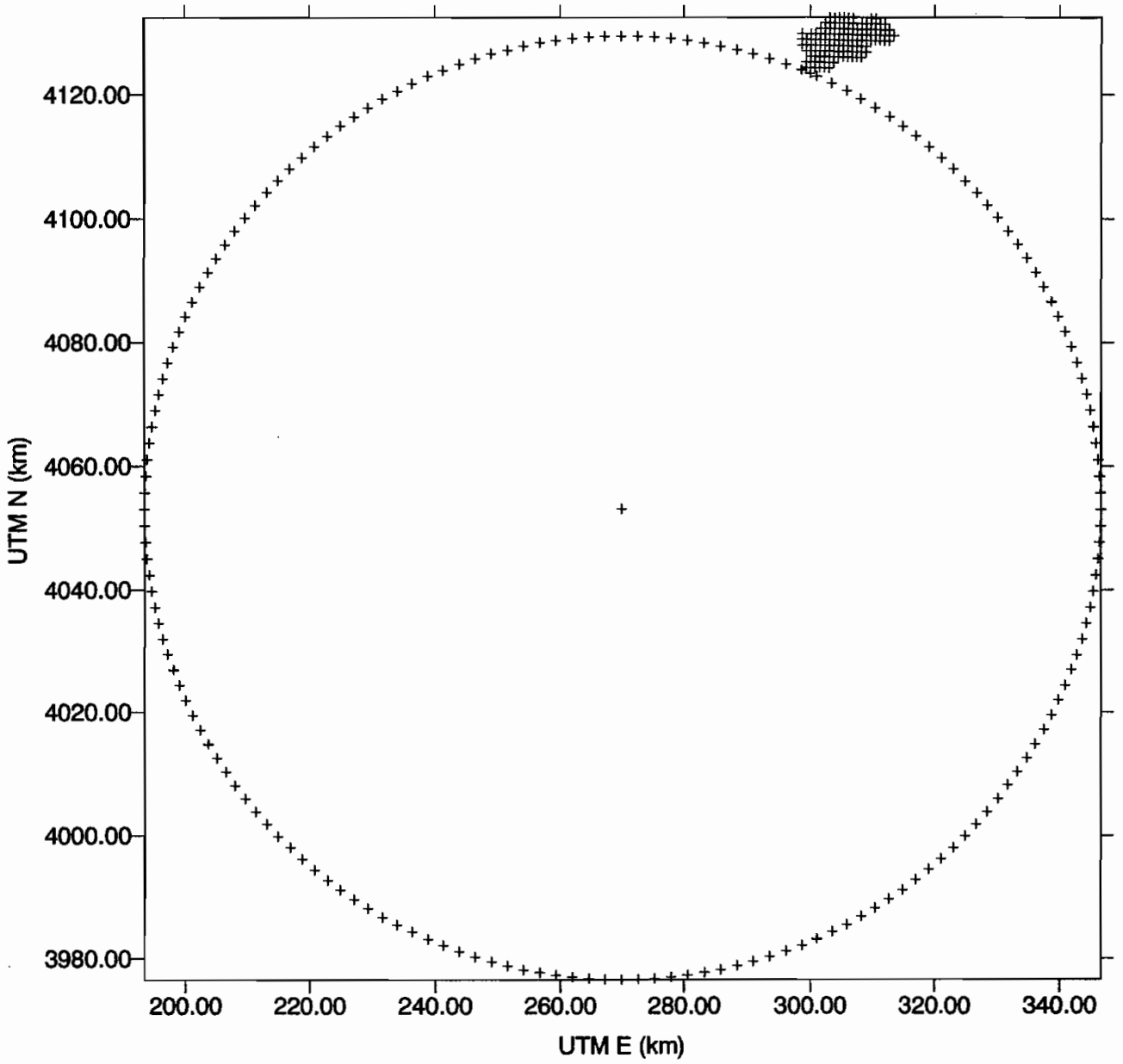

Figure A7-1- 5

YOSEMITE PARK BOUNDARY AND POLAR RECEPTORS

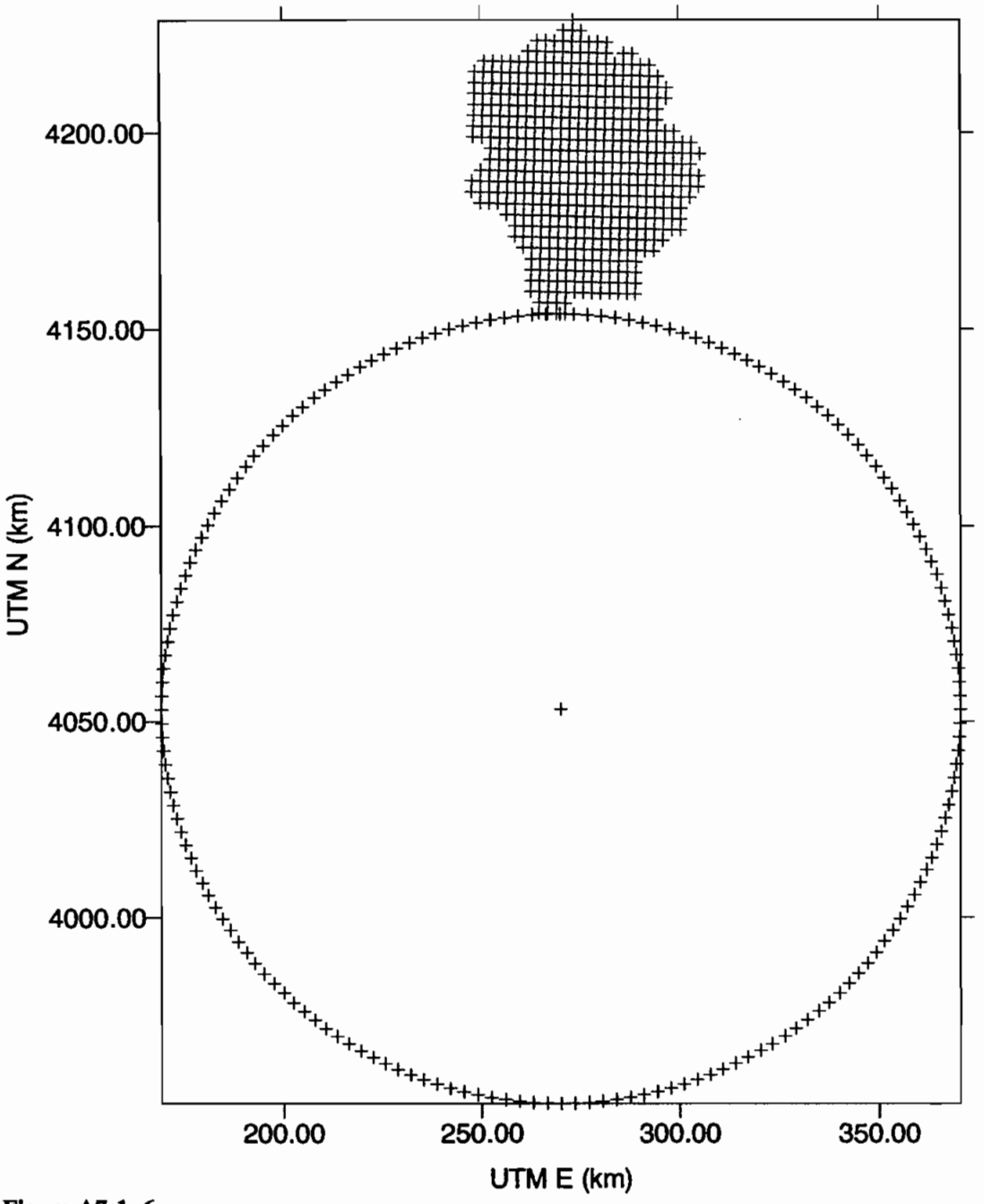

Figure A7-1- 6

ANSEL ADAMS PARK BOUNDARY AND POLAR RECEPTORS

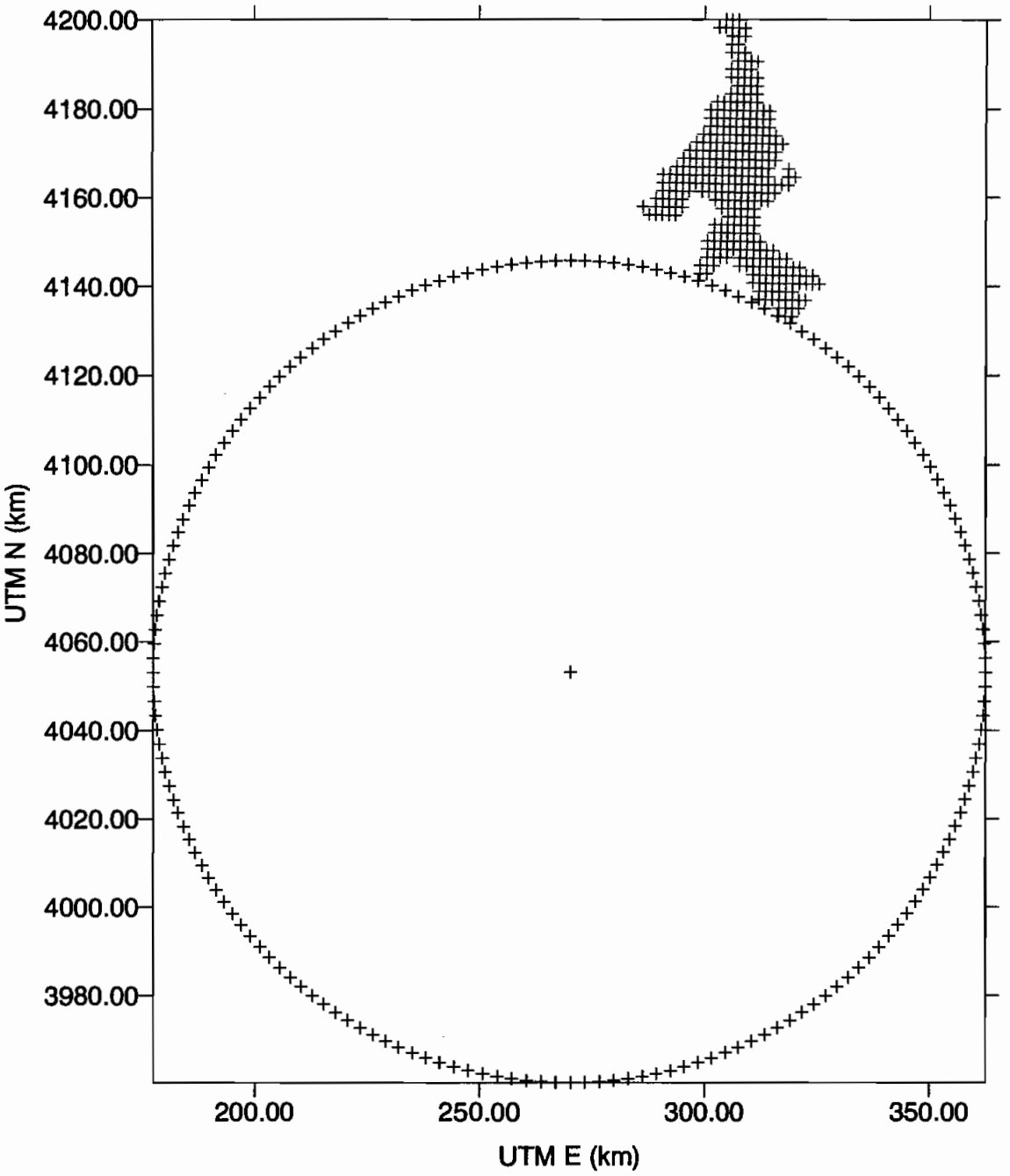

Figure A7-1- 7

YOSEMITE PARK BOUNDARY AND POLAR RECEPTORS

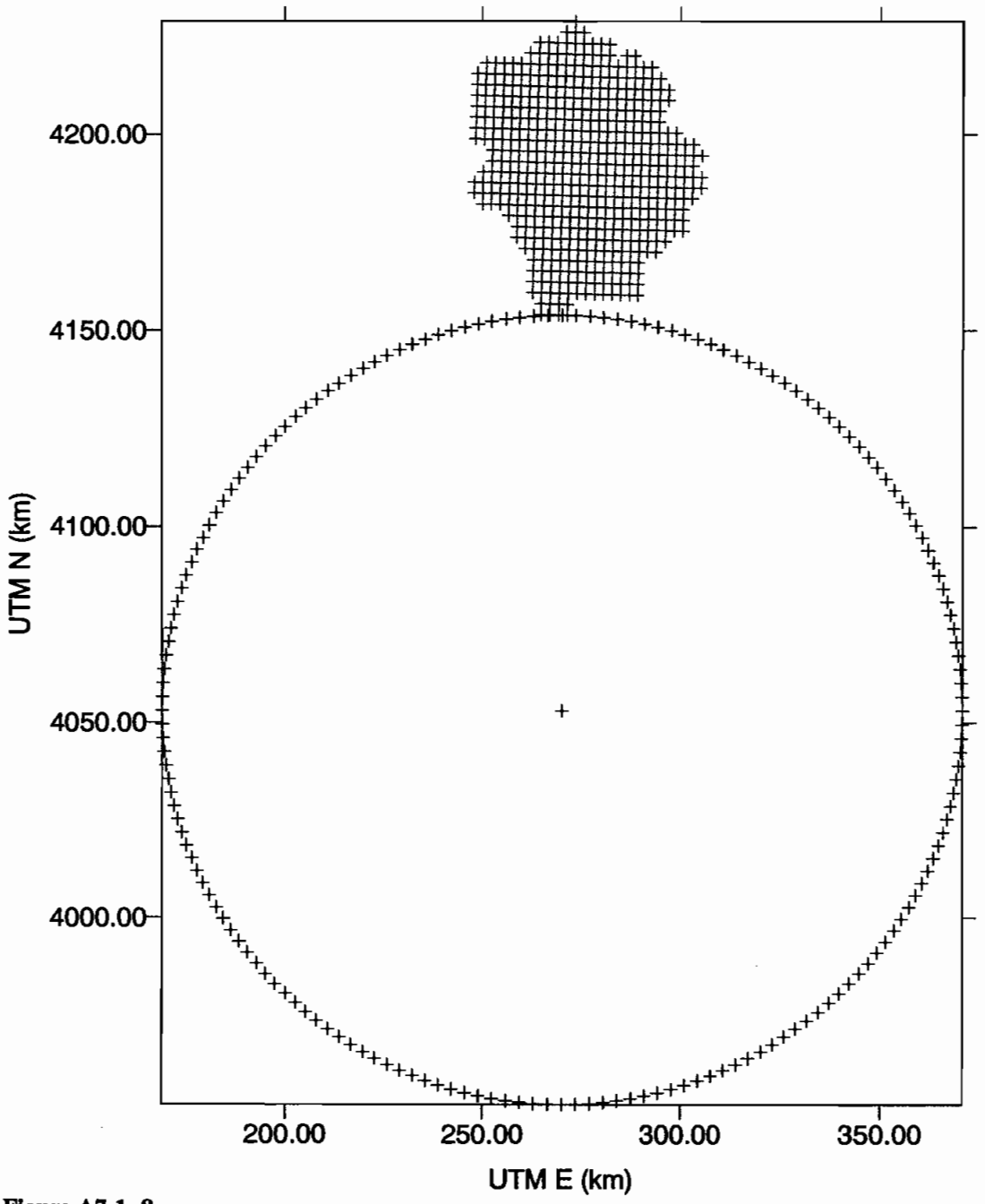

Figure A7-1- 8

DOMELAND PARK BOUNDARY AND POLAR RECEPTORS

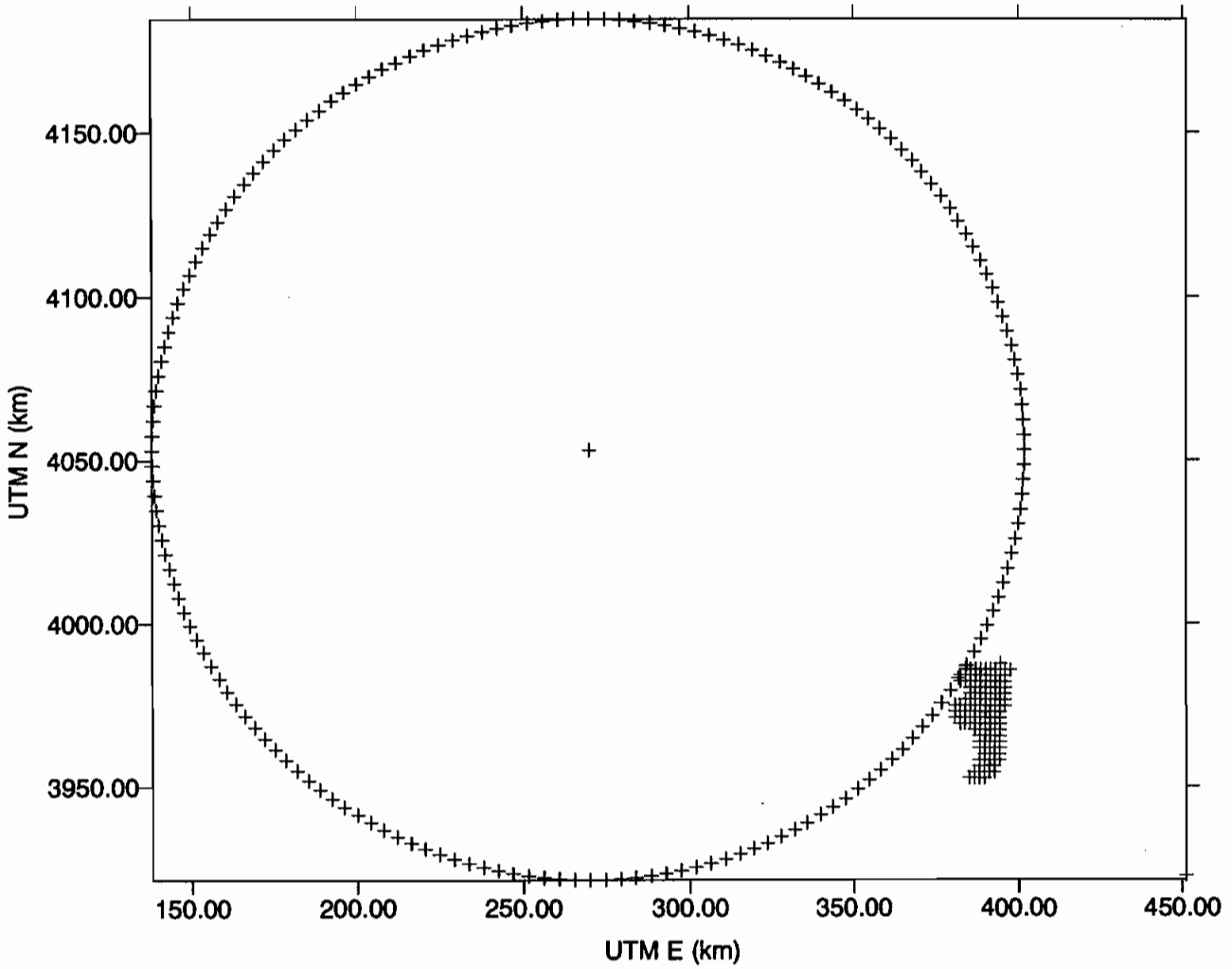

Figure A7-1- 9

PINNACLES PARK BOUNDARY AND POLAR RECEPTORS

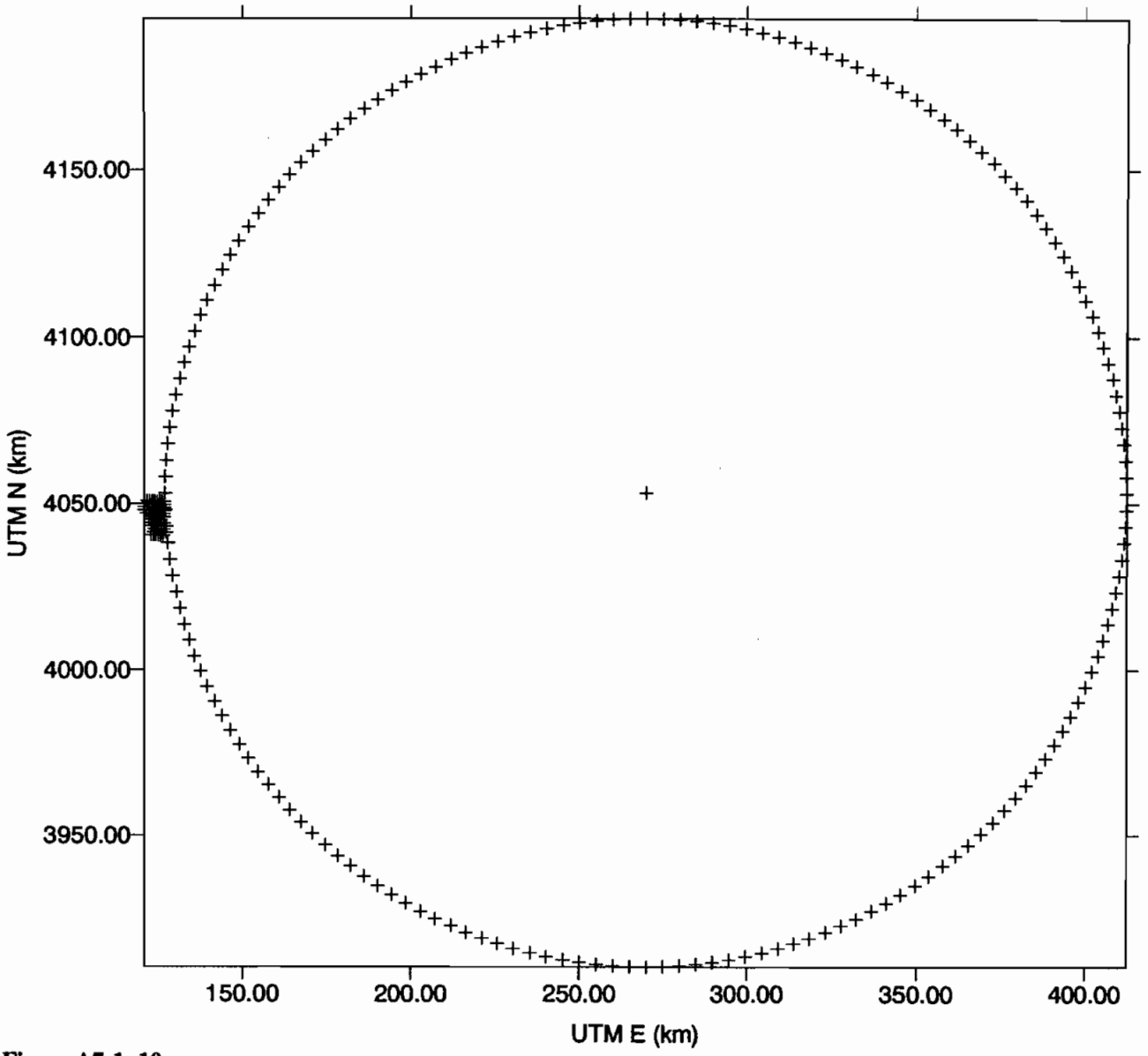

Figure A7-1- 10

HOOVER PARK BOUNDARY AND POLAR RECEPTORS

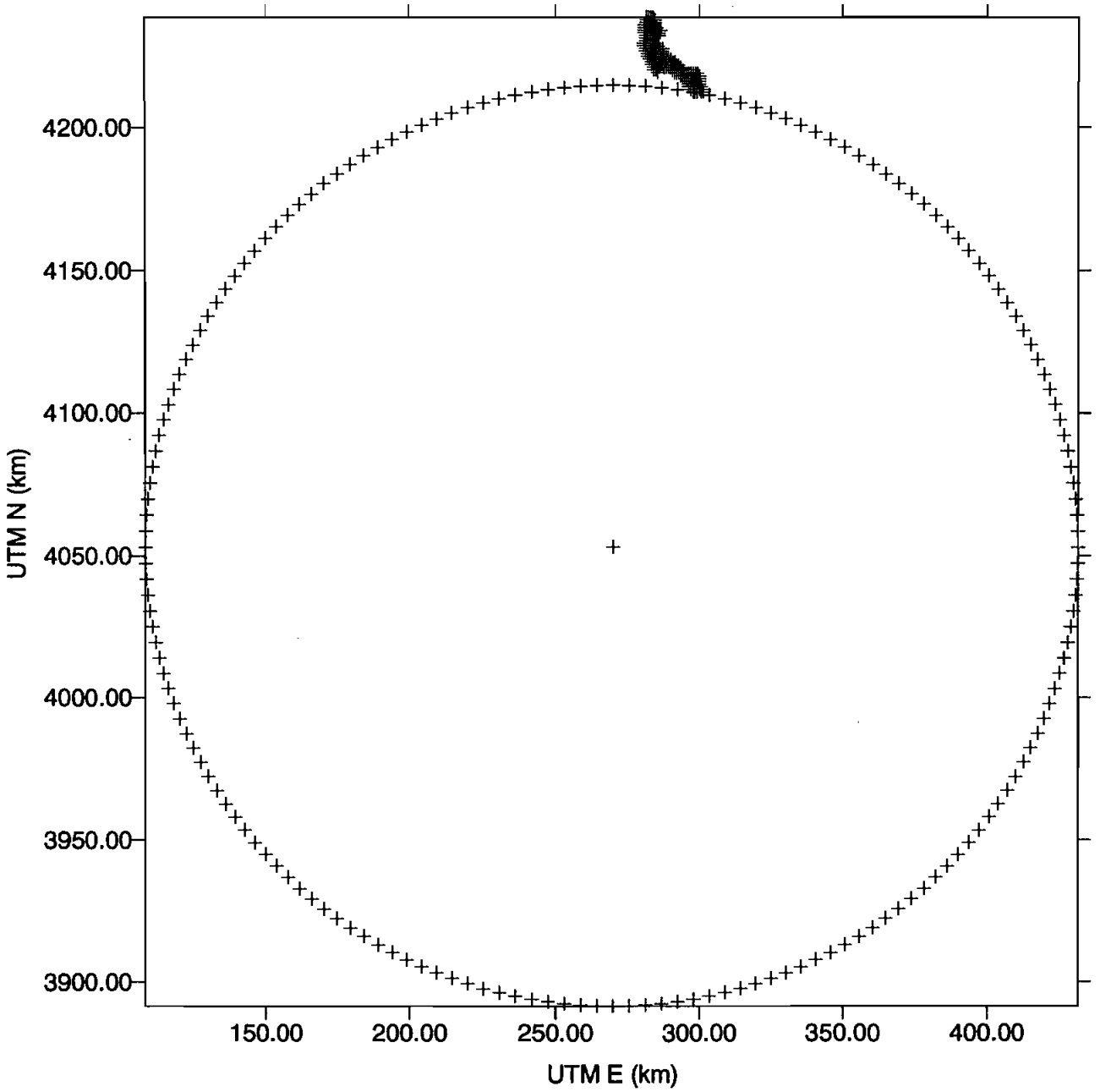

Figure A7-1- 11

VENTANA PARK BOUNDARY AND POLAR RECEPTORS

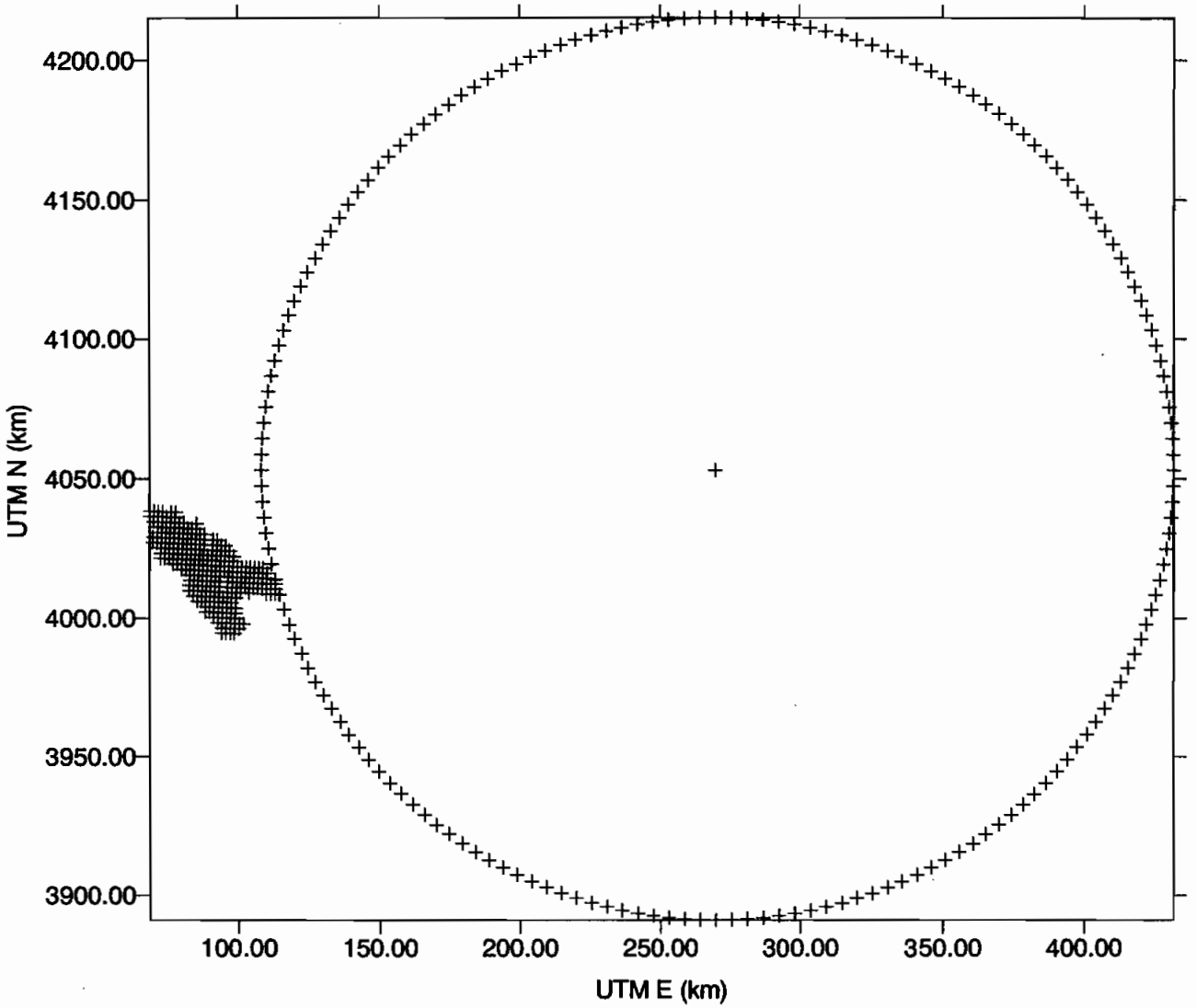

Figure A7-1- 12

EMIGRANT PARK BOUNDARY AND POLAR RECEPTORS

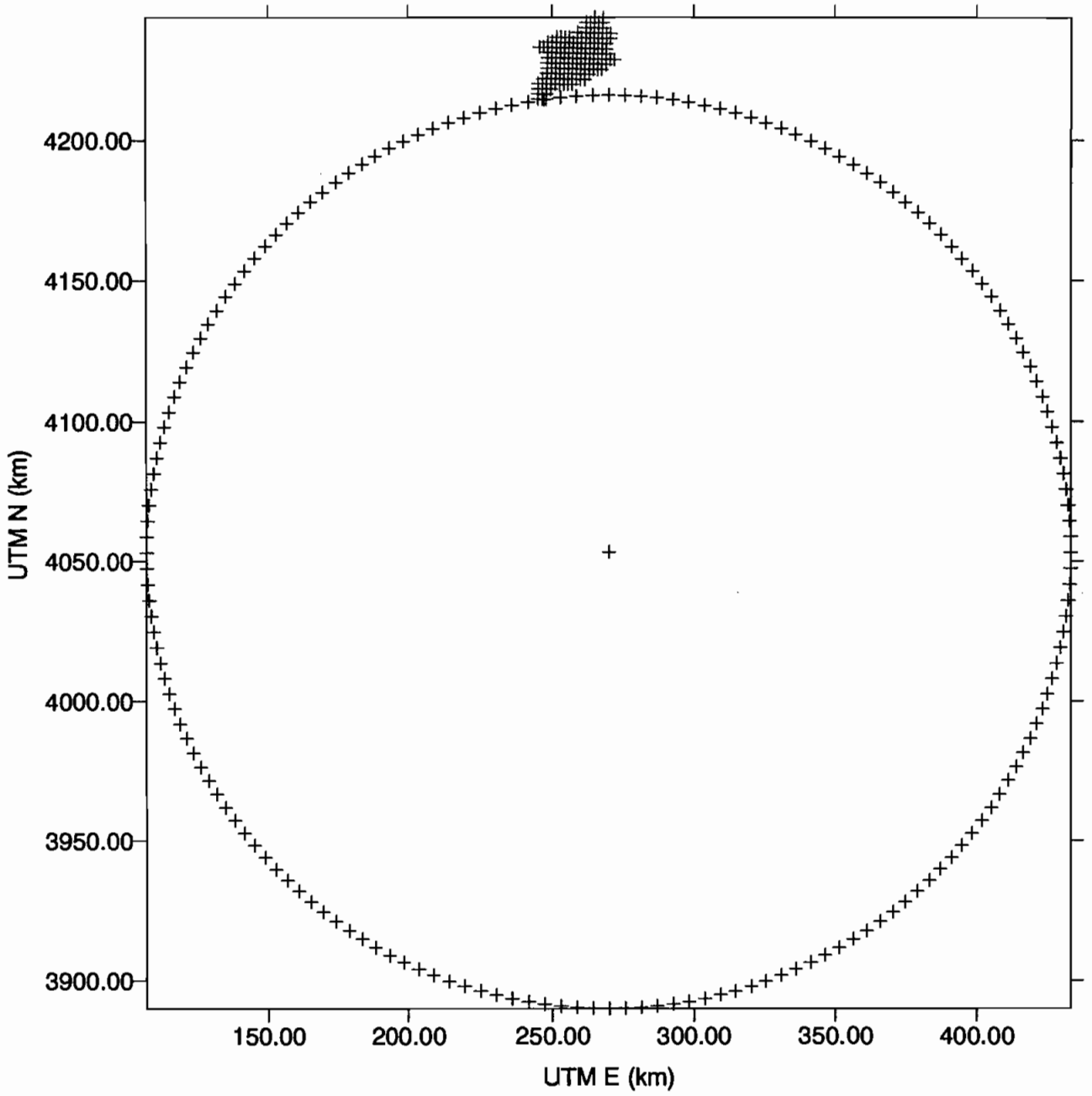

Figure A7-1- 13

SAMPLE CALPUFF INPUT FILE – PARTIAL LISTING

```
CPP 24-hr IMPACTS, CASE 4a, Scenario A, group 1
FRESNO 1986-1990, SIEMENS CT, AUX BOILER, COOL TWR

---------------- Run title (3 lines) ------------------------------------------

                    CALPUFF MODEL CONTROL FILE
                    --------------------------

------------------------------------------------------------------------------

INPUT GROUP: 0 -- Input and Output File Names

--------------
Default Name  Type          File Name
------------  ----          ---------
CALMET.DAT    input    * METDAT =             *
    or
ISCMET.DAT    input    ! ISCDAT =FRES8690.ASC !
    or
PLMMET.DAT    input    * PLMDAT =             *
    or
PROFILE.DAT   input    * PRFDAT =             *
SURFACE.DAT   input    * SFCDAT =             *
RESTARTB.DAT  input    * RSTARTB=             *
------------------------------------------------------------------------------
CALPUFF.LST   output   ! PUFLST =1S14aAcs.LST  !
CONC.DAT      output   ! CONDAT =1S14aAcs.DAT     !
DFLX.DAT      output   * DFDAT  =1S1AD.DAT     *
WFLX.DAT      output   * WFDAT  =1S1AW.DAT     *

VISB.DAT      output   ! VISDAT =  1S14aAch.DAT !
RESTARTE.DAT  output   * RSTARTE=             *
------------------------------------------------------------------------------
Emission Files
--------------
PTEMARB.DAT   input    * PTDAT  =             *
VOLEMARB.DAT  input    * VOLDAT =             *
BAEMARB.DAT   input    * ARDAT  =             *
LNEMARB.DAT   input    * LNDAT  =             *
------------------------------------------------------------------------------
Other Files
-----------
OZONE.DAT     input    * OZDAT  =             *
VD.DAT        input    * VDDAT  =             *
CHEM.DAT      input    * CHEMDAT=             *
H2O2.DAT      input    * H2O2DAT=             *
HILL.DAT      input    * HILDAT=             *
HILLRCT.DAT   input    * RCTDAT=             *
COASTLN.DAT   input    * CSTDAT=             *
FLUXBDY.DAT   input    * BDYDAT=             *
BCON.DAT      input    * BCNDAT=             *
DEBUG.DAT     output   * DEBUG =             *
MASSFLX.DAT   output   * FLXDAT=             *
MASSBAL.DAT   output   * BALDAT=             *
FOG.DAT       output   * FOGDAT=             *
------------------------------------------------------------------------------
All file names will be converted to lower case if LCFILES = T
Otherwise, if LCFILES = F, file names will be converted to UPPER CASE
         T = lower case      ! LCFILES = T !
         F = UPPER CASE
NOTE: (1) file/path names can be up to 70 characters in length


Provision for multiple input files
----------------------------------

     Number of CALMET.DAT files for run (NMETDAT)
                                    Default: 1       ! NMETDAT =   0   !

     Number of PTEMARB.DAT files for run (NPTDAT)
                                    Default: 0       ! NPTDAT =  0  !

     Number of BAEMARB.DAT files for run (NARDAT)
                                    Default: 0       ! NARDAT =  0  !

     Number of VOLEMARB.DAT files for run (NVOLDAT)
                                    Default: 0       ! NVOLDAT =  0  !
```

```
!END!

-------------
Subgroup (0a)
-------------

  The following CALMET.DAT filenames are processed in sequence if NMETDAT>1

Default Name  Type          File Name
------------  ----          ---------
 none         input    * METDAT=     *   *END*


------------------------------------------------------------------------------

INPUT GROUP: 1 -- General run control parameters
--------------

    Option to run all periods found
    in the met. file      (METRUN)   Default: 0       ! METRUN =   1  !

         METRUN = 0 - Run period explicitly defined below
         METRUN = 1 - Run all periods in met. file

     Starting date:    Year (IBYR) -- No default       ! IBYR =  1986  !
     (used only if    Month (IBMO) -- No default       ! IBMO =  0  !
      METRUN = 0)       Day (IBDY) -- No default       ! IBDY =  0  !
                       Hour (IBHR) -- No default       ! IBHR =  0  !

     Base time zone          (XBTZ) -- No default       ! XBTZ = 8.0  !
        PST = 8., MST = 7.
        CST = 6., EST = 5.

     Length of run (hours) (IRLG) -- No default       ! IRLG =  0  !

     Number of chemical species (NSPEC)
                                    Default: 5       ! NSPEC =  10   !

     Number of chemical species
     to be emitted  (NSE)           Default: 3       ! NSE =  6   !

     Flag to stop run after
     SETUP phase (ITEST)            Default: 2       ! ITEST =  2   !
     (Used to allow checking
     of the model inputs, files, etc.)
           ITEST = 1 - STOPS program after SETUP phase
           ITEST = 2 - Continues with execution of program
                       after SETUP

     Restart Configuration:

        Control flag (MRESTART)     Default: 0       ! MRESTART =  0   !

           0 = Do not read or write a restart file
           1 = Read a restart file at the beginning of
               the run
           2 = Write a restart file during run
           3 = Read a restart file at beginning of run
               and write a restart file during run

        Number of periods in Restart
        output cycle (NRESPD)       Default: 0       ! NRESPD =  0   !

           0 = File written only at last period
          >0 = File updated every NRESPD periods

     Meteorological Data Format (METFM)
                                    Default: 1       ! METFM =  2   !

           METFM = 1 - CALMET binary file (CALMET.MET)
           METFM = 2 - ISC ASCII file (ISCMET.MET)
           METFM = 3 - AUSPLUME ASCII file (PLMMET.MET)
           METFM = 4 - CTDM plus tower file (PROFILE.DAT) and
                       surface parameters file (SURFACE.DAT)

     PG sigma-y is adjusted by the factor (AVET/PGTIME)**0.2
     Averaging Time (minutes) (AVET)
```

```
                                    Default: 60.0    ! AVET = 60. !
     PG Averaging Time (minutes) (PGTIME)
                                    Default: 60.0    ! PGTIME = 60. !


!END!

------------------------------------------------------------------------------

INPUT GROUP: 2 -- Technical options
--------------

     Vertical distribution used in the
     near field (MGAUSS)                Default: 1     ! MGAUSS =  1   !
        0 = uniform
        1 = Gaussian

     Terrain adjustment method
     (MCTADJ)                           Default: 3     ! MCTADJ =  3   !
        0 = no adjustment
        1 = ISC-type of terrain adjustment
        2 = simple, CALPUFF-type of terrain
            adjustment
        3 = partial plume path adjustment

     Subgrid-scale complex terrain
     flag (MCTSG)                       Default: 0     ! MCTSG =  0    !
        0 = not modeled
        1 = modeled

     Near-field puffs modeled as
     elongated 0 (MSLUG)                Default: 0     ! MSLUG =  0    !
        0 = no
        1 = yes (slug model used)

     Transitional plume rise modeled ?
     (MTRANS)                           Default: 1     ! MTRANS =  1   !
        0 = no  (i.e., final rise only)
        1 = yes (i.e., transitional rise computed)

     Stack tip downwash? (MTIP)         Default: 1     ! MTIP =  1  !
        0 = no  (i.e., no stack tip downwash)
        1 = yes (i.e., use stack tip downwash)

     Method used to simulate building
     downwash? (MBDW)                   Default: 1     ! MBDW =   1  !
        1 = ISC method
        2 = PRIME method

     Vertical wind shear modeled above
     stack top? (MSHEAR)                Default: 0     ! MSHEAR =  0  !
        0 = no  (i.e., vertical wind shear not modeled)
        1 = yes (i.e., vertical wind shear modeled)

     Puff splitting allowed? (MSPLIT)   Default: 0     ! MSPLIT =  0  !
        0 = no (i.e., puffs not split)
        1 = yes (i.e., puffs are split)

     Chemical mechanism flag (MCHEM)    Default: 1     ! MCHEM =  1   !
        0 = chemical transformation not
            modeled
        1 = transformation rates computed
            internally (MESOPUFF II scheme)
        2 = user-specified transformation
            rates used
        3 = transformation rates computed
            internally (RIVAD/ARM3 scheme)
        4 = secondary organic aerosol formation
            computed (MESOPUFF II scheme for OH)

     Aqueous phase transformation flag (MAQCHEM)
     (Used only if MCHEM = 1, or 3)     Default: 0     ! MAQCHEM =  0   !
        0 = aqueous phase transformation
            not modeled
        1 = transformation rates adjusted
            for aqueous phase reactions
```

```
Wet removal modeled ? (MWET)          Default: 1     ! MWET =  1   !
   0 = no
   1 = yes

Dry deposition modeled ? (MDRY)       Default: 1     ! MDRY =  1   !
   0 = no
   1 = yes
   (dry deposition method specified
    for each species in Input Group 3)

Method used to compute dispersion
coefficients (MDISP)                  Default: 3     ! MDISP =  3   !

   1 = dispersion coefficients computed from measured values
       of turbulence, sigma v, sigma w
   2 = dispersion coefficients from internally calculated
       sigma v, sigma w using micrometeorological variables
       (u*, w*, L, etc.)
   3 = PG dispersion coefficients for RURAL areas (computed using
       the ISCST multi-segment approximation) and MP coefficients in
       urban areas
   4 = same as 3 except PG coefficients computed using
       the MESOPUFF II eqns.
   5 = CTDM sigmas used for stable and neutral conditions.
       For unstable conditions, sigmas are computed as in
       MDISP = 3, described above.  MDISP = 5 assumes that
       measured values are read

Sigma-v/sigma-theta, sigma-w measurements used? (MTURBVW)
(Used only if MDISP = 1 or 5)         Default: 3     ! MTURBVW =  0  !
   1 = use sigma-v or sigma-theta measurements
       from PROFILE.DAT to compute sigma-y
       (valid for METFM = 1, 2, 3, 4)
   2 = use sigma-w measurements
       from PROFILE.DAT to compute sigma-z
       (valid for METFM = 1, 2, 3, 4)
   3 = use both sigma-(v/theta) and sigma-w
       from PROFILE.DAT to compute sigma-y and sigma-z
       (valid for METFM = 1, 2, 3, 4)
   4 = use sigma-theta measurements
       from PLMMET.DAT to compute sigma-y
       (valid only if METFM = 3)

Back-up method used to compute dispersion
when measured turbulence data are
missing (MDISP2)                      Default: 3     ! MDISP2 =  3  !
(used only if MDISP = 1 or 5)
   2 = dispersion coefficients from internally calculated
       sigma v, sigma w using micrometeorological variables
       (u*, w*, L, etc.)
   3 = PG dispersion coefficients for RURAL areas (computed using
       the ISCST multi-segment approximation) and MP coefficients in
       urban areas
   4 = same as 3 except PG coefficients computed using
       the MESOPUFF II eqns.

PG sigma-y,z adj. for roughness?      Default: 0     ! MROUGH =  0  !
(MROUGH)
   0 = no
   1 = yes

Partial plume penetration of          Default: 1     ! MPARTL =  1  !
elevated inversion?
(MPARTL)
   0 = no
   1 = yes

Strength of temperature inversion     Default: 0     ! MTINV =  0  !
provided in PROFILE.DAT extended records?
(MTINV)
   0 = no (computed from measured/default gradients)
   1 = yes

PDF used for dispersion under convective conditions?
                                      Default: 0     ! MPDF =  0   !
(MPDF)
   0 = no
```

```
      1 = yes

   Sub-Grid TIBL module used for shore line?
                                        Default: 0     ! MSGTIBL = 0  !
   (MSGTIBL)
      0 = no
      1 = yes

   Boundary conditions (concentration) modeled?
                                        Default: 0     ! MBCON = 0  !
   (MBCON)
      0 = no
      1 = yes, using formatted BCON.DAT file
      2 = yes, using unformatted CONC.DAT file


   Analyses of fogging and icing impacts due to emissions from
   arrays of mechanically-forced cooling towers can be performed
   using CALPUFF in conjunction with a cooling tower emissions
   processor (CTEMISS) and its associated postprocessors.  Hourly
   emissions of water vapor and temperature from each cooling tower
   cell are computed for the current cell configuration and ambient
   conditions by CTEMISS. CALPUFF models the dispersion of these
   emissions and provides cloud information in a specialized format
   for further analysis. Output to FOG.DAT is provided in either
   'plume mode' or 'receptor mode' format.

   Configure for FOG Model output?
                                        Default: 0     ! MFOG =  0   !
   (MFOG)
      0 = no
      1 = yes  - report results in PLUME Mode format
      2 = yes  - report results in RECEPTOR Mode format


   Test options specified to see if
   they conform to regulatory
   values? (MREG)                       Default: 1     ! MREG =  0   !

      0 = NO checks are made
      1 = Technical options must conform to USEPA
          Long Range Transport (LRT) guidance
                    METFM    1 or 2
                    AVET     60. (min)
                    PGTIME   60. (min)
                    MGAUSS   1
                    MCTADJ   3
                    MTRANS   1
                    MTIP     1
                    MCHEM    1 or 3 (if modeling SOx, NOx)
                    MWET     1
                    MDRY     1
                    MDISP    2 or 3
                    MPDF     0 if MDISP=3
                             1 if MDISP=2
                    MROUGH   0
                    MPARTL   1
                    SYTDEP   550. (m)
                    MHFTSZ   0

!END!

------------------------------------------------------------------------------

INPUT GROUP: 3a, 3b -- Species list
-------------------

------------
Subgroup (3a)
------------

  The following species are modeled:

! CSPEC =          SO2 !         !END!
! CSPEC =          SO4 !         !END!
! CSPEC =          NOX !         !END!
```

```
! CSPEC =          HNO3 !          !END!
! CSPEC =           NO3 !          !END!
! CSPEC =          PM10 !          !END!
! CSPEC =           PMF !          !END!
! CSPEC =           PMC !          !END!
! CSPEC =            EC !          !END!
! CSPEC =           SOA !          !END!
```

SPECIES NAME (Limit: 12 Characters in length)	MODELED (0=NO, 1=YES)	EMITTED (0=NO, 1=YES)	Dry DEPOSITED (0=NO, 1=COMPUTED-GAS, 2=COMPUTED-PARTICLE, 3=USER-SPECIFIED)	OUTPUT GROUP NUMBER (0=NONE, 1=1st CGRUP, 2=2nd CGRUP, 3= etc.)
SO2	1,	1,	1,	0
SO4	1,	1,	2,	0
NOX	1,	1,	1,	0
HNO3	1,	0,	1,	0
NO3	1,	0,	2,	0
PM10	1,	1,	2,	0
PMF	1,	0,	0,	0
PMC	1,	0,	0,	0
EC	1,	1,	0,	0
SOA	1,	1,	0,	0

```
!END!
```

Subgroup (3b)

The following names are used for Species-Groups in which results for certain species are combined (added) prior to output. The CGRUP name will be used as the species name in output files. Use this feature to model specific particle-size distributions by treating each size-range as a separate species. Order must be consistent with 3(a) above.

INPUT GROUP: 4 -- Map Projection and Grid control parameters

Projection for all (X,Y):

Map projection
(PMAP) Default: UTM ! PMAP = UTM !

- UTM : Universal Transverse Mercator
- TTM : Tangential Transverse Mercator
- LCC : Lambert Conformal Conic
- PS : Polar Stereographic
- EM : Equatorial Mercator
- LAZA : Lambert Azimuthal Equal Area

False Easting and Northing (km) at the projection origin
(Used only if PMAP= TTM, LCC, or LAZA)
(FEAST) Default=0.0 ! FEAST = 0.000 !
(FNORTH) Default=0.0 ! FNORTH = 0.000 !

UTM zone (1 to 60)
(Used only if PMAP=UTM)
(IUTMZN) No Default ! IUTMZN = 11 !

Hemisphere for UTM projection?
(Used only if PMAP=UTM)
(UTMHEM) Default: N ! UTMHEM = N !

- N : Northern hemisphere projection
- S : Southern hemisphere projection

Latitude and Longitude (decimal degrees) of projection origin
(Used only if PMAP= TTM, LCC, PS, EM, or LAZA)
(RLAT0) No Default ! RLAT0 = 0N !

```
(RLON0)                    No Default      ! RLON0 = 0E  !

    TTM :  RLON0 identifies central (true N/S) meridian of projection
           RLAT0 selected for convenience
    LCC :  RLON0 identifies central (true N/S) meridian of projection
           RLAT0 selected for convenience
    PS  :  RLON0 identifies central (grid N/S) meridian of projection
           RLAT0 selected for convenience
    EM  :  RLON0 identifies central meridian of projection
           RLAT0 is REPLACED by 0.0N (Equator)
    LAZA:  RLON0 identifies longitude of tangent-point of mapping plane
           RLAT0 identifies latitude of tangent-point of mapping plane

Matching parallel(s) of latitude (decimal degrees) for projection
(Used only if PMAP= LCC or PS)
(XLAT1)                    No Default      ! XLAT1 = 0N  !
(XLAT2)                    No Default      ! XLAT2 = 0N  !

    LCC :  Projection cone slices through Earth's surface at XLAT1 and XLAT2
    PS  :  Projection plane slices through Earth at XLAT1
           (XLAT2 is not used)

----------
Note:  Latitudes and longitudes should be positive, and include a
       letter N,S,E, or W indicating north or south latitude, and
       east or west longitude.  For example,
       35.9  N Latitude  =  35.9N
       118.7 E Longitude = 118.7E


Datum-region
------------

The Datum-Region for the coordinates is identified by a character
string.  Many mapping products currently available use the model of the
Earth known as the World Geodetic System 1984 (WGS-G ).  Other local
models may be in use, and their selection in CALMET will make its output
consistent with local mapping products.  The list of Datum-Regions with
official transformation parameters is provided by the National Imagery and
Mapping Agency (NIMA).

NIMA Datum - Regions(Examples)
-------------------------------------------------------------------------------
WGS-G     WGS-84 GRS 80 Spheroid, Global coverage (WGS84)
NAS-C     NORTH AMERICAN 1927 Clarke 1866 Spheroid, MEAN FOR CONUS (NAD27)
NWS-27    NWS 6370KM Radius, Sphere
NWS-84    NWS 6370KM Radius, Sphere
ESR-S     ESRI REFERENCE 6371KM Radius, Sphere

Datum-region for output coordinates
(DATUM)                    Default: WGS-G     ! DATUM = WGS-G  !


METEOROLOGICAL Grid:

Rectangular grid defined for projection PMAP,
with X the Easting and Y the Northing coordinate

       No. X grid cells (NX)      No default     ! NX =  2   !
       No. Y grid cells (NY)      No default     ! NY =  2   !
   No. vertical layers (NZ)       No default     ! NZ =  1   !

     Grid spacing (DGRIDKM)       No default     ! DGRIDKM = 200. !
                                  Units: km

          Cell face heights
              (ZFACE(nz+1))       No defaults
                                  Units: m
 ! ZFACE = 0., 5000. !

       Reference Coordinates
      of SOUTHWEST corner of
            grid cell(1, 1):

       X coordinate (XORIGKM)     No default     ! XORIGKM = 70. !
       Y coordinate (YORIGKM)     No default     ! YORIGKM = 3853. !
                                 Units: km
```

```
COMPUTATIONAL Grid:

     The computational grid is identical to or a subset of the MET. grid.
     The lower left (LL) corner of the computational grid is at grid point
     (IBCOMP, JBCOMP) of the MET. grid.  The upper right (UR) corner of the
     computational grid is at grid point (IECOMP, JECOMP) of the MET. grid.
     The grid spacing of the computational grid is the same as the MET. grid.

        X index of LL corner (IBCOMP)      No default     ! IBCOMP =  1   !
                  (1 <= IBCOMP <= NX)

        Y index of LL corner (JBCOMP)      No default     ! JBCOMP =  1   !
                  (1 <= JBCOMP <= NY)


        X index of UR corner (IECOMP)      No default     ! IECOMP =  2   !
                  (1 <= IECOMP <= NX)

        Y index of UR corner (JECOMP)      No default     ! JECOMP =  2   !
                  (1 <= JECOMP <= NY)


SAMPLING Grid (GRIDDED RECEPTORS):

     The lower left (LL) corner of the sampling grid is at grid point
     (IBSAMP, JBSAMP) of the MET. grid.  The upper right (UR) corner of the
     sampling grid is at grid point (IESAMP, JESAMP) of the MET. grid.
     The sampling grid must be identical to or a subset of the computational
     grid.  It may be a nested grid inside the computational grid.
     The grid spacing of the sampling grid is DGRIDKM/MESHDN.

        Logical flag indicating if gridded
        receptors are used (LSAMP)         Default: T     ! LSAMP = F !
        (T=yes, F=no)

        X index of LL corner (IBSAMP)      No default     ! IBSAMP =  0   !
         (IBCOMP <= IBSAMP <= IECOMP)

        Y index of LL corner (JBSAMP)      No default     ! JBSAMP =  0   !
         (JBCOMP <= JBSAMP <= JECOMP)


        X index of UR corner (IESAMP)      No default     ! IESAMP =  0   !
         (IBCOMP <= IESAMP <= IECOMP)

        Y index of UR corner (JESAMP)      No default     ! JESAMP =  0   !
         (JBCOMP <= JESAMP <= JECOMP)


       Nesting factor of the sampling
        grid (MESHDN)                      Default: 1     ! MESHDN =  1  !
        (MESHDN is an integer >= 1)

!END!

-------------------------------------------------------------------------------


INPUT GROUP: 5 -- Output Options
--------------
                                                *                          *
     FILE                          DEFAULT VALUE            VALUE THIS RUN
     ----                          -------------            --------------

   Concentrations (ICON)                1                   !  ICON =  1   !
   Dry Fluxes (IDRY)                    1                   !  IDRY =  0   !
   Wet Fluxes (IWET)                    1                   !  IWET =  0   !
   Relative Humidity (IVIS)             1                   !  IVIS =  1   !
    (relative humidity file is
     required for visibility
     analysis)
   Use data compression option in output file?
   (LCOMPRS)                            Default: T          ! LCOMPRS = T !

   *
```

```
0 = Do not create file, 1 = create file


DIAGNOSTIC MASS FLUX OUTPUT OPTIONS:

   Mass flux across specified boundaries
   for selected species reported hourly?
   (IMFLX)                          Default: 0         ! IMFLX =  0  !
     0 = no
     1 = yes (FLUXBDY.DAT and MASSFLX.DAT filenames
              are specified in Input Group 0)

   Mass balance for each species
   reported hourly?
   (IMBAL)                          Default: 0         ! IMBAL =  0  !
     0 = no
     1 = yes (MASSBAL.DAT filename is
          specified in Input Group 0)


LINE PRINTER OUTPUT OPTIONS:

   Print concentrations (ICPRT)     Default: 0         ! ICPRT =  1   !
   Print dry fluxes (IDPRT)         Default: 0         ! IDPRT =  0   !
   Print wet fluxes (IWPRT)         Default: 0         ! IWPRT =  0   !
   (0 = Do not print, 1 = Print)

   Concentration print interval
   (ICFRQ) in hours                 Default: 1         ! ICFRQ =  720 !
   Dry flux print interval
   (IDFRQ) in hours                 Default: 1         ! IDFRQ =  1   !
   Wet flux print interval
   (IWFRQ) in hours                 Default: 1         ! IWFRQ =  1   !

   Units for Line Printer Output
   (IPRTU)                          Default: 1         ! IPRTU =  3   !
                  for            for
              Concentration    Deposition
       1 =       g/m**3         g/m**2/s
       2 =      mg/m**3        mg/m**2/s
       3 =      ug/m**3        ug/m**2/s
       4 =      ng/m**3        ng/m**2/s
       5 =     Odour Units

   Messages tracking progress of run
   written to the screen ?
   (IMESG)                          Default: 2         ! IMESG =  2   !
     0 = no
     1 = yes (advection step, puff ID)
     2 = yes (YYYYJJJHH, # old puffs, # emitted puffs)


  SPECIES (or GROUP for combined species) LIST FOR OUTPUT OPTIONS

                 ---- CONCENTRATIONS ----   ------ DRY FLUXES ------   ------ WET FLUXES ------   -
- MASS FLUX --
   SPECIES
   /GROUP        PRINTED?  SAVED ON DISK?   PRINTED?  SAVED ON DISK?   PRINTED?  SAVED ON DISK?
SAVED ON DISK?
   -------       ------------------------   ------------------------   ------------------------   -
--------------
!          SO2 =     0,           1,           0,           0,           0,           0,
0   !
!          SO4 =     0,           1,           0,           0,           0,           0,
0   !
!          NOX =     0,           1,           0,           0,           0,           0,
0   !
!         HNO3 =     0,           1,           0,           0,           0,           0,
0   !
!          NO3 =     0,           1,           0,           0,           0,           0,
0   !
!         PM10 =     0,           1,           0,           0,           0,           0,
0   !
!          PMF =     0,           1,           0,           0,           0,           0,
0   !
!          PMC =     0,           1,           0,           0,           0,           0,
0   !
```

```
!          EC =     0,          1,          0,          0,          0,          0,
0   !
!         SOA =     0,          1,          0,          0,          0,          0,
0   !

     OPTIONS FOR PRINTING "DEBUG" QUANTITIES (much output)

       Logical for debug output
       (LDEBUG)                                Default: F     ! LDEBUG = F !

       First puff to track
       (IPFDEB)                                Default: 1     ! IPFDEB =  1  !

       Number of puffs to track
       (NPFDEB)                                Default: 1     ! NPFDEB =  1  !

       Met. period to start output
       (NN1)                                   Default: 1     ! NN1 =  1   !

       Met. period to end output
       (NN2)                                   Default: 10    ! NN2 =  10  !

!END!

-------------------------------------------------------------------------------


INPUT GROUP: 6a, 6b, & 6c -- Subgrid scale complex terrain inputs
-------------------------

---------------
Subgroup (6a)
---------------
       Number of terrain features (NHILL)      Default: 0     ! NHILL =  0   !

       Number of special complex terrain
       receptors  (NCTREC)                     Default: 0     ! NCTREC =  0   !

       Terrain and CTSG Receptor data for
       CTSG hills input in CTDM format ?
       (MHILL)                                 No Default     ! MHILL =  2   !
       1 = Hill and Receptor data created
           by CTDM processors & read from
           HILL.DAT and HILLRCT.DAT files
       2 = Hill data created by OPTHILL &
           input below in Subgroup (6b);
           Receptor data in Subgroup (6c)

       Factor to convert horizontal dimensions  Default: 1.0   ! XHILL2M = 1. !
       to meters (MHILL=1)

       Factor to convert vertical dimensions    Default: 1.0   ! ZHILL2M = 1. !
       to meters (MHILL=1)

       X-origin of CTDM system relative to      No Default     ! XCTDMKM = 0.0E00 !
       CALPUFF coordinate system, in Kilometers (MHILL=1)

       Y-origin of CTDM system relative to      No Default     ! YCTDMKM = 0.0E00 !
       CALPUFF coordinate system, in Kilometers (MHILL=1)

! END !

---------------
Subgroup (6b)
---------------

                      1 **
     HILL information


HILL          XC        YC       THETAH  ZGRID  RELIEF    EXPO 1    EXPO 2   SCALE 1    SCALE 2
AMAX1     AMAX2
 NO.         (km)      (km)      (deg.)   (m)     (m)       (m)       (m)       (m)        (m)
(m)       (m)
----         ----      ----      ------  -----  ------    ------    ------   -------    -------
-----     -----
```

```
---------------
Subgroup (6c)
---------------

    COMPLEX TERRAIN RECEPTOR INFORMATION

                      XRCT         YRCT         ZRCT          XHH
                      (km)         (km)          (m)
                     ------       -----       ------         ----


--------------------
1
     Description of Complex Terrain Variables:
          XC, YC  = Coordinates of center of hill
          THETAH  = Orientation of major axis of hill (clockwise from
                    North)
          ZGRID   = Height of the  0  of the grid above mean sea
                    level
          RELIEF  = Height of the crest of the hill above the grid elevation
          EXPO 1  = Hill-shape exponent for the major axis
          EXPO 2  = Hill-shape exponent for the major axis
          SCALE 1 = Horizontal length scale along the major axis
          SCALE 2 = Horizontal length scale along the minor axis
          AMAX    = Maximum allowed axis length for the major axis
          BMAX    = Maximum allowed axis length for the major axis

          XRCT, YRCT = Coordinates of the complex terrain receptors
          ZRCT    = Height of the ground (MSL) at the complex terrain
                    Receptor
          XHH     = Hill number associated with each complex terrain receptor
                    (NOTE: MUST BE ENTERED AS A REAL NUMBER)

   **
     NOTE: DATA for each hill and CTSG receptor are treated as a separate
           input subgroup and therefore must end with an input group terminator.

------------------------------------------------------------------------------


INPUT GROUP: 7 -- Chemical parameters for dry deposition of gases
--------------

      SPECIES     DIFFUSIVITY      ALPHA STAR      REACTIVITY    MESOPHYLL RESISTANCE     HENRY'S
LAW COEFFICIENT
       NAME        (cm**2/s)                                           (s/cm)
(dimensionless)
      -------     -----------      ----------      ----------    --------------------     ---------
--------------

!          SO2 =     0.1509,         1000.,            8.,              0.,                  0.04
!
!          NOX =     0.1656,            1.,            8.,              5.,                   3.5
!
!         HNO3 =     0.1628,            1.,           18.,              0.,             0.00000008
!

!END!


------------------------------------------------------------------------------


INPUT GROUP: 8 -- Size parameters for dry deposition of particles
--------------

     For SINGLE SPECIES, the mean and standard deviation are used to
     compute a deposition velocity for NINT (see group 9) size-ranges,
     and these are then averaged to obtain a mean deposition velocity.

     For GROUPED SPECIES, the size distribution should be explicitly
     specified (by the 'species' in the group), and the standard deviation
     for each should be entered as 0.  The model will then use the
     deposition velocity for the stated mean diameter.

      SPECIES      GEOMETRIC MASS MEAN        GEOMETRIC STANDARD
       NAME             DIAMETER                 DEVIATION
                        (microns)                (microns)
```

```
      -------      -------------------        ------------------
!          SO4 =          0.48,                        2.   !
!          NO3 =          0.48,                        2.   !
!         PM10 =          0.48,                        2.   !

!END!

-------------------------------------------------------------------------------


INPUT GROUP: 9 -- Miscellaneous dry deposition parameters
--------------

     Reference cuticle resistance (s/cm)
     (RCUTR)                          Default: 30    !  RCUTR = 30.0 !
     Reference ground resistance  (s/cm)
     (RGR)                            Default: 10    !    RGR = 5.0 !
     Reference pollutant reactivity
     (REACTR)                         Default: 8     ! REACTR = 8.0 !

     Number of particle-size intervals used to
     evaluate effective particle deposition velocity
     (NINT)                           Default: 9     !   NINT =  9  !

     Vegetation state in unirrigated areas
     (IVEG)                           Default: 1     !   IVEG =  1   !
        IVEG=1 for active and unstressed vegetation
        IVEG=2 for active and stressed vegetation
        IVEG=3 for inactive vegetation

!END!

-------------------------------------------------------------------------------


INPUT GROUP: 10 -- Wet Deposition Parameters
---------------


                      Scavenging Coefficient -- Units: (sec)**(-1)

       Pollutant      Liquid Precip.       Frozen Precip.
       ---------      --------------       --------------
!          SO2 =         3.0E-05,              0.0E00 !
!          SO4 =         1.0E-04,             3.0E-05 !
!         HNO3 =         6.0E-05,              0.0E00 !
!          NO3 =         1.0E-04,             3.0E-05 !
!         PM10 =         1.0E-04,             3.0E-05 !

!END!

-------------------------------------------------------------------------------


INPUT GROUP: 11 -- Chemistry Parameters
---------------

     Ozone data input option (MOZ)     Default: 1            ! MOZ =  0   !
     (Used only if MCHEM = 1, 3, or 4)
        0 = use a monthly background ozone value
        1 = read hourly ozone concentrations from
            the OZONE.DAT data file

     Monthly ozone concentrations
     (Used only if MCHEM = 1, 3, or 4 and
      MOZ = 0 or MOZ = 1 and all hourly O3 data missing)
     (BCKO3) in ppb                    Default: 12*80.
     !  BCKO3 = 23.25, 29.00, 32.25, 38.75, 48.20, 64.60, 71.60, 71.00, 62.40, 47.80, 28.00, 32.40
!

     Monthly ammonia concentrations
     (Used only if MCHEM = 1, or 3)
     (BCKNH3) in ppb                   Default: 12*10.
     !  BCKNH3 = 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00
!
```

```
    Nighttime SO2 loss rate (RNITE1)
    in percent/hour                    Default: 0.2          ! RNITE1 = .2 !

    Nighttime NOx loss rate (RNITE2)
    in percent/hour                    Default: 2.0          ! RNITE2 = 2.0 !

    Nighttime HNO3 formation rate (RNITE3)
    in percent/hour                    Default: 2.0          ! RNITE3 = 2.0 !

    H2O2 data input option (MH2O2)     Default: 1            ! MH2O2 =  1   !
    (Used only if MAQCHEM = 1)
       0 = use a monthly background H2O2 value
       1 = read hourly H2O2 concentrations from
           the H2O2.DAT data file

    Monthly H2O2 concentrations
    (Used only if MQACHEM = 1 and
     MH2O2 = 0 or MH2O2 = 1 and all hourly H2O2 data missing)
    (BCKH2O2) in ppb                   Default: 12*1.
    !  BCKH2O2 = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00 !


--- Data for SECONDARY ORGANIC AEROSOL (SOA) Option
    (used only if MCHEM = 4)

    The SOA module uses monthly values of:
         Fine particulate concentration in ug/m^3 (BCKPMF)
         Organic fraction of fine particulate     (OFRAC)
         VOC / NOX ratio (after reaction)         (VCNX)
    to characterize the air mass when computing
    the formation of SOA from VOC emissions.
    Typical values for several distinct air mass types are:

       Month     1    2    3    4    5    6    7    8    9   10   11   12
                Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct  Nov  Dec

    Clean Continental
       BCKPMF   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.
       OFRAC  .15  .15  .20  .20  .20  .20  .20  .20  .20  .20  .20  .15
       VCNX    50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.

    Clean Marine (surface)
       BCKPMF  .5   .5   .5   .5   .5   .5   .5   .5   .5   .5   .5   .5
       OFRAC  .25  .25  .30  .30  .30  .30  .30  .30  .30  .30  .30  .25
       VCNX    50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.

    Urban - low biogenic (controls present)
       BCKPMF  30.  30.  30.  30.  30.  30.  30.  30.  30.  30.  30.  30.
       OFRAC  .20  .20  .25  .25  .25  .25  .25  .25  .20  .20  .20  .20
       VCNX     4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.

    Urban - high biogenic (controls present)
       BCKPMF  60.  60.  60.  60.  60.  60.  60.  60.  60.  60.  60.  60.
       OFRAC  .25  .25  .30  .30  .30  .55  .55  .55  .35  .35  .35  .25
       VCNX    15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.

    Regional Plume
       BCKPMF  20.  20.  20.  20.  20.  20.  20.  20.  20.  20.  20.  20.
       OFRAC  .20  .20  .25  .35  .25  .40  .40  .40  .30  .30  .30  .20
       VCNX    15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.

    Urban - no controls present
       BCKPMF 100. 100. 100. 100. 100. 100. 100. 100. 100. 100. 100. 100.
       OFRAC  .30  .30  .35  .35  .35  .55  .55  .55  .35  .35  .35  .30
       VCNX     2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.

    Default: Clean Continental
    !  BCKPMF = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00 !
    !  OFRAC  = 0.15, 0.15, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.15 !
    !  VCNX   = 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00
!


!END!
```

```
INPUT GROUP: 12 -- Misc. Dispersion and Computational Parameters
---------------

     Horizontal size of puff (m) beyond which
     time-dependent dispersion equations (Heffter)
     are used to determine sigma-y and
     sigma-z (SYTDEP)                          Default: 550.    ! SYTDEP = 5.5E02 !

     Switch for using Heffter equation for sigma z
     as above (0 = Not use Heffter; 1 = use Heffter
     (MHFTSZ)                                  Default: 0       ! MHFTSZ =  0    !

     Stability class used to determine plume
     growth rates for puffs above the boundary
     layer (JSUP)                              Default: 5       ! JSUP =  5    !

     Vertical dispersion constant for stable
     conditions (k1 in Eqn. 2.7-3)  (CONK1)    Default: 0.01    ! CONK1 = .01 !

     Vertical dispersion constant for neutral/
     unstable conditions (k2 in Eqn. 2.7-4)
     (CONK2)                                   Default: 0.1     ! CONK2 = .1 !

     Factor for determining Transition-point from
     Schulman-Scire to Huber-Snyder Building Downwash
     scheme (SS used for Hs < Hb + TBD * HL)
     (TBD)                                     Default: 0.5     ! TBD = .5 !
        TBD < 0   ==> always use Huber-Snyder
        TBD = 1.5 ==> always use Schulman-Scire
        TBD = 0.5 ==> ISC Transition-point

     Range of land use categories for which
     urban dispersion is assumed
     (IURB1, IURB2)                            Default: 10      ! IURB1 =  10  !
                                                        19      ! IURB2 =  19  !

     Site characterization parameters for single-point Met data files ---------
     (needed for METFM = 2,3,4)

        Land use category for modeling domain
        (ILANDUIN)                             Default: 20      ! ILANDUIN =  20  !

        Roughness length (m) for modeling domain
        (Z0IN)                                 Default: 0.25    ! Z0IN = .25 !

        Leaf area index for modeling domain
        (XLAIIN)                               Default: 3.0     ! XLAIIN = 3.0 !

        Elevation above sea level (m)
        (ELEVIN)                               Default: 0.0     ! ELEVIN = 100.0 !

        Latitude (degrees) for met location
        (XLATIN)                               Default: -999.   ! XLATIN = 36.78 !

        Longitude (degrees) for met location
        (XLONIN)                               Default: -999.   ! XLONIN = 119.72 !

     Specialized information for interpreting single-point Met data files -----

        Anemometer height (m) (Used only if METFM = 2,3)
        (ANEMHT)                               Default: 10.     ! ANEMHT = 10.0 !

        Form of lateral turbulance data in PROFILE.DAT file
        (Used only if METFM = 4 or MTURBVW = 1 or 3)
        (ISIGMAV)                              Default: 1       ! ISIGMAV =  1  !
            0 = read sigma-theta
            1 = read sigma-v

        Choice of mixing heights (Used only if METFM = 4)
        (IMIXCTDM)                             Default: 0       ! IMIXCTDM =  0  !
            0 = read PREDICTED mixing heights
            1 = read OBSERVED mixing heights

     Maximum length of a slug (met. grid units)
     (XMXLEN)                                  Default: 1.0     ! XMXLEN = 1.0 !
```

```
Maximum travel distance of a puff/slug (in
grid units) during one sampling step
(XSAMLEN)                                   Default: 1.0     ! XSAMLEN = 1.0 !

Maximum Number of slugs/puffs release from
one source during one time step
(MXNEW)                                     Default: 99      ! MXNEW =  99   !

Maximum Number of sampling steps for
one puff/slug during one time step
(MXSAM)                                     Default: 99      ! MXSAM =  99   !

Number of iterations used when computing
the transport wind for a sampling step
that includes gradual rise (for CALMET
and PROFILE winds)
(NCOUNT)                                    Default: 2       ! NCOUNT =  2   !

Minimum sigma y for a new puff/slug (m)
(SYMIN)                                     Default: 1.0     ! SYMIN = 1.0  !

Minimum sigma z for a new puff/slug (m)
(SZMIN)                                     Default: 1.0     ! SZMIN = 1.0  !

Default minimum turbulence velocities
sigma-v and sigma-w for each
stability class (m/s)
(SVMIN(6) and SWMIN(6))        Default SVMIN : .50,  .50,  .50,  .50,  .50,  .50
                               Default SWMIN : .20,  .12,  .08,  .06,  .03,  .016

                             Stability Class :  A     B     C     D     E     F
                                                ---   ---   ---   ---   ---   ---
                                    ! SVMIN = 0.500, 0.500, 0.500, 0.500, 0.500, 0.500!
                                    ! SWMIN = 0.200, 0.120, 0.080, 0.060, 0.030, 0.016!

Divergence criterion for dw/dz across puff
used to initiate adjustment for horizontal
convergence (1/s)
Partial adjustment starts at CDIV(1), and
full adjustment is reached at CDIV(2)
(CDIV(2))                                   Default: 0.0,0.0  ! CDIV = .0, .0 !

Minimum wind speed (m/s) allowed for
non-calm conditions. Also used as minimum
speed returned when using power-law
extrapolation toward surface
(WSCALM)                                    Default: 0.5     ! WSCALM = .5 !

Maximum mixing height (m)
(XMAXZI)                                    Default: 3000.   ! XMAXZI = 3000.0 !

Minimum mixing height (m)
(XMINZI)                                    Default: 50.     ! XMINZI = 50.0 !

Default wind speed classes --
5 upper bounds (m/s) are entered;
the 6th class has no upper limit
(WSCAT(5))                          Default   :
                                    ISC RURAL : 1.54, 3.09, 5.14, 8.23, 10.8 (10.8+)

                           Wind Speed Class :  1     2     3     4     5
                                               ---   ---   ---   ---   ---
                                      ! WSCAT = 1.54, 3.09, 5.14, 8.23, 10.80 !

Default wind speed profile power-law
exponents for stabilities 1-6
(PLX0(6))                           Default   : ISC RURAL values
                                    ISC RURAL : .07, .07, .10, .15, .35, .55
                                    ISC URBAN : .15, .15, .20, .25, .30, .30

                             Stability Class :  A     B     C     D     E     F
                                                ---   ---   ---   ---   ---   ---
                                       ! PLX0 = 0.07, 0.07, 0.10, 0.15, 0.35, 0.55 !

Default potential temperature gradient
for stable classes E, F (degK/m)
(PTG0(2))                           Default: 0.020, 0.035
                                       ! PTG0 = 0.020,   0.035 !
```

```
Default plume path coefficients for
each stability class (used when option
for partial plume height terrain adjustment
is selected -- MCTADJ=3)
(PPC(6))                    Stability Class :  A     B     C     D     E     F
                               Default  PPC :  .50,  .50,  .50,  .50,  .35,  .35
                                               ---   ---   ---   ---   ---   ---
                                      !  PPC = 0.50, 0.50, 0.50, 0.50, 0.35, 0.35 !

Slug-to-puff transition criterion factor
equal to sigma-y/length of slug
(SL2PF)                                 Default: 10.        ! SL2PF = 10.0 !

Puff-splitting control variables -----------------------

  VERTICAL SPLIT
  --------------

  Number of puffs that result every time a puff
  is split - nsplit=2 means that 1 puff splits
  into 2
  (NSPLIT)                              Default:   3        ! NSPLIT =  3  !

  Time(s) of a day when split puffs are eligible to
  be split once again; this is typically set once
  per day, around sunset before nocturnal shear develops.
  24 values: 0 is midnight (00:00) and 23 is 11 PM (23:00)
  0=do not re-split    1=eligible for re-split
  (IRESPLIT(24))                        Default:  Hour 17 = 1
  !  IRESPLIT = 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0 !

  Split is allowed only if last hour's mixing
  height (m) exceeds a minimum value
  (ZISPLIT)                             Default: 100.       ! ZISPLIT = 100.0 !

  Split is allowed only if ratio of last hour's
  mixing ht to the maximum mixing ht experienced
  by the puff is less than a maximum value (this
  postpones a split until a nocturnal layer develops)
  (ROLDMAX)                             Default: 0.25       ! ROLDMAX = 0.25 !


  HORIZONTAL SPLIT
  ----------------

  Number of puffs that result every time a puff
  is split - nsplith=5 means that 1 puff splits
  into 5
  (NSPLITH)                             Default:   5        ! NSPLITH =  5  !

  Minimum sigma-y (Grid Cells Units) of puff
  before it may be split
  (SYSPLITH)                            Default:  1.0       ! SYSPLITH = 1.0 !

  Minimum puff elongation rate (SYSPLITH/hr) due to
  wind shear, before it may be split
  (SHSPLITH)                            Default:  2.        ! SHSPLITH = 2.0 !

  Minimum concentration (g/m^3) of each
  species in puff before it may be split
  Enter array of NSPEC values; if a single value is
  entered, it will be used for ALL species
  (CNSPLITH)                            Default:  1.0E-07   ! CNSPLITH = 1.0E-07 !

Integration control variables -----------------------

  Fractional convergence criterion for numerical SLUG
  sampling integration
  (EPSSLUG)                             Default:   1.0e-04  ! EPSSLUG = 1.0E-04 !

  Fractional convergence criterion for numerical AREA
  source integration
  (EPSAREA)                             Default:   1.0e-06  ! EPSAREA = 1.0E-06 !

  Trajectory step-length (m) used for numerical rise
  integration
  (DSRISE)                              Default:   1.0      ! DSRISE = 1.0 !
```

```
      Boundary Condition (BC) Puff control variables ------------------------

      Minimum height (m) to which BC puffs are mixed as they are emitted
      (MBCON=2 ONLY).  Actual height is reset to the current mixing height
      at the release point if greater than this minimum.
      (HTMINBC)                          Default:   500.     ! HTMINBC = 500.0 !

      Search radius (in BC segment lengths) about a receptor for sampling
      nearest BC puff.  BC puffs are emitted with a spacing of one segment
      length, so the search radius should be greater than 1.
      (RSAMPBC)                          Default:   4.      ! RSAMPBC = 10.0 !

      Near-Surface depletion adjustment to concentration profile used when
      sampling BC puffs?
      (MDEPBC)                           Default:   1        ! MDEPBC =  1  !
         0 = Concentration is NOT adjusted for depletion
         1 = Adjust Concentration for depletion

!END!


-------------------------------------------------------------------------------


INPUT GROUPS: 13a, 13b, 13c, 13d -- Point source parameters
--------------------------------

---------------
Subgroup (13a)
---------------

     Number of point sources with
     parameters provided below      (NPT1)  No default  !  NPT1 =  4  !

     Units used for point source
     emissions below                (IPTU)  Default: 1  !  IPTU =   3  !
           1 =        g/s
           2 =       kg/hr
           3 =       lb/hr
           4 =     tons/yr
           5 =     Odour Unit * m**3/s  (vol. flux of odour compound)
           6 =     Odour Unit * m**3/min
           7 =     metric tons/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (13d)        (NSPT1) Default: 0  !  NSPT1 =  0  !

     Number of point sources with
     variable emission parameters
     provided in external file      (NPT2)  No default  !  NPT2 =  0  !

     (If NPT2 > 0, these point
     source emissions are read from
     the file: PTEMARB.DAT)

!END!

---------------
Subgroup (13b)
---------------
                                    a
          POINT SOURCE: CONSTANT DATA
          ----------------------------
                                                                                b          c
  Source       X          Y        Stack    Base     Stack    Exit  Exit    Bldg.  Emission
   No.     Coordinate Coordinate Height Elevation Diameter  Vel.  Temp.   Dwash   Rates
              (km)       (km)       (m)      (m)       (m)  (m/s) (deg. K)
  ------   ---------- ---------- ------  ------   -------- ----- -------- ----- --------
   1 ! SRCNAM = CTN !
   1 ! X = 269.9666,4053.0369,   45.72,  99.7,      5.49, 23.70,  363.7,  1.0, 1.66  , 8.3E-01,
22.58,
       0.0E00,  0.0E00,  9.7E00, 0.0, 0.0, 2.4275, 6.4525!
   1 ! FMFAC  =      1.0 !   !END!
   2 ! SRCNAM = CTS !
```

```
   2 ! X = 269.9657, 4052.991,   45.72,  99.7,      5.49, 23.70,  363.7,  1.0, 1.66  , 8.3E-01,
22.58,
       0.0E00,  0.0E00,   9.7E00, 0.0, 0.0, 2.4275, 6.4525!
   2 ! FMFAC  =      1.0 !   !END!
   3 ! SRCNAM = AUXBOIL !
   3 ! X = 269.9182,4052.9761,   30.48,  99.7,      1.07, 10.31,  435.9,  1.0, .01    , .005   ,
.12,
       0.0E00,  0.0E00, .11, 0.0, 0.0, .0275, .0775    !
   3 ! FMFAC  =      1.0 !   !END!
   4 ! SRCNAM = COOL !
   4 ! X = 270.0754,4053.0576,   24.38,  99.7,      7.92, 15.07,  300.4,  1.0, 0.0E00,  0.0E00,
0.0E00,
       0.0E00,  0.0E00, 5.6E-01, 0.0, 0.0, 0.0, 0.0 !
   4 ! FMFAC  =      1.0 !   !END!
```

.....END OF PARTIAL LISTING....

POSTUTIL SAMPLE INPUT FILE – DEPOSITION

```
KRCD CPP 1986-1990: total deposition fluxes (wet & dry)
Nitrogen deposition due to NO, NO2, HNO3, NH4NO3, and (NH4)2SO4
Sulfur deposition due to SO2, (NH4)2SO4
---------------- Run title (3 lines) ------------------------------------------

                    POSTUTIL MODEL CONTROL FILE
                    ---------------------------

-------------------------------------------------------------------------------

INPUT GROUP: 0 -- Input and Output File Names
--------------

-------------
Subgroup (0a)
-------------

Output Files
------------

 File            Default File Name
 ----            -----------------
 List File       POSTUTIL.LST       ! UTLLST =2S15bdp.LST   !
 Data File       MODEL.DAT          ! UTLDAT =2S15bdp.dat    !


Input Files
-----------

 Meteorological data files are needed for the HNO3/NO3 partition option.
 The met data file is the 'CALMET.DAT' format file used in the CALPUFF
 simulation.  If multiple CALMET files had been used in sequence, you
 may list all of these files in subgroup 0b.  Specify the total number
 of CALMET files runs you need to use, and provide the filename for each
 in subgroup 0b.

     Number of CALMET data files (NFILES)
                                    Default: 0       ! NMET    = 1   !


 A number of CALPUFF data files may be processed in this application.
 The files may represent individual CALPUFF simulations that were made
 for a specific set of species and/or sources.  Specify the total number
 of CALPUFF runs you wish to combine, and provide the filename for each
 in subgroup 0b.

     Number of CALPUFF data files (NFILES)
                                    Default: 1       ! NFILES  = 2   !


 All filenames will be converted to lower case if LCFILES = T
 Otherwise, if LCFILES = F, filenames will be converted to UPPER CASE

     Convert filenames to lower case?  Default: T     ! LCFILES = T !
         T = lower case
         F = UPPER CASE

!END!

------------------------------------------------------------
 NOTE: file/path names can be up to 70 characters in length
------------------------------------------------------------

-------------
Subgroup (0b)
-------------

NMET CALMET Data Files:

Input File      Default File Name
----------      -----------------
   1            MET.DAT            ! UTLMET = fres8690.asc ! !END!


Iput File      Default File Name
----------      -----------------
   1            CALPUFF.DAT        ! MODDAT =1s15baw.dat       ! !END!
```

```
  2            (none)              ! MODDAT =ls15bad.dat      ! !END!

-------------
Note:  provide NMET lines of the form    * UTLMET = name * *END*
       and NFILES lines of the form      * MODDAT = name * *END*
       where the * should be replaced with an exclamation point,
       the special delimiter character.

------------------------------------------------------------------------------

INPUT GROUP: 1 -- General run control parameters
-------------

     Starting date:    Year  (ISYR) --    No default   ! ISYR  = 1986 !
                       Month (ISMO) --    No default   ! ISMO  = 1    !
                       Day   (ISDY) --    No default   ! ISDY  = 1    !
                       Hour  (ISHR) --    No default   ! ISHR  = 1    !

     Number of periods to process
                                (NPER) -- No default   ! NPER  = 43824   !

     Number of species to process from CALPUFF runs
                            (NSPECINP) -- No default   ! NSPECINP = 5 !

     Number of species to write to output file
                            (NSPECOUT) -- No default   ! NSPECOUT = 7 !

     Number of species to compute from those modeled
     (must be no greater than NSPECOUT)
                            (NSPECCMP) -- No default   ! NSPECCMP = 2 !


 When multiple files are used, a species name may appear in more than
 one file.  Data for this species will be summed (appropriate if the
 CALPUFF runs use different source groups).  If this summing is not
 appropriate, remove duplicate species from the file(s).

     Stop run if duplicate species names
     are found? (MDUPLCT)              Default: 0       ! MDUPLCT  =  0  !
        0 = no  (i.e., duplicate species are summed)
        1 = yes (i.e., run is halted)

 Data for each species in a CALPUFF data file may also be scaled as
 they are read.  This can be done to alter the emission rate of all
 sources that were modeled in a particular CALPUFF application.
 The scaling factor for each species is entered in Subgroup (2d), for
 each file for which scaling is requested.

     Number of CALPUFF data files that will be scaled
     (must be no greater than NFILES)
     (NSCALED)                         Default: 0       ! NSCALED = 0 !


 Option to recompute the HNO3/NO3 concentration partition prior to
 performing other actions.  This option will NOT alter any deposition
 fluxes contained in the CALPUFF file(s).  Two partition selections
 are provided.  The first (MNITRATE=1) computes the partition for the
 TOTAL (all sources) concentration fields (SO4, NO3, HNO3; NH3), and
 the second (MNITRATE=2) uses this partition (from a previous application
 of POSTUTIL) to compute the partition for individual source groups.

 Required information for MNITRATE=1 includes:
           species NO3, HNO3, and SO4
           NH3 concentration(s)
           met. data file for RH and T

 Required information for MNITRATE=2 includes:
           species NO3 and HNO3 for a source group
           species NO3ALL and HNO3ALL for all source groups, properly
                   partitioned

     Recompute the HNO3/NO3 partition for concentrations?
     (MNITRATE)                        Default: 0       ! MNITRATE  =  0  !
        0 = no
        1 = yes, for all sources combined
        2 = yes, for a source group
```

```
     Ammonia concentrations may be available as a modeled species in
     the CALPUFF files.  When NH3 is listed as a processed species in
     Subgroup (2a) (as one of the NSPECINP ASPECI entries), the
     modeled values will be used in the chemical equilibrium calculation.
     If NH3 is not on this list, the default background value listed
     below will be used.
     Default ammonia concentration (ppb) used for HNO3/NO3 partition:
     (BCKNH3) in ppb                Default: 10.      ! BCKNH3 = 1. !

!END!
--------------------------------------------------------------------------------

INPUT GROUP: 2 -- Species Processing Information
--------------

-------------
Subgroup (2a)
-------------

  The following NSPECINP species will be processed:

! ASPECI =          SO2 !          !END!
! ASPECI =          SO4 !          !END!
! ASPECI =          NOX !          !END!
! ASPECI =         HNO3 !          !END!
! ASPECI =          NO3 !          !END!


-------------
Subgroup (2b)
-------------

  The following NSPECOUT species will be written:

! ASPECO =          SO2 !          !END!
! ASPECO =          SO4 !          !END!
! ASPECO =          NOX !          !END!
! ASPECO =         HNO3 !          !END!
! ASPECO =          NO3 !          !END!
! ASPECO =            N !          !END!
! ASPECO =            S !          !END!

-------------
Subgroup (2c)
-------------

  The following NSPECCMP species will be computed by scaling and summing
  one or more of the processed input species.  Identify the name(s) of
  the computed species and provide the scaling factors for each of the
  NSPECINP input species (NSPECCMP groups of NSPECINP+1 lines each):

! CSPECCMP =        N !
!     SO2  =     0.0 !
!     SO4  =     0.292 !
!     NOX  =     0.304 !
!    HNO3  =     0.222 !
!     NO3  =     0.452 !
!END!

! CSPECCMP =        S !
!     SO2  =     0.500 !
!     SO4  =     0.333 !
!     NOX  =     0.0 !
!    HNO3  =     0.0 !
!     NO3  =     0.0 !
!END!


-------------
Subgroup (2d)
-------------

  Each species in NSCALED CALPUFF data files may be scaled before being
  processed (e.g., to change the emission rate for all sources modeled
  in the run that produced a data file).  For each file, identify the
  file name and then provide the name(s) of the scaled species and the
  corresponding scaling factors (A,B where x' = Ax+B).
```

```
                A(Default=1.0)        B(Default=0.0)
                --------------        --------------

! MODDAT =NOFILES.DAT     !
!      SO2  =       1.0,                  0.0    !
!      SO4  =       1.0,                  0.0    !
!     HNO3  =       1.0,                  0.0    !
!      NO3  =       1.0,                  0.0    !
!END!
```

CALPOST SAMPLE INPUT FILE - VISIBILITY

```
SEQUOIA: Calpost Visibility Input file
KRCD CPP (SEQUOIA F(RH)), SIEMENS, case 4a, Scen A
FRESNO MET 1986-1990, EPA "NATURAL CONDITIONS"
---------------- Run title (3 lines) ------------------------------------------

                    CALPOST MODEL CONTROL FILE
                    --------------------------

------------------------------------------------------------------------------

INPUT GROUP: 0 -- Input and Output File Names
--------------

Input Files
-----------

File                        Default File Name
----                        -----------------
Conc/Dep Flux File          MODEL.DAT           ! MODDAT =1S14AAS.DAT   !
Relative Humidity File      VISB.DAT            * VISDAT =   *
Background Data File        BACK.DAT            *BACKDAT =   *
Transmissometer/            VSRN.DAT            *VSRDAT =   *
Nephelometer Data File

Output Files
------------

File                        Default File Name
----                        -----------------
List File                   CALPOST.LST         ! PSTLST =3SSEAADV.LST   !

Pathname for Timeseries Files   (blank)         * TSPATH =   *
(activate with exclamation points only if
providing NON-BLANK character string)

Pathname for Plot Files   (blank)               * PLPATH =   *
(activate with exclamation points only if
 providing NON-BLANK character string)

User Character String (U) to augment default filenames
(activate with exclamation points only if
 providing NON-BLANK character string)

Timeseries                  TSttUUUU.DAT        * TSUNAM =   *

Top Nth Rank Plot           RttUUUUU.DAT
                      or    RttiiUUU.GRD        * TUNAM =   *

Exceedance Plot             XttUUUUU.DAT
                      or    XttUUUUU.GRD        * XUNAM =   *

Echo Plot                   jjjtthhU.DAT
(Specific Days)       or    jjjtthhU.GRD        * EUNAM =   *

Visibility Plot             V24UUUUU.DAT        * VUNAM =   *
(Daily Peak Summary)

------------------------------------------------------------------------------
All file names will be converted to lower case if LCFILES = T
Otherwise, if LCFILES = F, file names will be converted to UPPER CASE
         T = lower case      ! LCFILES = F !
         F = UPPER CASE
NOTE: (1) file/path names can be up to 70 characters in length
NOTE: (2) Filenames for ALL PLOT and TIMESERIES FILES are constructed
          using a template that includes a pathname, user-supplied
          character(s), and fixed strings (tt,ii,jjj, and hh), where
                tt = Averaging Period (e.g. 03)
                ii = Rank (e.g. 02)
                jjj= Julian Day
                hh = Hour(ending)
          are determined internally based on selections made below.
          If a path or user-supplied character(s) are supplied, each
          must contain at least 1 non-blank character.

!END!
------------------------------------------------------------------------------
```

```
INPUT GROUP: 1 -- General run control parameters
--------------

     Option to run all periods found
     in the met. file(s)  (METRUN)        Default: 0   ! METRUN =   1  !

        METRUN = 0 - Run period explicitly defined below
        METRUN = 1 - Run all periods in CALPUFF data file(s)

     Starting date:    Year  (ISYR) --    No default   ! ISYR  =  1986   !
     (used only if     Month (ISMO) --    No default   ! ISMO  =  0    !
      METRUN = 0)      Day   (ISDY) --    No default   ! ISDY  =  0    !
                       Hour  (ISHR) --    No default   ! ISHR  =  0    !

     Number of hours to process (NHRS) -- No default   ! NHRS  =  0  !

     Process every hour of data?(NREP) -- Default: 1   ! NREP  =  1  !
      (1 = every hour processed,
       2 = every 2nd hour processed,
       5 = every 5th hour processed, etc.)

Species & Concentration/Deposition Information
----------------------------------------------

      Species to process (ASPEC)       -- No default   ! ASPEC = VISIB  !
      (ASPEC = VISIB for visibility processing)

      Layer/deposition code (ILAYER)   -- Default: 1   ! ILAYER =  1  !
        '1'  for CALPUFF concentrations,
        '-1' for dry deposition fluxes,
        '-2' for wet deposition fluxes,
        '-3' for wet+dry deposition fluxes.

      Scaling factors of the form:     -- Defaults:    ! A =  0.0    !
           X(new) = X(old) * A + B          A = 0.0    ! B =  0.0    !
        (NOT applied if A = B = 0.0)        B = 0.0

      Add Hourly Background Concentrations/Fluxes?
                              (LBACK)  -- Default: F   ! LBACK =  F !

Receptor information
--------------------

  Gridded receptors processed?     (LG) -- Default: F   ! LG  = F  !
  Discrete receptors processed?    (LD) -- Default: F   ! LD  = T  !
  CTSG Complex terrain receptors processed?
                                  (LCT) -- Default: F   ! LCT = F  !

--Report results by DISCRETE receptor RING?
  (only used when LD = T)      (LDRING) -- Default: F   ! LDRING = F  !

--Select range of DISCRETE receptors (only used when LD = T):

  Select ALL DISCRETE receptors by setting NDRECP flag to -1;
                               OR
  Select SPECIFIC DISCRETE receptors by entering a flag (0,1) for each
     0 = discrete receptor not processed
     1 = discrete receptor processed
  using repeated value notation to select blocks of receptors:
     23*1, 15*0, 12*1
  Flag for all receptors after the last one assigned is set to 0
  (NDRECP) -- Default: -1
 ! NDRECP = 180*0, 180*1  !


--Select range of GRIDDED receptors (only used when LG = T):

       X index of LL corner (IBGRID) -- Default: -1     ! IBGRID = -1  !
           (-1 OR 1 <= IBGRID <= NX)

       Y index of LL corner (JBGRID) -- Default: -1     ! JBGRID = -1  !
           (-1 OR 1 <= JBGRID <= NY)

       X index of UR corner (IEGRID) -- Default: -1     ! IEGRID = -1  !
           (-1 OR 1 <= IEGRID <= NX)

       Y index of UR corner (JEGRID) -- Default: -1     ! JEGRID = -1  !
           (-1 OR 1 <= JEGRID <= NY)
```

```
  Note: Entire grid is processed if IBGRID=JBGRID=IEGRID=JEGRID=-1


--Specific gridded receptors can also be excluded from CALPOST
  processing by filling a processing grid array with 0s and 1s.  If the
  processing flag for receptor index (i,j) is 1 (ON), that receptor
  will be processed if it lies within the range delineated by IBGRID,
  JBGRID,IEGRID,JEGRID and if LG=T. If it is 0 (OFF), it will not be
  processed in the run.  By default, all array values are set to 1 (ON).

  Number of gridded receptor rows provided in Subgroup (1a) to
  identify specific gridded receptors to process
                          (NGONOFF) -- Default: 0      ! NGONOFF =  0  !

!END!


--------------
Subgroup (1a) -- Specific gridded receptors included/excluded
--------------

    Specific gridded receptors are excluded from CALPOST processing
    by filling a processing grid array with 0s and 1s.  A total of
    NGONOFF lines are read here.  Each line corresponds to one 'row'
    in the sampling grid, starting with the NORTHERNMOST row that
    contains receptors that you wish to exclude, and finishing with
    row 1 to the SOUTH (no intervening rows may be skipped).  Within
    a row, each receptor position is assigned either a 0 or 1,
    starting with the westernmost receptor.
       0 = gridded receptor not processed
       1 = gridded receptor processed

    Repeated value notation may be used to select blocks of receptors:
       23*1, 15*0, 12*1

    Because all values are initially set to 1, any receptors north of
    the first row entered, or east of the last value provided in a row,
    remain ON.

    (NGXRECP) -- Default: 1


------------------------------------------------------------------------------

INPUT GROUP: 2 -- Visibility Parameters (ASPEC = VISIB)
--------------

    Maximum relative humidity (%) used in particle growth curve
                              (RHMAX) -- Default: 98   ! RHMAX  = 95.0 !

    Modeled species to be included in computing the light extinction
     Include SULFATE?          (LVSO4) -- Default: T   ! LVSO4  = T  !
     Include NITRATE?          (LVNO3) -- Default: T   ! LVNO3  = T  !
     Include ORGANIC CARBON?   (LVOC)  -- Default: T   ! LVOC   = T  !
     Include COARSE PARTICLES? (LVPMC) -- Default: T   ! LVPMC  = F  !
     Include FINE PARTICLES?   (LVPMF) -- Default: T   ! LVPMF  = F  !
     Include ELEMENTAL CARBON? (LVEC)  -- Default: T   ! LVEC   = T  !

    And, when ranking for TOP-N, TOP-50, and Exceedance tables,
     Include BACKGROUND?       (LVBK)  -- Default: T   ! LVBK   = T  !

    Species name used for particulates in MODEL.DAT file
                   COARSE    (SPECPMC) -- Default: PMC ! SPECPMC = PMC !
                   FINE      (SPECPMF) -- Default: PMF ! SPECPMF = PMF !

Extinction Efficiency (1/Mm per ug/m**3)
---------------------------------------
    MODELED particulate species:
               PM  COARSE      (EEPMC) -- Default: 0.6 ! EEPMC  = 0.6 !
               PM  FINE        (EEPMF) -- Default: 1.0 ! EEPMF  = 1.0 !
    BACKGROUND particulate species:
               PM  COARSE    (EEPMCBK) -- Default: 0.6 ! EEPMCBK = 0.6 !
    Other species:
              AMMONIUM SULFATE (EESO4) -- Default: 3.0 ! EESO4  = 3.0 !
              AMMONIUM NITRATE (EENO3) -- Default: 3.0 ! EENO3  = 3.0 !
              ORGANIC CARBON   (EEOC)  -- Default: 4.0 ! EEOC   = 4.0 !
              SOIL             (EESOIL)-- Default: 1.0 ! EESOIL = 1.0 !
```

```
            ELEMENTAL CARBON (EEEC)  -- Default: 10. ! EEEC   = 10.0 !

Background Extinction Computation
---------------------------------

    Method used for background light extinction
                            (MVISBK) -- Default: 2   ! MVISBK =  6  !

         1 =  Supply single light extinction and hygroscopic fraction
              - IWAQM (1993) RH adjustment applied to hygroscopic background
                and modeled sulfate and nitrate
         2 =  Compute extinction from speciated PM measurements (A)
              - Hourly RH adjustment applied to observed and modeled sulfate
                and nitrate
              - RH factor is capped at RHMAX
         3 =  Compute extinction from speciated PM measurements (B)
              - Hourly RH adjustment applied to observed and modeled sulfate
                and nitrate
              - Receptor-hour excluded if RH>RHMAX
              - Receptor-day excluded if fewer than 6 valid receptor-hours
         4 =  Read hourly transmissometer background extinction measurements
              - Hourly RH adjustment applied to modeled sulfate and nitrate
              - Hour excluded if measurement invalid (missing, interference,
                or large RH)
              - Receptor-hour excluded if RH>RHMAX
              - Receptor-day excluded if fewer than 6 valid receptor-hours
         5 =  Read hourly nephelometer background extinction measurements
              - Rayleigh extinction value (BEXTRAY) added to measurement
              - Hourly RH adjustment applied to modeled sulfate and nitrate
              - Hour excluded if measurement invalid (missing, interference,
                or large RH)
              - Receptor-hour excluded if RH>RHMAX
              - Receptor-day excluded if fewer than 6 valid receptor-hours
         6 =  Compute extinction from speciated PM measurements
              - FLAG RH adjustment factor applied to observed and
                modeled sulfate and nitrate

    Additional inputs used for MVISBK = 1:
    --------------------------------------
     Background light extinction (1/Mm)
                            (BEXTBK) -- No default   ! BEXTBK = 0.0 !
     Percentage of particles affected by relative humidity
                            (RHFRAC) -- No default   ! RHFRAC = 0.0 !

    Additional inputs used for MVISBK = 6:
    --------------------------------------
     Extinction coefficients for hygroscopic species (modeled and
     background) are computed using a monthly RH adjustment factor
     in place of an hourly RH factor (VISB.DAT file is NOT needed).
     Enter the 12 monthly factors here (RHFAC).  Month 1 is January.

     (RHFAC)  -- No default     ! RHFAC = 2.9, 2.6, 2.5, 2.2,
                                          2.1, 1.8, 1.7, 1.7,
                                          1.8, 1.9, 2.3, 2.5 !

    Additional inputs used for MVISBK = 2,3,6:
    ------------------------------------------
     Background extinction coefficients are computed from monthly
     CONCENTRATIONS of ammonium sulfate (BKSO4), ammonium nitrate (BKNO3),
     coarse particulates (BKPMC), organic carbon (BKOC), soil (BKSOIL), and
     elemental carbon (BKEC).  Month 1 is January.
     (ug/m**3)

     (BKSO4)  -- No default     ! BKSO4 = 0.12, 0.12, 0.12, 0.12,
                                          0.12, 0.12, 0.12, 0.12,
                                          0.12, 0.12, 0.12, 0.12 !
     (BKNO3)  -- No default     ! BKNO3 = 0.1, 0.1, 0.1, 0.1,
                                          0.1, 0.1, 0.1, 0.1,
                                          0.1, 0.1, 0.1, 0.1 !
     (BKPMC)  -- No default     ! BKPMC = 3.0, 3.0, 3.0, 3.0,
                                          3.0, 3.0, 3.0, 3.0,
                                          3.0, 3.0, 3.0, 3.0 !
     (BKOC)   -- No default     ! BKOC  = 0.47, 0.47, 0.47, 0.47,
                                          0.47, 0.47, 0.47, 0.47,
                                          0.47, 0.47, 0.47, 0.47 !
     (BKSOIL) -- No default     ! BKSOIL= 0.5, 0.5, 0.5, 0.5,
                                          0.5, 0.5, 0.5, 0.5,
                                          0.5, 0.5, 0.5, 0.5 !
```

```
    (BKEC)    -- No default      ! BKEC  = 0.02, 0.02, 0.02, 0.02,
                                           0.02, 0.02, 0.02, 0.02,
                                           0.02, 0.02, 0.02, 0.02 !

   Additional inputs used for MVISBK = 2,3,5,6:
   ------------------------------------------
    Extinction due to Rayleigh scattering is added (1/Mm)
                            (BEXTRAY) -- Default: 10.0 ! BEXTRAY = 10.0 !

!END!
-------------------------------------------------------------------------------

INPUT GROUP: 3 -- Output options
--------------

Documentation
-------------

   Documentation records contained in the header of the
   CALPUFF output file may be written to the list file.
   Print documentation image?
                              (LDOC) -- Default: F   !  LDOC = F !

Output Units
------------
   Units for All Output       (IPRTU) -- Default: 1   ! IPRTU =  1   !
                   for            for
              Concentration    Deposition
      1 =        g/m**3         g/m**2/s
      2 =       mg/m**3        mg/m**2/s
      3 =       ug/m**3        ug/m**2/s
      4 =       ng/m**3        ng/m**2/s
      5 =     Odour Units

   Visibility: extinction expressed in 1/Mega-meters (IPRTU is ignored)


Averaging time(s) reported
--------------------------

   1-hr averages           (L1HR) -- Default: T   !   L1HR = F  !

   3-hr averages           (L3HR) -- Default: T   !   L3HR = F  !

   24-hr averages         (L24HR) -- Default: T   !  L24HR = T  !

   Run-length averages    (LRUNL) -- Default: T   !  LRUNL = F  !

   User-specified averaging time in hours - results for
   an averaging time of NAVG hours are reported for
   NAVG greater than 0:
                           (NAVG) -- Default: 0   !   NAVG =  0  !


Types of tabulations reported
-----------------------------

  1) Visibility: daily visibility tabulations are always reported
                 for the selected receptors when ASPEC = VISIB.
                 In addition, any of the other tabulations listed
                 below may be chosen to characterize the light
                 extinction coefficients.
                 [List file or Plot/Analysis File]


  2) Top 50 table for each averaging time selected
     [List file only]
                           (LT50) -- Default: T   !   LT50 = T  !

  3) Top 'N' table for each averaging time selected
     [List file or Plot file]
                          (LTOPN) -- Default: F   !  LTOPN = T  !

       -- Number of 'Top-N' values at each receptor
          selected (NTOP must be <= 4)
                           (NTOP) -- Default: 4   ! NTOP =  1   !

       -- Specific ranks of 'Top-N' values reported
```

```
        (NTOP values must be entered)
               (ITOP(4) array) -- Default:      ! ITOP =  1   !
                                  1,2,3,4
```

4) Threshold exceedance counts for each receptor and each averaging time selected
   [List file or Plot file]

```
                        (LEXCD) -- Default: F   !  LEXCD = F  !
```

   -- Identify the threshold for each averaging time by assigning a non-negative value (output units).

```
                                  -- Default: -1.0
   Threshold for  1-hr averages    (THRESH1) !  THRESH1 = -1.0  !
   Threshold for  3-hr averages    (THRESH3) !  THRESH3 = -1.0  !
   Threshold for 24-hr averages   (THRESH24) ! THRESH24 = -1.0  !
   Threshold for NAVG-hr averages (THRESHN) !  THRESHN = -1.0  !
```

   -- Counts for the shortest averaging period selected can be tallied daily, and receptors that experience more than NCOUNT counts over any NDAY period will be reported. This type of exceedance violation output is triggered only if NDAY > 0.

```
   Accumulation period(Days)
                         (NDAY) -- Default: 0   !    NDAY =  0  !
   Number of exceedances allowed
                       (NCOUNT) -- Default: 1   !  NCOUNT =  1  !
```

5) Selected day table(s)

   Echo Option -- Many records are written each averaging period selected and output is grouped by day
   [List file or Plot file]

```
                        (LECHO) -- Default: F   !  LECHO = F  !
```

   Timeseries Option -- Averages at all selected receptors for each selected averaging period are written to timeseries files. Each file contains one averaging period, and all receptors are written to a single record each averaging time.
   [TSttUUUU.DAT files]

```
                        (LTIME) -- Default: F   !  LTIME = F  !
```

   -- Days selected for output

```
                    (IECHO(366)) -- Default: 366*0
      ! IECHO  = 366*0  !
      (366 values must be entered)
```

Plot output options

Plot files can be created for the Top-N, Exceedance, and Echo tables selected above. Two formats for these files are available, DATA and GRID. In the DATA format, results at all receptors are listed along with the receptor location [x,y,val1,val2,...]. In the GRID format, results at only gridded receptors are written, using a compact representation. The gridded values are written in rows (x varies), starting with the most southern row of the grid. The GRID format is given the .GRD extension, and includes headers compatible with the SURFER(R) plotting software.

A plotting and analysis file can also be created for the daily peak visibility summary output, in DATA format only.

Generate Plot file output in addition to writing tables to List file?

```
                               (LPLT) -- Default: F   ! LPLT  = T !
```

Use GRID format rather than DATA format, when available?

```
                               (LGRD) -- Default: F   ! LGRD  = F !
```

Additional Debug Output

```
   Output selected information to List file
    for debugging?
                                (LDEBUG) -- Default: F  ! LDEBUG  = F !

!END!
```

Appendix Table 7-1-1
CLASS I F(RH) VALUES

Class I Area	Site Name	LAT	LONG	Jan f(RH)	Feb f(RH)	Mar f(RH)	Apr f(RH)	May f(RH)	Jun f(RH)	Jul f(RH)	Aug f(RH)	Sep f(RH)	Oct f(RH)	Nov f(RH)	Dec f(RH)
Kings Canyon	Sequoia	36.38	-118.87	2.9	2.6	2.5	2.2	2.1	1.8	1.7	1.7	1.8	1.9	2.3	2.5
Sequoia	Sequoia	36.38	-118.87	2.9	2.6	2.5	2.2	2.1	1.8	1.7	1.7	1.8	1.9	2.3	2.5
John Muir	Kaiser	37.13	-119.12	3	2.7	2.5	2.1	2	1.7	1.7	1.7	1.8	1.9	2.3	2.7
Kaiser	Kaiser	37.13	-119.12	3	2.7	2.5	2.1	2	1.7	1.7	1.7	1.8	1.9	2.3	2.7
Ansel Adams	Kaiser	37.65	119.2	3	2.7	2.4	2.1	1.9	1.7	1.6	1.6	1.6	1.8	2.3	2.7
Yosemite	Yosemite	37.63	-119.62	3	2.9	2.7	2.2	2.1	1.7	1.5	1.5	1.6	1.8	2.3	2.7
Dome Land	Dome Land	35.7	118.19	2.6	2.3	2.2	1.9	1.9	1.8	1.8	1.8	1.9	1.9	2	2.2
Pinnacles	Pinnacles	36.49	121.16	3.4	3.4	3.5	2.6	2.4	2.2	2.1	2.2	2.2	2.4	2.4	2.9
Hoover	Hoover	38.13	-119.12	3.1	2.7	2.5	2	1.9	1.6	1.5	1.5	1.6	1.8	2.3	2.8
Ventana	Pinnacles	36.22	121.59	3.4	3.4	3.5	2.6	2.4	2.2	2.1	2.2	2.2	2.4	2.4	2.9
Emigrant	Yosemite	37.63	-119.62	3	2.9	2.7	2.2	2.1	1.7	1.5	1.5	1.6	1.8	2.3	2.7

Source: USEPA, 2003. Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Program. EPA-454/B-03-005. September.

Appendix Table 7-1-2
MONTHLY MEAN O3 (PPB)

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Pinnacles	2006	22	27	32	33	38	36	42	37	37	32	21	21
	2005	22	25	29	34	32	32	36	38	35	33	27	19
	2004	21	27	30	40	40	39	33	34	40	30	20	23
	2003	18	27	31	37	43	43	39	37	41	38	24	22
	2002	15	18	28	35	39	39	38	43	45	39	27	24
	AVERAGE	19.6	24.8	30	35.8	38.4	37.8	37.6	37.8	39.6	34.4	23.8	21.8
Sequoia/King Canyon Ash	2006	25	33	27	32	46	63	67	72	64	42	29	24
	2005	22	27	31	36	41	56	72	69	58	43	30	22
	2004	24	27	37	49	54	65	70	73	60	44	24	25
	2003					46	70	74	63	64	57	25	23
	2002	22	29	34	38	54	69	75	78	66	53	32	68
	AVERAGE	23.25	29	32.25	38.75	48.2	64.6	71.6	71	62.4	47.8	28	32.4
Yosemite/Turtleback Dome	2006	39	44	50	51	60	53	58	65	56	47	35	38
	2005	42	41	47	49	45	54	59	58	55	46	36	35
	2004	41	45	47	55	55	58	66	64	56	47	39	42
	2003	42	42	45	51	52	60	62	60	61	59	42	40
	2002	36	38	43	46	52	61	63	73	62	61	46	43
	AVERAGE	40	42	46.4	50.4	52.8	57.2	61.6	64	58	52	39.6	39.6

Source: National Park Service. 2007. http://12.45.109.6/pls/portal/data_request.mainplot. Last accessed February 10.

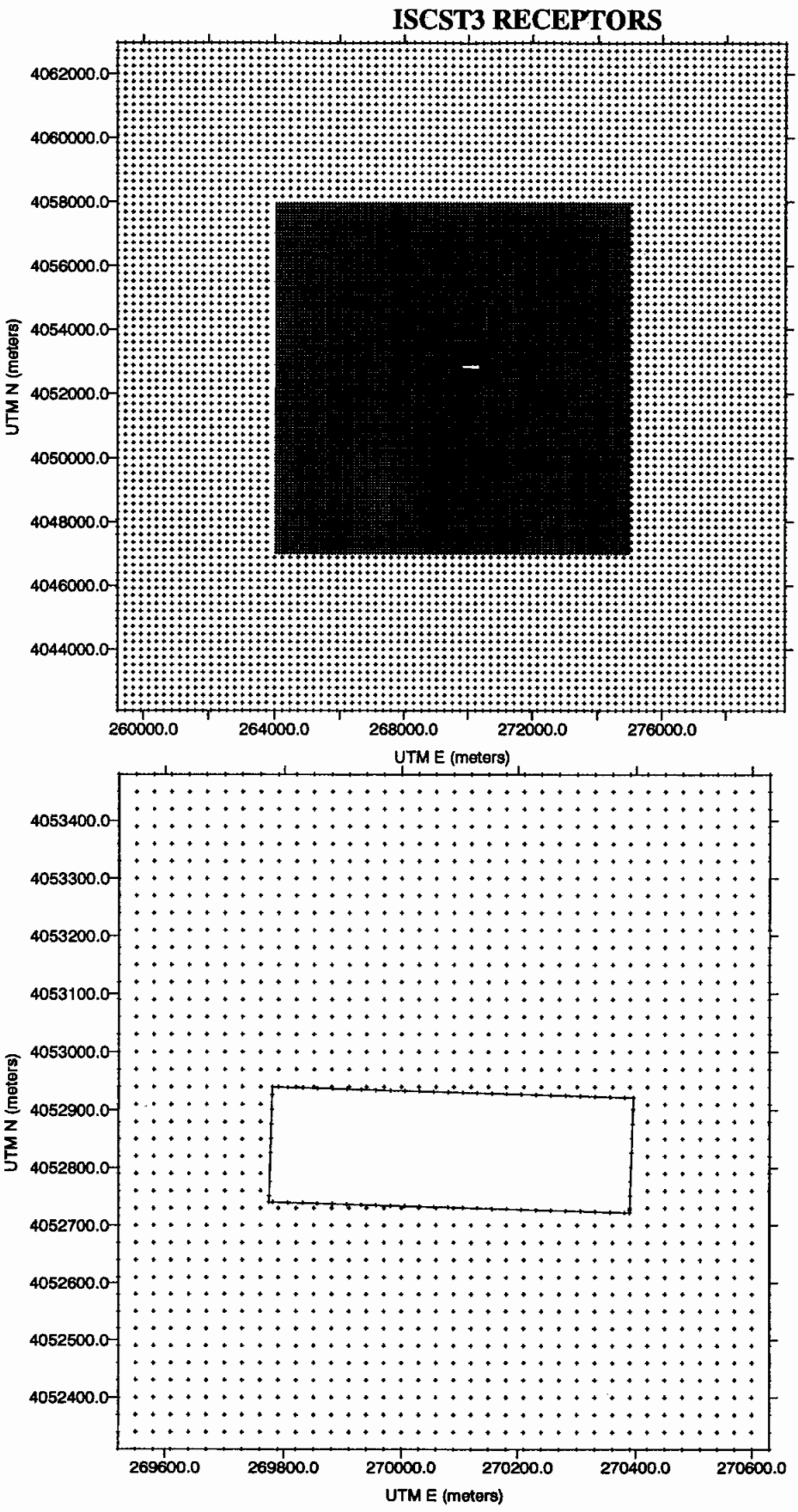

Figure A7-1- 14

CLASS II IMPACT RESULTS

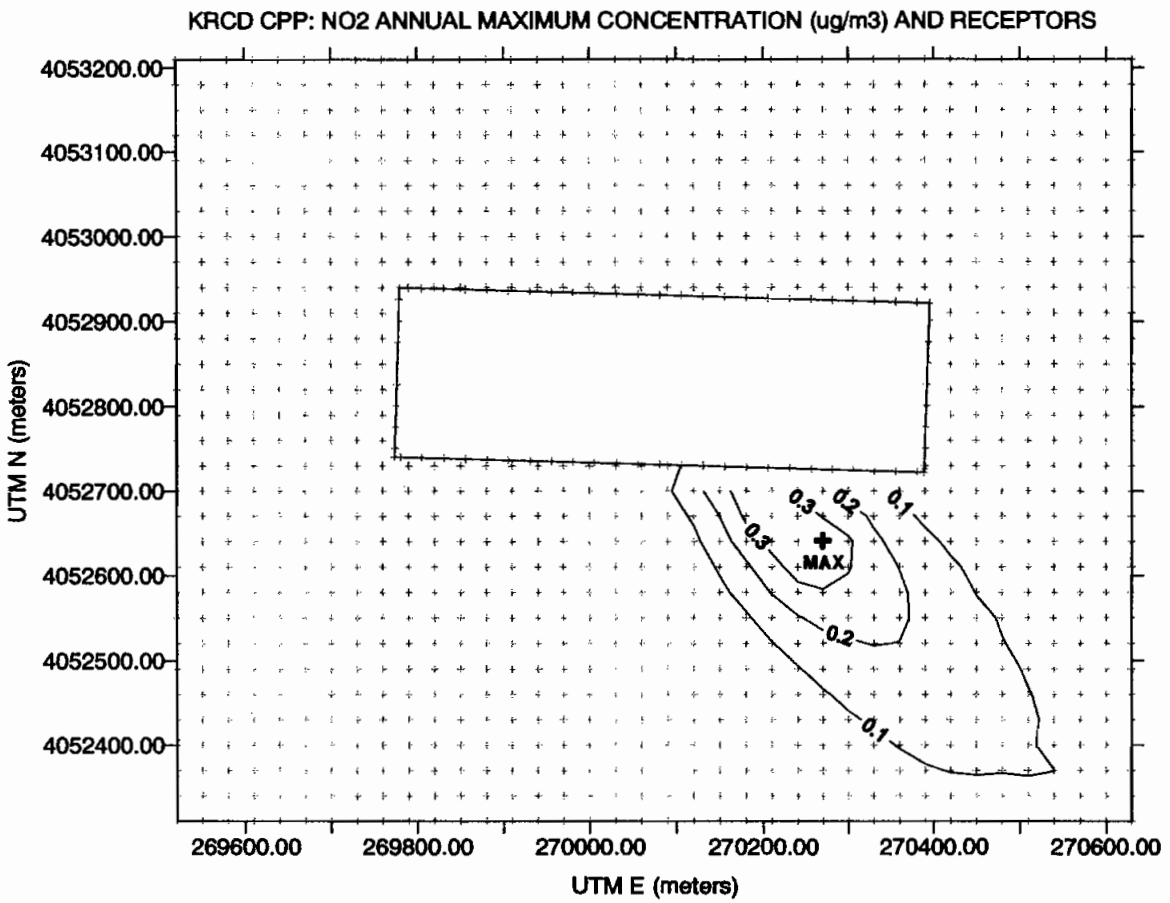

Figure A7-1- 15

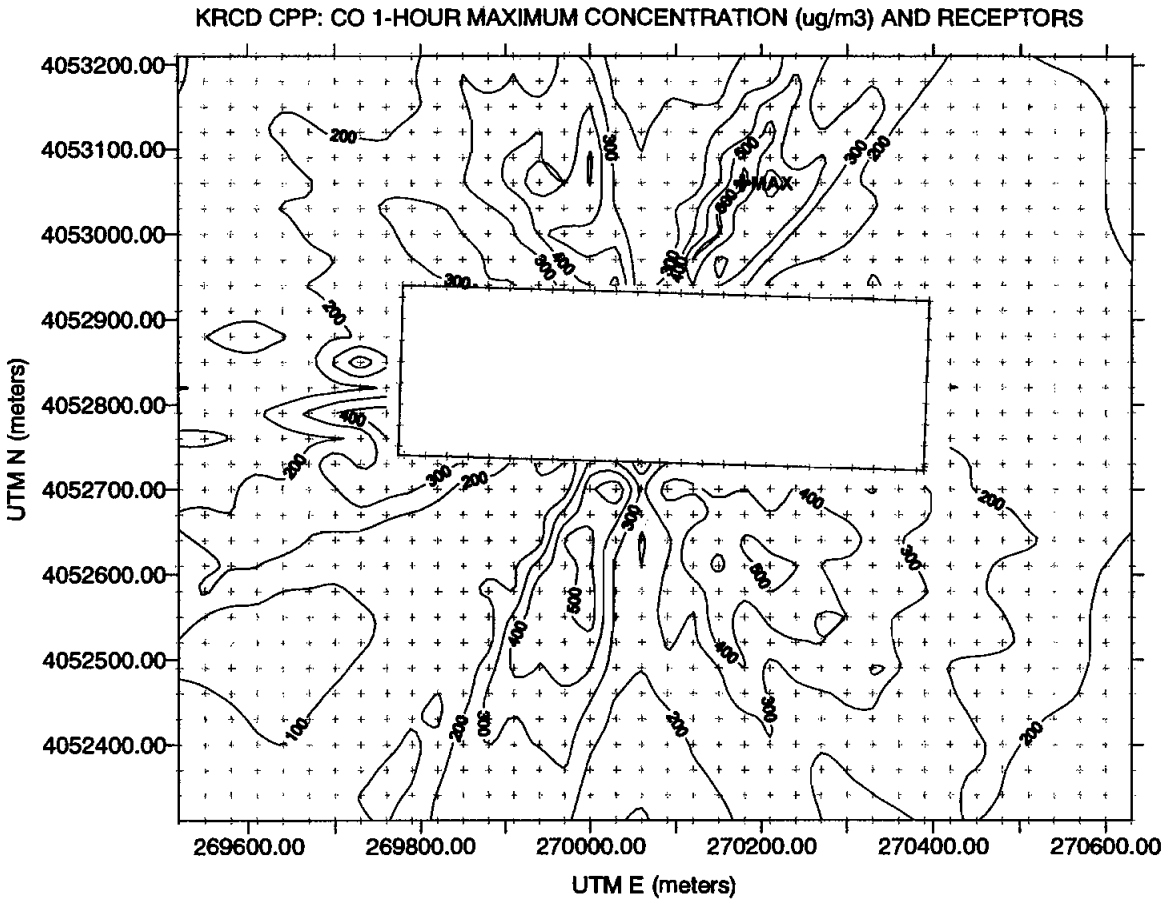

Figure A7-1- 16

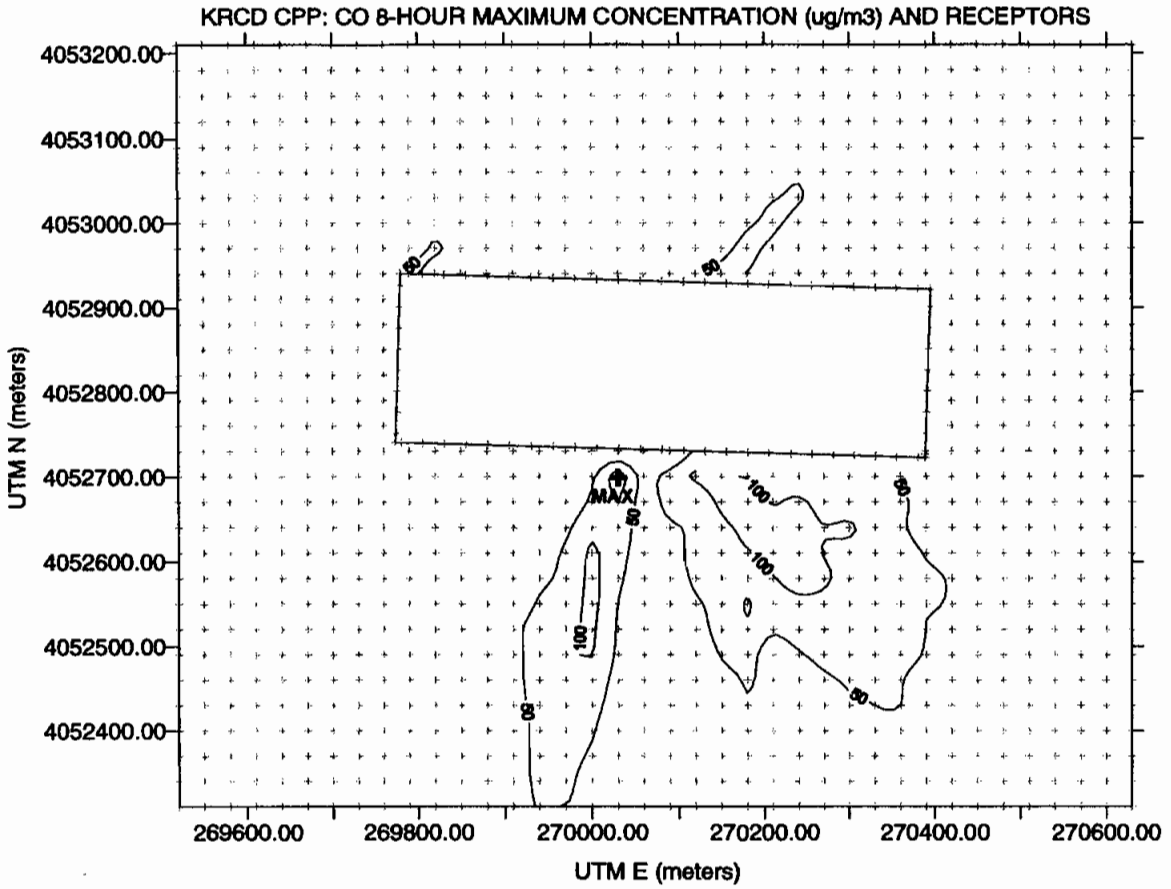

Figure A7-1- 17

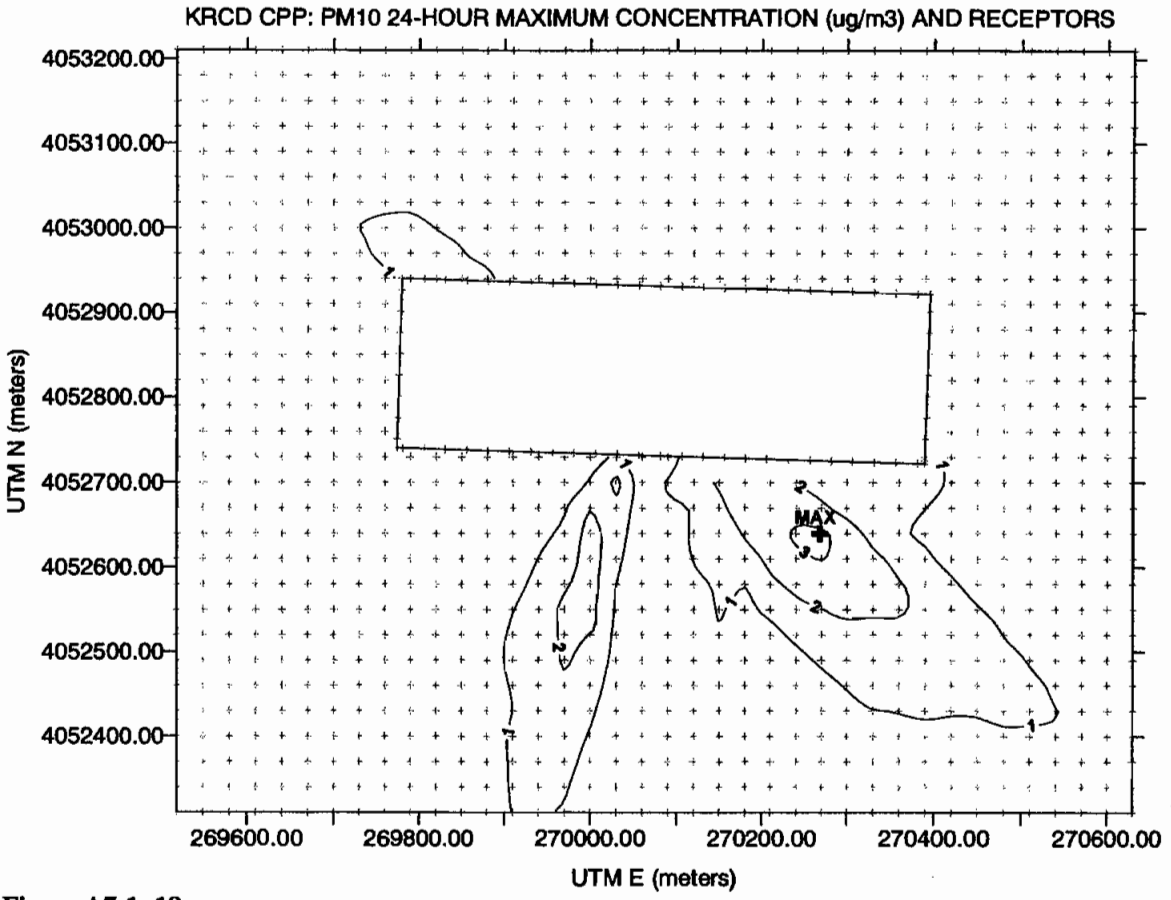

Figure A7-1- 18

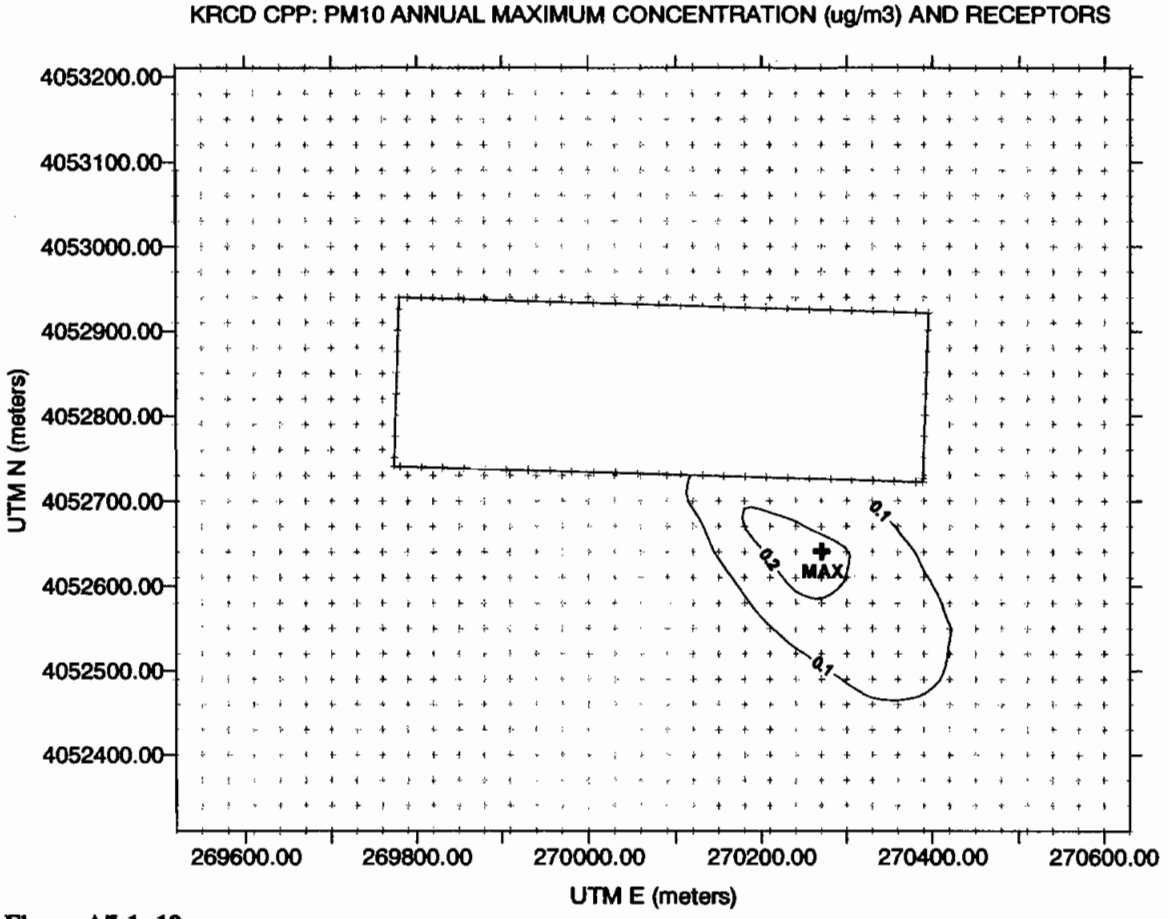

Figure A7-1- 19

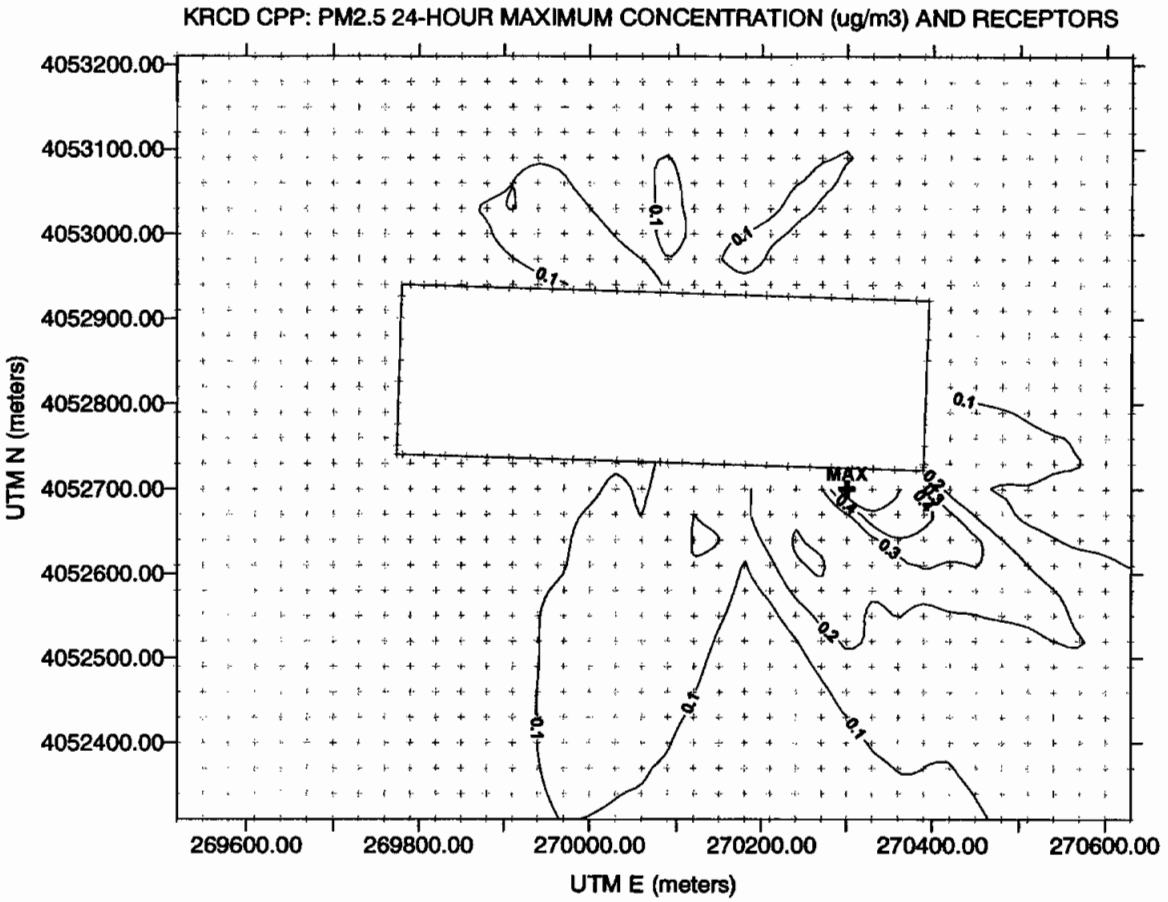

Figure A7-1- 20

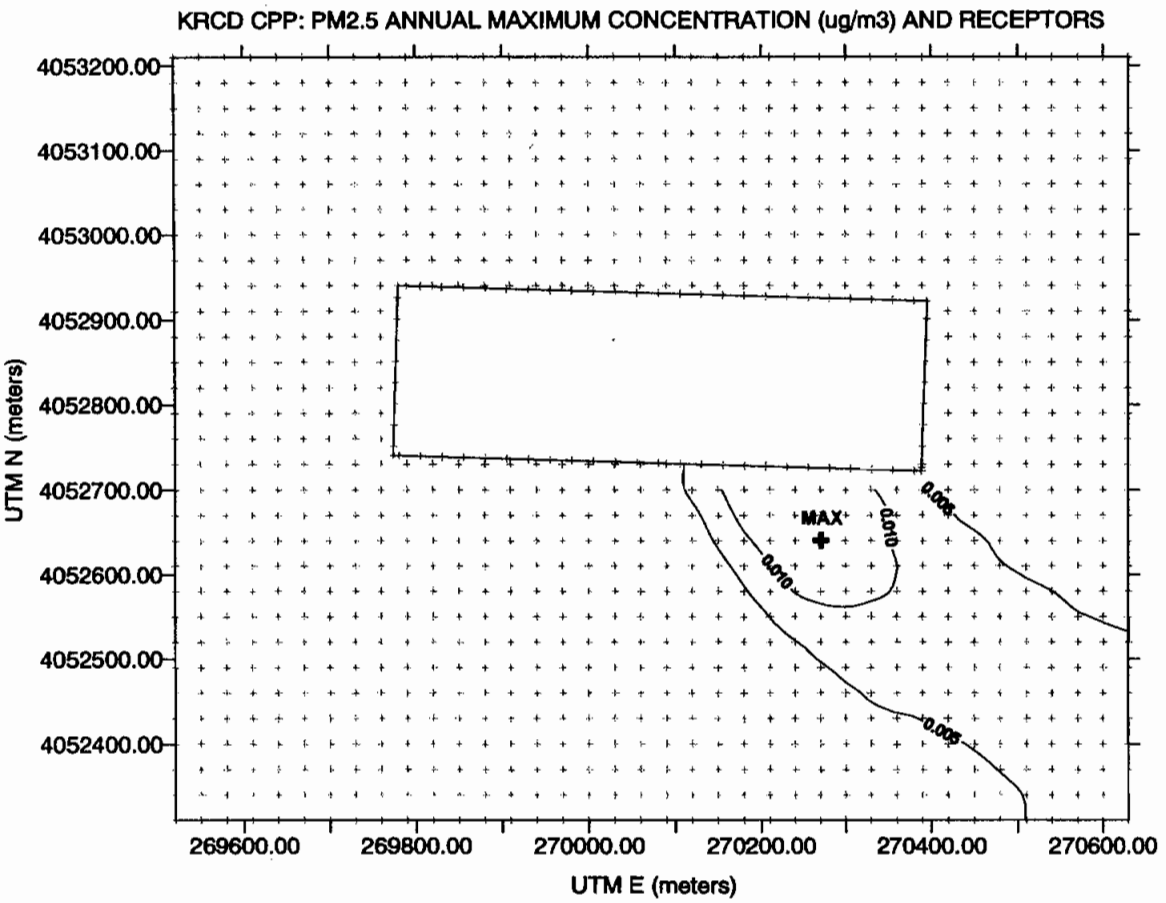

Figure A7-1- 21

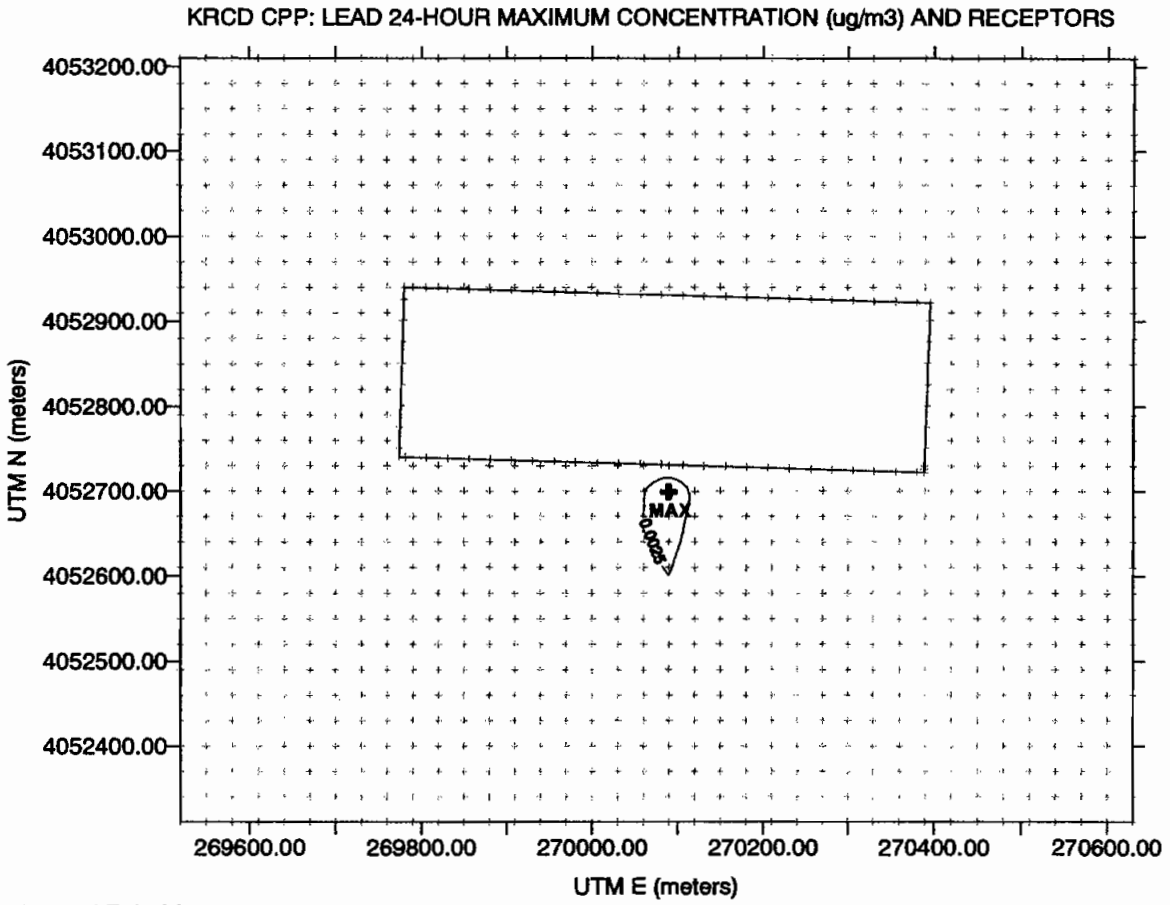

Figure A7-1- 22

GE MODELING OUTPUT SUMMARY

File Name	CASE / SCENARIO	EQUIPMENT	EMISSION RATE TABLE		POLLUTANT	AVERAGING TIME	Highest conc	Date	UTM E (meters)	UTM N (meters)	Elevation (meters)
GPCO1AA.OUT	1a, A	2 CT's, aux boil, EGEN 30 min	Table 12		CO	1-hr	467.756	88112221	269760	4052790	99
GPCO1AB.OUT	1a, B	2 CT's, aux boil, EGEN 30 min	Table 12		CO	1-hr	467.7474	88112221	269760	4052790	99
GPCO1AC.OUT	1a,C	2 CT's, aux boil, EGEN 30 min	Table 12		CO	1-hr	467.7411	88112221	269760	4052790	99
GPCO1AD.OUT	1a,D	2 CT's, aux boil, EGEN 30 min	Table 12		CO	1-hr	467.7441	88112221	269760	4052790	99
GPCO1AE.OUT	1a, E	2 CT's, aux boil, EGEN 30 min	Table 12		CO	1-hr	467.7236	88112221	269760	4052790	99
GPCO1AF.OUT	1a, F	2 CT's, aux boil, EGEN 30 min	Table 12		CO	1-hr	644.0858	88022723	270180	4053060	100
GPCTBF.OUT	1b, F	1 CT	Table 13		X/Q	1-hr	6.58694	88022723	270120	4052940	100
			lb/hr			3-hr	4.12944	91050618	270180	4052670	100
						8-hr	2.50093	91121908	270030	4052700	99
						24-hr	1.59582	91050824	270240	4052640	100
		no OLM		196.6	NOx	1-hr	163.169				
				404.4	CO	1-hr	335.6336				
				1.66	SO2	1-hr	1.377724				
	3b, F			404.4	CO	8-hr	127.4334				
	4b, F			1.66	SO2	24-hr	0.333782				
				10	PM10	24-hr	2.010733				
				0.59	PM2.5	24-hr	0.118633				
GPCTFn.OUT	1b, F	1 CT (northern)	Table 13		X/Q	1-hr	7.16893	88022723	270120	4052970	100
			lb/hr			3-hr	4.13632	91053018	270180	4052700	100
						8-hr	2.48759	91121908	270030.84	4052732.75	99.7
						24-hr	1.59691	91050824	270210	4052700	100
				196.6	NOx	1-hr	177.5859				

File Name	CASE / SCENARIO	EQUIPMENT	EMISSION RATE TABLE	POLLUTANT	AVERAGING TIME	Highest conc	Date	UTM E (meters)	UTM N (meters)	Elevation (meters)
			404.4	CO	1-hr	365.2885				
			1.66	SO2	1-hr	1.499453				
GPCTBE.OUT	1B, e	1 CT	Table 13	X/Q	1-hr	4.0671	88022723	270120	4052940	100
			lb/hr		3-hr	2.35937	91053018	270240	4052580	100
					8-hr	1.48726	91071224	270300	4052640	100
					24-hr	1.03225	91050824	270270	4052610	100
			196.6	NOx	1-hr	100.7486				
			404.4	CO	1-hr	207.2366				
			1.66	SO2	1-hr	0.850675				
GPCTBD.OUT	1B, D	1 CT	Table 13	X/Q	1-hr	3.31238	88022723	270180	4053060	100
			lb/hr		3-hr	2.08037	91053018	270240	4052580	100
					8-hr	1.34452	91071224	270300	4052640	100
					24-hr	0.92899	91050824	270270	4052610	100
			196.6	NOx	1-hr	82.05295				
			404.4	CO	1-hr	168.7803				
			1.66	SO2	1-hr	0.692817				
GPCTBC.OUT	1B, C	1 CT	Table 13	X/Q	1-hr	3.41549	88022723	270180	4053030	100
			lb/hr		3-hr	2.12237	91053018	270240	4052580	100
					8-hr	1.36094	91071224	270300	4052640	100
					24-hr	0.94232	91050824	270270	4052610	100
			196.6	NOx	1-hr	84.60715				
			404.4	CO	1-hr	174.0342				
			1.66	SO2	1-hr	0.714384				
GPCTBB.OUT	1B, B	1 CT	Table 13	X/Q	1-hr	3.27373	88022723	270180	4053060	100
			lb/hr		3-hr	2.04829	91053018	270240	4052580	100
					8-hr	1.31385	91071224	270300	4052640	100
					24-hr	0.91273	91050824	270270	4052610	100
			196.6	NOx	1-hr	81.09553				
			404.4	CO	1-hr	166.8109				
			1.66	SO2	1-hr	0.684733				
GPCTBA.OUT	1B, A	1 CT	Table 13	X/Q	1-hr	3.05917	88022723	270180	4053060	100

File Name	CASE / SCENARIO	EQUIPMENT	EMISSION RATE TABLE	POLLUTANT	AVERAGING TIME	Highest conc	Date	UTM E (meters)	UTM N (meters)	Elevation (meters)
			lb/hr		3-hr	1.94467	91053018	270240	4052580	100
					8-hr	1.26155	91071224	270300	4052640	100
					24-hr	0.87601	91050824	270270	4052610	100
			196.6	NOx	1-hr	75.78054				
			404.4	CO	1-hr	155.8782				
			1.66	SO2	1-hr	0.639856				
GPCO1cg2.OUT	1c	CTN B, CTS F, aux blr, egen	Table 14	CO	1-hr	467.6159	88112221	269760	4052790	99
GPCO3aA.OUT	3a	2 CT's, aux boil, EGEN 30 min	Table 17	CO	8-hr	45.60479	91121908	270000	4052550	99
GPCO3aB.OUT	3a	2 CT's, aux boil, EGEN 30 min	Table 17	CO	8-hr	47.38863	91121908	270000	4052550	99
GPCO3aC.OUT	3a	2 CT's, aux boil, EGEN 30 min	Table 17	CO	8-hr	49.08665	91121908	270000	4052550	99
GPCO3aD.OUT	3a	2 CT's, aux boil, EGEN 30 min	Table 17	CO	8-hr	48.02227	91121908	270000	4052550	99
GPCO3aE.OUT	3a	2 CT's, aux boil, EGEN 30 min	Table 17	CO	8-hr	55.65065	91121908	270000	4052550	99
GPCO3aF.OUT	3a	2 CT's, aux boil, EGEN 30 min	Table 17	CO	8-hr	90.31352	91121908	270000	4052580	99
GPCO3cg2.OUT	3c	2 CT's, aux boil, EGEN 30 min	Table 18	CO	8-hr	13.89318	89031008	269777.19	4052851.25	99.7
PGP104aA.OUT	4a, A	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM10	24-hr	1.78471	91050824	270270	4052640	100
PGP104aB.OUT	4a,B	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM10	24-hr	1.85626	91050824	270270	4052640	100

File Name	CASE / SCENARIO	EQUIPMENT	EMISSION RATE TABLE	POLLUTANT	AVERAGING TIME	Highest conc	Date	UTM E (meters)	UTM N (meters)	Elevation (meters)
PGP104aC.OUT	4a, C	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM10	24-hr	1.91389	91050824	270270	4052640	100
PGP104aD.OUT	4a, D	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM10	24-hr	1.88794	91050824	270270	4052640	100
PGP104aE.OUT	4a, E	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM10	24-hr	2.08962	91050824	270270	4052640	100
PGP104aF.OUT	4a, F	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM10	24-hr	3.16441	91050824	270270	4052640	100
PGP254aA.OUT	4a, A	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM2.5	24-hr	0.58564	91041024	270300	4052700	101
PGP254aB.OUT	4a,B	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM2.5	24-hr	0.5864	91041024	270300	4052700	101
PGP254aC.OUT	4a, C	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM2.5	24-hr	0.58687	91041024	270300	4052700	101
PGP254aD.OUT	4a, D	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM2.5	24-hr	0.58657	91041024	270300	4052700	101
PGP254aE.OUT	4a, E	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM2.5	24-hr	0.58857	91041024	270300	4052700	101
PGP254aF.OUT	4a, F	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM2.5	24-hr	0.59508	91041024	270300	4052700	101
PGP104b.OUT	4b, F	1 CT, cool	Table 20	PM10	24-hr	1.80345	91050824	270240	4052640	100
PGP254B.OUT	4b, F	1 CT, cool	Table 20	PM2.5	24-hr	0.14765	91041024	270300	4052700	101
PGP104c2.OUT	4c	2 CT, aux 2hr, CT, DFP 30 min	Table 21	PM10	24-hr	2.5734	91050824	270240	4052640	100
P104cg2.OUT	4c	2 CT, aux 2hr, CT,	Table 21	PM10	24-hr	2.56477	91050824	270240	4052640	100

File Name	CASE / SCENARIO	EQUIPMENT EGEN 30 min	EMISSION RATE TABLE		POLLUTANT	AVERAGING TIME	Highest conc	Date	UTM E (meters)	UTM N (meters)	Elevation (meters)
PGP254C.OUT	4c	2 CT, aux 2hr, CT, DFP 30 min	Table 21		PM2.5	24-hr	0.16471	91041024	270240	4052640	100
PGP254C2.OUT	4c	2 CT, aux 2hr, CT, DFP 30 min	Table 21		PM2.5	24-hr	0.16583	91041024	270240	4052610	100
PAUXB.OUT	aux boil/normalized	Aux boiler 100 ft stack			X/Q	1-hr	224.7436	88082420	269905.84	4052736.5	99.7
						3-hr	161.0376	90011721	269905.84	4052736.5	99.7
						8-hr	102.9525	89022008	270000	4052670	99
						24-hr	38.31786	89022024	270000	4052670	99
			Table 1 (lb/hr)								
				0.72	NOx	1-hr	20.38874				
				2.27	CO	1-hr	64.28116				
				2.27	CO	8-hr	29.44647				
				0.05	SO2	1-hr	1.415885				
				0.05	SO2	3-hr	1.014537				
				0.05	SO2	24-hr	0.241403				
				0.61	PM10	24-hr	2.945111				
				0.02	PM2.5	24-hr	0.096561				
G7NOAN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22		NOx	annual	0.16857	1987	270180	4052700	100
G8NOAN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22		NOx	annual	0.19495	1988	270180.84	4052728.25	99.7
GNOAN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux	Table 22		NOx	annual	0.26782	1989	270270	4052640	100

File Name	CASE / SCENARIO	EQUIPMENT	EMISSION RATE TABLE	POLLUTANT	AVERAGING TIME	Highest conc	Date	UTM E (meters)	UTM N (meters)	Elevation (meters)
		boiler								
G0NOAN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	NOx	annual	0.29233	1990	270240	4052640	100
G1NOAN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	NOx	annual	0.36332	1991	270270	4052640	100
G7P10AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM10	annual	0.0943	1987	270270	4052640	100
G8P10AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM10	annual	0.11512	1988	270270	4052640	100
GP10AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM10	annual	0.16463	1989	270270	4052640	100
G0P10AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM10	annual	0.18378	1990	270240	4052610	100
G1P10AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM10	annual	0.23231	1991	270270	4052640	100
G7P25AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM25	annual	0.00589	1987	271620	4051620	101
G8P25AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM25	annual	0.00721	1988	271620	4051620	101
GP25AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM25	annual	0.0097	1989	270270	4052640	100

File Name	CASE / SCENARIO	EQUIPMENT	EMISSION RATE TABLE	POLLUTANT	AVERAGING TIME	Highest conc	Date	UTM E (meters)	UTM N (meters)	Elevation (meters)
G0P25AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM25	annual	0.01043	1990	270270	4052610	100
G1P25AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM25	annual	0.01434	1991	270270	4052640	100

SIEMENS MODELING OUTPUT SUMMARY

File Name	CASE / SCENARIO	EQUIPMENT	EMISSION RATE TABLE	POLLUTANT	AVERAGING TIME	Highest conc.	Date	UTM E (meters)	UTM N (meters)	Elevation (meters)
SPCO1AA.OUT	1a, A	2 CT's, aux boil, EGEN 30 min	Table 12	CO	1-hr	467.7558	88112221	269760	4052790	99
SPCO1AB.OUT	1a, B	2 CT's, aux boil, EGEN 30 min	Table 12	CO	1-hr	467.7444	88112221	269760	4052790	99
SPCO1AC.OUT	1a,C	2 CT's, aux boil, EGEN 30 min	Table 12	CO	1-hr	467.7386	88112221	269760	4052790	99
SPCO1AD.OUT	1a,D	2 CT's, aux boil, EGEN 30 min	Table 12	CO	1-hr	467.739	88112221	269760	4052790	99
SPCO1AE.OUT	1a, E	2 CT's, aux boil, EGEN 30 min	Table 12	CO	1-hr	467.7216	88112221	269760	4052790	99
SPCO1AF.OUT	1a, F	2 CT's, aux boil, EGEN 30 min	Table 12	CO	1-hr	467.6892	88112221	269760	4052790	99
SPCTBF.OUT	1b, F	1 CT	Table 13	X/Q	1-hr	5.0527	88022723	270120	4052940	100
			lb/hr		3-hr	2.90323	91050618	270180	4052670	100
					8-hr	1.76814	91111416	270180	4052640	100
					24-hr	1.19315	91050824	270270	4052610	100
			196.6	NOx	1-hr	125.1635	88022723	270120	4052940	100
			404.4	CO	1-hr	257.4573	88022723	270120	4052940	100
			1.66	SO2	1-hr	1.056823	88022723	270120	4052940	100
	3b, F		404.4	CO	8-hr	90.09451				
	4b, F		1.66	SO2	24-hr	0.249559				
			10	PM10	24-hr	1.503369				
			0.59	PM2.5	24-hr	0.088699				
SPCTFn.OUT	1b, F	1 CT (northern)	Table 13	X/Q	1-hr	5.43528	88022723	270120	4052970	100
			lb/hr		3-hr	3.04095	91050618	270270	4052640	100
					8-hr	1.75394	91111416	270240	4052610	100
					24-hr	1.2006	91050824	270270	4052640	100

File Name	CASE / SCENARIO	EQUIPMENT	EMISSION RATE TABLE	POLLUTANT	AVERAGING TIME	Highest conc.	Date	UTM E (meters)	UTM N (meters)	Elevation (meters)
			196.6	NOx	1-hr	134.6406				
			404.4	CO	1-hr	276.9514				
			1.66	SO2	1-hr	1.136843				
			404.4	CO	8-hr	89.37096				
			1.66	SO2	24-hr	0.251117				
			10	PM10	24-hr	1.512756				
			0.59	PM2.5	24-hr	0.089253				
SPCTBE.OUT	1B, e	1 CT	Table 13	X/Q	1-hr	3.42117	88022723	270180	4053030	100
			lb/hr		3-hr	2.12028	91053018	270240	4052580	100
					8-hr	1.35509	91071224	270300	4052640	100
					24-hr	0.93997	91050824	270270	4052610	100
			196.6	NOx	1-hr	84.74785				
			404.4	CO	1-hr	174.3237				
			1.66	SO2	1-hr	0.715572				
SPCTBD.OUT	1B, D	1 CT	Table 13	X/Q	1-hr	2.88741	88022723	270180	4053060	100
			lb/hr		3-hr	1.88802	91050618	270240	4052610	100
					8-hr	1.23332	91071224	270300	4052640	100
					24-hr	0.84592	91050824	270270	4052610	100
			196.6	NOx	1-hr	71.52577				
			404.4	CO	1-hr	147.1262				
			1.66	SO2	1-hr	0.603931				
SPCTBC.OUT	1B, C	1 CT	Table 13	X/Q	1-hr	2.9281	88022723	270180	4053060	100
			lb/hr		3-hr	1.88568	91050618	270240	4052610	100
					8-hr	1.2297	91071224	270300	4052640	100
					24-hr	0.85368	91050824	270270	4052610	100
			196.6	NOx	1-hr	72.53372				
			404.4	CO	1-hr	149.1996				
			1.66	SO2	1-hr	0.612441				
SPCTBB.OUT	1B, B	1 CT	Table 13	X/Q	1-hr	2.7999	88022723	270160	4053060	100
			lb/hr		3-hr	1.82916	91050618	270240	4052610	100
					8-hr	1.18564	91071224	270300	4052640	100
					24-hr	0.808	91050824	270270	4052610	100

File Name	CASE / SCENARIO	EQUIPMENT	EMISSION RATE TABLE	POLLUTANT	AVERAGING TIME	Highest conc.	Date	UTM E (meters)	UTM N (meters)	Elevation (meters)
			196.6	NOx	1-hr	69.356				
			404.4	CO	1-hr	142.6672				
			1.66	SO2	1-hr	0.585627				
SPCTBA.OUT	1B, A	1 CT	Table 13	X/Q	1-hr	2.56035	88022723	270180	4053060	100
			lb/hr		3-hr	1.7279	91050618	270240	4052610	100
					8-hr	1.10815	91071224	270300	4052640	100
					24-hr	0.75895	91050824	270270	4052610	100
			196.6	NOx	1-hr	63.42397				
			404.4	CO	1-hr	130.4611				
			1.66	SO2	1-hr	0.535523				
SPCO1C.OUT	1c	CTN F, CTS B, aux blr, DFP	Table 14	CO	1-hr	65.4273	88082420	269905.84	4052736.5	99.7
SPCO1C2.OUT	1c	CTN B, CTS F, aux blr, DFP	Table 14	CO	1-hr	65.4273	88082420	269905.84	4052736.5	99.7
SPCO1Cg.OUT	1c	CTN F, CTS B, aux blr, egen	Table 14	CO	1-hr	467.6165	88112221	269760	4052790	99
SPCO1Cg2.OUT	1c	CTN B, CTS F, aux blr, egen	Table 14	CO	1-hr	467.6167	88112221	269760	4052790	99
SPCO3aA.OUT	3a	2 CT's, aux boil, EGEN 30 min	Table 17	CO	8-hr	41.61668	91121908	270000	4052550	99
SPCO3aB.OUT	3a	2 CT's, aux boil, EGEN 30 min	Table 17	CO	8-hr	43.8849	91121908	270000	4052550	99
SPCO3aC.OUT	3a	2 CT's, aux boil, EGEN 30 min	Table 17	CO	8-hr	45.2115	91121908	270000	4052550	99
SPCO3aD.OUT	3a	2 CT's, aux boil, EGEN 30 min	Table 17	CO	8-hr	45.00031	91121908	270000	4052550	99
SPCO3aE.OUT	3a	2 CT's, aux boil, EGEN 30 min	Table 17	CO	8-hr	50.25348	91121908	270000	4052550	99
SPCO3aF.OUT	3a	2 CT's, aux boil, EGEN 30 min	Table 17	CO	8-hr	68.64221	91121908	270000	4052550	99

File Name	CASE / SCENARIO	EQUIPMENT	EMISSION RATE TABLE	POLLUTANT	AVERAGING TIME	Highest conc.	Date	UTM E (meters)	UTM N (meters)	Elevation (meters)
SPCO3cg.OUT	3c	2 CT's, aux boil, EGEN 30 min	Table 18	CO	8-hr	13.75001	89031008	269777.19	4052851.25	99.7
SPCO3cg2.OUT	3c	2 CT's, aux boil, EGEN 30 min	Table 18	CO	8-hr	13.88907	89031008	269777.19	4052851.25	99.7
SPP104aA.OUT	4a, A	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM10	24-hr	1.66768	91050824	270270	4052640	100
SPP104aB.OUT	4a,B	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM10	24-hr	1.77026	91050824	270270	4052640	100
SPP104aC.OUT	4a, C	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM10	24-hr	1.87717	91050824	270270	4052640	100
SPP104aD.OUT	4a, D	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM10	24-hr	1.85523	91050824	270270	4052640	100
SPP104aE.OUT	4a, E	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM10	24-hr	2.05873	91050824	270270	4052640	100
SPP104aF.OUT	4a, F	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM10	24-hr	2.59105	91050824	270270	4052640	100
PS104aFg.OUT	4a, F	2 CT's, aux boil, cool twr, ngeg 30 min	Table 19	PM10	24-hr	2.57969	91050824	270270	4052640	100
SPP254aA.OUT	4a, A	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM2.5	24-hr	0.58585	91041024	270300	4052700	101
SPP254aB.OUT	4a,B	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM2.5	24-hr	0.58646	91041024	270300	4052700	101
SPP254aC.OUT	4a, C	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM2.5	24-hr	0.58679	91041024	270300	4052700	101

File Name	CASE / SCENARIO	EQUIPMENT	EMISSION RATE TABLE	POLLUTANT	AVERAGING TIME	Highest conc.	Date	UTM E (meters)	UTM N (meters)	Elevation (meters)
SPP254aD.OUT	4a, D	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM2.5	24-hr	0.58677	91041024	270300	4052700	101
SPP254aE.OUT	4a, E	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM2.5	24-hr	0.58845	91041024	270300	4052700	101
SPP254aF.OUT	4a, F	2 CT's, aux boil, cool twr, DFP 30 min	Table 19	PM2.5	24-hr	0.5931	91041024	270300	4052700	101
PS254aFg.OUT	4a, F	2 CT's, aux boil, cool twr, ngeg 30 min	Table 19	PM2.5	24-hr	0.59474	91041024	270300	4052700	101
SPP104B.OUT	4b, F	1 CT, cool	Table 20	PM10	24-hr	1.50436	91050824	270270	4052610	100
SPP254B.OUT	4b, F	1 CT, cool	Table 20	PM2.5	24-hr	0.14735	91041024	270300	4052700	101
SPP104C.OUT	4c	2 CT, aux 2hr, CT, DFP 30 min	Table 21	PM10	24-hr	2.32294	91050824	270270	4052640	100
SPP104C2.OUT	4c	2 CT, aux 2hr, CT, DFP 30 min	Table 21	PM10	24-hr	2.20693	91050824	270270	4052610	100
SPP254c.OUT	4c	2 CT, aux 2hr, CT, DFP 30 min	Table 21	PM2.5	24-hr	0.16202	91041024	270300	4052700	101
SPP254c2.OUT	4c	2 CT, aux 2hr, CT, DFP 30 min	Table 21	PM2.5	24-hr	0.15794	91041024	270300	4052700	101
S7NOAN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	NOx	annual	0.13199	1987	270180.84	4052728.25	99.7
S8NOAN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	NOx	annual	0.15347	1988	270180.84	4052728.25	99.7

File Name	CASE / SCENARIO	EQUIPMENT	EMISSION RATE TABLE	POLLUTANT	AVERAGING TIME	Highest conc.	Date	UTM E (meters)	UTM N (meters)	Elevation (meters)
SNOAN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	NOx	annual	0.19833	1989	270180	4052700	100
S0NOAN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	NOx	annual	0.22743	1990	270240	4052640	100
S1NOAN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	NOx	annual	0.2993	1991	270240	4052640	100
S7P10AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM10	annual	0.06357	1987	270270	4052640	100
S8P10AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM10	annual	0.15347	1988	270180.84	4052728.25	99.7
SP10AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM10	annual	0.11467	1989	270270	4052640	100
S0P10AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM10	annual	0.13679	1990	270240	4052610	100
S1P10AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM10	annual	0.18404	1991	270270	4052610	100
S7P25AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM25	annual	0.00535	1987	271620	4051620	101
S8P25AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM25	annual	0.00658	1988	271620	4051710	101

File Name	CASE / SCENARIO	EQUIPMENT	EMISSION RATE TABLE	POLLUTANT	AVERAGING TIME	Highest conc.	Date	UTM E (meters)	UTM N (meters)	Elevation (meters)
SP25AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM25	annual	0.00804	1989	271530	4051710	101
S0P25AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM25	annual	0.00966	1990	271440	4051710	101
S1P25AN.OUT	5	2 CT's, DFP + EGEN 26 hrs, aux boiler	Table 22	PM25	annual	0.01075	1991	270270	4052640	100
PPB.OUT	lead	aux boiler, DFP	DFP0.000143 lb/hr AuxB 3.05e-5 lb/hr	Pb	24-hr	0.0054	89021924	270090	4052700	99

CALPUFF MODELING FILE LIST

E NAME	DESCRIPTION
14AA5B.INP	CALPUFF INPUT SIEMENS, 24-HR, GROUP 1 CLASS I AREAS
S24AA5D.INP	CALPUFF INPUT SIEMENS, 24-HR, GROUP 2 CLASS I AREAS
S34AA5D.INP	CALPUFF INPUT SIEMENS, 24-HR, GROUP 3 CLASS I AREAS
S44AA5E.INP	CALPUFF INPUT SIEMENS, 24-HR, GROUP 4 CLASS I AREAS
S14C.INP	CALPUFF INPUT SIEMENS, 24-HR, PARTIAL LOAD, GROUP 1 CLASS I AREAS
G14AA5D.INP	CALPUFF INPUT GE, 24-HR, GROUP 1 CLASS I AREAS
G24AA5D.INP	CALPUFF INPUT GE, 24-HR, GROUP 2 CLASS I AREAS
G34AA5D.INP	CALPUFF INPUT GE, 24-HR, GROUP 3 CLASS I AREAS
G44AA5E.INP	CALPUFF INPUT GE, 24-HR, GROUP 4 CLASS I AREAS
AUX1.INP	CALPUFF INPUT AUX BOILER, 24-HR, GROUP 1 CLASS I AREAS
S15BAN.INP	CALPUFF INPUT SIEMENS, ANNUAL, GROUP 1 CLASS I AREAS
S25BAN.INP	CALPUFF INPUT SIEMENS, ANNUAL, GROUP 2 CLASS I AREAS
S35BAN.INP	CALPUFF INPUT SIEMENS, ANNUAL, GROUP 3 CLASS I AREAS
S45EAN.INP	CALPUFF INPUT SIEMENS, ANNUAL, GROUP 4 CLASS I AREAS
G15BAN.INP	CALPUFF INPUT GE, ANNUAL, GROUP 1 CLASS I AREAS
G25BAN.INP	CALPUFF INPUT GE, ANNUAL, GROUP 2 CLASS I AREAS
G35BAN.INP	CALPUFF INPUT GE, ANNUAL, GROUP 3 CLASS I AREAS
G45EAN.INP	CALPUFF INPUT GE, ANNUAL, GROUP 4 CLASS I AREAS
SKC5AN.INP	CALPUFF INPUT FILE SIEMENS, ANNUAL, KINGS CANYON 3 RINGS
SSE5AN.INP	CALPUFF INPUT FILE SIEMENS, ANNUAL, SEQUOIA, MEDIAN DISTANCE
SSEF5AN.INP	CALPUFF INPUT FILE SIEMENS, ANNUAL, SEQUOIA, FAR DISTANCE
SJM25AN.INP	CALPUFF INPUT FILE SIEMENS, ANNUAL, JOHN MUIR MEDIAN + FAR DISTANCE RINGS
SKA5AN.INP	CALPUFF INPUT FILE SIEMENS, ANNUAL, KAISER 3 RINGS
C25BAN.INP	CALPUFF INPUT FILE GE, ANNUAL, KINGS CANYON, MEDIAN + FAR RINGS
SE25BAN.INP	CALPUFF INPUT FILE GE, ANNUAL, SEQUOIA, MEDIAN + FAR RINGS
GJM25BAN.INP	CALPUFF INPUT FILE GE, ANNUAL, JOHN MUIR, MEDIAN + FAR RINGS
2S14AADS.INP	POSTUTIL INPUT FILE SIEMENS, 24-HR, PM, GROUP 1
2S24AASP.INP	POSTUTIL INPUT FILE SIEMENS, 24-HR, PM, GROUP 2
2S34AASP.INP	POSTUTIL INPUT FILE SIEMENS, 24-HR, PM, GROUP 3
2S44AESP.INP	POSTUTIL INPUT FILE SIEMENS, 24-HR, PM, GROUP 4
2S14CP.INP	POSTUTIL INPUT FILE SIEMENS, 24-HR, PARTIAL LOAD, PM, GROUP 1
2G14AASP.INP	POSTUTIL INPUT FILE GE, 24-HR, PM, GROUP 1
2G24AASP.INP	POSTUTIL INPUT FILE GE, 24-HR, PM, GROUP 2
2G34AASP.INP	POSTUTIL INPUT FILE GE, 24-HR, PM, GROUP 3
2G44AESP.INP	POSTUTIL INPUT FILE GE, 24-HR, PM, GROUP 4
2AUX1SP.INP	POSTUTIL INPUT FILE AUX BOILER, 24-HR, PM, GROUP 1
2S15ANP.INP	POSTUTIL INPUT FILE SIEMENS, ANNUAL, PM, GROUP 1
2S25ANP.INP	POSTUTIL INPUT FILE SIEMENS, ANNUAL, PM, GROUP 2
2S35ANP.INP	POSTUTIL INPUT FILE SIEMENS, ANNUAL, PM, GROUP 3
2S45EANP.INP	POSTUTIL INPUT FILE SIEMENS, ANNUAL, PM, GROUP 4
2G15ANP.INP	POSTUTIL INPUT FILE GE, ANNUAL, PM, GROUP 1
2G25ANP.INP	POSTUTIL INPUT FILE GE, ANNUAL, PM, GROUP 2
2G35ANP.INP	POSTUTIL INPUT FILE GE, ANNUAL, PM, GROUP 3
2G45EANP.INP	POSTUTIL INPUT FILE GE, ANNUAL, PM, GROUP 4
2S15BDP.INP	POSTUTIL INPUT FILE SIEMENS, ANNUAL, DEPOSITION, GROUP 1
2S25BDP.INP	POSTUTIL INPUT FILE SIEMENS, ANNUAL, DEPOSITION, GROUP 2
2S35BDP.INP	POSTUTIL INPUT FILE SIEMENS, ANNUAL, DEPOSITION, GROUP 3
15EDEP.INP	POSTUTIL INPUT FILE SIEMENS, ANNUAL, DEPOSITION, GROUP 4
SKC35DP.INP	POSTUTIL INPUT FILE SIEMENS, ANNUAL, DEPOSITION, KINGS CANYON 3 RINGS
2SSEM5DP.INP	POSTUTIL INPUT FILE SIEMENS, ANNUAL, DEPOSITION,SEQUOIA MEDIAN DISTANCE
2SSEF5DP.INP	POSTUTIL INPUT FILE SIEMENS, ANNUAL, DEPOSITION, SEQUOIA FAR DISTANCE

FILE NAME	DESCRIPTION
2SJM25DP.INP	POSTUTIL INPUT FILE SIEMENS, ANNUAL, DEPOSITION, JOHN MUIR MEDIAN + FAR
2SKA35DP.INP	POSTUTIL INPUT FILE SIEMENS, ANNUAL, DEPOSITION, KAISER 3 RINGS
2G15BDP.INP	POSTUTIL INPUT FILE GE, ANNUAL, DEPOSITION, GROUP 1
2G25BDP.INP	POSTUTIL INPUT FILE GE, ANNUAL, DEPOSITION, GROUP 2
2G35BDP.INP	POSTUTIL INPUT FILE GE, ANNUAL, DEPOSITION, GROUP 3
2G45EDEP.INP	POSTUTIL INPUT FILE GE, ANNUAL, DEPOSITION, GROUP 4
2KC25DP.INP	POSTUTIL INPUT FILE GE, ANNUAL, DEPOSITION, KINGS CANYON MEDIAN + FAR RINGS
2GSE25DP.INP	POSTUTIL INPUT FILE GE, ANNUAL, DEPOSITION,SEQUOIA MEDIAN DISTANCE
2GJM25DP.INP	POSTUTIL INPUT FILE GE, ANNUAL, DEPOSITION, JOHN MUIR MEDIAN + FAR
3S1AAD1V.INP	CALPOST INPUT FILE SIEMENS, VISIBILITY, KINGS CANYON
3SSEAADV.INP	CALPOST INPUT FILE SIEMENS, VISIBILITY, SEQUOIA
3SJMAADV.INP	CALPOST INPUT FILE SIEMENS, VISIBILITY, JOHN MUIR
3SKAAADV.INP	CALPOST INPUT FILE SIEMENS, VISIBILITY, KAISER
3SAAAADV.INP	CALPOST INPUT FILE SIEMENS, VISIBILITY, ANSEL ADAMS
3SYOAADV.INP	CALPOST INPUT FILE SIEMENS, VISIBILITY, YOSEMITE
3SHOAADV.INP	CALPOST INPUT FILE SIEMENS, VISIBILITY, HOOVER
3SEMAADV.INP	CALPOST INPUT FILE SIEMENS, VISIBILITY, EMIGRANT
3SDLAADV.INP	CALPOST INPUT FILE SIEMENS, VISIBILITY, DOME LAND
3SPIAAEV.INP	CALPOST INPUT FILE SIEMENS, VISIBILITY, PINNACLES
3SVEAAEV.INP	CALPOST INPUT FILE SIEMENS, VISIBILITY, VENTANA
3GKCAADV.INP	CALPOST INPUT FILE GE, VISIBILITY, KINGS CANYON
3GSEAADV.INP	CALPOST INPUT FILE GE, VISIBILITY, SEQUOIA
3GJMAADV.INP	CALPOST INPUT FILE GE, VISIBILITY, JOHN MUIR
3GKAAADV.INP	CALPOST INPUT FILE GE, VISIBILITY, KAISER
3GAAAADV.INP	CALPOST INPUT FILE GE, VISIBILITY, ANSEL ADAMS
3GYOAADV.INP	CALPOST INPUT FILE GE, VISIBILITY, YOSEMITE
3GHOAADV.INP	CALPOST INPUT FILE GE, VISIBILITY, HOOVER
3GEMAADV.INP	CALPOST INPUT FILE GE, VISIBILITY, EMIGRANT
3GDLAADV.INP	CALPOST INPUT FILE GE, VISIBILITY, DOME LAND
3GPIAAEV.INP	CALPOST INPUT FILE GE, VISIBILITY, PINNACLES
3GVEAAEV.INP	CALPOST INPUT FILE GE, VISIBILITY, VENTANA
3AUX1V.INP	CALPOST INPUT FILE AUX BOILER, VISIBILITY, KINGS CANYON
3SKC5BN.INP	CALPOST INPUT FILE SIEMENS, N DEPOSITION, KINGS CANYON
3SSE5BN.INP	CALPOST INPUT FILE SIEMENS, N DEPOSITION, SEQUOIA
3SJM5BN.INP	CALPOST INPUT FILE SIEMENS, N DEPOSITION, JOHN MUIR
3SKA5BN.INP	CALPOST INPUT FILE SIEMENS, N DEPOSITION, KAISER
3SAA5BN.INP	CALPOST INPUT FILE SIEMENS, N DEPOSITION, ANSEL ADAMS
3SYO5BN.INP	CALPOST INPUT FILE SIEMENS, N DEPOSITION, YOSEMITE
3SHO5BN.INP	CALPOST INPUT FILE SIEMENS, N DEPOSITION, HOOVER
3SEM5BN.INP	CALPOST INPUT FILE SIEMENS, N DEPOSITION, EMIGRANT
3SDL5BN.INP	CALPOST INPUT FILE SIEMENS, N DEPOSITION, DOME LAND
3SPI5EN.INP	CALPOST INPUT FILE SIEMENS, N DEPOSITION, PINNACLES
3SVE5EN.INP	CALPOST INPUT FILE SIEMENS, N DEPOSITION, VENTANA
3GKC5BN.INP	CALPOST INPUT FILE GE, N DEPOSITION, KINGS CANYON
3GSE5BN.INP	CALPOST INPUT FILE GE, N DEPOSITION, SEQUOIA
3GJM5BN.INP	CALPOST INPUT FILE GE, N DEPOSITION, JOHN MUIR
3GKA5BN.INP	CALPOST INPUT FILE GE, N DEPOSITION, KAISER
3GAA5BN.INP	CALPOST INPUT FILE GE, N DEPOSITION, ANSEL ADAMS
3GYO5BN.INP	CALPOST INPUT FILE GE, N DEPOSITION, YOSEMITE
3GHO5BN.INP	CALPOST INPUT FILE GE, N DEPOSITION, HOOVER
3GEM5BN.INP	CALPOST INPUT FILE GE, N DEPOSITION, EMIGRANT
3GDL5BN.INP	CALPOST INPUT FILE GE, N DEPOSITION, DOME LAND
3GPI5EN.INP	CALPOST INPUT FILE GE, N DEPOSITION, PINNACLES

FILE NAME	DESCRIPTION
3GVE5EN.INP	CALPOST INPUT FILE GE, N DEPOSITION, VENTANA
[illegible]C5BS.INP	CALPOST INPUT FILE SIEMENS, S DEPOSITION, KINGS CANYON
[illegible]E5BS.INP	CALPOST INPUT FILE SIEMENS, S DEPOSITION, SEQUOIA
3SJM5BS.INP	CALPOST INPUT FILE SIEMENS, S DEPOSITION, JOHN MUIR
3SKA5BS.INP	CALPOST INPUT FILE SIEMENS, S DEPOSITION, KAISER
3SAA5BS.INP	CALPOST INPUT FILE SIEMENS, S DEPOSITION, ANSEL ADAMS
3SYO5BS.INP	CALPOST INPUT FILE SIEMENS, S DEPOSITION, YOSEMITE
3SHO5BS.INP	CALPOST INPUT FILE SIEMENS, S DEPOSITION, HOOVER
3SEM5BS.INP	CALPOST INPUT FILE SIEMENS, S DEPOSITION, EMIGRANT
3SDL5BS.INP	CALPOST INPUT FILE SIEMENS, S DEPOSITION, DOME LAND
3SPI5ES.INP	CALPOST INPUT FILE SIEMENS, S DEPOSITION, PINNACLES
3SVE5ES.INP	CALPOST INPUT FILE SIEMENS, S DEPOSITION, VENTANA
3GKC5BS.INP	CALPOST INPUT FILE GE, S DEPOSITION, KINGS CANYON
3GSE5BS.INP	CALPOST INPUT FILE GE, S DEPOSITION, SEQUOIA
3GJM5BS.INP	CALPOST INPUT FILE GE, S DEPOSITION, JOHN MUIR
3GKA5BS.INP	CALPOST INPUT FILE GE, S DEPOSITION, KAISER
3GAA5BS.INP	CALPOST INPUT FILE GE, S DEPOSITION, ANSEL ADAMS
3GYO5BS.INP	CALPOST INPUT FILE GE, S DEPOSITION, YOSEMITE
3GHO5BS.INP	CALPOST INPUT FILE GE, S DEPOSITION, HOOVER
3GEM5BS.INP	CALPOST INPUT FILE GE, S DEPOSITION, EMIGRANT
3GDL5BS.INP	CALPOST INPUT FILE GE, S DEPOSITION, DOME LAND
3GPI5ES.INP	CALPOST INPUT FILE GE, S DEPOSITION, PINNACLES
3GVE5ES.INP	CALPOST INPUT FILE GE, S DEPOSITION, VENTANA
3SKC35BN.INP	CALPOST INPUT FILE SIEMENS, N DEPOSITION, KINGS CANYON, 3 RINGS
3SSEM5BN.INP	CALPOST INPUT FILE SIEMENS, N DEPOSITION, SEQUOIA MEDIAN RING
[illegible]EF5BN.INP	CALPOST INPUT FILE SIEMENS, N DEPOSITION, SEQUOIA FAR RING
[illegible]JM25BN.INP	CALPOST INPUT FILE SIEMENS, N DEPOSITION, JOHN MUIR, MEDIAN + FAR RING
3SKA35BN.INP	CALPOST INPUT FILE SIEMENS, N DEPOSITION, KAISER, 3 RING
3GKC25BN.INP	CALPOST INPUT FILE GE, N DEPOSITION, KINGS CANYON, MEDIAN + FAR RING
3GSE25BN.INP	CALPOST INPUT FILE GE, N DEPOSITION, SEQUOIA, MEDIAN + FAR RING
3GJM25BN.INP	CALPOST INPUT FILE GE, N DEPOSITION, JOHNM MUIR, MEDIAN + FAR RING
3S14AADP.INP	CALPOST INPUT SIEMENS, 24-HR PM10, GROUP 1 CLASS I AREAS
3S24AADP.INP	CALPOST INPUT SIEMENS, 24-HR PM10, GROUP 2 CLASS I AREAS
3S34AADP.INP	CALPOST INPUT SIEMENS, 24-HR PM10, GROUP 3 CLASS I AREAS
3S44AAEP.INP	CALPOST INPUT SIEMENS, 24-HR PM10, GROUP 4 CLASS I AREAS
3S14CP.INP	CALPOST INPUT SIEMENS, 24-HR PM10,PARTIAL LOAD GROUP 1 CLASS I AREAS
3AUX1SP.INP	CALPOST INPUT AUX BOILER, 24-HR PM10,GROUP 1 CLASS I AREAS
3G14AADP.INP	CALPOST INPUT GE, 24-HR PM10, GROUP 1 CLASS I AREAS
3G24AADP.INP	CALPOST INPUT GE, 24-HR PM10, GROUP 2 CLASS I AREAS
3G34AADP.INP	CALPOST INPUT GE, 24-HR PM10, GROUP 3 CLASS I AREAS
3G44AAEP.INP	CALPOST INPUT GE, 24-HR PM10, GROUP 4 CLASS I AREAS
3S15ANP.INP	CALPOST INPUT SIEMENS, ANNUAL PM10, GROUP 1 CLASS I AREAS
3S25ANP.INP	CALPOST INPUT SIEMENS, ANNUAL PM10, GROUP 2 CLASS I AREAS
3S35ANP.INP	CALPOST INPUT SIEMENS, ANNUAL PM10, GROUP 3 CLASS I AREAS
3S45ANEP.INP	CALPOST INPUT SIEMENS, ANNUAL PM10, GROUP 4 CLASS I AREAS
3G15ANP.INP	CALPOST INPUT GE, ANNUAL PM10, GROUP 1 CLASS I AREAS
3G25ANP.INP	CALPOST INPUT GE, ANNUAL PM10, GROUP 2 CLASS I AREAS
3G35ANP.INP	CALPOST INPUT GE, ANNUAL PM10, GROUP 3 CLASS I AREAS
3G45ANEP.INP	CALPOST INPUT GE, ANNUAL PM10, GROUP 4 CLASS I AREAS
[illegible]5ANP.INP	CALPOST INPUT SIEMENS, ANNUAL PM10, GROUP 1 CLASS I AREAS
[illegible]25ANP.INP	CALPOST INPUT SIEMENS, ANNUAL PM10, GROUP 2 CLASS I AREAS
3S35ANP.INP	CALPOST INPUT SIEMENS, ANNUAL PM10, GROUP 3 CLASS I AREAS
3S45ANEP.INP	CALPOST INPUT SIEMENS, ANNUAL PM10, GROUP 4 CLASS I AREAS

FILE NAME	DESCRIPTION
3G15ANP.INP	CALPOST INPUT GE, ANNUAL PM10, GROUP 1 CLASS I AREAS
3G25ANP.INP	CALPOST INPUT GE, ANNUAL PM10, GROUP 2 CLASS I AREAS
3G35ANP.INP	CALPOST INPUT GE, ANNUAL PM10, GROUP 3 CLASS I AREAS
3G45ANEP.INP	CALPOST INPUT GE, ANNUAL PM10, GROUP 4 CLASS I AREAS
3S15BANO.INP	CALPOST INPUT SIEMENS, ANNUAL NOX, GROUP 1 CLASS I AREAS
3S25BANO.INP	CALPOST INPUT SIEMENS, ANNUAL NOX, GROUP 2 CLASS I AREAS
3S35BANO.INP	CALPOST INPUT SIEMENS, ANNUAL NOX, GROUP 3 CLASS I AREAS
3S45EANO.INP	CALPOST INPUT SIEMENS, ANNUAL NOX, GROUP 4 CLASS I AREAS
3G15BANO.INP	CALPOST INPUT GE, ANNUAL NOX, GROUP 1 CLASS I AREAS
3G25BANO.INP	CALPOST INPUT GE, ANNUAL NOX, GROUP 2 CLASS I AREAS
3G35BANO.INP	CALPOST INPUT GE, ANNUAL NOX, GROUP 3 CLASS I AREAS
3G45EANO.INP	CALPOST INPUT GE, ANNUAL NOX, GROUP 4 CLASS I AREAS
1S14AAS.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT) SIEMENS 24-HR GROUP 1
1S14CS.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT) SIEMENS, PARTIAL LOAD 24-HR GROUP 1
1S15BANC.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT SIEMENS, ANNUAL, GROUP 1
1S15BAW.DAT	CALPUFF WET FLUX (BINARY OUTPUT) SIEMENS, ANNUAL, GROUP 1
1S15BAD.DAT	CALPUFF DRY FLUX (BINARY OUTPUT) SIEMENS, ANNUAL GROUP 1
1S12AADS.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT) SIEMENS 24-HR GROUP 2
1S25BAD.DAT	CALPUFF DRY FLUX (BINARY OUTPUT) SIEMENS, ANNUAL GROUP 2
1S25BANC.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT SIEMENS, ANNUAL, GROUP 2
1S25BAW.DAT	CALPUFF WET FLUX (BINARY OUTPUT) SIEMENS, ANNUAL, GROUP 2
1S34AADS.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT) SIEMENS 24-HR GROUP 3
1S35BAD.DAT	CALPUFF DRY FLUX (BINARY OUTPUT) SIEMENS, ANNUAL GROUP 3
1S35BANC.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT SIEMENS, ANNUAL, GROUP 3
1S35BAW.DAT	CALPUFF WET FLUX (BINARY OUTPUT) SIEMENS, ANNUAL, GROUP 3
1S44AAES.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT) SIEMENS 24-HR GROUP 4
1S45EAD.DAT	CALPUFF DRY FLUX (BINARY OUTPUT) SIEMENS, ANNUAL GROUP 4
1S45EANC.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT SIEMENS, ANNUAL, GROUP 4
1S45EAW.DAT	CALPUFF WET FLUX (BINARY OUTPUT) SIEMENS, ANNUAL, GROUP 4
1SJM25AC.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT SIEMENS, ANNUAL, JOHN MUIR, MEDIAN + FAR RINGS
1SJM25AD.DAT	CALPUFF DRY FLUX (BINARY OUTPUT) SIEMENS, ANNUAL JOHN MUIR, MEDIAN + FAR RINGS
1SJM25AW.DAT	CALPUFF WET FLUX (BINARY OUTPUT) SIEMENS, ANNUAL, JOHN MUIR, MEDIAN + FAR RINGS
1SKA5AD.DAT	CALPUFF DRY FLUX (BINARY OUTPUT) SIEMENS, ANNUAL KAISER, 3 RINGS
1SKA5ANC.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT SIEMENS, ANNUAL, KAISER, 3 RINGS
1SKA5AW.DAT	CALPUFF WET FLUX (BINARY OUTPUT) SIEMENS, ANNUAL, KAISER, 3 RINGS
1SKC5ANC.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT SIEMENS, ANNUAL, KINGS CANYON, 3 RINGS
1SKC5AW.DAT	CALPUFF WET FLUX (BINARY OUTPUT) SIEMENS, ANNUAL KINGS CANYON, 3 RINGS
1SKCAD.DAT	CALPUFF DRY FLUX (BINARY OUTPUT) SIEMENS, ANNUAL KINGS CANYON, 3 RINGS
1SSESF5AC.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT SIEMENS, ANNUAL, SEQUOIA, FAR RINGS
1SSEF5AD.DAT	CALPUFF DRY FLUX (BINARY OUTPUT) SIEMENS, ANNUAL SEQUOIA, FAR RINGS
1SSEF5AW.DAT	CALPUFF WET FLUX (BINARY OUTPUT) SIEMENS, ANNUAL, SEQUOIA, FAR RINGS
1SSE5AD.DAT	CALPUFF DRY FLUX (BINARY OUTPUT) SIEMENS, ANNUAL SEQUOIA, MEDIAN RINGS
1SSE5ANC.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT SIEMENS, ANNUAL, SEQUOIA, MEDIAN RINGS
1SSE5AW.DAT	CALPUFF WET FLUX (BINARY OUTPUT) SIEMENS, ANNUAL, SEQUOIA, MEDIAN RINGS
1G14AADS.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT) GE 24-HR GROUP 1
1G15BAD.DAT	CALPUFF DRY FLUX (BINARY OUTPUT) GE, ANNUAL GROUP 1
1G15BANC.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT GE, ANNUAL, GROUP 1
1G15BAW.DAT	CALPUFF WET FLUX (BINARY OUTPUT) GE, ANNUAL, GROUP 1
1G24AADS.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT) GE 24-HR GROUP 2
1G25BAD.DAT	CALPUFF DRY FLUX (BINARY OUTPUT) GE, ANNUAL GROUP 2
1G25BANC.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT GE, ANNUAL, GROUP 2
1G25BAW.DAT	CALPUFF WET FLUX (BINARY OUTPUT) GE, ANNUAL, GROUP 2
1G34AADS.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT) GE 24-HR GROUP 3

FILE NAME	DESCRIPTION
1G35BAD.DAT	CALPUFF DRY FLUX (BINARY OUTPUT) GE, ANNUAL GROUP 3
5BANC.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT GE, ANNUAL, GROUP 3
..35BAW.DAT	CALPUFF WET FLUX (BINARY OUTPUT) GE, ANNUAL, GROUP 3
1G44AAES.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT) GE 24-HR GROUP 4
1G45EAD.DAT	CALPUFF DRY FLUX (BINARY OUTPUT) GE, ANNUAL GROUP 4
1G4EANC.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT GE, ANNUAL, GROUP 4
1G45EAW.DAT	CALPUFF WET FLUX (BINARY OUTPUT) GE, ANNUAL, GROUP 4
1GJM25AC.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT GE, ANNUAL, JOHN MUIR, MEDIAN + FAR RINGS
1GJM25AD.DAT	CALPUFF DRY FLUX (BINARY OUTPUT) GE, ANNUAL JOHN MUIR, MEDIAN + FAR RINGS
1GJM25AW.DAT	CALPUFF WET FLUX (BINARY OUTPUT) GE, ANNUAL, JOHN MUIR, MEDIAN + FAR RINGS
1GKC25AC.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT GE, ANNUAL, KINGS CANYON, MEDIAN + FAR RINGS
1GKC25AD.DAT	CALPUFF DRY FLUX (BINARY OUTPUT) GE, ANNUAL KINGS CANYON, MEDIAN + FAR RINGS
1GKC25AW.DAT	CALPUFF DRY FLUX (BINARY OUTPUT) GE, ANNUAL KINGS CANYON, MEDIAN + FAR RINGS
1GSE25AC.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT GE, ANNUAL, SEQUOIA, MEDIAN + FAR RINGS
1GSE25AD.DAT	CALPUFF DRY FLUX (BINARY OUTPUT) GE, ANNUAL SEQUOIA, MEDIAN + FAR RINGS
1GSE25AW.DAT	CALPUFF WET FLUX (BINARY OUTPUT) GE, ANNUAL, SEQUOIA, MEDIAN + FAR RINGS
AUX1C.DAT	CALPUFF CONCENTRATION DAT (BINARY OUTPUT) AUX BOILER 24-HR GROUP 1
AUX1D.DAT	CALPUFF DRY FLUX DAT (BINARY OUTPUT) AUX BOILER 24-HR GROUP 1
AUX1W.DAT	CALPUFF WET FLUX DAT (BINARY OUTPUT) AUX BOILER 24-HR GROUP 1
2AUX1SP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), AUX BOILER, 24-HR,PM TOTAL, GROUP 1
2S14AADS.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), SIEMENS , 24-HR,PM TOTAL, GROUP 1
2S14CP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), SIEMENS , 24-HR PARTIAL LOAD,PM TOTAL, GROUP 1
2S15ANP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), SIEMENS, ANNUAL, PM TOTAL, GROUP 1
2S15BDP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), SIEMENS, ANNUAL, DEPOSITION, GROUP 1
2S24AADS.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), SIEMENS , 24-HR,PM TOTAL, GROUP 2
5ANP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), SIEMENS, ANNUAL, PM TOTAL, GROUP 2
25BDP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), SIEMENS, ANNUAL, DEPOSITION, GROUP 2
2S344AADS.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), SIEMENS , 24-HR,PM TOTAL, GROUP 3
2S35ANP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), SIEMENS, ANNUAL, PM TOTAL, GROUP 3
2S35BDP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), SIEMENS, ANNUAL, DEPOSITION, GROUP 3
2S44AAES.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), SIEMENS , 24-HR,PM TOTAL, GROUP 4
2S45ANEP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), SIEMENS, ANNUAL, PM TOTAL, GROUP 4
2S45EDEP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), SIEMENS, ANNUAL, DEPOSITION, GROUP 4
2SKA35DP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), SIEMENS, ANNUAL, DEPOSITION, KAISER, 3 RINGS
2SKC35DP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), SIEMENS, ANNUAL, DEPOSITION, KINGS CANYON, 3 RINGS
2SSEF5DP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), SIEMENS, ANNUAL, DEPOSITION, SEQUOIA, FAR RING
2SSEM5DP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), SIEMENS, ANNUAL, DEPOSITION, SEQUOIA, MEDIAN RING
2SSJM2DP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), SIEMENS, ANNUAL, DEPOSITION, JOHN MUIR, MEDIAN + FAR RINGS
2G14AADS.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), GE , 24-HR,PM TOTAL, GROUP 1
2G15ANP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), GE, ANNUAL, PM TOTAL, GROUP 1
2G15BDP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), GE, ANNUAL, DEPOSITION, GROUP 1
2G24AADS.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), GE , 24-HR,PM TOTAL, GROUP 2
2G25ANP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), GE, ANNUAL, PM TOTAL, GROUP 2
2G25BDP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), GE, ANNUAL, DEPOSITION, GROUP 2
2G34AADS.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), GE , 24-HR,PM TOTAL, GROUP 3
2G35ANP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), GE, ANNUAL, PM TOTAL, GROUP 3
2G35BDP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), GE, ANNUAL, DEPOSITION, GROUP 3
2G44AAES.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), GE , 24-HR,PM TOTAL, GROUP 4
2G45ANEP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), GE, ANNUAL, PM TOTAL, GROUP 4
5EDEP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), GE, ANNUAL, DEPOSITION, GROUP 4
2GJM25DP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), GE, ANNUAL, DEPOSITION, JOHN MUIR, MEDIAN + FAR RINGS
2GKC25DP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), GE, ANNUAL, DEPOSITION, KINGS CANYON, 3 RINGS
2GSE25DP.DAT	POSTUTIL CONCENTRATION DAT (BINARY OUTPUT), GE, ANNUAL, DEPOSITION, SEQUOIA, MEDIAN +FAR RING

FILE NAME	DESCRIPTION
1S14AABS.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, 24-HR, CONCENTRATION, GROUP 1
1S14CS.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, 24-HR PARTIAL LOAD, CONCENTRATION, GROUP 1
1S15BAN.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, CONCENTRATION, GROUP 1
1S24AADS.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, 24-HR, CONCENTRATION, GROUP 2
1S25BAN.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, CONCENTRATION, GROUP 2
1S34AADS.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, 24-HR, CONCENTRATION, GROUP 3
1S35BAN.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, CONCENTRATION, GROUP 3
1S44AAES.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, 24-HR, CONCENTRATION, GROUP 4
1S15EAN.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, CONCENTRATION, GROUP 4
1SJM25AN.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, CONCENTRATION, JOHN MUIR MEDIAN+FAR
1SKA5AN.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, CONCENTRATION, KAISER 3 RINGS
1SKC5AN.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, CONCENTRATION, KINGS CANYON 3 RINGS
1SSE5ANF.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, CONCENTRATION, SEQUOIA, FAR RING
1SSE5ANM.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, CONCENTRATION, SEQUOIA, MEDIAN RING
1G14AADS.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) GE, 24-HR, CONCENTRATION, GROUP 1
1G15BAN.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, CONCENTRATION, GROUP 1
1G24AADS.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, 24-HR, CONCENTRATION, GROUP 2
1G25BAN.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, CONCENTRATION, GROUP 2
1G34AADS.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, 24-HR, CONCENTRATION, GROUP 3
1G35BAN.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, CONCENTRATION, GROUP 3
1G44AAES.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, 24-HR, CONCENTRATION, GROUP 4
1G15EAN.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, CONCENTRATION, GROUP 4
1GJM25AN.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, CONCENTRATION, JOHN MUIR MEDIAN+FAR
1GKC25AN.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, CONCENTRATION, KINGS CANYON MEDIAN + FAR
1GSE25AN.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, CONCENTRATION, SEQUOIA, MEDIAN+FAR
AUX1.LST	CALPUFF LIST FILE (OUTPUT SUMMARY) AUX BOILER, 24-HR, CONCENTRATION, GROUP 1
2S14AADS.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) SIEMENS, 24-HR, PM TOTAL, GROUP 1
2S14CP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) SIEMENS, 24-HR PARTIAL LOAD, PM TOTAL, GROUP 1
2S15ANP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, PM TOTAL, GROUP 1
2S15BDP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, DEPOSITION, GROUP 1
2S24AADS.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) SIEMENS, 24-HR, PM TOTAL, GROUP 2
2S25ANP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, PM TOTAL, GROUP 2
2S25DP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, DEPOSITION, GROUP 2
2S34AADS.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) SIEMENS, 24-HR, PM TOTAL, GROUP 3
2S35ANP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, PM TOTAL, GROUP 3
2S35BDP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, DEPOSITION, GROUP 3
2S44AAES.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) SIEMENS, 24-HR, PM TOTAL, GROUP 4
2S4ANEP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, PM TOTAL, GROUP 4
2S4EDEP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, DEPOSITION, GROUP 4
2SJM25DP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, DEPOSITION, JOHN MUIR MEDIAN+FAR
2SKA35DP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, DEPOSITION, KAISER 3 RINGS
2SKC35DP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, DEPOSITION, KINGS CANYON 3 RINGS
2SSEF5DP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, DEPOSITION, SEQUOIA FAR RING
2SSEM5DP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) SIEMENS, ANNUAL, DEPOSITION, SEQUOIA MEDIAN RING
2AUX1SP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) AUX BOILER, 24-HR, PM TOTAL, GROUP 1
2G14AADS.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) GE, 24-HR, PM TOTAL, GROUP 1
2G15ANP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) GE, ANNUAL, PM TOTAL, GROUP 1
2G15BDP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) GE, ANNUAL, DEPOSITION, GROUP 1
2G24AADS.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) GE, 24-HR, PM TOTAL, GROUP 2
2G25ANP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) GE, ANNUAL, PM TOTAL, GROUP 2
2G25DP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) GE, ANNUAL, DEPOSITION, GROUP 2
2G34AADS.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) GE, 24-HR, PM TOTAL, GROUP 3
2G35ANP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) GE, ANNUAL, PM TOTAL, GROUP 3

FILE NAME	DESCRIPTION
2G35BDP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) GE, ANNUAL, DEPOSITION, GROUP 3
[illegible]4AAES.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) GE, 24-HR, PM TOTAL, GROUP 4
[illegible]5ANEP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) GE, ANNUAL, PM TOTAL, GROUP 4
2G45EDEP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) GE, ANNUAL, DEPOSITION, GROUP 4
2GJM25DP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) GE, ANNUAL, DEPOSITION, JOHN MUIR MEDIAN+FAR
2GKC25DP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) GE, ANNUAL, DEPOSITION, KINGS CANYON MEDIAN+FAR
2GSE25DP.LST	POSTUTIL LIST FILE (OUTPUT SUMMARY) GE, ANNUAL, DEPOSITION, SEQUOIA MEDIAN+FAR RING
3S1AAD1V.LST	CALPOST OUTPUT FILE SIEMENS, VISIBILITY, KINGS CANYON
3SSEAADV.LST	CALPOST OUTPUT FILE SIEMENS, VISIBILITY, SEQUOIA
3SJMAADV.LST	CALPOST OUTPUT FILE SIEMENS, VISIBILITY, JOHN MUIR
3SKAAADV.LST	CALPOST OUTPUT FILE SIEMENS, VISIBILITY, KAISER
3SAAAADV.LST	CALPOST OUTPUT FILE SIEMENS, VISIBILITY, ANSEL ADAMS
3SYOAADV.LST	CALPOST OUTPUT FILE SIEMENS, VISIBILITY, YOSEMITE
3SHOAADV.LST	CALPOST OUTPUT FILE SIEMENS, VISIBILITY, HOOVER
3SEMAADV.LST	CALPOST OUTPUT FILE SIEMENS, VISIBILITY, EMIGRANT
3SDLAADV.LST	CALPOST OUTPUT FILE SIEMENS, VISIBILITY, DOME LAND
3SPIAAEV.LST	CALPOST OUTPUT FILE SIEMENS, VISIBILITY, PINNACLES
3SVEAAEV.LST	CALPOST OUTPUT FILE SIEMENS, VISIBILITY, VENTANA
3GKCAADV.LST	CALPOST OUTPUT FILE GE, VISIBILITY, KINGS CANYON
3GSEAADV.LST	CALPOST OUTPUT FILE GE, VISIBILITY, SEQUOIA
3GJMAADV.LST	CALPOST OUTPUT FILE GE, VISIBILITY, JOHN MUIR
3GKAAADV.LST	CALPOST OUTPUT FILE GE, VISIBILITY, KAISER
3GAAAADV.LST	CALPOST OUTPUT FILE GE, VISIBILITY, ANSEL ADAMS
3GYOAADV.LST	CALPOST OUTPUT FILE GE, VISIBILITY, YOSEMITE
3GHOAADV.LST	CALPOST OUTPUT FILE GE, VISIBILITY, HOOVER
[illegible]MAADV.LST	CALPOST OUTPUT FILE GE, VISIBILITY, EMIGRANT
[illegible]LAADV.LST	CALPOST OUTPUT FILE GE, VISIBILITY, DOME LAND
3GPIAAEV.LST	CALPOST OUTPUT FILE GE, VISIBILITY, PINNACLES
3GVEAAEV.LST	CALPOST OUTPUT FILE GE, VISIBILITY, VENTANA
3AUX1V.LST	CALPOST OUTPUT FILE AUX BOILER, VISIBILITY, KINGS CANYON
3KC5BN.LST	CALPOST OUTPUT FILE SIEMENS, N DEPOSITION, KINGS CANYON
3SSE5BN.LST	CALPOST OUTPUT FILE SIEMENS, N DEPOSITION, SEQUOIA
3SJM5BN.LST	CALPOST OUTPUT FILE SIEMENS, N DEPOSITION, JOHN MUIR
3SKM5BN.LST	CALPOST OUTPUT FILE SIEMENS, N DEPOSITION, KAISER
3SAA5BN.LST	CALPOST OUTPUT FILE SIEMENS, N DEPOSITION, ANSEL ADAMS
3SYO5BN.LST	CALPOST OUTPUT FILE SIEMENS, N DEPOSITION, YOSEMITE
3SHO5BN.LST	CALPOST OUTPUT FILE SIEMENS, N DEPOSITION, HOOVER
3SEM5BN.LST	CALPOST OUTPUT FILE SIEMENS, N DEPOSITION, EMIGRANT
3SDL5BN.LST	CALPOST OUTPUT FILE SIEMENS, N DEPOSITION, DOME LAND
3SPI5EN.LST	CALPOST OUTPUT FILE SIEMENS, N DEPOSITION, PINNACLES
3SVE5EN.LST	CALPOST OUTPUT FILE SIEMENS, N DEPOSITION, VENTANA
3GKC5BN.LST	CALPOST OUTPUT FILE GE, N DEPOSITION, KINGS CANYON
3GSE5BN.LST	CALPOST OUTPUT FILE GE, N DEPOSITION, SEQUOIA
3GJM5BN.LST	CALPOST OUTPUT FILE GE, N DEPOSITION, JOHN MUIR
3GKA5BN.LST	CALPOST OUTPUT FILE GE, N DEPOSITION, KAISER
3GAA5BN.LST	CALPOST OUTPUT FILE GE, N DEPOSITION, ANSEL ADAMS
3GYO5BN.LST	CALPOST OUTPUT FILE GE, N DEPOSITION, YOSEMITE
3GHO5BN.LST	CALPOST OUTPUT FILE GE, N DEPOSITION, HOOVER
3GEM5BN.LST	CALPOST OUTPUT FILE GE, N DEPOSITION, EMIGRANT
[illegible]L5BN.LST	CALPOST OUTPUT FILE GE, N DEPOSITION, DOME LAND
[illegible]I5EN.LST	CALPOST OUTPUT FILE GE, N DEPOSITION, PINNACLES
3GVE5EN.LST	CALPOST OUTPUT FILE GE, N DEPOSITION, VENTANA
3KC5BS.LST	CALPOST OUTPUT FILE SIEMENS, S DEPOSITION, KINGS CANYON

FILE NAME	DESCRIPTION
3SSE5BS.LST	CALPOST OUTPUT FILE SIEMENS, S DEPOSITION, SEQUOIA
3SJM5BS.LST	CALPOST OUTPUT FILE SIEMENS, S DEPOSITION, JOHN MUIR
3SKA5BS.LST	CALPOST OUTPUT FILE SIEMENS, S DEPOSITION, KAISER
3SAA5BS.LST	CALPOST OUTPUT FILE SIEMENS, S DEPOSITION, ANSEL ADAMS
3SYO5BS.LST	CALPOST OUTPUT FILE SIEMENS, S DEPOSITION, YOSEMITE
3SHO5BS.LST	CALPOST OUTPUT FILE SIEMENS, S DEPOSITION, HOOVER
3SEM5BS.LST	CALPOST OUTPUT FILE SIEMENS, S DEPOSITION, EMIGRANT
3SDL5BS.LST	CALPOST OUTPUT FILE SIEMENS, S DEPOSITION, DOME LAND
3SPI5ES.LST	CALPOST OUTPUT FILE SIEMENS, S DEPOSITION, PINNACLES
3SVE5ES.LST	CALPOST OUTPUT FILE SIEMENS, S DEPOSITION, VENTANA
3GKC5BS.LST	CALPOST OUTPUT FILE GE, S DEPOSITION, KINGS CANYON
3GSE5BS.LST	CALPOST OUTPUT FILE GE, S DEPOSITION, SEQUOIA
3GJM5BS.LST	CALPOST OUTPUT FILE GE, S DEPOSITION, JOHN MUIR
3GKA5BS.LST	CALPOST OUTPUT FILE GE, S DEPOSITION, KAISER
3GAA5BS.LST	CALPOST OUTPUT FILE GE, S DEPOSITION, ANSEL ADAMS
3GYO5BS.LST	CALPOST OUTPUT FILE GE, S DEPOSITION, YOSEMITE
3GHO5BS.LST	CALPOST OUTPUT FILE GE, S DEPOSITION, HOOVER
3GEM5BS.LST	CALPOST OUTPUT FILE GE, S DEPOSITION, EMIGRANT
3GDL5BS.LST	CALPOST OUTPUT FILE GE, S DEPOSITION, DOME LAND
3GPI5ES.LST	CALPOST OUTPUT FILE GE, S DEPOSITION, PINNACLES
3GVE5ES.LST	CALPOST OUTPUT FILE GE, S DEPOSITION, VENTANA
3SKC35BN.LST	CALPOST OUTPUT FILE SIEMENS, N DEPOSITION, KINGS CANYON, 3 RINGS
3SSEM5BN.LST	CALPOST OUTPUT FILE SIEMENS, N DEPOSITION, SEQUOIA MEDIAN RING
3SSEF5BN.LST	CALPOST OUTPUT FILE SIEMENS, N DEPOSITION, SEQUOIA FAR RING
3SJM25BN.LST	CALPOST OUTPUT FILE SIEMENS, N DEPOSITION, JOHN MUIR, MEDIAN + FAR RING
3SKA35BN.LST	CALPOST OUTPUT FILE SIEMENS, N DEPOSITION, KAISER, 3 RING
3GKC25BN.LST	CALPOST OUTPUT FILE GE, N DEPOSITION, KINGS CANYON, MEDIAN + FAR RING
3GSE25BN.LST	CALPOST OUTPUT FILE GE, N DEPOSITION, SEQUOIA MEDIAN + FAR RING
3GJM25BN.LST	CALPOST OUTPUT FILE GE, N DEPOSITION, JOHN MUIR, MEDIAN + FAR RING
3S14AADP.LST	CALPOST OUTPUT SIEMENS, 24-HR PM10, GROUP 1 CLASS I AREAS
3S24AADP.LST	CALPOST OUTPUT SIEMENS, 24-HR PM10, GROUP 2 CLASS I AREAS
3S34AADP.LST	CALPOST OUTPUT SIEMENS, 24-HR PM10, GROUP 3 CLASS I AREAS
3S44AAEP.LST	CALPOST OUTPUT SIEMENS, 24-HR PM10, GROUP 4 CLASS I AREAS
3S14CP.LST	CALPOST OUTPUT SIEMENS, 24-HR PM10,PARTIAL LOAD GROUP 1 CLASS I AREAS
3AUX1SP.LST	CALPOST OUTPUT AUX BOILER, 24-HR PM10,GROUP 1 CLASS I AREAS
3G14AADP.LST	CALPOST OUTPUT GE, 24-HR PM10, GROUP 1 CLASS I AREAS
3G24AADP.LST	CALPOST OUTPUT GE, 24-HR PM10, GROUP 2 CLASS I AREAS
3G34AADP.LST	CALPOST OUTPUT GE, 24-HR PM10, GROUP 3 CLASS I AREAS
3G44AAEP.LST	CALPOST OUTPUT GE, 24-HR PM10, GROUP 4 CLASS I AREAS
3S15ANP.LST	CALPOST OUTPUT SIEMENS, ANNUAL PM10, GROUP 1 CLASS I AREAS
3S25ANP.LST	CALPOST OUTPUT SIEMENS, ANNUAL PM10, GROUP 2 CLASS I AREAS
3S35ANP.LST	CALPOST OUTPUT SIEMENS, ANNUAL PM10, GROUP 3 CLASS I AREAS
3S45ANEP.LST	CALPOST OUTPUT SIEMENS, ANNUAL PM10, GROUP 4 CLASS I AREAS
3G15ANP.LST	CALPOST OUTPUT GE, ANNUAL PM10, GROUP 1 CLASS I AREAS
3G25ANP.LST	CALPOST OUTPUT GE, ANNUAL PM10, GROUP 2 CLASS I AREAS
3G35ANP.LST	CALPOST OUTPUT GE, ANNUAL PM10, GROUP 3 CLASS I AREAS
3G45ANEP.LST	CALPOST OUTPUT GE, ANNUAL PM10, GROUP 4 CLASS I AREAS
3S15ANP.LST	CALPOST OUTPUT SIEMENS, ANNUAL PM10, GROUP 1 CLASS I AREAS
3S25ANP.LST	CALPOST OUTPUT SIEMENS, ANNUAL PM10, GROUP 2 CLASS I AREAS
3S35ANP.LST	CALPOST OUTPUT SIEMENS, ANNUAL PM10, GROUP 3 CLASS I AREAS
3S45ANEP.LST	CALPOST OUTPUT SIEMENS, ANNUAL PM10, GROUP 4 CLASS I AREAS
3G15ANP.LST	CALPOST OUTPUT GE, ANNUAL PM10, GROUP 1 CLASS I AREAS
3G25ANP.LST	CALPOST OUTPUT GE, ANNUAL PM10, GROUP 2 CLASS I AREAS

FILE NAME	DESCRIPTION
3G35ANP.LST	CALPOST OUTPUT GE, ANNUAL PM10, GROUP 3 CLASS I AREAS
15ANEP.LST	CALPOST OUTPUT GE, ANNUAL PM10, GROUP 4 CLASS I AREAS
15BANO.LST	CALPOST OUTPUT SIEMENS, ANNUAL NOX, GROUP 1 CLASS I AREAS
3S25BANO.LST	CALPOST OUTPUT SIEMENS, ANNUAL NOX, GROUP 2 CLASS I AREAS
3S35BANO.LST	CALPOST OUTPUT SIEMENS, ANNUAL NOX, GROUP 3 CLASS I AREAS
3S45EANO.LST	CALPOST OUTPUT SIEMENS, ANNUAL NOX, GROUP 4 CLASS I AREAS
3G15BANO.LST	CALPOST OUTPUT GE, ANNUAL NOX, GROUP 1 CLASS I AREAS
3G25BANO.LST	CALPOST OUTPUT GE, ANNUAL NOX, GROUP 2 CLASS I AREAS
3G35BANO.LST	CALPOST OUTPUT GE, ANNUAL NOX, GROUP 3 CLASS I AREAS
3G45EANO.LST	CALPOST OUTPUT GE, ANNUAL NOX, GROUP 4 CLASS I AREAS

Group 1: Kings Canyon, Sequoia, John Muir, Kaiser
Group 2: Ansel Adams, Yosemite, Hoover, Emigrant
Group 3: Dome Land
Group 4: Pinnacles, Ventana