0000108959

Exhibits A1, A2, A3 for L-00000S-00-0101-00000

PART 2 OF 2
BAR CODE # 0000108959

To review Part 1 please see:

BAR CODE #0000005518

Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station

Submitted By
Mesquite Power, LLC

Prepared By
Black & Veatch

February 2000

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Sempra Energy™
Resources

101 Ash Street
San Diego, CA 92101-3017

Sempra Energy Resources
101 Ash Street
San Diego, CA 92101-3017

Certification of Truth, Accuracy, and Completeness

I, Cecil D. Sterling, as Responsible Official for the Mesquite Power, Mesquite Project, pursuant to Maricopa County Air Pollution Control Rule 210, Section 301.7, certify that based on information and belief formed after reasonable inquiry, the statements and information contained within this application, the *Prevention of Significant Deterioration and Title V Air Permit Application for the Mesquite Power LLC, Mesquite Project are true, accurate, and complete.*

In addition, I certify that:

- This facility is in compliance with all of the applicable requirements set forth in Section 3 of this Application.
- The methods used for determining compliance with these requirements included site observations, records review, and monitoring, record keeping and reporting requirements and test methods specified in the requirements set forth in Section 7 of this application;
- This facility will submit compliance certifications annually, or more frequently if specified by underlying applicable requirements or by Maricopa County;
- This facility is in compliance with all currently applicable enhanced monitoring and compliance certification requestiments;
- An acid rain permit application will be prepared and submitted (a draft of this application is included in Appendix D of this application).

Date: 2/11/00

Cecil D. Sterling
Permitting Manager
Sempra Energy Resources

Sempra Energy Resources is not the same company as the utility, SDG&E or SoCalGas, and Sempra Energy Resources is not regulated by the California Public Utilities Commission.

EXECUTIVE SUMMARY

This Prevention of Significant Deterioration (PSD) and Title V Air Permit Application contains the information necessary, and details the analyses performed to support the proposed Mesquite Power, LLC, Mesquite Generating Station. The proposed project would consist of four (4) General Electric 7FA or Westinghouse 501F combustion turbines (CTs) driving electrical generators. These CTs will be operating in a combined cycle mode of operation, routing their exhaust through heat recovery steam generators (HRSGs). Steam formed in the four HRSGs will be routed through two steam turbines to generate additional electricity. Duct firing will be used in the HRSG to generate additional heat, as needed. The CTs are rated at approximately 170 megawatts (MW) each, and the two steam turbines are rated at approximately 300 MW each. The facility will provide approximately 1,000 MW of electricity to the grid for sale on the open market. The location of the proposed project is in western Maricopa County, near Arlington, Arizona.

The proposed facility will be classified as a major stationary source and will be subject to the PSD program, and the need to obtain a Title V operating permit. Under the PSD rules, all PSD regulated pollutants emitted by the proposed facility must be compared to the PSD significant emission levels in order to determine applicability to PSD review. The required PSD analyses were conducted for each of these regulated pollutants. Included, as part of the PSD application, is a Best Available Control Technology (BACT) analysis, an ambient air quality impact analysis (AAQIA), and an additional impact analysis (AIA).

The AAQIA demonstrates that emissions of nitrogen dioxide (NO_2), carbon monoxide (CO), and particulate matter with a diameter of less than or equal to ten microns (PM_{10}) are emitted in significant quantities. Based on the air dispersion modeling analysis performed for this application, these emissions will not cause or contribute to a violation of the National Ambient Air Quality Standards, or consume the available PSD increment for NO_2 or PM_{10}.

The BACT analysis demonstrates that the proposed pollution controls meet or exceed the criteria set by BACT. The AIA shows that operation of the proposed facility will not cause a significant impairment to visibility or have a detrimental impact on surrounding soils and vegetation.

Because a specific combustion turbine vendor (GE or Westinghouse) has not yet been selected for this project, emissions from both types of CTs have been evaluated throughout this document and are presented as alternative operating scenarios. The facility may be constructed using either of these CTs.

MARICOPA COUNTY
ENVIRONMENTAL SERVICES DEPARTMENT
DIVISION OF AIR POLLUTION CONTROL

1001 N. Central Ave., Ste 201
Phoenix, AZ 85004
(602) 506-6010

STANDARD PERMIT APPLICATION FORM

Internet Copy

(As required by A.R.S. § 49-480, and Chapter 3, Article 3, Arizona Administrative Code)

1. Permit to be issued to: (Business license name of organization that is to receive permit)
   Mesquite Generating Station
2. Mailing Address: 101 Ash Street
   City: San Diego State: CA ZIP: 92101
3. Plant Name (if different from item #1 above): Same
4. Name (or names) of Owner or Operator: Mesquite Power, LLC
   Phone: (619) 696-4455
5. Name of Owner's Agent: Cecil Sterling
   Phone: (619) 696-2940
6. Plant/Site Manager or Contact Person: Marty C. Swartz/ Cecil D. Sterling
   Phone: (619)696-2943/ (619)696-2940
7. Proposed Equipment/Plant Location Address: See attached
   City: _____ County: MARICOPA ZIP: _____
   Indian Reservation (if applicable): NA
   Section/Township/Range: Section 15, Township 1 South, Range 6 west of the Gila and Salt River Base and Merdian
   Latitude: 33°20'40" Longitude: 112°20'40" Elevation: 890 ft.
8. General Nature of Business: Electric Power Generation
   Standard Industrial Classification Code: 4911
9. Type of Organization: [x] Corporation [ ] Individual Owner [ ] Partnership
   [ ] Government Entity (Government Facility Code: _____)
   [ ] Other: _____
10. Permit Application Basis: [x] New Source [ ] Revision [ ] Renewal of Existing Permit
    [ ] Portable Source [ ] General Permit (Check all that apply)
    For renewal or modification, include existing permit number: NA
    Date of Commencement of Construction or Modification: 02/01/2001
    Is **any** of the equipment to be leased to another individual or entity? [ ] Yes [x] No
11. Signature of Responsible Official of Organization Joseph H Rowley
    Official Title of Signer: Vice President - Project Development
12. Typed or Printed Name of Signer: Joseph H. Rowley
    Date: 01/26/2000 Phone Number: (619) 696-4455

COMPANY NAME & LOCATION Mesquite Power, L L C

EMISSION SOURCES - One of Two Alternative Operating Scenarios

DATE 1/19/2000

Estimated Potential to Emit as per Rule 100.
Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					UTM COORDINATES OF EMISSION POINT (5)			EMISSION POINT DISCHARGE PARAMETERS						
EMISSION POINT (1)		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE					STACK SOURCES (6) Annual Average Conditions					NONPOINT SOURCES (7)	
General Electric										EXIT DATA				
NUMBER	Combustion Turbine and Duct Burner NAME	REGULATED AIR POLLUTANT NAME (2)	#/HR. (3)	TONS /YEAR (4)	ZONE	EAST (Mtrs.)	NORTH (Mtrs.)	HEIGHT ABOVE GROUND /feet	HEIGHT ABOVE STRUC. /feet	DIA. (ft.)	VEL. (fps.)	TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
1	unit 1	NOx	22.2	92.4	12	326601.9	3691016.0	170	80	18	64.1	172.1	NA	NA
1	unit 1	CO	21.6	89.8	12	326601.9	3691016.0	170	80	18	64.1	172.1	NA	NA
1	unit 1	PM/PM10	30.4	126.6	12	326601.9	3691016.0	170	80	18	64.1	172.1	NA	NA
1	unit 1	SO2	2.1	8.8	12	326601.9	3691016.0	170	80	18	64.1	172.1	NA	NA
1	unit 1	VOC	16.6	64.8	12	326601.9	3691016.0	170	80	18	64.1	172.1	NA	NA
2	unit 2	NOx	22.2	92.4	12	326601.9	3690980.4	170	80	18	64.1	172.1	NA	NA
2	unit 2	CO	21.6	89.8	12	326601.9	3690980.4	170	80	18	64.1	172.1	NA	NA
2	unit 2	PM/PM10	30.4	126.6	12	326601.9	3690980.4	170	80	18	64.1	172.1	NA	NA
2	unit 2	SO2	2.1	8.8	12	326601.9	3690980.4	170	80	18	64.1	172.1	NA	NA

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 890 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

General Instructions:

(1) Identify each emission point with a unique number for this plant site, consistent with emission point identification used on plot plan, previous permits, and Emissions Inventory Questionnaire. Include fugitive emissions. Limit emission point number to eight (8) character spaces. For each emission point use as many lines as necessary to list regulated air pollutant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, baghouse, fugitive, etc. Abbreviations are O.K.

(2) Components to be listed include regulated air pollutants as defined in R18-2-101. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_X), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.

(3) Pounds per hour (#/HR) is maximum potential emission rate expected by applicant.

(4) Tons per year is annual maximum potential emission expected by applicant, which takes into account process operating schedule.

(5) As a minimum applicant shall furnish a facility plot plan as described in the filing instructions. UTM coordinates are required only if the source is a major source or is required to perform refined modeling for the purposes of demonstrating compliance with ambient air quality guidelines.

(6) Supply additional information as follows if appropriate:
   (a) Stack exit configuration other than a round vertical stack. Show length and width for a rectangular stack. Indicate if horizontal discharge with a note.
   (b) Stack's height above supporting or adjacent structures if structure is within 3 "stack height above the ground" of stack.

(7) Dimensions of nonpoint sources as defined in R18-2-101.

COMPANY NAME & LOCATION Mesquite Power,L L C

EMISSION SOURCES - One of Two Alternative Operating Scenarios

DATE 1/19/2000

Estimated Potential to Emit as per Rule 100.
Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

EMISSION POINT (1)		REGULATED AIR POLLUTANT DATA			UTM COORDINATES OF EMISSION POINT (5)			EMISSION POINT DISCHARGE PARAMETERS STACK SOURCES (6) Annual Average Conditions					NONPOINT SOURCES (7)	
General Electric		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE							EXIT DATA				
NUMBER	NAME Combustion Turbine and Duct Burner	REGULATED AIR POLLUTANT NAME (2)	#/HR. (3)	TONS /YEAR (4)	ZONE	EAST (Mtrs.)	NORTH (Mtrs.)	HEIGHT ABOVE GROUND /feet	HEIGHT ABOVE STRUC. /feet	DIA. (ft.)	VEL. (fps.)	TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
2	unit 2	VOC	16.6	64.8	12	326601.9	3690980.4	170	80	18	64.1	172.1	NA	NA
3	unit 3	NOx	22.2	92.4	12	326601.8	3690836.8	170	80	18	64.1	172.1	NA	NA
3	unit 3	CO	21.6	89.8	12	326601.8	3690836.8	170	80	18	64.1	172.1	NA	NA
3	unit 3	PM/PM10	30.4	126.6	12	326601.8	3690836.8	170	80	18	64.1	172.1	NA	NA
3	unit 3	SO2	2.1	8.8	12	326601.8	3690836.8	170	80	18	64.1	172.1	NA	NA
3	unit 3	VOC	16.6	64.8	12	326601.8	3690836.8	170	80	18	64.1	172.1	NA	NA
3	unit 3	NOx	22.2	92.4	12	326601.5	3690802.2	170	80	18	64.1	172.1	NA	NA
4	unit 4	CO	21.6	89.8	12	326601.5	3690802.2	170	80	18	64.1	172.1	NA	NA
4	unit 4	PM/PM10	30.4	126.6	12	326601.5	3690802.2	170	80	18	64.1	172.1	NA	NA
4	unit 4													

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 890 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

General Instructions:

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(a) Stack exit configuration other than a round vertical stack. Show length and width for a rectangular stack. Indicate if horizontal discharge with a note.
(b) Stack's height above supporting or adjacent structures if structure is within 3 "stack height above the ground" of stack.

(7) Dimensions of nonpoint sources as defined in R18-2-101.

COMPANY NAME & LOCATION Mesquite Power, L L C

EMISSION SOURCES - One of Two Alternatives Operating Scenarios

DATE 1/19/2000

Estimated Potential to Emit as per Rule 100.
Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					UTM COORDINATES OF EMISSION POINT (5)			EMISSION POINT DISCHARGE PARAMETERS					NONPOINT SOURCES (7)	
EMISSION POINT (1)		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE					STACK SOURCES (6) Annual Average Conditions						
General Electric										EXIT DATA				
NUMBER	NAME Combustion Turbine and Duct Burner	REGULATED AIR POLLUTANT NAME (2)	#/HR. (3)	TONS /YEAR (4)	ZONE	EAST (Mtrs.)	NORTH (Mtrs.)	HEIGHT ABOVE GROUND /feet	HEIGHT ABOVE STRUC. /feet	DIA. (ft.)	VEL. (fps.)	TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
4	unit 4	SO2	2.1	8.8	12	326601.5	3690802.2	170	80	18	64.1	172.1	NA	NA
4	unit 4	VOC	16.6	64.8	12	326601.5	3690802.2	170	80	18	64.1	172.1	NA	NA

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 890 feet

ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

General Instructions:

(1) Identify each emission point with a unique number for this plant site, consistent with emission point identification used on plot plan, previous permits, and Emissions Inventory Questionnaire. Include fugitive emissions. Limit emission point number to eight (8) character spaces. For each emission point use as many lines as necessary to list regulated air pollutant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, baghouse, fugitive, etc. Abbreviations are O.K.

(2) Components to be listed include regulated air pollutants as defined in R18-2-101. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_X), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.

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(a) Stack exit configuration other than a round vertical stack. Show length and width for a rectangular stack. Indicate if horizontal discharge with a note.

(b) Stack's height above supporting or adjacent structures if structure is within 3 "stack height above the ground" of stack.

(7) Dimensions of nonpoint sources as defined in R18-2-101.

Page 2 of 2

COMPANY NAME & LOCATION Mesquite Power, L L C

EMISSION SOURCES - One of Two Alternative Operating Scenarios

DATE 1/19/2000

Estimated Potential to Emit as per Rule 100.
Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS										
EMISSION POINT (1) Westinghouse		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION POINT (5)			STACK SOURCES (6) Annual Average Conditions					NONPOINT SOURCES (7)	
NUMBER	Combustion Turbine and Duct Burner NAME	REGULATED AIR POLLUTANT NAME (2)	#/HR. (3)	TONS /YEAR (4)	ZONE	EAST (Mtrs.)	NORTH (Mtrs.)	HEIGHT ABOVE GROUND /feet	HEIGHT ABOVE STRUC. /feet	EXIT DATA DIA. (ft.)	EXIT DATA VEL. (fps.)	EXIT DATA TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
1	unit 1	NOx	23.6	98.6	12	326601.9	3691016.0	170	80	18	65.4	174.9	NA	NA
1	unit 1	CO	23.0	95.9	12	326601.9	3691016.0	170	80	18	65.4	174.9	NA	NA
1	unit 1	PM/PM10	28.8	118.7	12	326601.9	3691016.0	170	80	18	65.4	174.9	NA	NA
1	unit 1	SO2	2.24	9.3	12	326601.9	3691016.0	170	80	18	65.4	174.9	NA	NA
1	unit 1	VOC	16.1	67.0	12	326601.9	3691016.0	170	80	18	65.4	174.9	NA	NA
2	unit 2	NOx	23.6	98.6	12	326601.9	3690980.4	170	80	18	65.4	174.9	NA	NA
2	unit 2	CO	23.0	95.9	12	326601.9	3690980.4	170	80	18	65.4	174.9	NA	NA
2	unit 2	PM/PM10	28.8	118.7	12	326601.9	3690980.4	170	80	18	65.4	174.9	NA	NA
2	unit 2	SO2	2.24	9.3	12	326601.9	3690980.4	170	80	18	65.4	174.9	NA	NA

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 890 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

General Instructions:

(1) Identify each emission point with a unique number for this plant site, consistent with emission point identification used on plot plan, previous permits, and Emissions Inventory Questionnaire. Include fugitive emissions. Limit emission point number to eight (8) character spaces. For each emission point use as many lines as necessary to list regulated air pollutant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, baghouse, fugitive, etc. Abbreviations are O.K.

(2) Components to be listed include regulated air pollutants as defined in R18-2-101. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_x), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.

(3) Pounds per hour (#/HR) is maximum potential emission rate expected by applicant.

(4) Tons per year is annual maximum potential emission expected by applicant, which takes into account process operating schedule.

(5) As a minimum applicant shall furnish a facility plot plan as described in the filing instructions. UTM coordinates are required only if the source is a major source or is required to perform refined modeling for the purposes of demonstrating compliance with ambient air quality guidelines.

(6) Supply additional information as follows if appropriate:
   (a) Stack exit configuration other than a round vertical stack. Show length and width for a rectangular stack. Indicate if horizontal discharge with a note.
   (b) Stack's height above supporting or adjacent structures if structure is within 3 "stack height above the ground" of stack.

(7) Dimensions of nonpoint sources as defined in R18-2-101.

COMPANY NAME & LOCATION Mesquite Power, L L C

EMISSION SOURCES - One of Two Alternative Operating Scenarios

DATE 1/19/2000

Estimated Potential to Emit as per Rule 100.
Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS										
EMISSION POINT (1) Westinghouse		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION POINT (5)			STACK SOURCES (6) Annual Average Conditions					NONPOINT SOURCES (7)	
NUMBER	Combustion Turbine and Duct Burner NAME	REGULATED AIR POLLUTANT NAME (2)	#/HR. (3)	TONS /YEAR (4)	ZONE	EAST (Mtrs.)	NORTH (Mtrs.)	HEIGHT ABOVE GROUND /feet	HEIGHT ABOVE STRUC. /feet	EXIT DATA DIA. (ft.)	EXIT DATA VEL. (fps.)	EXIT DATA TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
2	unit 2	VOC	16.1	67.0	12	326601.9	3690980.4	170	80	18	65.4	174.9	NA	NA
3	unit 3	NOx	23.6	98.6	12	326601.8	3690836.8	170	80	18	65.4	174.9	NA	NA
3	unit 3	CO	23.0	95.9	12	326601.8	3690836.8	170	80	18	65.4	174.9	NA	NA
3	unit 3	PM/PM10	28.8	118.7	12	326601.8	3690836.8	170	80	18	65.4	174.9	NA	NA
3	unit 3	SO2	2.24	9.3	12	326601.8	3690836.8	170	80	18	65.4	174.9	NA	NA
3	unit 3	VOC	16.1	67.0	12	326601.8	3690836.8	170	80	18	65.4	174.9	NA	NA
4	unit 4	NOx	23.6	98.6	12	326601.5	3690802.2	170	80	18	65.4	174.9	NA	NA
4	unit 4	CO	23.0	95.9	12	326601.5	3690802.2	170	80	18	65.4	174.9	NA	NA
4	unit 4	PM/PM10	28.8	118.7	12	326601.5	3690802.2	170	80	18	65.4	174.9	NA	NA

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 890 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

General Instructions:

(1) Identify each emission point with a unique number for this plant site, consistent with emission point identification used on plot plan, previous permits, and Emissions Inventory Questionnaire. Include fugitive emissions. Limit emission point number to eight (8) character spaces. For each emission point use as many lines as necessary to list regulated air pollutant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, baghouse, fugitive, etc. Abbreviations are O.K.

(2) Components to be listed include regulated air pollutants as defined in R18-2-101. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_X), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.

(3) Pounds per hour (#/HR) is maximum potential emission rate expected by applicant.

(4) Tons per year is annual maximum potential emission expected by applicant, which takes into account process operating schedule.

(5) As a minimum applicant shall furnish a facility plot plan as described in the filing instructions. UTM coordinates are required only if the source is a major source or is required to perform refined modeling for the purposes of demonstrating compliance with ambient air quality guidelines.

(6) Supply additional information as follows if appropriate:
   (a) Stack exit configuration other than a round vertical stack. Show length and width for a rectangular stack. Indicate if horizontal discharge with a note.
   (b) Stack's height above supporting or adjacent structures if structure is within 3 "stack height above the ground" of stack.

(7) Dimensions of nonpoint sources as defined in R18-2-101.

COMPANY NAME & LOCATION Mesquite Power, L L C

EMISSION SOURCES - One of Two Alternative Operating Scenarios

DATE 1/19/2000

Estimated Potential to Emit as per Rule 100.
Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS									
EMISSION POINT (1) Westinghouse		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION POINT (5)			STACK SOURCES (6) Annual Average Conditions					NONPOINT SOURCES (7)	
NUMBER	NAME Combustion Turbine and Duct Burner	REGULATED AIR POLLUTANT NAME (2)	#/HR. (3)	TONS /YEAR (4)	ZONE	EAST (Mtrs.)	NORTH (Mtrs.)	HEIGHT ABOVE GROUND /feet	HEIGHT ABOVE STRUC. /feet	EXIT DATA DIA. (ft.)	EXIT DATA VEL. (fps.)	EXIT DATA TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
4	unit 4	SO2	2.24	9.3	12	326601.5	3690802.2	170	80	18	65.4	174.9	NA	NA
4	unit 4	VOC	16.1	67.0	12	326601.5	3690802.2	170	80	18	65.4	174.9	NA	NA

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 890 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

General Instructions:

(1) Identify each emission point with a unique number for this plant site, consistent with emission point identification used on plot plan, previous permits, and Emissions Inventory Questionnaire. Include fugitive emissions. Limit emission point number to eight (8) character spaces. For each emission point use as many lines as necessary to list regulated air pollutant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, baghouse, fugitive, etc. Abbreviations are O.K.

(2) Components to be listed include regulated air pollutants as defined in R18-2-101. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_x), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.

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   (a) Stack exit configuration other than a round vertical stack. Show length and width for a rectangular stack. Indicate if horizontal discharge with a note.
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(7) Dimensions of nonpoint sources as defined in R18-2-101.

COMPANY NAME & LOCATION Mesquite Power, L L C

EMISSION SOURCES

DATE 1/19/2000

Estimated Potential to Emit as per Rule 100.
Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS									
EMISSION POINT (1)		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION POINT (5)			STACK SOURCES (6) Annual Average Conditions					NONPOINT SOURCES (7)	
										EXIT DATA				
NUMBER	NAME	REGULATED AIR POLLUTANT NAME (2)	#/HR. (3)	TONS /YEAR (4)	ZONE	EAST (Mtrs.)	NORTH (Mtrs.)	HEIGHT ABOVE GROUND /feet	HEIGHT ABOVE STRUC. /feet	DIA. (ft.)	VEL. (fps.)	TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
CT1	Cooling Tower 1	PM/PM10	3.86	16.89	12	326441.2	3690969.4	45	10	32	25.30	122.0	NA	NA
CT2	Cooling Tower 2	PM/PM10	3.86	16.89	12	326438.9	3690793.4	45	10	32	25.30	122.0	NA	NA
FWP	Fire Water Pump	NOx	5.59	0.145	12	326574.7	3690920.4	21	1	0.5	227.49	668.0	NA	NA
FWP	Fire Water Pump	CO	1.00	0.026	12	326574.7	3690920.4	21	1	0.5	227.49	668.0	NA	NA
FWP	Fire Water Pump	PM/PM10	0.15	0.004	12	326574.7	3690920.4	21	1	0.5	227.49	668.0	NA	NA
FWP	Fire Water Pump	SO2	0.54	0.014	12	326574.7	3690920.4	21	1	0.5	227.49	668.0	NA	NA
FWP	Fire Water Pump	VOC	0.30	0.008	12	326574.7	3690920.4	21	1	0.5	227.49	668.0	NA	NA

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 890 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

General Instructions:

(1) Identify each emission point with a unique number for this plant site, consistent with emission point identification used on plot plan, previous permits, and Emissions Inventory Questionnaire. Include fugitive emissions. Limit emission point number to eight (8) character spaces. For each emission point use as many lines as necessary to list regulated air pollutant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, baghouse, fugitive, etc. Abbreviations are O.K.

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   (b) Stack's height above supporting or adjacent structures if structure is within 3 "stack height above the ground" of stack.

(7) Dimensions of nonpoint sources as defined in R18-2-101.

1.0 PROPOSED PROJECT

The proposed Mesquite Generating Station will consist of a natural gas-fired combined cycle power plant and associated linear facilities. The project will have a nominal electrical output of 1,000 MW, and commercial operation is planned for the summer of 2003. The combined cycle power plant will be fueled exclusively with natural gas. The natural gas for the project will be supplied from existing El Paso pipelines, which are located 3 to 4 miles southwest of the plant site. The project includes a new 230 kV switchyard and 500 kV transformer for connection into the Palo Verde Nuclear Generating Station's new satellite switchyard, which is to be located directly east of the plant site. Water for the project will be well water pumped from a location approximately 2 miles west of the plant site. Wastewater from the project will be pumped to evaporation ponds located on the plant site. The project owner and applicant submitting this application is Mesquite Power, LLC.

1.1 FACILITY LOCATION AND SITE DESCRIPTION

The site for the Mesquite Generating Station is located in the unincorporated community of Arlington, Arizona, in the county of Maricopa. The site is located approximately 40 miles west of Phoenix and approximately 8 miles south of Interstate 10. Please refer to the general area map provided on Figure 1-1. The approximately 276 acre site is situated south of the existing Palo Verde nuclear generating station on a 400 acre parcel. The approximate coordinates of the Mesquite site are latitude 33° 20' north, longitude 112° 51' east. the approximate legal description of the site is; the west half of Section 15, Township 1 South, Range 6 west of the Gila and Salt River base and meridian, Maricopa County, Arizona, excepting the east half of the Northeast quarter of the Northwest quarter of said Section 15.

Access to the site is via Elliot Road, which borders the site to the north. The entire 276 acre site will be fenced. Figure 1-2 shows the specific location of the plant site. The site contains few existing structures and consists of relatively flat topography with relatively sparse desert vegetation. Surrounding land is primarily undeveloped. The terrain slopes generally to the south and west. Elevations vary from approximately 893 MSL in the northeast corner of the property to 966 MSL in the southwest corner. Excluding evaporation ponds or the adjacent substation, the improved portion of the overall site is expected to cover approximately 40 acres of the 276 acre site, including 12 acres for a 230 kV to 500 kV switchyard. Additionally, two evaporation ponds are expected to cover approximately 90 acres each.

Mesquite Generating Station Area Map

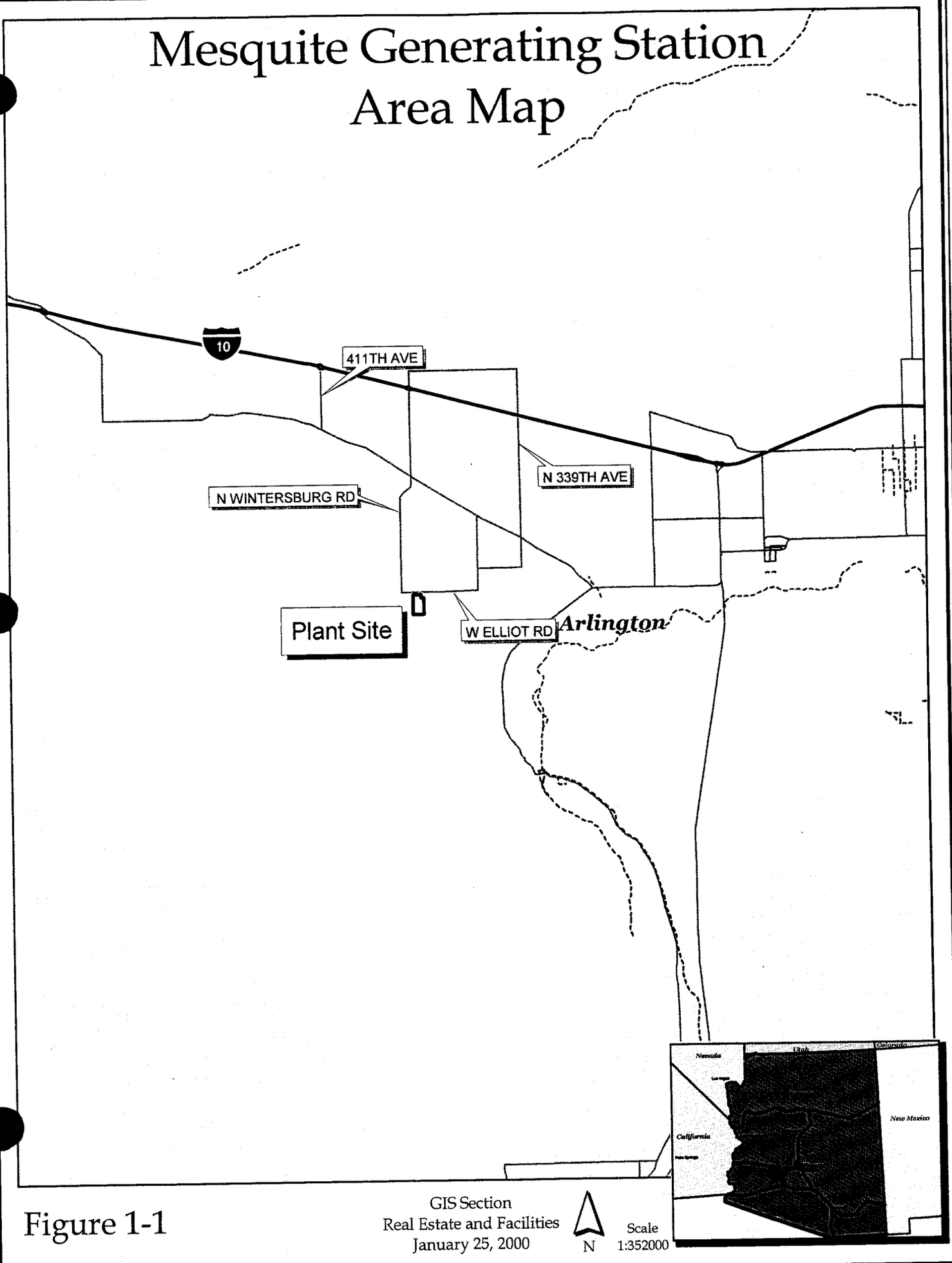

Figure 1-1

GIS Section
Real Estate and Facilities
January 25, 2000

Scale
1:352000

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Mesquite Generating Station
Plant Site Location

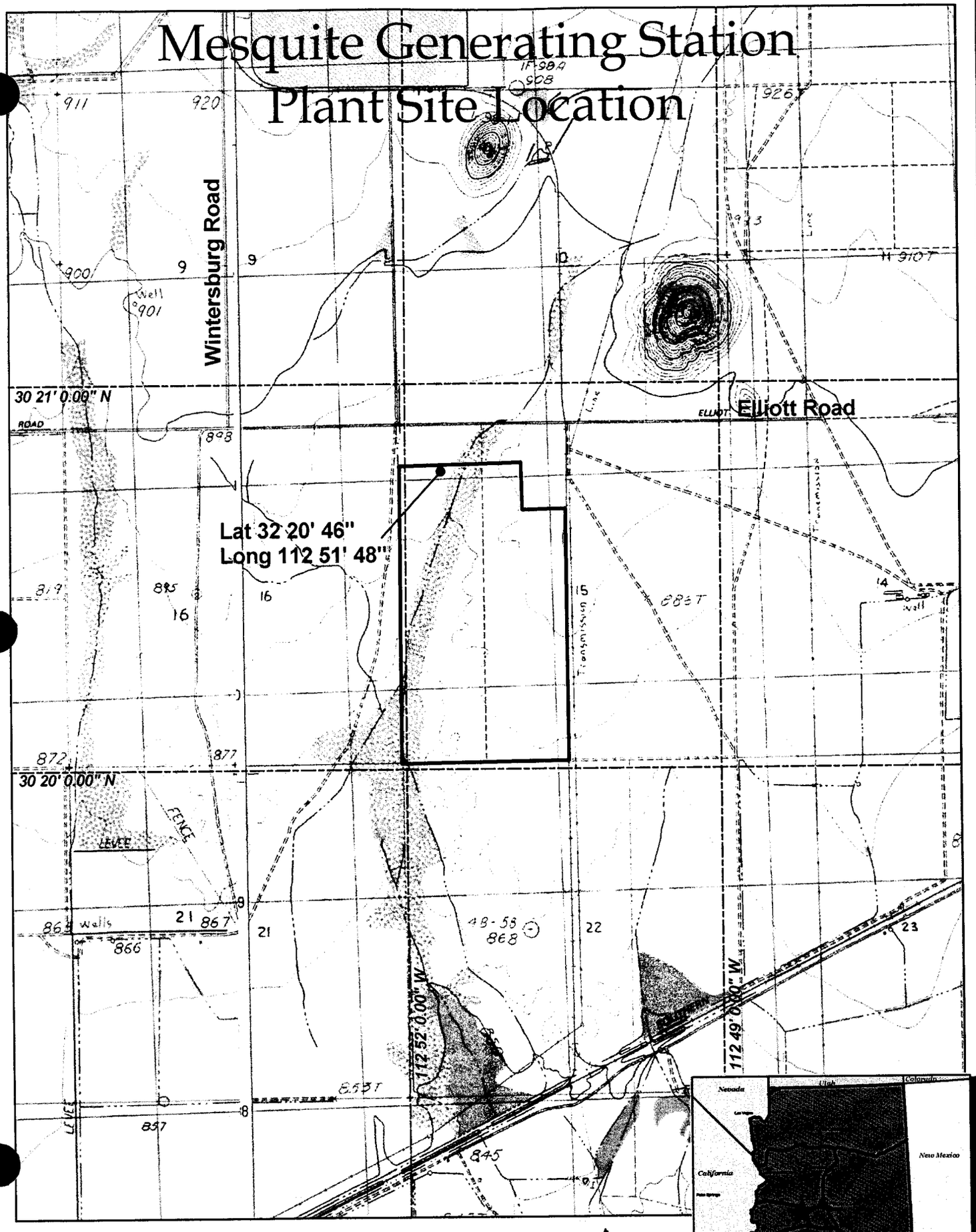

Figure 1-2

GIS Section
Real Estate and Facilities
January 25, 2000

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Scale
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1.2 PROCESS DESCRIPTION

The Mesquite Generating Station will consist of two combined cycle power blocks, each in a two-on-one configuration. Each of the two-on-one combined cycle power blocks will consist of two combustion turbine generators (CTGs) equipped with dry-low NO_x burners, an inlet air filter, and an inlet air evaporative cooler; two heat recovery steam generators (HRSGs) equipped with duct burners, a selective catalytic reduction (SCR) system, and an oxidizing catalyst system; a steam turbine generator (STG); and associated auxiliary systems and equipment. Each power block will be equipped with a 100 percent steam turbine bypass system, which will bypass steam to the condenser during startup or in the event of a sudden load rejection. The steam turbine bypass will not bypass the SCR or oxidizing catalyst.

Air flows through the inlet air filter, evaporative cooler, and associated inlet air ductwork of each CTG and is then compressed in the CTG compressor section. At times when power augmentation is employed, steam is injected at the CTG compressor discharge. As a result, steam injection has no effect on CTG emissions and is solely for the purpose of power augmentation. Natural gas fuel is injected into the combustor section and ignited. The hot combustion gases expand through the CTG turbine section to drive the entire CTG. The hot combustion gases exit the turbine section and enter an HRSG dedicated to each CTG. Duct burners installed immediately upstream of each HRSG are used to further heat the CTG exhaust gases at times when power augmentation is employed.

In the HRSGs, heat from the combustion gases is transferred to water pumped into the HRSG pressure parts (economizers, evaporators, drums, etc.). The water is converted to steam and is delivered to the STG. Steam leaving the STG enters a surface condenser, gives up its latent heat to circulating water, and is condensed to a liquid. The circulating water flows through a wet cooling tower where the heat is rejected to the atmosphere, and the circulating water is then pumped back to the surface condenser. Refer to the process flow diagram on Figure 1-3.

Each of the four CTGs generates approximately 170 MW at design ambient conditions without employing power augmentation. With the duct burners out-of-service, all of the steam exiting the HRSGs is directed to the STGs, which each generate approximately 170 MW at design ambient conditions. The overall gross output of the power plant is approximately 1,000 MW at design ambient conditions.

Each of the four CTGs generates approximately 180 MW at design ambient conditions while employing maximum power augmentation. With the duct burners in service, most of the steam exiting the HRSGs is directed to the STG, which generates approximately 290 MW at design ambient conditions. Steam not directed to the STG is injected into the CTGs for power augmentation. The overall gross output of the power plant with the duct burners in service and maximum power augmentation is approximately 1,300 MW at design ambient conditions.

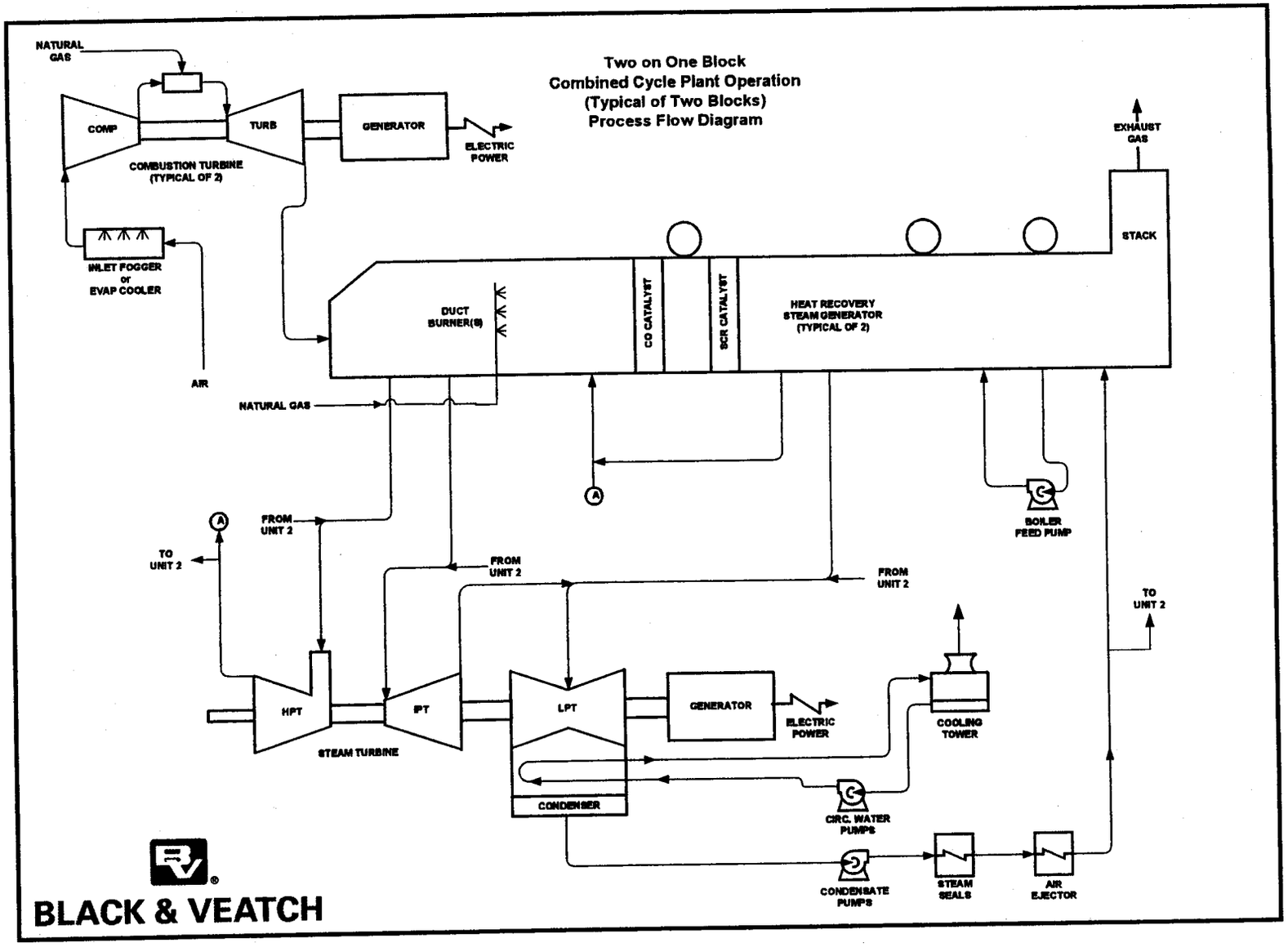

Two on One Block
Combined Cycle Plant Operation
(Typical of Two Blocks)
Process Flow Diagram
NATURAL GAS
COMP
TURB
COMBUSTION TURBINE (TYPICAL OF 2)
GENERATOR
ELECTRIC POWER
INLET FOGGER or EVAP COOLER
AIR
DUCT BURNER(S)
CO CATALYST
SCR CATALYST
HEAT RECOVERY STEAM GENERATOR (TYPICAL OF 2)
STACK
EXHAUST GAS
NATURAL GAS
FROM UNIT 2
TO UNIT 2
FROM UNIT 2
FROM UNIT 2
BOILER FEED PUMP
TO UNIT 2
HPT
IPT
LPT
STEAM TURBINE
GENERATOR
ELECTRIC POWER
COOLING TOWER
CONDENSER
CIRC. WATER PUMPS
CONDENSATE PUMPS
STEAM SEALS
AIR EJECTOR
BLACK & VEATCH

Figure 1-3

2.0 EQUIPMENT AND FACILITIES

A list of this major equipment, buildings, and structures is provided below. This includes all items identified on the site arrangement drawing provided in Appendix A and other major equipment, systems, and structures.

2.1 EQUIPMENT LIST

- Four (4) Combustion Turbine Generating units (heat input of approximately 1,630 to 1,730 mmBtu/h each at 73° F) each containing the following:
  - Inlet air filters and on-line filter cleaning system.
  - Inlet air evaporative coolers.
  - Dry-low NO_x burners (heat input of approximately 540 to 590 mmBtu/h at 73° F).
  - Metal acoustical enclosures.
  - Fire detection and protection system.
  - Lubrication oil system.
  - Generator coolers.
  - Water wash skids (one per two CTGs).
  - Starting system, auxiliary power system, and control system.
- Four (4) heat recovery steam generators, each containing the following:
  - Multipressure, natural circulation boiler with economizer, evaporate and superheater sections.
  - Integral deareator.
  - Duct burner .
  - SCR system.
  - Oxidizing catalyst system.
- Two (2) steam turbine generators, each containing the following:
  - Governor system.
  - Gland Steam System.
  - Lubrication oil system.
  - Generator coolers.
- Two (2) water cooled condensers.
- Two (2) mechanical draft cooling towers.
- Four (4) 18 feet diameter (inside) 170 feet high stacks.
- One (1) natural gas conditioning station.
- Six (6) 13.8 kV/230 kV step-up transformers.
- 230 kV ring bus switchyard.
- 230 kV/500 kV step-up transformer.

- Electrical system for plant auxiliaries.
- Emergency diesel-fire pump (348 BHP).
- Continuous emissions monitoring (CEM) system.
- Service and Instrumentation compressors.

2.2 BUILDINGS AND STRUCTURES

- Control and administration building.
- Water Treatment Building.
- Circulation water treatment building.
- Fire water pump house.
- Raw water storage tank.
- RO water storage tank.
- Demineralized water storage tank.
- Required fencing and access roads.

3.0 APPLICABLE REQUIREMENTS

3.1 FEDERAL APPLICABLE REQUIREMENTS

Federal applicable requirements include those developed under the authority of the Clean Air Act (CAA) and its amendments. Major programs considered in this review include the Prevention of Significant Deterioration (PSD) program (40 CFR 52.21), New Source Performance Standards (NSPS) (40 CFR 60), the Title V Operating Permit program (40 CFR 70), and the Acid Rain Permit program (40 CFR 72-75). A summary of the applicable requirements under these programs is provided in Table 3-1.

3.1.1 PREVENTION OF SIGNIFICANT DETERIORATION

The proposed facility will be classified as a major stationary source and will be subject to the Prevention of Significant Deterioration (PSD) program and the need to obtain a Title V operating permit. The PSD rules include applicable new source performance standards (NSPS), referenced at 40 CFR 60, that will apply to the proposed facility.

Subpart A of 40 CFR 60 contains general requirements and provisions applicable to all emissions units regulated under an NSPS.

Subpart Da will apply to only the duct burner portion of the combined cycle combustion turbine/duct burner emission unit. The affected units will comply with the PM emissions limitation of 0.03 lb/mmBtu, and the opacity limitation 20 percent opacity (40 CFR 60.42a). The affected units will also comply with the sulfur dioxide emissions limitation of 0.20 lb/mmBtu (40 CFR 60.43a), and the nitrogen oxides emissions limitations of 0.20 lb/mmBtu and 1.6 lb/MW-h, and a minimum 25 percent reduction of potential nitrogen oxides emissions, based on a 30 day rolling average (40 CFR 60.44a). A continuous monitoring system for monitoring NO_X, as well as either oxygen or carbon dioxide content of the flue gas (40 CFR 60.47a). A performance test required under 40 CFR 60.8, as well as within this Subpart, must be performed using the methods identified in Appendix A of 40 CFR 60, as well as within 40 CFR 60.48a.

Subpart GG applies to the combustion turbines and includes emission standards for NO_X and SO_2 (40 CFR 60.332 and 40 CFR 60.333). Additional requirements exist for monitoring (40 CFR 60.334) and testing of the emission units (40 CFR 60.335).

3.1.2 CHEMICAL ACCIDENT PREVENTION PROVISIONS

Facilities that store or use hazardous chemicals listed under this Subpart (40 CFR 68) are required to assess the risk and identify the consequences of a spill or release of these hazardous materials. Ammonia is utilized by the SCR emissions control system and is a listed hazardous material. A risk assessment and risk management plan (RMP) will need to be prepared for this facility prior to the introduction of ammonia to the site because the ammonia will be stored in quantities exceeding the threshold quantity.

Table 3-1 Federal Applicable Requirements		
Citation	Description/Summary	Comment
40 CFR 52.21	Prevention of Significant Deterioration	
40 CFR 60	New Source Performance Standards	
Subpart A	General Provisions	
Subpart Da	Standards of Performance for Electric Utility Steam Generating Units for Which Construction is Commenced After September 18, 1978	Duct burners
Subpart GG	Standards of Performance for Stationary Gas Turbines	
40 CFR 64	Compliance Assurance Monitoring	
40 CFR 68	Chemical Accident Prevention Provisions	
40 CFR 70	State Operating Permit Programs	
40 CFR 72	Permits Regulation	Title IV Acid Rain Program
Subpart A	Acid Rain Program General Provisions	
Subpart B	Designated Representative	
Subpart C	Acid Rain Permit Applications	
Subpart D	Acid Rain Compliance Plan and Compliance Options	
Subpart H	Permit Revisions	
Subpart I	Compliance Certification	
Appendix A	Methodology for Annualization of Emissions Limits	
Appendix B	Methodology for Conversion of Emissions Limits	
Appendix C	Annual 1985 Yearly SO_2 Emissions Calculation	
Appendix D	Calculation of Potential Electric Output Capacity	
40 CFR 73	Sulfur Dioxide Allowance System	
Subpart A	Background and Summary	
Subpart B	Allowance Allocations	
Subpart C	Allowance Tracking System	
Subpart D	Allowance Transfers	
Subpart E	Auctions, Direct Sales, and Independent Power Producers Written Guarantee	

Table 3-1 (Continued) Federal Applicable Requirements		
Citation	Description/Summary	Comment
40 CFR 75	Continuous Emissions Monitoring	
Subpart A	General	
Subpart B	Monitoring Provisions	
Subpart C	Operation and Maintenance Requirements	
Subpart D	Missing Data Substitution Procedures	
Subpart E	Alternative Monitoring Systems	
Subpart F	Recordkeeping Requirements	
Subpart G	Reporting Requirements	
Appendix A	Specification and Test Procedures	
Appendix B	Quality Assurance and Quality Control Procedures	
Appendix C	Missing Data Estimation Procedures	
Appendix D	Optional SO_2 Emissions Data Protocol For Gas-Fired and Oil-Fired Units	
Appendix E	Optional NO_x Emissions Estimation Protocol For Gas-Fired Peaking Units and Oil-Fired Peaking Units	
Appendix F	Conversion Procedures	
Appendix G	Determination of CO_2 Emissions	
Appendix H	Revised Traceability Protocol No. 1	
Appendix I	Optional F Factor/Fuel Flow Method	
Appendix J	Compliance Dates For Revised Recordkeeping Requirements and Missing Data Procedures	
40 CFR 82	Protection Of Stratospheric Ozone	
82.150	Purpose and Scope	
82.152	Definitions	
82.154	Prohibitions	
82.156	Required practices	
82.158	Standards for recycling and recovery equipment	
82.161	Technician certification	
Note: Each Part, Subpart, or Section listed above may be assumed to contain requirements applicable to this Facility. Other Parts, Subparts, or Sections not listed are applicable to this Facility.		

3.1.3 STATE OPERATING PERMIT PROGRAM

Under Subpart 40 CFR 70, because the proposed facility is classified as a major source for the purposes of the Title V program, the facility will be required to obtain an operating permit. The facility, through the submittal of this permit application, will comply with the requirements of this regulation.

3.1.4 ACID RAIN PERMIT PROGRAM

The Title IV Acid Rain Permit requirements are included in 40 CFR 72-75. These regulations are designed to control emissions of SO_2 and NO_X from large fossil fuel fired utility sources. The combustion sources proposed for this facility will be subject to the Acid Rain Permit Program. The requirements of this program include the identification of a Designated Representative and the submittal of an Acid Rain Permit application. A draft of the permit application is included as an appendix to this document.

The Acid Rain Permit will require monitoring of SO_2, CO_2, and NO_X. The facility will comply with all applicable requirements of these rules, and will install, maintain and operate the required monitoring systems, or acceptable alternate monitoring systems in the case of SO_2, as allowed in Appendix D of Part 75.

3.1.5 COMPLIANCE ASSURANCE MONITORING

The Compliance Assurance Monitoring Rule (40 CFR 64) addresses monitoring for certain emission units at major sources, in order to assure proper operation of air pollution equipment and compliance with emissions limitations or standards.

The rule does not apply to sources regulated under a New Source Performance Standard (NSPS) or the National Emission Standards for Hazardous Air Pollutants (NESHAP) adopted after November 15, 1990. The emission units potentially subject to the Compliance Assurance Monitoring Rule would consist of the combustion turbines, duct burners, and cooling tower. Emissions of CO and NO_X from the combustion turbines and duct burners are limited by an active control device, and thus subject to the standard. They will be exempt from the requirements of this rule; however, a continuous method of compliance is specified in the part 70 operating permit issued for this facility. The cooling tower PM emissions will be controlled by drift eliminators. The cooling tower source is, therefore, not subject to the requirements of this rule.

3.2 STATE APPLICABLE REQUIREMENTS

While Maricopa County has been delegated full authority to administer and enforce the air quality programs required under the Clean Air Act, there are several "pass-through" Arizona SIP regulations that were reviewed for applicability to the proposed facility. There were no specific state requirements found to apply to the proposed facility.

3.3 LOCAL APPLICABLE REQUIREMENTS

Maricopa County has been delegated full authority from the United States Environmental Protection Agency, and authority under AR S 49-402, to enforce the air quality programs required under the Clean Air Act. Their regulations are considered, therefore, federally enforceable. Maricopa County SIP-approved regulations are identified in Appendix B-1. These regulations have generally been supplemented by the currently adopted rules, but are still considered the federally enforceable version. Current Maricopa County Air Pollution Control Regulations are identified in Appendix B-2. Some of the more significant provisions and requirements applicable to this project include:

- Rule 200 of Regulation II--Permits and Fees, describes the requirement to obtain a permit. A Title V permit is required for any major source. Provisions are identified for a request for accelerated permitting. Fees, confidentiality issues, and selection of air dispersion models for air quality impact analyses are also described.
- Rule 210--Title V Permit Provisions, provides for the review of new Title V sources through the issuance of Title V permits. Describes the requirements of the Title V permit application and the "Standard Permit Application Form."
- Rule 240--Permits for New Major Sources and Major Modifications to Existing Major Sources, describes the procedures for review of New Major Sources requiring permits. Provides for the implementation of the new source review (NSR) permit process. Major sources are defined, significant ambient concentrations of specified pollutants are identified, and the specific requirements for an air quality impact analysis are described. The proposed facility will comply with all applicable requirements of this rule, as contained in this permit application.
- Rule 241--Permits for New Sources and Modifications to Existing Major Sources, provides for control technology review of nonmajor sources requiring permits. Requires the implementation of Best Available Control Technology (BACT) or Reasonably Available Control Technology (RACT) on affected sources. The cooling tower and emergency diesel firewater pump will be subject to this rule. The required BACT analysis is provided in Section 5.3 of this permit application.
- Rule 245--Continuous Source Emissions Monitoring, describes continuous source emission monitoring requirements for fossil fuel-fired generators. The CTs and duct burners are exempt from these provisions; however, because the rule specifically exempts sources that are subject to an NSPS and the monitoring requirements therein.

- Rule 270--Performance Tests, includes supportive data for good maintenance and operating practices, performance test requirements, and testing criteria of stationary sources.
- Rule 300--Visible Emissions, describes standards for visible emissions and opacity. Establishes a 20 percent opacity limitation, except for periods of startup, shutdown, and malfunction. Provisions for compliance monitoring using Method 9 are also provided.
- Rule 310--Fugitive Dust Sources, establishes limits for the emissions of particulate matter into the ambient air from any property, operation or activity that may serve as an open fugitive dust source. This regulation is designed to limit PM emissions from any fugitive dust source. A Dust Control Plan describing the total area of land surface disturbed and the proposed activities will be prepared prior to the start of construction of this facility, as well as the proposed control measures, dust suppressants, and/or specific surface treatments, and/or other control measures to be employed at the facility.
- Rule 320--Odors and Gaseous Air Contaminants, establishes limits for the emissions of odors and other gaseous air contaminants into the atmosphere. This regulation establishes limitations on sulfur dioxide and nitrogen oxide emissions from electric power plants. The limitation of 0.2 lbs/mmBtu of NO_X emissions will apply to this facility. The sulfur dioxide limit does not apply to gas fired facilities.
- Rule 360--New Source Performance Standards, describes acceptable design and performance criteria for specified new or modified emission sources. Subpart Da will apply to only the duct burner portion of the combined cycle combustion turbine/duct burner emission unit. Subpart GG will apply to the combustion turbines.
- Rule 370--Hazardous Air Pollutants, describes emissions standards for federally listed hazardous air pollutants. This facility is not currently subject to any NESHAP or maximum achievable control technology (MACT) requirement and is therefore, not currently subject to this rule.
- Rule 371--Acid Rain, incorporates by reference the Acid Rain federal regulations in order to obtain delegated authority to enforce portions of the Clean Air Act Amendments of 1990 (CAAA). The generating units proposed for this facility will be subject the provisions of this rule. A DRAFT Acid Rain Permit application is included in Appendix C of this permit application.

3.4 INSIGNIFICANT AND TRIVIAL ACTIVITIES

A draft list of insignificant activities was developed for the proposed project based on the draft Maricopa County Appendix D List of Insignificant Activities dated December 16, 1999. This list is provided in Table 3-2.

Trivial activities, as defined in the draft Maricopa County Appendix E List of trivial activities, will also occur at the proposed Facility. In accordance with the guidance in that document, a Title V source is not required to list these activities in the permit application. These trivial activities generally include activities that emit no regulated pollutant and have no applicable requirements. Trivial activities include such items as; analyzer vents, office air conditioning units, consumer use of office equipment and products, bathroom vents, plant maintenance and upkeep activities, maintenance shop activities, demineralizer tanks and vents, lubricating system vents, boiler water treatment, oxygen scavenging of water, natural gas regulator vents, and any other activity approved by the Control Officer and Administrator of the USEPA.

Table 3-2 Summary Listing of Typical Insignificant Activities Expected at the Facility Based on the December 16, 1999, DRAFT Appendix D List
Nonquantifiable Insignificant Activities
Roadways:
Construction, repair, and maintenance activities.
Fugitive dust from mobile equipment.
Water and Wastewater Treatment and Storage:
Water treatment and storage for use as process water and in cooling systems and cooling towers.
Wastewater neutralization treatment and tank storage.
Chemical storage associated with water and wastewater treatment.
Miscellaneous Activities:
Air conditioning and cooling equipment.
Transferring chemicals.
Power generation unit gas vents including lube oil extractor vents, and mist eliminator vents.
Unheated storage tanks containing aqueous acid or caustic solutions that have minimal fumes that would not emit HAPs.
Quantifiable Insignificant Activities:
Use of handheld aerosol cans.
Solvent cleaning equipment.
Unheated cleaning or coating equipment that does not include control enclosures.
Laboratories and pilot plants.
Laboratory equipment used exclusively for physical, biological, or chemical analysis.
Storage and Distribution:
Chemical or petroleum storage tanks or containers 250 gallons or less.
Any emission unit, operation, or activity that handles or stores a liquid with a vapor pressure less than 1.5 psia.
Any stationary gasoline dispensing operation less than 60,000 gallons of gasoline annually.

Table 3-2 (Continued) Summary Listing of Typical Insignificant Activities Expected at the Facility Based on the December 16, 1999, DRAFT Appendix D List
Nonquantifiable Insignificant Activities
Miscellaneous Activities:
Acetylene, butane, and propane torches.
Any other activity not otherwise subject to an applicable requirement, as approved by the Control Officer and the Administer of the USEPA, because of its size or production rate.
From the ADEQ Rules:
Landscaping, building maintenance, or janitorial activities.
Gasoline storage tanks less than 10,000 gallons.
Diesel and fuel oil storage tanks less than 40,000 gallons.

4.0 EMISSION CALCULATION

4.1 PROJECT EMISSIONS

Emissions from the Project will be generated from the following emissions units:

- Four combustion turbines/HRSGs with duct burners.
- One diesel firewater pump engine.
- Two mechanical draft cooling towers.

4.1.1 COMBUSTION TURBINE/HRSG DUCT BURNER EMISSIONS

CTG emissions are based on manufacturer's provided performance data, for each range of load condition and operating temperature, except for SO_2. Twenty operating scenarios were evaluated for each turbine make (GE and Westinghouse) to arrive at an operating envelope that represents worst case emissions for each unit. These data and worst case emissions calculations are shown in Appendix C. These scenarios include Performance data for the combustion turbines and HRSG duct burners at ambient air temperatures of 17° F, 59° F, 73° F, and 122° F. These temperatures were selected based on historical (30 to 60 years) meteorological data from Phoenix, Arizona. An ambient temperature of 17° F represents the lowest measured site temperature and corresponds to the highest heat input rate. An ambient temperature of 59° F is included as an ISO-condition for comparison purposes. An ambient temperature of 73° F corresponds to the average annual site temperature; this temperature is representative of the average heat input rate. An ambient temperature of 122° F represents the highest measured site temperature. This temperature corresponds to the lowest heat input rate for each turbine, resulting in the maximum required duct firing rates to maintain the desired plant electrical output. This is achieved with the evaporative coolers turned on and steam injection for power augmentation.

SO_2 emission calculations are based on a fuel sulfur content of 0.30 grains/100 SCF and an assumed lower heating value of 20,558 Btu/lb (AP-42, Volume I, Fifth Edition).

All particulate matter was conservatively assumed to have an aerodynamic diameter less than 10 microns and referred to as PM_{10} for all applicable standards. Particulate Matter emissions include estimates of all suspended particulates of all sizes, including back-half condensables in the form of sulfuric acid (H_2SO_4) mist and ammonium sulfate particulates. Most of the H_2SO_4 in the flue gas will form ammonium sulfates and will be emitted as PM_{10}, reducing sulfuric acid mist below significance levels.

The proposed combustion turbine/HRSGs will be operated in combined cycle mode up to a maximum of 8,760 hours per year. Supplemental heat (duct firing), inlet air foggers, and steam injection will occur as needed during full load operation. Based

on these considerations, at an average annual ambient temperature of 73° F, the per CTG and total CTG potential to emit is presented in Table 4-1.

4.1.1.1 STARTUP EMISSIONS

Startup emissions will result from operation of the combustion turbines only. Duct firing and steam injection for power augmentation occurs only at full load, and will not occur during startup or shutdown. Typically, emissions of VOC, SO_2, and PM_{10} are directly related to the firing rate and will be lower during low load and startup/shutdown operation. Emission rates of these pollutants will therefore be higher at the already evaluated full load PTE. Therefore, only emissions of CO and NO_x will be discussed further.

Startup emissions were evaluated for a worst case period of up to 4 hours in duration. Startup emissions of NO_x were conservatively calculated assuming a 33 percent control of the worst case CT emissions (17° F) at low load (50 percent of load for the GE Frame 7FA and 70 percent of load for the Westinghouse 501 FD CT) for a 4 hour startup period. CO startup emissions were estimated based on 0 percent control of the worst case CT emissions (17° F) at low load for a 4 hour startup period.

Estimated hourly NO_x emissions during startup are 26.1 lb/h for the GE Frame 7FA and 88.2 lb/h for the Westinghouse 501F combustion turbine. These can be compared to the normal full load emission rates of 21.1 lb/h for the GE Frame 7FA and 22.5 lb/h for the Westinghouse 501F combustion turbine. While these startup emission rates are somewhat higher than the full load emission rate, it should be noted that this is because the CT and the associated emission control system (the SCR) had been previously shut down. This period of no emissions should be considered in evaluating actual startup emissions. This would significantly lower overall startup emissions to levels below the full load emission rate for either type of CTs. In order to provide a conservative estimate of the 24 hour average emission rate of NO_x during startup, the 4 hour startup emission rate for each combustion turbine was averaged with the corresponding full load emission rate for each CT. For the GE Frame 7FA, this can be calculated as:

((26.1 lb/h x 4 hours) + (21.1 lb/h x 20 hour))/(24 hours) = 21.9 lb/h

For the Westinghouse 501F combustion turbine, the 24 hour average emission rate of NO_X during startup can be calculated as:

((88.2 lb/h x 4 hours) + (22.5 lb/h x 20 hour))/(24 hours) = 33.5 lb/h

Therefore, NO_x emissions resulting from startup/shutdown operations may also be eliminated from further review.

Table 4-1
Combustion Turbine/Duct Burners Air Pollutant Emissions Summary

	Startup (lb/h)	Full Load Hourly	Annual Emissions (tpy)
General Electric - 7F			
NO_x	26.1	21.1	369.7
CO	19.9	20.5	359.2
VOC	1.9	15.3	259.3
PM_{10}	18.0	28.9	506.3
SO_2	1.0	2.0	35.0
Westinghouse 501F			
NO_x	88.2	22.5	394.2
CO	28.3	21.9	383.7
VOC	3.7	14.8	268.1
PM_{10}	13.7	27.1	474.8
SO_2	1.2	2.1	37.3

NO_x--Startup emissions are based on 33 percent control at 17° F at low load.
Full load hourly emissions are based on the 73° F full load case, at 2.5 ppmvd, with full SCR controls (CT + STIG + Duct Burner).

CO--Startup emissions are based on 0 percent control at 17° F at low load.
Full load hourly emissions are based on the 73° F full load case, at 4.0 ppmvd, with full oxidation catalyst.

VOC--Startup emissions are based on 0 percent control at 17° F at low load.
Full load hourly emissions are based on the 73° F full load case.
Annual emissions are based on the 73° F base load case.

PM_{10}--Startup emissions are based on front and back half catch at 17° F at low load.
Full load hourly emissions are based on front and back half catch at 73° F.
Annual emissions based on front and back half catch at 73° F.

SO_2--Startup emissions are based on the 17° F case at low load, with a fuel sulfur content of 0.3 gr/100 scf.
Full load hourly emissions are based on the 73° F case at low load, with a fuel sulfur content of 0.3 gr/100 scf.

CO emissions may be considered in a similar manner. Estimated CO emissions during startup are 19.9 lb/h for the GE Frame 7FA combustion turbine and 28.3 lb/h for the Westinghouse 501F combustion turbine. These can be compared to the full load emission rates of 20.5 lb/h for the GE Frame 7FA and 21.9 lb/h for the Westinghouse 501F combustion turbine. Because the GE Frame 7FA CO startup emission rate is less than the normal full load PTE emission rate, CO emissions form the GE Frame 7FA combustion turbine need not be further evaluated.

For either combustion turbine, startup emissions occur after the combustion turbine has been shut down for an extended period, during which time it has no emissions. Note that as with the NO_x emissions, startup emissions for either combustion turbine, when averaged with the down time periods of no emissions, result in average emissions less than that already calculated for the full load PTE. These overall startup emissions do not effect the already calculated full load PTE.

Because CO has a short-term ambient air quality standard (1 and 8 hour averaging periods), short-term startup emissions for the Westinghouse 501F combustion turbine should be evaluated. For an 8 hour averaging period, the average emission rate should consider a period of normal operation of 4 hours, and a worst case 4 hour startup period. The worst case 8 hour startup emission rate of NO_x for the Westinghouse 501F combustion turbine then becomes:

((28.3 lb/h x 4 hours) + (23 lb/h x 4 hour))/(8 hours) = 25.7 lb/h

The worst case 1 hour CO emission rate is 28.3 lb/h. These short-term startup emissions will be evaluated in the Air Quality Impact Analysis for this facility.

The actual operating scenario of the proposed facility will depend on market conditions and dispatch requirements. The number of startups per CT per year is expected to be approximately 250, although this may vary. As mentioned above, overall startup emission rates are less than the full load emission rates. The number of startups does not affect facility PTE. In addition, and consistent with the provisions of 40 CFR 60.8(c), CT startup and shutdown emissions do not constitute representative conditions. Therefore, emissions during startup and shutdown in excess of the applicable emission limits are not considered a violation of the applicable standard.

4.1.1.2 HOURLY EMISSIONS

Worst case hourly emissions were determined from the full range of operating loads and temperatures. As shown in Table 4-1, maximum hourly emissions occurred at 73°F, at full load conditions for all pollutants. Mesquite Power, LLC requests that startup emissions be exempted from the emission limits established in the Permit to Operate.

4.1.1.3 ANNUAL EMISSIONS

Annual emissions are based on full load operation at 8,760 hours per year at the average annual temperature (73° F).

4.1.2 EMERGENCY DIESEL FIREWATER PUMP ENGINE POTENTIAL TO EMIT

Small quantities of air pollutant emissions may be produced from the operation of the proposed emergency diesel firewater pump engine. These emission rates are considered representative of a diesel engine with this electrical output. The diesel engine will be operated for approximately one hour per week for test and maintenance purposes and will fire No. 2 distillate fuel oil. The estimated diesel engine emissions are summarized in Table 4-2.

4.1.3 COOLING TOWER POTENTIAL TO EMIT

Particulate matter emissions will occur from the cooling tower as a result of drift. The maximum PM_{10} emission rate was calculated based on a design circulating water flow of 163,050 gpm, a controlled drift rate of 0.0005 percent, and a circulating water total dissolved solids (TDS) value of 30,000 ppm (based on well water grab samples). The mass balance calculation is shown below where 8.34 lb/gal represents the density of water:

(2 towers)(163,050 gpm)(8.34 lb/gal)(0.0005%/100)(30,000 ppm/10^6)
(60 min/h) = 24.48 lb/h

Assuming 8,760 hours of operation per year, this results in an annual PM emission rate of 107.2 tpy. It should be noted that only a fraction of the particulate matter from the cooling tower drift is PM_{10}. Therefore, it was conservatively assumed that 31.5 percent of the particulate matter from the cooling tower is PM_{10}, resulting in 33.8 tpy of PM_{10}. (The fraction of particulate matter assumed to be PM_{10} is found in technical paper 73-01 *Cooling Tower Drift Its Measurement, Control and Environmental Effects* by Wistrom and Ovard, presented at the 1973 Cooling Tower Institute Annual Meeting.)

4.2 OTHER SOURCE OF EMISSIONS

There are no other stationary sources proposed at the site that could cause the emission of contaminants.

Table 4-2 Emergency Diesel Firewater Pump		
	lb/h	tpy
NO_x	5.6	0.15
CO	1.0	0.30
VOC	0.3	0.01
PM_{10}	0.15	0.004
SO_2	0.54	0.01
Based on manufacturer estimated emissions for a 360 hp diesel firewater pump operating for 52 h/y.		

4.3 MAXIMUM FACILITY POTENTIAL TO EMIT

The Project's PTE for each pollutant and applicable PSD significant emission levels are summarized in Table 4-3.

4.4 PSD APPLICABILITY AND PROJECT'S POTENTIAL TO EMIT EMISSIONS

The Project is listed as one of the major source categories requiring application of the 100 tpy threshold. PSD applicability is determined on a pollutant by pollutant basis by comparing the net emissions of each pollutant against the PSD significant emission rates (i.e., 40 tpy for NO_x, 40 tpy for SO_2, 25 tpy for TSP, 15 tpy for PM_{10}, 100 tpy for CO, and 40 tpy for VOCs).

The proposed project will be classified as a PSD major stationary source. The Project's PTE for each pollutant is summarized in Table 4-3. The applicable PSD significant emission levels for each pollutant are included for comparison purposes in the table. The PTE emissions for NO_x, CO, PM_{10}, and VOC are greater than the applicable PSD significant emission rates, and these pollutants are subject to PSD review.

Table 4-3
Project Potential to Emit and PSD Applicability

Pollutant	Combustion Turbine/HRSG Maximum PTE[a] (tpy)	Diesel Firewater Pump PTE (tpy)	Cooling Towers PTE (tpy)	Project PTE[c] (tpy)	PSD Significant Emission Rate (tpy)	PSD Review Required?
NO_x	394.2[a]	0.145	-	394.3	40	**Yes**
CO	383.7[a]	0.026	-	383.7	100	**Yes**
SO_2	37.3[a]	0.014	-	37.3	40	No
VOC	268.1[a]	0.008	-	268.1	40	**Yes**
PM_{10}	506.3[a,b]	0.004	33.77	540.1	25/15	**Yes**
Total Reduced Sulfur	Negligible	Negligible	-	Negligible	10	No
Total Fluorides	Negligible	Negligible	-	Negligible	3	No
Lead	Negligible	Negligible	-	Negligible	0.6	No

[a]Based on the maximum PTE for both turbine vendors considered as presented in the 'Total' column of Table 4-1.

[b]Assumes front and back half PM_{10} emissions.

[c]Summation of 4 combustion turbine/HRSG duct burners, 1 diesel firewater pump, and 2 cooling towers.

5.0 BEST AVAILABLE CONTROL TECHNOLOGY

5.1 INTRODUCTION

The 1977 Clean Air Act (CAA) established revised conditions for the approval of preconstruction permit applications under the Prevention of Significant Deterioration (PSD) program. One of these requirements is that Best Available Control Technology (BACT) be installed for all regulated criteria pollutants that are emitted in significant amounts from New Major Sources or modifications. Another requirement is that the Lowest Achievable Emission Rate (LAER) be installed for ozone precursurs above a certain threshold for sources that are located in a nonattainment area. Because this project is located in an area classified as being attainment for all regulated pollutants, the emissions units must comply with BACT requirements only. Individual point sources for this project include four combustion turbines with duct firing, an emergency diesel-fire pump, and cooling towers.

5.2 COMBUSTION TURBINE BACT ANALYSIS

This section describes the basis of this BACT analysis. Information is provided on the BACT methodology and approach used. The parameters and factors used in developing the analysis are identified.

Regulatory and Methodology Basis

The United States Environmental Protection Agency (USEPA) has authorized the development of a guidance document (March 15, 1990) on the use of the "top-down" approach to BACT determinations. The first step in a top-down BACT analysis is to determine, for the pollutant in question, the most stringent control technology and emission limit available for a similar source or source category. Technologies required under Lowest Achievable Emission Rate (LAER) determinations must be considered. These technologies represent the top control alternative under the BACT analysis. LAER is defined as the most stringent emission limitation achievable. If it can be shown that this level of control is infeasible on the basis of technical, economic, energy, or environmental impacts for the source in question, then the next most stringent level of control is identified and similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by any technical, economic, energy, or environmental consideration.

The following is a summary of these requirements and the assumptions on which this BACT analysis is based:

- Federal and state ambient air quality standards, emission limitations, and other applicable regulations will be met.
- Federal New Source Performance Standards (NSPS) for combustion turbines with heat input greater than 10 mmBtu/h (40 CFR 60 Subpart

GG) establish limiting criteria for NO_x emissions. No NSPS criteria have been established for limiting CO, VOC, and PM_{10} emissions.

The following flue gas emission limits are established by NSPS for Subpart GG units:

NO_x: 75 ppmvd at 15 percent O_2, corrected for fuel nitrogen content and turbine heat rate.

Federal NSPS for electric utility steam generating units with fuel burn rates greater than 250 mmBtu/h (40 CFR 60 Subpart Da) establish limiting criteria for SO_2, NO_x, and PM_{10} only. No NSPS criteria have been established for limiting CO and VOC emissions. NSPS limits NO_x emissions to 0.5 lb/mmBtu, a minimum 25 percent reduction in potential concentration, and 1.6 lb/MWh for natural gas fired sources in Subpart Da. Particulate matter is limited to 0.03 lb/mmBtu. Additional standards for SO_2 do not apply to sources firing natural gas only.

As defined in the air permit application, the project will have potential to emit (PTE) emissions of NO_x, CO, VOC, and PM_{10} in excess of the major modification PSD threshold levels established for these pollutants. As a result, BACT is required for NO_x, CO, VOC emissions. BACT is defined as an emission limitation established based on the maximum degree of pollutant reduction determined on a case-by-case basis considering technical, economic, energy, and environmental considerations. However, BACT cannot be less stringent than the emissions limits established by an applicable Federal NSPS.

Operations/Emissions Basis

The following are summaries of the operating emission requirements and assumptions for which this BACT analysis is based:

- Both types of combustion turbines considered for the Project will be evaluated separately. The CTs' performance and emissions will be based on operating at full load (including duct burners in operation) using 73° F performance data.
- As mentioned previously, the proposed operating scenario for each CT consists of operating up to 8,760 hours per year.

Economic Basis

The economic criteria used to determine capital and annual costs of the control technologies are based on EPA methodologies shown in the EPA Best Available Control Technology Draft Guidance Document (October 1990), EPA BACT Guidelines, Office of Air Quality Planning and Standards (OAQPS) Control Cost Manual (Fourth Edition), internal project developer cost factors, and vendor budgetary cost quotes.

Table 5-1 lists the assumptions for the economic criteria used in the analysis of BACT alternatives.

Table 5-1 Project Economic Evaluation Criteria	
Economic Parameters	Value
Contingency, percent	20
Real Interest Rate, percent	7
Economic Life, years	20
Labor Cost, $/man-h	40
Energy Cost, $/kWh (1999)	0.03
Catalyst Life, years	3

5.2.1 COMBUSTION TURBINE NO_X BACT ANALYSIS

The objective of this analysis is to determine BACT for NO_x emissions from the combustion turbines and duct burners. Unless otherwise noted, the NO_x emission rates described in this section are corrected to 15 percent oxygen.

5.2.1.1 BACT/LAER CLEARINGHOUSE REVIEWS

A review of the BACT/LAER Clearinghouse documents (CAPCOA, 1985-1992; USEPA, 1990 to present) indicates that the lowest emission achieved for a natural gas fired CT is 2.0 ppmvd for the Federal Cold Storage Cogeneration facility located in California. The 2.0 ppmvd was achieved for six months (June 1997 to December 1997). Region IX of the EPA has deemed that the limit of 2.0 ppmvd at 15 percent oxygen was achieved in practice with three-hour averaging. Emissions from the unit are controlled through the use of water injection and a $SCONO_x$ system. The Federal Cold Storage Cogeneration facility is configured in a mode of operation similar to that proposed for this Project. It should be noted that the Federal Cold Storage facility is located in a nonattainment area for ozone, with NO_x regulated as a nonattainment pollutant. Thus, this emission level represents LAER for combined cycle CTs. It should also be noted that this is a small, 222 mmBtu/h GE model LM2500 combined cycle gas turbine that is producing 32 MW (cogeneration). The use designation is limited to the specific application of small, combined cycle CT projects (e.g., units under 30 MW), and is not considered applicable to the proposed Project.

It should also be noted that the Sacramento Power Authority located in California has set a 3.0 ppmvd NO_x emission limit for a natural gas fired CT. The unit is a 1,257 mmBtu/h combined cycle natural gas fired Siemens V84.2 gas turbine generator with water injection for power augmentation and 200 mmBtu/h of supplemental firing capacity that can produce 103 MW. The emissions from this unit are controlled through the use of standard combustors, water injection, and selective catalytic reduction (SCR). This combustion turbine emission limit is noted in the Clearinghouse as being representative of LAER for large CTs. Another stringent NO_x emissions limit for a gas fired CT is 3.5 ppmvd for the Brooklyn Navy Yard Cogeneration Project located in New York. The emissions from that unit are controlled through the use of dry-low NO_x burners and SCR.

5.2.1.2 ALTERNATIVE NO_X EMISSION REDUCTION SYSTEMS

During combustion, NO_x is formed through the oxidation of the fuel-bound nitrogen (fuel NO_x) or through the oxidation of a portion of the nitrogen contained in the combustion air (thermal NO_x), and are a function of combustion temperature. NO_x production in a gas turbine combustor occurs predominantly within the flame zone, where localized high temperatures sustain the NO_x-forming reactions. The overall

average gas temperature required to drive the turbine is well below the flame temperature, but the flame region is required to achieve stable combustion.

Nitrogen oxides control methods may be divided into two categories: in-combustor NO_x formation control and postcombustion emission reduction. An in-combustor NO_x formation control process reduces the quantity of NO_x formed in the combustion process. A postcombustion technology reduces the NO_x emissions in the flue gas stream after the NO_x has been formed in the combustion process. Both of these methods may be used alone or in combination to achieve the required NO_x emissions. The six different types of emission controls reviewed by this BACT analysis are as noted below:

- In-Combustor Type:
  - Water/Steam Injection
  - Dry-low NO_x Burner
  - Xonon
- Postcombustion Type:
  - SNCR
  - SCR
  - $SCONO_x$

Water or Steam Injection

NO_x emissions from the combustion turbines can be controlled by either water or steam injection. With this type of control, water or steam is injected into the primary combustion zone with the fuel. The water or steam serves to reduce NO_x formation by reducing the peak flame temperature. The degree of reduction in NO_x formation is proportional to the amount of water injected into the combustion turbine. Since the combustion turbine NSPS was last revised in 1982, manufacturers have improved combustion turbine tolerances to water injection. However, there is a point at which the amount of water injected into the combustion turbine seriously degrades its reliability and operational life. This type of control can also be counterproductive with regard to carbon monoxide (CO) and volatile organic compound (VOC) emissions that are formed as a result of incomplete combustion.

The development of dry-low-NO_x (DLN) burners has replaced the use of water injection except for certain cases such as oil firing. The only fuel for this project is natural gas; therefore, the water or steam injection method of postcombustion control will not be considered further in this BACT analysis.

Dry-low NO_x Burners

NO_x can be limited by lowering combustion temperatures and by staging combustion (i.e., creating a reducing atmosphere followed by an oxidizing atmosphere). The use of DLN burners as a way to reduce flame temperature is one common NO_x

control method. These combustor designs are called DLN burners because no water needs to be injected into the combustion chamber to achieve lower NO_x emissions. Most industry gas turbine manufacturers today have developed this type of lean premix combustion system as the state-of-the-art for NO_x controls in combustion turbines.

DLN combustion turbine burner designs use improved air/fuel mixing and reduced flame temperatures to limit thermal NO_x formation. DLN burner technology uses a two-stage combustor that premixes a portion of the air and fuel in the first stage with the remaining air and fuel being injected in the second stage. This two-stage process ensures good mixing of the air and fuel and minimizes the amount of air required, resulting in lower NO_x emissions.

The controlled emissions levels of combustion turbines will vary from manufacturer to manufacturer. NO_x emission levels of approximately 9 ppmvd for GE 7FA CTs and 25 ppmvd, using DLN SW 501F CTs, is considered feasible for this project. Also, as with the standard combustor with water injection, the DLN burners can also be counterproductive with regard to CO and VOC emissions, in that the staged combustion and lower combustion temperatures may cause higher CO and VOC emissions.

Due to the proven performance of the DLN burner technology, this method of NO_x emissions control will be considered in this BACT analysis. The combination of DLN burner technology with the addition of an SCR will represent BACT for the CTs proposed for the Project.

XONON

Another form of in-combustor control is Xonon. This technology, being developed by Catalytica Combustion Systems, is designed to avoid the high temperatures created in conventional combustors. The XONON combustor operates below 2,700° F at full power load, which significantly reduces NO_x emissions without raising, and possibly even lowering, emissions of carbon monoxide and VOC. XONON uses a proprietary flameless process in which fuel and air react on the surface of a catalyst in the turbine combustor to produce energy in the form of hot gases, which drive the turbine. To date, commercialization of this technology on utility size combustion turbines such as proposed for the Project has not yet occurred.

Due to the technical and commercial limitations of this technology, this method of postcombustion control will be eliminated from further evaluation for control of NO_x emissions in this BACT analysis.

Selective Noncatalytic Reduction

Selective noncatalytic reduction (SNCR) is one method of postcombustion NO_x control. SNCR reduces NO_x into nitrogen and water vapor through a reaction of the flue gas with a reagent. The SNCR system is dependent upon the reagent injector location

and temperature to achieve proper reagent/flue gas mixing for maximum NO_x reduction. SNCR systems can use either ammonia or urea as reagents. The use of these reagents for NO_x reduction is patented under the trade names Thermal $DeNO_x$ and NOXOUT, respectively. Ammonia for a thermal $DeNO_x$ system is received and stored as a liquid and vaporized prior to injection into the flue gas stream. Injection is accomplished using either compressed air or steam as a carrier. The injected ammonia then reacts with NO_x in the flue gas to form nitrogen and water. Urea for a NOXOUT system is stored as a 50 percent solution in water. This solution is atomized at the injection point to optimize mixing. The urea molecule dissociates to form two molecules of ammonia that reacts with NO_x in the flue gas to form nitrogen and water. Injector location requirements would be similar for both ammonia-based and urea-based SNCR systems.

SNCR systems require a fairly narrow temperature range for reagent injection in order to achieve effective NO_x reduction. The optimum temperature range for injection of ammonia or urea is 1,500° to 1,900° F. The NO_x reduction efficiency of an SNCR system decreases rapidly at temperatures outside the optimum temperature range. Operation below this temperature range results in excessive ammonia emissions (slip). Operation above the temperature range results in increased NO_x emissions. Injection of hydrogen or other additives can increase the effective temperature window required for SNCR operation. However, regardless of the magnitude of the temperature window, residence times in the temperature range are limited, resulting in less than optimum performance.

A portion of the ammonia used or generated by the SNCR process reacts with NO_x in the flue gas and decomposes into nitrogen and water vapor. The remaining unreacted ammonia exits the system as ammonia slip. Control of ammonia or urea in an SNCR system is difficult. The use of an SNCR system could potentially result in stack emissions of between 20 and 50 ppmvd of ammonia. Unreacted ammonia from the SNCR system and sulfur trioxide in the flue gas can react to form ammonium bisulfate and ammonium sulfate salts. Resultant particle diameters are on the order of 1 to 3 microns. The creation of these salts will increase plant PM_{10} emissions. Ammonium bisulfate is a sticky substance that can deposit on downstream equipment. Once liquefied (at temperatures below 410° F), it can resolidify, build up on, and foul equipment located downstream.

The use of an SNCR system will increase energy requirements for a given application, requiring fans, air compressors, or a steam source to provide the necessary energy for the dilution, atomization, and injection of reagent into the flue gas stream. These additional energy requirements will result in increased annual emissions of other pollutants as well. In general, an SNCR system is a less efficient NO_x reduction system than an SCR system.

Moreover, the exhaust temperature at the exit of a combustion turbine, which ranges from about 1,000° to 1,150° F for these units, is too low for any consideration of this technology.

Due to the technical and operational limitations on temperature and available reaction time, this method of postcombustion control will be eliminated from further evaluation in this BACT analysis.

Selective Catalytic Reduction

Another postcombustion method is selective catalytic reduction (SCR). SCR systems have been used quite extensively in combined cycle CT projects for the past 5 years. The SCR process combines vaporized ammonia with NO_x in the presence of a catalyst to form nitrogen and water. The vaporized ammonia is injected into the combustion turbine exhaust gases prior to passage through the catalyst bed. The use of a SCR system results in small levels of ammonia emissions (ammonia slip). As the catalyst degrades, ammonia slip will increase to approximately 10 ppm, ultimately requiring catalyst replacement.

The performance and effectiveness of SCR systems are directly dependent on the temperature of the flue gas when it passes through the catalyst. Vanadium/titanium catalysts have been used on the majority of SCR system installations (greater than 95 percent). The flue gas temperature range for optimum SCR operation using a conventional vanadium/titanium catalyst is approximately 500° to 750° F. At temperatures above 800° F permanent damage to the vanadium/titanium catalyst may occur. This temperature window can exist if the SCR catalyst is placed in the HRSG at an optimum position. The temperature out of the combustion turbine and into the HRSG is approximately 1,000° to 1,150° F. The temperature of the flue gas will have decreased to an acceptable level by the time it reaches the SCR catalyst. Accordingly, a vanadium/titanium catalyst can be installed for this project.

Mesquite Power, LLC, proposes to use a combination of DLN burners and SCR for controlling nitrogen oxides. This combination of control will be considered BACT to control NO_x emissions.

$SCONO_x$

A third, relatively new postcombustion technology from Goal Line Environmental Technologies is $SCONO_x$, which utilizes a coated oxidation catalyst to remove both NO_x and carbon monoxide (CO). The system utilizes hydrogen (H_2) (which is created by reforming natural gas) as the basis for a proprietary catalyst regeneration process. The system uses of a platinum-based catalyst coated with potassium carbonate (K_2CO_3) to oxidize both NO_x and CO and thereby reduce plant emissions. CO emissions are decreased by the oxidation of CO to carbon dioxide (CO_2). The catalyst is installed in the flue gas at a point where the temperature is between 280° to 650° F.

Flue gas temperatures above 550° F are preferred since the need for both an auto-thermal reformer and carbon scrubber can be avoided. In addition, the $SCONO_x$ catalyst is more efficient at higher temperatures, although the $SCONO_x$ system has yet to have proven reliable performance at temperatures greater than 550° F. Goal Line addresses the higher temperature issue by offering an additional section of catalyst to the HRSG to allow for adequate NO_x reduction. For placement in a low temperature region of the HRSG , additional catalyst would not be needed. Goal Line guarantees the performance of the catalyst for 3 years. When the catalyst reaches the end of its service life, it can be recycled to recover the precious metal contained within the catalyst. This recycled material can account for as much as one-third the cost of the replacement catalyst.

The $SCONO_x$ catalyst simultaneously oxidizes CO to CO_2 and NO to NO_2, then absorbs the NO_2 onto the catalyst surface through the use of a potassium carbonate absorber coating. The reactions of this oxidation/absorption cycle are shown as Equations [1], [2], and [3]:

$$CO + \tfrac{1}{2}O_2 \rightarrow CO_2 \qquad [1]$$

$$NO + \tfrac{1}{2}O_2 \rightarrow NO_2 \qquad [2]$$

$$2NO_2 + K_2CO_3 \rightarrow CO_2 + KNO_2 + KNO_3 \qquad [3]$$

The CO_2 in reactions [1] and [3] are exhausted out of the stack. The potassium carbonate coating reacts with NO_x to form potassium nitrites and nitrates that remain on the surface of the catalyst. The $SCONO_x$ catalyst eventually becomes saturated and must be regenerated. When all of the carbonate absorber coating on the surface of the catalyst has been reacted to form potassium nitrides and nitrates, NO_x will no longer be absorbed, and the catalyst must enter the regeneration cycle.

The regeneration of the catalyst is accomplished by passing a regeneration gas across the catalyst surface. The gas de-absorbs NO_2 from the catalyst surface and reduces it to nitrogen (N_2) and water vapor which is emitted to the atmosphere. For systems where the $SCONO_x$ catalyst is located in an area with low flue gas temperatures, the regeneration gas is produced by processing a small stream of natural gas through a separate skid-mounted processing unit or auto-thermal reformer. The $SCONO_x$ catalyst is susceptible to poisoning by SO_2, requiring the natural gas to be scrubbed to remove the sulfur. The resulting regenerating gas is approximately 3 percent N_2, 1.5 percent CO_2, and 4 percent H_2, with steam making up the balance (the steam is used as a carrier). For systems where the $SCONO_x$ catalyst is located in an area with the flue gas temperatures above 500° F, the regeneration gas can be produced in the flue gas before it regenerates the catalyst. In the high temperature case, a separate processing unit is not required. The regeneration gas must contain

minimal amounts of free oxygen. The carrier gas should be free of oxygen. The low concentrations of both hydrogen and free oxygen minimize the risk of any explosion. The appropriate reactions are shown in Equations [4] and [5]:

$$CH_4 + \tfrac{1}{2}O_2 + 1.88N_2 \rightarrow CO + 2H_2 + 1.88N_2 \qquad [4]$$

$$CO + 2H_2 + H_2O + 1.88N_2 \rightarrow CO_2 + 3H_2 + 1.88N_2 \qquad [5]$$

The hydrogen in this reaction combines with the potassium nitrites and nitrates to form water vapor and elemental nitrogen. Carbon dioxide in the regeneration gas reacts with potassium nitrites and nitrates to form potassium carbonate, which is the absorber coating that was on the surface of the catalyst before the oxidation/absorption cycle began. The appropriate reaction is shown in Equation [6]:

$$KNO_2 + KNO_3 + 4H_2 + CO_2 \rightarrow K_2CO_3 + 4H_2O(g) + N_2 \qquad [6]$$

Water vapor (steam) and elemental nitrogen are exhausted to the atmosphere and the potassium carbonate is returned to the surface of the catalyst. There is no net gain or net loss of potassium carbonate after the completion of the oxidation/absorption and regeneration cycle.

Dampers are used to isolate a portion of the catalyst for regeneration. At any time, one portion of the catalyst would be out of service, undergoing regeneration. The regenerative gas is passed through the isolated portion of the catalyst while the remaining catalyst stays in contact with the flue gas. After the isolated portion has been regenerated, the next set of dampers close and the next portion of the catalyst is isolated and regenerated. This cycle repeats continuously with each section of the catalyst regenerated about once every fifteen minutes. Homogeneous distribution of the regeneration gas over the surface of the isolated section of the catalyst is critical.

A $SCONO_x$ system for an F class combustion turbine has not been demonstrated, but is estimated to require 12 to 16 sections of catalyst. At any given time, 75 percent of these sections operate in the oxidation/absorption cycle while the remaining 25 percent are undergoing the regeneration cycle. The catalyst is sized to allow for on-line regeneration without a need to reduce unit load. The duration of the regeneration cycle for each catalyst section is flexible and can be programmed into the system's programmable logic controller (PLC). The duration between regeneration cycles will become shorter as the catalyst approaches the need to be recoated.

The $SCONO_x$ catalyst is very susceptible to fouling by sulfur in the flue gas. Sulfur causes the catalyst to become deactivated. As an example, at the Federal Cold Storage facility, one of the only two existing $SCONO_X$ installations, the natural gas contains 6 to 12 ppm of sulfur and requires frequent recoating or "washing" periods. A

carbon absorption scrubber was used to reduce the sulfur in the incoming natural gas. Before the sulfur scrubber was installed, NO_x emissions were typically about 3 to 4 ppm with peak values sometimes occurring at 7 ppm. After installation of the scrubber, typical emissions were reduced to 2 ppm with peaks at approximately 2.5 ppm.

The impact of sulfur can be minimized by a sulfur absorption $SCOSO_x$ catalyst. The $SCOSO_x$ catalyst is located upstream of the $SCONO_x$ catalyst. The SO_2 is oxidized to sulfur trioxide (SO_3) by the $SCOSO_x$ catalyst. The SO_3 is then deposited on the catalyst and removed from the catalyst when it is regenerated. The $SCOSO_x$ catalyst is regenerated along with the $SCONO_x$ catalyst. The resulting byproduct of the regeneration is either hydrogen sulfide (H_2S) (flue gas temperatures below 450° F at the $SCONO_x$ catalyst) or SO_2 (flue gas temperatures above 450° F). The H_2S byproduct can be removed from the regeneration gas through a carbon scrubber. In the case of an SO_2 byproduct, the regeneration gas is piped back into the combustion turbine exhaust downstream of the $SCONO_x$ catalyst. The higher the sulfur content of fuel burned, the more frequently the $SCOSO_x$ catalyst will require recoating. When both $SCOSO_x$ and $SCONO_x$ catalyst are installed, the regeneration gas is distributed within the space between these two isolated catalysts. The regeneration gas is discharged from the isolated catalyst chamber either upstream of the $SCOSO_x$ or downstream from the $SCONO_x$ catalyst. In this way, the SO_2 discharged from the $SCOSO_x$ catalyst is prevented from contacting the $SCONO_x$ catalyst. When the regeneration gas is subsequently discharged into the flue gas stream downstream of both catalysts, the SO_2 exits the stack along with the rest of the flue gas. In this case, no additional SO_2 emissions will occur beyond that typically found during natural gas firing.

Natural gas and carrier steam consumption is a function of the installed catalyst surface area. Likewise, the required catalyst surface area is a function of the flue gas temperature at the $SCONO_x$ catalyst location; the NO_x production rate of the combustion turbine, and the design of the combustion turbine. In general, for a $SCONO_x$ catalyst installed in a temperature region greater than 550° F for an F class combustion turbine, approximately 3,200 to 3,800 scfh of natural gas will be required for the production of the regeneration gas and 20,000 to 26,000 lb/h of superheated steam will be needed as the regeneration gas carrier. A facility may have difficulties operating within these parameters which are dependent on the combustion turbine selected.

The $SCONO_x$ catalyst will require that it be recoated or "washed" every six months to one year. The frequency of washing is dependent on the sulfur content in the fuel and the effectiveness of the $SCOSO_x$ catalyst. The "washing" consists of removing the catalyst modules from the unit and placing each module with a potassium carbonate reagent. The $SCOSO_x$ catalyst will also require washing, but due to limited operating experience with the $SCOSO_x$ catalyst, it is uncertain how often it will be required. However, it is expected that the $SCOSO_x$ catalyst will require annual washing.

Recoating is accomplished on the plant site using a series of four tanks. Three of the tanks use a potassium carbonate solution containing 8.5 to 10 percent K_2CO_3 by weight. The fourth tank contains deionized water for rinsing. One section of catalyst is dipped through a series of tanks and then dried with low-pressure compressed air following recoating. After two batches of catalyst are recoated, the solution on the initial dip tank must be changed out. For an F class combustion turbine, there would be approximately 12 to 16 $SCONO_x$ catalyst sections. The recoating sequence cascades the potassium carbonate solution forward, as fresh K_2CO_3 is required. Therefore, the freshest K_2CO_3 solution is used for the last recoating stage. The spent K_2CO_3 solution and deionized water are stored in a tank and treated with acid to adjust pH prior to discharge. Depending upon local discharge permits, treatment with acid to adjust the pH may or may not be required. Recoating arrangements are flexible and can be optimized for each site.

There are three main options for the recoating process of the catalyst. The first option requires the unit to be shut down for approximately one week (for a frame F size machine) to remove, recoat, and replace all of the $SCONO_x$ catalyst. This has the disadvantage of eliminating the ability to produce power during the recoating process. The second alternative is to develop a method of removing the catalyst while the unit is online and replacing the catalyst with a clean, previously recoated catalyst while the other catalyst is "washed." This alternative would require purchasing extra sets of catalyst and providing safe access to protect personnel from exposure to the hot flue gas while the catalyst is being replaced and reinstalled. This method of operation has not been demonstrated in practice and raises significant safety concerns. The third option is to bring the unit off line long enough to remove the old catalyst and replace it with a clean catalyst. The removed catalyst is then recoated and prepared for reinstallation during the next recoating outage. This would require a shorter outage than the first outage, but would require the purchase of two full sets of catalyst (one operating and one spare).

The Federal Cold Storage facility has demonstrated that $SCONO_x$ is capable of achieving NO_x emission concentrations as low as 2 ppm based on a maximum inlet concentration of 25 ppm (92 percent reduction) and a CO reduction of 90 percent based on a maximum inlet concentration of 50 ppm for a small (25 MW) machine. Although the $SCONO_x$ catalyst appears to be achieving the advertised NO_x control efficiencies, uncertainties still exist regarding the new catalyst technology. Although this system has been proven on a small size unit (32 MW), scale up concerns exist with regard to the use of this technology on large F frame units. Dampers would have to be scaled up and issues such as operator size requirements, damper blade shaft design, (prevent over-torque conditions), and shaft bearing loading would all have an impact with a larger system. The regeneration process would require the operation of the dampers to maintain a proper seal to isolate the catalyst from the flue gas, thus limiting ambient oxygen concentrations. Also, if replacing catalyst section with the unit online, personnel

safety requires that the damper seal must approach zero leakage when a section is isolated.

Another concern is the removal and replacement of the catalyst for recoating without adversely impacting unit availability. The larger volume of catalyst used in an F class combustion turbine will require a significant period of washing or will necessitate the purchase of several spare catalyst modules.

The current $SCONO_x$ catalyst technology is in its second generation. The first generation operated for approximately ten months on a small LM-2500 combined cycle CT unit before it was taken out of service because of poor regeneration gas distribution.

$SCONO_x$ is a technology that has effectively reduced emissions at the Federal Cold Storage facility thus far. While mechanically very complicated, $SCONO_x$ technology allows for transient operation (load changes) and no ammonia issues, such as transportation, storage, or slip emissions, are present. In addition, the wide operating temperature range has the potential for flexibility for future projects. The $SCONO_x$ catalyst can be placed in the most cost effective location in an HRSG. The $SCONO_x$ catalyst can also significantly reduce CO emissions, thus reducing the need for an oxidation catalyst. However, there are a number of serious concerns regarding $SCONO_x$ which still need to be addressed. They include the following:

- Design issues, such as damper size and proper distribution of regeneration gas for "scale-up" from a LM-2500 to a frame F combustion turbine.
- Mechanical system reliability: Damper and damper bearings are moving parts in the flue gas system that may present maintenance problems.
- On-line removal of catalyst for washing, including mechanics of how it is to be accomplished, time period, labor (cost), and safety issues.
- $SCOSO_x$ reliability: The SO_2 guard catalyst bed ($SCOSO_x$) can cause contaminated regeneration gas (containing sulfur and sulfur acids) to be handled, thereby questioning the effectiveness and reliability of the catalyst.
- Increased pressure drop.
- Proprietary Issue: $SCONO_x$ catalyst is a proprietary catalyst leading to concerns regarding long-term pricing.
- Financial Concerns: Lenders will have to assume performance and operational risks associated with the use of $SCONO_x$.

The application for this technology is currently limited to combined cycle CT units under 30 MW and cannot, therefore be considered to have been demonstrated in practice for "F" class machines. $SCONO_x$ cannot be considered to be BACT for this project because there are serious technical and economic concerns with using this new technology related to the operating plant size proposed for the Project.

5.2.1.3 CONCLUSIONS

Based on the technology evaluation for this process, a combination of both in-combustion and postcombustion NO_x emission control technology will be utilized to achieve the proposed BACT NO_x emission rate as follows.

SCR catalysts have proven emissions reduction capabilities and low maintenance requirements at a variety of different facilities throughout the United States, Europe, and Asia. SCR systems are representative of the BACT level of NO_x emissions reduction. SCR systems have been successfully used on numerous combined cycle combustion turbine applications. The combination of DLN burners and SCR technology has the lowest proven emission rate on an operating combined cycle CT and is considered technically feasible from both a control and measurement perspective.

A level of 2 ppmvd at 15 percent O_2 based on a combination of water injection and a $SCONO_x$ catalyst is unproven and technically unacceptable for this project. Although the system appears to be successful on a 32 MW CT, the effort and effect of scaling the technology for a CT of the size proposed for this facility (more than 5 times larger) raises serious technical concerns with this new technology. Therefore, in-combustor NO_x control consisting of dry-low NO_x burners firing natural gas only, followed by postcombustion NO_x control consisting of a selective catalytic reduction system to reduce NO_x emissions to 2.5 ppmvd at 15 percent O_2 for both the SW 501F and GE 7FA combustion turbines and duct burners is considered BACT for this Project. Because this low level of emissions is also representative LAER technology, a cost analysis is not required.

5.2.2 COMBUSTION TURBINE CO BACT ANALYSIS

The objective of this analysis is to determine BACT for CO emissions from the combustion turbines and duct burners. Unless otherwise noted, the CO emission rates described in this section are corrected to 15 percent oxygen.

A review of the BACT/LAER Clearinghouse documents indicates that the most stringent CO emission level for a combustion turbine is 1.8 ppmvd at 15 percent O_2 for the Newark Bay Cogeneration L.P. project located in New Jersey. These emissions are achieved by reducing CO emissions through the use of an oxidation catalyst. It should be noted that the use of the oxidation catalyst represents LAER. This Newark Bay Project is located in a nonattainment area for both CO and ozone (VOC control required). It should also be noted that the Saranac Energy Company located in Plattsburgh, New York has set a 3.0 ppmvd CO emission limit for a natural gas fired 1,123 mmBtu/h combined cycle CT. The emissions from this unit are controlled through the use of an oxidation catalyst.

5.2.2.1 ALTERNATIVE CO EMISSION REDUCTION SYSTEMS

Typically, measures taken to minimize the formation of NO_x during combustion inhibit complete combustion, which may increase the emissions of CO. CO is formed

during the combustion process due to incomplete oxidation of the carbon contained in the fuel. CO formation is limited by ensuring complete and efficient combustion of the fuel in the combustion turbine. High combustion temperatures, adequate excess air, and good air/fuel mixing during combustion minimize CO emissions. The development of good state-of-the-art DLN burners has reduced CO emissions lower than as compared to those previously obtained by the use of water injection as the main NO_x control method.

These improved combustion characteristics have allowed minimization of CO emissions without sacrificing NO_x control performance. For this reason, the use of low NO_x burners that use good combustion practices is the standard method of also controlling CO emissions.

The only CO reduction technology available that will not impact NO_x emissions is the use of an oxidation catalyst to convert the CO to CO_2. The oxidation catalyst is typically a precious metal catalyst and is not considered toxic. No reagent injection is necessary and oxidizing catalysts, depending on the uncontrolled emission level, are capable of reducing CO emissions by up to 90 percent.

This technology evaluation indicates that an oxidation catalyst is the only control technology suitable for further evaluation beyond the use of good combustion practices, as provided by a DLN burner. The estimated CO emissions for the GE 7FA and SW 501F CTs and duct burners, and the corresponding control technologies are listed in Table 5-2.

5.2.2.2 EVALUATION OF FEASIBLE TECHNOLOGIES

The following evaluation considers economic, energy, and environmental impacts on the potential BACT scenario's evaluated.

Economic Impacts

The use of an oxidation catalyst has a significant negative economic impact on the Project. Analysis of the economic impacts is provided below. The CO BACT costs presented in this analysis are based on operating the General Electric FA and Siemens Westinghouse 501F units at 100 percent of full load for 8,760 hours per year on natural gas.

Capital Costs

Tables 5-3a and 5-3b present the capital costs for installing an oxidation catalyst system on a GE PG7241(FA) and SW 501F combustion turbine with duct burners. The capital costs for the systems includes the oxidation catalyst reactor and balance of plant equipment, and were based on budgetary quotations from equipment manufacturers and other engineering estimates.

Table 5-2 Estimated CO Emissions From Alternate Control Technologies Per CT/Duct Burner Unit		
	Control Technologies	
	Dry-low NO_x Combustors	Oxidation Catalyst
GE 7FA Emissions		
Concentration, ppmvd	16.5	4.0
Percent Removal	N/A	75 percent
SW 501F Emissions		
Concentration, ppmvd	23.6	4.0
Percent Removal	N/A	83 percent

Table 5-3a
CO Reduction System Capital Cost Per GE 7FA Unit

	Oxidation Catalyst	Good Combustion Controls	Remarks
Direct Capital Cost			
Catalysts	577,000	NA	Scaled from an estimate from Engelhard Corporation
Catalyst Reactor	268,000	NA	Estimated from Engelhard Corporation based on catalyst size
Control/Instrumentation	40,000	NA	Estimated
Balance of Plant	133,000	NA	15% For Foundations and Supports, Erection, Electrical Installation, Painting, Insulation, Vendor Engineering.
Total Direct Capital Cost	1,018,000	Base	
Indirect Capital Costs			
Contingency	204,000	NA	20% of Direct Capital Cost
Engineering and Supervision	51,000	NA	5% of Direct Capital Cost
Construction and Field Expense	20,000	NA	2% of Direct Capital Cost
Construction Fee	10,000	NA	1% of Direct Capital Cost
Startup Assistance	10,000	NA	1% of Direct Capital Cost
Performance Test	5,000	NA	0.5% of Direct Capital Cost
Total Indirect Capital Costs	300,000	Base	
Total Installed Cost	1,318,000	Base	

Table 5-3b
CO Reduction System Capital Cost Per SW 501F Unit

	Oxidation Catalyst	Good Combustion Controls	Remarks
Direct Capital Cost			
Catalysts	589,000	NA	Scaled from an estimate from Engelhard Corporation
Catalyst Reactor	268,000	NA	Estimated from Engelhard Corporation based on catalyst size
Control/Instrumentation	40,000	NA	Estimated
Balance of Plant	135,000	NA	15% For Foundations and Supports, Erection, Electrical Installation, Painting, Insulation, Vendor Engineering.
Total Direct Capital Cost	1,032,000	Base	
Indirect Capital Costs			
Contingency	206,000	NA	20% of Direct Capital Cost
Engineering and Supervision	52,000	NA	5% of Direct Capital Cost
Construction and Field Expense	21,000	NA	2% of Direct Capital Cost
Construction Fee	10,000	NA	1% of Direct Capital Cost
Startup Assistance	10,000	NA	1% of Direct Capital Cost
Performance Test	5,000	NA	0.5% of Direct Capital Cost
Total Indirect Capital Costs	304,000	Base	
Total Installed Cost	1,336,000	Base	

Operating Costs

Tables 5-4a and 5-4b present the annual operating costs using an oxidation catalyst to achieve a 75 and 83 percent reduction of CO on the GE 7FA and SW 501F CTIs and duct burners, respectively. CO outlet emissions would be reduced to a maximum of approximately 4.0 ppmvd for the SW 501F and GE 7FA units (with duct burners) during natural gas firing. Annual operating costs for the system include catalyst replacement, operating personnel, maintenance costs, and lost power generation. Throughout the life of the plant, catalyst elements will require periodic replacement. Currently, catalyst manufacturers are willing to guarantee a catalyst life of 3 years or equivalent operating hours for an oxidation catalyst. The catalyst life is adjusted to account for the operating hours each year of the base load unit.

Total Annual Costs

Total 1999 annual cost for the oxidation catalyst system is calculated as the sum of the 1999 annual operating costs plus capital recovery. The total capital costs for an oxidation catalyst are estimated to be $1,318,000 and $1,336,000 for the GE 7FA and SW 501F units, respectively. The total annual operating costs for an oxidation catalyst are estimated to be $509,000 and $527,000 for the GE 7FA and SW 501F units, respectively. This corresponds to an incremental CO removal cost of $1,868 and $1,185 per ton for the GE 7FA and SW 501F combustion turbines, respectively.

Energy Impacts

An oxidation catalyst reactor located downstream of the combustion turbine exhaust will increase the backpressure on the combustion turbine. The additional backpressure of 0.8 inches, water gauge, will reduce the combustion turbine output by approximately 0.1 percent. The cost of lost power revenue due to the back pressure is included in the economic analysis.

Environmental Impacts

The major environmental disadvantage that exists when using an oxidation catalyst to reduce CO emissions is that a percentage of the SO_2 in the flue gas will oxidize to SO_3. The higher the operating temperature, the higher the SO_2 to SO_3 oxidation potential. It is estimated that approximately 30 percent of the SO_2 in the flue gas will oxidize to SO_3 as a result of the CO oxidation catalyst being installed. The SO_3 will react with the moisture in the flue gas to form sulfuric acid mist in the atmosphere. The increase in H_2SO_4 emissions would increase PM_{10} emissions.

Table 5-4a CO Reduction System Annual Cost Per GE 7FA Unit			
	Oxidation Catalyst	Good Combustion Controls	Remarks
Direct Annual Cost			Cost based on emissions in Table 5-1
Catalyst Replacement	221,000	NA	Catalyst life of 3 yr of equivalent operating hours
Operation and Maintenance	26,000	NA	2% of Capital Cost
Lost Power Generation	47,000	NA	From Westinghouse curve, dependent upon catalyst pressure drop and nominal CT rating
Total Direct Annual Cost	294,000	NA	
Indirect Annual Costs Indirect Annual Costs			
Overhead	16,000	NA	60% of Operating and Maintenance Labor
Administrative Charges	26,000	NA	2% of Total Installed Cost
Property Taxes	36,000	NA	2.75% of Total Installed Cost
Insurance	13,000	NA	1% of Total Installed Cost
Capital Recovery	124,000	NA	Capital Recovery Factor * Total Installed Cost
Total Indirect Annual Costs	215,000	NA	
Total Annual Cost	509,000	NA	
Annual Emissions, tpy	87.2	359.6	Emissions taken from Table 5-1
Emissions Reduction, tpy	272.4	NA	Emissions calculated from Table 5-1
Total Cost Effectiveness, $/ton	1,868	NA	Total Annual Cost/Emissions Reduction

Table 5-4b
CO Reduction System Annual Cost Per SW 501F Unit

	Oxidation Catalyst	Good Combustion Controls	Remarks
Direct Annual Cost			Cost based on emissions in Table 5-1
Catalyst Replacement	226,000	NA	Catalyst life of 3 yr of equivalent operating hours
Operation and Maintenance	27,000	NA	2% of Capital Cost
Lost Power Generation	55,000	NA	From Westinghouse curve, dependent upon catalyst pressure drop and nominal CT rating
Total Direct Annual Cost	308,000	NA	
Indirect Annual Costs Indirect Annual Costs			
Overhead	16,000	NA	60% of Operating and Maintenance Labor
Administrative Charges	27,000	NA	2% of Total Installed Cost
Property Taxes	37,000	NA	2.75% of Total Installed Cost
Insurance	13,000	NA	1% of Total Installed Cost
Capital Recovery	126,000	NA	Capital Recovery Factor * Total Installed Cost
Total Indirect Annual Costs	219,000	NA	
Total Annual Cost	527,000	NA	
Annual Emissions, tpy	90.8	535.7	Emissions taken from Table 5-1
Emissions Reduction, tpy	444.9	NA	Emissions calculated from Table 5-1
Total Cost Effectiveness, $/ton	1,185	NA	Total Annual Cost/Emissions Reduction

5.2.2.3 CONCLUSIONS

Mesquite Power, LLC, has proposed using an oxidation catalyst to reduce CO emissions in the SW 501F and GE 7FA CTs and duct burners to 4.0 ppmvd. Installation of an oxidation catalyst system designed to reduce CO emissions to 4 ppmvd would add approximately $509,000 to the annual operating cost of a GE 7FA unit. The capital cost for a GE-7FA unit would be about $1,318,000. The resultant cost effectiveness on a per ton of CO removed basis is $1,868. Installing an oxidation catalyst system to reduce CO emissions to 4.0 ppmvd would add about $527,000 to the annual operating cost for the SW 501F unit. The capital cost for a SW 501F unit would be about $1,336,000. The cost effectiveness on a per ton of CO removed basis is $1,185. Mesquite Power, LLC has proposed using an oxidation catalyst to reduce CO emissions in whichever CT it chooses for the Project. The CO emission level proposed for both the GE 7FA and SW 501F combustion turbines and duct burners during natural gas firing represents an emission level lower than any other recent projects that have been permitted. Therefore, the proposed CO BACT for the control of CO emissions from each combustion turbine and duct burner is good combustion practice using advanced combustion control and the addition of an oxidation catalyst.

5.2.3 COMBUSTION TURBINE PM_{10} EMISSIONS CONTROL

The emissions of PM_{10} from the Project will be controlled by ensuring as complete combustion of the fuel as possible and by minimizing SO_2 to SO_3 oxidation. The New Source Performance Standards (NSPS) for combustion turbines do not establish a PM_{10} emission limit. Natural gas contains only trace quantities of noncombustible material.

The manufacturer's standard operating procedures include filtering the turbine inlet air and combustion controls. The BACT/LAER Clearinghouse documents do not list any postcombustion PM_{10} control technologies being used on combustion turbines. Consistent with the previous BACT applications and with determinations recently referenced by states within the Southwest and Pacific regions, such as the Milagro Williams Field Service in New Mexico and the Northern California Power Agency in the San Joaquin Valley Unified APCD, the use of natural gas, combustion air filters, good combustion controls, and maintenance is considered BACT for particulate matter. This is proposed for this Project. PM_{10} emissions (front and back) will be approximately 0.0138 lb/mmBtu (28.9 lb/h at full load) while firing natural gas for the GE 7FA CT and duct burner unit and 0.0124 lb/mmBtu (27.1 lb/h at full load) while firing natural gas for the SW 501F CT and duct burner unit.

5.2.4 COMBUSTION TURBINE VOC BACT ANALYSIS

The objective of this analysis is to determine BACT for VOC emissions from the combustion turbines and duct burners. Unless otherwise noted, the VOC emission rates described in this section are corrected to 15 percent oxygen.

A review of the EPA BACT/LAER Clearinghouse Bulletin Board and the California Air Resource Board (BACT/LAER) indicates that the most stringent VOC emission control for a gas fired CT is 0.0022 lb/mmBtu at 15 percent O_2. This occurs at the Sacramento Power Authority Campbell Soup facility located in the Sacramento Metropolitan AQMD. The emission levels from a combined cycle natural gas fired 103 MW Siemens V84.2 gas turbine with water injection for power augmentation and 200 mmBtu/h of supplemental duct firing capacity are achieved through the application of an oxidation catalyst (assumed 5 percent destruction). In addition, the Sacramento Cogeneration Proctor and Gamble facility has a VOC emission control level for a GE LM-6000 combined cycle CT of 0.00221 lb/mmBtu (1.1 lb/h) using an oxidation catalyst. Most oxidation catalyst applications listed in the BACT/LAER database assumed destruction rates of 10 percent. The Saranac Energy Company located in New York uses an oxidation catalyst to control VOC emissions for a gas fired combustion turbine to as level of 0.0045 lb/mmBtu at O_2.

Only two projects show an emission reduction rate of any significance; the Combined Energy Resources project in the San Joaquin Valley Unified district and the Crockett Cogeneration (C&H Sugar) project in the Bay Area AQMD. The 44 and 50 percent removals reportedly achieved on these projects can be discounted, due to the high uncontrolled VOC emission rate for the projects. Mesquite Power, LLC, has proposed a VOC limit of approximately 5.2 ppmvd at 15 percent O_2 by using an oxidation catalyst for both the GE 7FA and the SW 501F CTs and duct burners. This corresponds to an approximate 10 percent reduction in emissions.

5.2.4.1 ALTERNATIVE VOC EMISSION REDUCTION SYSTEMS

Volatile organic compounds are formed during the combustion process due to incomplete oxidation of the carbon contained in the fuel. VOCs are typically defined as nonmethane, nonethane hydrocarbons that are emitted from the combustion turbine. VOC formation is limited by ensuring complete and efficient combustion of the fuel in the combustion turbine. High combustion temperatures, adequate excess air, and good air/fuel mixing during combustion minimize VOC emissions. Therefore, lowering combustion temperatures through steam/water injection or staged combustion, which is used to reduce combustor-based NO_x formation, can be counterproductive with regard to VOC emissions.

An alternative control method is catalytic oxidation, which is a postcombustion method reducing VOC emissions. This process is identical to that used for CO reduction where the same oxidation catalyst is used to promote the oxidation of VOC to CO_2 and

H_2O. The oxidation catalyst is typically a precious metal catalyst and reagent injection is necessary.

Two factors affect the ability of the catalyst to promote oxidation of VOC. Those factors are the temperature of the flue gas as it passes through the catalyst and the species of VOC present in the flue gas. Higher temperatures promote better oxidation of VOC. Long-chain hydrocarbons are also easier to oxidize than short-chain hydrocarbons. Therefore, the ability of the catalyst to oxidize VOC depends directly on the specific hydrocarbons that are in the flue gas.

The exact reduction that may be achieved can not be easily quantified. This uncertainty and the limited amount of removal that may be expected are reflected in the permitting of past projects with oxidation catalyst. As previously noted, most of the oxidation catalyst applications identified in the BACT/LAER databases indicate only an assumed destruction rate varying from 5 to 10 percent. Even with the oxidation catalyst included on their projects, the controlled emission rates on the Combined Energy Sources project and the Crockett Project are still significantly higher than the uncontrolled emission rate for the Project. The estimated VOC emissions for the units with the applicable control technology for the CTs and duct burners are listed in Table 5-5.

5.2.4.2 CONCLUSIONS

The VOC removal process is identical to that used for CO reduction where the same oxidation catalyst is used to promote the oxidation of VOC to CO_2 and H_20. Mesquite Power, LLC, has proposed to use an oxidation catalyst to control CO emissions. The use of this catalyst would allow for an approximate 10 percent reduction in VOC emissions as well. Therefore, the proposed BACT for the control of VOC emissions from each combustion turbine and duct burner is to use advanced combustion controls design and an oxidation catalyst, which represents good combustion practices.

5.2.5 COMBUSTION TURBINE SO_2 BACT ANALYSIS

Typically, natural gas has only trace amounts of sulfur, which is used as an odorant. The selection of this fuel provides inherently low SO_2 emissions. No supplemental SO_2 emission controls have been imposed on natural gas fired combustion turbines by regulatory agencies. Therefore, using natural gas as the only fuel is considered BACT for this project.

5.3 EMERGENCY DIESEL-FIRE PUMP BACT ANALYSIS

The (348 bhp) emergency diesel-fire pump will be operated for no more than 52 hours per year for routine maintenance and will fire only No. 2 fuel oil.

Table 5-5 Estimated VOC Emissions From Alternate Control Technologies Per CT Unit		
	Control Technologies	
	Dry-Low NO_x Combustors	Oxidation Catalyst
GE 7FA Emissions		
ppmvd	5.8	5.2
Percent Removal	N/A	10%
SW 501F Emissions		
ppmvd	5.8	5.2
Percent Removal	N/A	10%

The following is a summary of the requirements and assumptions on which the diesel-fire pump is based:

- Federal ambient air quality standards, emissions limitations, and applicable regulations will be met.
- No NSPS criteria have been established for diesel-fire pump emissions.

5.3.1 NO_X EMISSION CONTROL

The objective of the analysis is to determine BACT for NO_x emissions from the emergency diesel-fire pump which has the potential to emit NO_x at a rate of 5.6 lb/h.

A review of the BACT/LAER Clearinghouse documents (CAPCOA, November 1999 web site review; USEPA, November 1999 web site review) indicates that the most stringent NO_x emissions limit for a diesel-fired internal combustion engine is 94 percent reduction (no limit), which was achieved using an SCR at the Western Pacific Dredging Company located in the South Coast AQMD in southern California. The diesel-fired internal combustion engines are General Motors (Model 12-567) and Cooper Bessemer (Models JS-8-1 and LSV-16), which are separately manifolded together with two other engines to common control devices. It should be noted that the unit is located in a nonattainment area for ozone. Since NO_x is a precursor to ozone, the emission level is representative of LAER.

5.3.1.1 ALTERNATIVE NO_X EMISSION REDUCTION SYSTEMS

This section discusses two methods of NO_x control. The first method is the use of selective catalytic reduction and the second will be fuel injection timing retardation.

Selective Catalytic Reduction

SCR is a postcombustion method of controlling NO_x emissions. A detailed discussion of SCR is included in Section 5.2.1.2 This option represents the LAER for a diesel engine. SCR is not considered cost-effective for controlling NO_x emissions for the diesel-fire pump for this Project. This is due to the emergency status of the diesel-fire pump, which would not be in operation for a significant percentage of the year. The diesel-fire pump will not be operated for more than 52 hours per year for maintenance purposes Therefore, SCR will not be considered further in this BACT analysis.

Fuel Injection Timing Retardation

Fuel injection timing retardation delays the start of fuel injection in order to reduce the engine's maximum combustion pressure, thereby lowering the combustion temperature. Typically, fuel injection timing on these size units and unit service is retarded by three to four degrees. The maximum amount of retardation possible is controlled by such factors as piston, cylinder, manifold shape and materials, expected life, and the impact of modifying the combustion process on other pollutant emissions.

Retarding the fuel injection timing can reduce NO_x emissions by 20 to 30 percent, depending upon unit service, size, and design. However, the diesel engine combustion efficiency decreases with an increase in timing retardation; the emissions of other pollutants such as CO, VOC, and PM_{10} subsequently increase.

5.3.1.2 CONCLUSIONS

SCR is not considered to be a cost effective NO_x reduction alternative for the emergency diesel-fire pump in this Project. This is mainly because the maximum number of hours the diesel-fire pump will operate is 52 hours per year. Therefore, the recommended BACT for the emergency diesel-fire pump is fuel injection timing retardation.

5.3.2 CO AND VOC EMISSION CONTROL BACT ANALYSIS

The objective of this analysis is to determine BACT for CO and VOC emissions from the emergency diesel-fire pump. The emission rate of CO and VOC is limited to approximately 1.0 and 0.3 lb/h, respectively.

A review of the BACT/LAER Clearinghouse documents (CAPCOA, November 1999 web site review; USEPA, November 1999 web site review) indicates that the most stringent CO emission level for a diesel-fired internal combustion engine is 0.371 lb/mmBtu (8.27 lb/h). The 22 mmBtu/h unit is located at the Kamine/Besicorp Syracuse LP facility in New York. No add-on controls are required to meet this emission level.

The most stringent VOC emission level for a diesel-fired internal combustion engine is for the Western Pacific Dredging Company located in the South Coast AQMD in southern California. The diesel-fired internal combustion engines are General Motors (Model 12-567) and Cooper Beddemer (Models JS-8-1 and LSV-16) that are separately manifolded together with two other engines to common control devices. An oxidation catalyst applied to the diesel engine at the facility reduces the VOC emissions by 80 percent (no limit). The units are located in a nonattainment area for ozone. Since VOC is a precursor to ozone, the emission level is representative of LAER.

Alternative CO Emission Reduction Systems

CO and VOCs are formed during the combustion process due to incomplete oxidation of the carbon contained in the fuel. CO formation is limited by ensuring complete and efficient combustion of the fuel in the diesel engine. High combustion temperatures, adequate excess air, and good air/fuel mixing during combustion will minimize CO and VOC formation. However, lowering combustion temperatures to reduce NO_x formation can be counterproductive with regard to CO and VOC emissions. NO_x emission control technologies must always be considered when determining CO and VOC emission controls.

Postcombustion control technologies, such as an oxidation catalysts, may reduce CO and VOC emissions. An oxidation catalyst can be located at the diesel engine

exhaust. The reactions and catalyst used are identical to the catalyst oxidation technology previously described for the combustion turbines (Section 5.2.2). However, catalytic oxidation is not considered to be a cost effective control device for controlling CO and VOC emissions for the diesel-fire pump in this Project. This is due to the emergency status of the diesel-fire pump, which would be operated for no more than 52 hours per year for maintenance purposes. Therefore, an oxidation catalyst will not be considered further in this BACT analysis. BACT for the emergency diesel-fire pump proposed for the Project is to use good combustion controls.

5.3.3 PM_{10} EMISSION CONTROL BACT ANALYSIS

The objective of this analysis is to determine BACT for PM_{10} emissions from the emergency diesel-fire pump. A review of the BACT/LAER Clearinghouse documents (CAPCOA, November 1999 web site review; USEPA, November 1999 web site review) indicates that the most stringent PM_{10} emission level for a diesel-fired internal combustion engine is 1.0 g/bhp-h for Parker Hannifin Corporation, located in the San Joaquin Valley Unified APCD. The 450 hp diesel-fired (Detroit Diesel model 6V92) engine drives an electrical generator that is limited to 227 gallons per day. This diesel engine is required to burn low sulfur diesel fuel that is not to exceed 0.05 percent sulfur by weight and to use a positive crankcase control device that is 90 percent efficient. Because the diesel-fire pump will typically operate a maximum of 52 hours per year, it is anticipated that emission of particulate matter from the unit will be minimal. The emission of PM_{10} will be controlled by filtering the source inlet combustion air and by ensuring as complete combustion of the fuel as possible. The manufacturer's standard operating practices will ensure as complete combustion of the diesel fuel as possible. The PM_{10} emission rate of the emergency diesel-fire pump proposed for the Project is limited to approximately 0.2 lb/h. Therefore, the recommended BACT for the emergency diesel-fire pump for controlling PM_{10} is to be inlet air filtering and good combustion control.

5.3.4 SO_2 EMISSION CONTROL BACT ANALYSIS

The objective of this analysis is to determine BACT for SO_2 emissions from the emergency diesel-fire pump. The diesel engine proposed for the Project is required to burn low sulfur diesel fuel that is not to exceed 0.05 percent sulfur by weight. Furthermore, the diesel-fire pump will only be in operation for a maximum of 52 hours per year. The SO_2 emission rate of the emergency diesel-fire pump proposed for the Project is limited to approximately 0.5 lb/h. Therefore, the recommended BACT for the emergency diesel-fire pump for controlling SO_2 is to use low sulfur fuel oil with a maximum content of 0.05 percent by weight and to limit operation to a maximum of 52 hours per year.

5.4 COOLING TOWER BACT ANALYSIS

Uncontrolled cooling towers can be high emitters of PM_{10} under certain conditions. PM_{10} from cooling towers is generated by the presence of dissolved and suspended solids in the cooling tower circulation water, which is potentially lost as drift. A portion of the water droplets emitted from the tower exhausts will evaporate leaving the suspended or dissolved solids in the atmosphere, thus subject to dispersion. Typically, drift eliminators are used to minimize drift (droplet) losses. The drift eliminator control efficiency for the proposed cooling towers is 0.0005 percent resulting in emissions of 3.86 lb/h per tower. The drift eliminators are proposed as BACT for PM_{10} for the cooling towers.

5.5 SUMMARY

The following is a summary of the BACT determination and associated emission rates proposed for the pollutant emitting equipment for this project.

Nitrogen Oxides (NO_x) Emissions

- GE 7FA units - BACT was determined to be the use of dry-low NO_x burners during natural gas firing with an SCR to achieve an emission limit of 2.5 ppmvd at 15 percent O_2.
- SW 501F units - BACT was determined to be the use of dry-low NO_x burners during natural gas firing with an SCR to achieve an emission limit of 2.5 ppmvd at 15 percent O_2.
- Emergency Diesel-Fire Pump – BACT is fuel injection timing retardation.

Carbon Monoxide (CO) Emissions

- GE 7FA units – BACT was determined to be the use of good combustion controls during natural gas firing with an oxidation catalyst to achieve an emission limit of 4.0 ppmvd at 15 percent O_2.
- SW 501F units – BACT was determined to be the use of good combustion controls during natural gas firing with an oxidation catalyst to achieve an emission limit of 4.0 ppmvd at 15 percent O_2.
- Emergency Diesel-Fire Pump – BACT is good combustion controls during fuel oil firing.

Particulate Emissions

- BACT is the use of natural gas, combustion air filters, good combustion controls, and maintenance for both the GE 7FA and SW 501F units.
- Emergency Diesel-Fire Pump – BACT is inlet air filtering and good combustion control.

- Cooling Tower - BACT was determined to be the use of drift eliminators at an efficiency of 0.0005 percent.

VOC Emissions

- GE 7FA units – BACT was determined to be the use of good combustion controls during natural gas firing with an oxidation catalyst to achieve an emission limit of 5.2 ppmvd at 15 percent O_2 (10 percent removal).
- SW 501F units – BACT was determined to be the use of good combustion controls during natural gas firing with an oxidation catalyst to achieve an emission limit of 5.2 ppmvd at 15 percent O_2 (10 percent removal).
- Emergency Diesel-Fire Pump – BACT is good combustion controls during fuel oil firing.

Sulfur Dioxide (SO_2) emissions

- GE 7FA units – BACT is the use of good combustion controls using natural gas.
- SW 501F units – BACT is the use of good combustion controls using natural gas.
- Emergency Diesel-Fire Pump – BACT is the use of low sulfur fuel oil with a maximum content of 0.05 percent by weight and limiting operation to a maximum of 52 hours per year.

6.0 AIR QUALITY IMPACT ANALYSIS

6.1 SUMMARY OF FINDINGS

These findings are based on the results of the analyses conducted:

Applicability to PSD Review. Based on the Project's calculated potential to emit (PTE) emissions, the proposed facility will be a major stationary source. The regulated pollutants, NO_x, CO, PM_{10}, and VOC, exceed the PSD significant emission levels (SELs) and are subject to PSD review. The PTE calculations are presented in Section 4.0:

- Ambient Air Quality Impact Analysis. The results of the AAQIA demonstrate that predicted maximum CO emissions (1 and 8 hour averaging periods) do not exceed PSD Class II Significant Impact Levels (SILs). Thus, a PSD increment consumption analysis and a National Ambient Air Quality Standards (NAAQS) analysis are not required for this pollutant. Predicted NO_x (annual averaging period) and PM_{10} (annual and 24 hour averaging periods) ambient air quality impacts exceed the PSD Class II SILs. Both PSD Class II increment consumption and NAAQS analyses were performed for NO_2 (annual averaging period) and PM_{10} (annual and 24 hour averaging periods). The results of the Class II AAQIA, the NAAQS AAQIA results, and the Additional Impact Analyses results are presented in Sections 6.4, 6.6, and 6.8 respectively. These results show that neither the increment nor NAAQS standards are exceeded.
- Preconstruction Ambient Monitoring. The results of the AAQIA for NO_2, CO, and PM_{10} (annual averaging period) are less than the PSD de minimis monitoring levels, while the PM_{10} (24 hour averaging period) results are above the de minimis monitoring levels. Under PSD rules, ambient monitoring data gathering may be required by the Maricopa County Environmental Services Department Air Quality Division (ESDAQD) for PM_{10} unless representative data exists. The ESDAQD has approved the use of representative PM_{10} ambient monitoring data from an existing nearby monitor as representative of site conditions. The ESDAQD has also approved representative NO_2 monitoring data for use in the NAAQS analysis. A discussion of both representative monitoring data sets is presented in this Section.
- Additional Impacts Analysis. The proposed Project will not result in any secondary growth in the area, nor will the Project's air quality impacts have a significant adverse effect on surrounding soils and vegetation. Visibility, acid deposition, and ground level concentration analyses were performed for certain agreed-upon, sensitive Class II areas in Arizona. Groundlevel concentrations were also determined for Class I areas near the proposed Project. The results of the AIA demonstrate that the

operation of the proposed Project will not have a significant effect on the assessed areas.

The air dispersion modeling analysis was conducted in accordance with EPA's air dispersion modeling guidelines (incorporated as Appendix W of 40 CFR 51), as well as the Mesquite Power, LLC, Mesquite Generating Station Ambient Air Quality Impact Analysis Workplan (hereinafter referred to as the "workplan") submitted to ESDAQD on behalf of Mesquite Power, LLC, a copy of which is included in Appendix E.

6.2 MODEL SELECTION

The Industrial Source Complex Short-Term 3 (ISCST3 Version 99155) air dispersion model is capable of assessing impacts in simple, intermediate, and complex terrain, and was used to predict maximum ground level concentrations associated with the operation of the Project. The ISCST3 model is an EPA-approved, steady-state, straight-line Gaussian plume model, which may be used to assess pollutant concentrations from a wide variety of sources, associated with an industrial source complex. In addition, ISCST3 incorporates the COMPLEX1 dispersion algorithm for determining intermediate and complex terrain concentration impacts in accordance with EPA guidance.

6.3 MODEL INPUT AND OPTIONS

Model input parameters, source and emission parameters, as well as the ISCST3 model default options and input databases were chosen to adequately represent the Project.

6.3.1 MODEL INPUT SOURCE PARAMETERS

The ISCST3 model was used to determine the maximum predicted ground-level concentration for each pollutant and applicable averaging period over the typical operating ranges and four ambient temperatures (i.e., 17° F, 59° F, 73° F, and 122° F). The representative stack parameters and emission rates modeled for each load over the range of ambient temperatures considered in the analysis are presented in Table 6-1.

6.3.2 LAND USE DISPERSION COEFFICIENT DETERMINATION

The EPA's land use method was used to determine whether rural or urban dispersion coefficients should be used in the ISCST3 air dispersion model. In this procedure, land circumscribed within a 3 km radius of the Project was classified as rural or urban using the Auer land use classification method. Based on a visual inspection of the USGS 7.5 minute topographic map of the location of the Project and a site visit, it was concluded that over 50 percent of the area surrounding the Project is classified as rural. Accordingly, the rural dispersion modeling option was used in the ISCST3 air dispersion modeling.

Table 6-1
Summary of Combustion Turbine/HRSG Parameters and Emission Rates
Used in the AAQIA

Source Parameter	Combustion Turbine/HRSG Typical Operating Parameters							
	General Electric[b]				Westinghouse[b]			
	Short-term Scenario Loads			Annual Scenario[c]	Short-term Scenario Loads			Annual Scenario[c]
	100%[d]	75%[e]	50%[e]		100%[d]	85%[e]	75%[e]	
Units 1 – 4								
Base Elevation (ft)	890	890	890	890	890	890	890	890
Stack Height (ft)	170	170	170	170	170	170	170	170
Stack Diameter (ft)	18	18	18	18	18	18	18	18
Exit Temperature (F)	168.9	178.1	167.5	172.1	173.1	194.7	187.8	174.9
Exit Velocity (ft/s)	61.2	46.7	40.3	64.1	61.7	55.1	50.4	65.4
Emission Rates(lb/h)								
NO_x – Annual[a,c]				21.1				22.5
CO – Short-term[a]	21.6	13.1	10.5		23.0	14.9	12.8	
PM_{10} - Annual[a,c]				28.9				27.1
PM_{10} - Short-term[a]	30.4	18.0	18.0		28.8	15.5	13.7	

[a]Source parameters are listed on a per unit basis.
[b]Representative of the typical operating load ranges of the combustion turbines operating with the HRSGs (i.e., combined cycle mode).
[c]Determined from average annual temperature of 73° F at full load operation.
[d]Worst case full load operation over full range of ambient temperatures.
[e]Worst case operation over full range of ambient temperatures.

6.3.3 GEP STACK HEIGHT DETERMINATION

The dispersion of a plume can be affected by nearby structures when the stack is short enough to allow the plume to be significantly influenced by surrounding building turbulence. This phenomenon, known as structure induced downwash, generally results in higher model predicted ground level concentrations near the influencing structure. The Project's proposed buildings and structures were analyzed to determine their potential to influence the dispersion of stack emissions. EPA's Guideline for Determination of Good Engineering Practice Stack Height guidance document was followed in this evaluation. When a stack is constructed to good engineering practice (GEP) stack height, it avoids the modeled turbulent flow associated with nearby influencing structures. If a GEP stack height is used, structural downwash need not be considered in the analysis.

Structure dimensions and relative locations were entered into EPA's Building Profile Input Program (BPIP) to produce an ISCST3 input file with the proper Huber-Snyder or Schulman-Scire direction specific building downwash parameters. An output of GEP stack heights for each of the Project's emission sources is also produced. The structures and emission points included in the BPIP analysis are presented in Tables 6-2 and 6-3 and are illustrated on Figures 6-1 and 6-2, respectively. Results of the BPIP GEP analysis indicate that the proposed stack height for each stack is less than the respective GEP stack height, as shown in Table 6-4. Direction-specific building downwash parameters for all of the Project's stacks were incorporated into the ISCST3 air dispersion modeling analysis. A complete printout of the BPIP output file is included in Appendix F.

6.3.4 MODEL DEFAULTS

The following standard USEPA default regulatory modeling options were initialized in the ISCST3 air dispersion modeling:

- Final plume rises.
- Stack-tip downwash.
- Buoyancy induced dispersion.
- Default vertical wind profile exponents and vertical potential temperature gradient values.
- Calm processing option.
- Terrain elevations were incorporated.

6.3.5 RECEPTOR LOCATIONS

The air dispersion modeling receptor locations were established at appropriate distances to ensure sufficient density and aerial extent to adequately characterize the pattern of pollutant impacts in the area. Specifically, a nested rectangular grid network that extends 10 km from the center of the Project was used. The rectangular grid

Table 6-2 Structures Included in the BPIP Analysis			
Structure ID Number	Structure Designation*	Structure Base Elevation (ft)	Structure Height (ft)
1	HRSG 1	890	90
2	Combustion Turbine 1	890	45
3	Air Inlet 1	890	45
4	Electrical Control Center 1	890	10
5	HRSG 2	890	90
6	Combustion Turbine 2	890	45
7	Air Inlet 2	890	45
8	Firewater Storage Tank	890	60
9	Demineralized Water Tank	890	40
10	Cooling Tower 1	890	35
11	Cooling Tower 2	890	35
12	HRSG 3	890	90
13	Combustion Turbine 3	890	45
14	Air Inlet 3	890	45
15	HRSG 4	890	90
16	Combustion Turbine 4	890	45
17	Air Inlet 4	890	45
18	Electrical Control Center 2	890	10
19	Electrical Control Center 3	890	10
20	Electrical Control Center 4	890	10
21	Firewater Pump Housing	890	20
22	Demineralized H_2O Treatment	890	20
23	Waste Chemical Storage	890	20
24	Circulation Water Treatment	890	35
25	Control/Administration Area	890	60
26	Steam Turbine Area 1	890	60
27	Steam Turbine Area 2	890	60
28	Switchyard Control Building	890	20
29	SCR Ammonia Storage 1	890	25

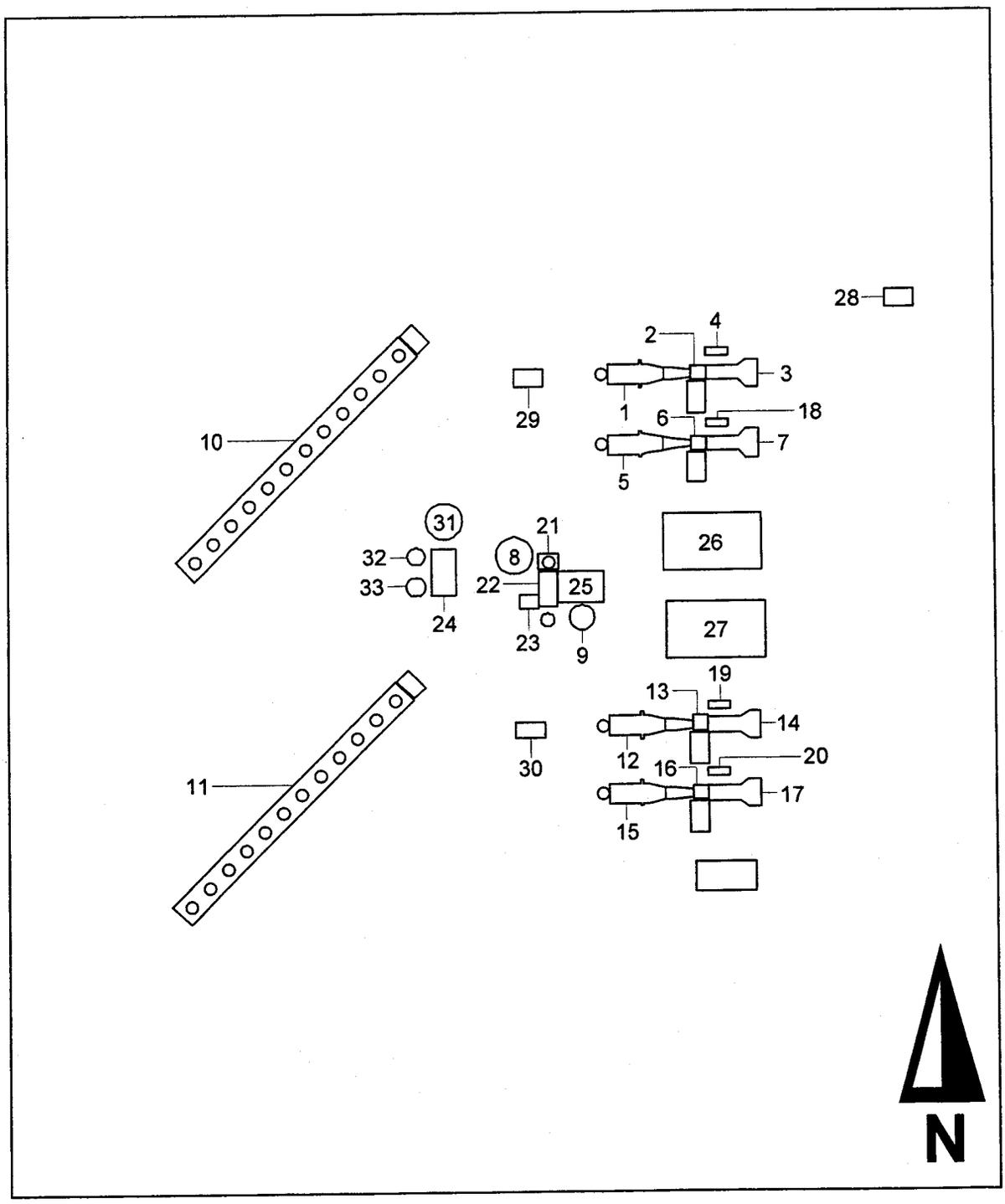
Table 6-2 (Continued) Structures Included in the BPIP Analysis			
Structure ID Number	Structure Designation*	Structure Base Elevation (ft)	Structure Height (ft)
30	SCR Ammonia Storage 2	890	25
31	Raw Water Storage Tank	890	60
32	Tank 1	890	20
33	Tank 2	890	20

*Proposed structures to be located at the Project. Refer to Figure 6-1 for locations.

Table 6-3
Emission Points Included in the BPIP Analysis

Emission ID Number	Emission Designation*	Base Elevation (ft)	Height (ft)
1	HRSG Stack 1	890	170
2	HRSG Stack 2	890	170
3	HRSG Stack 3	890	170
4	HRSG Stack 4	890	170
5	Cooling Tower Cell 1	925	10
6	Cooling Tower Cell 2	925	10
7	Cooling Tower Cell 3	925	10
8	Cooling Tower Cell 4	925	10
9	Cooling Tower Cell 5	925	10
10	Cooling Tower Cell 6	925	10
11	Cooling Tower Cell 7	925	10
12	Cooling Tower Cell 8	925	10
13	Cooling Tower Cell 9	925	10
14	Cooling Tower Cell 10	925	10
15	Cooling Tower Cell 11	925	10
16	Cooling Tower Cell 12	925	10
17	Cooling Tower Cell 13	925	10
18	Cooling Tower Cell 14	925	10
19	Cooling Tower Cell 15	925	10
20	Cooling Tower Cell 16	925	10
21	Cooling Tower Cell 17	925	10
22	Cooling Tower Cell 18	925	10
23	Cooling Tower Cell 19	925	10
24	Cooling Tower Cell 20	925	10
25	Cooling Tower Cell 21	925	10
26	Cooling Tower Cell 22	925	10
27	Cooling Tower Cell 23	925	10
28	Cooling Tower Cell 24	925	10
29	Diesel Firewater Pump	910	1

*Proposed emissions to be located at the Project. Refer to Figure 6-2 for locations.

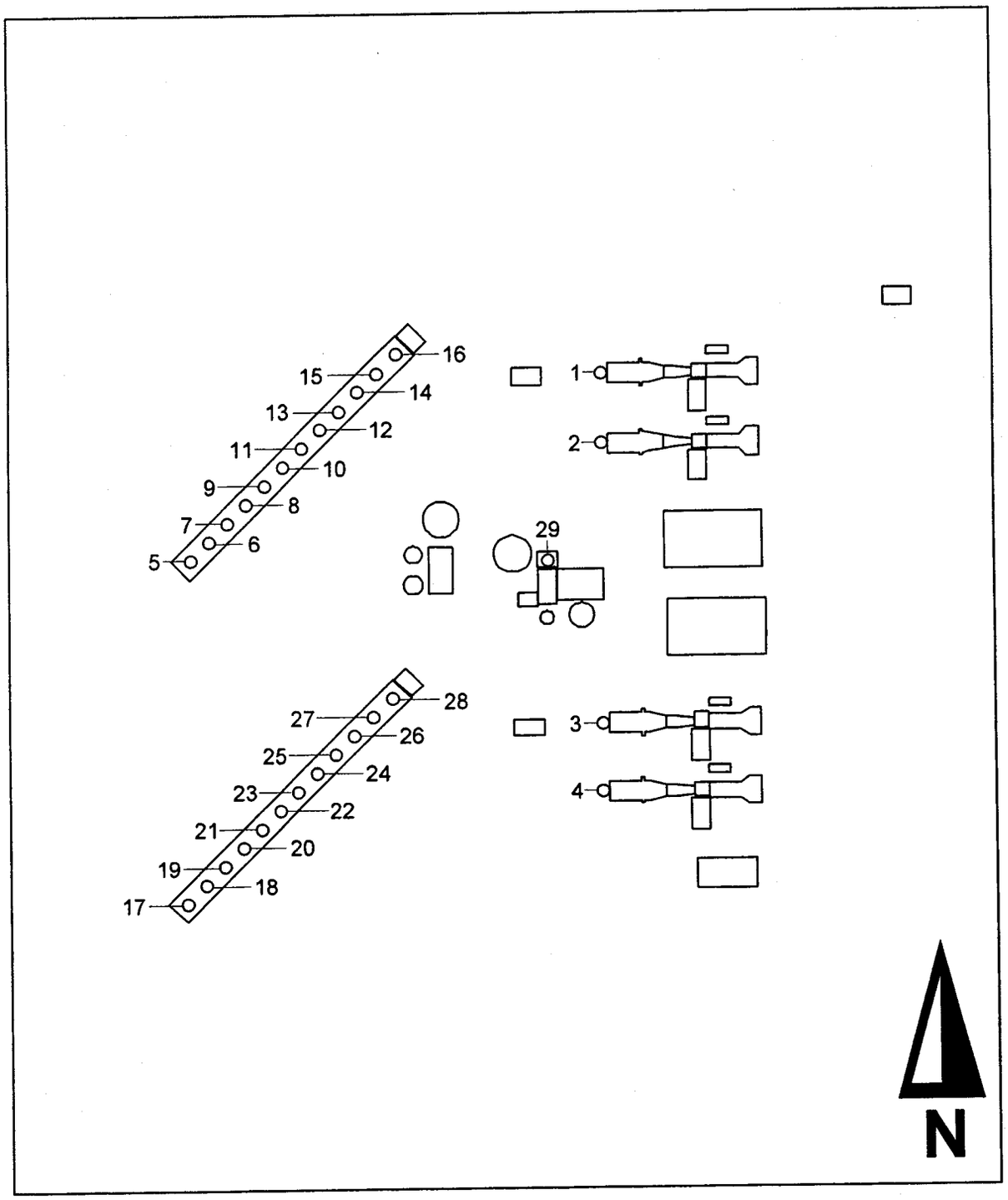


Buildings and Stuctures Included in the BPIP Analysis*

*See Table 6-2 for building/structure identification and dimensions.

Figure 6-1

building.srf



Emission Points Included in the Analysis*

*See Table 6-3 for description of sources.

Figure 6-2

sources.srf

Table 6-4
Results of BPIP GEP Analysis*

Emission ID Number	Emission Designation	Stack Height (ft)	GEP Height (ft)
1	HRSG Stack 1	170	225
2	HRSG Stack 2	170	225
3	HRSG Stack 3	170	225
4	HRSG Stack 4	170	225
5	Cooling Tower Cell 1	10	52.5
6	Cooling Tower Cell 2	10	52.5
7	Cooling Tower Cell 3	10	52.5
8	Cooling Tower Cell 4	10	115
9	Cooling Tower Cell 5	10	115
10	Cooling Tower Cell 6	10	115
11	Cooling Tower Cell 7	10	115
12	Cooling Tower Cell 8	10	115
13	Cooling Tower Cell 9	10	115
14	Cooling Tower Cell 10	10	115
15	Cooling Tower Cell 11	10	115
16	Cooling Tower Cell 12	10	176.6
17	Cooling Tower Cell 13	10	52.5
18	Cooling Tower Cell 14	10	52.5
19	Cooling Tower Cell 15	10	52.5
20	Cooling Tower Cell 16	10	52.5
21	Cooling Tower Cell 17	10	52.5
22	Cooling Tower Cell 18	10	52.5
23	Cooling Tower Cell 19	10	52.5
24	Cooling Tower Cell 20	10	52.5
25	Cooling Tower Cell 21	10	52.5
26	Cooling Tower Cell 22	10	52.5
27	Cooling Tower Cell 23	10	52.5
28	Cooling Tower Cell 24	10	177.2
29	Diesel-Fire Pump	1	205

*The complete BPIP output file is included in Appendix F.

network consists of 100 m spacing from the fence line out to 1,000 m, 500 m spacing out to 5 km, and then 1,000 m spacing from 5 to 10 km. Receptor spacing at 50 m intervals was used along the fence line. At the request of ESDAQD, additional receptors were placed on the peaks of surrounding buttes within the 10 km grid. Preliminary modeling showed that PM_{10} (24 hour averaging period) impacts, exceeding the PSD Class II SILs, fell on the edge of the 10 km grid. As a result, the grid was extended to capture all the Project's significant impacts. Figure 6-3 illustrates the 10 km nested rectangular grid, additional peaks, fence line receptors, and the relative location of the emission sources and downwash structures. Figure 6-4 shows the extended grid used for the PM_{10} (24 hour averaging period) PSD Class II SIL modeling as well as the PM_{10} annual averaging period modeling. The elevated terrain option was used for all receptor points.

Terrain elevations at the receptor locations were obtained using 30 meter Digital Elevation Model (DEM) terrain data from 7.5 minute USGS topographic maps. The terrain elevation values were calculated by choosing the highest elevation using the highest of the four DEM terrain elevations that encompassed each receptor.

6.3.6 METEOROLOGICAL DATA

The ISCST3 air dispersion model requires hourly input of specific surface and upper air meteorological data. These data include the wind flow vector, wind speed, ambient temperature, stability category, and the mixing height. Five years (1994-1998) of surface upper air meteorological data from the Palo Verde Nuclear Generating Station and data from Tucson International Airport was used in the ISCST3 air dispersion modeling analysis. This meteorological data was obtained from the Maricopa County ESDAQD for use in the air dispersion modeling analysis.

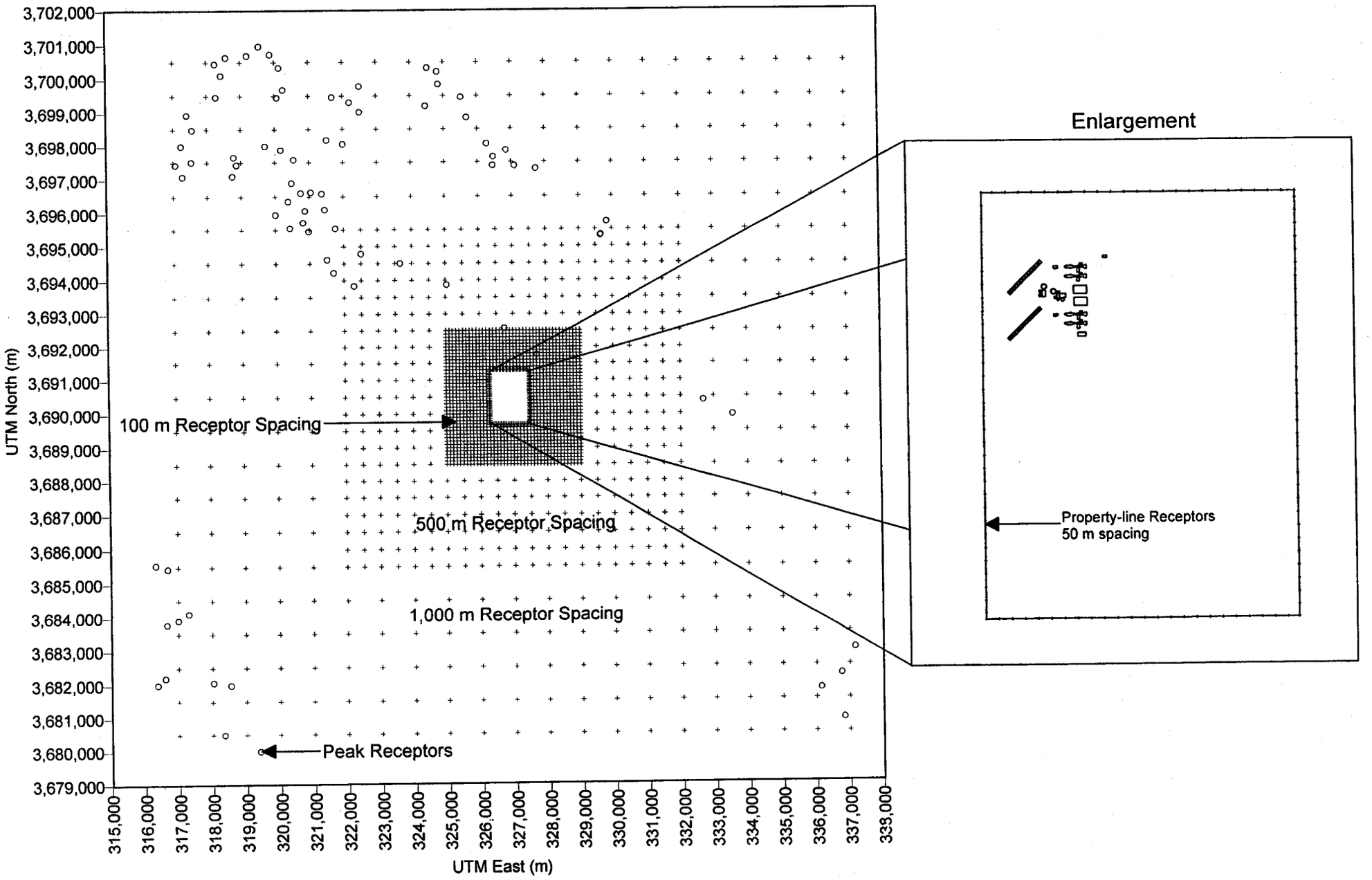
The Palo Verde Nuclear Generating Station is located approximately 2 miles north of the proposed Project location. The elevation, terrain, and surface roughness characteristics at the meteorological station are very similar to the Project site. Therefore, the meteorological data is representative of the Project site.

6.4 MODEL RESULTS

In accordance with the air modeling Workplan, ISCST3 air dispersion modeling was performed using the emission rates for NO_x, CO, and PM_{10}, and operational parameters by load, as presented in Table 6-5 for each applicable averaging period.

6.4.1 COMPARISON TO PSD CLASS II SIGNIFICANT IMPACT LEVELS AND PRECONSTRUCTION MONITORING REQUIREMENTS

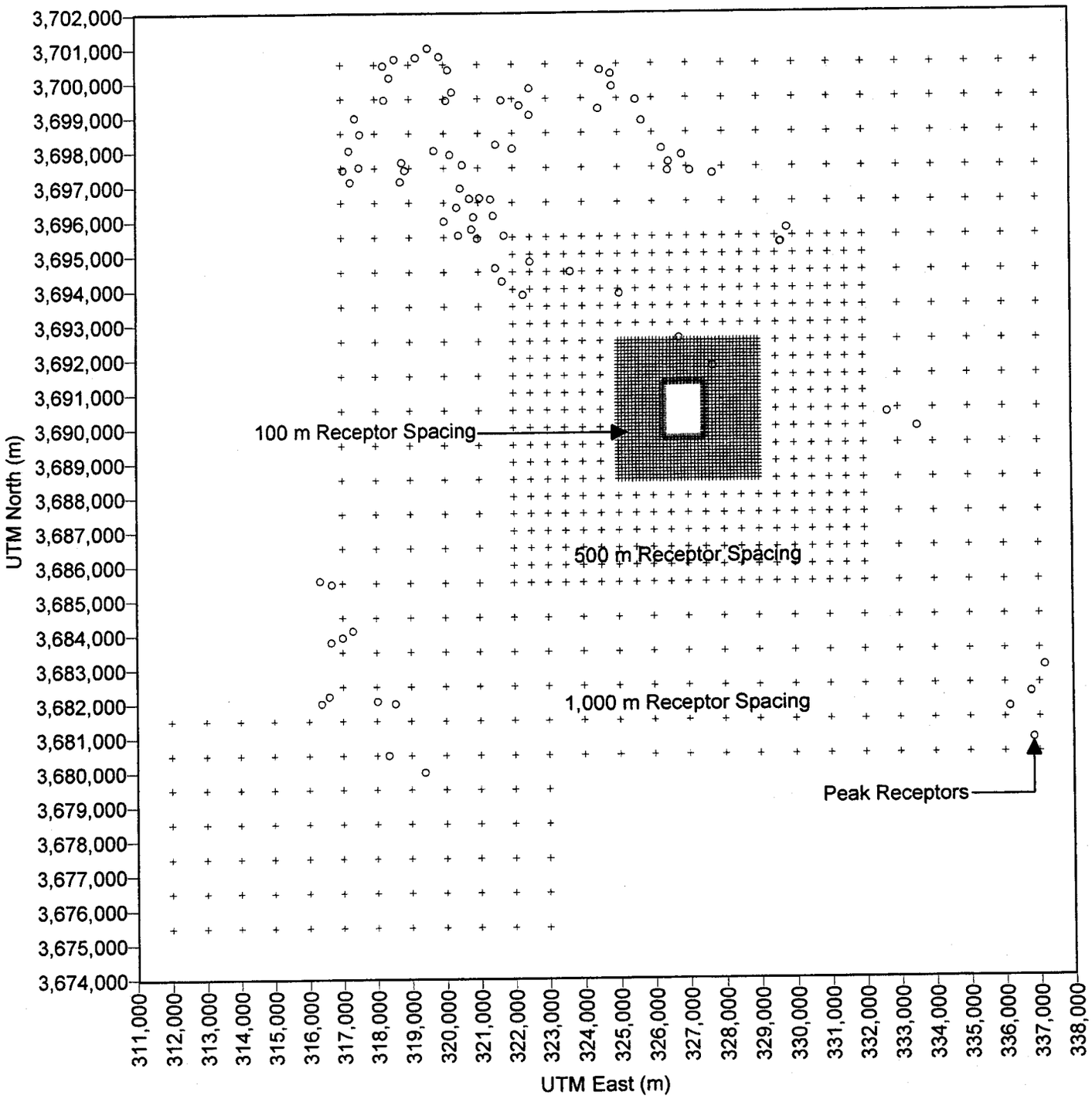
Table 6-5 presents the maximum predicted NO_x, CO, and PM_{10} impacts for the Project using the ISCST3 air dispersion model and 5 years of meteorological data (1994 to 1998) for each pollutant and averaging period. A complete listing of all modeled



Receptor Grid and Project Location

Figure 6-3

Facilitygrid.srf



Extended PM/PM_{10} Grid

Figure 6-4

PMGrid.srf

Table 6-5
Comparison of Maximum Predicted Project Impacts with the PSD Class II Significant Impact Levels and the PSD De Minimis Monitoring Levels

Pollutant	Averaging Period	General Electric			Westinghouse			PSD Class II Significant Impact Level[b] ($\mu g/m^3$)	Further Analysis Required[c]	PSD De Minimis Monitoring Level[d] ($\mu g/m^3$)	Monitoring Data Required?
		Max. Predicted Impact[a] ($\mu g/m^3$)	UTM Location (m)		Max. Predicted Impact[a] ($\mu g/m^3$)	UTM Location (m)					
			East	North		East	North				
NO_x	Annual	2.37	327711.5	3691769.3	2.39	327711.5	3691769.3	1	**Yes**	14	No
CO	1 Hour	479.69	326286.4	3690600.0	479.69	326286.4	3690600.0	2,000	**No**	-	-
	8 Hour	34.72	327711.5	3691769.3	35.12	327711.5	3691769.3	500	**No**	575	No
PM_{10}	Annual	3.95	327711.5	3691769.3	3.59	327711.5	3691769.3	1	**Yes**	-	-
	24 Hour	32.28	327711.5	3691769.3	29.50	327711.5	3691769.3	5	**Yes**	10	**Yes**

[a]For a complete listing of all impacts by year, pollutant, operating scenario, and averaging period refer to Appendix G.

[b]Predicted impacts from the Project that are below the specified level indicate that the Project will not have predicted significant impacts for that pollutant and further modeling is not necessary for that pollutant.

[c]If required, further analysis includes ambient air quality impact analysis of the Project and all nearby sources to determine compliance with PSD increment consumption and NAAQS.

[d]This criteria is used to determine if preconstruction ambient air monitoring is required to assess current and future compliance with NAAQS.

impacts by pollutant, operating scenario, and averaging period are contained in Appendix G.

Table 6-5 also compares the maximum model predicted concentrations for each pollutant and applicable averaging period with the PSD Class II SILs and the pre-construction monitoring requirements. The Project's CO (1 and 8 hour averaging periods) maximum predicted impacts are less than the PSD Class II significant impact levels. Therefore, under the PSD program, further air quality impact analyses are not required for this pollutant. Further air quality analyses are required for NO_x and PM_{10} (annual and 24 hour averaging periods). The additional analyses included the following assessments for both NO_x and annual and 24 hour PM_{10}.

- A NAAQS analysis.
- A PSD increment analysis.

The NAAQS analysis requires that the air quality from both the Project and all nearby "large" sources be combined with existing background air quality levels to determine whether the addition of the Project will result in the potential violation of the NAAQS. The NO_x and PM_{10} NAAQS analyses are presented in Section 6.6.

The PSD increment analysis requires that the air quality impact from the Project be combined with air quality impacts from other nearby increment consuming sources to determine whether total PSD related impacts are less than the allowable PSD increment level. The NO_x and PM_{10} Class II increment analyses are presented in Section 6.7.

As shown in Table 6-5, the maximum modeled 24 hour average PM_{10} impact of 40.42 $\mu g/m^3$ exceeds the PSD monitoring criterion of 10 $\mu g/m_3$ for PM_{10}. The predicted impacts for all other pollutants are less than the corresponding PSD monitoring criteria. The ESDAQD has approved the use of existing PM_{10} ambient monitoring data to represent the existing ambient PM_{10} concentration near the Project.

Even though the NO_2 ambient monitoring criterion was not exceeded, the maximum NO_x impact from the project exceeds the PSD NO_2 SIL. The ESDAQD approved the use of existing NO_2 ambient monitoring data for the NAAQS analysis. The existing monitoring data used in the NAAQS analysis are contained in Section 6.6.

6.4.2 STARTUP EMISSIONS ANALYSIS

Pollutant emission rates may vary significantly during low load transient conditions experienced during periods of startup. This is due to low load instability in the combustion turbine's dry-low NO_x combustor, and because the SCR and the oxidation catalyst are at suboptimum temperatures. Section 4 contains a discussion of emissions of SO_2, PM_{10}, VOC, CO, and NO_x during startups and shutdowns.

CO emissions from Westinghouse 501F combustion turbine were higher during startup than normal full load operation. CO has a short-term ambient air quality standard (1 and 8 hour averaging periods), short-term startup emissions for the Westinghouse 501F combustion turbine will be evaluated. The worst case 1 hour CO emission rate is 28.3 lb/h during startup. For an 8 hour averaging period, the average emission rate should consider a period of normal operation of 4 hours, and a worst case 4 hour startup period. The worst case 8 hour startup emission rate of CO for the Westinghouse turbine becomes:

(28.3 lb/h x 4 hours) + (23 lb/h x 4 hours)) / (8 hours) = 25.7 lb/h

Since the CO impacts (as presented in Table 6-5) are significantly below the PSD significant impact levels, a modeling analysis to determine the impacts from these startup emissions is unnecessary. Applying a ratio to the impacts that reflects the increase in emissions will give adequate representation of the CO impacts during startup. Table 6-6 presents the CO impacts during startup processes. The impacts remain well below the PSD significant impact levels for the CO 1 and 8 hour averaging periods.

6.5 SIGNIFICANT IMPACT AREA AND EMISSION INVENTORY DETERMINATION

As concluded in Section 6.4, further air quality impact analyses of NO_x and PM_{10} (annual and 24 hour averaging periods) are necessary to demonstrate compliance with PSD increments and the NAAQS. In accordance with EPA guidance, all nearby sources are required to be modeled as part of the NAAQS and increment analyses. The Modeling Guideline defines a "nearby" source as any point source expected to cause a significant contribution gradient in the vicinity of the proposed new source. For PSD purposes, "vicinity" is defined as the impact area. The "significant impact area" is then defined as a circle whose radius is the farthest distance from the Project for which there is a predicted significant impact. A significant impact is further defined as a modeled concentration more than the PSD significant impact levels, as shown in Table 6-7. A separate radius is determined for each pollutant and averaging period.

6.5.1 SIGNIFICANT IMPACT AREAS

The radii of significant impact were determined for the Project by finding the farthest receptor distance for which the predicted maximum impact was above the significance level. The results of this determination are contained in Table 6-7. As indicated in Table 6-7, the significant impact area for NO_x is 1.46 kilometers (km), for PM_{10} (annual average) is 5.41 km, and for PM_{10} (24 hour average) is 14.03 km from the Project location. Rather than model only those receptors that fall within the Project's significant impact areas, the full grids presented on Figures 6-3 and 6-4 were used in the NAAQS and increment analyses.

Table 6-6
CO Startup Emissions and Impacts[a]

Averaging Period	Normal Operation Impacts ($\mu g/m^3$)[b]	Startup Operation Impacts ($\mu g/m^3$)	PSD Class II Significant Impact Level[b] ($\mu g/m^3$)
1 hour	479.69	590.02[c]	2,000
8 hour	35.12	39.33[d]	500

[a]For the Westinghouse 501F combustion turbines.

[b]From Table 6-5.

[c]Applies a ratio of 1.23 to the impacts during normal operation. (28.3 lb/h startup emission rate/23 lb/h normal emission rate.)

[d]Applies a ratio of 1.12 to the impacts during normal operation. (25.7 lb/h startup emission rate/23 lb/h normal emission rate.)

Table 6-7 EPA Designated Significant Impact Levels			
Pollutant	Averaging Period	PSD Significant Impact Level ($\mu g/m^3$)	Distance of Significant Impact[a] (km)
NO_x	Annual	1.0	1.46
PM_{10}	Annual	1.0	5.41
PM_{10}	24 Hour	5.0	14.03

[a]The significant impact area for each pollutant and averaging period is defined by the distance shown and is the largest distance of the two turbine vendors' machines (General Electric and Westinghouse).

6.5.2 EMISSION INVENTORY OF NEARBY SOURCES

EPA guidance states that modeling must include those sources which have received PSD permits but have not yet begun to operate, as well as any complete PSD applications for which a permit has not yet been issued. As a compilation of emission sources for the emissions inventory, Mesquite Power, LLC, has gathered data for the nearby facilities of Duke, Pinnacle West, and Palo Verde Nuclear Generating Station. The emission inventory used is conservatively high because the Palo Verde Nuclear Generating Station is an existing facility, and its impacts are already accounted for in the background data. The source names, locations, and modeling parameters are shown in Table 6-8. The modeling parameters were identified through inspection of source permit application information obtained from the Maricopa County ESDAQD. The nearby sources presented in Table 6-8 will be included in the PSD increment and NAAQS analyses.

6.6 NAAQS ANALYSIS

The National Ambient Air Quality Standards (NAAQS) cumulative impact analysis was accomplished by adding the predicted ambient impact of the Project to the impact of nearby sources, then adding the representative background ambient concentration. The total was compared to the applicable NAAQS for the pollutant. This procedure was applied to NO_2 on an annual average basis and PM_{10} on an annual and 24 hour average basis.

6.6.1 EXISTING SOURCES

The emission inventory of sources included in the NAAQS analyses for NO_2 and PM_{10} is shown in Table 6-8. Source emissions used in the analyses were obtained from the air permit applications for the previously mentioned facilities. Stack modeling parameters (including height, diameter, flow rate, and temperature) were included as part of the inventory.

6.6.2 BACKGROUND CONCENTRATIONS

In accordance with EPA guidance, air quality data may be used to establish background concentrations in the impact area resulting from existing sources that are not considered nearby. Representative background concentration values have been developed from existing ambient data collected in the area. Table 6-9 shows the monitoring site used, its location relative to the Project, and the representative ambient monitoring concentrations. The Palo Verde Nuclear Generating Station monitoring site (AIRS #04-013-9993) was used exclusively for NO_2 and PM_{10}.

Table 6-8
Emission Inventory of Nearby Sources for NAAQS Modeling Analysis

Source*	Location		Emission Rate (g/s)		Stack Height, (m)	Stack Diameter, (m)	Stack Velocity, (m/s)	Stack Temp., (K)	Facility Elevation, (m)
	UTM-E	UTM-N	NO_x	PM_{10}					
Duke1	324282	3690470	3.02	4.03	48.77	5.49	21.34	359.82	268.5
Duke2	324330	3690470	3.02	4.03	48.77	5.49	21.34	359.82	268.5
DukBoilr	324255	3690476	0.39	0.04	11.28	0.61	10.67	505.37	268.5
DukCol01	324182	3690358	0	0.14	14.33	9.24	9.14	294.26	268.5
DukCol02	324198	3690358	0	0.14	14.33	9.24	9.14	294.26	268.5
DukCol03	324214	3690358	0	0.14	14.33	9.24	9.14	294.26	268.5
DukCol04	324231	3690358	0	0.14	14.33	9.24	9.14	294.26	268.5
DukCol05	324247	3690358	0	0.14	14.33	9.24	9.14	294.26	268.5
DukCol06	324264	3690358	0	0.14	14.33	9.24	9.14	294.26	268.5
DukCol07	324280	3690358	0	0.14	14.33	9.24	9.14	294.26	268.5
DukCol08	324297	3690358	0	0.14	14.33	9.24	9.14	294.26	268.5
DukCol09	324313	3690358	0	0.14	14.33	9.24	9.14	294.26	268.5
DukCol10	324330	3690358	0	0.14	14.33	9.24	9.14	294.26	268.5
PWStack1	328939.8	3690244.1	3.06	1.91	53.34	5.49	19.81	349.82	266.7
PWStack2	328939.8	3690200.4	3.06	1.91	53.34	5.49	19.81	349.82	266.7
PWStack3	328939.8	3690091.1	3.06	1.91	53.34	5.49	19.81	349.82	266.7
PWStack4	328939.8	3690047.5	3.06	1.91	53.34	5.49	19.81	349.82	266.7
PWStack5	328939.8	3689878.4	3.06	1.91	53.34	5.49	19.81	349.82	266.7
PWStack6	328939.8	3689834.7	3.06	1.91	53.34	5.49	19.81	349.82	266.7
PWStack7	328939.8	3689725.4	3.06	1.91	53.34	5.49	19.81	349.82	266.7
PWStack8	328939.8	3689681.8	3.06	1.91	53.34	5.49	19.81	349.82	266.7
PWT1C1	329019.8	3690251.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT1C2	329036.3	3690251.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT1C3	329052.8	3690251.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT1C4	329069.3	3690251.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT1C5	329085.8	3690251.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT1C6	329102.3	3690251.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT1C7	329118.8	3690251.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT1C8	329135.3	3690251.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT1C9	329151.8	3690251.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT1C10	329168.3	3690251.1	0	0.08	16.76	6.10	10.0	295.93	266.7

Table 6-8 (Continued)
Emission Inventory of Nearby Sources for NAAQS Modeling Analysis

Source*	Location		Emission Rate (g/s)		Stack Height, (m)	Stack Diameter, (m)	Stack Velocity, (m/s)	Stack Temp., (K)	Facility Elevation, (m)
	UTM-E	UTM-N	NO_x	PM_{10}					
PWT1C11	329184.9	3690251.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT1C12	329201.4	3690251.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT2C1	329019.8	3690098.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT2C2	329036.3	3690098.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT2C3	329052.8	3690098.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT2C4	329069.3	3690098.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT2C5	329085.8	3690098.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT2C6	329102.3	3690098.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT2C7	329118.8	3690098.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT2C8	329135.3	3690098.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT2C9	329151.8	3690098.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT2C10	329168.3	3690098.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT2C11	329184.9	3690098.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT2C12	329201.4	3690098.1	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT3C1	329019.8	3689885.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT3C2	329036.3	3689885.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT3C3	329052.8	3689885.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT3C4	329069.3	3689885.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT3C5	329085.8	3689885.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT3C6	329102.3	3689885.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT3C7	329118.8	3689885.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT3C8	329135.3	3689885.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT3C9	329151.8	3689885.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT3C10	329168.3	3689885.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT3C11	329184.9	3689885.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT3C12	329201.4	3689885.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT4C1	329019.8	3689732.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT4C2	329036.3	3689732.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT4C3	329052.8	3689732.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT4C4	329069.3	3689732.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT4C5	329085.8	3689732.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT4C6	329102.3	3689732.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT4C7	329118.8	3689732.4	0	0.08	16.76	6.10	10.0	295.93	266.7

Table 6-8 (Continued)
Emission Inventory of Nearby Sources for NAAQS Modeling Analysis

Source*	Location		Emission Rate (g/s)		Stack Height, (m)	Stack Diameter, (m)	Stack Velocity, (m/s)	Stack Temp., (K)	Facility Elevation, (m)
	UTM-E	UTM-N	NO_x	PM_{10}					
PWT4C8	329135.3	3689732.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT4C9	329151.8	3689732.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT4C10	329168.3	3689732.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT4C11	329184.9	3689732.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PWT4C12	329201.4	3689732.4	0	0.08	16.76	6.10	10.0	295.93	266.7
PVFurnce	327365.7	3696635.0	0.32	0.05	28.04	0.46	0.99	322.04	289.6
PVColTr1	326684.3	3696157.6	0	0.56	19.36	9.14	9.63	316.48	289.6
PVColTr2	326375.1	3695819.2	0	0.56	19.36	9.14	9.63	316.48	289.6
PVColTr3	326176.7	3695361.1	0	0.56	19.36	9.14	9.63	316.48	289.6

Source: Air permit applications for the respective facilities.

*Duk = Duke
PW = Pinnacle West
PV = Palo Verde Nuclear Generating Station

Table 6-9
Representative Ambient Background Monitoring Data

Monitoring Site	Location Latitude/ Longitude (degrees)	Distance from Project (km)	Direction from Project	Pollutant Monitored	Averaging Period	Representative Background Concentration ($\mu g/m^3$)
Palo Verde[a]	33.349/ 112.832	3.0	N	NO_2	Annual	58[b]
Palo Verde[a]	33.349/ 112.832	3.0	N	PM_{10}	Annual	20[c]
Palo Verde[a]	33.349/ 112.832	3.0	N	PM_{10}	24 hour	70[d]

[a]Palo Verde Nuclear Generating Station (AIRS #04-013-9993).

[b]Represents the maximum 1 hour NO_2 monitored value for a portion of 1998. This is conservatively higher than the annual average maximum.

[c]Represents the maximum annual mean for 1997.

[d]Represents the maximum high second high value for 1997.

NO_2 CONCENTRATIONS

A background NO_2 concentration of 58 μg/m^3 was assumed in the NAAQS analysis. This representative background concentration, as contained in Table 6-9, was calculated as the maximum 1 hour concentration of NO_2 for a portion of the calendar year 1998 at the monitoring site. The monitoring site began operation in April and has recorded 7 months of data. The ESDAQD determined that these NO_2 data are representative for the Project and as such are used in the NAAQS analysis.

PM_{10} CONCENTRATIONS

The background annual average PM_{10} concentration assumed in the NAAQS analysis is 20 μg/m^3. This value is the highest reported annual mean for the period of record of 1996-1999 at the monitor site. The background 24 hour average PM_{10} concentration assumed in the NAAQS analysis is 70 μg/m^3. This conservative background concentration, as presented in Table 6-9, is the high second high measured value for any given calendar year for the period of record of 1996 to 1999 at the monitor site. The monitor has been determined by the ESDAQD to be representative of the PM_{10} background concentration near the Project.

6.6.3 RECEPTOR LOCATIONS

The receptor grid is based on the same receptor grid utilized for the maximum air quality impact determination, as discussed in Section 6.3.5, which consists of a rectangular grid network of 100 m spacing from the fence line out to 1,000 m, 500 m spacing out to 5 km, and then 1,000 m spacing from 5 km to 10 km. Receptor spacing at 50 m intervals was used along the property boundary.

6.6.4 MODELING METHODOLOGY

The basis of the NAAQS analysis is the summation of impacts from the Project, nearby sources, and a representative background concentration. The modeling procedure used was similar to that used to determine maximum impacts from the Project, as described in Section 6.3. The ISCST3 model was operated with the 5 years (1994 to 1998) of meteorological data described in Section 6.3.6. However, for the NAAQS analysis the Project's emissions were simultaneously modeled with other nearby sources and added to a representative ambient background concentration.

6.6.5 RESULTS

For the annual averaging periods, the highest predicted impacts produced by the operating load and existing source combination were determined. For the PM_{10} 24 hour averaging period, the modeled high sixth high concentration was determined. NO_2 emissions from the Project and other nearby sources were conservatively assumed to be emitted as NO_x. As shown in Table 6-10, both NO_x and PM_{10} show no violation of the

Table 6-10
Comparison of NO_x and PM_{10} with NAAQS

Turbine Vendor	Pollutant	Averaging Period	Maximum Interactive Source Impacts[a,b] ($\mu g/m^3$)	Location		Representative Background Concentration[c] ($\mu g/m^3$)	Total Concentration[d] ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
				UTM-E (m)	UTM-N (m)			
General Electric	NO_x	Annual	3.53	327711.5	3691769	58	61.53	100
	PM_{10}	Annual	5.96	327711.5	3691769	20	25.96	50
	PM_{10}	24 hour[e]	24.76	327711.5	3691769	70	94.76	150
Westinghouse	NO_x	Annual	3.55	327711.5	3691769	58	61.55	100
	PM_{10}	Annual	5.62	327711.5	3691769	20	25.62	50
	PM_{10}	24 hour[e]	23.00	327711.5	3691769	70	93.00	150

[a]Modeled sum of the Project's impacts and other nearby sources.

[b]A complete listing of results is presented in Appendix H.

[c]As contained in Table 6-9.

[d]Arithmetic sum of the maximum interactive source impacts and the representative background concentration.

[e]High sixth high modeled impact.

NAAQS. A complete listing of NAAQS predicted impacts by pollutant, operating scenario, and averaging period are contained in Appendix H.

6.7 PSD CLASS II INCREMENT ANALYSIS

6.7.1 SOURCE INVENTORY

EPA guidance for the development of a cumulative inventory considers emissions from both the proposed Project and from sources in the significant impact area (SIA). There may be the need to include other sources outside the SIA that cause significant impacts in the Project's SIA. As detailed in the Pinnacle Northwest Combined Cycle Project Application, the recent APS West Phoenix Power Plant expansion project was evaluated to determine if a large source in the Phoenix area could contribute to a significant concentration in that project's SIA. The APS Plant's modeled impacts were insignificant. It is expected that sources of this size and location will not have an impact on the Project's SIA. Thus, as a compilation of emission sources for the emissions inventory, Mesquite has gathered data for the nearby facilities of Duke, Pinnacle West, and Palo Verde Nuclear Generating Station. The source names, locations, and modeling parameters are presented in Table 6-8. As previously discussed, the modeling parameters were identified through inspection of source permit application information obtained from the Maricopa County ESDAQD. The nearby sources presented in Table 6-8 are included in the PSD increment analyses.

6.7.2 INCREMENT ANALYSIS METHODOLOGY

The basis of the increment analysis follows the modeling methodology presented in the NAAQS analysis in Section 6.4 without the addition of a representative background concentration. The PSD increment levels of comparison are presented in Table 6-11.

6.7.3 CONCLUSION

The predicted maximum impact from the Project for NO_2 and PM_{10} were compared to the PSD Class II increments as shown in Table 6-12. The results shown in the table indicate that the operation of the Project will not result in consumption of the available PSD Class II increments. A complete listing of all increment modeled impacts by pollutant, operating scenario, and averaging period are contained in Appendix I.

Table 6-11 PSD Class II Increments for NO_x and PM_{10}		
Pollutant	Averaging Period	PSD Increment ($\mu g/m^3$)
NO_2	Annual	25
PM_{10}	Annual	17
PM_{10}	24 Hour	30

Table 6-12
Results of PSD Class II Increment Analysis

Turbine Vendor	Pollutant	Averaging Period	Maximum Modeled Increment Consumption[a,b] ($\mu g/m^3$)	Location		PSD Class II Increment ($\mu g/m^3$)	Increment Consumed?
				UTM-E (m)	UTM-N (m)		
General Electric	NO_x	Annual	3.53	327711.5	3691769	25	No
	PM_{10}	Annual	5.96	327711.5	3691769	17	No
	PM_{10}	24 hour[c]	24.76	327711.5	3691769	30	No
Westinghouse	NO_x	Annual	3.55	327711.5	3691769	25	No
	PM_{10}	Annual	5.62	327711.5	3691769	17	No
	PM_{10}	24 hour[c]	23.00	327711.5	3691769	30	No

[a]Arithmetic sum of the Project impacts and other nearby sources.

[b]A compete listing of results is presented in Appendix I.

[c]High sixth high modeled impact.

6.8 ADDITIONAL IMPACT ANALYSES

6.8.1 NONATTAINMENT AREAS NEAR THE PROJECT

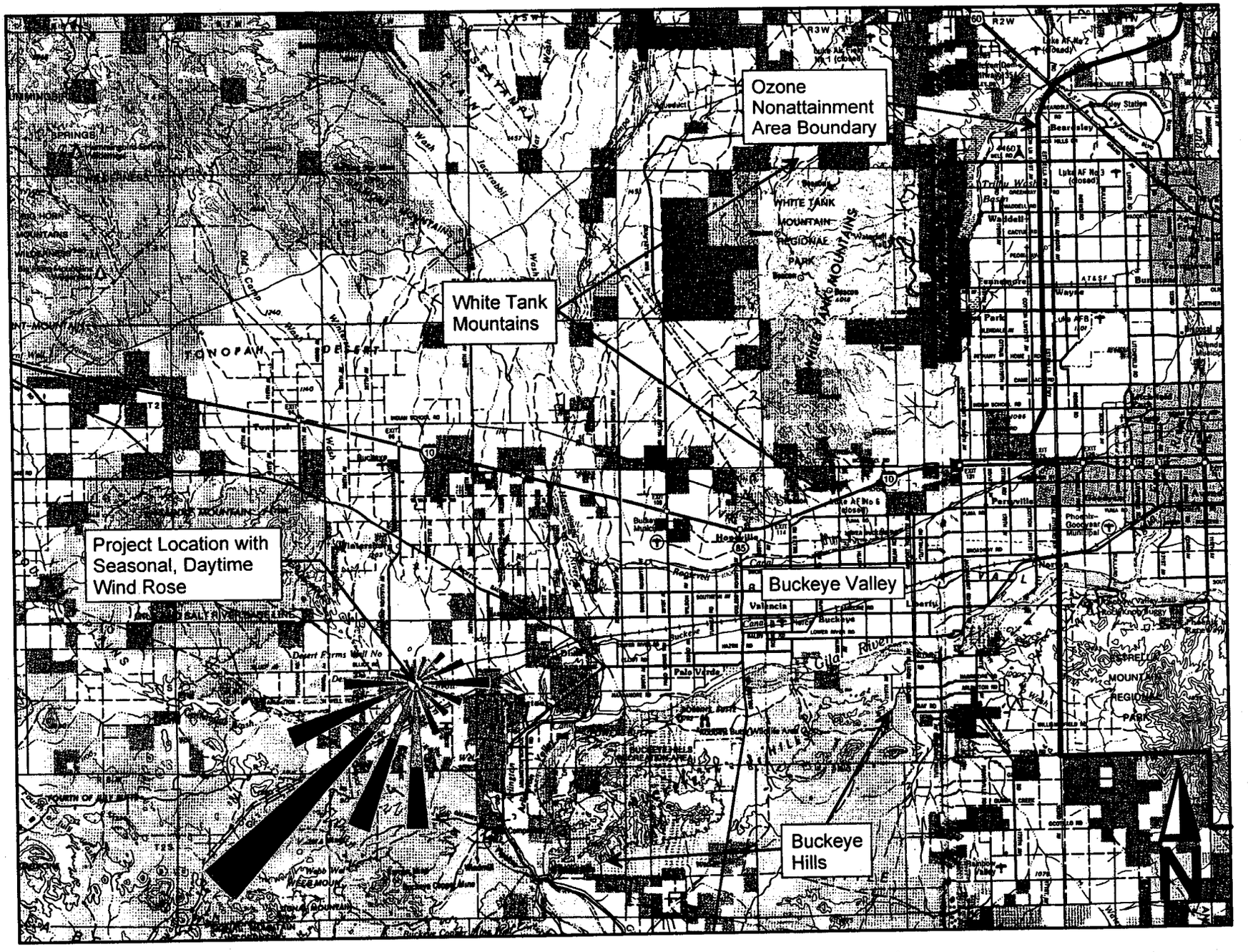
The Project will be located approximately 15 miles west of the Phoenix nonattainment area for PM_{10} and 25 miles west of the Phoenix nonattainment area for CO and NO_x (as a precursor to O_3) PSD pollutants. Maricopa County Rule 240 Section 308.1(e) presumes that any major source of VOCs and NO_x located within 50 km (31 miles) of an ozone nonattainment area contributes to ozone violations unless it can be demonstrated that topographical, meteorological, or other physical factors in the vicinity of the new major source are such that emissions are not expected to contribute to violations of the ozone standards in the adjacent nonattainment areas.

Figure 6.5 shows a seasonal, daytime wind rose for the Project, the boundary for the ozone nonattainment area, as well as the surrounding terrain and topography. The wind rose represents the hottest months (May through October) and the daylight hours (8 am to 8 pm). These bounds are used to represent the summer ozone period. The prevailing wind is from the southwest (with smaller components from the south). Considering these winds, emissions from the Project would be transported to the northeast along the river valley towards the White Tank Mountains. This keeps the emissions from making further eastward progression towards the ozone nonattainment area. Thus it is not likely, based on meteorological and topographical considerations, that emissions from the Project would be transported through the Buckeye Valley into the ozone nonattainment area of the Phoenix air basin. As further consideration of the transport of emissions from the Project into both the ozone and PM_{10} nonattainment areas, each area was evaluated with a modeling analysis.

These areas were modeled with the ISCST3 air dispersion model to demonstrate there would be no significant impacts into the areas. Receptors were placed along the boundaries of the nonattainment areas and were modeled against PSD Class II significant impact levels. Figure 6-6 illustrates the receptors with respect to the proposed Project location. Table 6-13 provides the maximum impacts on these receptors and compares them to PSD Class II SILs. As can be seen from Table 6-13, the Project will not have a significant impact on these nonattainment areas.

6.8.2 COMMERCIAL, RESIDENTIAL, AND INDUSTRIAL GROWTH

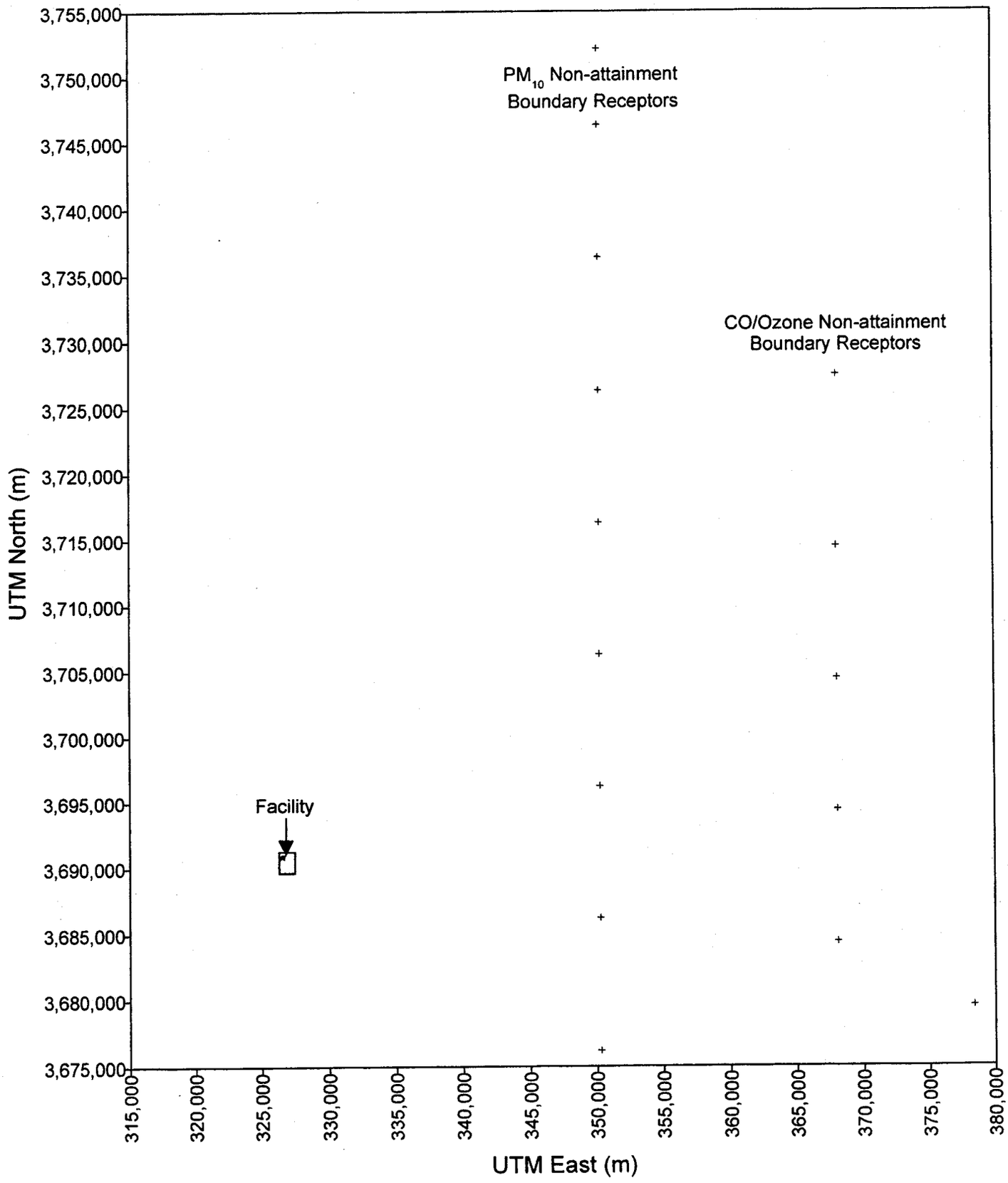
The Project will be constructed near Arlington, Arizona. There will be an increase in the local labor force during the construction phase of the Project, but this increase will be temporary, short-lived, and will not result in permanent or significant commercial and residential growth occurring in the vicinity of the Project. It is anticipated that most of the labor force during the construction phase will commute from nearby communities. The electrical generating capacity created by the Project will not have a significant effect upon the industrial growth in the immediate area considering that the



Wind Rose, Topography, & Ozone Nonattainment Area

Figure 6-5

nonattainment.srf



Non-attainment Boundary Receptors

Figure 6-6

NAgrid.srf

Table 6-13
Maximum Predicted Impacts on Nonattainment Areas

Pollutant	Averaging Period	General Electric			Westinghouse			PSD Class II Significant Impact Level* ($\mu g/m^3$)
		Max. Predicted Impact ($\mu g/m^3$)	UTM Location (m)		Max. Predicted Impact ($\mu g/m^3$)	UTM Location (m)		
			East	North		East	North	
NO_x	Annual	0.16	350268.6	3706266	0.17	350268.6	3706266	1
CO	1 Hour	12.33	350268.6	3706266	12.63	350268.6	3706266	2,000
	8 Hour	3.48	350268.6	3706266	3.64	350268.6	3706266	500
PM_{10}	Annual	0.24	350268.6	3706266	0.23	350268.6	3706266	1
	24 Hour	1.86	350268.6	3706266	1.73	350268.6	3706266	5

*Predicted impacts from the Project that are below the specified level indicate that the Project will not have predicted significant impacts for that pollutant and further modeling is not necessary for that pollutant.

Table 6-14 Comparison of Maximum Impacts to NAAQS				
Pollutant	Averaging Period	Maximum Impact ($\mu g/m^3$)		NAAQS ($\mu g/m^3$)
		General Electric	Westinghouse	
NO_x	Annual	2.37	2.39	100
CO	8 hour	34.72	35.12	10,000
	1 hour	479.69	479.69	40,000
PM_{10}	Annual	3.95	3.59	50
	24 hour	32.28	29.50	150

electrical generating capacity will be sold to the grid as opposed to a nearby industrial host.

Population increase is a secondary growth indicator of potential increases in air quality levels. Changes in air quality due to population increase is related to the amount of vehicle traffic, commercial/institution facilities, and home fuel use. Approximately 25 to 30 new permanent jobs will be created as a result of the Project, thus, it can be concluded that there will not be any significant air quality impacts associated with secondary growth.

6.8.3 SOILS AND VEGETATION

The NAAQS have been established to protect public health and welfare from any adverse effects of criteria pollutants, which include impacts on soil and vegetation. As shown in Table 6-14, the Project will have predicted impacts significantly below all NAAQS. It is concluded, therefore, that no adverse effects on soils and terrestrial vegetation are expected.

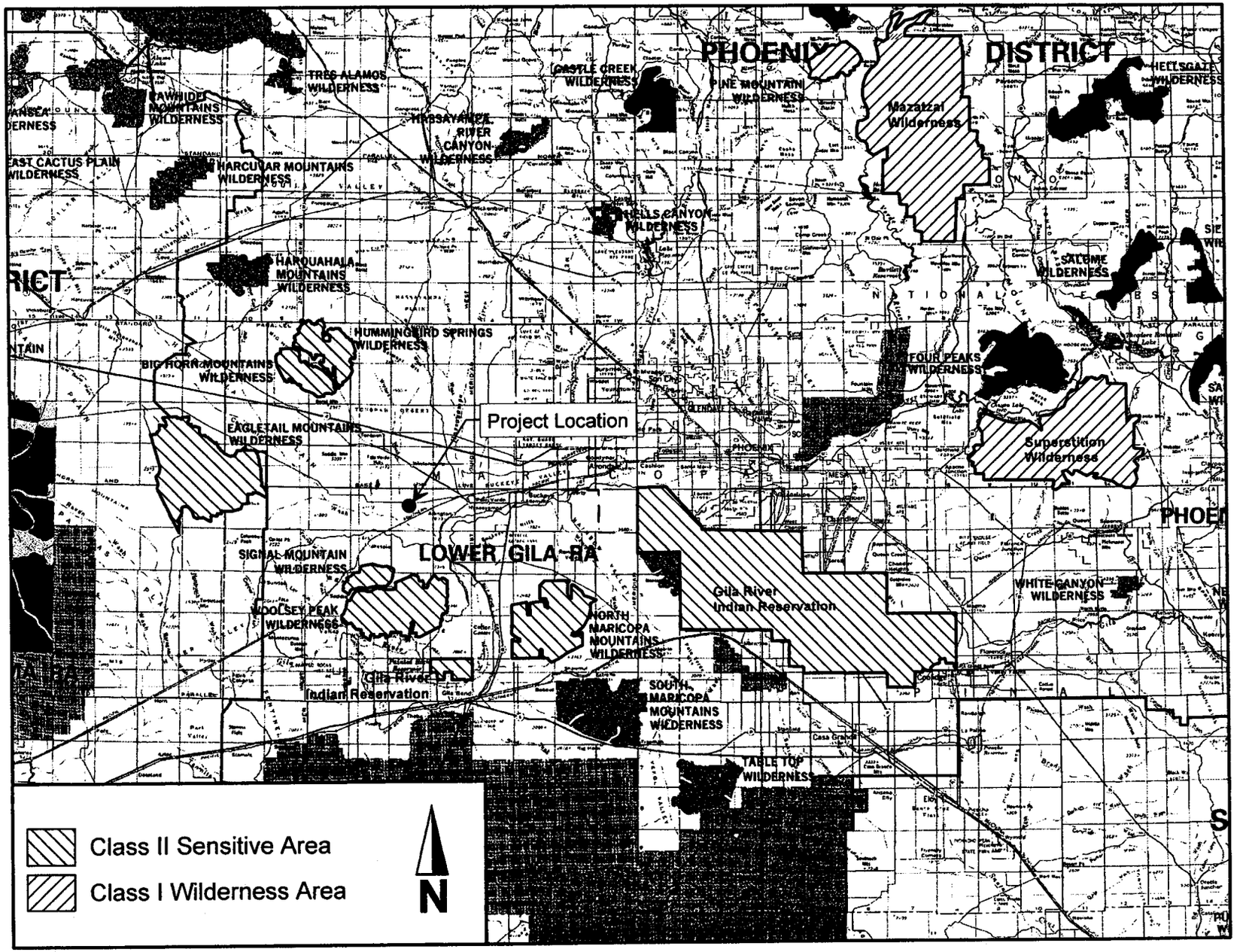
6.8.4 CLASS II SENSITIVE AREA IMPACT ANALYSIS

A Class II impact analysis was performed to evaluate the potential for visibility impairment, ground level impacts, and acid deposition. The following sensitive areas were identified by the Federal Land Manager (FLM) and Maricopa County ESDAQD in a meeting with a representative of Mesquite Power, LLC: Hummingbird Springs, Big Horn Mountain, Eagletail Mountain, Signal Mountain, Woolsey Peak, and North Maricopa Mountains Wilderness areas, as well as the Gila Bend and Gila River Indian Reservations. Figure 6-7 illustrates the locations of these sensitive areas with respect to the Project location.

6.8.4.1 VISIBILITY

Distinct from a Class I visibility analysis, the additional impact analysis presented here is concerned with visibility impairment within the Class II sensitive areas. The general components of a visibility impairment analysis include:

- Determination of the visual quality of the area.
- Determination of the potential for visibility impairment with a screening level assessment.
- If warranted, a more in-depth analysis of the visibility impairment potential.



Class I and Class II Areas Modeled for the Project

Figure 6-7

Class I & II Areas.srf

Visual Quality of the Area: The Project will be located in an area of southwestern Arizona, which is generally used for agricultural purposes. The climate of the area is characterized as extremely arid, typical of the low elevation desert valley. The low relative humidity and abundant sunshine result in generally good visibility throughout much of the year.

Visual Impairment Screening Assessment: A visibility impairment screening analysis was conducted at each of the Class II sensitive areas to provide a conservative indication of the perceptibility of plumes from the proposed emission sources. The analyses were performed in accordance with EPA's Workbook for Plume Visual Impact Screening and Analysis (EPA-450/4-88-015, September 1988, hereinafter referred to as the 'Workbook'), using the VISCREEN model.

In accordance with Workbook visual screening procedures, the VISCREEN plume visual impact-screening model was used with default worst case Level 1 screening parameters as presented in Table 6-15. Results of the conservative Level 1 visual screening analysis indicated a potential for visibility impairment at all locations. As such, less conservative Level 2 screening analyses with situation-specific input parameters were conducted.

Table 6-16 presents the Level 2 visual screening parameters used in the VISCREEN modeling. As Table 6-16 illustrates, many of the input parameters for a Level 2 analysis are the same as the default worst case values for a Level 1 analysis specified in the Workbook. However, the shaded parameters in Table 6-16 designate the situation-specific inputs of the Level 2 analysis, which are more representative of the specific region and operating conditions of the Project. The situation-specific Level 2 screening parameters are described below:

Emissions: The worst case maximum hourly emissions of NO_x and PM_{10} from the combustion turbine/HRSGs (refer to Table 6-1) were used in the Level 1 and Level 2 visibility analyses.

Background Visual Range: Figure 8 of the Workbook indicates that the background visual range for all the Class II sensitive areas is 110 km. This background visual range was used in the screening Level 1 approach. However, based on a November 14, 1999 meeting between representatives of Marcopa County, Mesquite Power, LLC, and Mr. Peter Lahm (representing the Federal Land Managers), it was recommend by Mr. Lahm to use a more current background visual range from the Superstition Class I Wilderness area to represent the visual ranges at the Class II sensitive areas.

Table 6-15
VISCREEN Level 1 Model Inputs

VISCREEN Modeling Parameter	Level 1 (Worst Case Analysis)			
	Hummingbird Springs	Eagletail Mountain	Signal Mountain	Woolsey Peak
Worst Case Emissions				
General Electric				
Particulate Emissions	15.32 g/s	15.32 g/s	15.32 g/s	15.32 g/s
NO_x (as NO_2) Emissions	11.20 g/s	11.20 g/s	11.20 g/s	11.20 g/s
Worst Case Emissions				
Westinghouse				
Particulate Emissions	14.52 g/s	14.52 g/s	14.52 g/s	14.52 g/s
NO_x (as NO_2) Emissions	11.88 g/s	11.88 g/s	11.88 g/s	11.88 g/s
Primary NO_2 Emissions	0.0 g/s	0.0 g/s	0.0 g/s	0.0 g/s
Soot Emissions	0.0 g/s	0.0 g/s	0.0 g/s	0.0 g/s
Sulfate Emissions	0.0 g/s	0.0 g/s	0.0 g/s	0.0 g/s
Source-Observer Distance	32.1 km	33.2 km	14.9 km	15.3 km
Minimum Source-Class I Distance	32.1 km	33.2 km	14.9 km	15.3 km
Maximum Source-Class I Distance	49.8 km	61.7 km	25.1 km	32.8 km
Background Visual Range	110 km	110 km	110 km	110 km
Plume-Source-Observer Angle	11.25 degrees	11.25 degrees	11.25 degrees	11.25 degrees
Background Ozone Concentration	0.04 ppm	0.04 ppm	0.04 ppm	0.04 ppm
Stability Class	F	F	F	F
Wind Speed	1.00 m/s	1.00 m/s	1.00 m/s	1.00 m/s
Threshold-delta E	2.00	2.00	2.00	2.00
Threshold-Green Contrast	0.05	0.05	0.05	0.05
Background Fine Particulate Density	1.50 g/cm^3	1.50 g/cm^3	1.50 g/cm^3	1.50 g/cm^3
Background Fine Particulate Size Index	0.3 μm	0.3 μm	0.3 μm	0.3 μm
Background Coarse Particulate Density	2.5 g/cm^3	2.5 g/cm^3	2.5 g/cm^3	2.5 g/cm^3

Table 6-15 (Continued)
VISCREEN Level 1 Model Inputs

VISCREEN Modeling Parameter	Level 1 (Worst Case Analysis)			
	Hummingbird Springs	Eagletail Mountain	Signal Mountain	Woolsey Peak
Background Coarse Particulate Size Index	6.0 µm	6.0 µm	6.0 µm	6.0 µm
Plume Particulate Density	2.5 g/cm^3	2.5 g/cm^3	2.5 g/cm^3	2.5 g/cm^3
Plume Particulate Size Index	2.0 µm	2.0 µm	2.0 µm	2.0 µm
Plume Soot Density	2.0 g/cm^3	2.0 g/cm^3	2.0 g/cm^3	2.0 g/cm^3
Plume Soot Size Index	0.1 µm	0.1 µm	0.1 µm	0.1 µm
Plume Primary SO_4 Density	1.5 g/cm^3	1.5 g/cm^3	1.5 g/cm^3	1.5 g/cm^3
Plume Primary SO_4 Size Index	0.5 µm	0.5 µm	0.5 µm	0.5 µm
Worst Case Emissions				
General Electric				
Particulate Emissions	15.32 g/s	15.32 g/s	15.32 g/s	15.32 g/s
NO_x (as NO_2) Emissions	11.20 g/s	11.20 g/s	11.20 g/s	11.20 g/s
Worst Case Emissions				
Westinghouse				
Particulate Emissions	14.52 g/s	14.52 g/s	14.52 g/s	14.52 g/s
NO_x (as NO_2) Emissions	11.88 g/s	11.88 g/s	11.88 g/s	11.88 g/s
Primary NO_2 Emissions	0.0 g/s	0.0 g/s	0.0 g/s	0.0 g/s
Soot Emissions	0.0 g/s	0.0 g/s	0.0 g/s	0.0 g/s
Sulfate Emissions	0.0 g/s	0.0 g/s	0.0 g/s	0.0 g/s
Source-Observer Distance	32.8 km	35.3 km	53.2 km	32.1 km
Minimum Source-Class I Distance	32.8 km	35.3km	53.2 km	32.1 km
Maximum Source-Class I Distance	51.5 km	42.8 km	132.3 km	47.8 km
Background Visual Range	110 km	110 km	110 km	110 km
Plume-Source-Observer Angle	11.25 degrees	11.25 degrees	11.25 degrees	11.25 degrees
Background Ozone Concentration	0.04 ppm	0.04 ppm	0.04 ppm	0.04 ppm
Stability Class	F	F	F	F
Wind Speed	1.00 m/s	1.00 m/s	1.00 m/s	1.00 m/s

Table 6-15 (Continued) VISCREEN Level 1 Model Inputs				
	Level 1 (Worst Case Analysis)			
VISCREEN Modeling Parameter	Hummingbird Springs	Eagletail Mountain	Signal Mountain	Woolsey Peak
Threshold-delta E	2.00	2.00	2.00	2.00
Threshold-Green Contrast	0.05	0.05	0.05	0.05
Background Fine Particulate Density	1.50 g/cm^3	1.50 g/cm^3	1.50 g/cm^3	1.50 g/cm^3
Background Fine Particulate Size Index	0.3 µm	0.3 µm	0.3 µm	0.3 µm
Background Coarse Particulate Density	2.5 g/cm^3	2.5 g/cm^3	2.5 g/cm^3	2.5 g/cm^3
Background Coarse Particulate Size Index	6.0 µm	6.0 µm	6.0 µm	6.0 µm
Plume Particulate Density	2.5 g/cm^3	2.5 g/cm^3	2.5 g/cm^3	2.5 g/cm^3
Plume Particulate Size Index	2.0 µm	2.0 µm	2.0 µm	2.0 µm
Plume Soot Density	2.0 g/cm^3	2.0 g/cm^3	2.0 g/cm^3	2.0 g/cm^3
Plume Soot Size Index	0.1 µm	0.1 µm	0.1 µm	0.1 µm
Plume Primary SO_4 Density	1.5 g/cm^3	1.5 g/cm^3	1.5 g/cm^3	1.5 g/cm^3
Plume Primary SO_4 Size Index	0.5 µm	0.5 µm	0.5 µm	0.5 µm

Table 6-16
VISCREEN Level 2 Model Inputs

VISCREEN Modeling Parameter	Level 2 (Situation-Specific Analysis)			
	Hummingbird Springs	Eagletail Mountain	Signal Mountain	Woolsey Peak
Worst Case Emissions				
General Electric				
Particulate Emissions	15.32 g/s	15.32 g/s	15.32 g/s	15.32 g/s
NO_x (as NO_2) Emissions	11.20 g/s	11.20 g/s	11.20 g/s	11.20 g/s
Worst Case Emissions				
Westinghouse				
Particulate Emissions	14.52 g/s	14.52 g/s	14.52 g/s	14.52 g/s
NO_x (as NO_2) Emissions	11.88 g/s	11.88 g/s	11.88 g/s	11.88 g/s
Primary NO_2 Emissions	0.0 g/s	0.0 g/s	0.0 g/s	0.0 g/s
Soot Emissions	0.0 g/s	0.0 g/s	0.0 g/s	0.0 g/s
Sulfate Emissions	0.0 g/s	0.0 g/s	0.0 g/s	0.0 g/s
Source-Observer Distance	32.1 km	33.2 km	14.9 km	15.3 km
Minimum Source-Class I Distance	32.1 km	33.2 km	14.9 km	15.3 km
Maximum Source-Class I Distance	49.8 km	61.7 km	25.1 km	32.8 km
Background Visual Range	102.9 km	102.9 km	102.9 km	102.9 km
Plume-Source-Observer Angle	11.25 degrees	11.25 degrees	11.25 degrees	11.25 degrees
Background Ozone Concentration	0.09 ppm	0.09 ppm	0.09 ppm	0.09 ppm
Stability Class	D	D	F	E
Wind Speed	5 m/s	5 m/s	3 m/s	2 m/s
Threshold-delta E	2.00	2.00	2.00	2.00
Threshold-Green Contrast	0.05	0.05	0.05	0.05
Background Fine Particulate Density	1.50 g/cm^3	1.50 g/cm^3	1.50 g/cm^3	1.50 g/cm^3
Background Fine Particulate Size Index	0.3 µm	0.3 µm	0.3 µm	0.3 µm
Background Coarse Particulate Density	2.5 g/cm^3	2.5 g/cm^3	2.5 g/cm^3	2.5 g/cm^3

Table 6-16 (Continued)
VISCREEN Level 2 Model Inputs

VISCREEN Modeling Parameter	Level 2 (Situation-Specific Analysis)			
	Hummingbird Springs	Eagletail Mountain	Signal Mountain	Woolsey Peak
Background Coarse Particulate Size Index	6.0 µm	6.0 µm	6.0 µm	6.0 µm
Plume Particulate Density	2.5 g/cm^3	2.5 g/cm^3	2.5 g/cm^3	2.5 g/cm^3
Plume Particulate Size Index	10.0 µm	10.0 µm	10.0 µm	10.0 µm
Plume Soot Density	2.0 g/cm^3	2.0 g/cm^3	2.0 g/cm^3	2.0 g/cm^3
Plume Soot Size Index	0.1 µm	0.1 µm	0.1 µm	0.1 µm
Plume Primary SO_4 Density	1.5 g/cm^3	1.5 g/cm^3	1.5 g/cm^3	1.5 g/cm^3
Plume Primary SO_4 Size Index	0.5 µm	0.5 µm	0.5 µm	0.5 µm
Worst Case Emissions				
General Electric				
Particulate Emissions	15.32 g/s	15.32 g/s	15.32 g/s	15.32 g/s
NO_x (as NO_2) Emissions	11.20 g/s	11.20 g/s	11.20 g/s	11.20 g/s
Worst Case Emissions				
Westinghouse				
Particulate Emissions	14.52 g/s	14.52 g/s	14.52 g/s	14.52 g/s
NO_x (as NO_2) Emissions	11.88 g/s	11.88 g/s	11.88 g/s	11.88 g/s
Primary NO_2 Emissions	0.0 g/s	0.0 g/s	0.0 g/s	0.0 g/s
Soot Emissions	0.0 g/s	0.0 g/s	0.0 g/s	0.0 g/s
Sulfate Emissions	0.0 g/s	0.0 g/s	0.0 g/s	0.0 g/s
Source-Observer Distance	32.8 km	35.3 km	53.2 km	32.1 km
Minimum Source-Class I Distance	32.8 km	35.3km	53.2 km	32.1 km
Maximum Source-Class I Distance	51.5 km	42.8 km	132.3 km	47.8 km
Background Visual Range	102.9 km	102.9 km	102.9 km	102.9 km
Plume-Source-Observer Angle	11.25 degrees	11.25 degrees	11.25 degrees	11.25 degrees
Background Ozone Concentration	0.09 ppm	0.09 ppm	0.09 ppm	0.09 ppm
Stability Class	E	E	E	C
Wind Speed	3 m/s	2 m/s	4 m/s	5 m/s

Table 6-16 (Continued) VISCREEN Level 2 Model Inputs				
	Level 2 (Situation-Specific Analysis)			
VISCREEN Modeling Parameter	Hummingbird Springs	Eagletail Mountain	Signal Mountain	Woolsey Peak
Threshold-delta E	2.00	2.00	2.00	2.00
Threshold-Green Contrast	0.05	0.05	0.05	0.05
Background Fine Particulate Density	1.50 g/cm^3	1.50 g/cm^3	1.50 g/cm^3	1.50 g/cm^3
Background Fine Particulate Size Index	0.3 µm	0.3 µm	0.3 µm	0.3 µm
Background Coarse Particulate Density	2.5 g/cm^3	2.5 g/cm^3	2.5 g/cm^3	2.5 g/cm^3
Background Coarse Particulate Size Index	6.0 υm	6.0 µm	6.0 µm	6.0 µm
Plume Particulate Density	2.5 g/cm^3	2.5 g/cm^3	2.5 g/cm^3	2.5 g/cm^3
Plume Particulate Size Index	10.0 µm	10.0 µm	10.0 µm	10.0 µm
Plume Soot Density	2.0 g/cm^3	2.0 g/cm^3	2.0 g/cm^3	2.0 g/cm^3
Plume Soot Size Index	0.1 µm	0.1 µm	0.1 µm	0.1 µm
Plume Primary SO_4 Density	1.5 g/cm^3	1.5 g/cm^3	1.5 g/cm^3	1.5 g/cm^3
Plume Primary SO_4 Size Index	0.5 µm	0.5 µm	0.5 µm	0.5 µm

The National Park Service's web site on visibility monitoring indicated that the annual mean reconstructed background visual range for the Tonto National Monument (approximately 2 miles north of the Superstition Class I Wilderness area) is 102.9 km. Thus, a more representative background visual range of 102.9 km was used in the Level 2 analyses.

Background Ozone Concentration: The default background ozone concentration in the Level 1 analysis is 0.04 ppm. A more representative background ozone concentration of 0.09 ppm was used in the Level 2 analysis. This value was obtained from the AIRS database for the Palo Verde Nuclear Generating Station monitor (#04-013-9993) for 1999. It is the maximum 1 hour ozone value reported for that year.

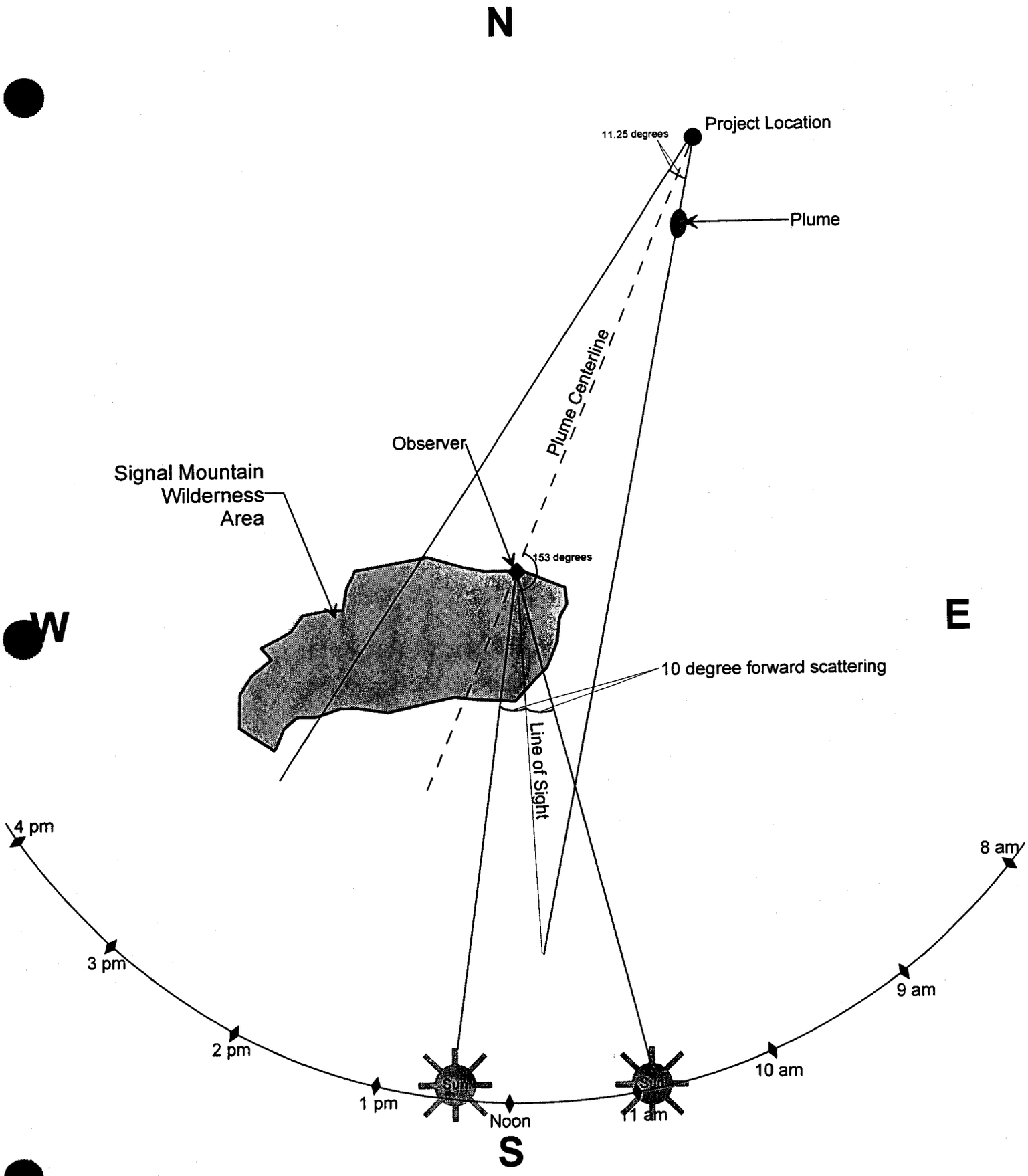
Stability Class and Wind Speed: The Level 1 VISCREEN stability class default value of 'F' and wind speed of 1.0 m/s were found not to be representative of the general climatological conditions in the vicinity of the Project. Therefore, stability class and wind speed information contained in the most recent year (1998) of the previously discussed five year meteorological data set (1994 to 1998) was analyzed to determine a more representative stability class and wind speed. Joint frequency distributions for stability classes A through F were performed for the meteorological data. These analyses were consistent with the Workbook. They consider the persistence as well as the frequency of the occurrence of the stabilities and wind speeds insomuch as the transport times to the Class II areas may be of sufficient length to allow the plume to break up and not remain visible. The results of the analyses are presented in Table 6-16 as a shaded value next to the stability class and wind speed headings.

Plume Particle Size Index: The default plume particulate size index value (i.e., mass median diameter) used in the worst case Level 1 analysis was 2.0 μm. A mass median diameter of 10 μm was used in the Level 2 analysis.

6.8.4.2 VISUAL IMPAIRMENT MODELING RESULTS

The VISCREEN model was used again with the aforementioned situation specific Level 2 input parameters as identified in Table 6-16. Results of the VISCREEN modeling are included in Appendix J. The results of the Level 2 screening analyses reveal that the Project's potential for visibility impairment is negligible, as potential plume delta-E and green contrast indices inside the Class II areas are less than the conservative Level 1 screening thresholds for all previously mentioned sensitive areas except for Signal Mountain Wilderness Area.

Signal Mountain exceeds only 1 of the 4 tests by approximately 8 percent for the Westinghouse CT (3 percent for the General Electric machines) of the conservative Class I, Level 1 screening criteria. Figure 6-8 illustrates the geometry of the occurrence



Possible Sun Locations (Angles) During the Viscreen Level 2 Exceedance

Figure 6-8

Signal Mtn.srf

of the exceedance. The exceedance occurs when viewing the plume along a line of sight (azimuth) of 153 degrees from plume centerline while the sun is in the forward scattering position. This geometry would restrict the exceedance to the sun angles given on Figure 6-8 (i.e., a high noon type of geometry). As can be seen in Table 6-16, the Level 2 meteorological data chosen for this wilderness area is a wind speed of 3 m/s and a stability of F. An analysis of the meteorological data for the given year and wind sector in which the wilderness area lies reveals that the meteorological conditions only occurred in the early morning (001 to 600) or late evening (1801 to 2400) times of the day. These times do not correspond to the sun angle geometry found on Figure 6-8. Therefore, because the exceedance of the Level 2 visual screening criteria occurred during an unrealistic scenario, that particular scenario may be ignored in accordance with EPA guidelines.

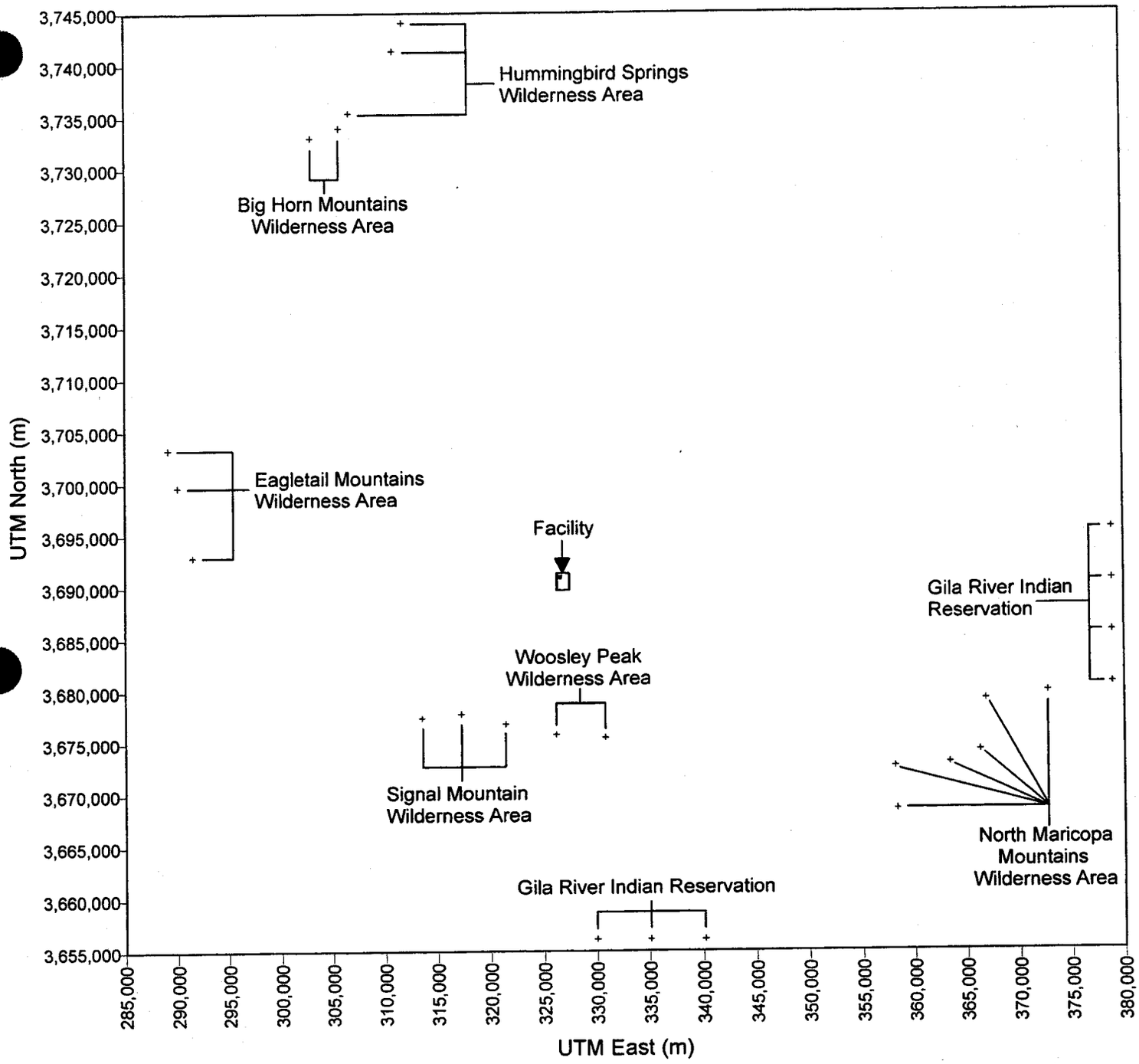
Views outside of these Class II areas were not considered in the analyses. The views in the Viscreen model represent views outside a Class I area and are defined as integral vistas or views leading up to a Class I area. There were no such integral vistas in the vicinity of the Project. Further analyses to quantify the extent of any reductions in visibility due to emissions from the Project are not warranted based on the results of the Level 2 visual impairment screening analysis.

6.8.4.3 CLASS II GROUNDLEVEL IMPACT MODELING RESULTS

The ISCST3 air dispersion model was used to assess maximum groundlevel pollutant concentrations at the special Class II sensitive areas. As shown on Figure 6-9, receptors were placed at the nearest point of each Class II area to the Project. Elevations were obtained with the USGS 7.5-minute digital elevation models (DEMs). The maximum predicted concentrations are presented in Table 6-17 for each year and compared with the Class II increments. As the results indicate, the maximum predicted concentrations are considerably less than the Class II increment values.

6.8.4.4 NITRATE DEPOSITION ANALYSIS

A Level I nitrate deposition analysis was performed for the Class II sensitive areas in accordance with the IWAQM Phase I Report (EPA-454/R-93-015). The same receptors discussed in Section 6.8.4.3 were used in this analysis. The ISCST3 air dispersion model was used to assess maximum predicted 24 hour NO_x ground-level concentrations at each receptor. Assuming that concentrations of NO_x are deposited as, HNO_3 and using the conversion equations provided by the National Park Service, nitrate depositions were calculated for the Class II sensitive areas. The deposition estimates are assumed to be conservative because the steady state ISCST3 Guassian plume model does not actually remove any mass from the plume in calculating the ground level concentration. Table 6-18 presents nitrate 24 hour concentrations and deposition impacts at each of the Class II sensitive areas. While no formal significance levels exist



Class II Sensitive Area Receptors

Figure 6-9

ClassIIgrid.srf

Table 6-17
Class II Groundlevel Impacts Increment Modeling Results

Pollutant	Averaging Period	Turbine*	Class II Sensitive Areas								
			Hummingbird Springs	Big Horn Mountain	Eagletail Mountain	Signal Mountain	Woolsey Peak	North Maricopa Mountains	Gila Bend Indian Reservation	Gila River Indian Reservation	Class II Increment ($\mu g/m^3$)
NO_x	Annual	GE	0.01	0.01	0.05	0.22	0.18	0.06	0.02	0.03	25
		WES	0.01	0.01	0.05	0.23	0.18	0.06	0.02	0.04	25
PM_{10}	Annual	GE	0.02	0.01	0.07	0.34	0.27	0.09	0.03	0.05	17
		WES	0.02	0.01	0.07	0.32	0.25	0.08	0.03	0.05	17
	24 hour	GE	0.29	0.25	1.22	2.69	2.80	1.65	0.46	0.75	30
		WES	0.27	0.24	1.14	2.51	2.58	1.55	0.43	0.71	30

*GE = General Electric, WES = Westinghouse

Table 6-18
Nitrate Concentration and Deposition Impacts onto Class II Wilderness Areas and Gila Bend and Gila River Indian Reservations

Class II Area	General Electric		Westinghouse	
	HNO_3 Deposition Values ($\mu g/m^2/s$)	Nitrate Deposition (kg/hectare)	HNO_3 Deposition Values ($\mu g/m^2/s$)	Nitrate Deposition (kg/hectare)
Hummingbird Springs	1169.48	0.01	1249.97	0.01
Big Horn Mountain	1008.50	0.01	1080.11	0.01
Eagletail Mountain	4851.31	0.05	5011.11	0.05
Signal Mountain	10422.30	0.10	10781.55	0.11
Woolsey Peak	10918.86	0.11	11198.8	0.11
North Maricopa Mountains	6626.83	0.07	6941.69	0.07
Gila Bend Indian Reservation	1789.72	0.02	1853.64	0.02
Gila River Indian Reservation	2978.73	0.03	3108.94	0.03

by which to compare the results presented in Table 6-18, the impacts on these Class II sensitive areas are minimal. An example nitrate deposition calculation is presented in Appendix J.

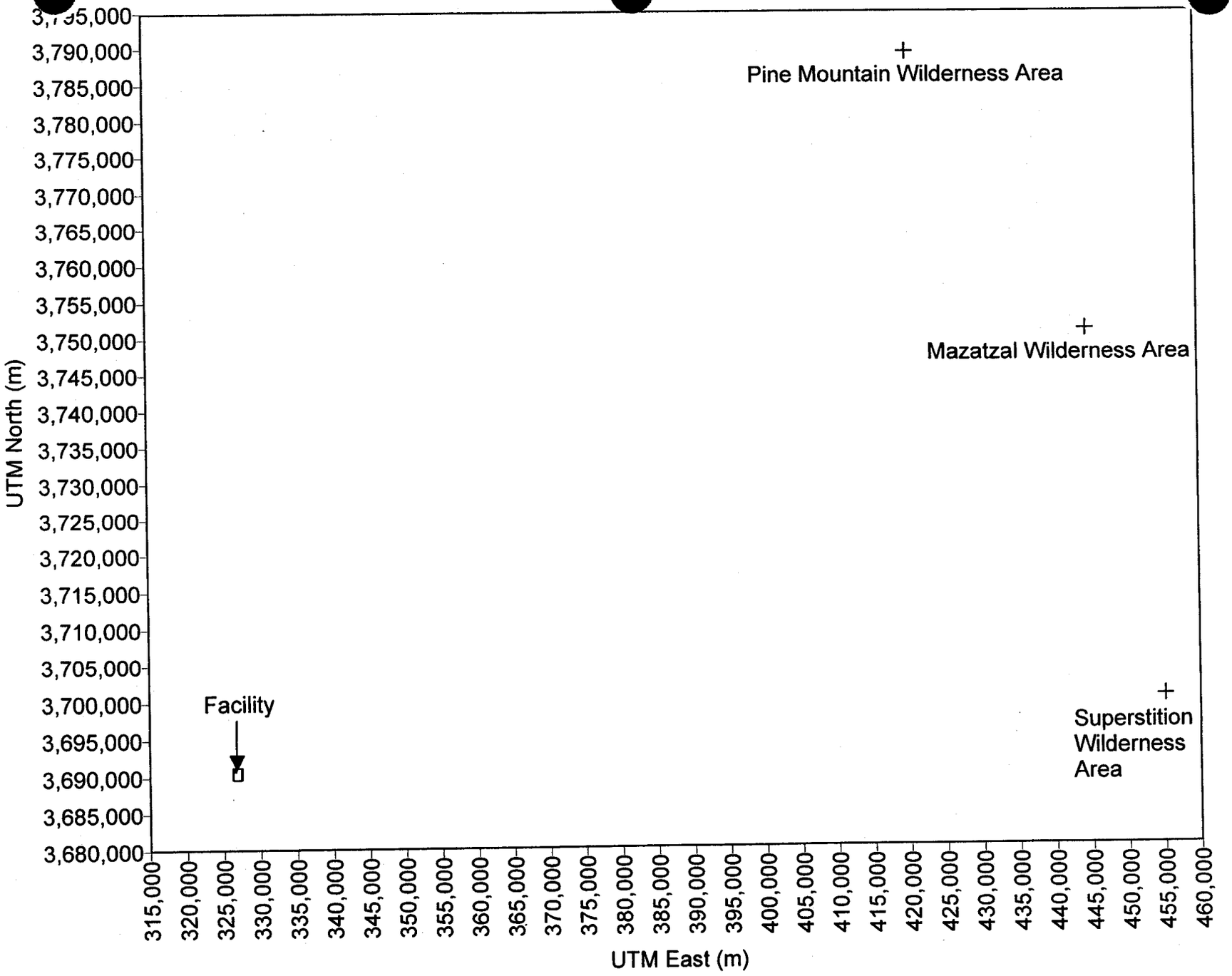
6.8.5 CLASS I AREA AIR QUALITY IMPACT ANALYSIS

Air dispersion modeling was performed to determine the Project's maximum predicted impact at the closest boundaries of the Superstition Wilderness Area, Mazatzal Wilderness Area, and the Pine Mountain Wilderness Area. These areas were presented on Figure 6-7. The ISCST3 air dispersion model was used to determine the maximum predicted impacts of NO_x and PM_{10} at the respective park boundaries. The 5 year meteorological data set, model options, and operating scenario emission rates that were used in the refined modeling analysis presented in Section 6.3, were also used in the Class I air quality impact analyses. As shown on Figure 6-10, receptors were placed at the closest boundary point of each park with respect to the Project.

Table 6-19 presents the results of the Class I SIL modeling for each pollutant and the applicable averaging period. In the table, the maximum predicted concentrations are presented and compared with the Class I SILs. The Class I SILs were calculated as 4 percent of the PSD Class I increments, as recommended by the National Park Service. As the results indicate, the maximum predicted concentrations of NO_x and PM_{10} are considerably less than the applicable Class I SILs.

6.8.6 HAZARDOUS AIR POLLUTANTS ANALYSIS

A hazardous air pollutants (HAPs) analysis was performed for the Project in accordance with current draft Maricopa County ESDAQD guidance documents (*Air Toxics/Hazardous Air Pollutant Permitting Procedure* December 14, 1999, and *Arizona Ambient Air Quality Guidelines (AAAQGs)* 1999 Update). AAAQGs are residential screening values that are protective of human health by considering the risk from inhalation of contaminants in ambient air. Emissions of HAPs from the Project were estimated using the California Air Toxics Emission Factor (CATEF) program and AP-42, Volume I, Fifth Edition. A modeling analysis was performed using worst case annual average performance parameters for the General Electric combustion turbine. These parameters were assumed to represent emissions from the Project. The modeling analysis used the ISCST3 air dispersion model to model a nominal 1 g/s emission rate with the fence line receptors and the standard grid referenced in Section 6.3.5. The emission factors and input assumptions for the HAPs analysis are found in Table 6-20. The results of the modeling analysis, shown in Table 6-21, indicate that the Project will not be a major source of HAPs, with the impacts being orders of magnitude below the AAAQGs.



Class I Area Receptors

Figure 6-10

Classlgrid.srf

Table 6-19
Class I SIL Modeling Results

Pollutant	Averaging Period	Turbine[a]	Mandatory Class I Area			Class I SIL[b] ($\mu g/m^3$)
			Superstition ($\mu g/m^3$)	Mazatzal ($\mu g/m^3$)	Pine Mtn. ($\mu g/m^3$)	
NO_x	Annual	GE	0.01	0.01	0.01	0.10
		WES	0.01	0.01	0.01	0.10
PM_{10}	Annual	GE	0.01	0.01	0.01	0.16
		WES	0.01	0.01	0.01	0.16
	24 hour	GE	0.14	0.08	0.05	0.32
		WES	0.13	0.08	0.05	0.32

[a]GE = General Electric, WES = Westinghouse.

[b]Calculated as a 4 percent of the PSD Class I increment values.

Table 6-20
Hazardous Air Pollutants Analysis Emission Factors and Total Emissions

Pollutant	CAS Number	CATEF[a]/AP-42 Emission Factor	Fuel Burn Rate (MMscf/h)[b]	Emission Rate	
				lb/h	tpy
Acetaldehyde	75-07-0	4.83E-02	2.224	1.07E-01	1.88E+00
Acrolein	107-02-8	1.44E-02	2.224	3.20E-02	5.61E-01
Arsenic	7440-38-2	2.00E-04	2.224	4.45E-04	7.79E-03
Barium	7440-39-3	4.40E-03	2.224	9.79E-03	1.71E-01
Benzene	71-43-2	2.10E-03	2.224	4.67E-03	8.18E-02
Benz(a)anthracene	56-55-3	3.61E-06	2.224	8.03E-06	1.41E-04
Benzo(a)pyrene	50-32-8	4.63E-07	2.224	1.03E-06	1.80E-05
Beryllium	7440-41-7	1.20E-05	2.224	2.67E-05	4.68E-04
1,3-Butadiene	106-99-0	1.24E-04	2.224	2.76E-04	4.83E-03
Cadmium	7440-43-9	1.10E-03	2.224	2.45E-03	4.29E-02
Chromium	7440-47-3	1.40E-03	2.224	3.11E-03	5.46E-02
Cobalt	7440-48-4	8.40E-05	2.224	1.87E-04	3.27E-03
Copper	7440-50-8	8.50E-04	2.224	1.89E-03	3.31E-02
Dibenz(a,h)anthracene	53-70-3	3.03E-06	2.224	6.74E-06	1.18E-04
Ethylbenzene	100-41-4	9.74E-03	2.224	2.17E-02	3.80E-01
Formaldehyde	50-00-0	8.45E-02	2.224	1.88E-01	3.29E+00
Hexane	110-54-3	2.19E-01	2.224	4.87E-01	8.53E+00
Manganese	7439-96-5	3.80E-04	2.224	8.45E-04	1.48E-02
Mercury	7439-97-6	2.60E-04	2.224	5.78E-04	1.01E-02
2-Methylchloranthrene	56-49-5	5.07E-06	2.224	1.13E-05	1.98E-04
Naphthalene	91-20-3	9.26E-04	2.224	2.06E-03	3.61E-02
Nickel	7440-02-0	2.10E-03	2.224	4.67E-03	8.18E-02
Propylene Oxide	75-56-9	4.48E-02	2.224	9.96E-02	1.75E+00
Selenium	7782-49-2	2.40E-05	2.224	5.34E-05	9.35E-04
Toluene	108-88-3	5.91E-02	2.224	1.31E-01	2.30E+00
Vanadium	7440-62-2	2.30E-03	2.224	5.12E-03	8.96E-02
Xylene (Total)	1330-20-7	1.93E-02	2.224	4.29E-02	7.52E-01
Total HAPs					20.08[d]

[a]California Air Toxics Emission Factor database (CATEF Version 1.2).

[b] Determined from annual average performance parameters for the General Electric combustion turbine.

Fuel burn rate = (HHV turbine heat input (mmBtu/h) + HHV duct burner heat input (mmBtu/h))/AP-42 conversion factor for mmBtu to MMscf.
(1725.74 mmBtu/h + 542.7 mmBtu/h) / 1020 mmBtu/MMscf = 2.224 MMscf/h.

[c]Assumes operation of 4 turbines.

[d]Total tons per year of all HAPs listed. This value falls below the 25 tpy MACT standard.

Table 6-21
Hazardous Air Pollutants Modeling Results and AAAQGs

Pollutant	CAS Number	Emission Rate (lb/h)	Annual Impact ($\mu g/m^3$)[a]	Annual AAAQG ($\mu g/m^3$)[b]	24 hour Impact ($\mu g/m^3$)[a]	24 hour AAAQG ($\mu g/m^3$)[b]	1 hour Impact ($\mu g/m^3$)[a]	1 hour AAAQG ($\mu g/m^3$)[b]
Acetaldehyde	75-07-0	1.07E-01	1.20E-02	4.50E-01	8.87E-02	1.70E+02	3.61E-01	6.30E+02
Acrolein	107-02-8	3.20E-02	-	-	2.65E-02	2.00E+00	1.07E-01	6.30E+00
Arsenic	7440-38-2	4.45E-04	4.99E-05	2.30E-04	3.67E-04	1.60E-02	1.49E-03	6.00E-02
Barium	7440-39-3	9.79E-03	-	-	8.08E-03	4.00E+00	3.28E-02	1.50E+01
Benzene	71-43-2	4.67E-03	5.24E-04	1.20E-01	3.86E-03	4.40E+01	1.57E-02	1.70E+02
Benz(a)anthracene	56-55-3	8.03E-06	9.00E-07	4.80E-03	6.63E-06	1.60E+00	2.69E-05	6.00E+00
Benzo(a)pyrene	50-32-8	1.03E-06	1.15E-07	4.80E-04	8.51E-07	1.80E-01	3.46E-06	6.70E-01
Beryllium	7440-41-7	2.67E-05	2.99E-06	4.20E-04	2.20E-05	1.60E-02	8.96E-05	6.00E-02
1,3-Butadiene	106-99-0	2.76E-04	3.09E-05	3.60E-03	2.28E-04	1.30E+00	9.26E-04	5.00E+00
Cadmium	7440-43-9	2.45E-03	2.74E-04	5.60E-04	2.02E-03	2.00E-01	8.21E-03	7.70E-01
Chromium	7440-47-3	3.11E-03	-	-	2.57E-03	4.00E+00	1.04E-02	1.50E+01
Cobalt	7440-48-4	1.87E-04	-	-	-	-	-	-
Copper	7440-50-8	1.89E-03	-	-	1.56E-03	7.90E-01	6.34E-03	3.00E+00
Dibenz(a,h)anthracene	53-70-3	6.74E-06	7.56E-07	4.80E-04	5.57E-06	1.80E-01	2.26E-05	6.70E-01
Ethylbenzene	100-41-4	2.17E-02	-	-	1.79E-02	3.50E+03	7.27E-02	4.50E+03
Formaldehyde	50-00-0	1.88E-01	2.11E-02	7.60E-02	1.55E-01	1.60E+01	6.31E-01	2.50E+01
Hexane	110-54-3	4.87E-01	-	-	4.02E-01	1.40E+03	1.63E+00	5.40E+03
Manganese	7439-96-5	8.45E-04	-	-	6.98E-04	7.90E+00	2.84E-03	2.50E+01
Mercury	7439-97-6	5.78E-04	-	-	4.78E-04	4.00E-01	1.94E-03	1.50E+00
2-Methylchloranthrene	56-49-5	1.13E-05	-	-	-	-	-	-
Naphthalene	91-20-3	2.06E-03	-	-	1.70E-03	4.00E+02	6.91E-03	6.30E+02
Nickel	7440-02-0	4.67E-03	5.24E-04	2.10E-03	3.86E-03	1.20E-01	1.57E-02	4.50E-01
Propylene Oxide	75-56-9	9.96E-02	1.12E-02	2.70E-01	8.23E-02	9.80E+01	3.34E-01	3.70E+02
Selenium	7782-49-2	5.34E-05	-	-	4.41E-05	1.60E+00	1.79E-04	6.00E+00
Toluene	108-88-3	1.31E-01	-	-	1.09E-01	3.00E+03	4.41E-01	4.40E+03
Vanadium	7440-62-2	5.12E-03	-	-	4.23E-03	4.00E-01	1.72E-02	1.50E+00
Xylene (Total)	1330-20-7	4.29E-02	-	-	3.55E-02	3.50E+03	1.44E-01	5.40E+03

[a] Derived by multiplying the nominal 1 g/s annual, 24 hour, or 1 hour impact by the emission rate (g/s) of each pollutant.
Nominal 1 g/s: annual impact = 0.8893 ($\mu g/m^3$)
24 hour impact = 6.54986 ($\mu g/m^3$)
1 hour impact = 26.61199 ($\mu g/m^3$)
Example calculation: acetaldehyde emission rate of 1.07E-01 lb/h * (453.59 g/lb / 3600 s/h) = 1.35E-02 g/s
1.35E-02 * annual 1 g/s impact of 0.8893 ($\mu g/m^3$)
= annual acetaldehyde impact 1.20E-02 $\mu g/m^3$

[b] Obtained from draft guidance document *Arizona Ambient Air Quality Guidelines (AAAQGs)* 1999 Update.

7.0 COMPLIANCE PLAN

The applicable requirements for the facility are identified in the Section 3.0. The facility will comply with all applicable rules and requirements in the issued permit, and that become effective during the term of the permit. The Compliance Plan proposed for the facility is provided in Table 7-1.

7.1 PERMIT SHIELD

Any requirement not specifically identified in this application is considered not applicable to this facility. Therefore, the applicant requests a permit shield to include all adopted federal, state and local regulations not identified as applicable in the tables provided herein.

7.2 OPERATION AND MAINTENANCE PLAN

Because the specific equipment and emission control devices proposed for the facility have not yet been selected. An operation and maintenance plan will be developed for the facility, as applicable, prior to operation of the facility. This plan will address the requirements of the Maricopa County O&M guidelines, including the establishment of equipment specific operating parameters and limits, maintenance procedures and schedules, and documentation methods that will demonstrate that emissions control devices are being properly operated and maintained.

7.3 PERFORMANCE TEST METHODS

The performance tests required for this facility will conform to the requirements of Rule 270, as applicable. The specific test proposed for each pollutant are identified in Table 7-2. Alternative and equivalent test methods may be proposed for use to the Control Officer for approval, prior to any required testing.

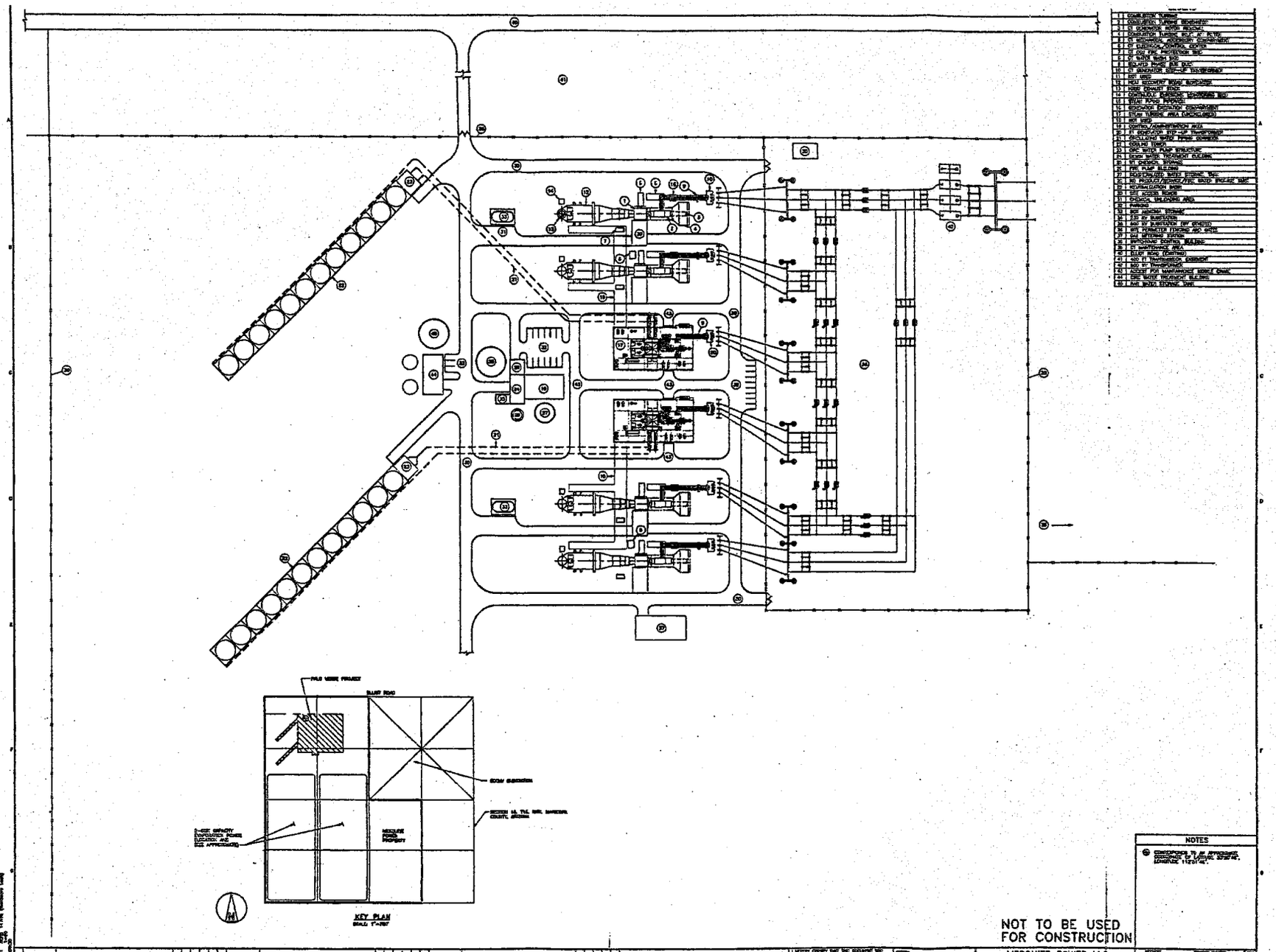
Table 7-1 Compliance Plan		
Applicable Requirement	Applicable Source	Compliance Monitoring Determination Method
40 CFR 60 Subpart A	Combustion Turbines and Duct Burners	Conduct performance tests and submit the required notifications and documentation and maintain required recordkeeping.
40 CFR 60 Subpart Da, Rule 360	Duct Burners	Maintain NO_X emissions less than 0.2 lb/mm Btu and 1.6 lb/MWh. Keep records and report as set forth in Subpart Da.
40 CFR 60, Subpart GG, Rule 360	Combustion Turbines	Monitor, keep records, and report as set forth in Subpart GG.
40 CFR 68	Plant	Review the facility to identify, prevent and minimize the consequences of accidental releases.
40 CFR 68	Ammonia Storage	Maintain records supporting implementation of the Risk Management Plan once ammonia or other regulated substances are present onsite above the threshold quantity.
40 CFR 72, Rule 371	Combustion Turbines and Duct Burners	Maintain records of Designated Representative Certification and other Part 72 submittals, including a complete Title IV Acid Rain permit application.
40 CFR 73	Combustion Turbines and Duct Burners	Maintain documentation of all Part 73 submittals.
40 CFR 75	Combustion Turbines and Duct Burners	Install, certify, operate, and maintain emission monitors and submit reports and keep records as required by Part 75.
40 CFR 82	Plant	Comply with 40 CFR §82.156 practices when servicing or disposing of applicable units.
Regulation I Rule 100	Plant	Perform requirements listed in this permit application; do not circumvent the rules; allow proper inspections; report emergencies in accordance with Rule 100 §501; maintain required records; prepare and submit required emission statements and annual emissions inventory questionnaires.

Table 7-1 (Continued) Compliance Plan		
Applicable Requirement	Applicable Source	Compliance Monitoring Determination Method
Regulation II Rule 200, 210, 240, 271, 280	Plant	Obtain required permits; post and not modify the permit when issued; transfer the permit only as provided in Rule 200 §414; perform modeling and testing as required using applicable procedures in Rule 270; pay applicable fees; make appropriate notifications under Rule 210 §403 and revise permit pursuant to the applicable requirements.
Rule 30 (SIP) Rule 300	Plant	Monitor visible emissions using EPA Ref. Method 9.
Rule 31.A (SIP) Rule 310 (SIP and County)	Open Areas, Parking Lots, Disturbed Soil, Surfaces, Storage Piles, Roadways and Streets, Material Handling, Unpaved Haul, Access Roads, Material Transport	Submit, implement and post a control plan as required in Rule 310 §303 and §401; monitor opacity using EPA Ref. Method 9; maintain a written log of implementation of RACM as required by Rule 310 §503; and maintain records and retain records for 3 years.
Rule 31.H.1.a (SIP)	Combustion Turbines and Duct Burners	Perform initial calculation for fuel burning based on AP42 (5th Edition) emission factors. Recalculate when applicable factors change. Track compliance.
Rule 32.A,C,E and F (SIP) Rule 320 §300, §302 and §304	Plant	Contain volatile and other listed materials and employ reasonable available controls to prevent unreasonable discharge into the air, the plant does not emit hydrogen sulfide and only insignificant amounts of sulfur oxide; demonstrate compliance with Rule 32.F and Rule 320 §304 by modeling.
Rule 33 (SIP)	Diesel Storage Tank	Conduct periodic inspections to ensure repair of visible leaks within 15 days as required by Rule 33(1).
Rule 34.E, G, K (SIP) Rule 330	Volatile Organic Compounds	Maintain good operating practices by containing any nonarchitectural spray painting operation, discharge no more than 40 lbs/day or 1-1/2 gallons per day to atmosphere, maintain records and retain for a minimum of five years as required by Rule 34 and Rule 330 §503.
Rule 34.C (SIP) Rule 331	Solvent Cleaning	Maintain good operating practices, post-operating requirements, and maintain records as required by Rule 331 §501.

Table 7-1 (Continued) Compliance Plan		
Applicable Requirement	Applicable Source	Compliance Monitoring Determination Method
Rule 335	Architectural Coatings	Restrict use of any prohibited coatings for architectural application.
Rule 40 (SIP)	Combustion Turbines and Duct Burners	Maintain and retain records and submit required reports.
Rule 41 (SIP)	Combustion Turbines and Duct Burners	Provide, install, and maintain monitoring devices and associated records as required.
Rule 42 (SIP)	Combustion Turbines and Duct Burners	Perform all testing and sampling as required by rule.
Rule 43 (SIP)	Combustion Turbines and Duct Burners	Provide access to emission units as required by rule.

Table 7-2 Performance Test Methods	
Pollutant	Performance Test Method
General	Methods 1 through 4
NO_x	Methods 19/20
CO	Method 10
PM_{10}	Methods 5 and 202, or 201a and 202
Opacity	Method 9
SO_2	Gas Supplier S Content Guarantee
TDS	Monthly Conductivity Test

APPENDIX A
SITE ARRANGEMENT DRAWING


KEY PLAN
NOTES
NOT TO BE USED
FOR CONSTRUCTION
BLACK & VEATCH
MESQUITE POWER LLC
PALO VERDE POWER PROJECT
SITE ARRANGEMENT
96210-CSTU-S1001
2

APPENDIX B1
MARICOPA COUNTY SIP-APPROVED REGULATIONS

Table B-1 Maricopa County State Implementation Plan Applicable Requirements		
Citation	Description/Summary	Comment
Regulation I	General Provisions	
Rule 3	Air Pollution Prohibited	
Regulation II	Permits	
Rule 220	Permits to Operate	
§301	Permit Requirements	
§401	Application Procedures for Permits to Operate	
§410	Fees Required	
Rule 21	Permit Conditions	
A.	Form and content of permit applications	
Rule 22	Permit-Denial-Action-Transfer-Posting-Revocation-Compliance-Expiration	
D.	Permit-Denial-Action-Transfer-Posting-Revocation-Compliance-Expiration	
F.	Permit Nontransferable	
Rule 25	Posting of Permit	
Rule 26	Emissions Test Methods and Procedures	
Regulation III	Control of Air Contaminants	
Rule 30	Visible Emissions – Opacity <40 percent as determined by reference Method 9	
Rule 31	Emissions of Particulate Matter	
A.	Nonpoint Sources of Particulate Matter	
1.	Open Areas – Take reasonable measures to prevent excessive amounts of particulate matter from becoming airborne.	
2.	Parking lots – Take all effective measures to prevent excessive amounts of dust from becoming airborne.	
3.	Disturbed Soil Surfaces – Do not disturb or place soil on any area greater than 5 acres and permit fragile soil conditions to remain vacant for more than 6 months or leave an open area vacant for more than 24 months without taking reasonable and semipermanent precautions to prevent excessive amounts of fugitive dust from becoming airborne.	

Table B-1 (Continued) Maricopa County State Implementation Plan Applicable Requirements		
Citation	Description/Summary	Comment
4.	Storage Piles – Do not allow dust-producing material to be stored without taking reasonable precautions to prevent excessive amounts of particulate matter from becoming airborne.	
6.	Roadways and Streets – Take reasonable precautions to prevent excessive amounts of particulate matter from becoming airborne when using, repairing, or constructing any roadway or when transporting materials likely to give rise to airborne dust. Remove material deposited by trucking and earth-moving equipment of paved streets.	
7.	Material Handling and Practices – Do not conduct sandblasting or other abrading operations, or conduct other operations which may cause airborne dust, without taking reasonable precautions to prevent excessive amounts of particulate matter from becoming airborne.	
H.	Fuel Burning	
1.a.	For equipment having a heat input rate of 4200 million Btu per hour or less, the maximum allowable particulate emissions rate in pounds-mass per hour (E)=1.02Q0.769 where Q=Heat input in million BTU per hour.	
Rule 300	Visible Emissions	
Rule 310	Open Fugitive Dust Sources [Approved 4/10/95]	
§301	Limitation – Opacity: Opacity from sources of fugitive dust must not exceed 20 percent or any other stricter limitation imposed by county, state, or federal regulations.	
§302	Dust Generating Operations Permits Required	
§303	Control Plan Required With Permit Application	
§304	Control Plan Revision	
§305	Vehicle Use in Open Areas and Vacant Parcels – Do not allow motor vehicles to drive on open areas without first implementing RACM.	
§306	Unpaved Parking Areas/Staging Areas – Do not use unpaved area larger than 5,000 square feet for parking, storing, servicing, or dispatching motor vehicles without first implementing RACM.	

Table B-1 (Continued) Maricopa County State Implementation Plan Applicable Requirements		
Citation	Description/Summary	Comment
§307	Unpaved Haul/Access Roads – Do not allow use of unpaved road more than 100 feet in length unless no more than 20 vehicular trips per day and speed does not exceed 15 mph. Alternatively, effectively treat and maintain road dust with dust suppressant or gravel.	
§308	Disturbed Surface Areas – Do not disturb soil without implementing RACM. Within 8 months of terminating dust-generating operations, stabilize disturbed area with permanent RACM.	
§309	Vacant Areas – Do not leave open area vacant for more than 15 days without implementing RACM. Within 8 months implement permanent RACM.	
§310	Material Handling – No material handling without implementing RACM.	
§311	Material Transport – Do not transport bulk materials without implementing RACM. Remove particulate matter from the exterior surface of equipment and deposited on paved roads using RACM. Remove deposits of bulk materials from vehicles onto roads within 6 hours of occurrence.	
§311.2	Haul Trucks – Standards	
§312	Roadways, Streets, and Alleys – Do not use, repair, or construct a roadway without implementing RACM.	
§313	Erosion, Sedimentation, and Deposition of Bulk Materials Onto Paved Surfaces – Standards for removing deposition of bulk material onto paved roadway, paved parking, or paved storage area from adjacent real property.	
§401	Information Required to be Included in a Control Plan	
§402	Permit and Control Plan Posting Required	
§501	Opacity Determination – Use EPA Reference Method 9	
§502	Wind Speed Determination	
§503	Recordkeeping – Daily written log of implementation of Control Plan	
§504	Records Retention – 3 years	
Rule 32	Odors and Gaseous Emissions	

Table B-1 (Continued) Maricopa County State Implementation Plan Applicable Requirements		
Citation	Description/Summary	Comment
2.	Use no architectural coating containing photochemically reactive solvents.	
G.	Discharge no more than 40lbs/day of organic material into the atmosphere from any device for employing, applying, evaporating, or drying any photochemically reactive solvent.	
K.	Dispose no more than 1-1/2 gallons per day of any photo-chemically reactive solvent by means which will permit the evaporation of the solvent.	
Rule 300	Visible Emissions	
Rule 335	Architectural Coatings	
§301	Prohibition – Bituminous Pavement Sealers	
§302	Interim Limits – Nonflat Architectural Coatings	
§303	Final Limits – Flat Architectural Coatings	
§304	Limits – Flat Architectural Coatings	
§305	Do not apply or sell any architectural coating that exceeds listed limits.	
§306	Exemptions – Specific Use Coatings	
§307	Exemption – Small Containers	
Regulation IV	Production of Records: Monitoring, Testing, and Sampling Facilities	
Rule 40	Recordkeeping and Reporting	
Rule 41	Monitoring	
A.	Provide, install, maintain, and operate such air contaminant monitoring devices as are reasonable and required to determine compliance.	
Rule 42	Testing and Sampling	
Rule 43	Right of Inspection	

APPENDIX B2
MARICOPA COUNTY AIR POLLUTION CONTROL REGULATIONS

Table B-2 Current Maricopa County Air Pollution Control Regulations		
Citation	Description/Summary	Date Adopted/Amended
Regulation I	General Provisions	
Rule 100	General Provisions and Definitions	5/20/98
Rule 110	Violations	2/15/95
Rule 120	Conditional Orders	11/15/93
Regulation II	Permits and Fees	
Rule 200	Permit Requirements	5/20/98
Section 301	Permits Required	
Section 302	Title V Permit	
Section 305	Earth Moving Permit	
Section 308	Standards for Applications	
Section 309	Permit Conditions	
Section 310	Prohibition – Permit Modification	
Section 311	Permit Posting Required	
Section 312.2	Title V Sources with an Installation, Operating, or Conditional Permit	
Section 313	Accelerated Permitting	
Section 402	Permit Openings: Revocation and Reissuance; Termination	
Section 404	Permit Transfers	
Section 407	Air Quality Impact Models	
Section 408	Testing Procedures	
Section 409	Permit Fees	
Rule 210	Title V Permit Provisions	5/20/98
Section 301	Permit Application Processing Procedures	
Section 302	Permit Contents	
Section 304	Emission Standards and Limitations	
Section 305	Compliance Plan; Certification	
Section 401	Fees Required	
Section 402	Permit Term	
Section 403	Source Changes Allowed Without Permit Revisions	

Table B-2 (Continued) Current Maricopa County Air Pollution Control Regulations		
Citation	Description/Summary	Date Adopted/Amended
Section 404	Administrative Permit Amendments	
Section 405	Minor Permit Revisions	
Section 406	Significant Permit Revisions	
Section 407	Permit Shields	
Section 408.6	Public Participation	
Rule 240	Permits for New Major Sources and Major Modifications to Existing Major Sources	2/15/95
Section 301	Permit or Permit Revision Required	
Section 302	Application Completeness	
Section 303	Air Impact Analysis for Any Geographical Area	
Section 308	Permit Requirements for Sources Located in Attainment and Unclassified Areas	
Section 501	Pollutants to be Included in Analysis of Ambient Air Quality	
Section 508	Visibility and Air Quality Impact Analysis	
Section 510	Air Quality Models	
Rule 241	Permits for New Sources and Modifications to Existing Sources	6/19/96
Section 301	Best Available Control Technology (BACT) Required	
Section 302	Reasonable Available Control Technology (RACT) Required	
Section 303	Circumvention	
Rule 270	Performance Tests	11/15/93
Section 301.1	Applicable Procedures and Testing Methods	
Section 301.2	Opacity Determination by Reference Method 9 of the Arizona Testing Manual	
Section 401	Performance Test Required	
Section 402	Testing Criteria	
Section 403	Testing Conditions	
Section 404	Notice of Testing	
Section 405	Testing Facilities Provided	

Table B-2 (Continued) Current Maricopa County Air Pollution Control Regulations		
Citation	Description/Summary	Date Adopted/Amended
Section 406	Minimum Testing Required	
Section 407	Compliance With Emissions Limits	
Section 408	Additional Testing	
Rule 280	Fees	8/19/98
Section 301	Title V Fees	
Section 304	Calculation of Emission Fees	
Section 310	Earth Moving Permit Fee	
Section 312	Hourly Rate	
Section 401	Payment of Fees	
Regulation III	Control of Air Contaminants	
Rule 300	Visible Emissions	8/5/94
Section 301	Limitations – Opacity /General: Opacity <20%	
Section 302	Exceptions	
Section 501	Compliance Determination – Opacity	
Section 502	Compliance Determination – Opacity of Visible Emissions from Intermittant Sources	
Rule 310	Fugitive Dust Sources	6/16/99
Section 301	Opacity Limitation for Fugitive Dust Sources	
Section 302	Stabilization Requirements for Fugitive Dust Sources	
Section 303	Dust Control Plan Requirements	
Section 304	Elements of a Dust Control Plan	
Section 305	Dust Control Plan Revision	
Section 306	Control Measures	
Section 307	Project Information Sign	
Section 308	Work Practices	
Section 401	Dust Control Plan Posting	
Section 402	Compliance Schedule	
Section 501	Opacity Observations	
Section 502	Stabilization Observations	

Table B-2 (Continued) Current Maricopa County Air Pollution Control Regulations		
Citation	Description/Summary	Date Adopted/Amended
Section 503	Wind Gust Determination	
Section 504	Recordkeeping	
Section 505	Records Retention	
Section 506	Test Methods Adopted by Reference	
Rule 311	Particulate Matter from Process Industries	8/2/93
Section 304	Limitations – Fuel Burning Equipment	
Section 502	Recordkeeping and Reporting	
Section 503	Record Retention	
Section 504	Test Methods	
Rule 320	Odors and Gaseous Air Contaminants	7/13/88
Section 302	Material Containment Required	
Section 303	Reasonable Stack Height Requirement	
Section 308.1	Nitrogen Oxides from Electrical Power Plants – Gaseous Fossil Fuels	
Section 310	Carbon Monoxide	
Rule 330	Volatile Organic Compounds	6/19/96
Section 301	Limitations – Operations Involving Heat	
Section 302	Limitations – Noncomplying Solvents	
Section 304	Reductions Required	
Section 305	Equipment Cleanup	
Section 306	VOC Containment and Disposal	
Section 501	Providing and Maintaining Monitoring Devices	
Section 502	Determination of Compliance	
Section 503	Recordkeeping and Reporting	
Section 504	Test Methods	
Rule 331	Solvent Cleaning	4/7/99
Section 301	Solvent Handling Requirements	
Section 302	Equipment Requirements for all Cleaning Machines	
Section 303	Specific Operating and Signage Requirements for Cleaning Machines	

Table B-2 (Continued) Current Maricopa County Air Pollution Control Regulations		
Citation	Description/Summary	Date Adopted/Amended
Section 304	Solvent Specifications for Nonvapor Cleaning and Degreasing	
Section 305	Nonvapor Batch Cleaning Machines	
Section 307	Special Vapor Cleaning Situations	
Section 308	Exemptions	
Section 309	Requirements for Air Pollution Control Equipment and ECS Monitoring Equipment	
Section 501	Recordkeeping and Reporting	
Section 502	Compliance Determination and Test Methods	
Rule 335	Architectural Coatings	7/13/88
Section 301	Prohibition – Bituminous Pavement Sealers	
Section 302	Interim Limits – Nonflat Architectural Coatings	
Section 303	Final Limits – Nonflat Architectural Coatings	
Section 304	Limits – Flat Architectural Coating	
Section 305	Specialty Coatings	
Section 306	Exemptions – Specific-Use Coatings	
Section 307	Exemptions – Small Containers	
Rule 360	New Source Performance Standards	4/7/99
Section 300	Adopted Federal Standards 40 CFR 60 [July 1, 1998]	
Section 301	Subpart A – General Provisions	
Section 301	Subpart Da – Standards of Performance for Electric Utility Steam Generating Units for Which Construction is Commenced After September 18, 1978	
Section 301	Subpart GG – Standard of Performance for Stationary Gas Turbines	
Rule 370	Federal Hazardous Air Pollutant Program	8/19/98
Section 302	Standards of Performance for Federally Listed Hazardous Air Pollutants	
Section 302.1	Subpart A – General Provisions	
Section 303	Additional Requirements	
Rule 371	Acid Rain	4/3/96

Table B-2 (Continued) Current Maricopa County Air Pollution Control Regulations		
Citation	Description/Summary	Date Adopted/Amended
Section 301	Incorporates Subparts of the Federal Acid Rain Regulations	
Section 301.1	Subparts A through I of 40 CFR Part 72 (Permits Regulation) and all accompanying appendices, adopted as of January 1, 1996	
Section 301.2	40 CFR Part 74 (Sulfur Dioxide Opt-Ins), 40 CFR Part 75 (Continuous Emission Monitoring), and 40 CFR 76 (Acid Rain Nitrogen Oxides Emission Reduction Program) and all accompanying appendices, adopted as of January 1, 1996	
Regulation IV	The Hearing Board	
Rule 400	Procedure before the Hearing Board	11/15/93
Regulation V	Air Quality Standards and Area Classification	
Rule 500	Attainment Area Classification	11/15/93
Rule 510	Air Quality Standards	7/13/88
Regulation VI	Emergency Episodes	
Rule 600	Emergency Episodes	7/13/88
Appendix B	Standard Application Form and Filing Instructions	2/15/95
Appendix C	Describes methods to visually determine opacity of emissions from unpaved roads, unpaved haul/access roads, unpaved parking lots, and sources for time-averaged regulations. Also gives test methods for dust stabilization	6/16/99

APPENDIX C
PERFORMANCE DATA

Representative Emission Rates and Stack Parameters and Potential to Emit

Mesquite Power, LLC

Revised 2/1/00
Printed 02/14/2000 8:00 AM

Determination of Representative Emission and Stack Parameters and Potential to Emit Calculator

Combined Cycle Operation - Natural Gas

GE7FA

G = General Electric Turbine
NOTE Ref. 1/4/00 performance data.

Turbine Operation 100 percent GE7FA

Case Name	Case G1a	Case G1b	Case G1c	Case G2a	Case G2b	Case G2c	Case G3a	Case G3b	Case G3c	Case G4a	Case G4b	Case G4c
Ambient Temp (F)	73	73	73	122	122	122	59	59	59	17	17	17
Evap Cooler	X	X	X	X	X	X	X	X	X			
Duct Firing (g)	X		X	X		X	X		X	X		X
STIG			X			X			X			X
Exit Temp (F)	179.3	187.4	173.1	177.7	180.6	168.8	175	180.9	172.7	174.3	187.1	176
Exit Velocity (ft/s)	64.1	64.6	69.4	61.2	61.8	65.8	64.8	66.2	70.3	68.6	69.4	75.1
Emissions (lb/h)												
NOX (e)	20.4	15.6	21.1	18.2	14.7	20.6	20.7	15.7	21.2	22.2	16.8	22.1
CO	19.9	15.1	20.5	18.7	14.3	20	20.1	15.3	20.7	21.6	16.2	21.5
PM/PM10 (d)	28.8	18	28.7	28.1	18	28.3	28.1	18	28.7	30.4	18	28.5
SO2 (f)	1.8	1.5	2.0	1.8	1.4	1.8	2.0	1.5	2.0	2.1	1.6	2.1
VOC(h)	14.7	2.4	14.8	13.7	2.3	16.2	14.9	2.5	14.7	16.6	2.6	14.7

Turbine Operation 75 percent

Case Name	Case G1d	Case G2d	Case G3d	Case G4d
Ambient Temp (F)	73	122	59	17
Evap Cooler				
Duct Firing				
STIG				
Exit Temp (F)	179.5	181.1	179.5	178.1
Exit Velocity (ft/s)	51	46.7	52.1	54
Emissions (lb/h)				
NOX (e)	12.3	10.6	12.7	13.6
CO	12	10.4	12.5	13.1
PM/PM10 (d)	18	16	16	18
SO2 (f)	1.2	1.0	1.2	1.3
VOC(h)	2	1.8	2	2.1

Turbine Operation 50 percent

Case Name	Case G1e	Case G2e	Case G3e	Case G4e
Ambient Temp (F)	73	122	59	17
Evap Cooler				
Duct Firing				
STIG				
Exit Temp (F)	170.5	175.8	169.6	167.8
Exit Velocity (ft/s)	42	40.2	42.8	44
Emissions (lb/h)				
NOX (e)	9.8	8.7	10.1	10.6
CO	9.8	8.5	9.9	10.6
PM/PM10 (d)	16	16	16	16
SO2 (f)	0.8	0.6	1.0	1.0
VOC(h)	1.6	1.6	1.7	1.7

WECS01F

W = Westinghouse Turbine
NOTE Ref. 1/4/00 performance data.

Turbine Operation 100 percent WECS01F

Case W1a	Case W1b	Case W1c	Case W2a	Case W2b	Case W2c	Case W3a	Case W3b	Case W3c	Case W4a	Case W4b	Case W4c
73	73	73	122	122	122	59	59	59	17	17	17
X	X	X	X	X	X	X	X	X			
X		X	X		X	X		X	X		X
		X			X			X			X
174.6	181.5	175.7	177.6	183.6	173.4	174.3	181.1	175.7	173.1	180.5	178.1
65.4	66.3	71	61.7	62.5	68.9	66.4	67.3	72.2	69	70	74.1
21.5	16.8	22.5	18.8	14.8	21.6	21.7	16.2	22.7	22.8	17.0	23.8
20.7	15.9	21.6	18.3	14.6	21	21.1	16.8	22.1	22	16.8	23
27.1	15.2	26.7	24.9	14	26.2	27.5	16.4	26.7	26.8	16.4	27.8
2.0	1.6	2.1	1.9	1.4	2.1	2.1	1.5	2.2	2.1	1.8	2.2
15.3	1.9	16	14.1	1.6	15.6	15.6	2	14.8	16.1	2.1	16

Turbine Operation 85 percent

Case W1d	Case W2d	Case W3d	Case W4d
73	122	59	17
184.7	184.7	184.6	186.3
61	56.1	62.6	66.7
13.8	11.9	14.1	15.3
13.3	11.6	13.6	14.8
14.1	12.8	14.6	15.3
1.3	1.1	1.3	1.5
3.5	3.1	3.6	3.8

Turbine Operation 70 percent

Case W1e	Case W2e	Case W3e	Case W4e
73	122	59	17
188.1	190.2	187.8	188.4
54	50.4	55	58.1
11.8	10.4	12.2	13.2
11.5	10.2	11.9	12.6
12.6	11.6	12.9	13.7
1.1	1.0	1.1	1.2
3.1	2.8	3.2	3.4

Both Turbines — Worst Case Load Representative Emissions and Stack Parameters

Exit Temp (F)	166.50	349.21	K
Exit Velocity (ft/s)	61.20	18.66	m/s
Emissions (lb/h)			
NOX	22.80	2.87	g/s
CO	23.00	2.90	g/s
PM/PM10	30.40	3.83	g/s
SO2	2.24	0.28	g/s
VOC	16.60	2.09	g/s
Exit Temp (F)	179.10	354.32	K
Exit Velocity (ft/s)	46.70	14.23	m/s
Emissions (lb/h)			
NOX	15.30	1.93	g/s
CO	14.60	1.86	g/s
PM/PM10	18.00	2.27	g/s
SO2	1.46	0.18	g/s
VOC	3.80	0.48	g/s
Exit Temp (F)	167.80	348.43	K
Exit Velocity (ft/s)	40.30	12.28	m/s
Emissions (lb/h)			
NOX	13.20	1.66	g/s
CO	12.80	1.61	g/s
PM/PM10	18.00	2.27	g/s
SO2	1.25	0.16	g/s
VOC	3.40	0.43	g/s

Short-term[a] — GE Turbine, Worst Case Load Representative Emissions and Stack Parameters

GE 100% Worst Case Parameters

Exit Temp (F)	168.90	349.21	K
Exit Velocity (ft/s)	61.20	18.66	m/s
Emissions (lb/h)			
NOX	22.20	2.80	g/s
CO	21.60	2.72	g/s
PM/PM10	30.40	3.83	g/s
SO2	2.10	0.26	g/s
VOC	16.60	2.09	g/s

GE 75% Worst Case Parameters

Exit Temp (F)	178.10	354.32	K
Exit Velocity (ft/s)	46.70	14.23	m/s
Emissions (lb/h)			
NOX	13.50	1.70	g/s
CO	13.10	1.65	g/s
PM/PM10	18.00	2.27	g/s
SO2	1.30	0.16	g/s
VOC	2.10	0.26	g/s

GE 50% Worst Case Parameters

Exit Temp (F)	167.80	348.43	K
Exit Velocity (ft/s)	40.30	12.28	m/s
Emissions (lb/h)			
NOX	10.60	1.34	g/s
CO	10.60	1.32	g/s
PM/PM10	18.00	2.27	g/s
SO2	1.00	0.13	g/s
VOC	1.70	0.21	g/s

Short-term[a] — WES Turbine, Worst Case Load Representative Emissions and Stack Parameters

WES 100% Worst Case Parameters

Exit Temp (F)	173.10	351.54	K
Exit Velocity (ft/s)	61.70	18.81	m/s
Emissions (lb/h)			
NOX	23.80	2.97	g/s
CO	23.00	2.90	g/s
PM/PM10	26.80	3.63	g/s
SO2	2.24	0.28	g/s
VOC	16.10	2.03	g/s

WES 85% Worst Case Parameters

Exit Temp (F)	184.70	363.54	K
Exit Velocity (ft/s)	56.10	16.79	m/s
Emissions (lb/h)			
NOX	15.30	1.93	g/s
CO	14.80	1.86	g/s
PM/PM10	15.50	1.95	g/s
SO2	1.46	0.18	g/s
VOC	3.80	0.48	g/s

WES 70% Worst Case Parameters

Exit Temp (F)	187.80	359.71	K
Exit Velocity (ft/s)	50.40	15.36	m/s
Emissions (lb/h)			
NOX	13.20	1.66	g/s
CO	12.80	1.61	g/s
PM/PM10	13.70	1.73	g/s
SO2	1.25	0.16	g/s
VOC	3.40	0.43	g/s

Emergency Fire Water Pump - Diesel Fuel(i)

Exit Temp (F)	668
Exit Velocity (ft/s)	227.40
Emissions (lb/h)	
NOX	5.59
CO	0.997
PM/PM10	0.1534
SO2	0.545
VOC(j)	0.2892

Exit Temp (F)	668.00	626.48	K
Exit Velocity (ft/s)	227.40	69.34	m/s
Emissions (lb/h)			
NOX	5.59	0.7047	g/s
CO	1.00	0.1256	g/s
PM/PM10	0.15	0.0193	g/s
SO2	0.54	0.0686	g/s
VOC	0.30	0.0377	g/s

Emergency Fire Water Pump

1 # of emergency fire water pumps
52 Hours of emergency fire water pump operation per year

NOX	5.59	lb/h	0.15	tpy
CO	1.00	lb/h	0.03	tpy
PM/PM10	0.15	lb/h	0.00	tpy
SO2	0.54	lb/h	0.01	tpy
VOC	0.30	lb/h	0.01	tpy

Cooling Towers

Exit Temp (F)	122
Exit Velocity (ft/s)	25.3
Emissions (lb/h)	
PM/PM10	8.32

Exit Temp (F)	122.00	323.15	K
Exit Velocity (ft/s)	25.30	7.71	m/s
Emissions (lb/h)			
PM/PM10	8.32	1.05	g/s

Cooling Towers

24 # of cooling tower cells
8760 Hours of [illegible] operation per year

PM/PM10	8.32	lb/h	33.77	tpy

Potential To Emit Calculations

Facility Operating Parameters

GE CCCT

4 # of turbines
8760 Hours of CCCT natural gas operation per year
365 Equivalent days operation per year

GE Annual Worst Case Parameters[a]

PTE-COMBINED CYCLE OPERATION

Max lb/h at 73 F on NG (a)

NOX	21.1	lb/h	369.7	tpy	2.66	g/s
CO	20.50	lb/h	359.2	tpy	2.58	g/s
PM/PM10	28.80	lb/h	505.3	tpy	3.64	g/s
SO2	2.00	lb/h	35.0	tpy	0.25	g/s
VOC	14.60	lb/h	256.3	tpy	1.86	g/s
Exit Temp	172.10	F	350.98	K		
Exit Velocity	64.10	ft/s	19.54	m/s		

	Turbines PTE (tpy)	Fire Water Pump PTE (tpy)	Cooling Towers PTE (tpy)	Total Facility PTE (tpy)	PSD SEL (tpy)	Exceed SEL
NOx	369.67	0.15	NA	369.82	40	Yes
CO	359.16	0.03	NA	359.19	100	Yes
PM/PM10	506.38	0.00	33.77	540.10	25/15	Yes
SO2	35.04	0.01	NA	35.05	40	no
VOC	256.30	0.01	NA	256.30	40	Yes
H2SO4 (c)	4.29	0.0	NA	4.29	7	no
Total Reduced Sulfur (TRS) (b)	negl	negl	NA	negl	10	no
Hydrogen Sulfide (H2S)	negl	negl	NA	negl	10	no
Total Fluorides (TF)	negl	negl	NA	negl	3	no
Lead (Pb)	negl	negl	NA	negl	0.6	no

Facility Operating Parameters

WES CCCT

4 # of turbines
8760 Hours of CCCT natural gas operation per year
365 Equivalent days operation per year

WES Annual Worst Case Parameters[a]

PTE-COMBINED CYCLE OPERATION

Max lb/h at 73 F on NG (a)

NOX	22.5	lb/h	394.2	tpy	2.83	g/s
CO	21.80	lb/h	383.7	tpy	2.76	g/s
PM/PM10	27.10	lb/h	474.8	tpy	3.41	g/s
SO2	2.13	lb/h	37.3	tpy	0.27	g/s
VOC	15.30	lb/h	268.1	tpy	1.93	g/s
Exit Temp	174.60	F	352.54	K		
Exit Velocity	65.40	ft/s	19.93	m/s		

	Turbines PTE (tpy)	Fire Water Pump PTE (tpy)	Cooling Towers PTE (tpy)	Total Facility PTE (tpy)	PSD SEL (tpy)	Exceed SEL
NOx	394.20	0.15	NA	394.35	40	Yes
CO	383.68	0.03	NA	383.71	100	Yes
PM/PM10	474.79	0.00	33.77	508.57	25/15	Yes
SO2	37.32	0.01	NA	37.33	40	no
VOC	268.06	0.01	NA	268.08	40	Yes
H2SO4 (c)	4.57	0.0	NA	4.57	7	no
Total Reduced Sulfur (TRS) (b)	negl	negl	NA	negl	10	no
Hydrogen Sulfide (H2S)	negl	negl	NA	negl	10	no
Total Fluorides (TF)	negl	negl	NA	negl	3	no
Lead (Pb)	negl	negl	NA	negl	0.6	no

Notes

- a Worst Case emissions are from 100% load for both vendors at annual average temperature of 73 F.
- b Combined Total Reduced Sulfur Compounds (excluding H2S) and Total Reduced Sulfur (including H2S).
- c H2SO4 based on a 10% conversion of SO2 to SO3 and a molecular ratio of 1.22 from SO3 to H2SO4 (in the stack and SCR).
- d PM/PM10 emissions represent front (filterable) and back-half (condensable).
- e NOX emissions from the turbines included the effect of selective catalytic reduction (SCR) to 2.5 ppm for Natural Gas firing only.
- f Sulfur content assumed for the Natural Gas = 0.30 grains of sulfur per 100 SCF.
- g Stack emissions, where applicable, also include emissions caused by the duct burner.
- h VOC emissions are estimated to be 20% of the UHC emissions for the GE Turbines and 80% of the UHC emissions for the Westinghouse Turbines.
- i Emergency Fire Water Pump will be operated for 52 hours per year.
- j VOC emissions for the Emergency Fire Water Pump were considered to 100% of the Hydrocarbon emissions.
- k Both worst case short-term and annual parameters do not represent a single specific operating case; the values indicate worst case parameters over each load (short-term), or annual average operating scenario.

Supplement to the "Representative Emission Rates and Stack Parameters and Potential to Emit"

Mesquite Power, LLC

Supplement Document to the "Determination of Representative Emission and Stack Parameters and Potential to Emit Calculator"
Explination of the development of worst case modeling scenario parameters

Revised [illegible]
Printed [illegible]

Combined Cycle Operation - Natural Gas

GE7FA

G - General Electric Turbine
NOTE For [illegible] parameters see

Turbine Operation 100 percent — GE7FA

Case Name	Case G1a	Case G1b	Case G1c	Case G2a	Case G2b	Case G2c	Case G3a	Case G3b	Case G3c	Case G4a	Case G4b	Case G4c
Ambient Temp (F)	73	73	73	122	122	122	59	59	59	17	17	17
Evap Cooler												
Duct Furing (LHV)												
Exit Temp (F)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Exit Velocity (fps)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Emissions (lb/hr)												
NOx (ppm)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PM/PM10 (g)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SO2 (lb)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
VOC (lb)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

A C

Turbine Operation 70 percent

Case Name	Case G1d	Case G1e	Case G1f	Case G2d	Case G2e
Ambient Temp (F)	73	122	59	17	
Evap Cooler					
Duct Furing (LHV)					
Exit Temp (F)	[illegible]	[illegible]	[illegible]	[illegible]	
Exit Velocity (fps)	[illegible]	[illegible]	[illegible]	[illegible]	
Emissions (lb/hr)					
NOx (ppm)	[illegible]	[illegible]	[illegible]	[illegible]	
CO	[illegible]	[illegible]	[illegible]	[illegible]	
PM/PM10 (g)	[illegible]	[illegible]	[illegible]	[illegible]	
SO2 (lb)	[illegible]	[illegible]	[illegible]	[illegible]	
VOC (lb)	[illegible]	[illegible]	[illegible]	[illegible]	

E

Turbine Operation 50 percent

Case Name	Case G1g	Case G1h	Case G1i	Case G2g	Case G2h
Ambient Temp (F)	73	122	59	17	
Evap Cooler					
Duct Furing (LHV)					
Exit Temp (F)	[illegible]	[illegible]	[illegible]	[illegible]	
Exit Velocity (fps)	[illegible]	[illegible]	[illegible]	[illegible]	
Emissions (lb/hr)					
NOx (ppm)	[illegible]	[illegible]	[illegible]	[illegible]	
CO	[illegible]	[illegible]	[illegible]	[illegible]	
PM/PM10 (g)	[illegible]	[illegible]	[illegible]	[illegible]	
SO2 (lb)	[illegible]	[illegible]	[illegible]	[illegible]	
VOC (lb)	[illegible]	[illegible]	[illegible]	[illegible]	

G

WES7F

W - Westinghouse Turbine
NOTE Not [illegible] parameters see

Turbine Operation 100 percent — WES7F

Case Name	Case W1a	Case W1b	Case W1c	Case W2a	Case W2b	Case W2c	Case W3a	Case W3b	Case W3c	Case W4a	Case W4b	Case W4c
Ambient Temp (F)	73	73	73	122	122	122	59	59	59	17	17	17
Evap Cooler												
Duct Furing (LHV)												
Exit Temp (F)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Exit Velocity (fps)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Emissions (lb/hr)												
NOx (ppm)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PM/PM10 (g)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SO2 (lb)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
VOC (lb)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

B D

Turbine Operation 70 percent

Case Name	Case W1d	Case W1e	Case W1f	Case W2d	Case W2e	Case W2f
Ambient Temp (F)	73	122	59	17		
Evap Cooler						
Duct Furing (LHV)						
Exit Temp (F)	[illegible]	[illegible]	[illegible]	[illegible]		
Exit Velocity (fps)	[illegible]	[illegible]	[illegible]	[illegible]		
Emissions (lb/hr)						
NOx (ppm)	[illegible]	[illegible]	[illegible]	[illegible]		
CO	[illegible]	[illegible]	[illegible]	[illegible]		
PM/PM10 (g)	[illegible]	[illegible]	[illegible]	[illegible]		
SO2 (lb)	[illegible]	[illegible]	[illegible]	[illegible]		
VOC (lb)	[illegible]	[illegible]	[illegible]	[illegible]		

F

Turbine Operation 50 percent

Case Name	Case W1g	Case W1h	Case W1i	Case W2g	Case W2h
Ambient Temp (F)	73	122	59	17	
Evap Cooler					
Duct Furing (LHV)					
Exit Temp (F)	[illegible]	[illegible]	[illegible]	[illegible]	
Exit Velocity (fps)	[illegible]	[illegible]	[illegible]	[illegible]	
Emissions (lb/hr)					
NOx (ppm)	[illegible]	[illegible]	[illegible]	[illegible]	
CO	[illegible]	[illegible]	[illegible]	[illegible]	
PM/PM10 (g)	[illegible]	[illegible]	[illegible]	[illegible]	
SO2 (lb)	[illegible]	[illegible]	[illegible]	[illegible]	
VOC (lb)	[illegible]	[illegible]	[illegible]	[illegible]	

H

Short-term[a]

GE Turbine
Worst Case Representative
Emissions and Stack Parameters

GE 100% Load Worst Case Parameters from C

Exit Temp (F)	189.9	349.31 K
Exit Velocity (fps)	61.8	18.85 m/s
Emissions (lb/hr)		
NOx	22.8	2.87 g/s
CO	23.4	2.94 g/s
PM/PM10	30.4	3.83 g/s
SO2	2.4	0.30 g/s
VOC	14.8	2.06 g/s

GE 75% Load Worst Case Parameters from E

Exit Temp (F)	178.1	354.32 K
Exit Velocity (fps)	46.3	14.12 m/s
Emissions (lb/hr)		
NOx	15.3	1.92 g/s
CO	14.9	1.88 g/s
PM/PM10	19.4	2.27 g/s
SO2	1.6	0.18 g/s
VOC	3.9	0.48 g/s

GE 50% Load Worst Case Parameters from G

Exit Temp (F)	167.9	349.43 K
Exit Velocity (fps)	40.3	12.28 m/s
Emissions (lb/hr)		
NOx	13.9	1.88 g/s
CO	12.9	1.61 g/s
PM/PM10	19.4	2.27 g/s
SO2	1.5	0.16 g/s
VOC	3.4	0.43 g/s

Short-term[a]

WES Turbine
Worst Case Representative
Emissions and Stack Parameters

WES 100% Load Worst Case Parameters from D

Exit Temp (F)	172.1	351.54 K
Exit Velocity (fps)	61.2	18.61 m/s
Emissions (lb/hr)		
NOx	22.4	2.87 g/s
CO	23.4	2.86 g/s
PM/PM10	28.9	3.63 g/s
SO2	2.3	0.29 g/s
VOC	16.0	2.03 g/s

WES 85% Load Worst Case Parameters from F

Exit Temp (F)	161.3	345.14 K
Exit Velocity (fps)	53.4	16.28 m/s
Emissions (lb/hr)		
NOx	15.3	1.93 g/s
CO	14.9	1.88 g/s
PM/PM10	19.3	2.26 g/s
SO2	1.6	0.18 g/s
VOC	3.6	0.46 g/s

WES 70% Load Worst Case Parameters from H

Exit Temp (F)	151.3	339.71 K
Exit Velocity (fps)	44.4	13.53 m/s
Emissions (lb/hr)		
NOx	13.9	1.85 g/s
CO	12.9	1.61 g/s
PM/PM10	19.3	1.73 g/s
SO2	1.3	0.16 g/s
VOC	2.9	0.43 g/s

Emergency Fire Water Pump - Diesel Fuel(i

Exit Temp (F)	[illegible]	[illegible]
Exit Velocity (fps)	[illegible]	[illegible]
Emissions (lb/hr)		
NOx	[illegible]	[illegible]
CO	[illegible]	[illegible]
PM/PM10	[illegible]	[illegible]
SO2	[illegible]	[illegible]
VOC(g)	[illegible]	[illegible]

Emergency Fire Water Pump

i = # of emergency fire water pumps
M Hours of emergency fire water pump operation per year

Exit Temp (F)	[illegible]	[illegible]
Exit Velocity (fps)	[illegible]	[illegible]
Emissions (lb/hr)		
NOx	[illegible]	[illegible]
CO	[illegible]	[illegible]
PM/PM10	[illegible]	[illegible]
SO2	[illegible]	[illegible]
VOC	[illegible]	[illegible]

Cooling Towers

Exit Temp (F)	[illegible]	[illegible]
Exit Velocity (fps)	[illegible]	[illegible]
Emissions (lb/hr)		
PM/PM10	[illegible]	[illegible]

Cooling Towers

Y = # of cooling towers cells
X Hours of cooling tower pump operation per year

Exit Temp (F)	[illegible]	[illegible]
Exit Velocity (fps)	[illegible]	[illegible]
Emissions (lb/hr)		
PM/PM10	[illegible]	[illegible]

Potential To Emit Calculation:

Facility Operating Parameters

GE CCCT

[illegible]

GE Annual Worst Case Parameters from A

GE Annual Worst Case Parameters

PTE-COMBINED CYCLE OPERATION

	Max lb/hr to 15.7 m NG (g)		
NOx	[illegible]	[illegible]	[illegible]
CO	[illegible]	[illegible]	[illegible]
PM/PM10	[illegible]	[illegible]	[illegible]
SO2	[illegible]	[illegible]	[illegible]
VOC	[illegible]	[illegible]	[illegible]
Exit Temp	[illegible]	[illegible]	[illegible]
Exit Velocity	[illegible]	[illegible]	[illegible]

	Turbines PTE (lb/yr)	Fire Water Pump PTE (lb/yr)	Cooling Towers PTE (lb/yr)	Total Facility PTE (lb/yr)	PSD SER (lb/yr)	Insignif SER (lb/yr)
NOx	[illegible]	[illegible]	NA	[illegible]	40	Yes
CO	[illegible]	[illegible]	NA	[illegible]	100	Yes
PM/PM10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
SO2	[illegible]	[illegible]	NA	[illegible]	40	No
VOC	[illegible]	[illegible]	NA	[illegible]	[illegible]	Yes
H2SO4 (g)	[illegible]	[illegible]	NA	[illegible]	7	No
Total Reduced Sulfur (TRS)	neg	neg	NA	neg	10	No
Hydrogen Sulfide (H2S)	neg	neg	NA	neg	10	No
Total Fluorides (F)	neg	neg	NA	neg	3	No
Lead (Pb)	neg	neg	NA	neg	0.6	No

Facility Operating Parameters

WES CCCT

[illegible]

WES Annual Worst Case Parameters from B

WES Annual Worst Case Parameters

PTE-COMBINED CYCLE OPERATION

	Max lb/hr to 15.7 m NG (g)		
NOx	[illegible]	[illegible]	[illegible]
CO	[illegible]	[illegible]	[illegible]
PM/PM10	[illegible]	[illegible]	[illegible]
SO2	[illegible]	[illegible]	[illegible]
VOC	[illegible]	[illegible]	[illegible]
Exit Temp	[illegible]	[illegible]	[illegible]
Exit Velocity	[illegible]	[illegible]	[illegible]

	Turbines PTE (lb/yr)	Fire Water Pump PTE (lb/yr)	Cooling Towers PTE (lb/yr)	Total Facility PTE (lb/yr)	PSD SER (lb/yr)	Insignif SER (lb/yr)
NOx	[illegible]	[illegible]	NA	[illegible]	40	Yes
CO	[illegible]	[illegible]	NA	[illegible]	100	Yes
PM/PM10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Yes
SO2	[illegible]	[illegible]	NA	[illegible]	40	No
VOC	[illegible]	[illegible]	NA	[illegible]	[illegible]	Yes
H2SO4 (g)	[illegible]	[illegible]	NA	[illegible]	7	No
Total Reduced Sulfur (TRS)	neg	neg	NA	neg	10	No
Hydrogen Sulfide (H2S)	neg	neg	NA	neg	10	No
Total Fluorides (F)	neg	neg	NA	neg	3	No
Lead (Pb)	neg	neg	NA	neg	0.6	No

Notes

1. Worst Case emissions are high NOx case for both turbines, at annual average temperature of 73 F
2. Gaseous Total Reduced Sulfur Compounds (including H2S) and Total Reduced Sulfur pass along (H2S)
3. H2SO4 based on a 10% conversion of SO2 to SO3 and a molecularly ratio of 1.32 from SO3 to H2SO4 (in mist, steam, and SCR)
4. PM/PM10 assumes representative (filterable and back-half condensible)
5. NOx emissions from the turbines included the effect of selective catalytic reduction (SCR) to 2.5 ppm for hourly CEM long only
6. Sulfur content contained for the Annual Cols = 0.30 grains of sulfur per MM SCF
7. Stack emissions where applicable also include emissions added by the duct burner
8. VOC emissions are estimated to be 20% of the LHV emission for the GE Turbines and 10% of the LHV emission for the Westinghouse Turbines
9. Emergency Fire Water Pump will be operated for 52 hours per year
10. VOC emissions for the Emergency Fire Water Pump were calculated in VOC of the representative emissions
11. Stack exit temperature and velocity presented for the hot exhaust is for a single operating case. For other modes and in some jurisdictions data each case (short term), or annual average operating scenario

Make-up Potential to Emit each Pollutant

General Electric Case A

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
B&V Project 96210.040

01/04/00
01:46 PM

CTG Load Level (percent of Base Load)	100.00%	100.00%	100.00%	100.00%
CTG Model	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	GE Cycledeck	GE Cycledeck	GE Cycledeck	GE Cycledeck
HRSG Firing	Fired NG	Fired NG	Fired NG	Fired NG
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
CTG Performance And Emissions				
Ambient Temperature, F	122	73	59	17
Ambient Relative Humidity, %	16.45%	38.10%	60.00%	67.37%
CTG Compressor Inlet Temperature, F	81	58	52	17
CTG Compr. Inlet Relative Humidity, %	96	94	94	67
Atmospheric Pressure, psia	14.223	14.223	14.223	14.223
Inlet Fogger In Service	Yes	Yes	Yes	No
Inlet Loss, in. H2O	3.0	3.0	3.0	3.0
Exhaust Loss, in. H2O	17.0	17.0	17.0	17.0
CTG Load Level (percent of Base Load)	100%	100%	100%	100%
Gross CTG Output, kW	151,500	164,700	167,400	181,300
Gross CTG Heat Rate, Btu/kWh (LHV)	9,687	9,438	9,388	9,179
CTG Heat Input, MBtu/h (LHV)	1,467.53	1,554.41	1,571.56	1,664.15
CTG Heat Input, MBtu/h (HHV)	1,629.29	1,725.74	1,744.78	1,847.58
CTG Fuel Flow, lb/h	71,390	75,610	76,440	80,950
CTG Steam Injection Flow, lb/h	0	0	0	0
Injection Ratio	0.000	0.000	0.000	0.000
CTG Exhaust Flow, lb/h	3,245,010	3,432,020	3,477,020	3,709,020
CTG Exhaust Temperature, F	1,148	1,126	1,117	1,072
CTG Exhaust Analysis (Volume Basis - Wet)				
Ar	0.91014%	0.92798%	0.93111%	0.94124%
CO2	3.74971%	3.78151%	3.77820%	3.76585%
H2O	10.73465%	8.94489%	8.62276%	7.57713%
N2	72.48334%	73.90389%	74.15274%	74.95933%
O2	12.12215%	12.44171%	12.51516%	12.75644%
SO2	0.00002%	0.00002%	0.00002%	0.00002%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at CTG exhaust flange)				
NOx, ppmvd @15% O2	9.0	9.0	9.0	9.0
NOx, lb/h as NO2	52.7	55.9	56.5	59.8
CO, ppmvd	9.0	9.0	9.0	9.0
CO, lb/h	26.0	27.8	28.2	30.3
SO2, ppmvd (with no conversion to H2SO4)	0.2	0.2	0.2	0.2
SO2, lb/h (with no conversion to H2SO4)	1.4	1.5	1.5	1.6
UHC, ppmvw	7.0	7.0	7.0	7.0
UHC, lb/h as CH4	13.0	13.6	13.8	14.6
VOC, ppmvw	1.4	1.4	1.4	1.4
VOC, lb/h as CH4	2.6	2.7	2.8	2.9
Particulates, lb/h (front only), excluding 2(NH4(SO4))	9.0	9.0	9.0	9.0
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	18.0	18.0	18.0	18.0
PM10, lb/h (front only), excluding 2(NH4(SO4))	9.0	9.0	9.0	9.0
PM10, lb/h (front and back), excluding 2(NH4(SO4))	18.0	18.0	18.0	18.0
CTG Fuel LHV, Btu/lb	20,558	20,558	20,558	20,558
CTG Fuel HHV, Btu/lb	22,824	22,824	22,824	22,824
HHV/LHV Ratio	1.1102	1.1102	1.1102	1.1102
CTG Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00%	100.00%	100.00%	100.00%
CTG Wet (Total) Exhaust Gas Analysis				
Molecular Wt, lb/mol	28.13	28.33	28.37	28.48
Gas Constant, ft-lbf/lbm-R	54.916	54.531	54.463	54.247
Specific Volume, ft^3/lb	41.32	40.47	40.19	38.89
Exhaust Gas Flow, acfm	2,234,730	2,314,897	2,329,024	2,404,063
Specific Volume, acf/lb	13.49	13.39	13.37	13.32
Exhaust Gas Flow, scfm	729,586	765,912	774,796	823,402
Specific Volume, Nm3/kg	0.7967	0.7911	0.7901	0.7870
Exhaust Gas Flow, Nm3/s	325.74	342.09	346.14	367.79
Duct Burner Performance and Emissions				
Duct Burner Heat Input, MBtu/h (LHV)	456.1	488.8	499.3	557.7
Duct Burner Heat Input, MBtu/h (HHV)	506.4	542.7	554.3	619.1
Duct Burner Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Duct Burner NOx, lb/MBtu (HHV)	0.100	0.100	0.100	0.100
Duct Burner CO, lb/MBtu (HHV)	0.100	0.100	0.100	0.100

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
BatV Project 96210.040

01/04/00
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CTG Load Level (percent of Base Load)	100.00%	100.00%	100.00%	100.00%
CTG Model	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	GE Cycledeck	GE Cycledeck	GE Cycledeck	GE Cycledeck
HRSG Firing	Fired NG	Fired NG	Fired NG	Fired NG
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
Duct Burner UHC (as CH4), lb/MBtu (HHV)	0.060	0.060	0.060	0.060
DB non-meth/non-eth VOC (as CH4), lb/MBtu (HHV)	0.025	0.025	0.025	0.025
Duct Burner Particulate, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner Particulate, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner PM10, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner PM10, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner SO2, lb/h	0.007	0.007	0.007	0.008
DB NOx, lb/h	50.6	54.3	55.4	61.9
DB CO, lb/h	50.6	54.3	55.4	61.9
DB UHC (as CH4), lb/h	30.4	32.6	33.3	37.1
DB VOC (as CH4), lb/h	12.7	13.6	13.9	15.5
DB Particulate, lb/h (front only)	5.1	5.4	5.5	6.2
DB Particulate, lb/h (front and back)	10.1	10.9	11.1	12.4
DB PM10, lb/h (front only)	5.1	5.4	5.5	6.2
DB PM10, lb/h (front and back)	10.1	10.9	11.1	12.4
Stack Exhaust Analysis (Volume Basis - Wet)				
Ar	0.89969%	0.91711%	0.92010%	0.92954%
CO2	4.85862%	4.91244%	4.91971%	4.96529%
H2O	12.86778%	11.14208%	10.84424%	9.92405%
N2	71.65565%	73.04283%	73.28072%	74.03314%
O2	9.71824%	9.98552%	10.03520%	10.14794%
SO2	0.00002%	0.00002%	0.00002%	0.00002%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at Stack exit)				
NOx, ppmvd @15% O2 w/o SCR	13.5	13.5	13.5	13.7
NOx, lb/h as NO2 w/o SCR	103.4	110.1	111.9	121.7
NOx, ppmvd @15% O2 w/ SCR	2.5	2.5	2.5	2.5
NOx, lb/h as NO2 w/ SCR	19.2	20.4	20.7	22.2
NH3, ppmvd @15% O2 w/o SCR	0.0	0.0	0.0	0.0
NH3, lb/h w/o SCR	0.0	0.0	0.0	0.0
NH3 slip, ppmvd @15% O2 w/ SCR	10.0	10.0	10.0	10.0
NH3 slip, lb/h w/ SCR	28.4	30.2	30.6	32.8
CO, ppmvd w/o Catalyst	26.9	26.9	27.0	27.7
CO, ppmvw w/o Catalyst	23.4	23.9	24.1	25.0
CO, ppmvd @ 15% O2 w/o Catalyst	16.4	16.5	16.6	17.1
CO, lb/h w/o Catalyst	76.6	82.1	83.7	92.3
CO, ppmvd w/ Catalyst	6.6	6.5	6.5	6.5
CO, ppmvw w/ Catalyst	5.7	5.8	5.8	5.8
CO, ppmvd @ 15% O2 w/ Catalyst	4.0	4.0	4.0	4.0
CO, lb/h w/ Catalyst	18.7	19.9	20.1	21.6
SO2, ppmvd (with no conversion to H2SO4)	0.28	0.28	0.28	0.28
SO2, ppmvw (with no conversion to H2SO4)	0.24	0.25	0.25	0.25
SO2, lb/h (with no conversion to H2SO4)	1.82	1.93	1.96	2.10
Total S in Exhaust Gas, lb/h	0.91	0.97	0.98	1.05
Exhaust Gas SO3 (converted from SO2), ppmvw	0.04	0.04	0.04	0.04
Exhaust Gas SO3 (converted from SO2), ppmvd	0.05	0.05	0.05	0.05
Exhaust Gas SO3 (converted from SO2), lb/h	0.38	0.41	0.42	0.45
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.47	0.51	0.51	0.55
Remaining SO2 in Exhaust Gas, ppmvw	0.20	0.20	0.20	0.21
Remaining SO2 in Exhaust Gas, ppmvd	0.23	0.23	0.23	0.23
Remaining SO2 in Exhaust Gas, lb/h	1.51	1.60	1.62	1.74
UHC, ppmvd	26.6	26.4	26.5	27.2
UHC, ppmvw	23.2	23.5	23.6	24.5
UHC, ppmvd @ 15% O2	16.2	16.2	16.3	16.7
UHC, lb/h as CH4	43.3	46.2	47.0	51.8
VOC, ppmvd	8.4	8.4	8.4	8.7
VOC, ppmvw	7.3	7.5	7.5	7.8
VOC, ppmvd @ 15% O2	5.1	5.2	5.2	5.4
VOC, lb/h as CH4	13.7	14.7	14.9	16.6
NOTE: Particulate and PM10 calculations do NOT include the effect of any SO2 conversions in the SCR catalyst.				
Particulates, lb/h (front only), excluding 2(NH4(SO4))	14.1	14.4	14.5	15.2
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	28.1	28.9	29.1	30.4
PM10, lb/h (front only), excluding 2(NH4(SO4))	14.1	14.4	14.5	15.2
PM10, lb/h (front and back), excluding 2(NH4(SO4))	28.1	28.9	29.1	30.4
Particulates, lb/h (front only), including 2(NH3(SO4))	14.7	15.1	15.2	15.9
Particulates, lb/h (front and back), including 2(NH3(SO4))	28.8	29.5	29.8	31.1
PM10, lb/h (front only), including 2(NH3(SO4))	14.7	15.1	15.2	15.9
PM10, lb/h (front and back), including 2(NH3(SO4))	28.8	29.5	29.8	31.1
NOTE: SO2 converted to H2SO4 (assumed).	16.9%	17.1%	17.1%	17.2%
Remaining SO2 in Exhaust Gas, lb/h	1.51	1.60	1.62	1.74
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.47	0.51	0.51	0.55
Exhaust Gas 2(NH3(SO4)) 100% from SO3, lb/h	0.63	0.68	0.69	0.75
Stack Exit Temperature, F	177.7	175.3	175	174.3
Stack Diameter, ft (estimated)	18	18	18	18
Stack Flow, lb/h	3,267,197	3,455,797	3,501,306	3,736,146
Stack Flow, scfm	737,842	775,250	784,293	833,783
Stack Flow, acfm	934,963	978,567	989,702	1,051,102
Stack Exit Velocity, ft/s	61.2	64.1	64.8	68.8

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
B&V Project 96210.040

01/04/00
01:46 PM

CTG Load Level (percent of Base Load)	100.00%	100.00%	100.00%	100.00%
CTG Model	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	GE Cycledeck	GE Cycledeck	GE Cycledeck	GE Cycledeck
HRSG Firing	Fired NG	Fired NG	Fired NG	Fired NG
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
w/ SCR				
NOx Removed, lb/h as NO2	33.5	35.5	35.8	37.6
NOx Removed, percent	63.6%	63.5%	63.4%	62.9%
NH3 Reacted, lb/h (1:1 stoichiometric ratio)	12.4	13.1	13.2	13.9
NH3 Slip, lb/h	28.4	30.2	30.6	32.8
Total NH3 Consumption, lb/h	40.8	43.3	43.8	46.7

Notes:

1. Duct Burner fuel is same as CTG fuel, Sulfur content 0.30 grains / SCF
2. Particulate values do not contain cayalsyt fines or other entrained particulate
3. Stack exhaust analysis and emissions do not include effects of CO catalyst.
4. SCR controls NOx to 2.5 ppmvd @ 15% O2.
5. CO Catalyst controls CO stack emissions to 4.0 ppmvw
6. VOC Reduction at stack due to CO catalyst assumed to be 10%
7. Emissions calculation do not include heavy particles such as lead, mercury,
8. Changes in fuel constituents from those provided and indicated in this table may change VOC, UHC, NOx, SOx, and other predicted emission levels.
9. VOC are assumed to be 0.2 * UHC's at the CTG exhaust flange
10. Back half particulates assumed equal to front half.
11. CTG manufacture provided front half particulate data only
12. Performance based Cycledeck, a General Electric program, and similar project performance.

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General Electric Case B

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
BstV Project 96210.040

01/04/00
01:46 PM

CTG Load Level (percent of Base Load)	100.00%	100.00%	100.00%	100.00%
CTG Model	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	GE Cycledeck	GE Cycledeck	GE Cycledeck	GE Cycledeck
HRSG Firing	Unfired	Unfired	Unfired	Unfired
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
CTG Performance And Emissions				
Ambient Temperature, F	122	73	59	17
Ambient Relative Humidity, %	14.45%	38.10%	60.00%	67.37%
CTG Compressor Inlet Temperature, F	81	58	52	17
CTG Compr. Inlet Relative Humidity, %	94	94	94	67
Atmospheric Pressure, psia	14.223	14.223	14.223	14.223
Inlet Fogger In Service	Yes	Yes	Yes	No
Inlet Loss, in. H2O	3.0	3.0	3.0	3.0
Exhaust Loss, in. H2O	17.0	17.0	17.0	17.0
CTG Load Level (percent of Base Load)	100%	100%	100%	100%
Gross CTG Output, kW	151,500	164,700	167,400	181,300
Gross CTG Heat Rate, Btu/kWh (LHV)	9,687	9,438	9,388	9,179
CTG Heat Input, MBtu/h (LHV)	1,467.53	1,554.41	1,571.56	1,664.15
CTG Heat Input, MBtu/h (HHV)	1,629.29	1,725.74	1,744.78	1,847.58
CTG Fuel Flow, lb/h	71,390	75,610	76,440	80,950
CTG Steam Injection Flow, lb/h	0	0	0	0
Injection Ratio	0.000	0.000	0.000	0.000
CTG Exhaust Flow, lb/h	3,245,010	3,432,020	3,477,020	3,709,020
CTG Exhaust Temperature, F	1,148	1,126	1,117	1,072
CTG Exhaust Analysis (Volume Basis - Wet)				
Ar	0.91014%	0.92798%	0.93111%	0.94124%
CO2	3.74971%	3.78151%	3.77820%	3.76585%
H2O	10.73465%	8.94489%	8.62276%	7.57713%
N2	72.48334%	73.90389%	74.15274%	74.95933%
O2	12.12215%	12.44171%	12.51516%	12.75644%
SO2	0.00002%	0.00002%	0.00002%	0.00002%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at CTG exhaust flange)				
NOx, ppmvd @15% O2	9.0	9.0	9.0	9.0
NOx, lb/h as NO2	52.7	55.9	56.5	59.8
CO, ppmvd	9.0	9.0	9.0	9.0
CO, lb/h	26.0	27.8	28.2	30.3
SO2, ppmvd (with no conversion to H2SO4)	0.2	0.2	0.2	0.2
SO2, lb/h (with no conversion to H2SO4)	1.4	1.5	1.5	1.6
UHC, ppmvw	7.0	7.0	7.0	7.0
UHC, lb/h as CH4	13.0	13.6	13.8	14.6
VOC, ppmvw	1.4	1.4	1.4	1.4
VOC, lb/h as CH4	2.6	2.7	2.8	2.9
Particulates, lb/h (front only), excluding 2(NH4(SO4))	9.0	9.0	9.0	9.0
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	18.0	18.0	18.0	18.0
PM10, lb/h (front only), excluding 2(NH4(SO4))	9.0	9.0	9.0	9.0
PM10, lb/h (front and back), excluding 2(NH4(SO4))	18.0	18.0	18.0	18.0
CTG Fuel LHV, Btu/lb	20,558	20,558	20,558	20,558
CTG Fuel HHV, Btu/lb	22,824	22,824	22,824	22,824
HHV/LHV Ratio	1.1102	1.1102	1.1102	1.1102
CTG Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00%	100.00%	100.00%	100.00%
CTG Wet (Total) Exhaust Gas Analysis				
Molecular Wt, lb/mol	28.13	28.33	28.37	28.48
Gas Constant, ft-lbf/lbm-R	54.916	54.531	54.463	54.247
Specific Volume, ft^3/lb	41.32	40.47	40.19	38.89
Exhaust Gas Flow, acfm	2,234,730	2,314,897	2,329,024	2,404,063
Specific Volume, scf/lb	13.49	13.39	13.37	13.32
Exhaust Gas Flow, scfm	729,586	765,912	774,796	823,402
Specific Volume, Nm3/kg	0.7967	0.7911	0.7901	0.7870
Exhaust Gas Flow, Nm3/s	325.74	342.09	346.14	367.79
Duct Burner Performance and Emissions				
Duct Burner Heat Input, MBtu/h (LHV)	0.0	0.0	0.0	0.0
Duct Burner Heat Input, MBtu/h (HHV)	0.0	0.0	0.0	0.0
Duct Burner Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Duct Burner NOx, lb/MBtu (HHV)	0.100	0.100	0.100	0.100
Duct Burner CO, lb/MBtu (HHV)	0.100	0.100	0.100	0.100

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
B&V Project 96210.040

01/04/00
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CTG Load Level (percent of Base Load)	100.00%	100.00%	100.00%	100.00%
CTG Model	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	GE Cycledeck	GE Cycledeck	GE Cycledeck	GE Cycledeck
HRSG Firing	Unfired	Unfired	Unfired	Unfired
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
Duct Burner UHC (as CH4), lb/MBtu (HHV)	0.060	0.060	0.060	0.060
DB non-meth/non-eth VOC (as CH4), lb/MBtu (HHV)	0.025	0.025	0.025	0.025
Duct Burner Particulate, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner Particulate, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner PM10, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner PM10, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner SO2, lb/h	0.000	0.000	0.000	0.000
DB NOx, lb/h	0.0	0.0	0.0	0.0
DB CO, lb/h	0.0	0.0	0.0	0.0
DB UHC (as CH4), lb/h	0.0	0.0	0.0	0.0
DB VOC (as CH4), lb/h	0.0	0.0	0.0	0.0
DB Particulate, lb/h (front only)	0.0	0.0	0.0	0.0
DB Particulate, lb/h (front and back)	0.0	0.0	0.0	0.0
DB PM10, lb/h (front only)	0.0	0.0	0.0	0.0
DB PM10, lb/h (front and back)	0.0	0.0	0.0	0.0
Stack Exhaust Analysis (Volume Basis - Wet)				
Ar	0.91014%	0.92798%	0.93111%	0.94124%
CO2	3.74971%	3.78151%	3.77820%	3.76585%
H2O	10.73465%	8.94489%	8.62276%	7.57713%
N2	72.48334%	73.90389%	74.15274%	74.95933%
O2	12.12215%	12.44171%	12.51516%	12.75444%
SO2	0.00002%	0.00002%	0.00002%	0.00002%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at Stack exit)				
NOx, ppmvd @15% O2 w/o SCR	9.0	9.0	9.0	9.0
NOx, lb/h as NO2 w/o SCR	52.7	55.9	56.5	59.8
NOx, ppmvd @15% O2 w/ SCR	2.5	2.5	2.5	2.5
NOx, lb/h as NO2 w/ SCR	14.7	15.5	15.7	16.6
NH3, ppmvd @15% O2 w/o SCR	0.0	0.0	0.0	0.0
NH3, lb/h w/o SCR	0.0	0.0	0.0	0.0
NH3 slip, ppmvd @15% O2 w/ SCR	10.0	10.0	10.0	10.0
NH3 slip, lb/h w/ SCR	21.7	23.0	23.2	24.6
CO, ppmvd w/o Catalyst	9.0	9.0	9.0	9.0
CO, ppmvw w/o Catalyst	8.0	8.2	8.2	8.3
CO, ppmvd @ 15% O2 w/o Catalyst	7.3	7.4	7.4	7.5
CO, lb/h w/o Catalyst	26.0	27.8	28.2	30.3
CO, ppmvd w/ Catalyst	4.9	4.9	4.9	4.8
CO, ppmvw w/ Catalyst	4.4	4.5	4.5	4.4
CO, ppmvd @ 15% O2 w/ Catalyst	4.0	4.0	4.0	4.0
CO, lb/h w/ Catalyst	14.3	15.1	15.3	16.2
SO2, ppmvd (with no conversion to H2SO4)	0.21	0.21	0.21	0.20
SO2, ppmvw (with no conversion to H2SO4)	0.19	0.19	0.19	0.19
SO2, lb/h (with no conversion to H2SO4)	1.39	1.47	1.49	1.58
Total S in Exhaust Gas, lb/h	0.70	0.74	0.74	0.79
Exhaust Gas SO3 (converted from SO2), ppmvw	0.03	0.04	0.04	0.04
Exhaust Gas SO3 (converted from SO2), ppmvd	0.04	0.04	0.04	0.04
Exhaust Gas SO3 (converted from SO2), lb/h	0.32	0.34	0.35	0.37
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.39	0.42	0.43	0.46
Remaining SO2 in Exhaust Gas, ppmvw	0.15	0.15	0.15	0.15
Remaining SO2 in Exhaust Gas, ppmvd	0.17	0.17	0.17	0.17
Remaining SO2 in Exhaust Gas, lb/h	1.13	1.20	1.21	1.28
UHC, ppmvd	7.8	7.7	7.7	7.6
UHC, ppmvw	7.0	7.0	7.0	7.0
UHC, ppmvd @ 15% O2	6.3	6.3	6.3	6.3
UHC, lb/h as CH4	13.0	13.6	13.8	14.6
VOC, ppmvd	1.4	1.4	1.4	1.4
VOC, ppmvw	1.3	1.3	1.3	1.3
VOC, ppmvd @ 15% O2	1.1	1.1	1.1	1.1
VOC, lb/h as CH4	2.3	2.4	2.5	2.6
NOTE: Particulate and PM10 calculations do NOT include the effect of any SO2 conversions in the SCR catalyst.				
Particulates, lb/h (front only), excluding 2(NH4(SO4))	9.0	9.0	9.0	9.0
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	18.0	18.0	18.0	18.0
PM10, lb/h (front only), excluding 2(NH4(SO4))	9.0	9.0	9.0	9.0
PM10, lb/h (front and back), excluding 2(NH4(SO4))	18.0	18.0	18.0	18.0
Particulates, lb/h (front only), including 2(NH3(SO4))	9.5	9.6	9.6	9.6
Particulates, lb/h (front and back), including 2(NH3(SO4))	18.5	18.6	18.6	18.6
PM10, lb/h (front only), including 2(NH3(SO4))	9.5	9.6	9.6	9.6
PM10, lb/h (front and back), including 2(NH3(SO4))	18.5	18.6	18.6	18.6
NOTE: SO2 converted to H2SO4 (assumed).	18.5%	18.7%	18.7%	18.9%
Remaining SO2 in Exhaust Gas, lb/h	1.13	1.20	1.21	1.28
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.39	0.42	0.43	0.46
Exhaust Gas 2(NH3(SO4)) 100% from SO3, lb/h	0.53	0.57	0.57	0.61
Stack Exit Temperature, F	190.6	187.4	186.9	187.1
Stack Diameter, ft (estimated)	18	18	18	18
Stack Flow, lb/h	3,245,010	3,432,020	3,477,020	3,709,020
Stack Flow, scfm	729,586	765,912	774,796	823,402
Stack Flow, acfm	943,216	985,562	996,166	1,058,925
Stack Exit Velocity, ft/s	61.8	64.6	65.2	69.4

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
B&V Project 96210.040

01/04/00
01:46 PM

CTG Load Level (percent of Base Load)	100.00%	100.00%	100.00%	100.00%
CTG Model	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	GE Cycledeck	GE Cycledeck	GE Cycledeck	GE Cycledeck
HRSG Firing	Unfired	Unfired	Unfired	Unfired
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
w/ SCR				
NOx Removed, lb/h as NO2	38.1	40.3	40.8	43.2
NOx Removed, percent	72.2%	72.2%	72.2%	72.2%
NH3 Reacted, lb/h (1:1 stoichiometric ratio)	14.1	14.9	15.1	16.0
NH3 Slip, lb/h	21.7	23.0	23.2	24.6
Total NH3 Consumption, lb/h	35.8	37.9	38.3	40.6

Notes:

1. Duct Burner fuel is same as CTG fuel, Sulfur content 0.30 grains / SCF
2. Particulate values do not contain cayalzyt fines or other entrained particulate
3. Stack exhaust analysis and emissions do not include effects of CO catalyst.
4. SCR controls NOx to 2.5 ppmvd @ 15% O2.
5. CO Catalyst controls CO stack emissions to 4.0 ppmvw
6. VOC Reduction at stack due to CO catalyst assumed to be 10%
7. Emissions calculation do not include heavy particles such as lead, mercury,
8. Changes in fuel constituents from those provided and indicated in this table may change VOC, UHC, NOx, SOx, and other predicted emission levels.
9. VOC are assumed to be 0.2 * UHC's at the CTG exhaust flange
10. Back half particualtes assumed equal to front half.
11. CTG manufacture provided front half particulate data only
12. Performance based Cycledeck, a General Electric program, and similar project performance.

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General Electric Case C

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
B&V Project 96210.040

01/04/00
01:46 PM

CTG Load Level (percent of Base Load)	100.00%	100.00%	100.00%	100.00%
CTG Model	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	Estimated	Estimated	Estimated	Estimated
HRSG Firing	Fired NG	Fired NG	Fired NG	Fired NG
	SCR On	SCR On	SCR On	SCR On
	STIG On	STIG On	STIG On	STIG On
CTG Performance And Emissions				
Ambient Temperature, F	122	73	59	17
Ambient Relative Humidity, %	16.45%	38.10%	60.00%	67.37%
CTG Compressor Inlet Temperature, F	81	58	52	17
CTG Compr. Inlet Relative Humidity, %	96	94	94	67
Atmospheric Pressure, psia	14.223	14.223	14.223	14.223
Inlet Fogger In Service	Yes	Yes	Yes	No
Inlet Loss, in. H2O	3.0	3.0	3.0	3.0
Exhaust Loss, in. H2O	17.0	17.0	17.0	17.0
CTG Load Level (percent of Base Load)	100%	100%	100%	100%
Gross CTG Output, kW	168,500	180,100	182,000	196,100
Gross CTG Heat Rate, Btu/kWh (LHV)	9,179	9,030	9,040	8,860
CTG Heat Input, MBtu/h (LHV)	1,546.66	1,626.24	1,645.20	1,737.52
CTG Heat Input, MBtu/h (HHV)	1,717.14	1,805.49	1,826.54	1,929.04
CTG Fuel Flow, lb/h	75,230	79,100	80,030	84,520
CTG Steam Injection Flow, lb/h	113,340	119,160	120,555	127,320
Injection Ratio	1.507	1.506	1.506	1.506
CTG Exhaust Flow, lb/h	3,471,690	3,670,340	3,718,130	3,969,660
CTG Exhaust Temperature, F	1,126	1,113	1,108	1,067
CTG Exhaust Analysis (Volume Basis - Wet)				
Ar	0.86399%	0.88110%	0.88404%	0.89412%
CO2	3.62592%	3.63106%	3.63082%	3.60614%
H2O	15.32525%	13.58415%	13.28338%	12.23130%
N2	68.80788%	70.17034%	70.40485%	71.20716%
O2	11.37696%	11.73334%	11.79688%	12.06127%
SO2	0.00002%	0.00002%	0.00002%	0.00002%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at CTG exhaust flange)				
NOx, ppmvd @15% O2	15.0	15.0	15.0	15.0
NOx, lb/h as NO2	92.6	97.4	98.5	104.1
CO, ppmvd	9.0	9.0	9.0	9.0
CO, lb/h	26.8	28.8	29.2	31.4
SO2, ppmvd (with no conversion to H2SO4)	0.2	0.2	0.2	0.2
SO2, lb/h (with no conversion to H2SO4)	1.5	1.5	1.6	1.6
UHC, ppmvw	7.0	7.0	7.0	7.0
UHC, lb/h as CH4	14.1	14.8	15.0	15.9
VOC, ppmvw	1.4	1.4	1.4	1.4
VOC, lb/h as CH4	2.8	3.0	3.0	3.2
Particulates, lb/h (front only), excluding 2(NH4(SO4))	9.0	9.0	9.0	9.0
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	18.0	18.0	18.0	18.0
PM10, lb/h (front only), excluding 2(NH4(SO4))	9.0	9.0	9.0	9.0
PM10, lb/h (front and back), excluding 2(NH4(SO4))	18.0	18.0	18.0	18.0
CTG Fuel LHV, Btu/lb	20,558	20,558	20,558	20,558
CTG Fuel HHV, Btu/lb	22,824	22,824	22,824	22,824
HHV/LHV Ratio	1.1102	1.1102	1.1102	1.1102
CTG Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00%	100.00%	100.00%	100.00%
CTG Wet (Total) Exhaust Gas Analysis				
Molecular Wt, lb/mol	27.62	27.81	27.84	27.96
Gas Constant, ft-lbf/lbm-R	53.938	55.554	55.488	55.264
Specific Volume, ft^3/lb	41.50	40.90	40.71	39.49
Exhaust Gas Flow, acfm	2,401,252	2,501,948	2,522,751	2,612,698
Specific Volume, scf/lb	13.74	13.64	13.63	13.57
Exhaust Gas Flow, scfm	795,017	834,391	844,635	897,805
Specific Volume, Nm3/kg	0.8115	0.8060	0.8050	0.8018
Exhaust Gas Flow, Nm3/s	354.97	372.74	377.12	401.04
Duct Burner Performance and Emissions				
Duct Burner Heat Input, MBtu/h (LHV)	506.8	483.8	480.0	473.4
Duct Burner Heat Input, MBtu/h (HHV)	562.6	537.2	532.9	525.5
Duct Burner Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Duct Burner NOx, lb/MBtu (HHV)	0.100	0.100	0.100	0.100
Duct Burner CO, lb/MBtu (HHV)	0.100	0.100	0.100	0.100

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
B&V Project 96210.040

01/04/00
01:46 PM

CTG Load Level (percent of Base Load)	100.00%	100.00%	100.00%	100.00%
CTG Model	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	Estimated	Estimated	Estimated	Estimated
HRSG Firing	Fired NG	Fired NG	Fired NG	Fired NG
	SCR On	SCR On	SCR On	SCR On
	STIG On	STIG On	STIG On	STIG On
Duct Burner UHC (as CH4), lb/MBtu (HHV)	0.060	0.060	0.060	0.060
DB non-meth/non-eth VOC (as CH4), lb/MBtu (HHV)	0.025	0.025	0.025	0.025
Duct Burner Particulates, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner Particulates, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner PM10, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner PM10, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner SO2, lb/h	0.007	0.007	0.007	0.007
DB NOx, lb/h	56.3	53.7	53.3	52.6
DB CO, lb/h	56.3	53.7	53.3	52.6
DB UHC (as CH4), lb/h	33.8	32.2	32.0	31.5
DB VOC (as CH4), lb/h	14.1	13.4	13.3	13.1
DB Particulates, lb/h (front only)	5.6	5.4	5.3	5.3
DB Particulates, lb/h (front and back)	11.3	10.7	10.7	10.5
DB PM10, lb/h (front only)	5.6	5.4	5.3	5.3
DB PM10, lb/h (front and back)	11.3	10.7	10.7	10.5
Stack Exhaust Analysis (Volume Basis - Wet)				
Ar	0.85387%	0.87171%	0.87480%	0.88545%
CO2	4.75763%	4.66122%	4.64115%	4.54402%
H2O	17.44574%	15.53301%	15.19787%	14.01825%
N2	68.00726%	69.42702%	69.67338%	70.52054%
O2	8.93546%	9.50703%	9.61276%	10.03173%
SO2	0.00002%	0.00002%	0.00002%	0.00002%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at Stack exit)				
NOx, ppmvd @15% O2 w/o SCR	18.2	17.9	17.9	17.7
NOx, lb/h as NO2 w/o SCR	148.9	151.1	151.8	156.6
NOx, ppmvd @15% O2 w/ SCR	2.5	2.5	2.5	2.5
NOx, lb/h as NO2 w/ SCR	20.5	21.1	21.2	22.1
NH3, ppmvd @15% O2 w/o SCR	0.0	0.0	0.0	0.0
NH3, lb/h w/o SCR	0.0	0.0	0.0	0.0
NH3 slip, ppmvd @15% O2 w/ SCR	10.0	10.0	10.0	10.0
NH3 slip, lb/h w/ SCR	30.4	31.2	31.4	32.7
CO, ppmvd w/o Catalyst	28.3	26.1	25.7	24.3
CO, ppmvw w/o Catalyst	23.3	22.1	21.8	20.9
CO, ppmvd @ 15% O2 w/o Catalyst	16.6	16.1	16.0	15.6
CO, lb/h w/o Catalyst	83.1	82.5	82.5	84.0
CO, ppmvd w/ Catalyst	6.8	6.5	6.4	6.2
CO, ppmvw w/ Catalyst	5.6	5.5	5.5	5.4
CO, ppmvd @ 15% O2 w/ Catalyst	4.0	4.0	4.0	4.0
CO, lb/h w/ Catalyst	20.0	20.5	20.7	21.5
SO2, ppmvd (with no conversion to H2SO4)	0.29	0.28	0.27	0.27
SO2, ppmvw (with no conversion to H2SO4)	0.24	0.23	0.23	0.23
SO2, lb/h (with no conversion to H2SO4)	1.94	2.00	2.01	2.09
Total S in Exhaust Gas, lb/h	0.97	1.00	1.01	1.05
Exhaust Gas SO3 (converted from SO2), ppmvw	0.04	0.04	0.04	0.04
Exhaust Gas SO3 (converted from SO2), ppmvd	0.05	0.05	0.05	0.05
Exhaust Gas SO3 (converted from SO2), lb/h	0.40	0.42	0.42	0.45
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.49	0.51	0.52	0.55
Remaining SO2 in Exhaust Gas, ppmvw	0.20	0.19	0.19	0.19
Remaining SO2 in Exhaust Gas, ppmvd	0.24	0.23	0.23	0.22
Remaining SO2 in Exhaust Gas, lb/h	1.63	1.66	1.67	1.73
UHC, ppmvd	28.4	26.0	25.6	24.0
UHC, ppmvw	23.5	22.0	21.7	20.6
UHC, ppmvd @ 15% O2	16.7	16.0	15.9	15.4
UHC, lb/h as CH4	47.9	47.0	47.0	47.5
VOC, ppmvd	9.0	8.2	8.0	7.4
VOC, ppmvw	7.4	6.9	6.8	6.4
VOC, ppmvd @ 15% O2	5.3	5.0	5.0	4.8
VOC, lb/h as CH4	15.2	14.8	14.7	14.7
NOTE: Particulate and PM10 calculations do NOT include the effect of any SO2 conversions in the SCR catalyst.				
Particulates, lb/h (front only), excluding 2(NH4(SO4))	14.6	14.4	14.3	14.3
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	29.3	28.7	28.7	28.5
PM10, lb/h (front only), excluding 2(NH4(SO4))	14.6	14.4	14.3	14.3
PM10, lb/h (front and back), excluding 2(NH4(SO4))	29.3	28.7	28.7	28.5
Particulates, lb/h (front only), including 2(NH3(SO4))	15.3	15.1	15.0	15.0
Particulates, lb/h (front and back), including 2(NH3(SO4))	29.9	29.4	29.4	29.2
PM10, lb/h (front only), including 2(NH3(SO4))	15.3	15.1	15.0	15.0
PM10, lb/h (front and back), including 2(NH3(SO4))	29.9	29.4	29.4	29.2
NOTE: SO2 converted to H2SO4 (assumed).	16.3%	16.7%	16.8%	17.1%
Remaining SO2 in Exhaust Gas, lb/h	1.63	1.66	1.67	1.73
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.49	0.51	0.52	0.55
Exhaust Gas 2(NH3(SO4)) 100% from SO3, lb/h	0.65	0.69	0.70	0.74
Stack Exit Temperature, F	168.9	172.1	172.7	176
Stack Diameter, ft (estimated)	18	18	18	18
Stack Flow, lb/h	3,496,340	3,693,875	3,741,480	3,992,685
Stack Flow, scfm	804,158	843,435	853,057	906,339
Stack Flow, acfm	1,005,198	1,059,526	1,073,181	1,145,901
Stack Exit Velocity, ft/s	65.8	69.4	70.3	75.1

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
BstV Project 96210.040

01/04/00
01:46 PM

CTG Load Level (percent of Base Load)	100.00%	100.00%	100.00%	100.00%
CTG Model	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	Estimated	Estimated	Estimated	Estimated
HRSG Firing	Fired NG	Fired NG	Fired NG	Fired NG
	SCR On	SCR On	SCR On	SCR On
	STIG On	STIG On	STIG On	STIG On
w/ SCR				
NOx Removed, lb/h as NO2	72.1	76.3	77.3	82.0
NOx Removed, percent	77.9%	78.4%	78.5%	78.8%
NH3 Reacted, lb/h (1:1 stoichiometric ratio)	26.7	28.2	28.6	30.3
NH3 Slip, lb/h	30.4	31.2	31.4	32.7
Total NH3 Consumption, lb/h	57.0	59.4	60.0	63.0

Notes:

1. Duct Burner fuel is same as CTG fuel, Sulfur content 0.30 grains / SCF
2. Particulate values do not contain cayalsyt fines or other entrained particulate
3. Stack exhaust analysis and emissions do not include effects of CO catalyst.
4. SCR controls NOx to 2.5 ppmvd @ 15% O2.
5. CO Catalyst controls CO stack emissions to 4.0 ppmvw
6. VOC Reduction at stack due to CO catalyst assumed to be 10%
7. Emissions calculation do not include heavy particles such as lead, mercury,
8. Changes in fuel constituents from those provided and indicated in this table may change VOC, UHC, NOx, SOx, and other predicted emission levels.
9. VOC are assumed to be 0.2 * UHC's at the CTG exhaust flange
10. Back half particulates assumed equal to front half.
11. CTG manufacture provided front half particulate data only
12. Performance based Cycledeck, a General Electric program, and similar project performance.

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General Electric Case D

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
B&V Project 96210.040

01/04/00
01:46 PM

CTG Load Level (percent of Base Load)	75.00%	75.00%	75.00%	75.00%
CTG Model	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	GE Cycledeck	GE Cycledeck	GE Cycledeck	GE Cycledeck
HRSG Firing	Unfired	Unfired	Unfired	Unfired
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
CTG Performance And Emissions				
Ambient Temperature, F	122	73	59	17
Ambient Relative Humidity, %	16.45%	38.10%	60.00%	67.37%
CTG Compressor Inlet Temperature, F	122	73	59	17
CTG Compr. Inlet Relative Humidity, %	16	38	60	67
Atmospheric Pressure, psia	14.223	14.223	14.223	14.223
Inlet Fogger In Service	No	No	No	No
Inlet Loss, in. H2O	3.0	3.0	3.0	3.0
Exhaust Loss, in. H2O	17.0	17.0	17.0	17.0
CTG Load Level (percent of Base Load)	75%	75%	75%	75%
Gross CTG Output, kW	93,500	117,400	123,300	136,000
Gross CTG Heat Rate, Btu/kWh (LHV)	11,399	10,473	10,284	9,926
CTG Heat Input, MBtu/h (LHV)	1,065.81	1,229.55	1,268.02	1,349.88
CTG Heat Input, MBtu/h (HHV)	1,183.29	1,365.08	1,407.79	1,498.67
CTG Fuel Flow, lb/h	51,840	59,810	61,680	65,660
CTG Steam Injection Flow, lb/h	0	0	0	0
Injection Ratio	0.000	0.000	0.000	0.000
CTG Exhaust Flow, lb/h	2,506,010	2,751,020	2,809,020	2,928,020
CTG Exhaust Temperature, F	1,200	1,171	1,160	1,131
CTG Exhaust Analysis (Volume Basis - Wet)				
Ar	0.92583%	0.93326%	0.93334%	0.94025%
CO2	3.54815%	3.73963%	3.77697%	3.86759%
H2O	8.93995%	8.36627%	8.39357%	7.77620%
N2	73.73164%	74.32377%	74.33065%	74.88077%
O2	12.85461%	12.63705%	12.56544%	12.53518%
SO2	0.00002%	0.00002%	0.00002%	0.00002%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at CTG exhaust flange)				
NOx, ppmvd @15% O2	9.0	9.0	9.0	9.0
NOx, lb/h as NO2	38.3	44.2	45.6	48.5
CO, ppmvd	9.0	9.0	9.0	9.0
CO, lb/h	20.3	22.4	22.8	23.9
SO2, ppmvd (with no conversion to H2SO4)	0.2	0.2	0.2	0.2
SO2, lb/h (with no conversion to H2SO4)	1.0	1.2	1.2	1.3
UHC, ppmvw	7.0	7.0	7.0	7.0
UHC, lb/h as CH4	9.9	10.9	11.1	11.5
VOC, ppmvw	1.4	1.4	1.4	1.4
VOC, lb/h as CH4	2.0	2.2	2.2	2.3
Particulates, lb/h (front only), excluding 2(NH4(SO4))	9.0	9.0	9.0	9.0
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	18.0	18.0	18.0	18.0
PM10, lb/h (front only), excluding 2(NH4(SO4))	9.0	9.0	9.0	9.0
PM10, lb/h (front and back), excluding 2(NH4(SO4))	18.0	18.0	18.0	18.0
CTG Fuel LHV, Btu/lb	20,558	20,558	20,558	20,558
CTG Fuel HHV, Btu/lb	22,824	22,824	22,824	22,824
HHV/LHV Ratio	1.1102	1.1102	1.1102	1.1102
CTG Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00%	100.00%	100.00%	100.00%
CTG Wet (Total) Exhaust Gas Analysis				
Molecular Wt, lb/mol	28.31	28.39	28.39	28.47
Gas Constant, ft-lbf/lbm-R	54.570	54.416	54.415	54.270
Specific Volume, ft^3/lb	42.39	41.53	41.25	40.40
Exhaust Gas Flow, acfm	1,770,496	1,904,164	1,931,201	1,971,533
Specific Volume, scf/lb	13.40	13.36	13.36	13.33
Exhaust Gas Flow, scfm	559,676	612,560	625,475	650,508
Specific Volume, Nm3/kg	0.7917	0.7895	0.7894	0.7873
Exhaust Gas Flow, Nm3/s	249.98	273.66	279.39	290.45
Duct Burner Performance and Emissions				
Duct Burner Heat Input, MBtu/h (LHV)	0.0	0.0	0.0	0.0
Duct Burner Heat Input, MBtu/h (HHV)	0.0	0.0	0.0	0.0
Duct Burner Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Duct Burner NOx, lb/MBtu (HHV)	0.100	0.100	0.100	0.100
Duct Burner CO, lb/MBtu (HHV)	0.100	0.100	0.100	0.100

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
B&V Project 96210.040

01/04/00
01:46 PM

CTG Load Level (percent of Base Load)	75.00%	75.00%	75.00%	75.00%
CTG Model	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	GE Cycledeck	GE Cycledeck	GE Cycledeck	GE Cycledeck
HRSG Firing	Unfired	Unfired	Unfired	Unfired
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
Duct Burner UHC (as CH4), lb/MBtu (HHV)	0.060	0.060	0.060	0.060
DB non-meth/non-eth VOC (as CH4), lb/MBtu (HHV)	0.025	0.025	0.025	0.025
Duct Burner Particulate, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner Particulate, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner PM10, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner PM10, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner SO2, lb/h	0.000	0.000	0.000	0.000
DB NOx, lb/h	0.0	0.0	0.0	0.0
DB CO, lb/h	0.0	0.0	0.0	0.0
DB UHC (as CH4), lb/h	0.0	0.0	0.0	0.0
DB VOC (as CH4), lb/h	0.0	0.0	0.0	0.0
DB Particulate, lb/h (front only)	0.0	0.0	0.0	0.0
DB Particulate, lb/h (front and back)	0.0	0.0	0.0	0.0
DB PM10, lb/h (front only)	0.0	0.0	0.0	0.0
DB PM10, lb/h (front and back)	0.0	0.0	0.0	0.0
Stack Exhaust Analysis (Volume Basis - Wet)				
Ar	0.92583%	0.93326%	0.93334%	0.94025%
CO2	3.54815%	3.73963%	3.77697%	3.86759%
H2O	8.93995%	8.36627%	8.39357%	7.77620%
N2	73.73164%	74.32377%	74.33065%	74.88077%
O2	12.85441%	12.63705%	12.56544%	12.53518%
SO2	0.00002%	0.00002%	0.00002%	0.00002%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at Stack exit)				
NOx, ppmvd @15% O2 w/o SCR	9.0	9.0	9.0	9.0
NOx, lb/h as NO2 w/o SCR	38.3	44.2	45.6	48.5
NOx, ppmvd @15% O2 w/ SCR	2.5	2.5	2.5	2.5
NOx, lb/h as NO2 w/ SCR	10.6	12.3	12.7	13.5
NH3, ppmvd @15% O2 w/o SCR	0.0	0.0	0.0	0.0
NH3, lb/h w/o SCR	0.0	0.0	0.0	0.0
NH3 slip, ppmvd @15% O2 w/ SCR	10.0	10.0	10.0	10.0
NH3 slip, lb/h w/ SCR	15.8	18.2	18.7	20.0
CO, ppmvd w/o Catalyst	9.0	9.0	9.0	9.0
CO, ppmvw w/o Catalyst	8.2	8.2	8.2	8.3
CO, ppmvd @ 15% O2 w/o Catalyst	7.8	7.5	7.4	7.3
CO, lb/h w/o Catalyst	20.3	22.4	22.8	23.9
CO, ppmvd w/ Catalyst	4.6	4.8	4.9	4.9
CO, ppmvw w/ Catalyst	4.2	4.4	4.4	4.6
CO, ppmvd @ 15% O2 w/ Catalyst	4.0	4.0	4.0	4.0
CO, lb/h w/ Catalyst	10.4	12.0	12.3	13.1
SO2, ppmvd (with no conversion to H2SO4)	0.20	0.20	0.21	0.21
SO2, ppmvw (with no conversion to H2SO4)	0.18	0.19	0.19	0.19
SO2, lb/h (with no conversion to H2SO4)	1.01	1.16	1.20	1.28
Total S in Exhaust Gas, lb/h	0.50	0.58	0.60	0.64
Exhaust Gas SO3 (converted from SO2), ppmvw	0.03	0.04	0.04	0.04
Exhaust Gas SO3 (converted from SO2), ppmvd	0.04	0.04	0.04	0.04
Exhaust Gas SO3 (converted from SO2), lb/h	0.24	0.27	0.28	0.30
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.29	0.34	0.34	0.37
Remaining SO2 in Exhaust Gas, ppmvw	0.14	0.15	0.15	0.16
Remaining SO2 in Exhaust Gas, ppmvd	0.16	0.17	0.17	0.17
Remaining SO2 in Exhaust Gas, lb/h	0.82	0.94	0.98	1.04
UHC, ppmvd	7.7	7.6	7.6	7.6
UHC, ppmvw	7.0	7.0	7.0	7.0
UHC, ppmvd @ 15% O2	6.7	6.4	6.3	6.1
UHC, lb/h as CH4	9.9	10.9	11.1	11.5
VOC, ppmvd	1.4	1.4	1.4	1.4
VOC, ppmvw	1.3	1.3	1.3	1.3
VOC, ppmvd @ 15% O2	1.2	1.1	1.1	1.1
VOC, lb/h as CH4	1.8	2.0	2.0	2.1
NOTE: Particulate and PM10 calculations do NOT include the effect of any SO2 conversions in the SCR catalyst.				
Particulates, lb/h (front only), excluding 2(NH4(SO4))	9.0	9.0	9.0	9.0
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	18.0	18.0	18.0	18.0
PM10, lb/h (front only), excluding 2(NH4(SO4))	9.0	9.0	9.0	9.0
PM10, lb/h (front and back), excluding 2(NH4(SO4))	18.0	18.0	18.0	18.0
Particulates, lb/h (front only), including 2(NH3(SO4))	9.4	9.5	9.5	9.5
Particulates, lb/h (front and back), including 2(NH3(SO4))	18.4	18.5	18.5	18.5
PM10, lb/h (front only), including 2(NH3(SO4))	9.4	9.5	9.5	9.5
PM10, lb/h (front and back), including 2(NH3(SO4))	18.4	18.5	18.5	18.5
NOTE: SO2 converted to H2SO4 (assumed).	18.9%	18.8%	18.8%	18.8%
Remaining SO2 in Exhaust Gas, lb/h	0.82	0.94	0.98	1.04
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.29	0.34	0.34	0.37
Exhaust Gas 2(NH3(SO4)) 100% from SO3, lb/h	0.39	0.45	0.46	0.49
Stack Exit Temperature, F	181.1	179.5	179.5	178.1
Stack Diameter, ft (estimated)	18	18	18	18
Stack Flow, lb/h	2,506,010	2,751,020	2,809,020	2,928,020
Stack Flow, scfm	559,676	612,560	625,475	650,508
Stack Flow, acfm	712,960	778,539	794,953	824,726
Stack Exit Velocity, ft/s	46.7	51.0	52.1	54.0

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
B&V Project 96210.040

01/04/00
01:46 PM

CTG Load Level (percent of Base Load)	75.00%	75.00%	75.00%	75.00%
CTG Model	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	GE Cycledeck	GE Cycledeck	GE Cycledeck	GE Cycledeck
HRSG Firing	Unfired	Unfired	Unfired	Unfired
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
w/ SCR				
NOx Removed, lb/h as NO2	27.7	31.9	32.9	35.0
NOx Removed, percent	72.2%	72.2%	72.2%	72.2%
NH3 Reacted, lb/h (1:1 stoichiometric ratio)	10.2	11.8	12.2	12.9
NH3 Slip, lb/h	15.8	18.2	18.7	20.0
Total NH3 Consumption, lb/h	26.0	30.0	30.9	32.9

Notes:

1. Duct Burner fuel is same as CTG fuel, Sulfur content 0.30 grains / SCF
2. Particulate values do not contain cayalsyt fines or other entrained particulate
3. Stack exhaust analysis and emissions do not include effects of CO catalyst.
4. SCR controls NOx to 2.5 ppmvd @ 15% O2.
5. CO Catalyst controls CO stack emissions to 4.0 ppmvw
6. VOC Reduction at stack due to CO catalyst assumed to be 10%
7. Emissions calculation do not include heavy particles such as lead, mercury,
8. Changes in fuel constituents from those provided and indicated in this table may change VOC, UHC, NOx, SOx, and other predicted emission levels.
9. VOC are assumed to be 0.2 * UHC's at the CTG exhaust flange
10. Back half particualates assumed equal to front half.
11. CTG manufacture provided front half particulate data only
12. Performance based Cycledeck, a General Electric program, and similar project performance.

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General Electric Case E

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
BatV Project 96210.040

01/04/00
01:46 PM

CTG Load Level (percent of Base Load)	52.00%	50.00%	50.00%	50.00%
CTG Model	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	GE Cycledeck	GE Cycledeck	GE Cycledeck	GE Cycledeck
HRSG Firing	Unfired	Unfired	Unfired	Unfired
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
CTG Performance And Emissions				
Ambient Temperature, F	122	73	59	17
Ambient Relative Humidity, %	16.45%	38.10%	60.00%	67.37%
CTG Compressor Inlet Temperature, F	122	73	59	17
CTG Compr. Inlet Relative Humidity, %	16	38	60	67
Atmospheric Pressure, psia	14.223	14.223	14.223	14.223
Inlet Fogger In Service	No	No	No	No
Inlet Loss, in. H2O	3.0	3.0	3.0	3.0
Exhaust Loss, in. H2O	17.0	17.0	17.0	17.0
CTG Load Level (percent of Base Load)	52%	50%	50%	50%
Gross CTG Output, kW	64,800	78,200	82,200	90,600
Gross CTG Heat Rate, Btu/kWh (LHV)	13,520	12,584	12,355	11,957
CTG Heat Input, MBtu/h (LHV)	876.07	984.05	1,015.56	1,083.26
CTG Heat Input, MBtu/h (HHV)	972.63	1,092.52	1,127.50	1,202.66
CTG Fuel Flow, lb/h	42,610	47,870	49,400	52,690
CTG Steam Injection Flow, lb/h	0	0	0	0
Injection Ratio	0.000	0.000	0.000	0.000
CTG Exhaust Flow, lb/h	2,182,000	2,299,010	2,329,010	2,426,010
CTG Exhaust Temperature, F	1,200	1,200	1,200	1,180
CTG Exhaust Analysis (Volume Basis - Wet)				
Ar	0.92770%	0.93476%	0.93456%	0.94141%
CO2	3.35229%	3.58396%	3.65046%	3.74778%
H2O	8.56033%	8.06303%	8.14706%	7.54178%
N2	73.88006%	74.44292%	74.42753%	74.97328%
O2	13.27960%	12.97531%	12.84036%	12.79573%
SO2	0.00002%	0.00002%	0.00002%	0.00002%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at CTG exhaust flange)				
NOx, ppmvd @15% O2	9.0	9.0	9.0	9.0
NOx, lb/h as NO2	31.5	35.4	34.5	38.9
CO, ppmvd	9.0	9.0	9.0	9.0
CO, lb/h	17.8	18.8	19.0	19.9
SO2, ppmvd (with no conversion to H2SO4)	0.2	0.2	0.2	0.2
SO2, lb/h (with no conversion to H2SO4)	0.8	0.9	1.0	1.0
UHC, ppmvw	7.0	7.0	7.0	7.0
UHC, lb/h as CH4	8.6	9.1	9.2	9.6
VOC, ppmvw	1.4	1.4	1.4	1.4
VOC, lb/h as CH4	1.7	1.8	1.8	1.9
Particulates, lb/h (front only), excluding 2(NH4(SO4))	9.0	9.0	9.0	9.0
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	18.0	18.0	18.0	18.0
PM10, lb/h (front only), excluding 2(NH4(SO4))	9.0	9.0	9.0	9.0
PM10, lb/h (front and back), excluding 2(NH4(SO4))	18.0	18.0	18.0	18.0
CTG Fuel LHV, Btu/lb	20,558	20,558	20,558	20,558
CTG Fuel HHV, Btu/lb	22,824	22,824	22,824	22,824
HHV/LHV Ratio	1.1102	1.1102	1.1102	1.1102
CTG Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00%	100.00%	100.00%	100.00%
CTG Wet (Total) Exhaust Gas Analysis				
Molecular Wt, lb/mol	28.34	28.41	28.41	28.48
Gas Constant, ft-lbf/lbm-R	54.525	54.380	54.386	54.242
Specific Volume, ft^3/lb	42.35	42.24	42.25	41.63
Exhaust Gas Flow, acfm	1,540,128	1,618,503	1,640,011	1,683,247
Specific Volume, scf/lb	13.39	13.35	13.36	13.32
Exhaust Gas Flow, scfm	486,950	511,530	518,593	530,574
Specific Volume, Nm3/kg	0.7910	0.7889	0.7890	0.7869
Exhaust Gas Flow, Nm3/s	217.47	228.52	231.53	240.53
Duct Burner Performance and Emissions				
Duct Burner Heat Input, MBtu/h (LHV)	0.0	0.0	0.0	0.0
Duct Burner Heat Input, MBtu/h (HHV)	0.0	0.0	0.0	0.0
Duct Burner Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Duct Burner NOx, lb/MBtu (HHV)	0.100	0.100	0.100	0.100
Duct Burner CO, lb/MBtu (HHV)	0.100	0.100	0.100	0.100

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
B&KV Project 96210.040

01/04/00
01:46 PM

CTG Load Level (percent of Base Load)	52.00%	50.00%	50.00%	50.00%
CTG Model	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	GE Cycledeck	GE Cycledeck	GE Cycledeck	GE Cycledeck
HRSG Firing	Unfired	Unfired	Unfired	Unfired
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
Duct Burner UHC (as CH4), lb/MBtu (HHV)	0.060	0.060	0.060	0.060
DB non-meth/non-eth VOC (as CH4), lb/MBtu (HHV)	0.025	0.025	0.025	0.025
Duct Burner Particulate, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner Particulate, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner PM10, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner PM10, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner SO2, lb/h	0.000	0.000	0.000	0.000
DB NOx, lb/h	0.0	0.0	0.0	0.0
DB CO, lb/h	0.0	0.0	0.0	0.0
DB UHC (as CH4), lb/h	0.0	0.0	0.0	0.0
DB VOC (as CH4), lb/h	0.0	0.0	0.0	0.0
DB Particulate, lb/h (front only)	0.0	0.0	0.0	0.0
DB Particulate, lb/h (front and back)	0.0	0.0	0.0	0.0
DB PM10, lb/h (front only)	0.0	0.0	0.0	0.0
DB PM10, lb/h (front and back)	0.0	0.0	0.0	0.0
Stack Exhaust Analysis (Volume Basis - Wet)				
Ar	0.92770%	0.93476%	0.93456%	0.94141%
CO2	3.35229%	3.58396%	3.65046%	3.74778%
H2O	8.56033%	8.06303%	8.14706%	7.54178%
N2	73.88046%	74.44292%	74.42753%	74.97328%
O2	13.27960%	12.97531%	12.84036%	12.79573%
SO2	0.00002%	0.00002%	0.00002%	0.00002%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at Stack exit)				
NOx, ppmvd @15% O2 w/o SCR	9.0	9.0	9.0	9.0
NOx, lb/h as NO2 w/o SCR	31.5	35.4	36.5	38.9
NOx, ppmvd @15% O2 w/ SCR	2.5	2.5	2.5	2.5
NOx, lb/h as NO2 w/ SCR	8.7	9.8	10.1	10.8
NH3, ppmvd @15% O2 w/o SCR	0.0	0.0	0.0	0.0
NH3, lb/h w/o SCR	0.0	0.0	0.0	0.0
NH3 slip, ppmvd @15% O2 w/ SCR	10.0	10.0	10.0	10.0
NH3 slip, lb/h w/ SCR	12.9	14.5	15.0	16.0
CO, ppmvd w/o Catalyst	9.0	9.0	9.0	9.0
CO, ppmvw w/o Catalyst	8.2	8.3	8.3	8.3
CO, ppmvd @ 15% O2 w/o Catalyst	8.3	7.8	7.7	7.5
CO, lb/h w/o Catalyst	17.8	18.8	19.0	19.9
CO, ppmvd w/ Catalyst	4.3	4.6	4.7	4.8
CO, ppmvw w/ Catalyst	3.9	4.2	4.3	4.4
CO, ppmvd @ 15% O2 w/ Catalyst	4.0	4.0	4.0	4.0
CO, lb/h w/ Catalyst	8.5	9.6	9.9	10.5
SO2, ppmvd (with no conversion to H2SO4)	0.18	0.20	0.20	0.20
SO2, ppmvw (with no conversion to H2SO4)	0.17	0.18	0.18	0.19
SO2, lb/h (with no conversion to H2SO4)	0.83	0.93	0.96	1.03
Total S in Exhaust Gas, lb/h	0.42	0.47	0.48	0.51
Exhaust Gas SO3 (converted from SO2), ppmvw	0.03	0.03	0.03	0.04
Exhaust Gas SO3 (converted from SO2), ppmvd	0.04	0.04	0.04	0.04
Exhaust Gas SO3 (converted from SO2), lb/h	0.20	0.22	0.23	0.24
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.24	0.27	0.28	0.30
Remaining SO2 in Exhaust Gas, ppmvw	0.14	0.15	0.15	0.15
Remaining SO2 in Exhaust Gas, ppmvd	0.15	0.16	0.16	0.16
Remaining SO2 in Exhaust Gas, lb/h	0.67	0.75	0.78	0.83
UHC, ppmvd	7.7	7.6	7.6	7.6
UHC, ppmvw	7.0	7.0	7.0	7.0
UHC, ppmvd @ 15% O2	7.1	6.6	6.5	6.3
UHC, lb/h as CH4	8.6	9.1	9.2	9.6
VOC, ppmvd	1.4	1.4	1.4	1.4
VOC, ppmvw	1.3	1.3	1.3	1.3
VOC, ppmvd @ 15% O2	1.3	1.2	1.2	1.1
VOC, lb/h as CH4	1.6	1.6	1.7	1.7
NOTE: Particulate and PM10 calculations do NOT include the effect of any SO2 conversions in the SCR catalyst.				
Particulates, lb/h (front only), excluding 2(NH4(SO4))	9.0	9.0	9.0	9.0
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	18.0	18.0	18.0	18.0
PM10, lb/h (front only), excluding 2(NH4(SO4))	9.0	9.0	9.0	9.0
PM10, lb/h (front and back), excluding 2(NH4(SO4))	18.0	18.0	18.0	18.0
Particulates, lb/h (front only), including 2(NH3(SO4))	9.3	9.4	9.4	9.4
Particulates, lb/h (front and back), including 2(NH3(SO4))	18.3	18.4	18.4	18.4
PM10, lb/h (front only), including 2(NH3(SO4))	9.3	9.4	9.4	9.4
PM10, lb/h (front and back), including 2(NH3(SO4))	18.3	18.4	18.4	18.4
NOTE: SO2 converted to H2SO4 (assumed).	19.2%	19.0%	18.9%	18.9%
Remaining SO2 in Exhaust Gas, lb/h	0.67	0.75	0.78	0.83
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.24	0.27	0.28	0.30
Exhaust Gas 2(NH3(SO4)) 100% from SO3, lb/h	0.33	0.37	0.38	0.40
Stack Exit Temperature, F	175.6	170.5	169.5	167.5
Stack Diameter, ft (estimated)	18	18	18	18
Stack Flow, lb/h	2,182,000	2,299,010	2,329,010	2,426,010
Stack Flow, acfm	486,950	511,530	518,593	538,574
Stack Flow, scfm	614,960	641,041	648,629	671,600
Stack Exit Velocity, ft/s	40.3	42.0	42.5	44.0

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
BatV Project 96210.040

01/04/00
01:46 PM

CTG Load Level (percent of Base Load)	52.00%	50.00%	50.00%	50.00%
CTG Model	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)	GEPG7241(FA)
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	GE Cycledeck	GE Cycledeck	GE Cycledeck	GE Cycledeck
HRSG Firing	Unfired	Unfired	Unfired	Unfired
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
w/ SCR				
NOx Removed, lb/h as NO2	22.7	25.5	26.4	28.1
NOx Removed, percent	72.2%	72.2%	72.2%	72.2%
NH3 Reacted, lb/h (1:1 stoichiometric ratio)	8.4	9.4	9.7	10.4
NH3 Slip, lb/h	12.9	14.5	15.0	16.0
Total NH3 Consumption, lb/h	21.4	24.0	24.8	26.4

Notes:

1. Duct Burner fuel is same as CTG fuel, Sulfur content 0.30 grains / SCF
2. Particulate values do not contain catalyst fines or other entrained particulate
3. Stack exhaust analysis and emissions do not include effects of CO catalyst.
4. SCR controls NOx to 2.5 ppmvd @ 15% O2.
5. CO Catalyst controls CO stack emissions to 4.0 ppmvw
6. VOC Reduction at stack due to CO catalyst assumed to be 10%
7. Emissions calculation do not include heavy particles such as lead, mercury,
8. Changes in fuel constituents from those provided and indicated in this table may change VOC, UHC, NOx, SOx, and other predicted emission levels.
9. VOC are assumed to be 0.2 * UHC's at the CTG exhaust flange
10. Back half particulates assumed equal to front half.
11. CTG manufacture provided front half particulate data only
12. Performance based Cycledeck, a General Electric program, and similar project performance.

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Westinghouse Case A

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
BatV Project 96210.040

01/06/00
02:02 PM

CTG Load Level (percent of Base Load)	100.00%	100.00%	100.00%	100.00%
CTG Model	W501F	W501F	W501F	W501F
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	S / W	S / W	S / W	S / W
HRSG Firing	Fired NG	Fired NG	Fired NG	Fired NG
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
CTG Performance And Emissions				
Ambient Temperature, F	122	73	59	17
Ambient Relative Humidity, %	16.00%	39.00%	60.00%	51.00%
CTG Compressor Inlet Temperature, F	86	60	53	17
CTG Compr. Inlet Relative Humidity, %	76	87	93	51
Atmospheric Pressure, psia	14.223	14.223	14.223	14.223
Evap Cooler In Service	Yes	Yes	Yes	No
Inlet Loss, in. H2O	3.0	3.9	4.0	4.2
Exhaust Loss, in. H2O	16.3	18.5	19.1	20.6
CTG Load Level (percent of Base Load)	100%	100%	100%	100%
Gross CTG Output, kW	154,685	168,923	172,820	182,154
Gross CTG Heat Rate, Btu/kWh (LHV)	9,616	9,443	9,411	9,348
CTG Heat Input, MBtu/h (LHV)	1,487.45	1,595.14	1,626.41	1,702.78
CTG Heat Input, MBtu/h (HHV)	1,651.40	1,770.96	1,805.68	1,890.47
CTG Fuel Flow, lb/h	72,350	77,590	79,110	82,830
CTG Steam Injection Flow, lb/h	0	0	0	0
Injection Ratio	0.000	0.000	0.000	0.000
CTG Exhaust Flow, lb/h	3,268,785	3,500,969	3,562,581	3,726,651
CTG Exhaust Temperature, F	1,140	1,121	1,117	1,096
CTG Exhaust Analysis (Volume Basis - Wet)				
Ar	0.91216%	0.92806%	0.93075%	0.94102%
CO2	3.77547%	3.80418%	3.81565%	3.83461%
H2O	10.55317%	8.95897%	8.69563%	7.66546%
N2	72.64438%	73.91001%	74.12414%	74.94230%
O2	12.11479%	12.39876%	12.43381%	12.61660%
SO2	0.00002%	0.00002%	0.00002%	0.00002%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at CTG exhaust flange)				
NOx, ppmvd @15% O2	25.0	25.0	25.0	25.0
NOx, lb/h as NO2	148.5	159.2	162.3	170.0
CO, ppmvd	20.0	20.0	20.0	20.0
CO, lb/h	58.2	63.0	64.2	67.7
SO2, ppmvd (with no conversion to H2SO4)	0.2	0.2	0.2	0.2
SO2, lb/h (with no conversion to H2SO4)	1.4	1.5	1.5	1.6
UHC, ppmvw	7.0	7.0	7.0	7.0
UHC, lb/h as CH4	13.0	13.9	14.1	14.7
VOC, ppmvw	1.1	1.1	1.1	1.1
VOC, lb/h as CH4	2.0	2.2	2.2	2.3
Particulates, lb/h (front only), excluding 2(NH4(SO4))	7.0	7.6	7.7	8.2
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	14.0	15.2	15.4	16.4
PM10, lb/h (front only), excluding 2(NH4(SO4))	7.0	7.6	7.7	8.2
PM10, lb/h (front and back), excluding 2(NH4(SO4))	14.0	15.2	15.4	16.4
CTG Fuel LHV, Btu/lb	20,558	20,558	20,558	20,558
CTG Fuel HHV, Btu/lb	22,824	22,824	22,824	22,824
HHV/LHV Ratio	1.1102	1.1102	1.1102	1.1102
CTG Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00%	100.00%	100.00%	100.00%
CTG Wet (Total) Exhaust Gas Analysis				
Molecular Wt, lb/mol	28.16	28.33	28.36	28.48
Gas Constant, ft-lbf/lbm-R	54.873	54.530	54.472	54.253
Specific Volume, ft^3/lb	41.15	40.20	39.99	39.16
Exhaust Gas Flow, acfm	2,241,842	2,345,649	2,374,460	2,432,261
Specific Volume, scf/lb	13.47	13.39	13.38	13.32
Exhaust Gas Flow, scfm	733,842	781,300	794,456	827,317
Specific Volume, Nm3/kg	0.7961	0.7911	0.7903	0.7871
Exhaust Gas Flow, Nm3/s	327.88	348.97	354.75	369.58
Duct Burner Performance and Emissions				
Duct Burner Heat Input, MBtu/h (LHV)	492.9	533.8	544.7	558.9
Duct Burner Heat Input, MBtu/h (HHV)	547.2	592.6	604.7	620.5
Duct Burner Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Duct Burner NOx, lb/MBtu (HHV)	0.100	0.100	0.100	0.100
Duct Burner CO, lb/MBtu (HHV)	0.100	0.100	0.100	0.100

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
BaCV Project 96210.040

01/06/00
02:02 PM

CTG Load Level (percent of Base Load)	100.00%	100.00%	100.00%	100.00%
CTG Model	W501F	W501F	W501F	W501F
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	S / W	S / W	S / W	S / W
HRSG Firing	Fired NG	Fired NG	Fired NG	Fired NG
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
Duct Burner UHC (as CH4), lb/MBtu (HHV)	0.060	0.060	0.060	0.060
DB non-meth/non-eth VOC (as CH4), lb/MBtu (HHV)	0.025	0.025	0.025	0.025
Duct Burner Particulate, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner Particulate, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner PM10, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner PM10, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner SO2, lb/h	0.007	0.008	0.008	0.008
DB NOx, lb/h	54.7	59.3	60.5	62.0
DB CO, lb/h	54.7	59.3	60.5	62.0
DB UHC (as CH4), lb/h	32.8	35.6	36.3	37.2
DB VOC (as CH4), lb/h	13.7	14.8	15.1	15.5
DB Particulate, lb/h (front only)	5.5	5.9	6.0	6.2
DB Particulate, lb/h (front and back)	10.9	11.9	12.1	12.4
DB PM10, lb/h (front only)	5.5	5.9	6.0	6.2
DB PM10, lb/h (front and back)	10.9	11.9	12.1	12.4
Stack Exhaust Analysis (Volume Basis - Wet)				
Ar	0.90093%	0.91643%	0.91904%	0.92936%
CO2	4.94464%	5.01360%	5.02953%	5.03003%
H2O	12.84356%	11.30901%	11.05795%	10.00506%
N2	71.75456%	72.98891%	73.19463%	74.01878%
O2	9.53629%	9.77203%	9.79663%	10.01675%
SO2	0.00002%	0.00003%	0.00003%	0.00003%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at Stack exit)				
NOx, ppmvd @15% O2 w/o SCR	25.7	25.7	25.7	25.7
NOx, lb/h as NO2 w/o SCR	203.2	218.5	222.8	232.0
NOx, ppmvd @15% O2 w/ SCR	2.5	2.5	2.5	2.5
NOx, lb/h as NO2 w/ SCR	19.8	21.3	21.7	22.6
NH3, ppmvd @15% O2 w/o SCR	0.0	0.0	0.0	0.0
NH3, lb/h w/o SCR	0.0	0.0	0.0	0.0
NH3 slip, ppmvd @15% O2 w/ SCR	10.0	10.0	10.0	10.0
NH3 slip, lb/h w/ SCR	29.3	31.5	32.1	33.4
CO, ppmvd w/o Catalyst	39.3	39.3	39.4	38.8
CO, ppmvw w/o Catalyst	34.3	34.9	35.0	35.0
CO, ppmvd @ 15% O2 w/o Catalyst	23.5	23.6	23.6	23.6
CO, lb/h w/o Catalyst	112.9	122.3	124.7	129.7
CO, ppmvd w/ Catalyst	6.7	6.7	6.7	6.6
CO, ppmvw w/ Catalyst	5.8	5.9	5.9	5.9
CO, ppmvd @ 15% O2 w/ Catalyst	4.0	4.0	4.0	4.0
CO, lb/h w/ Catalyst	19.3	20.7	21.1	22.0
SO2, ppmvd (with no conversion to H2SO4)	0.29	0.28	0.28	0.28
SO2, ppmvw (with no conversion to H2SO4)	0.25	0.25	0.25	0.25
SO2, lb/h (with no conversion to H2SO4)	1.87	2.02	2.06	2.14
Total S in Exhaust Gas, lb/h	0.94	1.01	1.03	1.07
Exhaust Gas SO3 (converted from SO2), ppmvw	0.04	0.04	0.04	0.04
Exhaust Gas SO3 (converted from SO2), ppmvd	0.05	0.05	0.05	0.05
Exhaust Gas SO3 (converted from SO2), lb/h	0.39	0.43	0.44	0.46
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.48	0.52	0.53	0.56
Remaining SO2 in Exhaust Gas, ppmvw	0.21	0.21	0.21	0.21
Remaining SO2 in Exhaust Gas, ppmvd	0.24	0.24	0.24	0.23
Remaining SO2 in Exhaust Gas, lb/h	1.56	1.67	1.71	1.77
UHC, ppmvd	27.9	27.8	27.8	27.1
UHC, ppmvw	24.3	24.6	24.7	24.4
UHC, ppmvd @ 15% O2	16.6	16.7	16.7	16.5
UHC, lb/h as CH4	45.9	49.4	50.4	51.9
VOC, ppmvd	8.6	8.6	8.6	8.4
VOC, ppmvw	7.5	7.6	7.6	7.6
VOC, ppmvd @ 15% O2	5.1	5.2	5.2	5.1
VOC, lb/h as CH4	14.1	15.3	15.6	16.1
NOTE: Particulate and PM10 calculations do NOT include the effect of any SO2 conversions in the SCR catalyst.				
Particulates, lb/h (front only), excluding 2(NH4(SO4))	12.5	13.5	13.7	14.4
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	24.9	27.1	27.5	28.8
PM10, lb/h (front only), excluding 2(NH4(SO4))	12.5	13.5	13.7	14.4
PM10, lb/h (front and back), excluding 2(NH4(SO4))	24.9	27.1	27.5	28.8
Particulates, lb/h (front only), including 2(NH3(SO4))	13.1	14.2	14.5	15.2
Particulates, lb/h (front and back), including 2(NH3(SO4))	25.6	27.8	28.2	29.6
PM10, lb/h (front only), including 2(NH3(SO4))	13.1	14.2	14.5	15.2
PM10, lb/h (front and back), including 2(NH3(SO4))	25.6	27.8	28.2	29.6
NOTE: SO2 converted to H2SO4 (assumed).	16.8%	16.9%	16.9%	17.1%
Remaining SO2 in Exhaust Gas, lb/h	1.56	1.67	1.71	1.77
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.48	0.52	0.53	0.56
Exhaust Gas 2(NH3(SO4)) 100% from SO3, lb/h	0.65	0.70	0.72	0.75
Stack Exit Temperature, F	177.8	174.9	174.3	173.1
Stack Diameter, ft (estimated)	18	18	18	18
Stack Flow, lb/h	3,292,760	3,526,934	3,589,077	3,753,836
Stack Flow, acfm	743,066	791,209	804,551	837,731
Stack Flow, scfm	942,278	998,122	1,013,914	1,054,202
Stack Exit Velocity, ft/s	61.7	65.4	66.4	69.0

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
B&V Project 96210.040

01/06/00
02:02 PM

CTG Load Level (percent of Base Load)	100.00%	100.00%	100.00%	100.00%
CTG Model	W501F	W501F	W501F	W501F
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	S / W	S / W	S / W	S / W
HRSG Firing	Fired NG	Fired NG	Fired NG	Fired NG
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
w/ SCR				
NOx Removed, lb/h as NO2	128.7	138.0	140.7	147.4
NOx Removed, percent	86.7%	86.7%	86.7%	86.7%
NH3 Reacted, lb/h (1:1 stoichiometric ratio)	47.6	51.0	52.0	54.5
NH3 Slip, lb/h	29.3	31.5	32.1	33.4
Total NH3 Consumption, lb/h	76.8	82.5	84.1	87.9

Notes:

1. Duct Burner fuel is same as CTG fuel, Sulfur content 0.30 grains / SCF
2. Particulate values do not contain catalyst fines or other entrained particulate
3. Stack exhaust analysis and emissions do not include effects of CO catalyst.
4. SCR controls NOx to 2.5 ppmvd @ 15% O2.
5. CO Catalyst controls CO stack emissions to 4.0 ppmvd @ 15% O2
6. VOC Reduction at stack due to CO catalyst assumed to be 10%
7. Emissions calculation do not include heavy particles such as lead, mercury,
8. Changes in fuel constituents from those provided and indicated in this table may change VOC, UHC, NOx, SOx, and other predicted emission levels.
9. VOC are assumed to be 0.2 * UHC's at the CTG exhaust flange
10. Back half particulates assumed equal to front half.
11. CTG manufacture provided front half particulate data only
12. Performance based Cycledeck, a General Electric program, and similar project performance.

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Westinghouse Case B

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
BatV Project 96210.040

01/06/00
02:02 PM

CTG Load Level (percent of Base Load)	100.00%	100.00%	100.00%	100.00%
CTG Model	W501F	W501F	W501F	W501F
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	BatV Estimate	BatV Estimate	BatV Estimate	BatV Estimate
HRSG Firing	Unfired	Unfired	Unfired	Unfired
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
CTG Performance And Emissions				
Ambient Temperature, F	122	73	59	17
Ambient Relative Humidity, %	16.00%	39.00%	60.00%	51.00%
CTG Compressor Inlet Temperature, F	86	60	53	17
CTG Compr. Inlet Relative Humidity, %	76	87	93	51
Atmospheric Pressure, psia	14.223	14.223	14.223	14.223
Evap Cooler In Service	Yes	Yes	Yes	No
Inlet Loss, in. H2O	3.0	3.9	4.0	4.2
Exhaust Loss, in. H2O	16.3	18.5	19.1	20.6
CTG Load Level (percent of Base Load)	100%	100%	100%	100%
Gross CTG Output, kW	154,685	168,923	172,820	182,154
Gross CTG Heat Rate, Btu/kWh (LHV)	9,616	9,443	9,411	9,348
CTG Heat Input, MBtu/h (LHV)	1,487.45	1,595.14	1,626.41	1,702.78
CTG Heat Input, MBtu/h (HHV)	1,651.40	1,770.96	1,805.68	1,890.47
CTG Fuel Flow, lb/h	72,330	77,590	79,110	82,830
CTG Steam Injection Flow, lb/h	0	0	0	0
Injection Ratio	0.000	0.000	0.000	0.000
CTG Exhaust Flow, lb/h	3,268,785	3,500,969	3,562,581	3,726,651
CTG Exhaust Temperature, F	1,140	1,121	1,117	1,096
CTG Exhaust Analysis (Volume Basis - Wet)				
Ar	0.91216%	0.92806%	0.93075%	0.94102%
CO2	3.77547%	3.80418%	3.81565%	3.83461%
H2O	10.55317%	8.95897%	8.69563%	7.66546%
N2	72.64438%	73.91001%	74.12414%	74.94230%
O2	12.11479%	12.39876%	12.43381%	12.61660%
SO2	0.00002%	0.00002%	0.00002%	0.00002%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at CTG exhaust flange)				
NOx, ppmvd @15% O2	25.0	25.0	25.0	25.0
NOx, lb/h as NO2	148.5	159.2	162.3	170.0
CO, ppmvd	20.0	20.0	20.0	20.0
CO, lb/h	58.2	63.0	64.2	67.7
SO2, ppmvd (with no conversion to H2SO4)	0.2	0.2	0.2	0.2
SO2, lb/h (with no conversion to H2SO4)	1.4	1.5	1.5	1.6
UHC, ppmvw	7.0	7.0	7.0	7.0
UHC, lb/h as CH4	13.0	13.9	14.1	14.7
VOC, ppmvw	1.1	1.1	1.1	1.1
VOC, lb/h as CH4	2.0	2.2	2.2	2.3
Particulates, lb/h (front only), excluding 2(NH4(SO4))	7.0	7.6	7.7	8.2
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	14.0	15.2	15.4	16.4
PM10, lb/h (front only), excluding 2(NH4(SO4))	7.0	7.6	7.7	8.2
PM10, lb/h (front and back), excluding 2(NH4(SO4))	14.0	15.2	15.4	16.4
CTG Fuel LHV, Btu/lb	20,558	20,558	20,558	20,558
CTG Fuel HHV, Btu/lb	22,824	22,824	22,824	22,824
HHV/LHV Ratio	1.1102	1.1102	1.1102	1.1102
CTG Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00%	100.00%	100.00%	100.00%
CTG Wet (Total) Exhaust Gas Analysis				
Molecular Wt, lb/mol	28.16	28.33	28.36	28.48
Gas Constant, ft-lbf/lbm-R	54.873	54.530	54.472	54.253
Specific Volume, ft^3/lb	41.15	40.20	39.99	39.16
Exhaust Gas Flow, acfm	2,241,842	2,345,649	2,374,460	2,432,261
Specific Volume, scf/lb	13.47	13.39	13.38	13.32
Exhaust Gas Flow, scfm	733,842	781,300	794,456	827,317
Specific Volume, Nm3/kg	0.7961	0.7911	0.7903	0.7871
Exhaust Gas Flow, Nm3/s	327.88	348.97	354.75	369.58
Duct Burner Performance and Emissions				
Duct Burner Heat Input, MBtu/h (LHV)	0.0	0.0	0.0	0.0
Duct Burner Heat Input, MBtu/h (HHV)	0.0	0.0	0.0	0.0
Duct Burner Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Duct Burner NOx, lb/MBtu (HHV)	0.100	0.100	0.100	0.100
Duct Burner CO, lb/MBtu (HHV)	0.100	0.100	0.100	0.100

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
B&V Project 96210.040

01/06/00
02:02 PM

CTG Load Level (percent of Base Load)	100.00%	100.00%	100.00%	100.00%
CTG Model	W501F	W501F	W501F	W501F
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	B&V Estimate	B&V Estimate	B&V Estimate	B&V Estimate
HRSG Firing	Unfired	Unfired	Unfired	Unfired
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
Duct Burner UHC (as CH4), lb/MBtu (HHV)	0.060	0.060	0.060	0.060
DB non-meth/non-eth VOC (as CH4), lb/MBtu (HHV)	0.025	0.025	0.025	0.025
Duct Burner Particulate, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner Particulate, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner PM10, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner PM10, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner SO2, lb/h	0.000	0.000	0.000	0.000
DB NOx, lb/h	0.0	0.0	0.0	0.0
DB CO, lb/h	0.0	0.0	0.0	0.0
DB UHC (as CH4), lb/h	0.0	0.0	0.0	0.0
DB VOC (as CH4), lb/h	0.0	0.0	0.0	0.0
DB Particulate, lb/h (front only)	0.0	0.0	0.0	0.0
DB Particulate, lb/h (front and back)	0.0	0.0	0.0	0.0
DB PM10, lb/h (front only)	0.0	0.0	0.0	0.0
DB PM10, lb/h (front and back)	0.0	0.0	0.0	0.0
Stack Exhaust Analysis (Volume Basis - Wet)				
Ar	0.91216%	0.92806%	0.93075%	0.94102%
CO2	3.77547%	3.80418%	3.81565%	3.83461%
H2O	10.55317%	8.95897%	8.69563%	7.66546%
N2	72.64438%	73.91001%	74.12414%	74.94230%
O2	12.11479%	12.39876%	12.43381%	12.61660%
SO2	0.00002%	0.00002%	0.00002%	0.00002%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at Stack exit)				
NOx, ppmvd @15% O2 w/o SCR	25.0	25.0	25.0	25.0
NOx, lb/h as NO2 w/o SCR	148.5	159.2	162.3	170.0
NOx, ppmvd @15% O2 w/ SCR	2.5	2.5	2.5	2.5
NOx, lb/h as NO2 w/ SCR	14.8	15.9	16.2	17.0
NH3, ppmvd @15% O2 w/o SCR	0.0	0.0	0.0	0.0
NH3, lb/h w/o SCR	0.0	0.0	0.0	0.0
NH3 slip, ppmvd @15% O2 w/ SCR	10.0	10.0	10.0	10.0
NH3 slip, lb/h w/ SCR	22.0	23.6	24.0	25.2
CO, ppmvd w/o Catalyst	20.0	20.0	20.0	20.0
CO, ppmvw w/o Catalyst	17.9	18.2	18.3	18.5
CO, ppmvd @ 15% O2 w/o Catalyst	16.1	16.3	16.3	16.4
CO, lb/h w/o Catalyst	58.2	63.0	64.2	67.7
CO, ppmvd w/ Catalyst	5.0	4.9	4.9	4.9
CO, ppmvw w/ Catalyst	4.4	4.5	4.5	4.5
CO, ppmvd @ 15% O2 w/ Catalyst	4.0	4.0	4.0	4.0
CO, lb/h w/ Catalyst	14.5	15.5	15.8	16.6
SO2, ppmvd (with no conversion to H2SO4)	0.21	0.21	0.21	0.21
SO2, ppmvw (with no conversion to H2SO4)	0.19	0.19	0.19	0.19
SO2, lb/h (with no conversion to H2SO4)	1.41	1.51	1.54	1.61
Total S in Exhaust Gas, lb/h	0.70	0.76	0.77	0.81
Exhaust Gas SO3 (converted from SO2), ppmvw	0.04	0.04	0.04	0.04
Exhaust Gas SO3 (converted from SO2), ppmvd	0.04	0.04	0.04	0.04
Exhaust Gas SO3 (converted from SO2), lb/h	0.33	0.35	0.36	0.38
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.40	0.43	0.44	0.46
Remaining SO2 in Exhaust Gas, ppmvw	0.15	0.16	0.16	0.16
Remaining SO2 in Exhaust Gas, ppmvd	0.17	0.17	0.17	0.17
Remaining SO2 in Exhaust Gas, lb/h	1.15	1.23	1.25	1.31
UHC, ppmvd	7.8	7.7	7.7	7.6
UHC, ppmvw	7.0	7.0	7.0	7.0
UHC, ppmvd @ 15% O2	6.3	6.2	6.2	6.2
UHC, lb/h as CH4	13.0	13.9	14.1	14.7
VOC, ppmvd	1.1	1.1	1.1	1.1
VOC, ppmvw	1.0	1.0	1.0	1.0
VOC, ppmvd @ 15% O2	0.9	0.9	0.9	0.9
VOC, lb/h as CH4	1.8	1.9	2.0	2.1
NOTE: Particulate and PM10 calculations do NOT include the effect of any SO2 conversions in the SCR catalyst.				
Particulates, lb/h (front only), excluding 2(NH4(SO4))	7.0	7.6	7.7	8.2
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	14.0	15.2	15.4	16.4
PM10, lb/h (front only), excluding 2(NH4(SO4))	7.0	7.6	7.7	8.2
PM10, lb/h (front and back), excluding 2(NH4(SO4))	14.0	15.2	15.4	16.4
Particulates, lb/h (front only), including 2(NH3(SO4))	7.5	8.2	8.3	8.8
Particulates, lb/h (front and back), including 2(NH3(SO4))	14.5	15.8	16.0	17.0
PM10, lb/h (front only), including 2(NH3(SO4))	7.5	8.2	8.3	8.8
PM10, lb/h (front and back), including 2(NH3(SO4))	14.5	15.8	16.0	17.0
NOTE: SO2 converted to H2SO4 (assumed).	18.5%	18.7%	18.7%	18.8%
Remaining SO2 in Exhaust Gas, lb/h	1.15	1.23	1.25	1.31
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.40	0.43	0.44	0.46
Exhaust Gas 2(NH3(SO4)) 100% from SO3, lb/h	0.54	0.58	0.59	0.62
Stack Exit Temperature, F	193.8	191.5	191.1	189.6
Stack Diameter, ft (estimated)	18	18	18	18
Stack Flow, lb/h	3,268,785	3,500,969	3,562,581	3,726,651
Stack Flow, scfm	733,842	781,300	794,456	827,317
Stack Flow, acfm	953,940	1,011,780	1,027,805	1,068,307
Stack Exit Velocity, ft/s	62.5	66.3	67.3	70.0

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
BatV Project 96210.040

01/06/00
02:02 PM

CTG Load Level (percent of Base Load)	100.00%	100.00%	100.00%	100.00%
CTG Model	W501F	W501F	W501F	W501F
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	BatV Estimate	BatV Estimate	BatV Estimate	BatV Estimate
HRSG Firing	Unfired	Unfired	Unfired	Unfired
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
w/ SCR				
NOx Removed, lb/h as NO2	133.6	143.3	146.1	153.0
NOx Removed, percent	90.0%	90.0%	90.0%	90.0%
NH3 Reacted, lb/h (1:1 stoichiometric ratio)	49.4	53.0	54.0	56.5
NH3 Slip, lb/h	22.0	23.6	24.0	25.2
Total NH3 Consumption, lb/h	71.4	76.5	78.0	81.7

Notes:

1. Duct Burner fuel is same as CTG fuel, Sulfur content 0.30 grains / SCF
2. Particulate values do not contain cayalsyt fines or other entrained particulate
3. Stack exhaust analysis and emissions do not include effects of CO catalyst.
4. SCR controls NOx to 2.5 ppmvd @ 15% O2.
5. CO Catalyst controls CO stack emissions to 4.0 ppmvd @ 15% O2
6. VOC Reduction at stack due to CO catalyst assumed to be 10%
7. Emissions calculation do not include heavy particles such as lead, mercury,
8. Changes in fuel constituents from those provided and indicated in this table may change VOC, UHC, NOx, SOx, and other predicted emission levels.
9. VOC are assumed to be 0.2 * UHC's at the CTG exhaust flange
10. Back half particulates assumed equal to front half.
11. CTG manufacture provided front half particulate data only
12. Performance based Cycledeck, a General Electric program, and similar project performance.

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Westinghouse Case C

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
B&V Project 96210.040

01/06/00
02:02 PM

CTG Load Level (percent of Base Load)	100.00%	100.00%	100.00%	100.00%
CTG Model	W501F	W501F	W501F	W501F
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	S / W	S / W	S / W	S / W
HRSG Firing	Fired NG	Fired NG	Fired NG	Fired NG
	SCR On	SCR On	SCR On	SCR On
	STIG On	STIG On	STIG On	STIG On
CTG Performance And Emissions				
Ambient Temperature, F	122	73	59	17
Ambient Relative Humidity, %	16.00%	39.00%	60.00%	51.00%
CTG Compressor Inlet Temperature, F	122	73	59	17
CTG Compr. Inlet Relative Humidity, %	16	39	60	51
Atmospheric Pressure, psia	14.223	14.223	14.223	14.223
Evap Cooler In Service	No	No	No	No
Inlet Loss, in. H2O	3.0	3.9	4.0	4.2
Exhaust Loss, in. H2O	16.3	18.5	19.1	20.6
CTG Load Level (percent of Base Load)	100%	100%	100%	100%
Gross CTG Output, kW	176,650	192,910	197,340	208,020
Gross CTG Heat Rate, Btu/kWh (LHV)	9,145	8,980	8,950	8,890
CTG Heat Input, MBtu/h (LHV)	1,615.46	1,732.33	1,766.37	1,849.30
CTG Heat Input, MBtu/h (HHV)	1,793.52	1,923.28	1,961.07	2,053.14
CTG Fuel Flow, lb/h	78,580	84,270	85,920	89,960
CTG Steam Injection Flow, lb/h	109,990	117,970	120,260	90,810
Injection Ratio	1.400	1.400	1.400	1.009
CTG Exhaust Flow, lb/h	3,484,645	3,734,481	3,800,416	3,940,440
CTG Exhaust Temperature, F	1,127	1,108	1,104	1,083
CTG Exhaust Analysis (Volume Basis - Wet)				
Ar	0.87739%	0.88511%	0.88551%	0.90540%
CO2	3.79126%	3.80773%	3.81552%	3.88358%
H2O	14.11648%	13.34428%	13.31107%	11.34730%
N2	69.87585%	70.49083%	70.52262%	72.10630%
O2	11.33900%	11.47203%	11.44525%	11.75740%
SO2	0.00002%	0.00002%	0.00002%	0.00002%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at CTG exhaust flange)				
NOx, ppmvd @15% O2	25.0	25.0	25.0	25.0
NOx, lb/h as NO2	161.3	172.9	176.3	184.6
CO, ppmvd	20.0	20.0	20.0	20.0
CO, lb/h	60.4	65.1	66.3	69.7
SO2, ppmvd (with no conversion to H2SO4)	0.2	0.2	0.2	0.2
SO2, lb/h (with no conversion to H2SO4)	1.5	1.6	1.7	1.8
UHC, ppmvw	7.0	7.0	7.0	7.0
UHC, lb/h as CH4	14.1	15.1	15.3	15.8
VOC, ppmvw	1.0	1.0	1.0	1.1
VOC, lb/h as CH4	2.1	2.2	2.3	2.4
Particulates, lb/h (front only), excluding 2(NH4(SO4))	7.0	7.6	7.7	8.2
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	14.0	15.2	15.4	16.4
PM10, lb/h (front only), excluding 2(NH4(SO4))	7.0	7.6	7.7	8.2
PM10, lb/h (front and back), excluding 2(NH4(SO4))	14.0	15.2	15.4	16.4
CTG Fuel LHV, Btu/lb	20,558	20,558	20,558	20,558
CTG Fuel HHV, Btu/lb	22,824	22,824	22,824	22,824
HHV/LHV Ratio	1.1102	1.1102	1.1102	1.1102
CTG Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00%	100.00%	100.00%	100.00%
CTG Wet (Total) Exhaust Gas Analysis				
Molecular Wt, lb/mol	27.77	27.85	27.86	28.08
Gas Constant, ft-lbf/lbm-R	55.641	55.469	55.461	55.024
Specific Volume, ft^3/lb	41.39	40.55	40.38	39.38
Exhaust Gas Flow, acfm	2,405,204	2,523,887	2,557,680	2,586,242
Specific Volume, scf/lb	13.66	13.62	13.62	13.51
Exhaust Gas Flow, scfm	793,793	847,727	862,694	887,256
Specific Volume, Nm3/kg	0.8072	0.8047	0.8046	0.7983
Exhaust Gas Flow, Nm3/s	354.61	378.64	385.28	396.35
Duct Burner Performance and Emissions				
Duct Burner Heat Input, MBtu/h (LHV)	548.1	519.6	511.1	512.9
Duct Burner Heat Input, MBtu/h (HHV)	608.5	576.9	567.4	569.5
Duct Burner Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Duct Burner NOx, lb/MBtu (HHV)	0.100	0.100	0.100	0.100
Duct Burner CO, lb/MBtu (HHV)	0.100	0.100	0.100	0.100

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
BatV Project 96210.040

01/06/00
02:02 PM

CTG Load Level (percent of Base Load)	100.00%	100.00%	100.00%	100.00%
CTG Model	W501F	W501F	W501F	W501F
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	S / W	S / W	S / W	S / W
HRSG Firing	Fired NG	Fired NG	Fired NG	Fired NG
	SCR On	SCR On	SCR On	SCR On
	STIG On	STIG On	STIG On	STIG On
Duct Burner UHC (as CH4), lb/MBtu (HHV)	0.060	0.060	0.060	0.060
DB non-meth/non-eth VOC (as CH4), lb/MBtu (HHV)	0.025	0.025	0.025	0.025
Duct Burner Particulate, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner Particulate, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner PM10, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner PM10, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner SO2, lb/h	0.008	0.008	0.008	0.008
DB NOx, lb/h	60.8	57.7	56.7	56.9
DB CO, lb/h	60.8	57.7	56.7	56.9
DB UHC (as CH4), lb/h	36.5	34.6	34.0	34.2
DB VOC (as CH4), lb/h	15.2	14.4	14.2	14.2
DB Particulate, lb/h (front only)	6.1	5.8	5.7	5.7
DB Particulate, lb/h (front and back)	12.2	11.5	11.3	11.4
DB PM10, lb/h (front only)	6.1	5.8	5.7	5.7
DB PM10, lb/h (front and back)	12.2	11.5	11.3	11.4
Stack Exhaust Analysis (Volume Basis - Wet)				
Ar	0.86628%	0.87515%	0.87587%	0.89578%
CO2	5.01324%	4.89405%	4.86595%	4.90796%
H2O	16.42532%	15.40585%	15.30504%	13.31408%
N2	68.99636%	69.70193%	69.75939%	71.34464%
O2	8.69875%	9.12299%	9.19373%	9.53751%
SO2	0.00003%	0.00002%	0.00002%	0.00002%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at Stack exit)				
NOx, ppmvd @15% O2 w/o SCR	25.7	25.6	25.6	25.6
NOx, lb/h as NO2 w/o SCR	222.1	230.6	233.1	241.6
NOx, ppmvd @15% O2 w/ SCR	2.5	2.5	2.5	2.5
NOx, lb/h as NO2 w/ SCR	21.6	22.5	22.7	23.6
NH3, ppmvd @15% O2 w/o SCR	0.0	0.0	0.0	0.0
NH3, lb/h w/o SCR	0.0	0.0	0.0	0.0
NH3 slip, ppmvd @15% O2 w/ SCR	10.0	10.0	10.0	10.0
NH3 slip, lb/h w/ SCR	32.0	33.3	33.7	34.9
CO, ppmvd w/o Catalyst	40.7	38.2	37.6	36.8
CO, ppmvw w/o Catalyst	34.0	32.3	31.8	31.9
CO, ppmvd @ 15% O2 w/o Catalyst	23.1	22.4	22.2	22.1
CO, lb/h w/o Catalyst	121.3	122.8	123.0	126.6
CO, ppmvd w/ Catalyst	7.1	6.8	6.8	6.7
CO, ppmvw w/ Catalyst	5.9	5.8	5.7	5.8
CO, ppmvd @ 15% O2 w/ Catalyst	4.0	4.0	4.0	4.0
CO, lb/h w/ Catalyst	21.0	21.9	22.1	23.0
SO2, ppmvd (with no conversion to H2SO4)	0.30	0.29	0.29	0.28
SO2, ppmvw (with no conversion to H2SO4)	0.25	0.25	0.24	0.25
SO2, lb/h (with no conversion to H2SO4)	2.05	2.13	2.16	2.24
Total S in Exhaust Gas, lb/h	1.03	1.07	1.08	1.12
Exhaust Gas SO3 (converted from SO2), ppmvw	0.04	0.04	0.04	0.04
Exhaust Gas SO3 (converted from SO2), ppmvd	0.05	0.05	0.05	0.05
Exhaust Gas SO3 (converted from SO2), lb/h	0.41	0.44	0.44	0.47
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.51	0.54	0.54	0.57
Remaining SO2 in Exhaust Gas, ppmvw	0.21	0.21	0.20	0.20
Remaining SO2 in Exhaust Gas, ppmvd	0.25	0.24	0.24	0.24
Remaining SO2 in Exhaust Gas, lb/h	1.72	1.78	1.80	1.86
UHC, ppmvd	29.7	27.0	26.3	25.3
UHC, ppmvw	24.8	22.8	22.3	21.9
UHC, ppmvd @ 15% O2	16.8	15.8	15.6	15.2
UHC, lb/h as CH4	50.6	49.7	49.4	49.9
VOC, ppmvd	9.1	8.1	7.9	7.6
VOC, ppmvw	7.6	6.9	6.7	6.6
VOC, ppmvd @ 15% O2	5.2	4.8	4.7	4.6
VOC, lb/h as CH4	15.6	15.0	14.8	15.0
NOTE: Particulate and PM10 calculations do NOT include the effect of any SO2 conversions in the SCR catalyst.				
Particulates, lb/h (front only), excluding 2(NH4(SO4))	13.1	13.4	13.4	13.9
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	26.2	26.7	26.7	27.8
PM10, lb/h (front only), excluding 2(NH4(SO4))	13.1	13.4	13.4	13.9
PM10, lb/h (front and back), excluding 2(NH4(SO4))	26.2	26.7	26.7	27.8
Particulates, lb/h (front only), including 2(NH3(SO4))	13.8	14.1	14.1	14.7
Particulates, lb/h (front and back), including 2(NH3(SO4))	26.9	27.5	27.5	28.6
PM10, lb/h (front only), including 2(NH3(SO4))	13.8	14.1	14.1	14.7
PM10, lb/h (front and back), including 2(NH3(SO4))	26.9	27.5	27.5	28.6
NOTE: SO2 converted to H2SO4 (assumed).	16.1%	16.5%	16.5%	16.8%
Remaining SO2 in Exhaust Gas, lb/h	1.72	1.78	1.80	1.86
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.51	0.54	0.54	0.57
Exhaust Gas 2(NH3(SO4)) 100% from SO3, lb/h	0.68	0.72	0.73	0.77
Stack Exit Temperature, F	179.4	175.7	175.7	175.1
Stack Diameter, ft (estimated)	18	18	18	18
Stack Flow, lb/h	3,513,305	3,759,756	3,825,276	3,965,390
Stack Flow, acfm	803,961	857,224	872,163	896,839
Stack Flow, scfm	1,021,786	1,083,436	1,101,679	1,132,119
Stack Exit Velocity, ft/s	66.9	71.0	72.2	74.1

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
B&V Project 96210.040

01/06/00
02:02 PM

CTG Load Level (percent of Base Load)	100.00%	100.00%	100.00%	100.00%
CTG Model	W501F	W501F	W501F	W501F
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	S / W	S / W	S / W	S / W
HRSG Firing	Fired NG	Fired NG	Fired NG	Fired NG
	SCR On	SCR On	SCR On	SCR On
	STIG On	STIG On	STIG On	STIG On
w/ SCR				
NOx Removed, lb/h as NO2	139.7	150.5	153.6	161.0
NOx Removed, percent	86.6%	87.0%	87.1%	87.2%
NH3 Reacted, lb/h (1:1 stoichiometric ratio)	51.6	55.6	56.8	59.5
NH3 Slip, lb/h	32.0	33.3	33.7	34.9
Total NH3 Consumption, lb/h	83.6	88.9	90.4	94.4

Notes:

1. Duct Burner fuel is same as CTG fuel, Sulfur content 0.30 grains / SCF
2. Particulate values do not contain cayalzyt fines or other entrained particulate
3. Stack exhaust analysis and emissions do not include effects of CO catalyst.
4. SCR controls NOx to 2.5 ppmvd @ 15% O2.
5. CO Catalyst controls CO stack emissions to 4.0 ppmvd @ 15% O2
6. VOC Reduction at stack due to CO catalyst assumed to be 10%
7. Emissions calculation do not include heavy particles such as lead, mercury,
8. Changes in fuel constituents from those provided and indicated in this table may change VOC, UHC, NOx, SOx, and other predicted emission levels.
9. VOC are assumed to be 0.2 * UHC's at the CTG exhaust flange
10. Back half particulates assumed equal to front half.
11. CTG manufacture provided front half particulate data only
12. Performance based Cyclodock, a General Electric program, and similar project performance.

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Westinghouse Case D

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
BatV Project 96210.040

01/06/00
02:02 PM

CTG Load Level (percent of Base Load)	85.00%	85.00%	85.00%	85.00%
CTG Model	W501F	W501F	W501F	W501F
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	S / W	S / W	S / W	S / W
HRSG Firing	Unfired	Unfired	Unfired	Unfired
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
CTG Performance And Emissions				
Ambient Temperature, F	122	73	59	17
Ambient Relative Humidity, %	16.00%	39.00%	60.00%	51.00%
CTG Compressor Inlet Temperature, F	122	73	59	17
CTG Compr. Inlet Relative Humidity, %	16	39	60	51
Atmospheric Pressure, psia	14.223	14.223	14.223	14.223
Evap Cooler In Service	No	No	No	No
Inlet Loss, in. H2O	3.0	3.4	3.5	3.7
Exhaust Loss, in. H2O	11.7	14.0	14.7	16.5
CTG Load Level (percent of Base Load)	85%	85%	85%	85%
Gross CTG Output, kW	116,990	142,030	149,010	165,900
Gross CTG Heat Rate, Btu/kWh (LHV)	10,175	9,605	9,490	9,235
CTG Heat Input, MBtu/h (LHV)	1,190.37	1,364.20	1,414.10	1,532.09
CTG Heat Input, MBtu/h (HHV)	1,321.58	1,514.57	1,569.97	1,700.96
CTG Fuel Flow, lb/h	57,900	66,360	68,790	74,530
CTG Steam Injection Flow, lb/h	0	0	0	0
Injection Ratio	0.000	0.000	0.000	0.000
CTG Exhaust Flow, lb/h	2,895,976	3,216,108	3,300,794	3,517,804
CTG Exhaust Temperature, F	1,081	1,048	1,041	1,014
CTG Exhaust Analysis (Volume Basis - Wet)				
Ar	0.92753%	0.93492%	0.93517%	0.94274%
CO2	3.43179%	3.55182%	3.58770%	3.65801%
H2O	8.65480%	8.01560%	8.02479%	7.31982%
N2	73.86634%	74.45368%	74.47559%	75.07873%
O2	13.11954%	13.04196%	12.97673%	13.00068%
SO2	0.00002%	0.00002%	0.00002%	0.00002%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at CTG exhaust flange)				
NOx, ppmvd @15% O2	25.0	25.0	25.0	25.0
NOx, lb/h as NO2	118.8	136.2	141.2	152.9
CO, ppmvd	10.0	10.0	10.0	10.0
CO, lb/h	26.2	29.2	29.9	32.0
SO2, ppmvd (with no conversion to H2SO4)	0.2	0.2	0.2	0.2
SO2, lb/h (with no conversion to H2SO4)	1.1	1.3	1.3	1.5
UHC, ppmvw	7.0	7.0	7.0	7.0
UHC, lb/h as CH4	11.5	12.7	13.0	13.9
VOC, ppmvw	2.1	2.1	2.1	2.1
VOC, lb/h as CH4	3.4	3.8	3.9	4.2
Particulates, lb/h (front only), excluding 2(NH4(SO4))	6.3	7.1	7.3	7.8
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	12.6	14.1	14.5	15.5
PM10, lb/h (front only), excluding 2(NH4(SO4))	6.3	7.1	7.3	7.8
PM10, lb/h (front and back), excluding 2(NH4(SO4))	12.6	14.1	14.5	15.5
CTG Fuel LHV, Btu/lb	20,558	20,558	20,558	20,558
CTG Fuel HHV, Btu/lb	22,824	22,824	22,824	22,824
HHV/LHV Ratio	1.1102	1.1102	1.1102	1.1102
CTG Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00%	100.00%	100.00%	100.00%
CTG Wet (Total) Exhaust Gas Analysis				
Molecular Wt, lb/mol	28.33	28.41	28.42	28.50
Gas Constant, ft-lbf/lbm-R	54.531	54.375	54.371	54.212
Specific Volume, ft^3/lb	39.84	38.65	38.40	37.44
Exhaust Gas Flow, acfm	1,922,928	2,071,710	2,112,508	2,195,110
Specific Volume, scf/lb	13.39	13.35	13.35	13.31
Exhaust Gas Flow, scfm	646,285	715,584	734,427	780,366
Specific Volume, Nm3/kg	0.7911	0.7889	0.7888	0.7865
Exhaust Gas Flow, Nm3/s	288.66	319.68	328.06	348.60
Duct Burner Performance and Emissions				
Duct Burner Heat Input, MBtu/h (LHV)	0.0	0.0	0.0	0.0
Duct Burner Heat Input, MBtu/h (HHV)	0.0	0.0	0.0	0.0
Duct Burner Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Duct Burner NOx, lb/MBtu (HHV)	0.100	0.100	0.100	0.100
Duct Burner CO, lb/MBtu (HHV)	0.100	0.100	0.100	0.100

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
BatV Project 96210.040

01/06/00
02:02 PM

CTG Load Level (percent of Base Load)	85.00%	85.00%	85.00%	85.00%
CTG Model	W501F	W501F	W501F	W501F
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	S / W	S / W	S / W	S / W
HRSG Firing	Unfired	Unfired	Unfired	Unfired
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
Duct Burner UHC (as CH4), lb/MBtu (HHV)	0.060	0.060	0.060	0.060
DB non-meth/non-eth VOC (as CH4), lb/MBtu (HHV)	0.025	0.025	0.025	0.025
Duct Burner Particulate, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner Particulate, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner PM10, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner PM10, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner SO2, lb/h	0.000	0.000	0.000	0.000
DB NOx, lb/h	0.0	0.0	0.0	0.0
DB CO, lb/h	0.0	0.0	0.0	0.0
DB UHC (as CH4), lb/h	0.0	0.0	0.0	0.0
DB VOC (as CH4), lb/h	0.0	0.0	0.0	0.0
DB Particulate, lb/h (front only)	0.0	0.0	0.0	0.0
DB Particulate, lb/h (front and back)	0.0	0.0	0.0	0.0
DB PM10, lb/h (front only)	0.0	0.0	0.0	0.0
DB PM10, lb/h (front and back)	0.0	0.0	0.0	0.0
Stack Exhaust Analysis (Volume Basis - Wet)				
Ar	0.92753%	0.93492%	0.93517%	0.94274%
CO2	3.43179%	3.55182%	3.58770%	3.65801%
H2O	8.65480%	8.01560%	8.02479%	7.31982%
N2	73.86634%	74.45568%	74.47559%	75.07873%
O2	13.11954%	13.04196%	12.97673%	13.00068%
SO2	0.00002%	0.00002%	0.00002%	0.00002%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at Stack exit)				
NOx, ppmvd @15% O2 w/o SCR	25.0	25.0	25.0	25.0
NOx, lb/h as NO2 w/o SCR	118.8	136.2	141.2	152.9
NOx, ppmvd @15% O2 w/ SCR	2.5	2.5	2.5	2.5
NOx, lb/h as NO2 w/ SCR	11.9	13.6	14.1	15.3
NH3, ppmvd @15% O2 w/o SCR	0.0	0.0	0.0	0.0
NH3, lb/h w/o SCR	0.0	0.0	0.0	0.0
NH3 slip, ppmvd @15% O2 w/ SCR	10.0	10.0	10.0	10.0
NH3 slip, lb/h w/ SCR	17.6	20.2	20.9	22.4
CO, ppmvd w/o Catalyst	10.0	10.0	10.0	10.0
CO, ppmvw w/o Catalyst	9.1	9.2	9.2	9.3
CO, ppmvd @ 15% O2 w/o Catalyst	9.0	8.8	8.7	8.6
CO, lb/h w/o Catalyst	26.2	29.2	29.9	32.0
CO, ppmvd w/ Catalyst	4.4	4.5	4.6	4.6
CO, ppmvw w/ Catalyst	4.0	4.2	4.2	4.3
CO, ppmvd @ 15% O2 w/ Catalyst	4.0	4.0	4.0	4.0
CO, lb/h w/ Catalyst	11.6	13.3	13.8	14.9
SO2, ppmvd (with no conversion to H2SO4)	0.19	0.19	0.20	0.20
SO2, ppmvw (with no conversion to H2SO4)	0.17	0.18	0.18	0.18
SO2, lb/h (with no conversion to H2SO4)	1.13	1.29	1.34	1.45
Total S in Exhaust Gas, lb/h	0.56	0.65	0.67	0.73
Exhaust Gas SO3 (converted from SO2), ppmvw	0.03	0.03	0.03	0.03
Exhaust Gas SO3 (converted from SO2), ppmvd	0.04	0.04	0.04	0.04
Exhaust Gas SO3 (converted from SO2), lb/h	0.27	0.31	0.32	0.35
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.33	0.38	0.39	0.42
Remaining SO2 in Exhaust Gas, ppmvw	0.14	0.14	0.15	0.15
Remaining SO2 in Exhaust Gas, ppmvd	0.15	0.16	0.16	0.16
Remaining SO2 in Exhaust Gas, lb/h	0.91	1.05	1.08	1.17
UHC, ppmvd	7.7	7.6	7.6	7.6
UHC, ppmvw	7.0	7.0	7.0	7.0
UHC, ppmvd @ 15% O2	6.9	6.7	6.6	6.5
UHC, lb/h as CH4	11.5	12.7	13.0	13.9
VOC, ppmvd	2.1	2.1	2.1	2.1
VOC, ppmvw	1.9	1.9	1.9	1.9
VOC, ppmvd @ 15% O2	1.9	1.8	1.8	1.8
VOC, lb/h as CH4	3.1	3.5	3.5	3.8
NOTE: Particulate and PM10 calculations do NOT include the effect of any SO2 conversions in the SCR catalyst.				
Particulates, lb/h (front only), excluding 2(NH4(SO4))	6.3	7.1	7.3	7.8
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	12.6	14.1	14.5	15.5
PM10, lb/h (front only), excluding 2(NH4(SO4))	6.3	7.1	7.3	7.8
PM10, lb/h (front and back), excluding 2(NH4(SO4))	12.6	14.1	14.5	15.5
Particulates, lb/h (front only), including 2(NH3(SO4))	6.7	7.6	7.8	8.3
Particulates, lb/h (front and back), including 2(NH3(SO4))	13.0	14.6	15.0	16.1
PM10, lb/h (front only), including 2(NH3(SO4))	6.7	7.6	7.8	8.3
PM10, lb/h (front and back), including 2(NH3(SO4))	13.0	14.6	15.0	16.1
NOTE: SO2 converted to H2SO4 (assumed).	19.1%	19.1%	19.0%	19.0%
Remaining SO2 in Exhaust Gas, lb/h	0.91	1.05	1.08	1.17
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.33	0.38	0.39	0.42
Exhaust Gas 2(NH3(SO4)) 100% from SO3, lb/h	0.44	0.51	0.52	0.57
Stack Exit Temperature, F	194.7	194.7	194.8	196.3
Stack Diameter, ft (estimated)	18	18	18	18
Stack Flow, lb/h	2,895,976	3,216,108	3,300,794	3,517,804
Stack Flow, scfm	646,285	715,584	734,427	780,366
Stack Flow, acfm	840,798	931,063	955,580	1,017,818
Stack Exit Velocity, ft/s	55.1	61.0	62.6	66.7

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
B&V Project 96210.040

01/06/00
02:02 PM

CTG Load Level (percent of Base Load)	85.00%	85.00%	85.00%	85.00%
CTG Model	W501F	W501F	W501F	W501F
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	S / W	S / W	S / W	S / W
HRSG Firing	Unfired	Unfired	Unfired	Unfired
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
w/ SCR				
NOx Removed, lb/h as NO2	106.9	122.6	127.0	137.7
NOx Removed, percent	90.0%	90.0%	90.0%	90.0%
NH3 Reacted, lb/h (1:1 stoichiometric ratio)	39.5	45.3	47.0	50.9
NH3 Slip, lb/h	17.6	20.2	20.9	22.6
Total NH3 Consumption, lb/h	57.1	65.5	67.9	73.5

Notes:

1. Duct Burner fuel is same as CTG fuel, Sulfur content 0.30 grains / SCF
2. Particulate values do not contain cayalsyt fines or other entrained particulate
3. Stack exhaust analysis and emissions do not include effects of CO catalyst.
4. SCR controls NOx to 2.5 ppmvd @ 15% O2.
5. CO Catalyst controls CO stack emissions to 4.0 ppmvd @ 15% O2
6. VOC Reduction at stack due to CO catalyst assumed to be 10%
7. Emissions calculation do not include heavy particles such as lead, mercury,
8. Changes in fuel constituents from those provided and indicated in this table may change VOC, UHC, NOx, SOx, and other predicted emission levels.
9. VOC are assumed to be 0.2 * UHC's at the CTG exhaust flange
10. Back half particulates assumed equal to front half.
11. CTG manufacture provided front half particulate data only
12. Performance based Cyclodeck, a General Electric program, and similar project performance.

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Westinghouse Case E

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
B&V Project 96210.040

01/06/00
02:02 PM

CTG Load Level (percent of Base Load)	70.00%	70.00%	70.00%	70.00%
CTG Model	W501F	W501F	W501F	W501F
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	S / W	S / W	S / W	S / W
HRSG Firing	Unfired	Unfired	Unfired	Unfired
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
CTG Performance And Emissions				
Ambient Temperature, F	122	73	59	17
Ambient Relative Humidity, %	16.00%	39.00%	60.00%	51.00%
CTG Compressor Inlet Temperature, F	81	59	52	17
CTG Compr. Inlet Relative Humidity, %	96	94	94	51
Atmospheric Pressure, psia	14.223	14.223	14.223	14.223
Evap Cooler In Service	Yes	Yes	Yes	No
Inlet Loss, in. H2O	2.6	2.8	2.8	2.9
Exhaust Loss, in. H2O	9.9	11.3	11.7	12.9
CTG Load Level (percent of Base Load)	70%	70%	70%	70%
Gross CTG Output, kW	96,080	116,710	122,470	136,400
Gross CTG Heat Rate, Btu/kWh (LHV)	10,895	10,145	9,980	9,665
CTG Heat Input, MBtu/h (LHV)	1,046.79	1,184.02	1,222.25	1,318.31
CTG Heat Input, MBtu/h (HHV)	1,162.17	1,314.53	1,356.97	1,463.62
CTG Fuel Flow, lb/h	50,920	57,590	59,450	64,130
CTG Steam Injection Flow, lb/h	0	0	0	0
Injection Ratio	0.000	0.000	0.000	0.000
CTG Exhaust Flow, lb/h	2,633,406	2,875,229	2,931,632	3,103,301
CTG Exhaust Temperature, F	1,081	1,056	1,049	1,021
CTG Exhaust Analysis (Volume Basis - Wet)				
Ar	0.91501%	0.93109%	0.93389%	0.94361%
CO2	3.27798%	3.44285%	3.48943%	3.56935%
H2O	9.78375%	8.30197%	8.06079%	7.14630%
N2	72.86935%	74.15000%	74.37334%	75.14722%
O2	13.15389%	13.17407%	13.14252%	13.19350%
SO2	0.00002%	0.00002%	0.00002%	0.00002%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at CTG exhaust flange)				
NOx, ppmvd @15% O2	25.0	25.0	25.0	25.0
NOx, lb/h as NO2	104.5	118.2	122.0	131.6
CO, ppmvd	10.0	10.0	10.0	10.0
CO, lb/h	23.8	26.0	26.6	28.3
SO2, ppmvd (with no conversion to H2SO4)	0.2	0.2	0.2	0.2
SO2, lb/h (with no conversion to H2SO4)	1.0	1.1	1.2	1.2
UHC, ppmvw	7.0	7.0	7.0	7.0
UHC, lb/h as CH4	10.6	11.4	11.6	12.2
VOC, ppmvw	2.1	2.1	2.1	2.1
VOC, lb/h as CH4	3.1	3.4	3.5	3.7
Particulates, lb/h (front only), excluding 2(NH4(SO4))	5.8	6.3	6.5	6.9
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	11.6	12.6	12.9	13.7
PM10, lb/h (front only), excluding 2(NH4(SO4))	5.8	6.3	6.5	6.9
PM10, lb/h (front and back), excluding 2(NH4(SO4))	11.6	12.6	12.9	13.7
CTG Fuel LHV, Btu/lb	20,558	20,558	20,558	20,558
CTG Fuel HHV, Btu/lb	22,824	22,824	22,824	22,824
HHV/LHV Ratio	1.1102	1.1102	1.1102	1.1102
CTG Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00%	100.00%	100.00%	100.00%
CTG Wet (Total) Exhaust Gas Analysis				
Molecular Wt, lb/mol	28.20	28.37	28.40	28.51
Gas Constant, ft-lbf/lbm-R	54.797	54.454	54.396	54.191
Specific Volume, ft^3/lb	40.21	39.17	38.91	37.93
Exhaust Gas Flow, acfm	1,778,226	1,877,045	1,901,163	1,961,803
Specific Volume, scf/lb	13.46	13.37	13.36	13.31
Exhaust Gas Flow, scfm	595,248	640,697	652,777	688,416
Specific Volume, Nm3/kg	0.7950	0.7900	0.7892	0.7862
Exhaust Gas Flow, Nm3/s	265.79	286.20	291.51	307.41
Duct Burner Performance and Emissions				
Duct Burner Heat Input, MBtu/h (LHV)	0.0	0.0	0.0	0.0
Duct Burner Heat Input, MBtu/h (HHV)	0.0	0.0	0.0	0.0
Duct Burner Fuel Composition (Ultimate Analysis by Weight)				
Ar	0.00000%	0.00000%	0.00000%	0.00000%
C	72.75974%	72.75974%	72.75974%	72.75974%
H2	23.92314%	23.92314%	23.92314%	23.92314%
N2	0.70575%	0.70575%	0.70575%	0.70575%
O2	2.61040%	2.61040%	2.61040%	2.61040%
S	0.00097%	0.00097%	0.00097%	0.00097%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Duct Burner NOx, lb/MBtu (HHV)	0.100	0.100	0.100	0.100
Duct Burner CO, lb/MBtu (HHV)	0.100	0.100	0.100	0.100

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
BatV Project 96210.040

01/06/00
02:02 PM

CTG Load Level (percent of Base Load)	70.00%	70.00%	70.00%	70.00%
CTG Model	W501F	W501F	W501F	W501F
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	S / W	S / W	S / W	S / W
HRSG Firing	Unfired	Unfired	Unfired	Unfired
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
Duct Burner UHC (as CH4), lb/MBtu (HHV)	0.060	0.060	0.060	0.060
DB non-meth/non-eth VOC (as CH4), lb/MBtu (HHV)	0.025	0.025	0.025	0.025
Duct Burner Particulate, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner Particulate, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner PM10, lb/MBtu (HHV) (front only)	0.010	0.010	0.010	0.010
Duct Burner PM10, lb/MBtu (HHV) (front and back)	0.020	0.020	0.020	0.020
Duct Burner SO2, lb/h	0.000	0.000	0.000	0.000
DB NOx, lb/h	0.0	0.0	0.0	0.0
DB CO, lb/h	0.0	0.0	0.0	0.0
DB UHC (as CH4), lb/h	0.0	0.0	0.0	0.0
DB VOC (as CH4), lb/h	0.0	0.0	0.0	0.0
DB Particulate, lb/h (front only)	0.0	0.0	0.0	0.0
DB Particulate, lb/h (front and back)	0.0	0.0	0.0	0.0
DB PM10, lb/h (front only)	0.0	0.0	0.0	0.0
DB PM10, lb/h (front and back)	0.0	0.0	0.0	0.0
Stack Exhaust Analysis (Volume Basis - Wet)				
Ar	0.91501%	0.93109%	0.93389%	0.94361%
CO2	3.27798%	3.44285%	3.48943%	3.56935%
H2O	9.78375%	8.30197%	8.06079%	7.14630%
N2	72.84935%	74.15000%	74.37334%	75.14722%
O2	13.15389%	13.17407%	13.14252%	13.19350%
SO2	0.00002%	0.00002%	0.00002%	0.00002%
Total	100.00000%	100.00000%	100.00000%	100.00000%
Emissions (at Stack exit)				
NOx, ppmvd @15% O2 w/o SCR	25.0	25.0	25.0	25.0
NOx, lb/h as NO2 w/o SCR	104.5	118.2	122.0	131.6
NOx, ppmvd @15% O2 w/ SCR	2.5	2.5	2.5	2.5
NOx, lb/h as NO2 w/ SCR	10.4	11.8	12.2	13.2
NH3, ppmvd @15% O2 w/o SCR	0.0	0.0	0.0	0.0
NH3, lb/h w/o SCR	0.0	0.0	0.0	0.0
NH3 slip, ppmvd @15% O2 w/ SCR	10.0	10.0	10.0	10.0
NH3 slip, lb/h w/ SCR	15.5	17.5	18.1	19.5
CO, ppmvd w/o Catalyst	10.0	10.0	10.0	10.0
CO, ppmvw w/o Catalyst	9.0	9.2	9.2	9.3
CO, ppmvd @ 15% O2 w/o Catalyst	9.3	9.0	8.9	8.8
CO, lb/h w/o Catalyst	23.8	26.0	26.6	28.3
CO, ppmvd w/ Catalyst	4.3	4.4	4.5	4.5
CO, ppmvw w/ Catalyst	3.9	4.1	4.1	4.2
CO, ppmvd @ 15% O2 w/ Catalyst	4.0	4.0	4.0	4.0
CO, lb/h w/ Catalyst	10.2	11.5	11.9	12.8
SO2, ppmvd (with no conversion to H2SO4)	0.18	0.19	0.19	0.19
SO2, ppmvw (with no conversion to H2SO4)	0.16	0.17	0.17	0.18
SO2, lb/h (with no conversion to H2SO4)	0.99	1.12	1.16	1.25
Total S in Exhaust Gas, lb/h	0.50	0.56	0.58	0.62
Exhaust Gas SO3 (converted from SO2), ppmvw	0.03	0.03	0.03	0.03
Exhaust Gas SO3 (converted from SO2), ppmvd	0.03	0.04	0.04	0.04
Exhaust Gas SO3 (converted from SO2), lb/h	0.24	0.27	0.28	0.30
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.29	0.33	0.34	0.37
Remaining SO2 in Exhaust Gas, ppmvw	0.13	0.14	0.14	0.14
Remaining SO2 in Exhaust Gas, ppmvd	0.15	0.15	0.15	0.16
Remaining SO2 in Exhaust Gas, lb/h	0.80	0.91	0.94	1.01
UHC, ppmvd	7.8	7.6	7.6	7.5
UHC, ppmvw	7.0	7.0	7.0	7.0
UHC, ppmvd @ 15% O2	7.3	6.9	6.8	6.7
UHC, lb/h as CH4	10.6	11.4	11.6	12.2
VOC, ppmvd	2.1	2.1	2.1	2.1
VOC, ppmvw	1.9	1.9	1.9	1.9
VOC, ppmvd @ 15% O2	1.9	1.9	1.9	1.8
VOC, lb/h as CH4	2.8	3.1	3.2	3.4
NOTE: Particulate and PM10 calculations do NOT include the effect of any SO2 conversions in the SCR catalyst.				
Particulates, lb/h (front only), excluding 2(NH4(SO4))	5.8	6.3	6.5	6.9
Particulates, lb/h (front and back), excluding 2(NH4(SO4))	11.6	12.6	12.9	13.7
PM10, lb/h (front only), excluding 2(NH4(SO4))	5.8	6.3	6.5	6.9
PM10, lb/h (front and back), excluding 2(NH4(SO4))	11.6	12.6	12.9	13.7
Particulates, lb/h (front only), including 2(NH3(SO4))	6.2	6.7	6.9	7.3
Particulates, lb/h (front and back), including 2(NH3(SO4))	12.0	13.0	13.4	14.2
PM10, lb/h (front only), including 2(NH3(SO4))	6.2	6.7	6.9	7.3
PM10, lb/h (front and back), including 2(NH3(SO4))	12.0	13.0	13.4	14.2
NOTE: SO2 converted to H2SO4 (assumed).	19.1%	19.1%	19.1%	19.1%
Remaining SO2 in Exhaust Gas, lb/h	0.80	0.91	0.94	1.01
Exhaust Gas H2SO4 (100% converted from SO3), lb/h	0.29	0.33	0.34	0.37
Exhaust Gas 2(NH3(SO4)) 100% from SO3, lb/h	0.39	0.44	0.46	0.49
Stack Exit Temperature, F	190.2	188.1	187.8	188.4
Stack Diameter, ft (estimated)	18	18	18	18
Stack Flow, lb/h	2,653,408	2,875,229	2,931,632	3,103,301
Stack Flow, acfm	595,248	640,697	652,777	688,416
Stack Flow, scfm	769,046	825,191	840,401	887,027
Stack Exit Velocity, ft/s	50.4	54.0	55.0	58.1

Sempra Energy
Palo Verde
Expected Combustion Turbine and HRSG Emissions (per unit)
BatV Project 96210.040

01/06/00
02:02 PM

CTG Load Level (percent of Base Load)	70.00%	70.00%	70.00%	70.00%
CTG Model	W501F	W501F	W501F	W501F
Diluent/NOx Emission Rate	Dry Low NOx	Dry Low NOx	Dry Low NOx	Dry Low NOx
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Performance Reference	S / W	S / W	S / W	S / W
HRSG Firing	Unfired	Unfired	Unfired	Unfired
	SCR On	SCR On	SCR On	SCR On
	STIG Off	STIG Off	STIG Off	STIG Off
w/ SCR				
NOx Removed, lb/h as NO2	94.0	104.4	109.8	118.4
NOx Removed, percent	90.0%	90.0%	90.0%	90.0%
NH3 Reacted, lb/h (1:1 stoichiometric ratio)	34.8	39.3	40.6	43.8
NH3 Slip, lb/h	15.5	17.5	18.1	19.5
Total NH3 Consumption, lb/h	50.2	56.8	58.6	63.3

Notes:

1. Duct Burner fuel is same as CTG fuel, Sulfur content 0.30 grains / SCF
2. Particulate values do not contain catalyst fines or other entrained particulate
3. Stack exhaust analysis and emissions do not include effects of CO catalyst.
4. SCR controls NOx to 2.5 ppmvd @ 15% O2.
5. CO Catalyst controls CO stack emissions to 4.0 ppmvd @ 15% O2
6. VOC Reduction at stack due to CO catalyst assumed to be 10%
7. Emissions calculation do not include heavy particles such as lead, mercury,
8. Changes in fuel constituents from those provided and indicated in this table may change VOC, UHC, NOx, SOx, and other predicted emission levels.
9. VOC are assumed to be 0.2 * UHC's at the CTG exhaust flange
10. Back half particulates assumed equal to front half.
11. CTG manufacture provided front half particulate data only
12. Performance based Cyclodeck, a General Electric program, and similar project performance.

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APPENDIX D
DRAFT ACID RAIN PERMIT APPLICATION FORMS

Sempra Energy℠
Resources

101 Ash Street
San Diego, CA 92101-3017

Dale Lieb
Title V and General Permits
Engineering Unit Manager
Maricopa County Environmental Services Department
Air quality Division
1001 N. Central Ave., Suite 200
Phoenix, AZ 85004-1942

RE: Delegation of Representative Official

Dear Mr. Lieb;

This letter is to request that Cecil D. Sterling, Manager of Permitting for Sempra Energy Resources, be recognized as the representative official for Mesquite Power, LLC, for purposes of the Compliance Certification required under Maricopa County Air Pollution Control Rule 210, Section 301.7. If you have any questions in this regard, please contact me at (619) 696-4455.

Date: 1/26/00

Joseph H Rowley

Joseph H. Rowley
Vice President-Project Development
Mesquite Power, LLC
101 Ash Street
San Diego, CA 92101-3017

Sempra Energy Resources is not the same company as the utility, SDG&E or SoCalGas, and Sempra Energy Resources is not regulated by the California Public Utilities Commission.

United States
Environmental Protection Agency
Acid Rain Program

OMB No. 2060-0258

EPA

Certificate of Representation

For more information, see instructions and refer to 40 CFR 72.24

This submission is: [X] New [ ] Revised (revised submissions must be completed in full; see instructions)

This submission includes combustion or process sources under 40 CFR part 74 [ ]

STEP 1
Identify the source by plant name, State, and ORIS code.

Plant Name	State	ORIS Code
Mesquite Generating Station	AZ	Pending

STEP 2
Enter requested information for the designated representative.

Name: Joseph H. Rowley	
Address: 101 Ash St. San Diego, CA 92101-3017	
Phone Number: 619-696-4455	Fax Number: 619-696-2791
E-mail address (if available): jrowley@sempra.res.com	

STEP 3
Enter requested information for the alternate designated representative, if applicable.

Name: Marty Swartz	
Phone Number: 619-696-2943	Fax Number: 619-696-2791
E-mail address (if available): mswartz@sempra.res.com	

STEP 4
Complete Step 5, read the certifications, and sign and date. For a designated representative of a combustion or process source under 40 CFR part 74, the references in the certifications to "affected unit" or "affected units" also apply to the combustion or process source under 40 CFR part 74 and the references to "affected source" also apply to the source at which the combustion or process source is located.

I certify that I was selected as the designated representative or alternate designated representative, as applicable, by an agreement binding on the owners and operators of the affected source and each affected unit at the source.

I certify that I have given notice of the agreement, selecting me as the designated representative for the affected source and each affected unit at the source identified in this certificate of representation, in a newspaper of general circulation in the area where the source is located or in a State publication designed to give general public notice.

I certify that I have all necessary authority to carry out my duties and responsibilities under the Acid Rain Program on behalf of the owners and operators of the affected source and of each affected unit at the source and that each such owner and operator shall be fully bound by my actions, inactions, or submissions.

I certify that I shall abide by any fiduciary responsibilities imposed by the agreement by which I was selected as designated representative or alternate designated representative, as applicable.

I certify that the owners and operators of the affected source and of each affected unit at the source shall be bound by any order issued to me by the Administrator, the permitting authority, or a court regarding the source or unit.

Where there are multiple holders of a legal or equitable title to, or a leasehold interest in, an affected unit, or where a utility or industrial customer purchases power from an affected unit under life-of-the-unit, firm power contractual arrangements, I certify that:

> I have given a written notice of my selection as the designated representative or alternate designated representative, as applicable, and of the agreement by which I was selected to each owner and operator of the affected source and of each affected unit at the source; and
>
> Allowances and the proceeds of transactions involving allowances will be deemed to be held or distributed in proportion to each holder's legal, equitable, leasehold, or contractual reservation or entitlement or, if such multiple holders have expressly provided for a different distribution of allowances by contract, that allowances and the proceeds of transactions involving allowances will be deemed to be held or distributed in accordance with the contract.

The agreement by which I was selected as the alternate designated representative, if applicable, includes a procedure for the owners and operators of the source and affected units at the source to authorize the alternate designated representative to act in lieu of the designated representative.

Mesquite Generating Station
Plant Name (from Step 1)

I am authorized to make this submission on behalf of the owners and operators of the affected source or affected units for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.

Signature (designated representative)	Date
Signature (alternate designated representative)	Date

STEP 5
Provide the name of every owner and operator of the source and identify each affected unit (or combustion or process source) they own and/or operate.

Name Mesquite Power L.L.C.					[X] Owner	[X] Operator
ID# 1	ID# 2	ID# 3	ID# 4	ID#	ID#	ID#
ID#	ID#	ID#	ID#	ID#	ID#	ID#

Name					[ ] Owner	[ ] Operator
ID#	ID#	ID#	ID#	ID#	ID#	ID#
ID#	ID#	ID#	ID#	ID#	ID#	ID#

Name					[ ] Owner	[ ] Operator
ID#	ID#	ID#	ID#	ID#	ID#	ID#
ID#	ID#	ID#	ID#	ID#	ID#	ID#

Name					[ ] Owner	[ ] Operator
ID#	ID#	ID#	ID#	ID#	ID#	ID#
ID#	ID#	ID#	ID#	ID#	ID#	ID#

Acid Rain Program
Instructions for Certificate of Representation (40 CFR 72.24)

Under the Acid Rain Program (at 40 CFR part 72 subpart B), the owners and operators for each affected source must designate a representative, and may designate an alternate, to act on their behalf. The owners and operators must choose the designated representative through a process that ensures that all owners and operators have notice regarding the selection.

All affected units at a source must have the same designated representative. The designated representative is responsible for all submissions and allowance transactions relating to the units at that source, and is liable for acts or omissions within the scope of his or her responsibilities under the Acid Rain Program.

Please type or print. If more space is needed, photocopy the second page. Indicate the page order and total number of pages (*e.g.*, 1 of 4, 2 of 4, etc.) in the boxes in the upper right hand corner of each page. ***Note:* A Certificate of Representation amending an earlier submission supersedes the earlier submission *in its entirety*. A revised Certificate of Representation must therefore *be complete*, including signature and dating by the designated representative (and the alternate designated representative, if applicable), as required under 40 CFR 72.24(a) and 72.25(a).**

Submit one Certificate of Representation form with *original* signatures. Remember that under 40 CFR 72.21, the designated representative must notify each owner and operator of all Acid Rain Program submissions.

For assistance, call the Acid Rain Hotline at (202) 564-9620.

STEP 1 An ORIS code is a 4 digit number assigned by the Energy Information Agency (EIA) at the U.S. Department of Energy to power plants owned by utilities. If the plant is not owned by a utility but has a 5 digit facility code (also assigned by EIA), use the facility code. If no code has been assigned or if there is uncertainty regarding what the code number is, contact EIA at (202) 426-1142 (for ORIS codes), or (202) 426-1269 (for facility codes).

For a combustion or process source under 40 CFR part 74, identify the ORIS or facility code, if one has been assigned. If not, leave blank.

STEP 2 The designated representative must be a natural person and cannot be a company. Please enter the firm name and address as it should appear on all correspondence. Note: All EPA correspondence is mailed to the designated representative *only*. An alternate designated representative must rely on the designated representative to forward information mailed by EPA to the designated representative.

STEP 4 Note that the certifications apply to the designated representative of combustion or process sources seeking to become opt-in sources under 40 CFR part 74.

STEP 5 See 40 CFR 72.2 for the definitions of "owner" and "operator." The owners and operators may be companies or natural persons.

Identify each affected unit at the affected source that is owned or operated by the named party by providing the appropriate unit identification number. The identification number entered for each unit should be consistent with previously submitted Certificates of Representation (if applicable), with unit identification numbers listed in NADB (for units that commenced operation prior to 1993), and with unit identification numbers used in reporting to DOE and/or EIA. For new units without identification numbers, owners and operators may assign such numbers consistent with EIA and DOE requirements. NADB is the National Allowance Data Base for the Acid Rain Program, and can be downloaded from the Acid Rain Program Website at "www.epa.gov/acidrain/" or obtained on diskette by calling the Acid Rain Hotline. This data file is in dBase format for use on an IBM-compatible PC and requires 2 megabytes of hard drive memory.

Mail this form to:

U.S. Environmental Protection Agency
Acid Rain Program (6204J)
Attention: Designated Representative

by regular mail:	or	overnight mail:
401 M St., SW Washington, DC 20460		501 3rd St., NW Washington, DC 20001

Submit this form prior to or concurrent with the first submission under the Acid Rain Program. This form must be submitted before participating in the annual auctions and sales of allowances. EPA will not issue proceeds from auctions or sales to a unit until it receives a complete Certificate of Representation.

Combustion or process sources seeking to become opt-in sources under 40 CFR part 74 must submit this form prior to or concurrent with the opt-in permit application under 40 CFR 74.14.

Submit a revised Certificate of Representation when any information in the existing Certificate of Representation changes. EPA must be notified of changes to owners and operators within 30 days.

Paperwork Burden Estimate

The burden on the public for collecting and reporting information under this request is estimated at 35 hours per response. Send comments regarding this collection of information, including suggestions for reducing the burden, to: Chief, Information Policy Branch (2136), U.S. Environmental Protection Agency, 401 M Street, SW, Washington, D.C. 20460; and to: Paperwork Reduction Project (OMB#2060-0221), Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, D.C. 20503. ***Do not submit forms to these addresses; see the submission instructions above.***

United States
Environmental Protection Agency
Acid Rain Program

OMB No. 2060-0258

Phase II Permit Application

For more information, see instructions and refer to 40 CFR 72.30 and 72.31

This submission is: [X] New [ ] Revised

STEP 1
Identify the source by plant name, State, and ORIS code.

Plant Name	State	ORIS Code
Mesquite Generating Station	AZ	Pending

STEP 2
Enter the unit ID# for each affected unit, and indicate whether a unit is being repowered and the repowering plan being renewed by entering "yes" or "no" at column c. For new units, enter the requested information in columns d and e.

a	b	c	d	e
	Compliance Plan			
Unit ID#	Unit Will Hold Allowances in Accordance with 40 CFR 72.9(c)(1)	Repowering Plan	New Units Commence Operation Date	New Units Monitor Certification Deadline
1	Yes		X	X
2	Yes		X	X
3	Yes		X	X
4	Yes		X	X
	Yes			
	Yes			
	Yes			
	Yes			
	Yes			
	Yes			
	Yes			
	Yes			

STEP 3
Check the box if the response in column c of Step 2 is "Yes" for any unit.

[ ] For each unit that is being repowered, the Repowering Extension Plan form is included.

Mesquite Generating Station
Plant Name (from Step 1)

STEP 4
Read the standard requirements and certification, enter the name of the designated representative, and sign and date

Standard Requirements

Permit Requirements.

(1) The designated representative of each affected source and each affected unit at the source shall:
(i) Submit a complete Acid Rain permit application (including a compliance plan) under 40 CFR part 72 in accordance with the deadlines specified in 40 CFR 72.30; and
(ii) Submit in a timely manner any supplemental information that the permitting authority determines is necessary in order to review an Acid Rain permit application and issue or deny an Acid Rain permit;
(2) The owners and operators of each affected source and each affected unit at the source shall:
(i) Operate the unit in compliance with a complete Acid Rain permit application or a superseding Acid Rain permit issued by the permitting authority; and
(ii) Have an Acid Rain Permit.

Monitoring Requirements.

(1) The owners and operators and, to the extent applicable, designated representative of each affected source and each affected unit at the source shall comply with the monitoring requirements as provided in 40 CFR part 75.
(2) The emissions measurements recorded and reported in accordance with 40 CFR part 75 shall be used to determine compliance by the unit with the Acid Rain emissions limitations and emissions reduction requirements for sulfur dioxide and nitrogen oxides under the Acid Rain Program.
(3) The requirements of 40 CFR part 75 shall not affect the responsibility of the owners and operators to monitor emissions of other pollutants or other emissions characteristics at the unit under other applicable requirements of the Act and other provisions of the operating permit for the source.

Sulfur Dioxide Requirements.

(1) The owners and operators of each source and each affected unit at the source shall:
(i) Hold allowances, as of the allowance transfer deadline, in the unit's compliance subaccount (after deductions under 40 CFR 73.34(c)) not less than the total annual emissions of sulfur dioxide for the previous calendar year from the unit; and
(ii) Comply with the applicable Acid Rain emissions limitations for sulfur dioxide.
(2) Each ton of sulfur dioxide emitted in excess of the Acid Rain emissions limitations for sulfur dioxide shall constitute a separate violation of the Act.
(3) An affected unit shall be subject to the requirements under paragraph (1) of the sulfur dioxide requirements as follows:
(i) Starting January 1, 2000, an affected unit under 40 CFR 72.6(a)(2); or
(ii) Starting on the later of January 1, 2000 or the deadline for monitor certification under 40 CFR part 75, an affected unit under 40 CFR 72.6(a)(3).
(4) Allowances shall be held in, deducted from, or transferred among Allowance Tracking System accounts in accordance with the Acid Rain Program.
(5) An allowance shall not be deducted in order to comply with the requirements under paragraph (1) of the sulfur dioxide requirements prior to the calendar year for which the allowance was allocated.
(6) An allowance allocated by the Administrator under the Acid Rain Program is a limited authorization to emit sulfur dioxide in accordance with the Acid Rain Program. No provision of the Acid Rain Program, the Acid Rain permit application, the Acid Rain permit, or an exemption under 40 CFR 72.7, 72.8, or 72.14 and no provision of law shall be construed to limit the authority of the United States to terminate or limit such authorization.
(7) An allowance allocated by the Administrator under the Acid Rain Program does not constitute a property right.

Nitrogen Oxides Requirements. The owners and operators of the source and each affected unit at the source shall comply with the applicable Acid Rain emissions limitation for nitrogen oxides.

Excess Emissions Requirements.

(1) The designated representative of an affected unit that has excess emissions in any calendar year shall submit a proposed offset plan, as required under 40 CFR part 77.
(2) The owners and operators of an affected unit that has excess emissions in any calendar year shall:
(i) Pay without demand the penalty required, and pay upon demand the interest on that penalty, as required by 40 CFR part 77; and
(ii) Comply with the terms of an approved offset plan, as required by 40 CFR part 77.

Recordkeeping and Reporting Requirements.

(1) Unless otherwise provided, the owners and operators of the source and each affected unit at the source shall keep on site at the source each of the following documents for a period of 5 years from the date the document is created. This period may be extended for cause, at any time prior to the end of 5 years, in writing by the Administrator or permitting authority:
(i) The certificate of representation for the designated representative for the source and each affected unit at the source and all documents that demonstrate the truth of the statements in the certificate of representation, in accordance with 40 CFR 72.24; provided that the certificate and documents shall be retained on site at the source beyond such 5-year period until such documents are superseded because of the submission of a new certificate of representation changing the designated representative;
(ii) All emissions monitoring information, in accordance with 40 CFR part 75, provided that to the extent that 40 CFR part 75 provides for a 3-year period for recordkeeping, the 3-year period shall apply.
(iii) Copies of all reports, compliance certifications, and other submissions and all records made or required under the Acid Rain Program; and,
(iv) Copies of all documents used to complete an Acid Rain permit application and any other submission under the Acid Rain Program or to demonstrate compliance with the requirements of the Acid Rain Program.
(2) The designated representative of an affected source and each affected unit at the source shall submit the reports and compliance certifications required under the Acid Rain Program, including those under 40 CFR part 72 subpart I and 40 CFR part 75.

Mesquite Generating Station
Plant Name (from Step 1)

Liability.

(1) Any person who knowingly violates any requirement or prohibition of the Acid Rain Program, a complete Acid Rain permit application, an Acid Rain permit, or an exemption under 40 CFR 72.7, 72.8, or 72.14, including any requirement for the payment of any penalty owed to the United States, shall be subject to enforcement pursuant to section 113(c) of the Act.
(2) Any person who knowingly makes a false, material statement in any record, submission, or report under the Acid Rain Program shall be subject to criminal enforcement pursuant to section 113(c) of the Act and 18 U.S.C. 1001.
(3) No permit revision shall excuse any violation of the requirements of the Acid Rain Program that occurs prior to the date that the revision takes effect.
(4) Each affected source and each affected unit shall meet the requirements of the Acid Rain Program.
(5) Any provision of the Acid Rain Program that applies to an affected source (including a provision applicable to the designated representative of an affected source) shall also apply to the owners and operators of such source and of the affected units at the source.
(6) Any provision of the Acid Rain Program that applies to an affected unit (including a provision applicable to the designated representative of an affected unit) shall also apply to the owners and operators of such unit. Except as provided under 40 CFR 72.44 (Phase II repowering extension plans) and 40 CFR 76.11 (NO$_x$ averaging plans), and except with regard to the requirements applicable to units with a common stack under 40 CFR part 75 (including 40 CFR 75.16, 75.17, and 75.18), the owners and operators and the designated representative of one affected unit shall not be liable for any violation by any other affected unit of which they are not owners or operators or the designated representative and that is located at a source of which they are not owners or operators or the designated representative.
(7) Each violation of a provision of 40 CFR parts 72, 73, 74, 75, 76, 77, and 78 by an affected source or affected unit, or by an owner or operator or designated representative of such source or unit, shall be a separate violation of the Act.

Effect on Other Authorities. No provision of the Acid Rain Program, an Acid Rain permit application, an Acid Rain permit, or an exemption under 40 CFR 72.7, 72.8, or 72.14 shall be construed as:

(1) Except as expressly provided in title IV of the Act, exempting or excluding the owners and operators and, to the extent applicable, the designated representative of an affected source or affected unit from compliance with any other provision of the Act, including the provisions of title I of the Act relating to applicable National Ambient Air Quality Standards or State Implementation Plans;
(2) Limiting the number of allowances a unit can hold; *provided*, that the number of allowances held by the unit shall not affect the source's obligation to comply with any other provisions of the Act;
(3) Requiring a change of any kind in any State law regulating electric utility rates and charges, affecting any State law regarding such State regulation, or limiting such State regulation, including any prudence review requirements under such State law;
(4) Modifying the Federal Power Act or affecting the authority of the Federal Energy Regulatory Commission under the Federal Power Act; or,
(5) Interfering with or impairing any program for competitive bidding for power supply in a State in which such program is established.

Certification

I am authorized to make this submission on behalf of the owners and operators of the affected source or affected units for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.

Name Joseph H. Rowley	
Signature Joseph H Rowley	Date 1/26/00

Acid Rain Program
Instructions for Phase II
Permit Application (40 CFR 72.30- 72.31)

The Acid Rain Program regulations require the designated representative to submit an Acid Rain permit application for Phase II for each source with an affected unit. A complete Phase II permit application is binding on the owners and operators of the affected source and is enforceable in the absence of a permit until the permitting authority either issues a permit to the source or disapproves the application.

Please type or print. The alternate designated representative may sign in lieu of the designated representative. If assistance is needed, contact the title V permitting authority.

STEP 1 Use the plant name and ORIS Code listed on the Certificate of Representation for the plant. An ORIS code is a 4 digit number assigned by the Energy Information Agency (EIA) at the U.S. Department of Energy to power plants owned by utilities. If the plant is not owned by a utility but has a 5 digit facility code (also assigned by EIA), use the facility code. If no code has been assigned or if there is uncertainty regarding what the code number is, contact EIA at (202) 426-1234 (for ORIS codes), or (202) 426-1289 (for facility codes).

STEP 2 For column "a," identify each affected unit at the affected source by providing the appropriate unit identification numbers, consistent with the unit identification numbers entered on the Certificate of Representation, with unit identification numbers listed in NADB (for units that commenced operation prior to 1993), and with unit identification numbers used in reporting to DOE and/or EIA. For new units without identification numbers, owners and operators may assign such numbers consistent with EIA and DOE requirements. NADB is the National Allowance Data Base for the Acid Rain Program, and can be downloaded from the Acid Rain Program Website at "www.epa.gov/acidrain/" or obtained on diskette by calling the Acid Rain Hotline. This data file is in dBase format for use on an IBM-compatible PC and requires 2 megabytes of hard drive memory.

For column "c," enter "yes" only if a repowering technology petition has been approved for the unit by U.S. EPA, an initial repowering extension plan was approved by the title V permitting authority and activated by the designated representative, and a repowering extension plan renewing the original repowering extension plan has been included with the current acid rain permit application for that unit.

For columns "d" and "e," enter the commence operation date(s) and monitor certification deadline(s) for new units in accordance with 40 CFR 75.4. If the commence operation date or monitor certification date changes after the Phase II permit is issued, the designated representative must submit a request for an administrative permit amendment under 40 CFR 72.83.

Submission Deadlines

For new units, an initial Phase II permit application must be submitted to the title V permitting authority at least 24 months before the later of January 1, 2000 or the date the unit commences operation. Phase II acid rain renewal applications must be submitted at least 6 months in advance of the expiration of the acid rain portion of a title V permit, or such longer time as provided for under the title V permitting authority s operating permits regulation.

Submission Instructions

Submit this form and 1 copy to the appropriate title V air permitting authority. If you have questions regarding this form, contact your local, State, or EPA Regional acid rain contact, or call EPA's Acid Rain Hotline at (202) 564-9620.

Paperwork Burden Estimate

The burden on the public for collecting and reporting information under this request is estimated at 17 hours per response. Send comments regarding this collection of information, including suggestions for reducing the burden, to: Chief, Information Policy Branch (2136), U.S. Environmental Protection Agency, 401 M Street, SW, Washington, D.C. 20460; and to: Paperwork Reduction Project (OMB#2060-0258), Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, D.C. 20503. ***Do not submit forms to these addresses; see the submission instructions above.***

U.S. Department of Energy
Energy Information Administration
Form EIA-860A (1999)

Annual Electric Generator Report - Utility
as of January 1, 1999

Form Approved
OMB NO. 1905-0129
(Expires 12/31/01)

This report is mandatory under Public Law 93-275, the Federal Energy Administration Act of 1974. Information reported on the form EIA-860 is not considered confidential. Public reporting burden for this collection of information is estimated to average 15.3 hours per response, including the time for reviewing the instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this form, its burden estimate, or any aspect of the data collection to the Energy Information Administration, Statistics and Methods Group EI-70, 1000 Independence Avenue S.W., Forrestal Building, Washington, D.C. 20585-0670; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, D.C. 20503. A person is not required to respond to the collection of information unless it displays a valid OMB number. If you need assistance, call the HELP CENTER on voice phone (202) 426-1191 or FAX phone (202) 426-1940 or contact the survey manager, Elsie Beas at (202) 426-1142 or E-Mail, elsie.beas@eia.doe.gov. To be completed by, or on behalf of, those utilities operating electric power plants.

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Power Plant Site Information ..... Schedule II
Generator Information ..... Schedule III
Ownership of Generators Owned Jointly or by Others ..... Schedule IV

Schedule I
Identification and Certification

1. Operating utility: EIA utility code:
   Name: Mesquite Power, LLC

Return completed form to:

U.S. Department of Energy
Energy Information Admin. EI-53
Mail Stop: BG-076 (EIA-860A)
Washington, D.C. 20077-5651

2. Respondent Mailing Address:
   X

4. Certifying Official: X
   Name:
   Title:
   Date:
   Signature:

3. Contact Person: X
   Name:
   Title:
   Telephone: Ext.
   FAX: EMail:

Notes:

U.S. Department of Energy
Energy Information Administration
Form EIA-860A (1999)

Annual Electric Generator Report - Utility as of January 1, 1999

Utility Code:
Utility Name:

Page :

Schedule II
Power Plant Site Information
(Existing Power Plants and Those Planned for Initial Commercial Operation within 5 Years)

Section A

1. Plant

Plant Name: Mesquite Generating Station
County Name: Maricopa
State: AZ
Plant Zip Code: X
Name of Water Source (Cooling or Hydroelectric): Wells
Cogeneration: N

Section B

1. Plant

Plant Name:
County Name:
State:
Plant Zip Code:
Name of Water Source (Cooling or Hydroelectric):
Cogeneration:

Section C

1. Plant

Plant Name:
County Name:
State:
Plant Zip Code:
Name of Water Source (Cooling or Hydroelectric):
Cogeneration:

Specify with a "Y" which, if any of the above are mobile plants. A.____ B.____ C.____

Notes:

Check ☐ if no change to preprinted data on this page.

U.S. Department of Energy
Energy Information Administration
Form EIA-860A (1999)

Annual Electric Generator Report - Utility
as of January 1, 1999

Utility Code:
Utility Name:

Page:

Schedule III.
Generator Information
(Existing Generators and those Planned for Initial Commercial Operation within 5 Years)

Section A

1. Generator: Plant Name Mesquite Generating Stati; Generator Id. 1; Prime Mover CT; Unit Code ____; Ownership U

2. Existing Generators: Maximum Generator Nameplate Capacity (MW) NA; Status Code NA; Commercial Operation Date(Mo/Yr) NA / ____; Retirement Date(Mo/Yr) NA / ____; Heat Rate (Btu/kWh) NA
Energy Source(s)* NA ____ ____; Mode of Transportation NA ____ ____; Net Capability (kW) Summer NA; Winter NA

3. Proposed Generator or Proposed Changes: Maximum Generator Nameplate Capacity (kW) 170,000; Status Code L; Effective Date(Mo/Yr) Original X / X; Current ____ / ____
Energy Source(s)* NG ____ ____; Mode of Transportation PL ____ ____; New Prime Mover NA; Net Capability (kW) Summer 170,000; Winter 170,000

Section B

1. Generator: Plant Name Mesquite Generating Station; Generator Id. 2; Prime Mover CT; Unit Code ____; Ownership U

2. Existing Generators: Maximum Generator Nameplate Capacity (kW) NA; Status Code NA; Commercial Operation Date(Mo/Yr) NA / ____; Retirement Date(Mo/Yr) NA / ____; Heat Rate (Btu/kWh) NA
Energy Source(s)* NA ____ ____; Mode of Transportation NA ____ ____; Net Capability (kW) Summer NA; Winter NA

3. Proposed Generator or Proposed Changes: Maximum Generator Nameplate Capacity (kW) 170,000; Status Code L; Effective Date(Mo/Yr) Original X / X; Current ____ / ____
Energy Source(s)* NG ____ ____; Mode of Transportation PL ____ ____; New Prime Mover NA; Net Capability (kW) Summer 170,000; Winter 170,000

Section C

1. Generator: Plant Name Mesquite Generating Sta.; Generator Id. 3; Prime Mover CT; Unit Code ____; Ownership U

2. Existing Generators: Maximum Generator Nameplate Capacity (kW) NA; Status Code NA; Commercial Operation Date(Mo/Yr) NA / ____; Retirement Date(Mo/Yr) NA / ____; Heat Rate (Btu/kWh) NA
Energy Source(s)* NA ____ ____; Mode of Transportation NA ____ ____; Net Capability (kW) Summer NA; Winter NA

3. Proposed Generator or Proposed Changes: Maximum Generator Nameplate Capacity (kW) 170,000; Status Code L; Effective Date(Mo/Yr) Original X / X; Current ____ / ____
Energy Source(s)* NG ____ ____; Mode of Transportation PL ____ ____; New Prime Mover NA; Net Capability (kW) Summer 170,000; Winter 170,000

Notes: * These are listed in order of predominence of quantity of Btus consumed during the prior year.

Check ☐ if no change to preprinted data on this page.

U.S. Department of Energy
Energy Information Administration
Form EIA-860A (1999)

Annual Electric Generator Report - Utility as of January 1, 1999

Utility Code:
Utility Name:

Page:

Schedule III
Generator Information
(Existing Generators and those Planned for Initial Commercial Operation within 5 Years)

Section A

1. Generator	Plant Name Mesquite Generating Sta. Generator Id. 4 Prime Mover CT Unit Code ____ Ownership U
2. Existing Generators	Maximum Generator Nameplate Capacity (kW) NA Status Code NA Commercial Operation Date(Mo/Yr) NA / ____ Retirement Date(Mo/Yr) NA / ____ Heat Rate (Btu/kWh) NA Energy Source(s)* NA ____ Mode of Transportation NA ____ Net Capability (kW) Summer NA Winter NA
3. Proposed Generator or Proposed Changes	Maximum Generator Nameplate Capacity (kW) 170,000 Status Code L Effective Date(Mo/Yr) Original X / X Current ____ / ____ Energy Source(s)* NG ____ Mode of Transportation PL ____ New Prime Mover NA Net Capability (kW) Summer 170,000 Winter 170,000

Section B

1. Generator	Plant Name Mesquite Generating Sta. Generator Id. 5 Prime Mover CW Unit Code ____ Ownership U
2. Existing Generators	Maximum Generator Nameplate Capacity (kW) NA Status Code NA Commercial Operation Date(Mo/Yr) NA / ____ Retirement Date(Mo/Yr) NA / ____ Heat Rate (Btu/kWh) NA Energy Source(s)* NA ____ Mode of Transportation NA ____ Net Capability (kW) Summer NA Winter NA
3. Proposed Generator or Proposed Changes	Maximum Generator Nameplate Capacity (kW) 160,000 Status Code L Effective Date(Mo/Yr) Original X / X Current ____ / ____ Energy Source(s)* NG ____ Mode of Transportation PL ____ New Prime Mover NA Net Capability (kW) Summer 160,000 Winter 160,000

Section C

1. Generator	Plant Name Mesquite Generating Sta. Generator Id. 6 Prime Mover CW Unit Code ____ Ownership U
2. Existing Generators	Maximum Generator Nameplate Capacity (kW) NA Status Code NA Commercial Operation Date(Mo/Yr) NA / ____ Retirement Date(Mo/Yr) NA / ____ Heat Rate (Btu/kWh) NA Energy Source(s)* NA ____ Mode of Transportation NA ____ Net Capability (kW) Summer NA Winter NA
3. Proposed Generator or Proposed Changes	Maximum Generator Nameplate Capacity (kW) 160,000 Status Code L Effective Date(Mo/Yr) Original X / X Current ____ / ____ Energy Source(s)* NG ____ Mode of Transportation PL ____ New Prime Mover NA Net Capability (kW) Summer 160,000 Winter 160,000

Notes: * These are listed in order of predominance of quantity of Btus consumed during the prior year.

Check ☐ if no change to preprinted data on this page.

APPENDIX E

MESQUITE POWER, LLC, MESQUITE GENERATING STATION
AMBIENT AIR QUALITY IMPACT ANALYSIS WORKPLAN

Ambient Air Quality Impact Analysis Workplan
For the
Mesquite Power LLC
Palo Verde Power Project

Prepared By
Black & Veatch

December, 1999

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1.0 Introduction

Mesquite Power LLC proposes to construct a natural gas fired, combined-cycle power generation facility in Maricopa County, near Arlington, Arizona. The proposed Palo Verde Power Project (hereinafter referred to as the Project) will be a new major stationary source, thus, subject to the Prevention of Significant Deterioration (PSD) review program. This Ambient Air Quality Impact Analysis Workplan (Workplan) describes the methodology for assessing ambient air quality impacts resulting from construction and operation of the proposed Project. Subject to Maricopa County Environmental Services Department review and approval, this Workplan will provide the basis of a mutually agreed upon procedure for the final ambient air quality impact analysis in support of the air construction permit application.

This Workplan describes site and source characteristics, determination of pollutants applicable to the air quality review, and the analytical procedures that will be used to conduct the ambient air quality impact analysis. The ambient air quality impact analysis includes a demonstration of compliance with the National Ambient Air Quality Standards (NAAQS) and the Prevention of Significant Deterioration (PSD) increments. The analysis will also include an additional impacts assessment.

2.0 Project Characterization

The following sections briefly characterize the combustion turbine Project including a general description of the Project, location, and emission units, as well as an overview of the local air quality status and New Source Review (NSR) applicability.

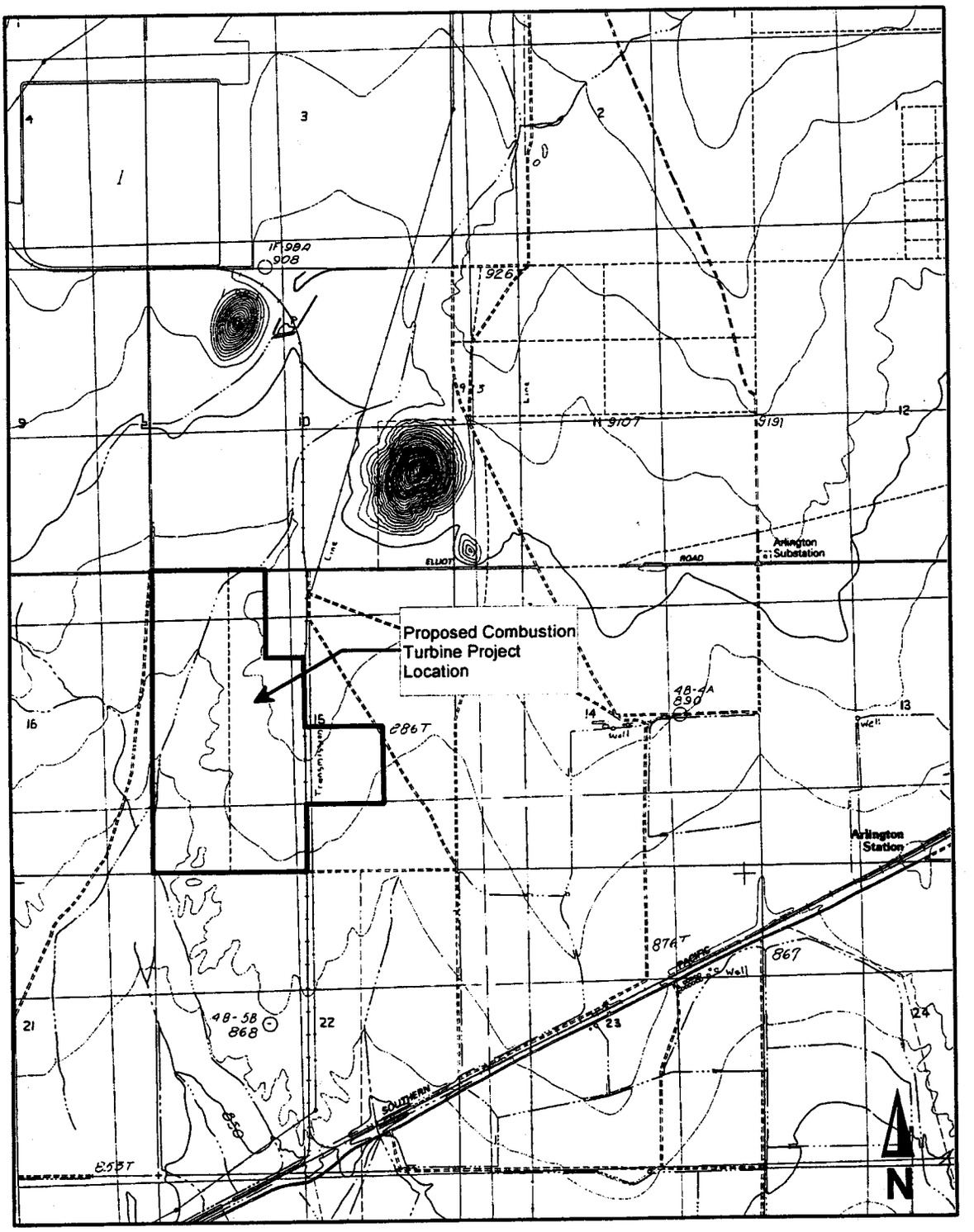
2.1 Project Description

The Project will consist of two 500 MW (nominal) combined-cycle power blocks. Each block will include two combustion turbine generators (CTGs), each directly connected to an electric generator. Exhaust heat from each CTG will be routed to a dedicated heat recovery steam generator (HRSG). Steam produced by the HRSGs will be combined and directed to a common steam turbine generator (STG). The Project will consist of four General Electric Model 7FA or Westinghouse 501F CTGs, four HRSGs, two STGs, two linear mechanical draft cooling towers, and associated support equipment. The HRSGs are also equipped with natural gas fired duct burners that add additional heat input to increase the steam generating capability of the HRSGs as needed. Each CTG/HRSG will have a single exhaust stack. Natural gas will be the only fuel fired in the CTGs and duct burners.

2.2 Project Location and Proximity to Mandatory Class I Areas

The Project is located in the unincorporated community of Arlington, Arizona (Figure 2-1). The site is approximately 40 miles west of Phoenix, and south of Interstate 10. The proposed site consists of a 300-acre rectangular parcel of land south of the Palo Verde Nuclear Station. The improved portion of the site for this Project is expected to cover approximately 35 acres of the total 300 acre site.

The nearest Mandatory Class I areas are the Superstition Wilderness Area, Mazatzal Wilderness Area, and the Pine Mountain Wilderness Area which are located approximately 127 km east-northeast, 132 km northeast, and 135 km northeast of the Project site, respectively. The Project is not expected to significantly impact the aforementioned Class I areas because of its distance



Base Map: 7.5' Quadrangle
Arlington, Arizona

Mesquite Power LLC Proposed Combustion Turbine Project Location

Figure 2-1

Mesquite.srf

from the areas and the use of clean fuel technology (natural gas) with state-of-the-art pollution control equipment. As discussed in Section 3-3, a preliminary air quality analysis will be conducted for the Class I areas and compared to the applicable significant impact levels. As an outcome of a November 14, 1999 meeting between representatives of Maricopa County, Mesquite, the Federal Land Managers, and Black & Veatch neither a visibility nor regional haze analysis is
required for the Mandatory Class I areas. Mr. Peter Lahm, representing the Federal Land Managers, indicated that because the Project will fire very clean fuel (i.e., natural gas), will employ best available control technology (BACT) to obtain a low NO_x emission rate, and the great distance between the Project site and the Class I areas neither a visibility nor a regional haze analysis is required. Thus, a visibility and regional haze analysis is not expected for the Project.

2.3 Project Emissions

Air emissions sources at the proposed Project will consist of the four CTG/HRSGs, mechanical draft cooling towers, and an emergency diesel fire pump. Representative manufacturer's data and engineering estimates will be used to characterize and quantify the potential to emit (PTE) of the Project from these air emission units. As mentioned in Section 2.1, the Project will consist of four General Electric or Westinghouse CTG. Because a specific CTG manufacturer has not yet been selected, emissions data from two vendors (WEC and GE) will be used in the analysis.

2.4 Local Air Quality Attainment/Nonattainment Status

The air quality in any given area is generally designated as being in attainment for a pollutant if the monitored concentrations of that pollutant are less than the applicable NAAQS. Likewise, a given area is generally classified as nonattainment for a pollutant if the monitored concentrations of that pollutant in the area are above the NAAQS.

A review of the air quality status in the region reveals that the Project site near Arlington, Arizona is in attainment or unclassifiable for all pollutants. The Phoenix area of Maricopa County is, however, classified as a nonattainment area for ozone, carbon monoxide, and particulate matter.

2.5 New Source Review Applicability

The federal Clean Air Act (CAA) NSR provisions are implemented for new major stationary sources and major modifications under two programs; the PSD program outlined in 40 CFR 52.21, and the Nonattainment NSR program outlined in 40 CFR 51 and 52. As noted in Section 2.4, the Project will be located in an attainment area with respect to all pollutants. As such, the PSD program will apply to the Project, which is assumed to be a new major stationary source for one or more regulated pollutant.

The PSD regulations are designed to ensure that the air quality in existing attainment areas does not significantly deteriorate or exceed the NAAQS, while providing a margin for future industrial and commercial growth. PSD regulations apply to major stationary sources and major modifications at existing sources undergoing construction in areas designated as attainment or unclassifiable under Section 107 of the CAA for any criteria pollutant. The primary provisions of the PSD regulations require that new major stationary sources be carefully reviewed prior to construction to ensure compliance with the NAAQS, the applicable PSD air quality increments, and the requirements to apply BACT to minimize the Project's emissions of air pollutants.

A new stationary source is defined as a "major stationary source" if it is classified as any one of the listed major source categories which emits, or has the potential to emit, 100 tons per year (tpy) or more of any regulated pollutant, or 250 tpy or more of any regulated pollutant if the stationary source does not fall under one of the listed major source categories. Because the Project falls into one of the listed major source categories (i.e., fossil fuel fired steam electric plant greater than 250 MBtu/hr), the 100 tpy threshold is applicable to the Project. Because the Project is likely to exceed the 100 tpy threshold for at least one regulated pollutant, the Project will be subject to PSD review. Once the Project becomes applicable to PSD review, PSD applicability will then be determined on a pollutant-by-pollutant basis for the remaining regulated pollutants by comparing the net potential emissions increase of each pollutant against the PSD significant emission rate (i.e., 40 tpy for NO_x, 40 tpy for SO_x, 25 tpy for TSP, 15 tpy for PM_{10}, 100 tpy for CO, and 40 tpy for VOCs). Each regulated pollutant with a PTE above the PSD significant emission rates will be subject to PSD review, including a BACT assessment, ambient air quality impact analysis (AAQIA), and an additional impact analysis.

3.0 Ambient Air Quality Impact Analysis

The following sections discuss the air dispersion modeling methodology and Ambient Air Quality Impact Analysis (AAQIA) that are proposed for those regulated pollutants which are determined to have a PTE greater than the PSD significant emission rate and thus subject to PSD review. The AAQIA will be conducted in accordance with USEPA's air dispersion modeling guidelines (incorporated as Appendix W of 40 CFR 51), as well as a mutually agreed upon modeling methodology initiated by this Workplan.

3.1 Air Dispersion Modeling Methodology

The base elevation at the site location for the Project is approximately 890 ft above mean sea level. The site topography is generally flat, although occasional prominent terrain features (buttes) are expected to exceed stack heights within the domain of the modeling grid. As air dispersion modeling receptors will be located in simple, intermediate, and complex terrain, the Industrial Source Complex Short-Term (ISCST3 Version 99155) air dispersion model is proposed for the AAQIA.

The ISCST3 model is a USEPA approved, steady-state, straight-line gaussian plume model, which may be used to assess pollutant concentrations from a wide variety of sources associated with an industrial source complex. Necessary for this analysis, ISCST3, unlike its predecessors, incorporates the COMPLEX1 dispersion algorithm for determining intermediate and complex terrain concentration impacts in accordance with USEPA guidance.

The ISCST3 air dispersion model will be used in a refined mode (based on the worst-case combination of CTG operating load and ambient temperature, with five years of representative meteorological data) to determine the maximum predicted impact concentrations for the AAQIA. The refined ISCST3 modeling methodology is discussed below.

3.1.1 Model Input and Source Parameters

The AAQIA will be based on the worst-case combination of operating parameters. Manufacturer's data and engineering calculations will be used as inputs in the ISCST3 air dispersion model to determine the maximum predicted ground level concentrations from the Project based on various operating loads, duct firing, and ambient operating temperatures of the CTGs. In a process referred to as "enveloping", each load and operating condition analyzed will be represented

with a set of stack parameters and pollutant emission rates that will be conservatively selected to produce the worst-case plume dispersion conditions and highest model predicted concentrations. These conditions will also consider a range of ambient temperatures that include minimum and maximum temperatures, as well as average annual ambient temperatures.

Enveloping allows multiple operating scenarios to be conservatively considered in an AAQIA, while keeping the actual air dispersion modeling runs to a minimum. However, it is possible that because of the specific characteristics of the sources, this analysis approach could result in overly conservative modeling impacts. In this case, an AAQIA may be performed without enveloping. Regardless of the input source data, actual sequential hourly meteorological data will be used to predict concentrations of each pollutant for each applicable averaging period.

3.1.2 GEP and Building Downwash Evaluation

All on-site buildings and structures, including the combustion turbine housings and HRSGs, will be analyzed to determine the potential to influence the plume dispersion from the CTG/HRSG stacks. The USEPA's Guideline for Determination of Good Engineering Practice Stack Height guidance document will be followed in this evaluation. Structure dimensions and relative locations will be entered into the USEPA's Building Profile Input Program (BPIP) to produce an ISCST3 input file with the proper Huber-Snyder or Schulman-Scire direction specific building downwash parameters. This same program will also determine a good engineering practice (GEP) stack height for each of the CTG/HRSG stacks.

3.1.3 Model Options

The following standard USEPA default regulatory modeling options will be invoked in the ISCST3 model:

- Final plume rise.
- Stack-tip downwash.
- Buoyancy induced dispersion.
- Default vertical wind profile exponents and vertical potential temperature gradient values.
- Calm processing option.
- Terrain elevations will be incorporated.

The USEPA default model options, in addition to the COMPLEX1 algorithm, will be used in the refined level air dispersion modeling runs.

3.1.4 Receptor Grids and Terrain Considerations

The air dispersion modeling receptor locations will be established at appropriate distances to ensure sufficient density and aerial extent to adequately characterize the pattern of pollutant impacts in the area. Specifically, a nested rectangular grid network is proposed that will extend 10 km from the center of the Project. The rectangular grid network will consists of 100 meter spacing out to 1 km, 500 meter spacing from 1 to 5 km, and then 1,000 meter spacing from 5 to 10 km. Receptor spacing at 50 meter intervals will be used along the property line. The receptor grid will be extended as necessary to ensure that the significant impact area is defined, and a 100 meter fine grid will be used around the maximum receptor points. In addition to the receptor grid, discrete receptors will be placed on the peaks of significant (i.e., complex) terrain features within the Project's 10 km nested grid.

Furthermore, discrete receptors will be placed at the closest boundary to the Project of the Phoenix nonattainment areas, Hummingbird Springs, Eagletail Mountains, Signal Mountain, Woolsey Peak, and North Maricopa Mountains Class II Wilderness areas, and the Gila Bend and Gila River Indian Reservations. Extra receptors may be added depending on the size and/or shape of the respective areas. In addition to the nonattainment areas, Class II Wilderness areas, and Indian Reservations, discrete receptors will also be placed at the closest points to the Mandatory Class I areas discussed in Section 2.2.

Receptor terrain elevations will be obtained from 30-meter Digital Elevation Model (DEM) terrain data based on United States Geological Survey (USGS) 7.5-minute digital quadrangles. The elevations will be determined with a method that will locate the maximum terrain elevation near the receptor. This method is similar to the "box" method in which the area considered for each receptor will consist of a "box" with boundaries drawn midway between the particular receptor and the adjacent receptor. This method will ensure that the highest (most conservative) elevations are used for each model receptor. The source receptor elevation will be compared with the actual USGS 7.5-minute quadrangle maps to ensure consistency.

3.1.5 Meteorological Data

The ISCST3 air dispersion model requires input of specific hourly surface and upper-air meteorological data. These data include the wind flow vector, wind speed, ambient temperature, stability category, and the mixing height. Five years (1994-1998) of processed meteorological data were obtained from the Maricopa County Environmental Services Department, Air Quality Division. The meteorological data consists of surface data from the Palo Verde Nuclear Generating Station and upper-air data from the Tucson, Arizona National Weather Service station.

The Palo Verde Nuclear Generating Station is located approximately 3 miles north of the proposed Project location. The elevation, terrain, and surface roughness characteristics at the meteorological station are very similar to the Project site. As such, the meteorological data are considered to be representative of the Project site.

3.1.6 Land Use Dispersion Coefficients

The USEPA's Auer land use method is used to determine whether rural or urban dispersion coefficients are used in the ISCST3 air dispersion model. In this procedure, the land area circumscribed within a 3 km radius of the site is classified as rural or urban using the Auer land use classification method. If rural land use types account for more than 50 percent of the land use area within the 3 km radius, then the rural dispersion coefficient option should be used. Otherwise, the urban coefficients are used.

Based on visual inspection of the USGS 7.5 minute topographic map of the proposed site location, it is conservatively concluded that over 50 percent of the area surrounding the proposed Project may be classified as rural. Accordingly, the rural dispersion modeling option will be used in the ISCST3 model.

3.2 Model Predicted Impacts

Based on the air dispersion modeling methodology outlined in the previous sections, the maximum model predicted ground level concentrations for the worst case operating scenario associated with the Project will be determined for each regulated pollutant and applicable averaging period that is subject to PSD review and for which a significant impact level exists. From the modeling results, the significant impact area, preconstruction monitoring requirements, and the need for a NAAQS and PSD increment consumption analyses will be determined.

3.2.1 *PSD Class II Significant Impact Area*

The predicted impacts for all PSD significant pollutants on both the 10 km nested grid and the discrete receptors along the nonattainment areas will be compared to the applicable PSD Class II significant impact levels (SILs) (25 $\mu g/m^3$ for 3-hour SO_2, 5 $\mu g/m^3$ for 24-hour SO_2, 1 $\mu g/m^3$ for annual SO_2, 5 $\mu g/m^3$ for 24-hour PM, 1 $\mu g/m^3$ for annual PM, 1 $\mu g/m^3$ for annual NO_x, 2,000 $\mu g/m^3$ for 1-hour CO, and 500 $\mu g/m^3$ for 8-hour CO). If the model-predicted maximum concentrations are less than the PSD SILs for all pollutants and applicable averaging periods, then no further air dispersion modeling analyses will be performed. However, if the predicted impact of one or more pollutants and applicable averaging periods are greater than the PSD SILs, then a significant impact area will be determined and interactive source modeling will be performed for those pollutants and applicable averaging periods. In this event, additional agency consultation will be requested and an inventory of PSD increment consuming sources and all nearby sources for the NAAQS analysis will be obtained and included as interactive sources in the AAQIA.

3.2.2 *Determination of Preconstruction Monitoring Requirements*

Existing ambient air quality data will be compared with the PSD significant monitoring concentrations. If ambient air quality data in the area are less than the applicable significant monitoring concentrations, then an exemption from pre-application monitoring requirements will be requested.

If the existing air quality concentration for a given pollutant is equal to or greater than the applicable PSD significant monitoring concentration, then the need for pre-application air quality data will be determined by comparing the pollutant's maximum model predicted concentration from the Project to the applicable PSD significant monitoring concentration. If the Project's maximum model predicted concentration for that pollutant is less than the applicable PSD significant monitoring concentration, then an exemption from pre-application monitoring requirements will be requested for that pollutant.

In the event both the ambient air quality data and maximum model predicted impacts exceed the applicable PSD significant monitoring concentration for a given pollutant, then the existing ambient air quality monitoring network will be evaluated for representativeness of these data to the site location pursuant to requesting a waiver from the pre-application monitoring requirements for that pollutant.

3.2.3 Class II Sensitive Area Analysis

As discussed in Section 3.1.4, receptors will be placed along the closest boundary to the Project of the Class II Wilderness areas and Indian Reservations within 50 km of the Project site. The Class II Wilderness areas to be modeled are Hummingbird Springs, Eagletail Mountains, Signal Mountain, Woolsey Peak, and North Maricopa Mountains. The Indian Reservations that will be included in the modeling are the Gila Bend and Gila River reservations.

3.2.3.1 Ground Level Impacts The Class II sensitive areas will be modeled with the ISCST3 air dispersion model to obtain the maximum ground level impacts at each of the receptors making up the nearest boundaries of these areas. The results from this analysis will be compared with the PSD Class II increment levels.

3.2.3.2 Visibility Analysis A visibility impairment screening analysis will be conducted for the Class II sensitive areas. The analysis will be performed in accordance with EPA's Workbook for Plume Visual Impact Screening and Analysis (EPA-450/4-88-015, September 1988), using the VISCREEN model. In accordance with the Workbook visual screening procedures, the VISCREEN plume visual impact screening model will be used with default worst-case Level-1 visual screening parameters for each sensitive area. If it is determined that a Level-1 analysis is overly conservative, a Level-2 screening analysis with situation-specific input parameters will be conducted for all sensitive areas.

3.2.3.3 Acid Deposition An acid deposition analysis for nitrates and sulfates will be performed for all previously mentioned Class II sensitive areas surrounding the Project site. The analysis will follow the methodology defined in the Interagency Workgroup on Air Quality Modeling (IWAQM) Phase I Report (EPA-454/R-93-015, April 1993).

3.3 Class I Area Impact Analysis

Class I areas are afforded special attention based on their value from a natural, scenic, recreational, or historic perspective. Emission sources subject to PSD review are analyzed to determine their potential for deteriorating the particular properties that make these areas worthy of their Class I or other relative designation. These properties are known as air quality related values (AQRVs),

and typically include such attributes as flora and fauna, visibility, and scenic value.

The Federal Land Manager (FLM) typically establishes indicators and thresholds to measure a source's potential for impacting the AQRV's of a Class I area. These indicators are typically measured by assessing the Project's impact on air quality. The model predicted concentrations at each of the Class I areas will be compared with the respective Class I SILs, which are based on 4 percent of the PSD Class I increments.

3.4 Additional Impact Analysis

Federal PSD regulations require the preparation of an analysis of additional impacts due to construction and operation of a new major stationary source or major modification to an existing major source. The analysis considers impairment to visibility, soils, and vegetation, as well as projected air quality impacts that may occur as the result of general commercial, residential, industrial, and other growth associated with the new major stationary source.

3.4.1 Commercial, Residential, and Industrial Growth

This analysis is typically conducted to predict the amount of commercial, residential, and industrial growth that may result from the operation of a proposed facility, and the effect this growth may have on the ambient air quality. Because the Project is not expected to generate additional commercial, residential or industrial growth in the immediate vicinity of the Project, the effects on ambient air quality due to growth associated with the Project are expected to be insignificant.

3.4.2 Vegetation and Soils

An analysis will be performed to examine the Project's predicted ambient air quality impacts on local soils and vegetation. The secondary NAAQS will serve as a basis for assessing the vegetation and soil impacts.

3.4.3 Visibility

The effects on visibility from the Project on the Class II sensitive areas will be evaluated using the VISCREEN model described previously in Section 3.2.3.2.

APPENDIX F
BPIP OUTPUT FILE

BUILDING PROFILE INPUT PROGRAM (BPIP)
Dated 95086
BREEZE BPIP
PC VERSION (3.0.0)
(C) COPYRIGHT 1994-1998 TRINITY CONSULTANTS, INC.

RUN INFORMATION
****
Building Data File:
Source Info. File:
BPIP Run File: D:\Sempra-PaloVerde\modeling\run20\170ft\downwash.bpi
Output List File: D:\Sempra-PaloVerde\modeling\run20\170ft\downwash.bpo
Output Wake File: D:\Sempra-PaloVerde\modeling\run20\170ft\downwash.WAK
Output EPA File: D:\Sempra-PaloVerde\modeling\run20\170ft\downwash.EPA

Run began on: 1/24/2000 at 9:42:07
****

BREEZE BPIP - D:\Sempra-PaloVerde\modeling\run20\170ft\downwash.bpi

Plant North: 0.00

Calculations for the ISCST3/AERMOD model 36 with radial directions.

Input Buildings: 45

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD1	1	271.27	1	1	27.43	15	326605.200	3691021.100
							326621.400	3691021.100
							326621.400	3691022.900
							326622.800	3691022.900
							326622.800	3691021.100
							326625.900	3691021.100
							326634.000	3691019.100
							326634.000	3691012.900
							326625.900	3691010.900
							326622.800	

3691010.900	326622.700
3691009.100	326621.500
3691009.100	326621.500
3691010.900	326605.300
3691010.900	326605.300
3691021.100	

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD3	2	271.27	1	7	27.43	6	326634.000	3691019.100
							326638.600	3691019.100
							326647.800	3691018.000
							326647.800	3691014.000
							326638.600	3691012.900
							326634.000	3691012.900

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD6	3	271.27	1	13	13.72	4	326647.800	3691019.400
							326655.400	3691019.400
							326655.400	3691012.500
							326647.800	3691012.500

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD7	4	271.27	1	19	13.72	8	326655.400	3691019.400
							326671.400	

3691019.400	326675.400
3691022.900	326681.500
3691022.900	326681.500
3691009.100	326675.400
3691009.100	326671.400
3691012.600	326655.400
3691012.600	

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD8	5	271.27	1	25	3.05	4		
							326655.200	3691028.400
							326666.600	3691028.400
							326666.600	3691024.600
							326655.200	3691024.600

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD9	6	271.27	1	31	0.00	4		
							326646.100	3691012.200
							326646.100	3690996.100
							326655.200	3690996.100
							326655.200	3691012.200

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD12	7	271.27	1	37	27.43	14		
							326605.100	3690985.300
							326621.300	3690985.300
							326621.300	

Y (m)	X (m)
3690987.000	326622.700
3690987.000	326622.700
3690985.500	326633.700
3690983.500	326633.700
3690977.200	326625.800
3690975.400	326622.700
3690975.200	326622.700
3690973.700	326621.300
3690973.700	326621.300
3690975.200	326605.100
3690975.200	326605.100
3690985.300	

------ Building ------ coordinates ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner X (m)	Y (m)
BLD14	8	271.27	1	43	27.43	6	326633.700	3690983.500
							326638.700	3690983.300
							326647.800	3690982.200
							326648.000	3690978.500
							326638.700	3690977.400
							326633.700	3690977.200

------ Building ------ coordinates ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner X (m)	Y (m)
BLD15	9	271.27	1	49	13.72	5	326647.800	3690983.800
							326655.300	3690983.800
							326655.300	3690977.000
							326647.800	3690977.000

326648.100

3690983.800

------ Building ID	#	------ Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD4	10	271.27	1	55	13.72	8	326655.500	3690984.100
							326671.700	3690984.100
							326675.300	3690987.600
							326681.600	3690987.600
							326681.600	3690973.100
							326675.300	3690973.100
							326671.700	3690976.600
							326655.600	3690976.600

------ Building ID	#	------ Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD16	11	271.27	1	61	18.29	24	326556.900	3690933.600
							326559.380	3690933.270
							326561.700	3690932.310
							326563.690	3690930.790
							326565.210	3690928.800
							326566.170	3690926.480
							326566.500	3690924.000
							326566.170	3690921.520
							326565.210	3690919.200
							326563.690	3690917.210
							326561.700	3690915.690
							326559.380	3690914.730
							326556.900	

Y (m)	X (m)
3690914.400	326554.420
3690914.730	326552.100
3690915.690	326550.110
3690917.210	326548.590
3690919.200	326547.630
3690921.520	326547.300
3690924.000	326547.630
3690926.480	326548.590
3690928.800	326550.110
3690930.790	326552.100
3690932.310	326554.420
3690933.270	

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD17	12	271.27	1	67	12.19	24	326591.300	3690898.600
							326592.930	3690898.390
							326594.450	3690897.760
							326595.750	3690896.750
							326596.760	3690895.450
							326597.390	3690893.930
							326597.600	3690892.300
							326597.390	3690890.670
							326596.760	3690889.150
							326595.750	3690887.850
							326594.450	3690886.840
							326592.930	3690886.210
							326591.300	3690886.000
							326589.670	3690886.210
							326588.150	

Y (m)	X (m)
3690886.840	326586.850
3690887.850	326585.840
3690889.150	326585.210
3690890.670	326585.000
3690892.300	326585.210
3690893.930	326585.840
3690895.450	326586.850
3690896.750	326588.150
3690897.760	326589.670
3690898.390	

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD24	13	271.27	1	73	10.67	4	326393.500	3690912.200
							326384.100	3690922.100
							326498.000	3691036.000
							326507.500	3691026.300

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD26	14	271.27	1	79	0.00	4	326498.700	3691035.700
							326504.600	3691041.600
							326513.400	3691032.790
							326507.500	3691026.900

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)

BLD27	15	271.27	1	85	10.67	4	326391.300	3690736.400
							326381.400	3690746.300
							326495.900	3690860.200
							326505.200	3690850.400

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner X (m)	Y (m)
BLD28	16	271.27	1	91	0.00	4	326496.500	3690860.200
							326502.350	3690866.050
							326511.140	3690857.250
							326505.300	3690851.400

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner X (m)	Y (m)
BLD31	17	271.27	1	97	27.43	14	326605.000	3690841.900
							326621.200	3690841.900
							326621.200	3690843.400
							326622.700	3690843.400
							326622.700	3690841.900
							326625.400	3690841.900
							326633.600	3690840.100
							326633.600	3690833.900
							326625.400	3690831.900
							326622.700	3690831.900
							326622.700	3690830.300
							326621.200	3690830.300
							326621.200	3690831.900

326605.000

3690831.900

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD32	18	271.27	1	103	27.43	6	326633.600	3690839.900
							326638.500	3690839.900
							326647.700	3690838.800
							326647.700	3690835.200
							326638.900	3690833.700
							326633.600	3690833.700

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD35	19	271.27	1	109	0.00	4	326645.900	3690976.300
							326655.000	3690976.300
							326655.000	3690960.500
							326645.900	3690960.500

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD36	20	271.27	1	115	13.72	4	326647.800	3690841.600
							326655.100	3690841.600
							326655.100	3690833.400
							326647.800	3690833.400

------ Building ------ ID	#	Elev.	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X

Y
(m) (m)
(m)

BLD37 21 271.27 1 121 13.72 8
326655.100
3690840.600
326671.200
3690840.600
326676.100
3690844.100
326681.400
3690844.100
326681.400
3690829.900
326676.100
3690829.900
326671.200
3690833.000
326655.100
3690833.000

------ Building ------ Tier Tier Tier # of Corner
coordinates
ID # Elev. # Ref. hgt corners X
Y
(m) (m)
(m)

BLD38 22 271.27 1 127 0.00 4
326646.100
3690833.000
326646.100
3690817.000
326655.500
3690817.000
326655.500
3690833.000

------ Building ------ Tier Tier Tier # of Corner
coordinates
ID # Elev. # Ref. hgt corners X
Y
(m) (m)
(m)

BLD39 23 271.27 1 133 27.43 14
326604.700
3690807.100
326620.800
3690807.100
326620.800
3690808.700
326622.200
3690808.700
326622.200
3690807.100
326625.300
3690807.100
326633.400
3690805.300

3690799.200	326633.400
3690797.200	326625.300
3690797.200	326622.200
3690795.600	326622.200
3690795.600	326620.800
3690797.200	326620.800
3690797.200	326604.700

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates Y (m)	X (m)
BLD40	24	271.27	1	139	27.43	6		
							3690805.300	326633.400
							3690805.300	326638.200
							3690803.900	326647.600
							3690800.200	326647.600
							3690799.000	326638.200
							3690799.000	326633.400

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates Y (m)	X (m)
BLD41	25	271.27	1	145	13.72	4		
							3690805.600	326647.600
							3690805.600	326654.900
							3690798.600	326654.900
							3690798.600	326647.600

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates Y (m)	X (m)
BLD42	26	271.27	1	151	13.72	8		

326654.900
3690805.900
326671.000
3690805.900
326675.000
3690809.200
326681.200
3690809.200
326681.200
3690795.200
326675.000
3690795.200
326671.000
3690798.300
326654.900
3690798.300

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD43	27	271.27	1	157	0.00	4	326645.800	3690798.100
							326655.100	3690798.100
							326655.100	3690782.100
							326645.800	3690782.100

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD23	28	271.27	1	163	3.05	4	326655.400	3690992.400
							326666.600	3690992.400
							326666.600	3690988.800
							326655.400	3690988.800

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD25	29	271.27	1	169	3.05	4	326654.800	3690814.900

326665.800

3690814.900

326665.800

3690811.100

326654.800

3690811.100

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD30	30	271.27	1	175	3.05	4	326655.300	3690848.800
							326666.300	3690848.800
							326666.300	3690845.100
							326655.300	3690845.100

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD5	31	271.27	1	181	6.10	4	326569.300	3690925.100
							326579.500	3690925.100
							326579.500	3690916.600
							326569.300	3690916.600

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD10	32	271.27	1	187	6.10	4	326569.500	3690915.700
							326579.000	3690915.700
							326579.000	3690897.500
							326569.500	3690897.500

------ Building ------ ID	#	Elev.	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X

Y (m) (m)

BLD11	33	271.27	1	193	6.10	4	326559.700
3690903.500							326569.400
3690903.500							326569.400
3690896.900							326559.700
3690896.900							

------ Building ------			Tier	Tier	Tier	# of	Corner coordinates
ID	#	Elev. (m)	#	Ref.	hgt	corners	X (m)
BLD13	34	271.27	1	199	0.00	4	326648.300
3690767.200							326678.400
3690767.200							326678.400
3690752.300							326648.300
3690752.300							

------ Building ------			Tier	Tier	Tier	# of	Corner coordinates
ID	#	Elev. (m)	#	Ref.	hgt	corners	X (m)
BLD18	35	271.27	1	205	0.00	24	326574.000
3690894.400							326574.880
3690894.280							326575.700
3690893.940							326576.400
3690893.400							326576.940
3690892.700							326577.280
3690891.880							326577.400
3690891.000							326577.280
3690890.120							326576.940
3690889.300							326576.400
3690888.600							326575.700
3690888.060							

3690887.720	326574.880
3690887.600	326574.000
3690887.720	326573.120
3690888.060	326572.300
3690888.600	326571.600
3690889.300	326571.060
3690890.120	326570.720
3690891.000	326570.600
3690891.880	326570.720
3690892.700	326571.060
3690893.400	326571.600
3690893.940	326572.300
3690894.280	326573.120

------ Building ------			Tier	Tier	Tier	# of	Corner coordinates	
ID	#	Elev. (m)	#	Ref.	hgt	corners	X (m)	Y (m)
BLD20	36	271.27	1	211	10.67	4	326514.300	3690928.200
							326526.700	3690928.200
							326526.700	3690903.600
							326514.300	3690903.600

------ Building ------			Tier	Tier	Tier	# of	Corner coordinates	
ID	#	Elev. (m)	#	Ref.	hgt	corners	X (m)	Y (m)
BLD21	37	271.27	1	217	18.29	4	326579.200	3690915.600
							326602.500	3690915.600
							326602.500	3690900.300
							326579.200	3690900.300

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD22	38	271.27	1	223	18.29	4	326633.200	3690944.700
							326682.700	3690944.700
							326682.700	3690915.900
							326633.200	3690915.900

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD33	39	271.27	1	229	18.29	4	326634.700	3690899.700
							326684.200	3690899.700
							326684.200	3690870.400
							326634.700	3690870.400

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD34	40	271.27	1	235	6.10	4	326745.200	3691058.200
							326759.600	3691058.200
							326759.600	3691049.000
							326745.200	3691049.000

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners	Corner coordinates X (m)	Y (m)
BLD44	41	271.27	1	241	7.62	4	326557.200	3691018.500

								326572.000
3691018.500								326572.000
3691009.500								326557.200
3691009.500								
------ Building ------ coordinates			Tier	Tier	Tier	# of		Corner
ID	#	Elev.	#	Ref.	hgt	corners		X
Y		(m)						(m)
(m)								
BLD45	42	271.27	1	247	7.62	4		326557.200
3690839.300								326572.400
3690839.300								326572.400
3690830.400								326557.200
3690830.400								
------ Building ------ coordinates			Tier	Tier	Tier	# of		Corner
ID	#	Elev.	#	Ref.	hgt	corners		X
Y		(m)						(m)
(m)								
BLD2	43	271.27	1	253	18.29	24		326520.800
3690951.200								326523.210
3690950.880								326525.450
3690949.950								326527.380
3690948.480								326528.850
3690946.550								326529.780
3690944.310								326530.100
3690941.900								326529.780
3690939.490								326528.850
3690937.250								326527.380
3690935.320								326525.450
3690933.850								326523.210
3690932.920								326520.800
3690932.600								326518.390
3690932.920								326516.150

Y (m)	X (m)
3690933.850	326514.220
3690935.320	326512.750
3690937.250	326511.820
3690939.490	326511.500
3690941.900	326511.820
3690944.310	326512.750
3690946.550	326514.220
3690948.480	326516.150
3690949.950	326518.390
3690950.880	

------ Building ------			Tier	Tier	Tier	# of	Corner coordinates
ID	#	Elev. (m)	#	Ref.	hgt	corners	X (m)
BLD19	44	271.27	1	259	6.10	24	

Y (m)	X (m)
3690928.600	326506.500
3690928.450	326507.660
3690928.000	326508.750
3690927.280	326509.680
3690926.350	326510.400
3690925.260	326510.850
3690924.100	326511.000
3690922.940	326510.850
3690921.850	326510.400
3690920.920	326509.680
3690920.200	326508.750
3690919.750	326507.660
3690919.600	326506.500
3690919.750	326505.340
3690920.200	326504.250
3690920.920	326503.320
	326502.600

Y (m)	X (m)
3690921.850	326502.150
3690922.940	326502.000
3690924.100	326502.150
3690925.260	326502.600
3690926.350	326503.320
3690927.280	326504.250
3690928.000	326505.340
3690928.450	

------ Building ------ ID	#	Elev. (m)	Tier #	Tier Ref.	Tier hgt	# of corners
BLD29	45	271.27	1	265	6.10	24

Corner coordinates Y (m)	X (m)
3690913.400	326506.400
3690913.240	326507.640
3690912.760	326508.800
3690911.990	326509.790
3690911.000	326510.560
3690909.840	326511.040
3690908.600	326511.200
3690907.360	326511.040
3690906.200	326510.560
3690905.210	326509.790
3690904.440	326508.800
3690903.960	326507.640
3690903.800	326506.400
3690903.960	326505.160
3690904.440	326504.000
3690905.210	326503.010
3690906.200	326502.240
3690907.360	326501.760
	326501.600

3690908.600

3690909.840

3690911.000

3690911.990

3690912.760

3690913.240

326501.760

326502.240

326503.010

326504.000

326505.160

Input Stacks: 42

Stack #	Stack Name	Stack Height	Stack Elev.	Stack coordinates X (m)	Y (m)
1	SRC1	3.05	281.94	326394.000	3690921.900
2	SRC2	3.05	281.94	326403.400	3690931.500
3	SRC3	3.05	281.94	326412.800	3690941.000
4	SRC4	3.05	281.94	326422.200	3690950.400
5	SRC5	3.05	281.94	326431.800	3690960.000
6	SRC6	3.05	281.94	326441.200	3690969.400
7	SRC7	3.05	281.94	326451.000	3690979.100
8	SRC8	3.05	281.94	326460.300	3690988.600
9	SRC9	3.05	281.94	326470.000	3690997.600
10	SRC10	3.05	281.94	326479.200	3691007.600
11	SRC23	3.05	281.94	326486.300	3690841.000
12	SRC24	3.05	281.94	326496.000	3690850.400
13	SRC22	3.05	281.94	326476.800	3690831.400
14	SRC21	3.05	281.94	326467.400	3690821.900
15	SRC20	3.05	281.94	326457.900	3690812.600
16	SRC19	3.05	281.94	326448.200	3690802.900
17	SRC18	3.05	281.94	326438.900	3690793.400
18	SRC17	3.05	281.94	326429.300	3690783.900
19	SRC16	3.05	281.94	326419.900	3690774.400
20	SRC15	3.05	281.94	326410.500	3690765.100
21	SRC14	3.05	281.94	326400.900	3690755.500
22	SRC13	3.05	281.94	326391.400	3690746.100
23	SRC11	3.05	281.94	326488.800	3691016.600
24	SRC12	3.05	281.94	326498.400	3691026.400
25	100ST1	51.82	271.27	326601.900	3691016.000
26	100ST2	51.82	271.27	326601.900	3690980.400
27	100ST3	51.82	271.27	326601.800	3690836.800
28	100ST4	51.82	271.27	326601.500	3690802.200
29	FWP24	0.30	277.37	326574.700	3690920.400
30	FWPA	0.30	277.37	326574.700	3690920.400
31	ANNST1	51.82	271.27	326601.900	3691016.000
32	ANNST2	51.82	271.27	326601.900	3690980.400
33	ANNST3	51.82	271.27	326601.800	3690836.800
34	ANNST4	51.82	271.27	326601.500	3690802.200
35	85ST1	51.82	271.27	326601.900	3691016.000
36	85ST2	51.82	271.27	326601.900	3690980.400
37	85ST3	51.82	271.27	326601.800	3690836.800
38	85ST4	51.82	271.27	326601.500	3690802.200
39	70ST1	51.82	271.27	326601.900	3691016.000
40	70ST2	51.82	271.27	326601.900	3690980.400
41	70ST3	51.82	271.27	326601.800	3690836.800
42	70ST4	51.82	271.27	326601.500	3690802.200

Stack number: 1 Name: SRC1

Structure producing the greatest GEP stack height within 5L: (73)
Height: 10.67 Width: 123.40 GEP: 16.00

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.43	16.00	S-S	(73)
20	10.67	80.32	16.00	S-S	(73)
30	10.67	54.77	16.00	S-S	(73)
40	10.67	27.55	16.00	S-S	(73)
50	10.67	27.67	16.00	S-S	(73)
60	10.67	54.96	16.00	S-S	(73)
70	10.67	80.59	16.00	S-S	(73)
80	10.67	103.77	16.00	S-S	(73)
90	10.67	123.80	16.00	S-S	(73)
100	10.67	140.07	16.00	S-S	(73)
110	10.67	152.08	16.00	S-S	(73)
120	10.67	159.46	16.00	S-S	(73)
130	10.67	162.01	16.00	S-S	(73)
140	10.67	161.51	16.00	S-S	(73)
150	10.67	158.97	16.00	S-S	(73)
160	10.67	151.60	16.00	S-S	(73)
170	10.67	139.62	16.00	S-S	(73)
180	10.67	123.40	16.00	S-S	(73)
190	10.67	103.43	16.00	S-S	(73)
200	10.67	80.32	16.00	S-S	(73)
210	10.67	54.77	16.00	S-S	(73)
220	10.67	27.55	16.00	S-S	(73)
230	10.67	27.67	16.00	S-S	(73)
240	10.67	54.96	16.00	S-S	(73)
250	10.67	80.59	16.00	S-S	(73)
260	10.67	103.77	16.00	S-S	(73)
270	10.67	123.80	16.00	S-S	(73)
280	10.67	140.07	16.00	S-S	(73)
290	10.67	152.08	16.00	S-S	(73)
300	10.67	159.46	16.00	S-S	(73)
310	10.67	162.01	16.00	S-S	(73)
320	10.67	161.51	16.00	S-S	(73)
330	10.67	158.97	16.00	S-S	(73)
340	10.67	151.60	16.00	S-S	(73)
350	10.67	139.62	16.00	S-S	(73)
360	10.67	123.40	16.00	S-S	(73)

Stack number: 2 Name: SRC2

Structure producing the greatest GEP stack height within 5L: (73)
Height: 10.67 Width: 123.40 GEP: 16.00

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.43	16.00	S-S	(73)

20	10.67	80.32	16.00	S-S	(73)
30	10.67	54.77	16.00	S-S	(73)
40	10.67	27.55	16.00	S-S	(73)
50	10.67	27.67	16.00	S-S	(73)
60	10.67	54.96	16.00	S-S	(73)
70	10.67	80.59	16.00	S-S	(73)
80	10.67	103.77	16.00	S-S	(73)
90	10.67	123.80	16.00	S-S	(73)
100	10.67	140.07	16.00	S-S	(73)
110	10.67	152.08	16.00	S-S	(73)
120	10.67	159.46	16.00	S-S	(73)
130	10.67	162.01	16.00	S-S	(73)
140	10.67	161.51	16.00	S-S	(73)
150	10.67	158.97	16.00	S-S	(73)
160	10.67	151.60	16.00	S-S	(73)
170	10.67	139.62	16.00	S-S	(73)
180	10.67	123.40	16.00	S-S	(73)
190	10.67	103.43	16.00	S-S	(73)
200	10.67	80.32	16.00	S-S	(73)
210	10.67	54.77	16.00	S-S	(73)
220	10.67	27.55	16.00	S-S	(73)
230	10.67	27.67	16.00	S-S	(73)
240	10.67	54.96	16.00	S-S	(73)
250	10.67	80.59	16.00	S-S	(73)
260	10.67	103.77	16.00	S-S	(73)
270	10.67	123.80	16.00	S-S	(73)
280	10.67	140.07	16.00	S-S	(73)
290	10.67	152.08	16.00	S-S	(73)
300	10.67	159.46	16.00	S-S	(73)
310	10.67	162.01	16.00	S-S	(73)
320	10.67	161.51	16.00	S-S	(73)
330	10.67	158.97	16.00	S-S	(73)
340	10.67	151.60	16.00	S-S	(73)
350	10.67	139.62	16.00	S-S	(73)
360	10.67	123.40	16.00	S-S	(73)

Stack number: 3 Name: SRC3

Structure producing the greatest GEP stack height within 5L: (73)
Height: 10.67 Width: 123.40 GEP: 16.00

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.43	16.00	S-S	(73)
20	10.67	80.32	16.00	S-S	(73)
30	10.67	54.77	16.00	S-S	(73)
40	10.67	27.55	16.00	S-S	(73)
50	10.67	27.67	16.00	S-S	(73)
60	10.67	54.96	16.00	S-S	(73)
70	10.67	80.59	16.00	S-S	(73)
80	10.67	103.77	16.00	S-S	(73)
90	10.67	123.80	16.00	S-S	(73)
100	10.67	140.07	16.00	S-S	(73)
110	10.67	152.08	16.00	S-S	(73)
120	10.67	159.46	16.00	S-S	(73)
130	10.67	162.01	16.00	S-S	(73)

140	10.67	161.51	16.00	S-S	(73)
150	10.67	158.97	16.00	S-S	(73)
160	10.67	151.60	16.00	S-S	(73)
170	10.67	139.62	16.00	S-S	(73)
180	10.67	123.40	16.00	S-S	(73)
190	10.67	103.43	16.00	S-S	(73)
200	10.67	80.32	16.00	S-S	(73)
210	10.67	54.77	16.00	S-S	(73)
220	10.67	27.55	16.00	S-S	(73)
230	10.67	27.67	16.00	S-S	(73)
240	10.67	54.96	16.00	S-S	(73)
250	10.67	80.59	16.00	S-S	(73)
260	10.67	103.77	16.00	S-S	(73)
270	10.67	123.80	16.00	S-S	(73)
280	10.67	140.07	16.00	S-S	(73)
290	10.67	152.08	16.00	S-S	(73)
300	10.67	159.46	16.00	S-S	(73)
310	10.67	162.01	16.00	S-S	(73)
320	10.67	161.51	16.00	S-S	(73)
330	10.67	158.97	16.00	S-S	(73)
340	10.67	151.60	16.00	S-S	(73)
350	10.67	139.62	16.00	S-S	(73)
360	10.67	123.40	16.00	S-S	(73)

Stack number: 4 Name: SRC4

Structure producing the greatest GEP stack height within 5L: (253)
Height: 18.29 Width: 18.59 GEP: 35.05

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.43	16.00	S-S	(73)
20	10.67	80.32	16.00	S-S	(73)
30	10.67	54.77	16.00	S-S	(73)
40	10.67	27.55	16.00	S-S	(73)
50	10.67	27.67	16.00	S-S	(73)
60	10.67	54.96	16.00	S-S	(73)
70	10.67	80.59	16.00	S-S	(73)
80	10.67	103.77	16.00	S-S	(73)
90	10.67	123.80	16.00	S-S	(73)
100	10.67	140.07	16.00	S-S	(73)
110	10.67	152.08	16.00	S-S	(73)
120	10.67	159.46	16.00	S-S	(73)
130	10.67	162.01	16.00	S-S	(73)
140	10.67	161.51	16.00	S-S	(73)
150	10.67	158.97	16.00	S-S	(73)
160	10.67	151.60	16.00	S-S	(73)
170	10.67	139.62	16.00	S-S	(73)
180	10.67	123.40	16.00	S-S	(73)
190	10.67	103.43	16.00	S-S	(73)
200	10.67	80.32	16.00	S-S	(73)
210	10.67	54.77	16.00	S-S	(73)
220	10.67	27.55	16.00	S-S	(73)
230	10.67	27.67	16.00	S-S	(73)
240	10.67	54.96	16.00	S-S	(73)
250	10.67	80.59	16.00	S-S	(73)

260	10.67	103.77	16.00	S-S	(73)
270	18.29	18.60	35.05	S-S	(253)
280	18.29	18.52	35.05	S-S	(253)
290	10.67	152.08	16.00	S-S	(73)
300	10.67	159.46	16.00	S-S	(73)
310	10.67	162.01	16.00	S-S	(73)
320	10.67	161.51	16.00	S-S	(73)
330	10.67	158.97	16.00	S-S	(73)
340	10.67	151.60	16.00	S-S	(73)
350	10.67	139.62	16.00	S-S	(73)
360	10.67	123.40	16.00	S-S	(73)

Stack number: 5 Name: SRC5

Structure producing the greatest GEP stack height within 5L: (253)
Height: 18.29 Width: 18.51 GEP: 35.05

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.43	16.00	S-S	(73)
20	10.67	80.32	16.00	S-S	(73)
30	10.67	54.77	16.00	S-S	(73)
40	10.67	27.55	16.00	S-S	(73)
50	10.67	27.67	16.00	S-S	(73)
60	10.67	54.96	16.00	S-S	(73)
70	10.67	80.59	16.00	S-S	(73)
80	10.67	103.77	16.00	S-S	(73)
90	10.67	123.80	16.00	S-S	(73)
100	10.67	140.07	16.00	S-S	(73)
110	10.67	152.08	16.00	S-S	(73)
120	10.67	159.46	16.00	S-S	(73)
130	10.67	162.01	16.00	S-S	(73)
140	10.67	161.51	16.00	S-S	(73)
150	10.67	158.97	16.00	S-S	(73)
160	10.67	151.60	16.00	S-S	(73)
170	10.67	139.62	16.00	S-S	(73)
180	10.67	123.40	16.00	S-S	(73)
190	10.67	103.43	16.00	S-S	(73)
200	10.67	80.32	16.00	S-S	(73)
210	10.67	54.77	16.00	S-S	(73)
220	10.67	27.55	16.00	S-S	(73)
230	10.67	27.67	16.00	S-S	(73)
240	10.67	54.96	16.00	S-S	(73)
250	10.67	80.59	16.00	S-S	(73)
260	10.67	103.77	16.00	S-S	(73)
270	18.29	18.60	35.05	S-S	(253)
280	18.29	18.52	35.05	S-S	(253)
290	18.29	18.53	35.05	S-S	(253)
300	10.67	159.46	16.00	S-S	(73)
310	10.67	162.01	16.00	S-S	(73)
320	10.67	161.51	16.00	S-S	(73)
330	10.67	158.97	16.00	S-S	(73)
340	10.67	151.60	16.00	S-S	(73)
350	10.67	139.62	16.00	S-S	(73)
360	10.67	123.40	16.00	S-S	(73)

Stack number: 6 Name: SRC6

Structure producing the greatest GEP stack height within 5L: (253)
Height: 18.29 Width: 18.58 GEP: 35.05

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.43	16.00	S-S	(73)
20	10.67	80.32	16.00	S-S	(73)
30	10.67	54.77	16.00	S-S	(73)
40	10.67	27.55	16.00	S-S	(73)
50	10.67	27.67	16.00	S-S	(73)
60	10.67	54.96	16.00	S-S	(73)
70	10.67	80.59	16.00	S-S	(73)
80	10.67	103.77	16.00	S-S	(73)
90	10.67	123.80	16.00	S-S	(73)
100	10.67	140.07	16.00	S-S	(73)
110	10.67	152.08	16.00	S-S	(73)
120	10.67	159.46	16.00	S-S	(73)
130	10.67	162.01	16.00	S-S	(73)
140	10.67	161.51	16.00	S-S	(73)
150	10.67	158.97	16.00	S-S	(73)
160	10.67	151.60	16.00	S-S	(73)
170	10.67	139.62	16.00	S-S	(73)
180	10.67	123.40	16.00	S-S	(73)
190	10.67	103.43	16.00	S-S	(73)
200	10.67	80.32	16.00	S-S	(73)
210	10.67	54.77	16.00	S-S	(73)
220	10.67	27.55	16.00	S-S	(73)
230	10.67	27.67	16.00	S-S	(73)
240	10.67	54.96	16.00	S-S	(73)
250	10.67	80.59	16.00	S-S	(73)
260	10.67	103.77	16.00	S-S	(73)
270	10.67	123.80	16.00	S-S	(73)
280	18.29	18.52	35.05	S-S	(253)
290	18.29	18.53	35.05	S-S	(253)
300	18.29	18.59	35.05	S-S	(253)
310	10.67	162.01	16.00	S-S	(73)
320	10.67	161.51	16.00	S-S	(73)
330	10.67	158.97	16.00	S-S	(73)
340	10.67	151.60	16.00	S-S	(73)
350	10.67	139.62	16.00	S-S	(73)
360	10.67	123.40	16.00	S-S	(73)

Stack number: 7 Name: SRC7

Structure producing the greatest GEP stack height within 5L: (253)
Height: 18.29 Width: 18.48 GEP: 35.05

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure

10	10.67	103.43	16.00	S-S	(73)
20	10.67	80.32	16.00	S-S	(73)
30	10.67	54.77	16.00	S-S	(73)
40	10.67	27.55	16.00	S-S	(73)
50	10.67	27.67	16.00	S-S	(73)
60	10.67	54.96	16.00	S-S	(73)
70	10.67	80.59	16.00	S-S	(73)
80	10.67	103.77	16.00	S-S	(73)
90	10.67	123.80	16.00	S-S	(73)
100	10.67	140.07	16.00	S-S	(73)
110	10.67	152.08	16.00	S-S	(73)
120	10.67	159.46	16.00	S-S	(73)
130	10.67	162.01	16.00	S-S	(73)
140	10.67	161.51	16.00	S-S	(73)
150	10.67	158.97	16.00	S-S	(73)
160	10.67	151.60	16.00	S-S	(73)
170	10.67	139.62	16.00	S-S	(73)
180	10.67	123.40	16.00	S-S	(73)
190	10.67	103.43	16.00	S-S	(73)
200	10.67	80.32	16.00	S-S	(73)
210	10.67	54.77	16.00	S-S	(73)
220	10.67	27.55	16.00	S-S	(73)
230	10.67	27.67	16.00	S-S	(73)
240	10.67	54.96	16.00	S-S	(73)
250	10.67	80.59	16.00	S-S	(73)
260	10.67	103.77	16.00	S-S	(73)
270	10.67	123.80	16.00	S-S	(73)
280	10.67	140.07	16.00	S-S	(73)
290	18.29	18.53	35.05	S-S	(253)
300	18.29	18.59	35.05	S-S	(253)
310	18.29	18.54	35.05	S-S	(253)
320	10.67	161.51	16.00	S-S	(73)
330	10.67	158.97	16.00	S-S	(73)
340	10.67	151.60	16.00	S-S	(73)
350	10.67	139.62	16.00	S-S	(73)
360	10.67	123.40	16.00	S-S	(73)

Stack number: 8 Name: SRC8

Structure producing the greatest GEP stack height within 5L: (253)
Height: 18.29 Width: 18.59 GEP: 35.05

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.43	16.00	S-S	(73)
20	10.67	80.32	16.00	S-S	(73)
30	10.67	54.77	16.00	S-S	(73)
40	10.67	27.55	16.00	S-S	(73)
50	10.67	27.67	16.00	S-S	(73)
60	10.67	54.96	16.00	S-S	(73)
70	10.67	80.59	16.00	S-S	(73)
80	10.67	103.77	16.00	S-S	(73)
90	10.67	123.80	16.00	S-S	(73)
100	10.67	140.07	16.00	S-S	(73)
110	10.67	152.08	16.00	S-S	(73)
120	10.67	159.46	16.00	S-S	(73)

130	10.67	162.01	16.00	S-S	(73)
140	10.67	161.51	16.00	S-S	(73)
150	10.67	158.97	16.00	S-S	(73)
160	10.67	151.60	16.00	S-S	(73)
170	10.67	139.62	16.00	S-S	(73)
180	10.67	123.40	16.00	S-S	(73)
190	10.67	103.43	16.00	S-S	(73)
200	10.67	80.32	16.00	S-S	(73)
210	10.67	54.77	16.00	S-S	(73)
220	10.67	27.55	16.00	S-S	(73)
230	10.67	27.67	16.00	S-S	(73)
240	10.67	54.96	16.00	S-S	(73)
250	10.67	80.59	16.00	S-S	(73)
260	10.67	103.77	16.00	S-S	(73)
270	10.67	123.80	16.00	S-S	(73)
280	10.67	140.07	16.00	S-S	(73)
290	10.67	152.08	16.00	S-S	(73)
300	18.29	18.59	35.05	S-S	(253)
310	18.29	18.54	35.05	S-S	(253)
320	18.29	18.54	35.05	S-S	(253)
330	10.67	158.97	16.00	S-S	(73)
340	10.67	151.60	16.00	S-S	(73)
350	10.67	139.62	16.00	S-S	(73)
360	10.67	123.40	16.00	S-S	(73)

Stack number: 9 Name: SRC9

Structure producing the greatest GEP stack height within 5L: (253)
Height: 18.29 Width: 18.56 GEP: 35.05

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.43	16.00	S-S	(73)
20	10.67	80.32	16.00	S-S	(73)
30	10.67	54.77	16.00	S-S	(73)
40	10.67	27.55	16.00	S-S	(73)
50	10.67	27.67	16.00	S-S	(73)
60	10.67	54.96	16.00	S-S	(73)
70	10.67	80.59	16.00	S-S	(73)
80	10.67	103.77	16.00	S-S	(73)
90	10.67	123.80	16.00	S-S	(73)
100	10.67	140.07	16.00	S-S	(73)
110	10.67	152.08	16.00	S-S	(73)
120	10.67	159.46	16.00	S-S	(73)
130	10.67	162.01	16.00	S-S	(73)
140	10.67	161.51	16.00	S-S	(73)
150	10.67	158.97	16.00	S-S	(73)
160	10.67	151.60	16.00	S-S	(73)
170	10.67	139.62	16.00	S-S	(73)
180	10.67	123.40	16.00	S-S	(73)
190	10.67	103.43	16.00	S-S	(73)
200	10.67	80.32	16.00	S-S	(73)
210	10.67	54.77	16.00	S-S	(73)
220	10.67	27.55	16.00	S-S	(73)
230	10.67	27.67	16.00	S-S	(73)
240	10.67	54.96	16.00	S-S	(73)

250	10.67	80.59	16.00	S-S	(73)
260	10.67	103.77	16.00	S-S	(73)
270	10.67	123.80	16.00	S-S	(73)
280	10.67	140.07	16.00	S-S	(73)
290	10.67	152.08	16.00	S-S	(73)
300	10.67	159.46	16.00	S-S	(73)
310	18.29	18.54	35.05	S-S	(253)
320	18.29	18.54	35.05	S-S	(253)
330	18.29	18.59	35.05	S-S	(253)
340	10.67	151.60	16.00	S-S	(73)
350	10.67	139.62	16.00	S-S	(73)
360	10.67	123.40	16.00	S-S	(73)

Stack number: 10 Name: SRC10

Structure producing the greatest GEP stack height within 5L: (253)
Height: 18.29 Width: 18.51 GEP: 35.05

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.43	16.00	S-S	(73)
20	10.67	80.32	16.00	S-S	(73)
30	10.67	54.77	16.00	S-S	(73)
40	10.67	27.55	16.00	S-S	(73)
50	10.67	27.67	16.00	S-S	(73)
60	10.67	54.96	16.00	S-S	(73)
70	10.67	80.59	16.00	S-S	(73)
80	10.67	103.77	16.00	S-S	(73)
90	10.67	123.80	16.00	S-S	(73)
100	10.67	140.07	16.00	S-S	(73)
110	10.67	152.08	16.00	S-S	(73)
120	10.67	159.46	16.00	S-S	(73)
130	10.67	162.01	16.00	S-S	(73)
140	10.67	161.51	16.00	S-S	(73)
150	10.67	158.97	16.00	S-S	(73)
160	10.67	151.60	16.00	S-S	(73)
170	10.67	139.62	16.00	S-S	(73)
180	10.67	123.40	16.00	S-S	(73)
190	10.67	103.43	16.00	S-S	(73)
200	10.67	80.32	16.00	S-S	(73)
210	10.67	54.77	16.00	S-S	(73)
220	10.67	27.55	16.00	S-S	(73)
230	10.67	27.67	16.00	S-S	(73)
240	10.67	54.96	16.00	S-S	(73)
250	10.67	80.59	16.00	S-S	(73)
260	10.67	103.77	16.00	S-S	(73)
270	10.67	123.80	16.00	S-S	(73)
280	10.67	140.07	16.00	S-S	(73)
290	10.67	152.08	16.00	S-S	(73)
300	10.67	159.46	16.00	S-S	(73)
310	10.67	162.01	16.00	S-S	(73)
320	18.29	18.54	35.05	S-S	(253)
330	18.29	18.59	35.05	S-S	(253)
340	18.29	18.53	35.05	S-S	(253)
350	10.67	139.62	16.00	S-S	(73)
360	10.67	123.40	16.00	S-S	(73)

Stack number: 11 Name: SRC23

Structure producing the greatest GEP stack height within 5L: (85)
Height: 10.67 Width: 123.80 GEP: 16.00

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.84	16.00	S-S	(85)
20	10.67	80.73	16.00	S-S	(85)
30	10.67	55.16	16.00	S-S	(85)
40	10.67	27.92	16.00	S-S	(85)
50	10.67	27.60	16.00	S-S	(85)
60	10.67	54.91	16.00	S-S	(85)
70	10.67	80.56	16.00	S-S	(85)
80	10.67	103.76	16.00	S-S	(85)
90	10.67	123.80	16.00	S-S	(85)
100	10.67	140.08	16.00	S-S	(85)
110	10.67	152.11	16.00	S-S	(85)
120	10.67	159.51	16.00	S-S	(85)
130	10.67	162.07	16.00	S-S	(85)
140	10.67	161.75	16.00	S-S	(85)
150	10.67	159.26	16.00	S-S	(85)
160	10.67	151.94	16.00	S-S	(85)
170	10.67	140.00	16.00	S-S	(85)
180	10.67	123.80	16.00	S-S	(85)
190	10.67	103.84	16.00	S-S	(85)
200	10.67	80.73	16.00	S-S	(85)
210	10.67	55.16	16.00	S-S	(85)
220	10.67	27.92	16.00	S-S	(85)
230	10.67	27.60	16.00	S-S	(85)
240	10.67	54.91	16.00	S-S	(85)
250	10.67	80.56	16.00	S-S	(85)
260	10.67	103.76	16.00	S-S	(85)
270	10.67	123.80	16.00	S-S	(85)
280	10.67	140.08	16.00	S-S	(85)
290	10.67	152.11	16.00	S-S	(85)
300	10.67	159.51	16.00	S-S	(85)
310	10.67	162.07	16.00	S-S	(85)
320	10.67	161.75	16.00	S-S	(85)
330	10.67	159.26	16.00	S-S	(85)
340	10.67	151.94	16.00	S-S	(85)
350	10.67	140.00	16.00	S-S	(85)
360	10.67	123.80	16.00	S-S	(85)

Stack number: 12 Name: SRC24

Structure producing the greatest GEP stack height within 5L: (133
139)
Height: 27.43 Width: 24.83 GEP: 54.01

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant

Structure

10	10.67	103.84	16.00	S-S	(85)
20	10.67	80.73	16.00	S-S	(85)
30	10.67	55.16	16.00	S-S	(85)
40	10.67	27.92	16.00	S-S	(85)
50	10.67	27.60	16.00	S-S	(85)
60	10.67	54.91	16.00	S-S	(85)
70	10.67	80.56	16.00	S-S	(85)
80	10.67	103.76	16.00	S-S	(85)
90	10.67	123.80	16.00	S-S	(85)
100	10.67	140.08	16.00	S-S	(85)
110	10.67	152.11	16.00	S-S	(85)
120	10.67	159.51	16.00	S-S	(85)
130	10.67	162.07	16.00	S-S	(85)
140	10.67	161.75	16.00	S-S	(85)
150	10.67	159.26	16.00	S-S	(85)
160	10.67	151.94	16.00	S-S	(85)
170	10.67	140.00	16.00	S-S	(85)
180	10.67	123.80	16.00	S-S	(85)
190	18.29	18.52	35.05	S-S	(253)
200	18.29	18.53	35.05	S-S	(253)
210	18.29	19.19	35.05	S-S	(61)
220	18.29	19.13	35.05	S-S	(61)
230	18.29	19.13	35.05	S-S	(61)
240	18.29	52.92	35.05	S-S	(61 217)
250	10.67	80.56	16.00	S-S	(85)
260	10.67	103.76	16.00	S-S	(85)
270	10.67	123.80	16.00	S-S	(85)
280	10.67	140.08	16.00	S-S	(85)
290	27.43	20.97	48.22	S-S	(133 139)
300	27.43	24.83	54.01	S-S	(139 133 145)
310	10.67	162.07	16.00	S-S	(85)
320	10.67	161.75	16.00	S-S	(85)
330	10.67	159.26	16.00	S-S	(85)
340	10.67	151.94	16.00	S-S	(85)
350	10.67	140.00	16.00	S-S	(85)
360	10.67	123.80	16.00	S-S	(85)

Stack number: 13 Name: SRC22

Structure producing the greatest GEP stack height within 5L: (85)
Height: 10.67 Width: 123.80 GEP: 16.00

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.84	16.00	S-S	(85)
20	10.67	80.73	16.00	S-S	(85)
30	10.67	55.16	16.00	S-S	(85)
40	10.67	27.92	16.00	S-S	(85)
50	10.67	27.60	16.00	S-S	(85)
60	10.67	54.91	16.00	S-S	(85)
70	10.67	80.56	16.00	S-S	(85)
80	10.67	103.76	16.00	S-S	(85)
90	10.67	123.80	16.00	S-S	(85)

100	10.67	140.08	16.00	S-S	(85)
110	10.67	152.11	16.00	S-S	(85)
120	10.67	159.51	16.00	S-S	(85)
130	10.67	162.07	16.00	S-S	(85)
140	10.67	161.75	16.00	S-S	(85)
150	10.67	159.26	16.00	S-S	(85)
160	10.67	151.94	16.00	S-S	(85)
170	10.67	140.00	16.00	S-S	(85)
180	10.67	123.80	16.00	S-S	(85)
190	10.67	103.84	16.00	S-S	(85)
200	10.67	80.73	16.00	S-S	(85)
210	10.67	55.16	16.00	S-S	(85)
220	10.67	27.92	16.00	S-S	(85)
230	10.67	27.60	16.00	S-S	(85)
240	10.67	54.91	16.00	S-S	(85)
250	10.67	80.56	16.00	S-S	(85)
260	10.67	103.76	16.00	S-S	(85)
270	10.67	123.80	16.00	S-S	(85)
280	10.67	140.08	16.00	S-S	(85)
290	10.67	152.11	16.00	S-S	(85)
300	10.67	159.51	16.00	S-S	(85)
310	10.67	162.07	16.00	S-S	(85)
320	10.67	161.75	16.00	S-S	(85)
330	10.67	159.26	16.00	S-S	(85)
340	10.67	151.94	16.00	S-S	(85)
350	10.67	140.00	16.00	S-S	(85)
360	10.67	123.80	16.00	S-S	(85)

Stack number: 14 Name: SRC21

Structure producing the greatest GEP stack height within 5L: (85)
Height: 10.67 Width: 123.80 GEP: 16.00

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.84	16.00	S-S	(85)
20	10.67	80.73	16.00	S-S	(85)
30	10.67	55.16	16.00	S-S	(85)
40	10.67	27.92	16.00	S-S	(85)
50	10.67	27.60	16.00	S-S	(85)
60	10.67	54.91	16.00	S-S	(85)
70	10.67	80.56	16.00	S-S	(85)
80	10.67	103.76	16.00	S-S	(85)
90	10.67	123.80	16.00	S-S	(85)
100	10.67	140.08	16.00	S-S	(85)
110	10.67	152.11	16.00	S-S	(85)
120	10.67	159.51	16.00	S-S	(85)
130	10.67	162.07	16.00	S-S	(85)
140	10.67	161.75	16.00	S-S	(85)
150	10.67	159.26	16.00	S-S	(85)
160	10.67	151.94	16.00	S-S	(85)
170	10.67	140.00	16.00	S-S	(85)
180	10.67	123.80	16.00	S-S	(85)
190	10.67	103.84	16.00	S-S	(85)
200	10.67	80.73	16.00	S-S	(85)
210	10.67	55.16	16.00	S-S	(85)

220	10.67	27.92	16.00	S-S	(85)
230	10.67	27.60	16.00	S-S	(85)
240	10.67	54.91	16.00	S-S	(85)
250	10.67	80.56	16.00	S-S	(85)
260	10.67	103.76	16.00	S-S	(85)
270	10.67	123.80	16.00	S-S	(85)
280	10.67	140.08	16.00	S-S	(85)
290	10.67	152.11	16.00	S-S	(85)
300	10.67	159.51	16.00	S-S	(85)
310	10.67	162.07	16.00	S-S	(85)
320	10.67	161.75	16.00	S-S	(85)
330	10.67	159.26	16.00	S-S	(85)
340	10.67	151.94	16.00	S-S	(85)
350	10.67	140.00	16.00	S-S	(85)
360	10.67	123.80	16.00	S-S	(85)

Stack number: 15 Name: SRC20

Structure producing the greatest GEP stack height within 5L: (85)
Height: 10.67 Width: 123.80 GEP: 16.00

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.84	16.00	S-S	(85)
20	10.67	80.73	16.00	S-S	(85)
30	10.67	55.16	16.00	S-S	(85)
40	10.67	27.92	16.00	S-S	(85)
50	10.67	27.60	16.00	S-S	(85)
60	10.67	54.91	16.00	S-S	(85)
70	10.67	80.56	16.00	S-S	(85)
80	10.67	103.76	16.00	S-S	(85)
90	10.67	123.80	16.00	S-S	(85)
100	10.67	140.08	16.00	S-S	(85)
110	10.67	152.11	16.00	S-S	(85)
120	10.67	159.51	16.00	S-S	(85)
130	10.67	162.07	16.00	S-S	(85)
140	10.67	161.75	16.00	S-S	(85)
150	10.67	159.26	16.00	S-S	(85)
160	10.67	151.94	16.00	S-S	(85)
170	10.67	140.00	16.00	S-S	(85)
180	10.67	123.80	16.00	S-S	(85)
190	10.67	103.84	16.00	S-S	(85)
200	10.67	80.73	16.00	S-S	(85)
210	10.67	55.16	16.00	S-S	(85)
220	10.67	27.92	16.00	S-S	(85)
230	10.67	27.60	16.00	S-S	(85)
240	10.67	54.91	16.00	S-S	(85)
250	10.67	80.56	16.00	S-S	(85)
260	10.67	103.76	16.00	S-S	(85)
270	10.67	123.80	16.00	S-S	(85)
280	10.67	140.08	16.00	S-S	(85)
290	10.67	152.11	16.00	S-S	(85)
300	10.67	159.51	16.00	S-S	(85)
310	10.67	162.07	16.00	S-S	(85)
320	10.67	161.75	16.00	S-S	(85)
330	10.67	159.26	16.00	S-S	(85)

340	10.67	151.94	16.00	S-S	(85)
350	10.67	140.00	16.00	S-S	(85)
360	10.67	123.80	16.00	S-S	(85)

Stack number: 16 Name: SRC19

Structure producing the greatest GEP stack height within 5L: (85)
Height: 10.67 Width: 123.80 GEP: 16.00

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.84	16.00	S-S	(85)
20	10.67	80.73	16.00	S-S	(85)
30	10.67	55.16	16.00	S-S	(85)
40	10.67	27.92	16.00	S-S	(85)
50	10.67	27.60	16.00	S-S	(85)
60	10.67	54.91	16.00	S-S	(85)
70	10.67	80.56	16.00	S-S	(85)
80	10.67	103.76	16.00	S-S	(85)
90	10.67	123.80	16.00	S-S	(85)
100	10.67	140.08	16.00	S-S	(85)
110	10.67	152.11	16.00	S-S	(85)
120	10.67	159.51	16.00	S-S	(85)
130	10.67	162.07	16.00	S-S	(85)
140	10.67	161.75	16.00	S-S	(85)
150	10.67	159.26	16.00	S-S	(85)
160	10.67	151.94	16.00	S-S	(85)
170	10.67	140.00	16.00	S-S	(85)
180	10.67	123.80	16.00	S-S	(85)
190	10.67	103.84	16.00	S-S	(85)
200	10.67	80.73	16.00	S-S	(85)
210	10.67	55.16	16.00	S-S	(85)
220	10.67	27.92	16.00	S-S	(85)
230	10.67	27.60	16.00	S-S	(85)
240	10.67	54.91	16.00	S-S	(85)
250	10.67	80.56	16.00	S-S	(85)
260	10.67	103.76	16.00	S-S	(85)
270	10.67	123.80	16.00	S-S	(85)
280	10.67	140.08	16.00	S-S	(85)
290	10.67	152.11	16.00	S-S	(85)
300	10.67	159.51	16.00	S-S	(85)
310	10.67	162.07	16.00	S-S	(85)
320	10.67	161.75	16.00	S-S	(85)
330	10.67	159.26	16.00	S-S	(85)
340	10.67	151.94	16.00	S-S	(85)
350	10.67	140.00	16.00	S-S	(85)
360	10.67	123.80	16.00	S-S	(85)

Stack number: 17 Name: SRC18

Structure producing the greatest GEP stack height within 5L: (85)
Height: 10.67 Width: 123.80 GEP: 16.00

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.84	16.00	S-S	(85)
20	10.67	80.73	16.00	S-S	(85)
30	10.67	55.16	16.00	S-S	(85)
40	10.67	27.92	16.00	S-S	(85)
50	10.67	27.60	16.00	S-S	(85)
60	10.67	54.91	16.00	S-S	(85)
70	10.67	80.56	16.00	S-S	(85)
80	10.67	103.76	16.00	S-S	(85)
90	10.67	123.80	16.00	S-S	(85)
100	10.67	140.08	16.00	S-S	(85)
110	10.67	152.11	16.00	S-S	(85)
120	10.67	159.51	16.00	S-S	(85)
130	10.67	162.07	16.00	S-S	(85)
140	10.67	161.75	16.00	S-S	(85)
150	10.67	159.26	16.00	S-S	(85)
160	10.67	151.94	16.00	S-S	(85)
170	10.67	140.00	16.00	S-S	(85)
180	10.67	123.80	16.00	S-S	(85)
190	10.67	103.84	16.00	S-S	(85)
200	10.67	80.73	16.00	S-S	(85)
210	10.67	55.16	16.00	S-S	(85)
220	10.67	27.92	16.00	S-S	(85)
230	10.67	27.60	16.00	S-S	(85)
240	10.67	54.91	16.00	S-S	(85)
250	10.67	80.56	16.00	S-S	(85)
260	10.67	103.76	16.00	S-S	(85)
270	10.67	123.80	16.00	S-S	(85)
280	10.67	140.08	16.00	S-S	(85)
290	10.67	152.11	16.00	S-S	(85)
300	10.67	159.51	16.00	S-S	(85)
310	10.67	162.07	16.00	S-S	(85)
320	10.67	161.75	16.00	S-S	(85)
330	10.67	159.26	16.00	S-S	(85)
340	10.67	151.94	16.00	S-S	(85)
350	10.67	140.00	16.00	S-S	(85)
360	10.67	123.80	16.00	S-S	(85)

Stack number: 18 Name: SRC17

Structure producing the greatest GEP stack height within 5L: (85)
Height: 10.67 Width: 123.80 GEP: 16.00

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.84	16.00	S-S	(85)
20	10.67	80.73	16.00	S-S	(85)
30	10.67	55.16	16.00	S-S	(85)
40	10.67	27.92	16.00	S-S	(85)
50	10.67	27.60	16.00	S-S	(85)
60	10.67	54.91	16.00	S-S	(85)
70	10.67	80.56	16.00	S-S	(85)
80	10.67	103.76	16.00	S-S	(85)

90	10.67	123.80	16.00	S-S	(85)
100	10.67	140.08	16.00	S-S	(85)
110	10.67	152.11	16.00	S-S	(85)
120	10.67	159.51	16.00	S-S	(85)
130	10.67	162.07	16.00	S-S	(85)
140	10.67	161.75	16.00	S-S	(85)
150	10.67	159.26	16.00	S-S	(85)
160	10.67	151.94	16.00	S-S	(85)
170	10.67	140.00	16.00	S-S	(85)
180	10.67	123.80	16.00	S-S	(85)
190	10.67	103.84	16.00	S-S	(85)
200	10.67	80.73	16.00	S-S	(85)
210	10.67	55.16	16.00	S-S	(85)
220	10.67	27.92	16.00	S-S	(85)
230	10.67	27.60	16.00	S-S	(85)
240	10.67	54.91	16.00	S-S	(85)
250	10.67	80.56	16.00	S-S	(85)
260	10.67	103.76	16.00	S-S	(85)
270	10.67	123.80	16.00	S-S	(85)
280	10.67	140.08	16.00	S-S	(85)
290	10.67	152.11	16.00	S-S	(85)
300	10.67	159.51	16.00	S-S	(85)
310	10.67	162.07	16.00	S-S	(85)
320	10.67	161.75	16.00	S-S	(85)
330	10.67	159.26	16.00	S-S	(85)
340	10.67	151.94	16.00	S-S	(85)
350	10.67	140.00	16.00	S-S	(85)
360	10.67	123.80	16.00	S-S	(85)

Stack number: 19 Name: SRC16

Structure producing the greatest GEP stack height within 5L: (85)
Height: 10.67 Width: 123.80 GEP: 16.00

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.84	16.00	S-S	(85)
20	10.67	80.73	16.00	S-S	(85)
30	10.67	55.16	16.00	S-S	(85)
40	10.67	27.92	16.00	S-S	(85)
50	10.67	27.60	16.00	S-S	(85)
60	10.67	54.91	16.00	S-S	(85)
70	10.67	80.56	16.00	S-S	(85)
80	10.67	103.76	16.00	S-S	(85)
90	10.67	123.80	16.00	S-S	(85)
100	10.67	140.08	16.00	S-S	(85)
110	10.67	152.11	16.00	S-S	(85)
120	10.67	159.51	16.00	S-S	(85)
130	10.67	162.07	16.00	S-S	(85)
140	10.67	161.75	16.00	S-S	(85)
150	10.67	159.26	16.00	S-S	(85)
160	10.67	151.94	16.00	S-S	(85)
170	10.67	140.00	16.00	S-S	(85)
180	10.67	123.80	16.00	S-S	(85)
190	10.67	103.84	16.00	S-S	(85)
200	10.67	80.73	16.00	S-S	(85)

210	10.67	55.16	16.00	S-S	(85)
220	10.67	27.92	16.00	S-S	(85)
230	10.67	27.60	16.00	S-S	(85)
240	10.67	54.91	16.00	S-S	(85)
250	10.67	80.56	16.00	S-S	(85)
260	10.67	103.76	16.00	S-S	(85)
270	10.67	123.80	16.00	S-S	(85)
280	10.67	140.08	16.00	S-S	(85)
290	10.67	152.11	16.00	S-S	(85)
300	10.67	159.51	16.00	S-S	(85)
310	10.67	162.07	16.00	S-S	(85)
320	10.67	161.75	16.00	S-S	(85)
330	10.67	159.26	16.00	S-S	(85)
340	10.67	151.94	16.00	S-S	(85)
350	10.67	140.00	16.00	S-S	(85)
360	10.67	123.80	16.00	S-S	(85)

Stack number: 20 Name: SRC15

Structure producing the greatest GEP stack height within 5L: (85)
Height: 10.67 Width: 123.80 GEP: 16.00

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.84	16.00	S-S	(85)
20	10.67	80.73	16.00	S-S	(85)
30	10.67	55.16	16.00	S-S	(85)
40	10.67	27.92	16.00	S-S	(85)
50	10.67	27.60	16.00	S-S	(85)
60	10.67	54.91	16.00	S-S	(85)
70	10.67	80.56	16.00	S-S	(85)
80	10.67	103.76	16.00	S-S	(85)
90	10.67	123.80	16.00	S-S	(85)
100	10.67	140.08	16.00	S-S	(85)
110	10.67	152.11	16.00	S-S	(85)
120	10.67	159.51	16.00	S-S	(85)
130	10.67	162.07	16.00	S-S	(85)
140	10.67	161.75	16.00	S-S	(85)
150	10.67	159.26	16.00	S-S	(85)
160	10.67	151.94	16.00	S-S	(85)
170	10.67	140.00	16.00	S-S	(85)
180	10.67	123.80	16.00	S-S	(85)
190	10.67	103.84	16.00	S-S	(85)
200	10.67	80.73	16.00	S-S	(85)
210	10.67	55.16	16.00	S-S	(85)
220	10.67	27.92	16.00	S-S	(85)
230	10.67	27.60	16.00	S-S	(85)
240	10.67	54.91	16.00	S-S	(85)
250	10.67	80.56	16.00	S-S	(85)
260	10.67	103.76	16.00	S-S	(85)
270	10.67	123.80	16.00	S-S	(85)
280	10.67	140.08	16.00	S-S	(85)
290	10.67	152.11	16.00	S-S	(85)
300	10.67	159.51	16.00	S-S	(85)
310	10.67	162.07	16.00	S-S	(85)
320	10.67	161.75	16.00	S-S	(85)

330	10.67	159.26	16.00	S-S	(85)
340	10.67	151.94	16.00	S-S	(85)
350	10.67	140.00	16.00	S-S	(85)
360	10.67	123.80	16.00	S-S	(85)

Stack number: 21 Name: SRC14

Structure producing the greatest GEP stack height within 5L: (85)
Height: 10.67 Width: 123.80 GEP: 16.00

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.84	16.00	S-S	(85)
20	10.67	80.73	16.00	S-S	(85)
30	10.67	55.16	16.00	S-S	(85)
40	10.67	27.92	16.00	S-S	(85)
50	10.67	27.60	16.00	S-S	(85)
60	10.67	54.91	16.00	S-S	(85)
70	10.67	80.56	16.00	S-S	(85)
80	10.67	103.76	16.00	S-S	(85)
90	10.67	123.80	16.00	S-S	(85)
100	10.67	140.08	16.00	S-S	(85)
110	10.67	152.11	16.00	S-S	(85)
120	10.67	159.51	16.00	S-S	(85)
130	10.67	162.07	16.00	S-S	(85)
140	10.67	161.75	16.00	S-S	(85)
150	10.67	159.26	16.00	S-S	(85)
160	10.67	151.94	16.00	S-S	(85)
170	10.67	140.00	16.00	S-S	(85)
180	10.67	123.80	16.00	S-S	(85)
190	10.67	103.84	16.00	S-S	(85)
200	10.67	80.73	16.00	S-S	(85)
210	10.67	55.16	16.00	S-S	(85)
220	10.67	27.92	16.00	S-S	(85)
230	10.67	27.60	16.00	S-S	(85)
240	10.67	54.91	16.00	S-S	(85)
250	10.67	80.56	16.00	S-S	(85)
260	10.67	103.76	16.00	S-S	(85)
270	10.67	123.80	16.00	S-S	(85)
280	10.67	140.08	16.00	S-S	(85)
290	10.67	152.11	16.00	S-S	(85)
300	10.67	159.51	16.00	S-S	(85)
310	10.67	162.07	16.00	S-S	(85)
320	10.67	161.75	16.00	S-S	(85)
330	10.67	159.26	16.00	S-S	(85)
340	10.67	151.94	16.00	S-S	(85)
350	10.67	140.00	16.00	S-S	(85)
360	10.67	123.80	16.00	S-S	(85)

Stack number: 22 Name: SRC13

Structure producing the greatest GEP stack height within 5L: (85)
Height: 10.67 Width: 123.80 GEP: 16.00

Direction Specific Building Downwash

Degree Structure	Height	Width	GEP	Method	Dominant
10	10.67	103.84	16.00	S-S	(85)
20	10.67	80.73	16.00	S-S	(85)
30	10.67	55.16	16.00	S-S	(85)
40	10.67	27.92	16.00	S-S	(85)
50	10.67	27.60	16.00	S-S	(85)
60	10.67	54.91	16.00	S-S	(85)
70	10.67	80.56	16.00	S-S	(85)
80	10.67	103.76	16.00	S-S	(85)
90	10.67	123.80	16.00	S-S	(85)
100	10.67	140.08	16.00	S-S	(85)
110	10.67	152.11	16.00	S-S	(85)
120	10.67	159.51	16.00	S-S	(85)
130	10.67	162.07	16.00	S-S	(85)
140	10.67	161.75	16.00	S-S	(85)
150	10.67	159.26	16.00	S-S	(85)
160	10.67	151.94	16.00	S-S	(85)
170	10.67	140.00	16.00	S-S	(85)
180	10.67	123.80	16.00	S-S	(85)
190	10.67	103.84	16.00	S-S	(85)
200	10.67	80.73	16.00	S-S	(85)
210	10.67	55.16	16.00	S-S	(85)
220	10.67	27.92	16.00	S-S	(85)
230	10.67	27.60	16.00	S-S	(85)
240	10.67	54.91	16.00	S-S	(85)
250	10.67	80.56	16.00	S-S	(85)
260	10.67	103.76	16.00	S-S	(85)
270	10.67	123.80	16.00	S-S	(85)
280	10.67	140.08	16.00	S-S	(85)
290	10.67	152.11	16.00	S-S	(85)
300	10.67	159.51	16.00	S-S	(85)
310	10.67	162.07	16.00	S-S	(85)
320	10.67	161.75	16.00	S-S	(85)
330	10.67	159.26	16.00	S-S	(85)
340	10.67	151.94	16.00	S-S	(85)
350	10.67	140.00	16.00	S-S	(85)
360	10.67	123.80	16.00	S-S	(85)

Stack number: 23 Name: SRC11

Structure producing the greatest GEP stack height within 5L: (253)
Height: 18.29 Width: 18.59 GEP: 35.05

Direction Specific Building Downwash

Degree Structure	Height	Width	GEP	Method	Dominant
10	10.67	103.43	16.00	S-S	(73)
20	10.67	80.32	16.00	S-S	(73)
30	10.67	54.77	16.00	S-S	(73)
40	10.67	27.55	16.00	S-S	(73)
50	10.67	27.67	16.00	S-S	(73)
60	10.67	54.96	16.00	S-S	(73)
70	10.67	80.59	16.00	S-S	(73)

80	10.67	103.77	16.00	S-S	(73)
90	10.67	123.80	16.00	S-S	(73)
100	10.67	140.07	16.00	S-S	(73)
110	10.67	152.08	16.00	S-S	(73)
120	10.67	159.46	16.00	S-S	(73)
130	10.67	162.01	16.00	S-S	(73)
140	10.67	161.51	16.00	S-S	(73)
150	10.67	158.97	16.00	S-S	(73)
160	10.67	151.60	16.00	S-S	(73)
170	10.67	139.62	16.00	S-S	(73)
180	10.67	123.40	16.00	S-S	(73)
190	10.67	103.43	16.00	S-S	(73)
200	10.67	80.32	16.00	S-S	(73)
210	10.67	54.77	16.00	S-S	(73)
220	10.67	27.55	16.00	S-S	(73)
230	10.67	27.67	16.00	S-S	(73)
240	10.67	54.96	16.00	S-S	(73)
250	10.67	80.59	16.00	S-S	(73)
260	10.67	103.77	16.00	S-S	(73)
270	10.67	123.80	16.00	S-S	(73)
280	10.67	140.07	16.00	S-S	(73)
290	10.67	152.08	16.00	S-S	(73)
300	10.67	159.46	16.00	S-S	(73)
310	10.67	162.01	16.00	S-S	(73)
320	10.67	161.51	16.00	S-S	(73)
330	18.29	18.59	35.05	S-S	(253)
340	18.29	18.53	35.05	S-S	(253)
350	10.67	139.62	16.00	S-S	(73)
360	10.67	123.40	16.00	S-S	(73)

Stack number: 24 Name: SRC12

Structure producing the greatest GEP stack height within 5L: (43 37)

Height: 27.43 Width: 24.70 GEP: 53.82

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	10.67	103.43	16.00	S-S	(73)
20	10.67	80.32	16.00	S-S	(73)
30	10.67	54.77	16.00	S-S	(73)
40	10.67	27.55	16.00	S-S	(73)
50	10.67	27.67	16.00	S-S	(73)
60	10.67	54.96	16.00	S-S	(73)
70	10.67	80.59	16.00	S-S	(73)
80	10.67	103.77	16.00	S-S	(73)
90	10.67	123.80	16.00	S-S	(73)
100	10.67	140.07	16.00	S-S	(73)
110	10.67	152.08	16.00	S-S	(73)
120	10.67	159.46	16.00	S-S	(73)
130	10.67	162.01	16.00	S-S	(73)
140	10.67	161.51	16.00	S-S	(73)
150	10.67	158.97	16.00	S-S	(73)
160	10.67	151.60	16.00	S-S	(73)
170	10.67	139.62	16.00	S-S	(73)
180	10.67	123.40	16.00	S-S	(73)

190	10.67	103.43	16.00	S-S	(73)
200	10.67	80.32	16.00	S-S	(73)
210	10.67	54.77	16.00	S-S	(73)
220	10.67	27.55	16.00	S-S	(73)
230	10.67	27.67	16.00	S-S	(73)
240	10.67	54.96	16.00	S-S	(73)
250	10.67	80.59	16.00	S-S	(73)
260	10.67	103.77	16.00	S-S	(73)
270	10.67	123.80	16.00	S-S	(73)
280	10.67	140.07	16.00	S-S	(73)
290	27.43	21.18	48.54	S-S	(37 43)
300	27.43	24.70	53.82	S-S	(43 37)
310	10.67	162.01	16.00	S-S	(73)
320	10.67	161.51	16.00	S-S	(73)
330	10.67	158.97	16.00	S-S	(73)
340	18.29	18.53	35.05	S-S	(253)
350	18.29	18.52	35.05	S-S	(253)
360	10.67	123.40	16.00	S-S	(73)

Stack number: 25 Name: 100ST1

Structure producing the greatest GEP stack height within 5L: (1)
Height: 27.43 Width: 28.62 GEP: 68.58

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	27.43	29.57	68.58	H-S	(37)
20	27.43	29.65	68.58	H-S	(37)
30	27.43	29.04	68.58	H-S	(1)
40	27.43	37.20	68.58	H-S	(7 1)
50	27.43	32.82	68.58	H-S	(7 1)
60	27.43	27.45	68.58	H-S	(1 7)
70	27.43	21.24	59.29	H-S	(1 7)
80	27.43	14.86	49.72	ND	(1)
90	27.43	13.80	48.13	ND	(1)
100	27.43	14.86	49.72	ND	(1)
110	27.43	21.21	59.24	H-S	(1 7)
120	27.43	27.41	68.55	H-S	(37 43)
130	27.43	32.76	68.58	H-S	(7 1)
140	27.43	37.12	68.58	H-S	(7 1)
150	27.43	28.92	68.58	H-S	(37)
160	27.43	29.71	68.58	H-S	(37)
170	27.43	29.61	68.58	H-S	(37)
180	27.43	28.60	68.58	H-S	(37)
190	27.43	29.57	68.58	H-S	(37)
200	27.43	29.65	68.58	H-S	(37)
210	27.43	29.04	68.58	H-S	(1)
220	27.43	37.20	68.58	H-S	(7 1)
230	27.43	32.82	68.58	H-S	(7 1)
240	27.43	27.45	68.58	H-S	(1 7)
250	27.43	21.24	59.29	H-S	(1 7)
260	27.43	14.86	49.72	ND	(1)
270	27.43	13.80	48.13	ND	(1)
280	27.43	14.86	49.72	ND	(1)
290	27.43	21.21	59.24	H-S	(1 7)
300	27.43	27.41	68.55	H-S	(43 37)

310	27.43	32.76	68.58	H-S	(7 1)
320	27.43	37.12	68.58	H-S	(7 1)
330	27.43	28.92	68.58	H-S	(37)
340	27.43	29.71	68.58	H-S	(37)
350	27.43	29.61	68.58	H-S	(37)
360	27.43	28.60	68.58	H-S	(37)

Stack number: 26 Name: 100ST2

Structure producing the greatest GEP stack height within 5L: (1)
Height: 27.43 Width: 29.38 GEP: 68.58

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	27.43	29.57	68.58	H-S	(37)
20	27.43	29.65	68.58	H-S	(37)
30	27.43	28.82	68.58	H-S	(37)
40	27.43	37.20	68.58	H-S	(7 1)
50	27.43	32.78	68.58	H-S	(43 37)
60	27.43	27.45	68.58	H-S	(1 7)
70	27.43	21.06	59.03	H-S	(37 43)
80	27.43	14.48	49.15	ND	(37)
90	27.43	13.30	47.38	ND	(37)
100	27.43	14.68	49.45	ND	(37)
110	27.43	21.18	59.21	H-S	(37 43)
120	27.43	27.41	68.55	H-S	(37 43)
130	27.43	32.81	68.58	H-S	(43 37)
140	27.43	37.21	68.58	H-S	(43 37)
150	27.43	28.92	68.58	H-S	(37)
160	27.43	29.71	68.58	H-S	(37)
170	27.43	29.61	68.58	H-S	(37)
180	27.43	28.60	68.58	H-S	(37)
190	27.43	29.57	68.58	H-S	(37)
200	27.43	29.65	68.58	H-S	(37)
210	27.43	28.82	68.58	H-S	(37)
220	27.43	37.20	68.58	H-S	(7 1)
230	27.43	32.78	68.58	H-S	(43 37)
240	27.43	27.45	68.58	H-S	(1 7)
250	27.43	21.06	59.03	H-S	(37 43)
260	27.43	14.48	49.15	ND	(37)
270	27.43	13.30	47.38	ND	(37)
280	27.43	14.68	49.45	ND	(37)
290	27.43	21.18	59.21	H-S	(37 43)
300	27.43	27.41	68.55	H-S	(43 37)
310	27.43	32.81	68.58	H-S	(43 37)
320	27.43	37.21	68.58	H-S	(43 37)
330	27.43	28.92	68.58	H-S	(37)
340	27.43	29.71	68.58	H-S	(37)
350	27.43	29.61	68.58	H-S	(37)
360	27.43	28.60	68.58	H-S	(37)

Stack number: 27 Name: 100ST3

Structure producing the greatest GEP stack height within 5L: (97)
Height: 27.43 Width: 28.46 GEP: 68.58

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	27.43	29.55	68.58	H-S	(97)
20	27.43	29.61	68.58	H-S	(97)
30	27.43	28.77	68.58	H-S	(97)
40	27.43	37.02	68.58	H-S	(103 97)
50	27.43	32.58	68.58	H-S	(103 97)
60	27.43	51.18	68.58	H-S	(97 103 133)
70	27.43	20.90	58.78	H-S	(97 103)
80	27.43	14.50	49.18	ND	(97)
90	27.43	13.10	47.08	ND	(97)
100	27.43	14.40	49.03	ND	(97)
110	27.43	21.09	59.06	H-S	(97 103)
120	27.43	51.60	68.58	H-S	(133 97 139)
130	27.43	32.71	68.58	H-S	(139 133)
140	27.43	37.15	68.58	H-S	(103 97)
150	27.43	28.87	68.58	H-S	(97)
160	27.43	29.68	68.58	H-S	(97)
170	27.43	29.59	68.58	H-S	(97)
180	27.43	28.60	68.58	H-S	(97)
190	27.43	29.55	68.58	H-S	(97)
200	27.43	29.61	68.58	H-S	(97)
210	27.43	28.77	68.58	H-S	(97)
220	27.43	37.02	68.58	H-S	(103 97)
230	27.43	32.58	68.58	H-S	(103 97)
240	27.43	51.18	68.58	H-S	(97 103 133)
250	27.43	20.90	58.78	H-S	(97 103)
260	27.43	14.50	49.18	ND	(97)
270	27.43	13.10	47.08	ND	(97)
280	27.43	14.40	49.03	ND	(97)
290	27.43	21.09	59.06	H-S	(97 103)
300	27.43	51.60	68.58	H-S	(133 97 139)
310	27.43	32.71	68.58	H-S	(139 133)
320	27.43	37.15	68.58	H-S	(103 97)
330	27.43	28.87	68.58	H-S	(97)
340	27.43	29.68	68.58	H-S	(97)
350	27.43	29.59	68.58	H-S	(97)
360	27.43	28.60	68.58	H-S	(97)

Stack number: 28 Name: 100ST4

Structure producing the greatest GEP stack height within 5L: (97)
Height: 27.43 Width: 29.21 GEP: 68.58

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	27.43	29.55	68.58	H-S	(97)

20	27.43	29.61	68.58	H-S	(97)
30	27.43	28.77	68.58	H-S	(97)
40	27.43	37.02	68.58	H-S	(103 97)
50	27.43	32.58	68.58	H-S	(103 97)
60	27.43	51.18	68.58	H-S	(97 103
133)					
70	27.43	21.16	59.17	H-S	(133 139)
80	27.43	14.36	48.98	ND	(133)
90	27.43	13.10	47.08	ND	(133)
100	27.43	14.36	48.98	ND	(133)
110	27.43	20.97	58.88	H-S	(133 139)
120	27.43	51.60	68.58	H-S	(133 97
139)					
130	27.43	32.71	68.58	H-S	(139 133)
140	27.43	37.17	68.58	H-S	(139 133)
150	27.43	28.90	68.58	H-S	(133)
160	27.43	29.68	68.58	H-S	(97)
170	27.43	29.59	68.58	H-S	(97)
180	27.43	28.60	68.58	H-S	(97)
190	27.43	29.55	68.58	H-S	(97)
200	27.43	29.61	68.58	H-S	(97)
210	27.43	28.77	68.58	H-S	(97)
220	27.43	37.02	68.58	H-S	(103 97)
230	27.43	32.58	68.58	H-S	(103 97)
240	27.43	51.18	68.58	H-S	(97 103
133)					
250	27.43	21.16	59.17	H-S	(133 139)
260	27.43	14.36	48.98	ND	(133)
270	27.43	13.10	47.08	ND	(133)
280	27.43	14.36	48.98	ND	(133)
290	27.43	20.97	58.88	H-S	(133 139)
300	27.43	51.60	68.58	H-S	(133 97
139)					
310	27.43	32.71	68.58	H-S	(139 133)
320	27.43	37.17	68.58	H-S	(139 133)
330	27.43	28.90	68.58	H-S	(133)
340	27.43	29.68	68.58	H-S	(97)
350	27.43	29.59	68.58	H-S	(97)
360	27.43	28.60	68.58	H-S	(97)

Stack number: 29 Name: FWP24

Structure producing the greatest GEP stack height within 5L: (37)
Height: 27.43 Width: 27.47 GEP: 62.48

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	18.29	19.12	39.62	S-S	(61)
20	18.29	19.12	39.62	S-S	(61)
30	18.29	19.19	39.62	S-S	(61)
40	18.29	19.13	39.62	S-S	(61)
50	18.29	19.13	39.62	S-S	(61)
60	27.43	27.34	62.34	S-S	(37 43)
70	18.29	19.12	39.62	S-S	(61)
80	18.29	19.11	39.62	S-S	(217)
90	18.29	19.20	39.62	S-S	(61)

100	18.29	18.52	39.62	S-S	(253)
110	18.29	18.53	39.62	S-S	(253)
120	18.29	18.59	39.62	S-S	(253)
130	18.29	18.54	39.62	S-S	(253)
140	18.29	19.13	39.62	S-S	(61)
150	18.29	19.19	39.62	S-S	(61)
160	18.29	19.12	39.62	S-S	(61)
170	18.29	19.12	39.62	S-S	(61)
180	18.29	19.20	39.62	S-S	(61)
190	27.43	29.79	62.48	S-S	(1)
200	27.43	29.65	62.48	S-S	(37)
210	27.43	28.82	62.48	S-S	(37)
220	27.43	37.20	62.48	S-S	(7 1)
230	27.43	32.78	62.48	S-S	(43 37)
240	27.43	27.34	62.34	S-S	(37 43)
250	18.29	19.12	39.62	S-S	(61)
260	18.29	19.11	39.62	S-S	(217)
270	18.29	19.20	39.62	S-S	(61)
280	18.29	19.11	39.62	S-S	(217)
290	18.29	19.12	39.62	S-S	(61)
300	18.29	19.19	39.62	S-S	(61)
310	18.29	19.13	39.62	S-S	(61)
320	27.43	37.15	62.48	S-S	(103 97)
330	27.43	28.87	62.48	S-S	(97)
340	27.43	29.68	62.48	S-S	(97)
350	27.43	29.67	62.48	S-S	(133)
360	18.29	19.20	39.62	S-S	(61)

Stack number: 30 Name: FWPA

Structure producing the greatest GEP stack height within 5L: (37)
Height: 27.43 Width: 27.47 GEP: 62.48

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	18.29	19.12	39.62	S-S	(61)
20	18.29	19.12	39.62	S-S	(61)
30	18.29	19.19	39.62	S-S	(61)
40	18.29	19.13	39.62	S-S	(61)
50	18.29	19.13	39.62	S-S	(61)
60	27.43	27.34	62.34	S-S	(37 43)
70	18.29	19.12	39.62	S-S	(61)
80	18.29	19.11	39.62	S-S	(217)
90	18.29	19.20	39.62	S-S	(61)
100	18.29	18.52	39.62	S-S	(253)
110	18.29	18.53	39.62	S-S	(253)
120	18.29	18.59	39.62	S-S	(253)
130	18.29	18.54	39.62	S-S	(253)
140	18.29	19.13	39.62	S-S	(61)
150	18.29	19.19	39.62	S-S	(61)
160	18.29	19.12	39.62	S-S	(61)
170	18.29	19.12	39.62	S-S	(61)
180	18.29	19.20	39.62	S-S	(61)
190	27.43	29.79	62.48	S-S	(1)
200	27.43	29.65	62.48	S-S	(37)
210	27.43	28.82	62.48	S-S	(37)

220	27.43	37.20	62.48	S-S	(7 1)
230	27.43	32.78	62.48	S-S	(43 37)
240	27.43	27.34	62.34	S-S	(37 43)
250	18.29	19.12	39.62	S-S	(61)
260	18.29	19.11	39.62	S-S	(217)
270	18.29	19.20	39.62	S-S	(61)
280	18.29	19.11	39.62	S-S	(217)
290	18.29	19.12	39.62	S-S	(61)
300	18.29	19.19	39.62	S-S	(61)
310	18.29	19.13	39.62	S-S	(61)
320	27.43	37.15	62.48	S-S	(103 97)
330	27.43	28.87	62.48	S-S	(97)
340	27.43	29.68	62.48	S-S	(97)
350	27.43	29.67	62.48	S-S	(133)
360	18.29	19.20	39.62	S-S	(61)

Stack number: 31 Name: ANNST1

Structure producing the greatest GEP stack height within 5L: (1)
Height: 27.43 Width: 28.62 GEP: 68.58

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	27.43	29.57	68.58	H-S	(37)
20	27.43	29.65	68.58	H-S	(37)
30	27.43	29.04	68.58	H-S	(1)
40	27.43	37.20	68.58	H-S	(7 1)
50	27.43	32.82	68.58	H-S	(7 1)
60	27.43	27.45	68.58	H-S	(1 7)
70	27.43	21.24	59.29	H-S	(1 7)
80	27.43	14.86	49.72	ND	(1)
90	27.43	13.80	48.13	ND	(1)
100	27.43	14.86	49.72	ND	(1)
110	27.43	21.21	59.24	H-S	(1 7)
120	27.43	27.41	68.55	H-S	(37 43)
130	27.43	32.76	68.58	H-S	(7 1)
140	27.43	37.12	68.58	H-S	(7 1)
150	27.43	28.92	68.58	H-S	(37)
160	27.43	29.71	68.58	H-S	(37)
170	27.43	29.61	68.58	H-S	(37)
180	27.43	28.60	68.58	H-S	(37)
190	27.43	29.57	68.58	H-S	(37)
200	27.43	29.65	68.58	H-S	(37)
210	27.43	29.04	68.58	H-S	(1)
220	27.43	37.20	68.58	H-S	(7 1)
230	27.43	32.82	68.58	H-S	(7 1)
240	27.43	27.45	68.58	H-S	(1 7)
250	27.43	21.24	59.29	H-S	(1 7)
260	27.43	14.86	49.72	ND	(1)
270	27.43	13.80	48.13	ND	(1)
280	27.43	14.86	49.72	ND	(1)
290	27.43	21.21	59.24	H-S	(1 7)
300	27.43	27.41	68.55	H-S	(43 37)
310	27.43	32.76	68.58	H-S	(7 1)
320	27.43	37.12	68.58	H-S	(7 1)
330	27.43	28.92	68.58	H-S	(37)

340	27.43	29.71	68.58	H-S	(37)
350	27.43	29.61	68.58	H-S	(37)
360	27.43	28.60	68.58	H-S	(37)

Stack number: 32 Name: ANNST2

Structure producing the greatest GEP stack height within 5L: (1)
Height: 27.43 Width: 29.38 GEP: 68.58

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	27.43	29.57	68.58	H-S	(37)
20	27.43	29.65	68.58	H-S	(37)
30	27.43	28.82	68.58	H-S	(37)
40	27.43	37.20	68.58	H-S	(7 1)
50	27.43	32.78	68.58	H-S	(43 37)
60	27.43	27.45	68.58	H-S	(1 7)
70	27.43	21.06	59.03	H-S	(37 43)
80	27.43	14.48	49.15	ND	(37)
90	27.43	13.30	47.38	ND	(37)
100	27.43	14.68	49.45	ND	(37)
110	27.43	21.18	59.21	H-S	(37 43)
120	27.43	27.41	68.55	H-S	(37 43)
130	27.43	32.81	68.58	H-S	(43 37)
140	27.43	37.21	68.58	H-S	(43 37)
150	27.43	28.92	68.58	H-S	(37)
160	27.43	29.71	68.58	H-S	(37)
170	27.43	29.61	68.58	H-S	(37)
180	27.43	28.60	68.58	H-S	(37)
190	27.43	29.57	68.58	H-S	(37)
200	27.43	29.65	68.58	H-S	(37)
210	27.43	28.82	68.58	H-S	(37)
220	27.43	37.20	68.58	H-S	(7 1)
230	27.43	32.78	68.58	H-S	(43 37)
240	27.43	27.45	68.58	H-S	(1 7)
250	27.43	21.06	59.03	H-S	(37 43)
260	27.43	14.48	49.15	ND	(37)
270	27.43	13.30	47.38	ND	(37)
280	27.43	14.68	49.45	ND	(37)
290	27.43	21.18	59.21	H-S	(37 43)
300	27.43	27.41	68.55	H-S	(43 37)
310	27.43	32.81	68.58	H-S	(43 37)
320	27.43	37.21	68.58	H-S	(43 37)
330	27.43	28.92	68.58	H-S	(37)
340	27.43	29.71	68.58	H-S	(37)
350	27.43	29.61	68.58	H-S	(37)
360	27.43	28.60	68.58	H-S	(37)

Stack number: 33 Name: ANNST3

Structure producing the greatest GEP stack height within 5L: (97)
Height: 27.43 Width: 28.46 GEP: 68.58

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	27.43	29.55	68.58	H-S	(97)
20	27.43	29.61	68.58	H-S	(97)
30	27.43	28.77	68.58	H-S	(97)
40	27.43	37.02	68.58	H-S	(103 97)
50	27.43	32.58	68.58	H-S	(103 97)
60	27.43	51.18	68.58	H-S	(97 103 133)
70	27.43	20.90	58.78	H-S	(97 103)
80	27.43	14.50	49.18	ND	(97)
90	27.43	13.10	47.08	ND	(97)
100	27.43	14.40	49.03	ND	(97)
110	27.43	21.09	59.06	H-S	(97 103)
120	27.43	51.60	68.58	H-S	(133 97 139)
130	27.43	32.71	68.58	H-S	(139 133)
140	27.43	37.15	68.58	H-S	(103 97)
150	27.43	28.87	68.58	H-S	(97)
160	27.43	29.68	68.58	H-S	(97)
170	27.43	29.59	68.58	H-S	(97)
180	27.43	28.60	68.58	H-S	(97)
190	27.43	29.55	68.58	H-S	(97)
200	27.43	29.61	68.58	H-S	(97)
210	27.43	28.77	68.58	H-S	(97)
220	27.43	37.02	68.58	H-S	(103 97)
230	27.43	32.58	68.58	H-S	(103 97)
240	27.43	51.18	68.58	H-S	(97 103 133)
250	27.43	20.90	58.78	H-S	(97 103)
260	27.43	14.50	49.18	ND	(97)
270	27.43	13.10	47.08	ND	(97)
280	27.43	14.40	49.03	ND	(97)
290	27.43	21.09	59.06	H-S	(97 103)
300	27.43	51.60	68.58	H-S	(133 97 139)
310	27.43	32.71	68.58	H-S	(139 133)
320	27.43	37.15	68.58	H-S	(103 97)
330	27.43	28.87	68.58	H-S	(97)
340	27.43	29.68	68.58	H-S	(97)
350	27.43	29.59	68.58	H-S	(97)
360	27.43	28.60	68.58	H-S	(97)

Stack number: 34 Name: ANNST4

Structure producing the greatest GEP stack height within 5L: (97)
Height: 27.43 Width: 29.21 GEP: 68.58

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	27.43	29.55	68.58	H-S	(97)
20	27.43	29.61	68.58	H-S	(97)
30	27.43	28.77	68.58	H-S	(97)
40	27.43	37.02	68.58	H-S	(103 97)

50	27.43	32.58	68.58	H-S	(103 97)
60	27.43	51.18	68.58	H-S	(97 103 133)
70	27.43	21.16	59.17	H-S	(133 139)
80	27.43	14.36	48.98	ND	(133)
90	27.43	13.10	47.08	ND	(133)
100	27.43	14.36	48.98	ND	(133)
110	27.43	20.97	58.88	H-S	(133 139)
120	27.43	51.60	68.58	H-S	(133 97 139)
130	27.43	32.71	68.58	H-S	(139 133)
140	27.43	37.17	68.58	H-S	(139 133)
150	27.43	28.90	68.58	H-S	(133)
160	27.43	29.68	68.58	H-S	(97)
170	27.43	29.59	68.58	H-S	(97)
180	27.43	28.60	68.58	H-S	(97)
190	27.43	29.55	68.58	H-S	(97)
200	27.43	29.61	68.58	H-S	(97)
210	27.43	28.77	68.58	H-S	(97)
220	27.43	37.02	68.58	H-S	(103 97)
230	27.43	32.58	68.58	H-S	(103 97)
240	27.43	51.18	68.58	H-S	(97 103 133)
250	27.43	21.16	59.17	H-S	(133 139)
260	27.43	14.36	48.98	ND	(133)
270	27.43	13.10	47.08	ND	(133)
280	27.43	14.36	48.98	ND	(133)
290	27.43	20.97	58.88	H-S	(133 139)
300	27.43	51.60	68.58	H-S	(133 97 139)
310	27.43	32.71	68.58	H-S	(139 133)
320	27.43	37.17	68.58	H-S	(139 133)
330	27.43	28.90	68.58	H-S	(133)
340	27.43	29.68	68.58	H-S	(97)
350	27.43	29.59	68.58	H-S	(97)
360	27.43	28.60	68.58	H-S	(97)

Stack number: 35 Name: 85ST1

Structure producing the greatest GEP stack height within 5L: (1)
Height: 27.43 Width: 28.62 GEP: 68.58

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	27.43	29.57	68.58	H-S	(37)
20	27.43	29.65	68.58	H-S	(37)
30	27.43	29.04	68.58	H-S	(1)
40	27.43	37.20	68.58	H-S	(7 1)
50	27.43	32.82	68.58	H-S	(7 1)
60	27.43	27.45	68.58	H-S	(1 7)
70	27.43	21.24	59.29	H-S	(1 7)
80	27.43	14.86	49.72	ND	(1)
90	27.43	13.80	48.13	ND	(1)
100	27.43	14.86	49.72	ND	(1)
110	27.43	21.21	59.24	H-S	(1 7)
120	27.43	27.41	68.55	H-S	(37 43)

130	27.43	32.76	68.58	H-S	(7 1)
140	27.43	37.12	68.58	H-S	(7 1)
150	27.43	28.92	68.58	H-S	(37)
160	27.43	29.71	68.58	H-S	(37)
170	27.43	29.61	68.58	H-S	(37)
180	27.43	28.60	68.58	H-S	(37)
190	27.43	29.57	68.58	H-S	(37)
200	27.43	29.65	68.58	H-S	(37)
210	27.43	29.04	68.58	H-S	(1)
220	27.43	37.20	68.58	H-S	(7 1)
230	27.43	32.82	68.58	H-S	(7 1)
240	27.43	27.45	68.58	H-S	(1 7)
250	27.43	21.24	59.29	H-S	(1 7)
260	27.43	14.86	49.72	ND	(1)
270	27.43	13.80	48.13	ND	(1)
280	27.43	14.86	49.72	ND	(1)
290	27.43	21.21	59.24	H-S	(1 7)
300	27.43	27.41	68.55	H-S	(43 37)
310	27.43	32.76	68.58	H-S	(7 1)
320	27.43	37.12	68.58	H-S	(7 1)
330	27.43	28.92	68.58	H-S	(37)
340	27.43	29.71	68.58	H-S	(37)
350	27.43	29.61	68.58	H-S	(37)
360	27.43	28.60	68.58	H-S	(37)

Stack number: 36 Name: 85ST2

Structure producing the greatest GEP stack height within 5L: (1)
Height: 27.43 Width: 29.38 GEP: 68.58

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	27.43	29.57	68.58	H-S	(37)
20	27.43	29.65	68.58	H-S	(37)
30	27.43	28.82	68.58	H-S	(37)
40	27.43	37.20	68.58	H-S	(7 1)
50	27.43	32.78	68.58	H-S	(43 37)
60	27.43	27.45	68.58	H-S	(1 7)
70	27.43	21.06	59.03	H-S	(37 43)
80	27.43	14.48	49.15	ND	(37)
90	27.43	13.30	47.38	ND	(37)
100	27.43	14.68	49.45	ND	(37)
110	27.43	21.18	59.21	H-S	(37 43)
120	27.43	27.41	68.55	H-S	(37 43)
130	27.43	32.81	68.58	H-S	(43 37)
140	27.43	37.21	68.58	H-S	(43 37)
150	27.43	28.92	68.58	H-S	(37)
160	27.43	29.71	68.58	H-S	(37)
170	27.43	29.61	68.58	H-S	(37)
180	27.43	28.60	68.58	H-S	(37)
190	27.43	29.57	68.58	H-S	(37)
200	27.43	29.65	68.58	H-S	(37)
210	27.43	28.82	68.58	H-S	(37)
220	27.43	37.20	68.58	H-S	(7 1)
230	27.43	32.78	68.58	H-S	(43 37)
240	27.43	27.45	68.58	H-S	(1 7)

250	27.43	21.06	59.03	H-S	(37 43)
260	27.43	14.48	49.15	ND	(37)
270	27.43	13.30	47.38	ND	(37)
280	27.43	14.68	49.45	ND	(37)
290	27.43	21.18	59.21	H-S	(37 43)
300	27.43	27.41	68.55	H-S	(43 37)
310	27.43	32.81	68.58	H-S	(43 37)
320	27.43	37.21	68.58	H-S	(43 37)
330	27.43	28.92	68.58	H-S	(37)
340	27.43	29.71	68.58	H-S	(37)
350	27.43	29.61	68.58	H-S	(37)
360	27.43	28.60	68.58	H-S	(37)

Stack number: 37 Name: 85ST3

Structure producing the greatest GEP stack height within 5L: (97)
Height: 27.43 Width: 28.46 GEP: 68.58

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	27.43	29.55	68.58	H-S	(97)
20	27.43	29.61	68.58	H-S	(97)
30	27.43	28.77	68.58	H-S	(97)
40	27.43	37.02	68.58	H-S	(103 97)
50	27.43	32.58	68.58	H-S	(103 97)
60	27.43	51.18	68.58	H-S	(97 103 133)
70	27.43	20.90	58.78	H-S	(97 103)
80	27.43	14.50	49.18	ND	(97)
90	27.43	13.10	47.08	ND	(97)
100	27.43	14.40	49.03	ND	(97)
110	27.43	21.09	59.06	H-S	(97 103)
120	27.43	51.60	68.58	H-S	(133 97 139)
130	27.43	32.71	68.58	H-S	(139 133)
140	27.43	37.15	68.58	H-S	(103 97)
150	27.43	28.87	68.58	H-S	(97)
160	27.43	29.68	68.58	H-S	(97)
170	27.43	29.59	68.58	H-S	(97)
180	27.43	28.60	68.58	H-S	(97)
190	27.43	29.55	68.58	H-S	(97)
200	27.43	29.61	68.58	H-S	(97)
210	27.43	28.77	68.58	H-S	(97)
220	27.43	37.02	68.58	H-S	(103 97)
230	27.43	32.58	68.58	H-S	(103 97)
240	27.43	51.18	68.58	H-S	(97 103 133)
250	27.43	20.90	58.78	H-S	(97 103)
260	27.43	14.50	49.18	ND	(97)
270	27.43	13.10	47.08	ND	(97)
280	27.43	14.40	49.03	ND	(97)
290	27.43	21.09	59.06	H-S	(97 103)
300	27.43	51.60	68.58	H-S	(133 97 139)
310	27.43	32.71	68.58	H-S	(139 133)
320	27.43	37.15	68.58	H-S	(103 97)

330	27.43	28.87	68.58	H-S	(97)
340	27.43	29.68	68.58	H-S	(97)
350	27.43	29.59	68.58	H-S	(97)
360	27.43	28.60	68.58	H-S	(97)

Stack number: 38 Name: 85ST4

Structure producing the greatest GEP stack height within 5L: (97)
Height: 27.43 Width: 29.21 GEP: 68.58

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	27.43	29.55	68.58	H-S	(97)
20	27.43	29.61	68.58	H-S	(97)
30	27.43	28.77	68.58	H-S	(97)
40	27.43	37.02	68.58	H-S	(103 97)
50	27.43	32.58	68.58	H-S	(103 97)
60	27.43	51.18	68.58	H-S	(97 103 133)
70	27.43	21.16	59.17	H-S	(133 139)
80	27.43	14.36	48.98	ND	(133)
90	27.43	13.10	47.08	ND	(133)
100	27.43	14.36	48.98	ND	(133)
110	27.43	20.97	58.88	H-S	(133 139)
120	27.43	51.60	68.58	H-S	(133 97 139)
130	27.43	32.71	68.58	H-S	(139 133)
140	27.43	37.17	68.58	H-S	(139 133)
150	27.43	28.90	68.58	H-S	(133)
160	27.43	29.68	68.58	H-S	(97)
170	27.43	29.59	68.58	H-S	(97)
180	27.43	28.60	68.58	H-S	(97)
190	27.43	29.55	68.58	H-S	(97)
200	27.43	29.61	68.58	H-S	(97)
210	27.43	28.77	68.58	H-S	(97)
220	27.43	37.02	68.58	H-S	(103 97)
230	27.43	32.58	68.58	H-S	(103 97)
240	27.43	51.18	68.58	H-S	(97 103 133)
250	27.43	21.16	59.17	H-S	(133 139)
260	27.43	14.36	48.98	ND	(133)
270	27.43	13.10	47.08	ND	(133)
280	27.43	14.36	48.98	ND	(133)
290	27.43	20.97	58.88	H-S	(133 139)
300	27.43	51.60	68.58	H-S	(133 97 139)
310	27.43	32.71	68.58	H-S	(139 133)
320	27.43	37.17	68.58	H-S	(139 133)
330	27.43	28.90	68.58	H-S	(133)
340	27.43	29.68	68.58	H-S	(97)
350	27.43	29.59	68.58	H-S	(97)
360	27.43	28.60	68.58	H-S	(97)

Stack number: 39 Name: 70ST1

Structure producing the greatest GEP stack height within 5L: (1)
Height: 27.43 Width: 28.62 GEP: 68.58

Direction Specific Building Downwash

Degree Structure	Height	Width	GEP	Method	Dominant
10	27.43	29.57	68.58	H-S	(37)
20	27.43	29.65	68.58	H-S	(37)
30	27.43	29.04	68.58	H-S	(1)
40	27.43	37.20	68.58	H-S	(7 1)
50	27.43	32.82	68.58	H-S	(7 1)
60	27.43	27.45	68.58	H-S	(1 7)
70	27.43	21.24	59.29	H-S	(1 7)
80	27.43	14.86	49.72	ND	(1)
90	27.43	13.80	48.13	ND	(1)
100	27.43	14.86	49.72	ND	(1)
110	27.43	21.21	59.24	H-S	(1 7)
120	27.43	27.41	68.55	H-S	(37 43)
130	27.43	32.76	68.58	H-S	(7 1)
140	27.43	37.12	68.58	H-S	(7 1)
150	27.43	28.92	68.58	H-S	(37)
160	27.43	29.71	68.58	H-S	(37)
170	27.43	29.61	68.58	H-S	(37)
180	27.43	28.60	68.58	H-S	(37)
190	27.43	29.57	68.58	H-S	(37)
200	27.43	29.65	68.58	H-S	(37)
210	27.43	29.04	68.58	H-S	(1)
220	27.43	37.20	68.58	H-S	(7 1)
230	27.43	32.82	68.58	H-S	(7 1)
240	27.43	27.45	68.58	H-S	(1 7)
250	27.43	21.24	59.29	H-S	(1 7)
260	27.43	14.86	49.72	ND	(1)
270	27.43	13.80	48.13	ND	(1)
280	27.43	14.86	49.72	ND	(1)
290	27.43	21.21	59.24	H-S	(1 7)
300	27.43	27.41	68.55	H-S	(43 37)
310	27.43	32.76	68.58	H-S	(7 1)
320	27.43	37.12	68.58	H-S	(7 1)
330	27.43	28.92	68.58	H-S	(37)
340	27.43	29.71	68.58	H-S	(37)
350	27.43	29.61	68.58	H-S	(37)
360	27.43	28.60	68.58	H-S	(37)

Stack number: 40 Name: 70ST2

Structure producing the greatest GEP stack height within 5L: (1)
Height: 27.43 Width: 29.38 GEP: 68.58

Direction Specific Building Downwash

Degree Structure	Height	Width	GEP	Method	Dominant
10	27.43	29.57	68.58	H-S	(37)
20	27.43	29.65	68.58	H-S	(37)
30	27.43	28.82	68.58	H-S	(37)

40	27.43	37.20	68.58	H-S	(7 1)
50	27.43	32.78	68.58	H-S	(43 37)
60	27.43	27.45	68.58	H-S	(1 7)
70	27.43	21.06	59.03	H-S	(37 43)
80	27.43	14.48	49.15	ND	(37)
90	27.43	13.30	47.38	ND	(37)
100	27.43	14.68	49.45	ND	(37)
110	27.43	21.18	59.21	H-S	(37 43)
120	27.43	27.41	68.55	H-S	(37 43)
130	27.43	32.81	68.58	H-S	(43 37)
140	27.43	37.21	68.58	H-S	(43 37)
150	27.43	28.92	68.58	H-S	(37)
160	27.43	29.71	68.58	H-S	(37)
170	27.43	29.61	68.58	H-S	(37)
180	27.43	28.60	68.58	H-S	(37)
190	27.43	29.57	68.58	H-S	(37)
200	27.43	29.65	68.58	H-S	(37)
210	27.43	28.82	68.58	H-S	(37)
220	27.43	37.20	68.58	H-S	(7 1)
230	27.43	32.78	68.58	H-S	(43 37)
240	27.43	27.45	68.58	H-S	(1 7)
250	27.43	21.06	59.03	H-S	(37 43)
260	27.43	14.48	49.15	ND	(37)
270	27.43	13.30	47.38	ND	(37)
280	27.43	14.68	49.45	ND	(37)
290	27.43	21.18	59.21	H-S	(37 43)
300	27.43	27.41	68.55	H-S	(43 37)
310	27.43	32.81	68.58	H-S	(43 37)
320	27.43	37.21	68.58	H-S	(43 37)
330	27.43	28.92	68.58	H-S	(37)
340	27.43	29.71	68.58	H-S	(37)
350	27.43	29.61	68.58	H-S	(37)
360	27.43	28.60	68.58	H-S	(37)

Stack number: 41 Name: 70ST3

Structure producing the greatest GEP stack height within 5L: (97)
Height: 27.43 Width: 28.46 GEP: 68.58

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	27.43	29.55	68.58	H-S	(97)
20	27.43	29.61	68.58	H-S	(97)
30	27.43	28.77	68.58	H-S	(97)
40	27.43	37.02	68.58	H-S	(103 97)
50	27.43	32.58	68.58	H-S	(103 97)
60	27.43	51.18	68.58	H-S	(97 103 133)
70	27.43	20.90	58.78	H-S	(97 103)
80	27.43	14.50	49.18	ND	(97)
90	27.43	13.10	47.08	ND	(97)
100	27.43	14.40	49.03	ND	(97)
110	27.43	21.09	59.06	H-S	(97 103)
120	27.43	51.60	68.58	H-S	(133 97 139)
130	27.43	32.71	68.58	H-S	(139 133)

140	27.43	37.15	68.58	H-S	(103 97)
150	27.43	28.87	68.58	H-S	(97)
160	27.43	29.68	68.58	H-S	(97)
170	27.43	29.59	68.58	H-S	(97)
180	27.43	28.60	68.58	H-S	(97)
190	27.43	29.55	68.58	H-S	(97)
200	27.43	29.61	68.58	H-S	(97)
210	27.43	28.77	68.58	H-S	(97)
220	27.43	37.02	68.58	H-S	(103 97)
230	27.43	32.58	68.58	H-S	(103 97)
240	27.43	51.18	68.58	H-S	(97 103
133)					
250	27.43	20.90	58.78	H-S	(97 103)
260	27.43	14.50	49.18	ND	(97)
270	27.43	13.10	47.08	ND	(97)
280	27.43	14.40	49.03	ND	(97)
290	27.43	21.09	59.06	H-S	(97 103)
300	27.43	51.60	68.58	H-S	(133 97
139)					
310	27.43	32.71	68.58	H-S	(139 133)
320	27.43	37.15	68.58	H-S	(103 97)
330	27.43	28.87	68.58	H-S	(97)
340	27.43	29.68	68.58	H-S	(97)
350	27.43	29.59	68.58	H-S	(97)
360	27.43	28.60	68.58	H-S	(97)

Stack number: 42 Name: 70ST4

Structure producing the greatest GEP stack height within 5L: (97)
Height: 27.43 Width: 29.21 GEP: 68.58

Direction Specific Building Downwash

Degree	Height	Width	GEP	Method	Dominant Structure
10	27.43	29.55	68.58	H-S	(97)
20	27.43	29.61	68.58	H-S	(97)
30	27.43	28.77	68.58	H-S	(97)
40	27.43	37.02	68.58	H-S	(103 97)
50	27.43	32.58	68.58	H-S	(103 97)
60	27.43	51.18	68.58	H-S	(97 103
133)					
70	27.43	21.16	59.17	H-S	(133 139)
80	27.43	14.36	48.98	ND	(133)
90	27.43	13.10	47.08	ND	(133)
100	27.43	14.36	48.98	ND	(133)
110	27.43	20.97	58.88	H-S	(133 139)
120	27.43	51.60	68.58	H-S	(133 97
139)					
130	27.43	32.71	68.58	H-S	(139 133)
140	27.43	37.17	68.58	H-S	(139 133)
150	27.43	28.90	68.58	H-S	(133)
160	27.43	29.68	68.58	H-S	(97)
170	27.43	29.59	68.58	H-S	(97)
180	27.43	28.60	68.58	H-S	(97)
190	27.43	29.55	68.58	H-S	(97)
200	27.43	29.61	68.58	H-S	(97)
210	27.43	28.77	68.58	H-S	(97)

220	27.43	37.02	68.58	H-S	(103 97)
230	27.43	32.58	68.58	H-S	(103 97)
240	27.43	51.18	68.58	H-S	(97 103 133)
250	27.43	21.16	59.17	H-S	(133 139)
260	27.43	14.36	48.98	ND	(133)
270	27.43	13.10	47.08	ND	(133)
280	27.43	14.36	48.98	ND	(133)
290	27.43	20.97	58.88	H-S	(133 139)
300	27.43	51.60	68.58	H-S	(133 97 139)
310	27.43	32.71	68.58	H-S	(139 133)
320	27.43	37.17	68.58	H-S	(139 133)
330	27.43	28.90	68.58	H-S	(133)
340	27.43	29.68	68.58	H-S	(97)
350	27.43	29.59	68.58	H-S	(97)
360	27.43	28.60	68.58	H-S	(97)

****

Run ended on: 1/24/2000 at 9:42:38
****

Notes:
1) A structure refers to a single tier,combined tiers, or groups of both.
Wherever combined tiers or groups of tiers apply, BREEZE WAKE/BPIP lists
the tiers that comprise the structure.
2) L is the lesser of the height or maximumprojected width (width) of a structure.
3) GEP is an acronym for Good Engineering Practice.
4) The greatest GEP stack height within 5L is the greatest GEP stack height
calculated for the structure within 5L of a stack in any direction.
Calculations are made at 1/4 degree increments from 0 to 359.75 degrees.
5) If the direction-specific heights and widths are set to zero, then the
stack is assumed to be unaffected by building downwash in that direction.
6) The dominant structure is the structure producing the greatest GEP stack
height in a specific direction.
7) These are the wake-effect calculation methods:
a) Schulman and Scire (S-S).
Applies if the stack height is less than the dominant structure height (Hb) plus half the lesser of the dominant structure height
or width (L). The dominant structure is used to define the direction-specific height and width.
ISC2 performs an additional check using the gradual plume rise due to momentum alone at a distance
of two structure heights downwind.
If the plume height given by the sum of the physical stack height and
momentum rise is greater than the structure height plus two times
the lesser of the structure height or width (Hb + 2L), then the plume
is assumed to be unaffected by the building wake. Otherwise,

the
plume is affected by the building wake.

b) Huber and Snyder (H-S).
Applies if the stack height is less than the dominant structure height (Hb) plus 1.5 times the lesser of the dominant structure height or width (Hb + 1.5L). The structure producing the greatest GEP stack height is used to define the direction-specific height and width.
ISC2 performs an additional check using the gradual plume rise due to momentum alone at a distance of two structure heights downwind.
If the plume height given by the sum of the physical stack height and momentum rise is greater than the structure height plus 1.5 times the lesser of the structure height or width (Hb + 1.5L), the plume is assumed to be unaffected by the building wake. Otherwise, the plume is affected by the building wake.

c) No Downwash (ND).
Applies if the stack height is greater than the dominant structure height plus 1.5 times the lesser of the dominant structure height and width (Hb + 1.5L).

8) In some cases, though the direction specific downwash table indicates ND for certain directions, the .WAK file might contain building heights and widths for those directions. This inconsistency in the BPIP program does not affect model results as ISC2 is capable of distinguishing between the different downwash regimes and correctly identifying directions where no downwash occurs.

9) In the direction specific building downwash table, dominant structure refers to tiers and not buildings. Though buildings are numbered consecutively, the first tier in each building is numbered in increments of six, because each building may have up to six tiers. For example, if building 1 has five tiers, building 2, three tiers and building 3, one tier, their tier numbers are as follows: Building 1 has tiers numbered 1 through 5, building 2 has tiers numbered 7, 8 and 9 and building 3 has tier numbered 13.

APPENDIX G
AAQIA MODELING RESULTS

Table G-1
Air Dispersion Modeling Predicted Impacts for the Project
General Electric Turbines/HRSGs

Year	Load	NO_x	PM_{10}		CO	
		Annual[a] ($\mu g/m^3$)	Annual[a] ($\mu g/m^3$)	24 Hour[a] ($\mu g/m^3$)	1 Hour ($\mu g/m^3$)	8 Hour ($\mu g/m^3$)
1994	100[b]	2.19	3.62	21.69	186.97	27.99
	75			16.20	186.97	20.20
	50			19.79	186.97	20.34
1995	100[b]	1.97	3.25	20.70	479.69	23.07
	75			15.80	479.69	17.32
	50			19.55	479.69	17.74
1996	100[b]	2.37	3.95	23.41	85.98	26.48
	75			18.04	81.11	19.76
	50			21.85	81.11	20.34
1997	100[b]	2.11	3.48	32.28	441.00	34.72
	75			24.29	441.00	25.50
	50			29.19	441.00	25.76
1998	100[b]	1.98	3.26	22.50	100.07	34.25
	75			17.01	100.07	25.31
	50			20.34	100.07	26.11

[a]Underlined values indicate and exceedance of the PSD Class II Significant Impact Levels.

[b]100 percent load represents full load operation.

Table G-2
Air Dispersion Modeling Predicted Impacts for the Project
Westinghouse Turbines/HRSGs

Year	Load	NO_x	PM_{10}		CO	
		Annual[a] ($\mu g/m^3$)	Annual[a] ($\mu g/m^3$)	24 Hour[a] ($\mu g/m^3$)	1 Hour ($\mu g/m^3$)	8 Hour ($\mu g/m^3$)
1994	100[b]	2.22	3.29	19.76	186.97	28.25
	75			11.37	186.97	16.98
	50			11.65	186.97	16.90
1995	100[b]	1.99	2.96	18.93	479.69	23.10
	75			11.17	479.69	13.93
	50			11.45	479.69	13.94
1996	100[b]	2.39	3.59	21.36	85.64	26.72
	75			12.50	81.11	16.27
	50			13.04	81.11	16.36
1997	100[b]	2.13	3.16	29.50	441.00	35.12
	75			17.13	441.00	21.29
	50			17.52	441.00	21.23
1998	100[b]	2.00	2.97	20.66	100.07	34.44
	75			12.05	100.07	20.60
	50			12.25	100.07	20.78

[a]Underlined values indicate and exceedance of the PSD Class II Significant Impact Levels.

[b]100 percent load represents full load operation.

APPENDIX H
NAAQS PREDICTED IMPACTS

Table H-1
NAAQS Predicted Impacts for NO_x

Year	General Electric			Westinghouse		
	NO_x Annual Impact[a,b] ($\mu g/m^3$)	Location		NO_x Annual Impact[a,b] ($\mu g/m^3$)	Location	
		UTM-E (m)	UTM-N (m)		UTM-E (m)	UTM-N (m)
1994	61.53	327711.5	3691769	61.55	327711.5	3691769
1995	61.16	327711.5	3691769	61.18	327711.5	3691769
1996	61.40	327711.5	3691769	61.42	327711.5	3691769
1997	61.13	327711.5	3691769	61.16	327711.5	3691769
1998	61.16	327711.5	3691769	61.18	327711.5	3691769

[a]Annual impacts represent full load operation at the average annual temperature of 73° F.

[b]Impacts are the sum of the Project's impacts, inventory impacts, and a background value of 58 $\mu g/m^3$.

Table H-2
NAAQS Predicted Impacts for PM_{10} Annual Averaging Period

Year	General Electric			Westinghouse		
	PM_{10} Annual Impact[a,b] ($\mu g/m^3$)	Location		PM_{10} Annual Impact[a,b] ($\mu g/m^3$)	Location	
		UTM-E (m)	UTM-N (m)		UTM-E (m)	UTM-N (m)
1994	25.96	327711.5	3691769	25.62	327711.5	3691769
1995	25.27	327711.5	3691769	24.98	327711.5	3691769
1996	25.69	327711.5	3691769	25.32	327711.5	3691769
1997	25.28	327711.5	3691769	24.96	327711.5	3691769
1998	25.24	327711.5	3691769	24.95	327711.5	3691769

[a]Annual impacts represent full load operation at the average annual temperature of 73° F.

[b]Impacts are the sum of the Project's impacts, inventory impacts, and a background value of 20 $\mu g/m^3$.

Table H-3
NAAQS Predicted Impacts for PM_{10} 24 hour Averaging Period
General Electric

Load	PM_{10} 24 hour Impact[a,b] ($\mu g/m^3$)	UTM East (m)	UTM North (m)
100[c]	94.76	327711.5	3691769
75	89.90	327711.5	3691769
50	92.92	327711.5	3691769

[a]Impacts are the sum of the project impacts, inventory impacts, and a background value of 70 $\mu g/m^3$.

[b]High sixth high values over the 5 year period.

[c]100 percent load represents full load operation.

Table H-4
NAAQS Predicted Impacts for PM_{10} 24 hour Averaging Period
Westinghouse

Load	PM_{10} 24 hour Impact[a,b] ($\mu g/m^3$)	UTM East (m)	UTM North (m)
100[c]	93.00	327711.5	3691769
85	86.69	327711.5	3691769
70	86.69	327711.5	3691769

[a]Impacts are the sum of the project impacts, inventory impacts, and a background value of 70 $\mu g/m^3$.

[b]High sixth high values over the 5 year period.

[c]100 percent load represents full load operation.

APPENDIX I
INCREMENT MODELING RESULTS

Table I-1
Increment Air Dispersion Modeling Impacts for NO_x

Year	General Electric			Westinghouse		
	NO_x Annual Impact* ($\mu g/m^3$)	Location		NO_x Annual Impact* ($\mu g/m^3$)	Location	
		UTM-E (m)	UTM-N (m)		UTM-E (m)	UTM-N (m)
1994	3.53	327711.5	3691769	3.55	327711.5	3691769
1995	3.16	327711.5	3691769	3.18	327711.5	3691769
1996	3.40	327711.5	3691769	3.42	327711.5	3691769
1997	3.13	327711.5	3691769	3.16	327711.5	3691769
1998	3.16	327711.5	3691769	3.18	327711.5	3691769

*Annual impacts represent full load operation at the average annual temperature of 73° F.

Table I-2
Increment Air Dispersion Modeling Impacts for PM_{10} Annual Averaging Period

Year	General Electric			Westinghouse		
	PM_{10} Annual Impact* ($\mu g/m^3$)	Location		PM_{10} Annual Impact* ($\mu g/m^3$)	Location	
		UTM-E (m)	UTM-N (m)		UTM-E (m)	UTM-N (m)
1994	5.96	327711.5	3691769	5.62	327711.5	3691769
1995	5.27	327711.5	3691769	4.98	327711.5	3691769
1996	5.69	327711.5	3691769	5.32	327711.5	3691769
1997	5.28	327711.5	3691769	4.96	327711.5	3691769
1998	5.24	327711.5	3691769	4.95	327711.5	3691769

*Annual impacts represent full load operation at the average annual temperature of 73° F.

Table I-3
Increment Air Dispersion Modeling Impacts for PM_{10} 24 hour Averaging Period
General Electric

Load	PM_{10} 24 hour Impact[a] ($\mu g/m^3$)	UTM East (m)	UTM North (m)
100[b]	24.76	327711.5	3691769
75	19.90	327711.5	3691769
50	22.92	327711.5	3691769

[a]High sixth high values over the 5 year period.

[b]100 percent load represents full load operation.

Table I-4
Increment Air Dispersion Modeling Impacts for PM_{10} 24 hour Averaging Period
Westinghouse

Load	PM_{10} 24 hour Impact[a] ($\mu g/m^3$)	UTM East (m)	UTM North (m)
100[b]	23.00	327711.5	3691769
85	16.69	327711.5	3691769
70	16.69	327711.5	3691769

[a]High sixth high values over the 5 year period.

[b]100 percent load represents full load operation.

APPENDIX J
ADDITIONAL IMPACT ANALYSIS

VISCREEN Level-1 Output

Visual Effects Screening Analysis for
Source: PaloVerde GE machines
Class I Area: Big Horn Mountain

*** Level-1 Screening ***

Input Emissions for

Particulates	15.32	G	/S
NOx (as NO2)	11.20	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04	ppm
Background Visual Range:	110.00	km
Source-Observer Distance:	32.13	km
Min. Source-Class I Distance:	32.13	km
Max. Source-Class I Distance:	47.83	km
Plume-Source-Observer Angle:	11.25	degrees

Stability: 6
Wind Speed: 1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	148.	47.8	21.	2.00	7.732*	.05	.126*
SKY	140.	148.	47.8	21.	2.00	2.003*	.05	-.077*
TERRAIN	10.	84.	32.1	84.	2.00	12.295*	.05	.107*
TERRAIN	140.	84.	32.1	84.	2.00	1.286	.05	.027

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	23.635*	.05	.400*
SKY	140.	0.	1.0	168.	2.00	5.949*	.05	-.206*
TERRAIN	10.	0.	1.0	168.	2.00	26.571*	.05	.302*
TERRAIN	140.	0.	1.0	168.	2.00	9.514*	.05	.285*

Visual Effects Screening Analysis for
Source: PaloVerde GE machines
Class I Area: Eagletail Mountain

*** Level-1 Screening ***

Input Emissions for

Particulates	15.32	G	/S
NOx (as NO2)	11.20	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	110.00 km
Source-Observer Distance:	33.19 km
Min. Source-Class I Distance:	33.19 km
Max. Source-Class I Distance:	61.70 km
Plume-Source-Observer Angle:	11.25 degrees

Stability: 6
Wind Speed: 1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	145.	47.3	24.	2.00	7.334*	.05	.121*
SKY	140.	145.	47.3	24.	2.00	1.958	.05	-.074*
TERRAIN	10.	84.	33.2	84.	2.00	11.864*	.05	.104*
TERRAIN	140.	84.	33.2	84.	2.00	1.246	.05	.027

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	23.075*	.05	.385*
SKY	140.	0.	1.0	168.	2.00	5.764*	.05	-.199*
TERRAIN	10.	0.	1.0	168.	2.00	25.645*	.05	.291*
TERRAIN	140.	0.	1.0	168.	2.00	9.199*	.05	.275*

Visual Effects Screening Analysis for
Source: PaloVerde GE machines
Class I Area: Gila Bend Indian Reserva

*** Level-1 Screening ***

Input Emissions for

Particulates	15.32	G	/S
NOx (as NO2)	11.20	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04	ppm
Background Visual Range:	110.00	km
Source-Observer Distance:	35.32	km
Min. Source-Class I Distance:	35.32	km
Max. Source-Class I Distance:	42.76	km
Plume-Source-Observer Angle:	11.25	degrees

Stability: 6
Wind Speed: 1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	128.	42.8	40.	2.00	6.138*	.05	.106*
SKY	140.	128.	42.8	40.	2.00	1.887	.05	-.065*
TERRAIN	10.	84.	35.3	84.	2.00	11.069*	.05	.099*
TERRAIN	140.	84.	35.3	84.	2.00	1.174	.05	.026

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	21.983*	.05	.357*
SKY	140.	0.	1.0	168.	2.00	5.413*	.05	-.184*
TERRAIN	10.	0.	1.0	168.	2.00	23.893*	.05	.269*
TERRAIN	140.	0.	1.0	168.	2.00	8.602*	.05	.256*

Visual Effects Screening Analysis for
Source: PaloVerde GE machines
Class I Area: Gila River Indian Reserv

*** Level-1 Screening ***

Input Emissions for

Particulates	15.32	G	/S
NOx (as NO2)	11.20	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04	ppm
Background Visual Range:	110.00	km
Source-Observer Distance:	53.19	km
Min. Source-Class I Distance:	53.19	km
Max. Source-Class I Distance:	132.33	km
Plume-Source-Observer Angle:	11.25	degrees

Stability: 6
Wind Speed: 1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	140.	71.1	29.	2.00	3.420*	.05	.053*
SKY	140.	140.	71.1	29.	2.00	.803	.05	-.032
TERRAIN	10.	84.	53.2	84.	2.00	5.611*	.05	.055*
TERRAIN	140.	84.	53.2	84.	2.00	.636	.05	.017

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	169.	2.64	14.232*	.05	.190*
SKY	140.	0.	1.0	169.	2.00	3.207*	.05	-.098*
TERRAIN	10.	0.	1.0	169.	2.49	13.415*	.05	.141*
TERRAIN	140.	0.	1.0	169.	2.00	4.947*	.05	.137*

Visual Effects Screening Analysis for
Source: PaloVerde GE machines
Class I Area: Hummingbird Springs

*** Level-1 Screening ***

Input Emissions for

Particulates	15.32	G	/S
NOx (as NO2)	11.20	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	110.00 km
Source-Observer Distance:	32.13 km
Min. Source-Class I Distance:	32.13 km
Max. Source-Class I Distance:	49.78 km
Plume-Source-Observer Angle:	11.25 degrees

Stability: 6
Wind Speed: 1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	150.	49.8	19.	2.00	7.708*	.05	.123*
SKY	140.	150.	49.8	19.	2.00	1.922	.05	-.075*
TERRAIN	10.	84.	32.1	84.	2.00	12.295*	.05	.107*
TERRAIN	140.	84.	32.1	84.	2.00	1.286	.05	.027

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	23.635*	.05	.400*
SKY	140.	0.	1.0	168.	2.00	5.949*	.05	-.206*
TERRAIN	10.	0.	1.0	168.	2.00	26.571*	.05	.302*
TERRAIN	140.	0.	1.0	168.	2.00	9.514*	.05	.285*

Visual Effects Screening Analysis for
Source: PaloVerde GE machines
Class I Area: North Maricopa Mountains

*** Level-1 Screening ***

Input Emissions for

Particulates	15.32	G	/S
NOx (as NO2)	11.20	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04	ppm
Background Visual Range:	110.00	km
Source-Observer Distance:	32.76	km
Min. Source-Class I Distance:	32.76	km
Max. Source-Class I Distance:	51.49	km
Plume-Source-Observer Angle:	11.25	degrees

Stability: 6
Wind Speed: 1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	145.	46.7	24.	2.00	7.479*	.05	.124*
SKY	140.	145.	46.7	24.	2.00	2.009*	.05	-.076*
TERRAIN	10.	84.	32.8	84.	2.00	12.036*	.05	.105*
TERRAIN	140.	84.	32.8	84.	2.00	1.262	.05	.027

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	23.301*	.05	.391*
SKY	140.	0.	1.0	168.	2.00	5.838*	.05	-.202*
TERRAIN	10.	0.	1.0	168.	2.00	26.016*	.05	.295*
TERRAIN	140.	0.	1.0	168.	2.00	9.326*	.05	.279*

Visual Effects Screening Analysis for
Source: PaloVerde GE machines
Class I Area: Signal Mountain

*** Level-1 Screening ***

Input Emissions for

Particulates	15.32	G	/S
NOx (as NO2)	11.20	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	110.00 km
Source-Observer Distance:	14.89 km
Min. Source-Class I Distance:	14.89 km
Max. Source-Class I Distance:	25.10 km
Plume-Source-Observer Angle:	11.25 degrees

Stability: 6
Wind Speed: 1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	153.	25.1	15.	2.00	14.742*	.05	.262*
SKY	140.	153.	25.1	15.	2.00	4.678*	.05	-.160*
TERRAIN	10.	84.	14.9	84.	2.00	25.729*	.05	.178*
TERRAIN	140.	84.	14.9	84.	2.00	2.676*	.05	.038

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	1.	1.0	168.	2.00	35.114*	.05	.732*
SKY	140.	1.	1.0	168.	2.00	10.521*	.05	-.377*
TERRAIN	10.	1.	1.0	168.	2.00	49.757*	.05	.563*
TERRAIN	140.	1.	1.0	168.	2.00	17.324*	.05	.498*

Visual Effects Screening Analysis for
Source: PaloVerde GE machines
Class I Area: Woolsey Peak

*** Level-1 Screening ***

Input Emissions for

Particulates	15.32	G	/S
NOx (as NO2)	11.20	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	110.00 km
Source-Observer Distance:	15.32 km
Min. Source-Class I Distance:	15.32 km
Max. Source-Class I Distance:	32.76 km
Plume-Source-Observer Angle:	11.25 degrees
Stability: 6	
Wind Speed: 1.00 m/s	

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	159.	32.8	10.	2.00	16.567*	.05	.276*
SKY	140.	159.	32.8	10.	2.00	4.406*	.05	-.169*
TERRAIN	10.	159.	32.8	10.	2.00	27.855*	.05	.299*
TERRAIN	140.	159.	32.8	10.	2.00	6.410*	.05	.177*

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	1.	1.0	168.	2.00	34.747*	.05	.721*
SKY	140.	1.	1.0	168.	2.00	10.346*	.05	-.371*
TERRAIN	10.	1.	1.0	168.	2.00	48.883*	.05	.554*
TERRAIN	140.	1.	1.0	168.	2.00	17.030*	.05	.492*

Visual Effects Screening Analysis for
Source: PaloVerde WES machines
Class I Area: Big Horn Mountain

*** Level-1 Screening ***

Input Emissions for

Particulates	14.52	G	/S
NOx (as NO2)	11.88	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04	ppm
Background Visual Range:	110.00	km
Source-Observer Distance:	32.13	km
Min. Source-Class I Distance:	32.13	km
Max. Source-Class I Distance:	47.83	km
Plume-Source-Observer Angle:	11.25	degrees

Stability: 6
Wind Speed: 1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

Backgrnd	Theta	Azi	Distance	Alpha	Delta E Crit	Delta E Plume	Contrast Crit	Contrast Plume
SKY	10.	148.	47.8	21.	2.00	7.422*	.05	.119*
SKY	140.	148.	47.8	21.	2.00	1.966	.05	-.074*
TERRAIN	10.	84.	32.1	84.	2.00	11.762*	.05	.102*
TERRAIN	140.	84.	32.1	84.	2.00	1.222	.05	.026

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

Backgrnd	Theta	Azi	Distance	Alpha	Delta E Crit	Delta E Plume	Contrast Crit	Contrast Plume
SKY	10.	0.	1.0	168.	2.00	23.353*	.05	.394*
SKY	140.	0.	1.0	168.	2.00	5.856*	.05	-.203*
TERRAIN	10.	0.	1.0	168.	2.00	26.337*	.05	.299*
TERRAIN	140.	0.	1.0	168.	2.00	9.357*	.05	.280*

Visual Effects Screening Analysis for
Source: PaloVerde WES machines
Class I Area: Eagletail Mountain

*** Level-1 Screening ***

Input Emissions for

Particulates	14.52	G	/S
NOx (as NO2)	11.88	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	110.00 km
Source-Observer Distance:	33.19 km
Min. Source-Class I Distance:	33.19 km
Max. Source-Class I Distance:	61.70 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	6
Wind Speed:	1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	145.	47.3	24.	2.00	7.034*	.05	.114*
SKY	140.	145.	47.3	24.	2.00	1.927	.05	-.071*
TERRAIN	10.	84.	33.2	84.	2.00	11.348*	.05	.099*
TERRAIN	140.	84.	33.2	84.	2.00	1.184	.05	.026

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	22.800*	.05	.379*
SKY	140.	0.	1.0	168.	2.00	5.675*	.05	-.196*
TERRAIN	10.	0.	1.0	168.	2.00	25.416*	.05	.288*
TERRAIN	140.	0.	1.0	168.	2.00	9.048*	.05	.270*

Visual Effects Screening Analysis for
Source: PaloVerde WES machines
Class I Area: Gila Bend Indian Reserva

*** Level-1 Screening ***

Input Emissions for

Particulates	14.52	G	/S
NOx (as NO2)	11.88	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04	ppm
Background Visual Range:	110.00	km
Source-Observer Distance:	35.32	km
Min. Source-Class I Distance:	35.32	km
Max. Source-Class I Distance:	42.76	km
Plume-Source-Observer Angle:	11.25	degrees

Stability: 6
Wind Speed: 1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	128.	42.8	40.	2.00	5.866*	.05	.099*
SKY	140.	128.	42.8	40.	2.00	1.872	.05	-.062*
TERRAIN	10.	84.	35.3	84.	2.00	10.581*	.05	.094*
TERRAIN	140.	84.	35.3	84.	2.00	1.115	.05	.025

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	21.719*	.05	.352*
SKY	140.	0.	1.0	168.	2.00	5.330*	.05	-.182*
TERRAIN	10.	0.	1.0	168.	2.00	23.674*	.05	.266*
TERRAIN	140.	0.	1.0	168.	2.00	8.462*	.05	.251*

Visual Effects Screening Analysis for
Source: PaloVerde WES machines
Class I Area: Gila River Indian Reserv

*** Level-1 Screening ***

Input Emissions for

Particulates	14.52	G	/S
NOx (as NO2)	11.88	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04	ppm
Background Visual Range:	110.00	km
Source-Observer Distance:	53.19	km
Min. Source-Class I Distance:	53.19	km
Max. Source-Class I Distance:	132.33	km
Plume-Source-Observer Angle:	11.25	degrees

Stability: 6
Wind Speed: 1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

Backgrnd	Theta	Azi	Distance	Alpha	Delta E Crit	Delta E Plume	Contrast Crit	Contrast Plume
SKY	10.	140.	71.1	29.	2.00	3.270*	.05	.050
SKY	140.	140.	71.1	29.	2.00	.782	.05	-.031
TERRAIN	10.	84.	53.2	84.	2.00	5.340*	.05	.052*
TERRAIN	140.	84.	53.2	84.	2.00	.603	.05	.016

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

Backgrnd	Theta	Azi	Distance	Alpha	Delta E Crit	Delta E Plume	Contrast Crit	Contrast Plume
SKY	10.	0.	1.0	169.	2.64	14.048*	.05	.187*
SKY	140.	0.	1.0	169.	2.00	3.162*	.05	-.097*
TERRAIN	10.	0.	1.0	169.	2.49	13.270*	.05	.140*
TERRAIN	140.	0.	1.0	169.	2.00	4.873*	.05	.135*

Visual Effects Screening Analysis for
Source: PaloVerde WES machines
Class I Area: Hummingbird Springs

*** Level-1 Screening ***

Input Emissions for

Particulates	14.52	G	/S
NOx (as NO2)	11.88	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04	ppm
Background Visual Range:	110.00	km
Source-Observer Distance:	32.13	km
Min. Source-Class I Distance:	32.13	km
Max. Source-Class I Distance:	49.78	km
Plume-Source-Observer Angle:	11.25	degrees

Stability: 6
Wind Speed: 1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	150.	49.8	19.	2.00	7.401*	.05	.116*
SKY	140.	150.	49.8	19.	2.00	1.881	.05	-.073*
TERRAIN	10.	84.	32.1	84.	2.00	11.762*	.05	.102*
TERRAIN	140.	84.	32.1	84.	2.00	1.222	.05	.026

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	23.353*	.05	.394*
SKY	140.	0.	1.0	168.	2.00	5.856*	.05	-.203*
TERRAIN	10.	0.	1.0	168.	2.00	26.337*	.05	.299*
TERRAIN	140.	0.	1.0	168.	2.00	9.357*	.05	.280*

Visual Effects Screening Analysis for
Source: PaloVerde WES machines
Class I Area: North Maricopa Mountains

*** Level-1 Screening ***

Input Emissions for

Particulates	14.52	G	/S
NOx (as NO2)	11.88	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	110.00 km
Source-Observer Distance:	32.76 km
Min. Source-Class I Distance:	32.76 km
Max. Source-Class I Distance:	51.49 km
Plume-Source-Observer Angle:	11.25 degrees

Stability: 6
Wind Speed: 1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	145.	46.7	24.	2.00	7.174*	.05	.117*
SKY	140.	145.	46.7	24.	2.00	1.977	.05	-.073*
TERRAIN	10.	84.	32.8	84.	2.00	11.513*	.05	.100*
TERRAIN	140.	84.	32.8	84.	2.00	1.199	.05	.026

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	23.023*	.05	.385*
SKY	140.	0.	1.0	168.	2.00	5.748*	.05	-.199*
TERRAIN	10.	0.	1.0	168.	2.00	25.785*	.05	.292*
TERRAIN	140.	0.	1.0	168.	2.00	9.172*	.05	.274*

Visual Effects Screening Analysis for
Source: PaloVerde WES machines
Class I Area: Signal Mountain

*** Level-1 Screening ***

Input Emissions for

Particulates	14.52	G	/S
NOx (as NO2)	11.88	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04	ppm
Background Visual Range:	110.00	km
Source-Observer Distance:	14.89	km
Min. Source-Class I Distance:	14.89	km
Max. Source-Class I Distance:	25.10	km
Plume-Source-Observer Angle:	11.25	degrees

Stability: 6
Wind Speed: 1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	153.	25.1	15.	2.00	14.209*	.05	.248*
SKY	140.	153.	25.1	15.	2.00	4.641*	.05	-.155*
TERRAIN	10.	84.	14.9	84.	2.00	24.801*	.05	.170*
TERRAIN	140.	84.	14.9	84.	2.00	2.541*	.05	.036

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	1.	1.0	168.	2.00	34.653*	.05	.719*
SKY	140.	1.	1.0	168.	2.00	10.352*	.05	-.372*
TERRAIN	10.	1.	1.0	168.	2.00	49.426*	.05	.558*
TERRAIN	140.	1.	1.0	168.	2.00	16.996*	.05	.487*

Visual Effects Screening Analysis for
Source: PaloVerde WES machines
Class I Area: Woolsey Peak

*** Level-1 Screening ***

Input Emissions for

Particulates	14.52	G	/S
NOx (as NO2)	11.88	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	110.00 km
Source-Observer Distance:	15.32 km
Min. Source-Class I Distance:	15.32 km
Max. Source-Class I Distance:	32.76 km
Plume-Source-Observer Angle:	11.25 degrees

Stability: 6
Wind Speed: 1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	159.	32.8	10.	2.00	16.059*	.05	.262*
SKY	140.	159.	32.8	10.	2.00	4.321*	.05	-.164*
TERRAIN	10.	159.	32.8	10.	2.00	27.078*	.05	.291*
TERRAIN	140.	159.	32.8	10.	2.00	6.162*	.05	.170*

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	1.	1.0	168.	2.00	34.294*	.05	.709*
SKY	140.	1.	1.0	168.	2.00	10.180*	.05	-.366*
TERRAIN	10.	1.	1.0	168.	2.00	48.555*	.05	.550*
TERRAIN	140.	1.	1.0	168.	2.00	16.709*	.05	.481*

VISCREEN Level-2 Output

Visual Effects Screening Analysis for
Source: PaloVerde GE machines
Class I Area: Big Horn Mountain

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	15.32	G	/S
NOx (as NO2)	11.20	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	9
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.09 ppm
Background Visual Range:	102.90 km
Source-Observer Distance:	32.13 km
Min. Source-Class I Distance:	32.13 km
Max. Source-Class I Distance:	47.83 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	3
Wind Speed:	5.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	148.	47.8	21.	9.04	.020	.16	.000
SKY	140.	148.	47.8	21.	3.75	.009	.16	-.000
TERRAIN	10.	84.	32.1	84.	10.61	.013	.27	.000
TERRAIN	140.	84.	32.1	84.	4.62	.003	.27	.000

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	.498	.05	-.002
SKY	140.	0.	1.0	168.	2.00	.223	.05	-.007
TERRAIN	10.	0.	1.0	168.	2.00	.557	.05	.007
TERRAIN	140.	0.	1.0	168.	2.00	.208	.05	.006

Visual Effects Screening Analysis for
Source: PaloVerde GE machines
Class I Area: Eagletail Mountain

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	15.32	G	/S
NOx (as NO2)	11.20	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	9
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.09 ppm
Background Visual Range:	102.90 km
Source-Observer Distance:	33.19 km
Min. Source-Class I Distance:	33.19 km
Max. Source-Class I Distance:	61.70 km
Plume-Source-Observer Angle:	11.25 degrees
Stability: 4	
Wind Speed: 5.00 m/s	

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	140.	44.4	29.	2.02	.130	.05	-.000
SKY	140.	140.	44.4	29.	2.00	.062	.05	-.001
TERRAIN	10.	84.	33.2	84.	2.49	.071	.06	.001
TERRAIN	140.	84.	33.2	84.	2.00	.017	.06	.000

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	.886	.05	-.003
SKY	140.	0.	1.0	168.	2.00	.398	.05	-.014
TERRAIN	10.	0.	1.0	168.	2.00	1.026	.05	.014
TERRAIN	140.	0.	1.0	168.	2.00	.376	.05	.011

Visual Effects Screening Analysis for
Source: PaloVerde GE machines
Class I Area: Gila Bend Indian Reserva

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	15.32	G	/S
NOx (as NO2)	11.20	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	9
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.09	ppm
Background Visual Range:	102.90	km
Source-Observer Distance:	35.32	km
Min. Source-Class I Distance:	35.32	km
Max. Source-Class I Distance:	42.76	km
Plume-Source-Observer Angle:	11.25	degrees

Stability: 5
Wind Speed: 2.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	128.	42.8	40.	2.00	.599	.05	-.001
SKY	140.	128.	42.8	40.	2.00	.289	.05	-.005
TERRAIN	10.	84.	35.3	84.	2.00	.322	.05	.003
TERRAIN	140.	84.	35.3	84.	2.00	.081	.05	.001

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	1.983	.05	-.004
SKY	140.	0.	1.0	168.	2.00	.969	.05	-.039
TERRAIN	10.	0.	1.0	168.	2.00	3.062*	.05	.041
TERRAIN	140.	0.	1.0	168.	2.00	.954	.05	.032

Visual Effects Screening Analysis for
Source: PaloVerde GE machines
Class I Area: Gila River Indian Res.

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	15.32	G	/S
NOx (as NO2)	11.20	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	9
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.09 ppm
Background Visual Range:	102.90 km
Source-Observer Distance:	53.19 km
Min. Source-Class I Distance:	53.19 km
Max. Source-Class I Distance:	132.33 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	5
Wind Speed:	4.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	120.	61.3	49.	2.00	.190	.05	-.000
SKY	140.	120.	61.3	49.	2.00	.090	.05	-.002
TERRAIN	10.	84.	53.2	84.	2.00	.090	.05	.001
TERRAIN	140.	84.	53.2	84.	2.00	.026	.05	.000

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	169.	2.00	.440	.05	-.002
SKY	140.	0.	1.0	169.	2.00	.279	.05	-.012
TERRAIN	10.	0.	1.0	169.	2.00	.874	.05	.012
TERRAIN	140.	0.	1.0	169.	2.00	.288	.05	.011

Visual Effects Screening Analysis for
Source: PaloVerde GE machines
Class I Area: Hummingbird Springs

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	15.32	G	/S
NOx (as NO2)	11.20	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	9
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.09 ppm
Background Visual Range:	102.90 km
Source-Observer Distance:	32.13 km
Min. Source-Class I Distance:	32.13 km
Max. Source-Class I Distance:	49.78 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	4
Wind Speed:	5.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	145.	45.8	24.	2.00	.134	.05	-.000
SKY	140.	145.	45.8	24.	2.00	.063	.05	-.001
TERRAIN	10.	84.	32.1	84.	2.50	.075	.06	.001
TERRAIN	140.	84.	32.1	84.	2.00	.018	.06	.000

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	.946	.05	-.003
SKY	140.	0.	1.0	168.	2.00	.424	.05	-.014
TERRAIN	10.	0.	1.0	168.	2.00	1.076	.05	.014
TERRAIN	140.	0.	1.0	168.	2.00	.398	.05	.011

Visual Effects Screening Analysis for
Source: PaloVerde GE Machines
Class I Area: North Maricopa Mountains

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	15.32	G	/S
NOx (as NO2)	11.20	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	9
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.09 ppm
Background Visual Range:	102.90 km
Source-Observer Distance:	32.76 km
Min. Source-Class I Distance:	32.76 km
Max. Source-Class I Distance:	51.49 km
Plume-Source-Observer Angle:	11.25 degrees
Stability: 5	
Wind Speed: 3.00 m/s	

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	140.	43.8	29.	2.00	.453	.05	-.001
SKY	140.	140.	43.8	29.	2.00	.215	.05	-.004
TERRAIN	10.	84.	32.8	84.	2.00	.238	.05	.002
TERRAIN	140.	84.	32.8	84.	2.00	.057	.05	.001

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	2.008*	.05	-.007
SKY	140.	0.	1.0	168.	2.00	.912	.05	-.033
TERRAIN	10.	0.	1.0	168.	2.00	2.433*	.05	.033
TERRAIN	140.	0.	1.0	168.	2.00	.869	.05	.026

Visual Effects Screening Analysis for
Source: PaloVerde GE machines
Class I Area: Signal Mountain

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	15.32	G	/S
NOx (as NO2)	11.20	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	9
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.09 ppm
Background Visual Range:	102.90 km
Source-Observer Distance:	14.89 km
Min. Source-Class I Distance:	14.89 km
Max. Source-Class I Distance:	25.10 km
Plume-Source-Observer Angle:	11.25 degrees

Stability: 6
Wind Speed: 3.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	153.	25.1	15.	2.00	2.065*	.05	-.004
SKY	140.	153.	25.1	15.	2.00	.995	.05	-.019
TERRAIN	10.	84.	14.9	84.	2.00	1.145	.05	.007
TERRAIN	140.	84.	14.9	84.	2.00	.165	.05	.001

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	1.	1.0	168.	2.00	6.830*	.05	-.008
SKY	140.	1.	1.0	168.	2.00	3.247*	.05	-.084*
TERRAIN	10.	1.	1.0	168.	2.00	8.420*	.05	.085*
TERRAIN	140.	1.	1.0	168.	2.00	2.768*	.05	.044

Visual Effects Screening Analysis for
Source: PaloVerde GE machines
Class I Area: Woolsey Peak

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	15.32	G	/S
NOx (as NO2)	11.20	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	9
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.09 ppm
Background Visual Range:	102.90 km
Source-Observer Distance:	15.32 km
Min. Source-Class I Distance:	15.32 km
Max. Source-Class I Distance:	32.76 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	5
Wind Speed:	2.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	155.	27.2	14.	2.00	1.668	.05	-.003
SKY	140.	155.	27.2	14.	2.00	.796	.05	-.016
TERRAIN	10.	159.	32.8	10.	2.00	1.592	.05	.017
TERRAIN	140.	159.	32.8	10.	2.00	.648	.05	.010

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	1.	1.0	168.	2.00	6.623*	.05	-.009
SKY	140.	1.	1.0	168.	2.00	3.134*	.05	-.081*
TERRAIN	10.	1.	1.0	168.	2.00	8.012*	.05	.082*
TERRAIN	140.	1.	1.0	168.	2.00	2.684*	.05	.044

Visual Effects Screening Analysis for
Source: PaloVerde WES machines
Class I Area: Big Horn Mountain

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	14.52	G	/S
NOx (as NO2)	11.88	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	9
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.09 ppm
Background Visual Range:	102.90 km
Source-Observer Distance:	32.13 km
Min. Source-Class I Distance:	32.13 km
Max. Source-Class I Distance:	47.83 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	3
Wind Speed:	5.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	148.	47.8	21.	9.04	.021	.16	.000
SKY	140.	148.	47.8	21.	3.75	.010	.16	-.000
TERRAIN	10.	84.	32.1	84.	10.61	.013	.27	.000
TERRAIN	140.	84.	32.1	84.	4.62	.003	.27	.000

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	.519	.05	-.002
SKY	140.	0.	1.0	168.	2.00	.231	.05	-.007
TERRAIN	10.	0.	1.0	168.	2.00	.547	.05	.007
TERRAIN	140.	0.	1.0	168.	2.00	.216	.05	.006

Visual Effects Screening Analysis for
Source: PaloVerde WES machines
Class I Area: Eagletail Mountain

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	14.52	G	/S
NOx (as NO2)	11.88	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	9
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.09 ppm
Background Visual Range:	102.90 km
Source-Observer Distance:	33.19 km
Min. Source-Class I Distance:	33.19 km
Max. Source-Class I Distance:	61.70 km
Plume-Source-Observer Angle:	11.25 degrees
Stability: 4	
Wind Speed: 5.00 m/s	

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	140.	44.4	29.	2.02	.137	.05	-.000
SKY	140.	140.	44.4	29.	2.00	.065	.05	-.001
TERRAIN	10.	84.	33.2	84.	2.49	.068	.06	.001
TERRAIN	140.	84.	33.2	84.	2.00	.018	.06	.000

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	.920	.05	-.003
SKY	140.	0.	1.0	168.	2.00	.412	.05	-.014
TERRAIN	10.	0.	1.0	168.	2.00	1.005	.05	.014
TERRAIN	140.	0.	1.0	168.	2.00	.387	.05	.011

Visual Effects Screening Analysis for
Source: PaloVerde WES machines
Class I Area: Gila Bend Indian Reserva

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	14.52	G	/S
NOx (as NO2)	11.88	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	9
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.09 ppm
Background Visual Range:	102.90 km
Source-Observer Distance:	35.32 km
Min. Source-Class I Distance:	35.32 km
Max. Source-Class I Distance:	42.76 km
Plume-Source-Observer Angle:	11.25 degrees
Stability: 5	
Wind Speed: 2.00 m/s	

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	128.	42.8	40.	2.00	.631	.05	-.001
SKY	140.	128.	42.8	40.	2.00	.304	.05	-.005
TERRAIN	10.	84.	35.3	84.	2.00	.307	.05	.003
TERRAIN	140.	84.	35.3	84.	2.00	.085	.05	.001

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	1.969	.05	-.005
SKY	140.	0.	1.0	168.	2.00	.950	.05	-.038
TERRAIN	10.	0.	1.0	168.	2.00	2.932*	.05	.039
TERRAIN	140.	0.	1.0	168.	2.00	.932	.05	.031

Visual Effects Screening Analysis for
Source: PaloVerde WES machines
Class I Area: Gila River Indian Res.

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	14.52	G	/S
NOx (as NO2)	11.88	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	9
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.09 ppm
Background Visual Range:	102.90 km
Source-Observer Distance:	53.19 km
Min. Source-Class I Distance:	53.19 km
Max. Source-Class I Distance:	132.33 km
Plume-Source-Observer Angle:	11.25 degrees
Stability: 5	
Wind Speed: 4.00 m/s	

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	120.	61.3	49.	2.00	.200	.05	-.000
SKY	140.	120.	61.3	49.	2.00	.095	.05	-.002
TERRAIN	10.	84.	53.2	84.	2.00	.087	.05	.001
TERRAIN	140.	84.	53.2	84.	2.00	.027	.05	.000

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	169.	2.00	.449	.05	-.003
SKY	140.	0.	1.0	169.	2.00	.277	.05	-.012
TERRAIN	10.	0.	1.0	169.	2.00	.846	.05	.012
TERRAIN	140.	0.	1.0	169.	2.00	.283	.05	.011

Visual Effects Screening Analysis for
Source: PaloVerde WES machines
Class I Area: Hummingbird Springs

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	14.52	G	/S
NOx (as NO2)	11.88	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	9
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.09 ppm
Background Visual Range:	102.90 km
Source-Observer Distance:	32.13 km
Min. Source-Class I Distance:	32.13 km
Max. Source-Class I Distance:	49.78 km
Plume-Source-Observer Angle:	11.25 degrees

Stability: 4
Wind Speed: 5.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	145.	45.8	24.	2.00	.141	.05	-.000
SKY	140.	145.	45.8	24.	2.00	.066	.05	-.001
TERRAIN	10.	84.	32.1	84.	2.50	.071	.06	.001
TERRAIN	140.	84.	32.1	84.	2.00	.019	.06	.000

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	.984	.05	-.004
SKY	140.	0.	1.0	168.	2.00	.439	.05	-.014
TERRAIN	10.	0.	1.0	168.	2.00	1.055	.05	.014
TERRAIN	140.	0.	1.0	168.	2.00	.411	.05	.011

Visual Effects Screening Analysis for
Source: PaloVerde WES machines
Class I Area: North Maricopa Mountains

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	14.52	G	/S
NOx (as NO2)	11.88	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	9
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.09 ppm
Background Visual Range:	102.90 km
Source-Observer Distance:	32.76 km
Min. Source-Class I Distance:	32.76 km
Max. Source-Class I Distance:	51.49 km
Plume-Source-Observer Angle:	11.25 degrees
Stability: 5	
Wind Speed: 3.00 m/s	

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	140.	43.8	29.	2.00	.476	.05	-.001
SKY	140.	140.	43.8	29.	2.00	.226	.05	-.004
TERRAIN	10.	84.	32.8	84.	2.00	.227	.05	.002
TERRAIN	140.	84.	32.8	84.	2.00	.060	.05	.001

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	168.	2.00	2.077*	.05	-.008
SKY	140.	0.	1.0	168.	2.00	.938	.05	-.033
TERRAIN	10.	0.	1.0	168.	2.00	2.378*	.05	.032
TERRAIN	140.	0.	1.0	168.	2.00	.890	.05	.026

Visual Effects Screening Analysis for
Source: PaloVerde WES machines
Class I Area: Signal Mountain

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	14.52	G	/S
NOx (as NO2)	11.88	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	9
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.09 ppm
Background Visual Range:	102.90 km
Source-Observer Distance:	14.89 km
Min. Source-Class I Distance:	14.89 km
Max. Source-Class I Distance:	25.10 km
Plume-Source-Observer Angle:	11.25 degrees
Stability: 6	
Wind Speed: 3.00 m/s	

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	153.	25.1	15.	2.00	2.173*	.05	-.005
SKY	140.	153.	25.1	15.	2.00	1.044	.05	-.019
TERRAIN	10.	84.	14.9	84.	2.00	1.085	.05	.006
TERRAIN	140.	84.	14.9	84.	2.00	.172	.05	.001

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	1.	1.0	168.	2.00	6.850*	.05	-.010
SKY	140.	1.	1.0	168.	2.00	3.245*	.05	-.081*
TERRAIN	10.	1.	1.0	168.	2.00	8.097*	.05	.081*
TERRAIN	140.	1.	1.0	168.	2.00	2.760*	.05	.043

Visual Effects Screening Analysis for
Source: PaloVerde WES machines
Class I Area: Woolsey Peak

*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	14.52	G	/S
NOx (as NO2)	11.88	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.8	9
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.09 ppm
Background Visual Range:	102.90 km
Source-Observer Distance:	15.32 km
Min. Source-Class I Distance:	15.32 km
Max. Source-Class I Distance:	32.76 km
Plume-Source-Observer Angle:	11.25 degrees
Stability: 5	
Wind Speed: 2.00 m/s	

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	155.	27.2	14.	2.00	1.744	.05	-.004
SKY	140.	155.	27.2	14.	2.00	.829	.05	-.015
TERRAIN	10.	159.	32.8	10.	2.00	1.492	.05	.015
TERRAIN	140.	159.	32.8	10.	2.00	.672	.05	.009

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	1.	1.0	168.	2.00	6.595*	.05	-.012
SKY	140.	1.	1.0	168.	2.00	3.100*	.05	-.074*
TERRAIN	10.	1.	1.0	168.	2.00	7.115*	.05	.072*
TERRAIN	140.	1.	1.0	168.	2.00	2.636*	.05	.039

Nitrate Deposition Calculation

Example Nitrate Deposition Calculation:

Modeled NO_x 24 hour impact = 0.1976 $\mu g/m^3$

Conversion of NO_x to HNO_3 = (NO_x) x 1.37 = HNO_3
(0.1976) x 1.37 = 0.2707

Conversion from a 24 hour rate to a total rate
= (24 hour impact) x (number of seconds in averaging time)
= (0.2707) x (86,400s/24 hours) = 23,389.52 $\mu g/m^3$

Conversion to deposition units = (total rate) x (deposition velocity for HNO_3)
= (23,389.52) x (0.05 m/s) = 1169.48 $\mu g/m^2/s$

Conversion to kg/hectacre = (deposition impact) x (10^{-5})
= (1169.48) x (10^{-5}) = 0.01 kg/hectare

Modeling Files

All necessary and required original modeling files, including revisions, if any, supporting the Mesquite Generating Station Prevention of Significant Deterioration and Title V Air Permit Application were filed with the Maricopa County Environmental Services Department - Air Quality Division (ESDAQD).

The Maricopa County Environmental Services Department - Air Quality Division may be contacted at:

Maricopa County, Arizona
Environmental Services Department
Air Quality Division
1001 North Central Avenue, Suite 200
Phoenix, Arizona 85004-1942
Phone: (602) 506-1202
Fax: (602) 506-6985

BLACK & VEATCH

8400 Ward Parkway
P.O. Box 8405
Kansas City, Missouri 64114

Tel: (913) 458-2000

Black & Veatch Corporation

Mesquite Power, LLC
Mesquite Generating Station

B&V Project 96210.0020
March 22, 2000

Mr. Robert Arpino
Maricopa County Environmental Services Department
Air Quality Division
1001 N. Central Ave.
Suite 200
Phoenix, AZ 85004-1942

Subject: Response to IT's Protocol Comments

Dear Mr. Arpino:

On behalf of Mesquite Power, LLC, please find the attached response to the protocol comments from IT Corporation. We believe that all of the comments have been properly addressed. In addition, extra information has been inserted to ensure that every point in the ADEQ Protocol Checklist has been covered.

If you have any questions, please don't hesitate to call me at (913) 458-8269.

Very truly yours,

BLACK & VEATCH

William G. Collins
Permitting/Compliance Project Manager

cgd

Enclosure

cc:	M. Swartz	Sempra Energy Resources
	C. Sterling	Sempra Energy Resources
	P. Allard	SA&B
	R. Felty	IT Corporation
	K. Kading	IT Corporation
	E. Valis	IT Corporation
	S. Bohning	EPA Region 9
	D. Lieb	Maricopa County Environmental Services Department – Air Quality Division

Addendum

Introduction

This Addendum is in response to comments issued by Ed Valis of IT Corporation on behalf of Maricopa County Environmental Services Department – Air Quality Division (ESDAQD) for the Air Quality Impact Analysis Workplan For The Mesquite Generating Station submitted by Mesquite Power, LLC. Each comment is addressed by restating the comment received, and then presenting the response. Attachments, which are referenced in the responses, are included at the end of the Addendum.

Several areas of deficiency were addressed in the comments, including the absence of modeling parameters and results. It is the purpose of this Addendum to the Workplan to resolve these issues in accordance with the recommendations of Ed Valis and Maricopa County ESDAQD. In addition to the responses, included for ease of review are the comments and recommendations as well as an Arizona Department of Environmental Quality (ADEQ) checklist for a refined modeling protocol. Also included in the Addendum is an analysis/discussion intended to satisfy and address the need for possible pre-application monitoring of ozone for the facility. As a result of this discussion, Mesquite Power, LLC is requesting a waiver from conducting a full ozone impact analysis.

Note that additional information beyond that which addresses the specific comments has been included in this Addendum. This additional information is located after the comment/response portion of the Addendum. For example, information to address ozone transport is included. This additional information has been provided as a supplement with the purpose of making the Workplan/Addendum as complete as possible.

Comments on Ambient Air Quality Impact Analysis Workplan
Mesquite Power, LLC

ADEQ Protocol Checklist Section	Workplan Location	Comment	Recommendation	Response
Executive Summary	N/A	There was no Executive Summary presented in the Workplan	Provide an Executive Summary outlining the major points of each section of the Workplan	Comment is addressed in Addendum Executive Summary
ADEQ Completeness Checklist	N/A	The ADEQ Completeness Checklist was not presented in the Workplan	Provide a copy of a filled-in ADEQ Completeness Checklist	Comment is addressed in Addendum ADEQ Completeness Checklist
2.2 Area Classifications	Section 2.4, Page 2-3	There needs to be a better presentation of the location of the Nonattainment, Class 1, "sensitive" Class II, and Baseline Areas.	Describe the locations via direction and distance from the proposed site. In addition, a detailed, scaled map with the location of the Areas should be provided.	Comment is addressed in Addendum Section 2.2 Area Classifications
2.3 Baseline Dates	Section 2.5, Page 2-4	There is no discussion of the various PSD Baseline Dates in the Workplan	Provide a table of potential PSD applicable compounds with associated Major Source and Minor Source Baseline Dates	Comment is addressed in Addendum Section 2.3 Baseline Dates
2.4 Baseline Areas	Section 2.5, Page 2-4	There is no presentation of the Baseline Areas around the proposed source	If there are multiple Baseline Areas for PSD increment Consumption, present a map outlining these areas and discuss possible increment/impact scenarios. If there is one Baseline Area within the Metropolitan Phoenix Area, state this in the Workplan	Comment is addressed in Addendum Section 2.4 Baseline Areas

Comments on Ambient Air Quality Impact Analysis Workplan
Mesquite Power, LLC

ADEQ Protocol Checklist Section	Workplan Location	Comment	Recommendation	Response
2.5 Increment Consumption and Expansion	Section 2.5, Page 2-4	There is no discussion about the ramifications of a significant impact in the PSD and Nonattainment Area, the available PSD Increments or the applicability of NSR and the need for offsets	There should be a discussion and a table presenting the available PSD Increment and the approach to be taken for a significant impact in a Nonattainment Area	Comment is addressed in Addendum Section 2.5 Increment Consumption and Expansion
3.1 Pre-Application Air Quality Monitoring	Section 3.2.2, Page 3-5	See Comments for Section 3.4	If Comments and Recommendations from Section 7.1 are followed, then more detailed conclusions in this section can be developed	Comment is addressed in Addendum Section 3.1 Pre-Application Air Quality Monitoring
3.2 Post-Construction Air Quality Monitoring	Section 3.2.2, Page 3-5	There is no discussion provided on this subject	Proponent should provide some discussion on this subject, even if the proposed approach is to not have Post-Construction Monitoring	Comment is addressed in Addendum Section 3.2 Post-Construction Air Quality Monitoring
3.4 Background Concentrations	Section 3.2.2, Page 3-5	There are no background ambient air quality concentrations provided	A discussion and tables of the pollutants and averaging times, stations to be reviewed, years considered, and conclusions should be provided for review and approval.	Comment is addressed in Addendum Section 3.4 Background Concentrations
4.1 Source Emissions Inventory	Section 2.3, page 2-3 Section 2.5, Page 2-4	There is no presentation of preliminary/proposed source listing with associated stack locations, parameters and emission rates (grams/sec and tons/year). This is the basis of a modeling protocol/analysis and needs to be presented.	Provide a table of all relevant source parameters and locations that will be used in the analysis. Because Mesquite Power is a "listed major stationary source" making the major source level 100 tons/yr, then all fugitive sources (i.e. cooling towers, tanks, roads?) needs to be considered for	Comment is addressed in Addendum Section 4.1 Source Emissions Inventory

Comments on Ambient Air Quality Impact Analysis Workplan
Mesquite Power, LLC

ADEQ Protocol Checklist Section	Workplan Location	Comment	Recommendation	Response
			estimating potential emissions for major source/significant emission levels.	
4.2 The NAAQS Inventory	Section 3.0, Pages 3-1 through 3-7	This inventory is only required if model results show significant impact levels (SILs). No approach was discussed that would show how sources are to be identified, emission rates determined and criteria for source elimination proposed	The approach to be used should be discussed in case the SILs are exceeded	Comment is addressed in Addendum Section 4.2 The NAAQS Inventory
4.3 The Increment Inventory	Section 3.0, Pages 3-1 through 3-7	This inventory is only required if model results show significant impact levels (SILs). No approach was discussed that would show how sources are to be identified, emission rates determined and criteria for source elimination proposed	The approach to be used should be discussed in case the SILs are exceeded	Comment is addressed in Addendum Section 4.3 The Increment Inventory
4.4 Noncriteria Inventory	Section 3.0, Pages 3-1 through 3-7	Because the Arizona DEQ Air Toxics Rule compliance is being required, a Noncriteria Inventory should be provided	The source should provide a listing of all air toxic emitting sources along with emission rates and locations	Comment is addressed in Addendum Section 4.4 Noncriteria Inventory
5.1 Regional Topography	Section 3.1.4, Page 3-3	The comparison of the digital data terrain heights and other information with USGS topographic quadrangles may create data conflicts due to differing NAD's	Proposed an approach that account for the differing dates or propose another data validation scheme	Comment is addressed in Addendum Section 5.1 Regional Topography
5.3.1 Surface Meteorology	Section 3.1.5, Page 3-4	There is no technical discussion or information presented on the surface meteorological data.	Because the proposed met. data is not from a NWS Station (even though it is from Maricopa County), a presentation of data quality should be provided (focusing on missing data, review of data appropriateness,	Comment is addressed in Addendum Section 5.3.1 Surface Meteorology

Comments on Ambient Air Quality Impact Analysis Workplan
Mesquite Power, LLC

ADEQ Protocol Checklist Section	Workplan Location	Comment	Recommendation	Response
			etc.) for review and approval.	
6.2 Model Input Defaults/Options	Section 3.1.3, Page3-2,3	Intermediate Terrain option is not listed as a model options	Intermediate Terrain option should be added to the list of model options	Comment is addressed in Addendum Section 6.2 Model Input Default/Options
6.3 Rural/Urban Classification	Section 3.1.6, Page 3-4	There is no technical justification for use of rural dispersion coefficient	A colored USGS Topographic map should be provided in the Workplan in order to provide some presentation of justification	Comment is addressed in Addendum Section 6.3 Rural/Urban Classification
6.4 Receptor Network	Section 3.1.4, Page 3-3	Maricopa County Regulation Rule 240, Section 303 requires a 50-km grid. There is a 10-km grid with additional discrete receptors proposed in the Workplan.	A justification, using screening level modeling, needs to be made for use of a receptor grid other than those required by regulation. Discrete receptors proposed need to be presented via table (location: distance (x, y) or angle/distance from site) and presented on a detailed, scaled map in order to be considered for approval	Comment is addressed in Addendum Section 6.4 Receptor Network
6.5 Receptor Elevations	Section 3.1.4, Page 3-3	There is no presentation of proposed receptor elevations/heights. Also, the documentation of the "box" method of terrain height determination of digital terrain data has not been discussed in detail or provided for review.	A table of receptor elevations/heights needs to be presented prior to any modeling for approval. Also, documentation with technical description of the "box" method of terrain height determination of digital terrain data must be provided for review and approval.	Comment is addressed in Addendum Section 6.5 Receptor Elevations

Comments on Ambient Air Quality Impact Analysis Workplan
Mesquite Power, LLC

ADEQ Protocol Checklist Section	Workplan Location	Comment	Recommendation	Response
6.6 Source Characterization	Section 2.3, page 2-3 Section 2.5, Page 2-4	See Comment associated with Checklist Section 4.1	See Recommendation associated with Checklist Section 4.1	Comment is addressed in Addendum Section 6.6 Source Characterization
6.7 Source Location and Parameters	Section 2.3, page 2-3 Section 2.5, Page 2-4	See Comment associated with Checklist Section 4.1	See Recommendation associated with Checklist Section 4.1	Comment is addressed in Addendum Section 6.7 Source Locations and Parameters
6.8 Building Wake Downwash and GEP	Section 3.1.2, Page 3-2	The GEP and Building Downwash Analysis should take into account any structure on-site or off-site that may influence plume dispersion	Provide a site plan showing all on-site and off-site structures that have the potential to influence the proposed stacks	Comment is addressed in Addendum Section 6.8 Building Wake Downwash and GEP
7.1 Preliminary Analysis	Section 3.1.1, page 3-2	Preliminary modeling, traditionally referred to as screening level modeling, has not been presented in the protocol. An alternative approach referred to as "enveloping" has been proposed by Black & Veatch. The "enveloping" approach has not been adequately described by Black & Veatch and needs to be better explained to warrant approval.	The traditional approach is the use of traditional screening level, worst-case (i.e. 100%, 50%, idle load; all source) scenario modeling to determine the most appropriate operating scenario for maximum ambient impacts. The screening level analysis is also used to determine the most appropriate receptor network, show if any or all pollutants are below significant impact levels (SILs) (and therefore able to be left out of any refined analysis), and determine the need for pre-construction monitoring	Comment is addressed in Addendum Section 7.1 Preliminary Analysis

Comments on Ambient Air Quality Impact Analysis Workplan
Mesquite Power, LLC

ADEQ Protocol Checklist Section	Workplan Location	Comment	Recommendation	Response
7.2 Full Impact Analysis	Section 3.0, Page 3-1	There is no discussion or proposed approach to show compliance with the proposed Arizona DEQ Air Toxics Rule	If the use of Selective Catalytic Reduction (SCR) is being proposed, then ammonia slip associated with SCR should be considered along with any other air toxics listed under the Arizona DEQ Air Toxics Rule	Comment is addressed in Addendum Section 7.2 Full Impact Analysis
9.0 Class I Impact Analysis	Section 3.3, Pages 3-6,7	There appears to be an exemption from Class I Impact issues proposed in the Workplan	The proper authority (i.e. Maricopa County, Arizona DEQ, EPA, Federal Land Manager) to exempt the proponent from Class 1 area impacts should be confirmed. Also, a better discussion as to the technical reason for exemption should be provided.	Comment is addressed in Addendum Section 9.0 Class I Impact Analysis
11.0 Appendices	N/A	Minutes from the pre-application meeting and any other correspondence between the proponent and Maricopa County were not included in the Workplan	Provide any and all meeting notes and correspondences to ensure proper understanding and authority of procedures proposed	Comment is addressed in Addendum Section 11.0 Appendices

Responses to Comment on Ambient Air Quality Impact Analysis Workplan
Mesquite Power, LLC

EXECUTIVE SUMMARY

This Ambient Air Quality Impact Analysis Workplan contains the information necessary, and details the analyses that will be performed to support the proposed Mesquite Power, LLC, Mesquite Generating Station. The proposed project will consist of four (4) General Electric 7FA or Westinghouse 501F combustion turbines (CTs) driving electrical generators. These CTs will be operating in a combined cycle mode of operation, routing their exhaust through heat recovery steam generators (HRSGs). Steam formed in the four HRSGs will be routed through two steam turbines to generate additional electricity. Duct firing will be used in the HRSG to generate additional heat, as needed. The CTs are rated at approximately 170 megawatts (MW) each, and the two steam turbines are rated at approximately 300 MW each. The facility will provide approximately 1,000 MW of electricity to the grid for sale on the open market. The location of the proposed project is in western Maricopa County, near Arlington, Arizona.

The proposed facility will be classified as a major stationary source and will be subject to the PSD program, and will need to obtain a Title V operating permit. Under the PSD rules, all PSD regulated pollutants emitted by the proposed facility must be compared to the PSD significant emission levels in order to determine applicability to PSD review. The potential to emit analysis demonstrates that emissions of nitrogen oxides (NO_x), carbon monoxide (CO), and particulate matter with a diameter of less than or equal to ten microns (PM_{10}) are emitted in significant quantities. The required PSD analyses will be conducted for each of these regulated pollutants.

One of the PSD review requirements is an ambient air quality impact analysis (AAQIA). The Maricopa County ESDAQD provided the meteorological data for the AAQIA. The meteorological data was recorded at the Palo Verde Nuclear Generating Station and covers the five-year period of 1994-1998. The terrain surrounding the Project site ranges from simple to complex and the modeling procedures to handle this range in terrain are explained in this Workplan. Based on the air dispersion modeling performed for this workplan, CO impacts have been determined to be insignificant thus further impact analysis will not be required. Further analysis for NO_x and PM_{10} will be required and will be provided in the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station.*

Pre-construction monitoring is not being proposed for this project, because an ADEQ monitor site located approximately 3 km from the site. This monitor records values for Ozone, NO_x, and PM_{10} and data is available from 1997 to the present.

Because a specific combustion turbine vendor (GE or Westinghouse) has not yet been selected for this project, emissions from both types of CTs have been evaluated throughout the analysis and will be presented as alternative operating scenarios. The facility may be constructed using either of these CTs.

Is the Requirement Sufficiently Addressed? (✓ one)			Refined Modeling Protocol Contents (Headings and Chapters should be labeled as follows:)
Yes	No	N/A	
✓			Executive Summary
✓			ADEQ Completeness Checklist
			1.0 Introduction
✓			1.1 Site Description
✓			1.2 Project Description
		✓	1.3 Application Forms
			2.0 Regulatory Status
✓			2.1 Source Designation
✓			2.2 Area Classifications
✓			2.3 Baseline Dates
✓			2.3.1 Major Source Baseline Date
✓			2.3.2 Trigger Date
✓			2.3.3 Minor Source Baseline Date
✓			2.4 Baseline Area
✓			2.5 Increment Consumption and Expansion
			3.0 Ambient Data Requirements
✓			3.1 Pre-Application Air Quality Monitoring
✓			3.2 Post-Construction Air Quality Monitoring
✓			3.3 Meteorological Monitoring
✓			3.4 Background Concentrations
			4.0 Emissions Inventory
✓			4.1 Source Emissions Inventory

✓			4.1.1 The NAAQS Inventory
✓			4.1.2 The Increment Inventory
✓			4.1.3 Noncriteria Pollutants Inventory
			5.0 Topography, Climatology and Meteorology
✓			5.1 Regional Topography
✓			5.1.1 Simple Terrain
✓			5.1.2 Intermediate Terrain
✓			5.1.3 Complex Terrain
✓			5.2 Regional Climatology
✓			5.3 Regional Meteorology
✓			5.3.1 Surface Meteorology
✓			5.3.1.1 Wind Speed and Wind Directions
✓			5.3.1.2 Stability Class
✓			5.3.1.3 Data Capture
✓			5.3.1.4 Treatment of Calms
✓			5.3.2 Upper Air Data
			6.0 Modeling Analysis Design
✓			6.1 Modeling Selection
✓			6.1.1 Screen Modeling
✓			6.1.2 Refined Screen Modeling
✓			6.1.3 Refined Modeling
✓			6.2 Model Input Defaults/Options
✓			6.3 Rural/Urban Classification
✓			6.3.1 Land Use Classification
✓			6.3.2 Rural vs Urban
✓			6.4 Receptor Network

✓			6.4.1 Coarse Receptors
✓			6.4.2 Medium Receptors
✓			6.4.3 Fine Receptors
✓			6.4.4 Tight Receptors
✓			6.4.5 Discrete Receptors
✓			6.4.6 Class I Receptors
✓			6.4.7 Nonattainment Area Boundary Receptors
✓			6.5 Receptor Elevations
✓			6.6 Source Characterization
✓			6.6.1 Point Sources
		✓	6.6.2 Area Sources
		✓	6.6.3 Volume Sources
		✓	6.6.4 Line Sources
		✓	6.6.5 Mobile Sources
		✓	6.6.6 Open Pit/Pit Retention
		✓	6.6.7 Dry Deposition
✓			6.7 Source Locations and Parameters
✓			6.8 Building Wake Downwash and GEP
			7.0 Dispersion Modeling Impact Analysis
✓			7.1 Preliminary Analysis
✓			7.1.1 Preliminary Impact Determination
✓			7.1.2 Sources Within Area of Impact
✓			7.1.3 Sources Omitted
✓			7.1.4 Significant Impacts
✓			7.2 Full Impact Analysis
✓			7.2.1 The NAAQS Analysis

✓			7.2.2 The Increment Analysis
✓			7.2.3 AAAQG Pollutant Analysis
			8.0 Additional Impact Analysis
✓			8.1 Growth Analysis
✓			8.2 Soils and Vegetation Analysis
✓			8.3 Visibility Impairment Analysis
✓			8.3.1 Level One Screening
✓			8.3.2 Level Two Screening
		✓	8.3.3 Level Three Screening
		✓	8.4 Conclusions
			9.0 Class I Impact Analysis
✓			9.1 Class I Increments
		✓	9.2 Air Quality Related Values
		✓	9.2.1 Flora and Fauna
		✓	9.2.2 Water
		✓	9.2.3 Acid Deposition
		✓	9.3 Visibility Impact Analysis
			10.0 References
			11.0 Appendices
✓			Minutes from pre-application meetings
✓			Copies of all correspondence

2.2 Area Classifications

Comment

There needs to be a better presentation of the location of the Nonatttainment, Class I, "sensitive" Class II, and Baseline Areas.

Response

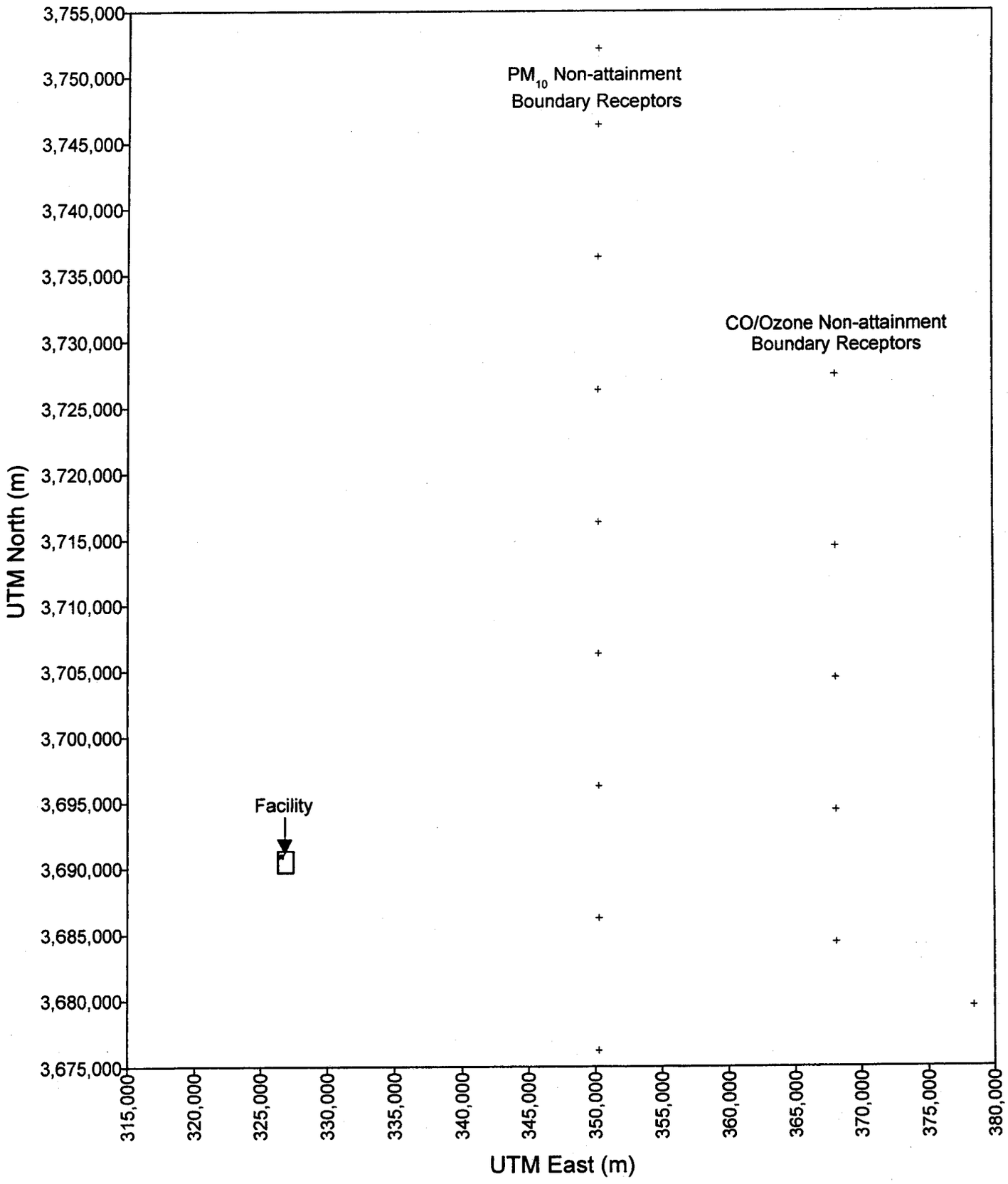
The Project will be located approximately 15 miles west of the Phoenix nonattainment area for PM_{10} and 25 miles west of the Phoenix nonattainment area for CO and NO_x (as a precursor to O_3) PSD pollutants. Receptors will be placed along the closest boundary of the each nonattainment area to the site. The proposed receptor locations are shown in Figure 1.

Air dispersion modeling will be performed to determine the Project's maximum predicted impact at the closest boundaries of the Superstition Wilderness Area, Mazatzal Wilderness Area, and the Pine Mountain Wilderness Area. These areas are presented on Figure 2. As shown on Figure 3, receptors will be placed at the closest boundary point of each park with respect to the Project.

A Class II impact analysis will be performed to evaluate the potential for visibility impairment, ground level impacts, and acid deposition. The following sensitive areas were identified by the Federal Land Manager (FLM) and Maricopa County ESDAQD in a meeting with a representative of Mesquite Power, LLC: Hummingbird Springs, Big Horn Mountain, Eagletail Mountain, Signal Mountain, Woolsey Peak, and North Maricopa Mountains Wilderness areas, as well as the Gila Bend and Gila River Indian Reservations. Figure 2 illustrates the locations of these sensitive areas with respect to the Project location. As shown on Figure 4, receptors will be placed along the closest boundary of each sensitive area with respect to the Project.

The above description for Nonattainment, Class I, and Class II Sensitive Area receptors is provided and applied in the modeling analysis shown in the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station* Section 6.0 Air Quality Impact Analysis.

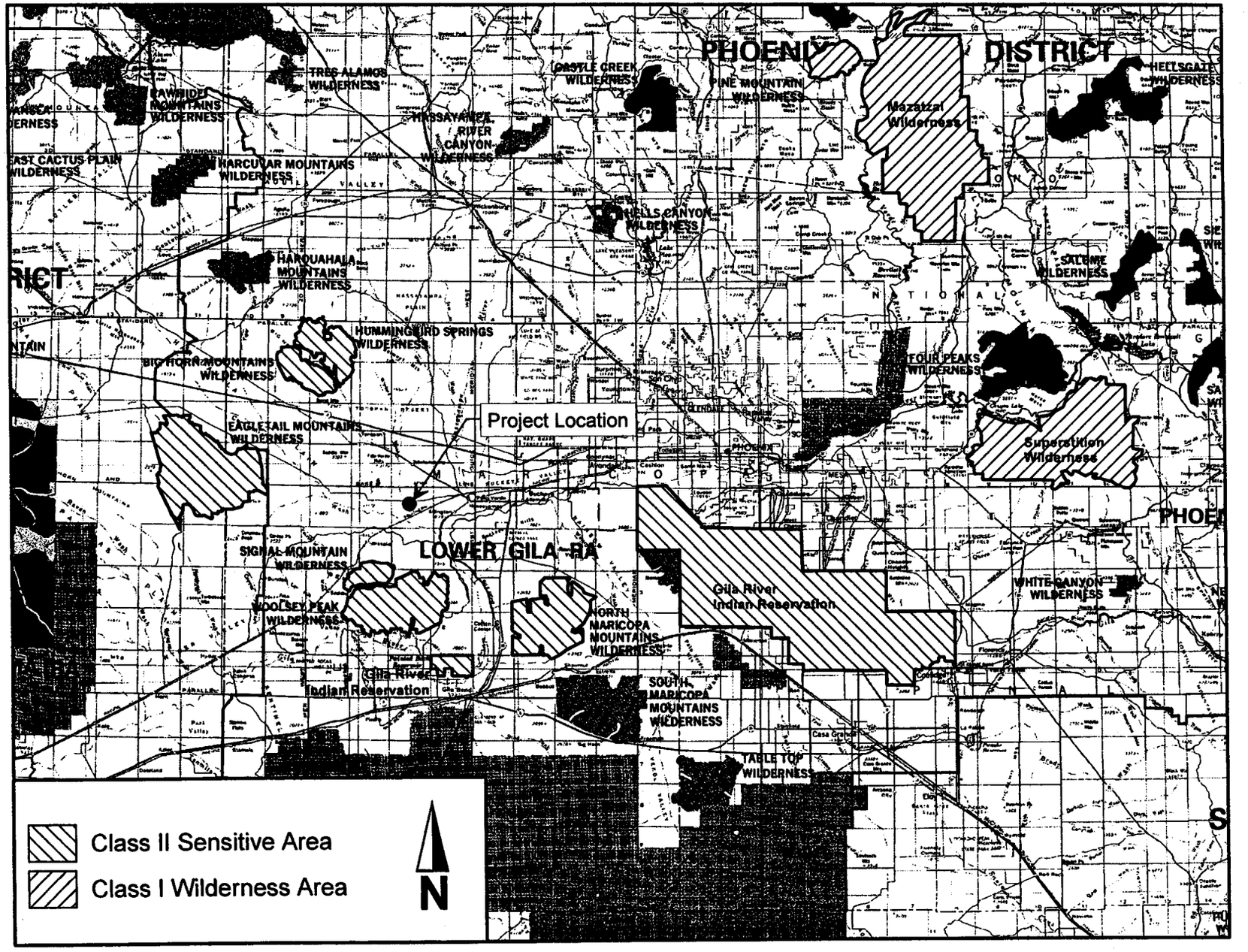
For a discussion and map of Baseline areas, please refer to response to Comment 2.4 Baseline Areas.



Non-attainment Boundary Receptors

Figure 1

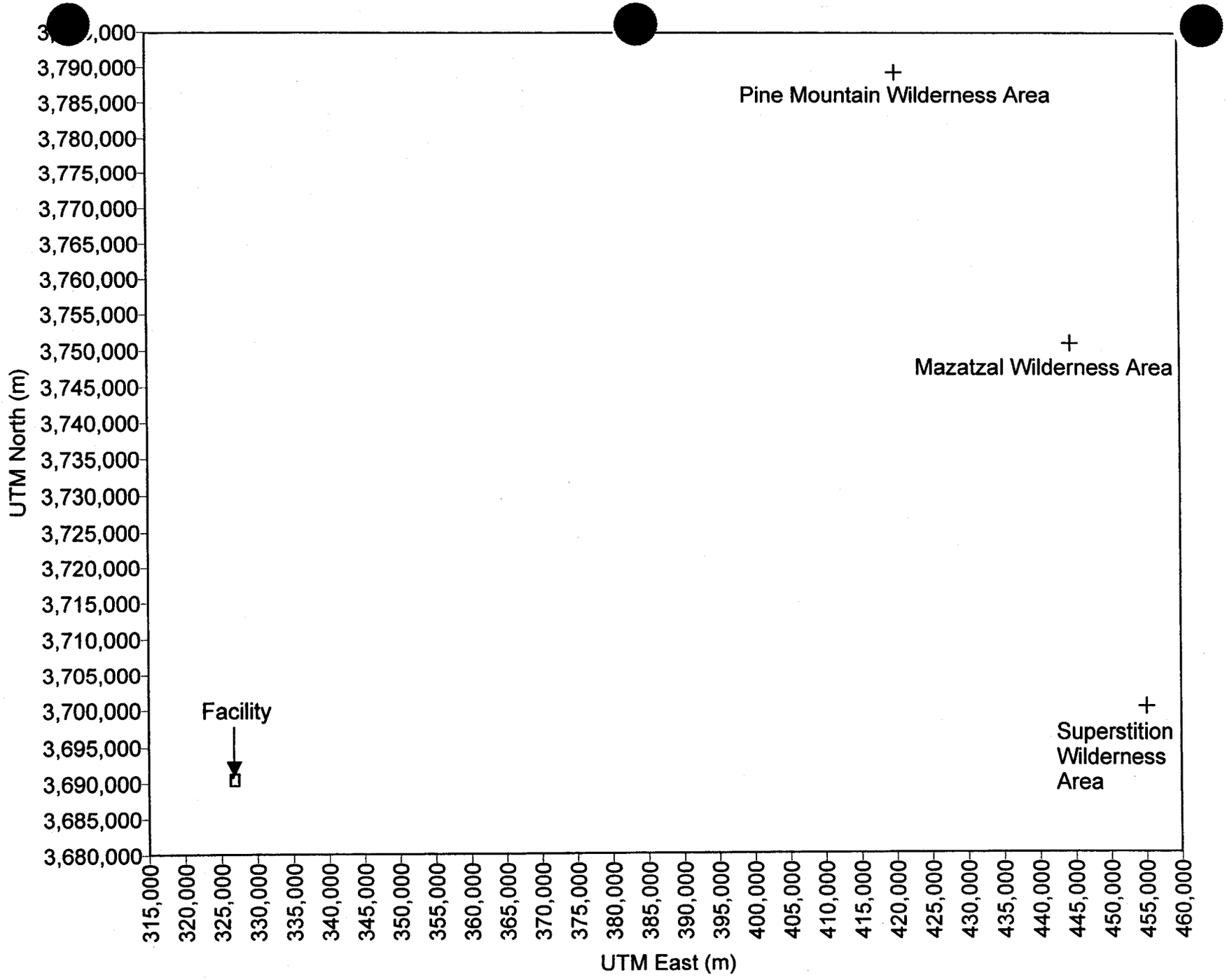
NAgrid.srf



Class I and Class II Areas Modeled for the Project

Figure 2

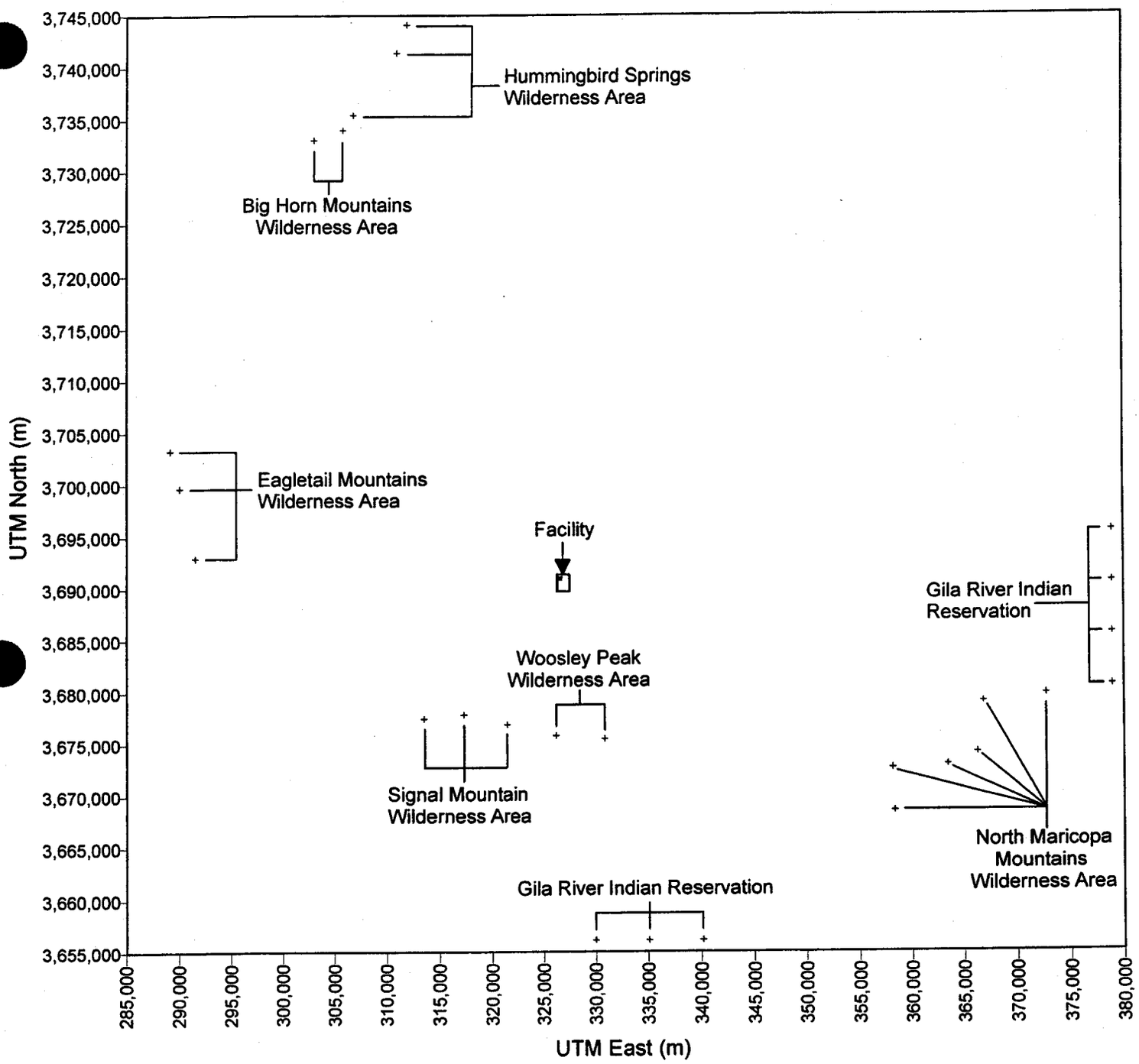
Class I & II Areas.srf



Class I Area Receptors

Figure 3

Classigrid.srf



Class II Sensitive Area Receptors

Figure 4

Classiigrid.srf

2.3 Baseline Dates

Comment

There is no discussion of the various PSD Baseline Dates in the Workplan.

Response

Rob Arpino of Maricopa County ESDAQD was contacted and he provided the necessary Baseline Dates on March 22, 2000.

NO_x and PM_{10} have been determined as the only pollutants needing further analysis. This further analysis will require inclusion of outside sources within the area of influence plus 50 km. These sources will include all new major stationary sources and major modifications since the major source baseline dates (February 8, 1988 for NO_x and January 6, 1975 for PM_{10}), and actual emission changes occurring at stationary sources since the minor source baseline date (January 20,1993 for NO_x and March 3, 1980 for PM_{10}). In addition, the trigger dates for this area are August 7, 1977 for NO_x and February 8, 1988 for PM_{10}.

2.4 Baseline Areas

Comment

There is no presentation of the Baseline Areas around the proposed source.

Response

Rob Arpino of Maricopa ESDAQD was contacted and he provided the necessary Baseline Area information on March 22, 2000. He indicated that each county is a Baseline Area in the state of Arizona. For a Baseline Area to be affected there must be an annual impact of 1 $\mu g/m^3$ or higher within the area from the proposed Project. The Project's annual impacts at or above 1 $\mu g/m^3$ are all located within 5.5 km. With this information, the only Baseline Area affected by the proposed source is the Maricopa Baseline Area.

2.5 Increment Consumption and Expansion

Comment

There is no discussion about the ramifications of a significant impact in the PSD and Nonattainment Area, the available PSD Increments or the applicability of NSR and the need for offsets.

Response

The analysis provided in the response to Comment 7.1 Preliminary Analysis, shows that the facility maximum impacts for NO_x and PM_{10} are above the significant impact level. As a result, an increment consumption analysis will be preformed. For this analysis, it is assumed that the full increment is available. The results of the increment consumption analysis are provided in the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station* – Section 6.7.

As a result of the analysis provided in the response to Comment 7.1 Preliminary Analysis, no significant impacts are expected in the Nonattainment areas and offsets will not be needed. The closest Nonattainment Area boundary is located 24 km from the site and the analysis showed no significant impacts beyond 14 km for any pollutant. A more detailed modeling analysis of the Nonattainment areas is provided in the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station* – Section 6.8.1.

3.1 Pre-Application Air Quality Monitoring

Comment

See Comments for Section 3.4 (Comment Section 3.4 – There are no background ambient air quality concentrations provided)

Response

One PSD review requirement is the collection of pre-application ambient monitoring data if existing monitoring data are not available. Mesquite Power, LLC proposes using the Palo Verde Nuclear Generating Station Air Quality Monitor (AIRS #04-013-9993) to fulfill the pre-construction monitoring requirement. The location, distance from project, and the representative ambient monitoring concentrations from the monitor are located in the response to Comment 3.4 Background Concentrations.

3.2 Post-Construction Air Quality Monitoring

Comment

There is no discussion provided on this subject.

Responses

Because the NAAQS will not be threatened and there are not uncertainties regarding the databases used in the dispersion modeling, no post-construction monitoring is currently proposed for Mesquite Generating Station at this time. In the case that monitoring is required, Mesquite Power, LLC proposes to use the Palo Verde Nuclear Generating Station Monitor data (AIRS #04-013-9993) to fulfill the requirement. For the location of the monitor relative to the Project location, please refer to the response on Comment 3.4 Background Concentrations.

3.4 Background Concentrations

Comment

There are no background ambient air quality concentrations provided.

Response

In accordance with EPA guidance, air quality data may be used to establish background concentrations in the impact area resulting from existing sources that are not considered nearby. Representative background concentration values have been developed from existing ambient data collected in the area. Table 1 shows the monitoring site used, its location relative to the Project, and the representative ambient monitoring values proposed for the analysis. The Palo Verde Nuclear Generating Station monitoring site (AIRS #04-013-9993) was used exclusively for NO_2 and PM_{10}.

The above description for Background Concentrations is provided and applied in the modeling analysis shown in the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station* Section 6.0 Air Quality Impact Analysis.

Table 1
Representative Ambient Background Monitoring Values
Proposed for Air Quality Impact Analysis

Monitoring Site	Location Latitude/ Longitude (degrees)	Distance from Project (km)	Direction from Project	Pollutant Monitored	Averaging Period	Representative Background Concentration ($\mu g/m^3$)
Palo Verde[a]	33.349/ 112.832	3.0	N	NO_2[e]	Annual	58[b]
Palo Verde[a]	33.349/ 112.832	3.0	N	PM_{10}[f]	Annual	20[c]
					24 hour	70[d]

[a]Palo Verde Nuclear Generating Station (AIRS #04-013-9993).

[b]Represents the maximum 1 hour NO_2 monitored value. This is conservatively higher than the annual average maximum.

[c]Represents the maximum annual mean.

[d]Represents the maximum high second high value.

[e]NO_2 data from May through October 1997 and April through mid-October 1998.

[f]PM_{10} data from November 1996 through June 1999.

4.1 Source Emissions Inventory

Comment

There is no presentation of preliminary/proposed source listing with associated stack locations, parameters and emissions rates (grams/sec and tons/year). This is the basis of a modeling protocol/analysis and needs to be presented.

Response

Attachment 1 of this document contains all of the source locations, parameters, emission rates, and potential to emit calculations evaluated for the Mesquite Generating Station. There are two operating scenarios presented in Attachment 1, Alternative Operating Scenario 1 applies to General Electric Turbines and Alternative Operating Scenario 2 applies to Westinghouse Turbines. The forms in Attachment 1 are also provided in the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station* Standard Forms Section. All of the sources included in the modeling analysis will be point sources.

4.2 The NAAQS Inventory

Comment

This inventory is only required if model results show significant impact levels (SILs). No approach was discussed that would show how sources are to be identified, emission rates determined and criteria for source elimination proposed.

Response

Modeling results show significant impact levels for NO_x and PM_{10}. Thus, a NAAQS cumulative analysis has been performed and is presented in Section 6.6 of the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station.* The inventory was developed from a list of nearby existing NO_x and/or PM_{10} sources and from nearby proposed sources in the permitting process. These sources are listed in Table 6-8 of the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station.* We have been notified by the Maricopa County ESDAQD that an additional source, the El Paso Natural Gas Compressor Station, needs to be added to the NO_x inventory. We have received the additional source data from Maricopa County ESDAQD and will remodel the NAAQS cumulative analysis with it added in. The revised modeling results will be forwarded to Maricopa County ESDAQD when complete. We do not anticipate any threats to the NAAQS with the addition of this source because it is relatively distant (approximately 11.5 km) from the proposed Project site.

4.3 The Increment Inventory

Comment

This inventory is only required if model results show significant impact levels (SILs). No approach was discussed that would show how sources are to be identified, emission rates determined and criteria for source elimination proposed.

Response

Modeling results show significant impact levels for NO_x and PM_{10}. Thus, a PSD increment analysis has been performed and is presented in Section 6.7 of the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station.* The inventory was developed from a list of nearby existing NO_x and/or PM_{10} sources and from nearby proposed sources in the permitting process. These sources are listed in Table 6-8 of the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station.* We have been notified by the Maricopa County ESDAQD that an additional source, the El Paso Natural Gas Compressor Station, needs to be added to the NO_x inventory. We have received the additional source data from Maricopa County ESDAQD and will remodel the PSD increment analysis with it added in. The revised modeling results will be forwarded to Maricopa County ESDAQD when complete. We do not anticipate complete consumption of the PSD increment with the addition of this source because it is relatively distant (approximately 11.5 km) from the proposed Project site.

Subsequent Comment

On March 21, 2000, an additional comment (via e-mail) regarding increment consumption from Interstate I-10 traffic was received from Robert Arpino of Maricopa County. The comment states, "Another issue has been brought to my attention, regarding the inclusion of mobile sources. If the facility is significant, then emissions from Interstate I-10 traffic will need to be included in the PSD increment modeling."

Response

According to EPA guidance on these analyses, PSD increment is consumed by increases in air quality impacts due to changes in mobile source activity since the minor source baseline date. The minor source baseline date for this project area is January 20, 1993 for NOx (as stated in the response to Item 2.3 in this Addendum). Thus, if air quality NOx impacts from Interstate I-10 have increased since January 20, 1993, then PSD increment has been consumed. Mobile source impacts are generally very small or have been decreasing as a result of lower vehicle emission standards associated with newer car models. Thus, increment consumption specifically by mobile sources is typically not a required element of a PSD air quality impact analysis. In response to the above referenced request, Mesquite Power, LLC proposes to assess the possibility of

PSD NOx increment consumption in the following manner. (Particulate emission from typical mobile sources is very small. Thus, only possible NOx increment consumption will be assessed.)

Although vehicle miles traveled (VMT) on Interstate I-10 since 1993 has likely increased, there has also been a decrease in NOx emission rates per VMT since 1993. This is a result of a lowering of the new vehicle emission limits imposed on the auto industry. When accounting for the combination of increased VMT and decreased emission rates per VMT, it is likely that the total emission level from Interstate I-10 has actually decreased since 1993. An analysis of the emissions increase/decrease from 1993 to the most recent year will be prepared by Mesquite Power, LLC and submitted to Maricopa County ESDAQD as a supplement to the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station.*

The approach of the analysis will be to obtain VMT data for Interstate I-10 for 1993 and for the most recent year available. These data should be available through the Arizona Department of Transportation. The percentage increase in VMT between 1993 and the most recent year on Interstate I-10 in the vicinity of the proposed source location will be calculated. The new vehicle NOx emission factor for 1993 will then be compared to the emission factor for the most recent year and the percentage decrease calculated. Then, the percentage increase in VMT and percentage decrease in emission factors will be combined to determine an estimate of the percentage decrease (or increase) in NOx emissions from Interstate I-10. If there has been a decrease in NOx emissions, as is expected, then PSD increment has not been consumed and emissions from the highway need not be further assessed. If this process shows an increase in NOx emissions, then Mesquite Power, LLC will discuss with Maricopa County ESDAQD alternative methods of determining whether incremental increases in NOx impacts in the vicinity of Interstate I-10 need to be specifically quantified. In making this determination, consideration must be given to whether these incremental highway impacts have the potential to threaten over-consumption of the full PSD NOx increment value.

4.4 Noncriteria Inventory

Comment

Because The Arizona DEQ Air Toxics Rule compliance is being required, a Noncriteria Inventory should be provided.

Response

The power generating units will be a source of hazardous air pollutant (HAP) emissions. The estimated HAP emissions from the power generating units are shown in Table 2. The air quality impact of these emissions have been modeled to determine compliance with the Arizona DEQ Air Toxic Rule. The impact analysis is contained in the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station.*

Table 2
Hazardous Air Pollutant Emissions from the Power Generating Units

Pollutant	CAS Number	CATEF[a]/AP-42 Emission Factor	Fuel Burn Rate (MMscf/h)[b]	Emission Rate[c] (lb/h)
Acetaldehyde	75-07-0	4.83E-02	2.224	1.07E-01
Acrolein	107-02-8	1.44E-02	2.224	3.20E-02
Ammonia[d]	7664-41-7	-	-	3.12E+01
Arsenic	7440-38-2	2.00E-04	2.224	4.45E-04
Barium	7440-39-3	4.40E-03	2.224	9.79E-03
Benzene	71-43-2	2.10E-03	2.224	4.67E-03
Benz(a)anthracene	56-55-3	3.61E-06	2.224	8.03E-06
Benzo(a)pyrene	50-32-8	4.63E-07	2.224	1.03E-06
Beryllium	7440-41-7	1.20E-05	2.224	2.67E-05
1,3-Butadiene	106-99-0	1.24E-04	2.224	2.76E-04
Cadmium	7440-43-9	1.10E-03	2.224	2.45E-03
Chromium	7440-47-3	1.40E-03	2.224	3.11E-03
Cobalt	7440-48-4	8.40E-05	2.224	1.87E-04
Copper	7440-50-8	8.50E-04	2.224	1.89E-03
Dibenz(a,h)anthracene	53-70-3	3.03E-06	2.224	6.74E-06
Ethylbenzene	100-41-4	9.74E-03	2.224	2.17E-02
Formaldehyde	50-00-0	8.45E-02	2.224	1.88E-01
Hexane	110-54-3	2.19E-01	2.224	4.87E-01
Manganese	7439-96-5	3.80E-04	2.224	8.45E-04
Mercury	7439-97-6	2.60E-04	2.224	5.78E-04
2-Methylchloranthrene	56-49-5	5.07E-06	2.224	1.13E-05
Naphthalene	91-20-3	9.26E-04	2.224	2.06E-03
Nickel	7440-02-0	2.10E-03	2.224	4.67E-03
Propylene Oxide	75-56-9	4.48E-02	2.224	9.96E-02
Selenium	7782-49-2	2.40E-05	2.224	5.34E-05
Toluene	108-88-3	5.91E-02	2.224	1.31E-01
Vanadium	7440-62-2	2.30E-03	2.224	5.12E-03
Xylene (Total)	1330-20-7	1.93E-02	2.224	4.29E-02

[a]California Air Toxics Emission Factor database (CATEF Version 1.2).

[b] Determined from annual average performance parameters for the General Electric combustion turbine.

Fuel burn rate = (HHV turbine heat input (mmBtu/h) + HHV duct burner heat input (mmBtu/h))/AP-42 conversion factor for mmBtu to MMscf.
(1725.74 mmBtu/h + 542.7 mmBtu/h) / 1020 mmBtu/MMscf = 2.224 MMscf/h.

[c]Assumes operation of 4 turbines.

[d]Emission rate is a worst-case value from the three GE 73 F 100% load cases.

5.1 Regional Topography

Comment

The comparison of the digital data terrain heights and other information with USGS topographic quadrangles may create data conflicts due to differing NAD's.

Response

The terrain around the Project site is relatively flat other than the numerous buttes that can rise well above the stack top elevation. Receptor terrain elevations have been obtained from 30-meter Digital Elevation Model (DEM) terrain data based on United States Geological Survey (USGS) 7.5-minute digital quadrangles. The receptor elevations have been compared with the actual USGS 7.5-minute quadrangle maps to ensure consistency.

5.3.1 Surface Meteorology

Comment

There is no technical discussion or information presented on the surface meteorological data.

Response

Maricopa County ESDAQD provided surface Meteorological data for use in the modeling analysis. At the kickoff meeting, Maricopa County ESDAQD requested that the Palo Verde Nuclear Generating Station Meteorological dataset be used in the modeling analysis. Upon receipt, the data was put through a QA/QC process. Errors in the original dataset were found and a letter explaining the error and the data substitution process was set to Elena Gorelik of Maricopa County ESDAQD. A copy of the letter is located in Attachment 2.

Attachment 3 contains a wind rose has been provided to illustrate the wind speeds and directions registered at the monitor from 1994-1998. The Frequency Distribution of Stability Classes is also presented in Attachment 3. Calm hours in the dataset will be processed using the regulatory default option in Industrial Source Complex Short-Term 3 (ISCST3 Version 99155).

6.2 Model Input Defaults/Options

Comment:

Intermediate Terrain option is not listed as a model options (SICS).

Response:

The ISCST3 air dispersion model contains no selectable switch or option for modeling intermediate terrain. Intermediate terrain is handled by the use of the simple terrain and complex terrain options in the model. Through the selection of both the simple and complex terrain options in ISCST3, the model internally evaluates receptors located in intermediate terrain by calculating impacts with both the simple terrain algorithm and the complex terrain algorithm. The model output result is given as the higher of the two impacts. This procedure is in accordance with EPA's air dispersion modeling guidelines (incorporated as Appendix W of 40 CFR 51).

6.3 Rural/Urban Classification

Comment:

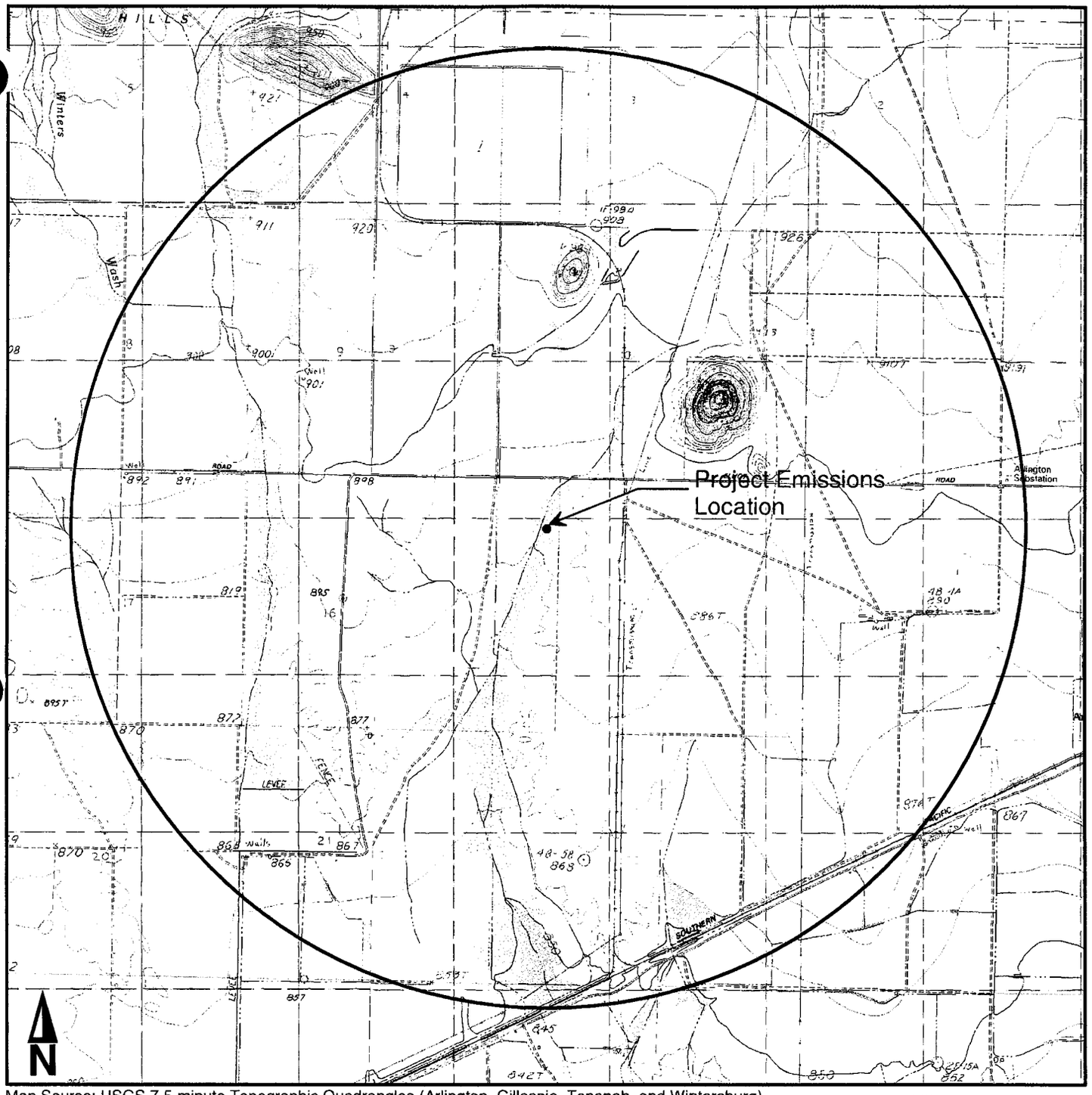
There is no technical justification for use of rural dispersion coefficient.

Response:

The EPA's land use method was used to determine whether rural or urban dispersion coefficients should be used in the ISCST3 air dispersion model. In this procedure, land circumscribed within a 3-km radius of the Project was classified as rural or urban using the Auer land use classification method. The area is shown in Figure 5. Table 3 presents the land-use classification types. Using the Auer method it was found that the urban land-use classification types I1, I2, C1, R2, and R3 account for significantly less than 50 percent of the three-kilometer radius. Therefore, the rural dispersion coefficients will be used for the air dispersion modeling analysis.

Table 3
Land-Use Classification Types

Type	Description	Class
I1	Heavy Industrial	Urban
I2	Light/Moderate Industrial	Urban
C1	Commercial	Urban
R1	Common Residential (Normal Easements)	Rural
R2	Compact Residential (Single Family)	Urban
R3	Compact Residential (Multi-Family)	Urban
R4	Estate Residential (Multi-Acre)	Rural
A1	Metropolitan Natural	Rural
A2	Agricultural	Rural
A3	Undeveloped (Grasses/Weeds)	Rural
A4	Undeveloped (Heavily Wooded)	Rural
A5	Water Surfaces	Rural



Map Source: USGS 7.5 minute Topographic Quadrangles (Arlington, Gillespie, Tonopah, and Wintersburg)

Kilometers

0 0.5 1.0 1.5

Auer Land-use Map
3 Kilometer Radius

Figure 5

Land-use.srf

6.4 Receptor Network

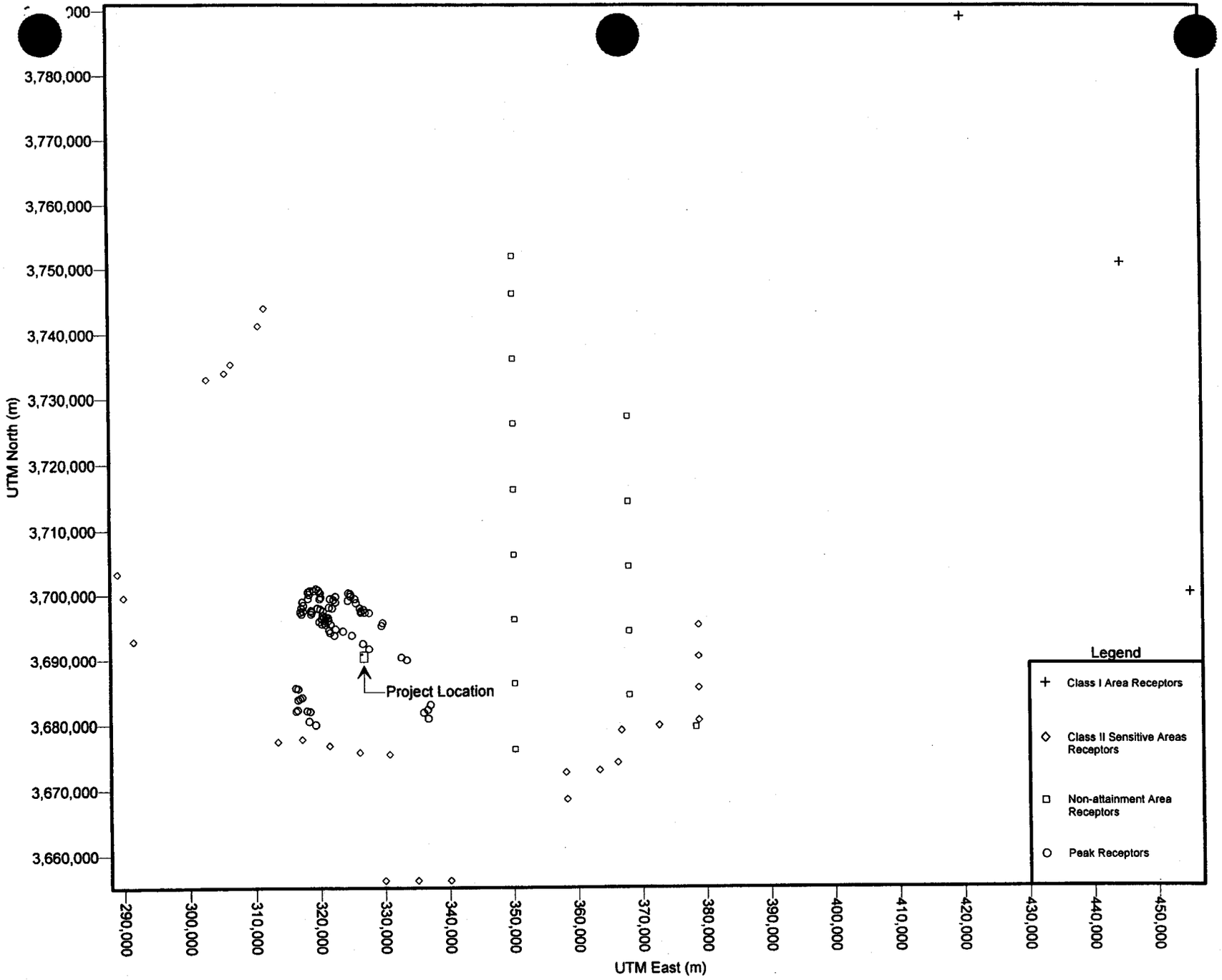
Comment:

Maricopa County Regulation Rule 240, Section 303 requires a 50-km grid. There is a 10-km grid with additional discrete receptors proposed in the Workplan.

Response:

We have already been notified by Maricopa County ESDAQD that a 50-km grid will be required for the analysis. Thus, the grid has been extended appropriately to meet this requirement. Now, the nested rectangular grid network consists of 100 meter spacing out to 1 km, 500 m spacing from 1 to 5 km, 1,000 m spacing from 5 to 10 km, 2,000 m spacing from 10 to 20 km, 5,000 m spacing from 20 to 40 km, and 10 km spacing from 40 to 50 km. Receptor spacing at 50-m intervals is used along the fenceline. These receptors are presented in Attachment 4. Numerous discrete receptors were also placed at the closest boundaries of the Phoenix nonattainment areas, Hummingbird Springs, Bighorn Mountain, Eagletail Mountains, Signal Mountain, Woolsey Peak, North Maricopa Mountains Class II Wilderness areas, Gila Bend and Gila River Indian Reservations, as well as on the peaks of significant (i.e., complex) terrain features. Attachment 5 presents a listing of these discrete receptors used in the air dispersion modeling analyses. Figures 2 illustrates the locations of these Class I and Class II sensitive areas while Figure 6 shows the receptors placed at them.

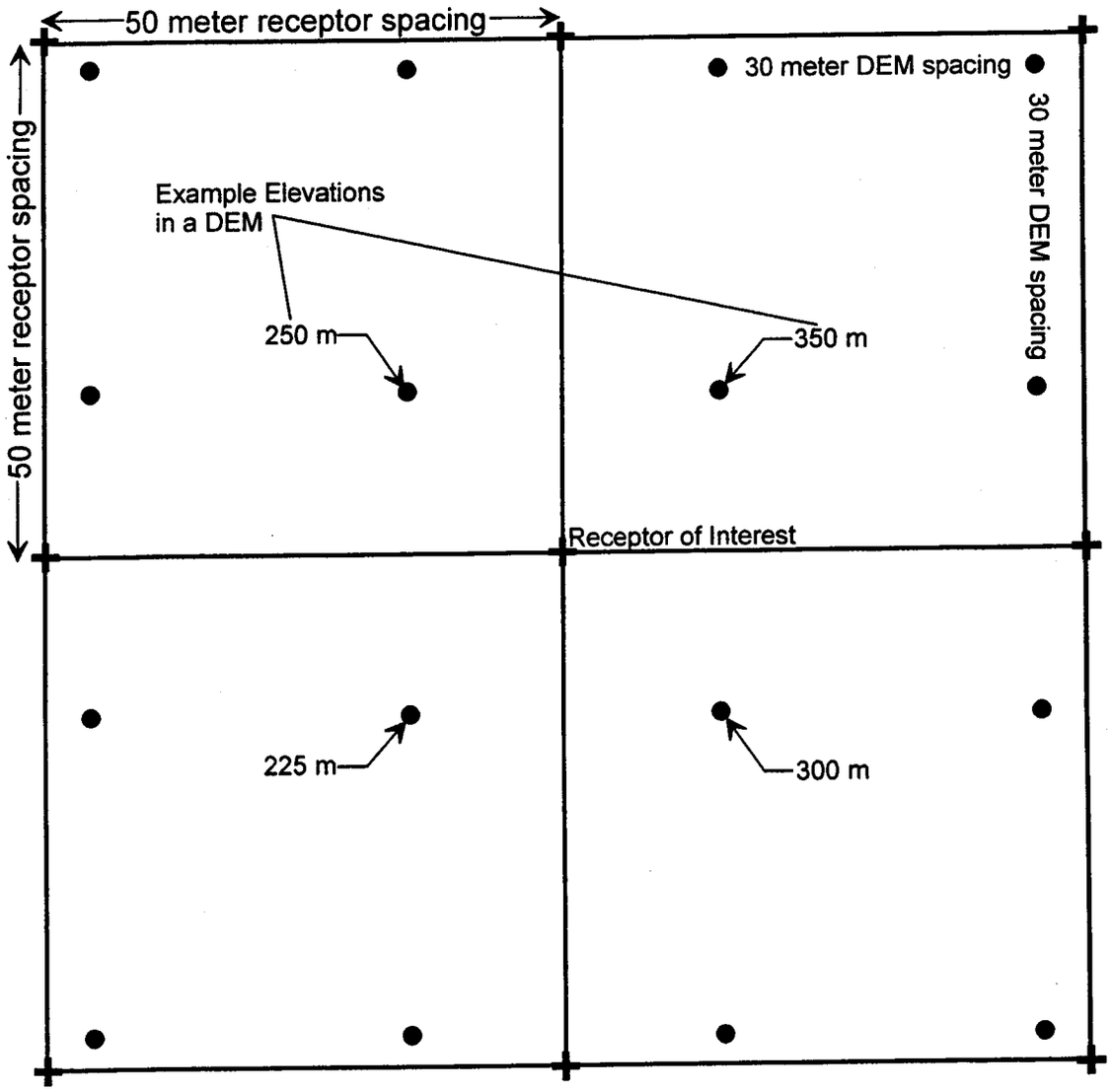
The air quality impact analysis presented in the air permit application is based on the 10-km grid. An analysis has recently been completed for the additional receptors associated with the 50-km extended grid. The results of this analysis show that the maximum air quality impacts were within the original 10-km grid. Extending the grid does not result in higher air quality impacts. The analysis with the 50-km extended grid will be provided to Maricopa County ESDAQD as a supplement to the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station.*



Additional Discrete Receptor Locations

Figure 6

Discrete Receptors.srf



The receptor of interest in this example
(using the 'highest' option in the ISCST3 GUI)
would have an elevation of 350 m assigned to it.

Digital Elevation Model
Terrain Elevation Selection Procedure

Figure 7

DEM Procedure.srf

6.5 Receptor Elevations

Comment:

There is no presentation of proposed receptor elevations/heights. Also, the documentation of the "box" method of terrain height determination of digital terrain data has not been discussed in detail or provided for review.

Response:

The list in Attachment 4 of all nested receptors used in the air dispersion modeling analysis includes each receptor's elevation. Locations and elevations of extra discrete receptors were previously presented in the response to Comment 6.4 Receptor Network.

The graphical user interface (GUI) used with the ISCST3 air dispersion model contains options for the selection of a receptor's elevation from a digital elevation model (DEM). At any given receptor location, there are four DEM elevation points that surround the receptor. The method chosen in the GUI for determining terrain elevations is labeled 'highest.' Thus, the highest of those 4 DEM elevation points will be given to the receptor. Figure 7 illustrates an example of this process. In addition, the receptor elevations have been compared with the actual USGS 7.5-minute quadrangle maps to ensure consistency.

6.6 Source Characterization

Comment:

See Comment associated with Checklist Section 4.1. (Comment 4.1 Source Emission Inventory: There is no presentation of preliminary/proposed source listing with associated stack locations, parameters and emission rates (grams/sec and tons/year). This is the basis of a modeling protocol/analysis and needs to be presented.)

Response:

See response to Comment 4.1 Source Emission Inventory.

6.7 Source Location and Parameters

Comment:

See Comment associated with Checklist Section 4.1. (Comment 4.1 Source Emission Inventory: There is no presentation of preliminary/proposed source listing with associated stack locations, parameters and emission rates (grams/sec and tons/year). This is the basis of a modeling protocol/analysis and needs to be presented.)

Response:

See response to Comment 4.1 Source Emission Inventory.

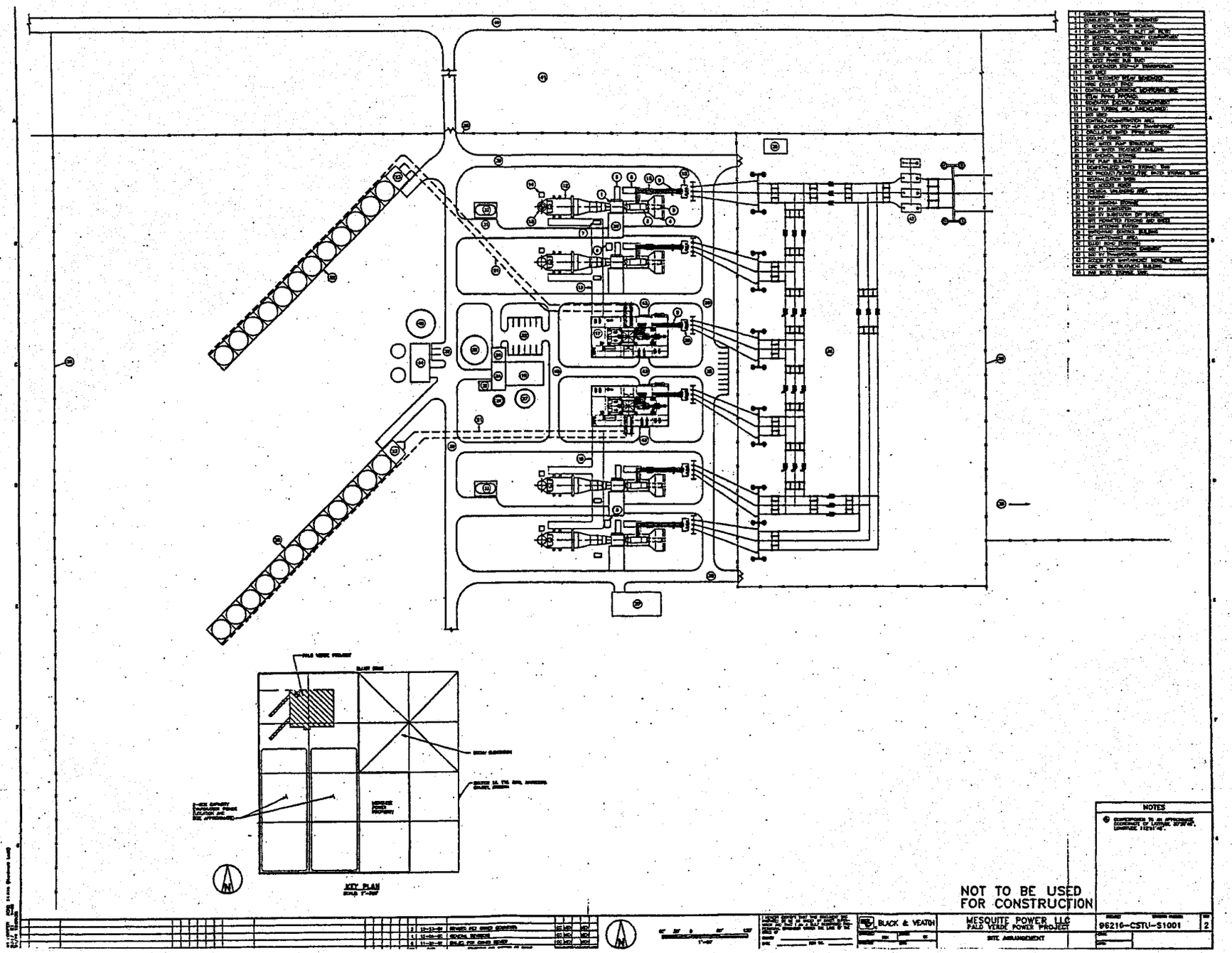
6.8 Building Wake Downwash and GEP

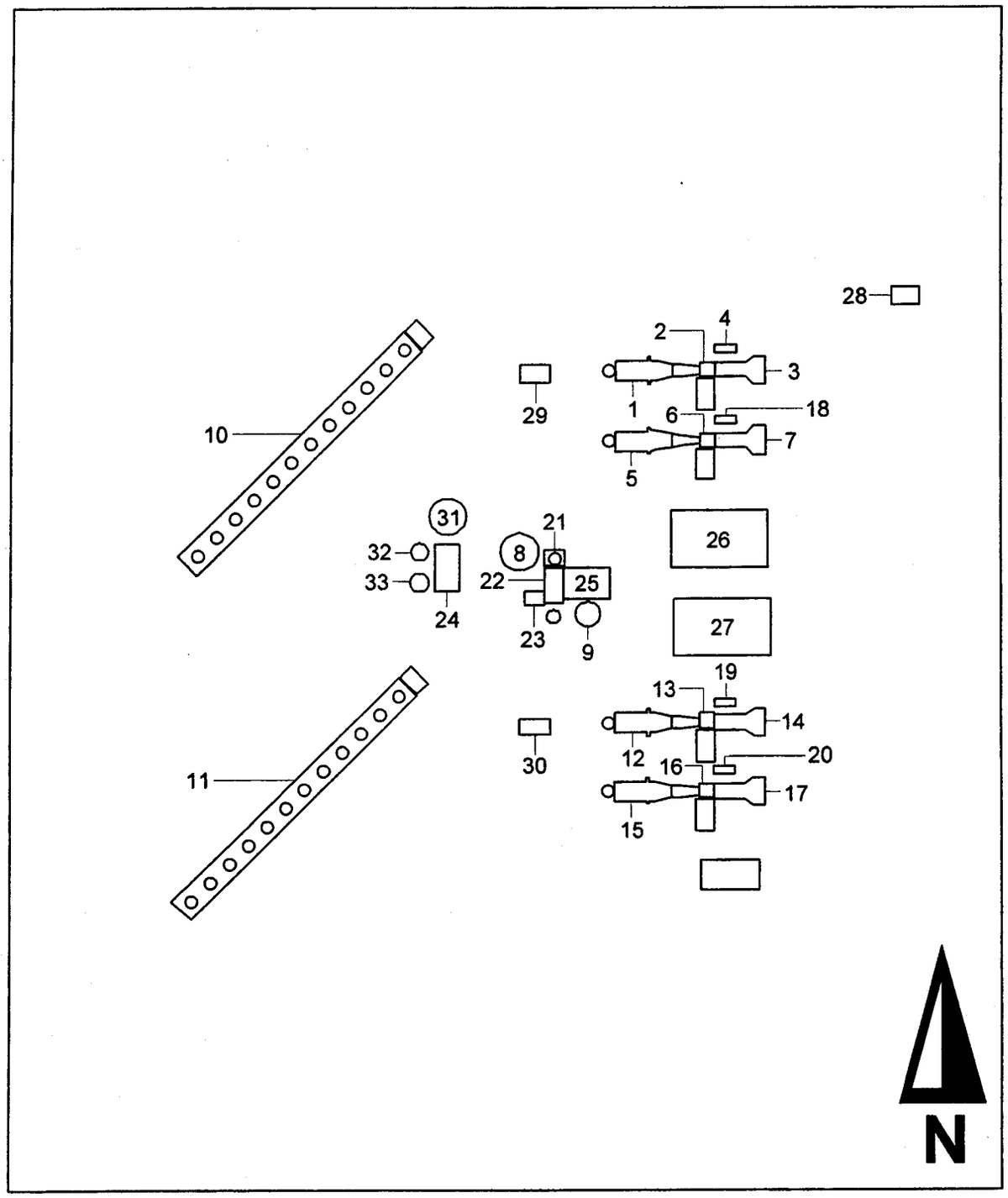
Comment:

The GEP and Building Downwash Analysis should take into account any structure on-site or off-site that may influence plume dispersion.

Response:

The Project's proposed buildings and structures have been analyzed to determine their potential to influence the dispersion of stack emissions. EPA's Guideline for Determination of Good Engineering Practice Stack Height guidance document have been followed in this evaluation. Structure dimensions and relative locations were entered into EPA's Building Profile Input Program (BPIP) to produce an ISCST3 input file with the proper Huber-Snyder or Schulman-Scire direction specific building downwash parameters. Figure 8 provides a site plan of the Project indicates locations and dimension of buildings and structures on-site. Figure 9 illustrates those building and structure included in the BPIP analysis. Table 4 lists the structures included in the BPIP analysis. A discussion of building downwash and GEP is included in the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station* Section 6.3.3.


KEY PLAN
NOTES
NOT TO BE USED
FOR CONSTRUCTION
BLACK & VEATCH
MESQUITE POWER LLC
PALO VERDE POWER PROJECT
SITE ARRANGEMENT
96216-CSTU-S1001
2



Buildings and Stuctures Included in the BPIP Analysis*

*See Table 4 for building/structure identification and dimensions.

Figure 9

building.srf

Table 4 Structures Included in the BPIP Analysis			
Structure ID Number	Structure Designation*	Structure Base Elevation (ft)	Structure Height (ft)
1	HRSG 1	890	90
2	Combustion Turbine 1	890	45
3	Air Inlet 1	890	45
4	Electrical Control Center 1	890	10
5	HRSG 2	890	90
6	Combustion Turbine 2	890	45
7	Air Inlet 2	890	45
8	Firewater Storage Tank	890	60
9	Demineralized Water Tank	890	40
10	Cooling Tower 1	890	35
11	Cooling Tower 2	890	35
12	HRSG 3	890	90
13	Combustion Turbine 3	890	45
14	Air Inlet 3	890	45
15	HRSG 4	890	90
16	Combustion Turbine 4	890	45
17	Air Inlet 4	890	45
18	Electrical Control Center 2	890	10
19	Electrical Control Center 3	890	10
20	Electrical Control Center 4	890	10
21	Firewater Pump Housing	890	20
22	Demineralized H_2O Treatment	890	20
23	Waste Chemical Storage	890	20
24	Circulation Water Treatment	890	35
25	Control/Administration Area	890	60
26	Steam Turbine Area 1	890	60
27	Steam Turbine Area 2	890	60
28	Switchyard Control Building	890	20
29	SCR Ammonia Storage 1	890	25

Table 4 (Continued) Structures Included in the BPIP Analysis			
Structure ID Number	Structure Designation*	Structure Base Elevation (ft)	Structure Height (ft)
30	SCR Ammonia Storage 2	890	25
31	Raw Water Storage Tank	890	60
32	Tank 1	890	20
33	Tank 2	890	20
*Proposed structures to be located at the Project. Refer to Figure 9 for locations.			

7.1 Preliminary Analysis

Comment:

Preliminary modeling, traditionally referred to as screening level modeling, has not been presented in the protocol. An alternative approach referred to as "enveloping" has been proposed by Black & Veatch. The "enveloping" approach has not been adequately described by Black & Veatch and needs to be better explained to warrant approval.

Response:

Due to the significant increase in computing power (i.e., speed and file size handling), it is often more effective to jump directly to a refined level of modeling. Refined air dispersion modeling was performed for the Project to determine the maximum air quality impacts and significant impact area.

Enveloping is a process that considers all of the operating scenarios (i.e., high, ambient, or low temperature operation, steam injection on/off, inlet fogging on/off, etc.) for a particular operating load (i.e., 100%, 50%, etc.) and chooses the worst-case operating scenario per load (i.e., lowest exit velocity, lowest exit temperature, and highest emission rates per pollutant). This process results in worst-case plume dispersion conditions and highest model predicted concentrations. Table 5 presents the refined air dispersion modeling results for each of the pollutants evaluated (NOx, CO, and PM10). These maximum impacts were evaluated over the entire receptor network previously described including the added discrete receptors on the peaks of complex terrain.

The results indicate maximum impacts in excess of the Significant Impact Levels (SILs) for NO_x and PM_{10} (annual and 24-hour averaging periods). Thus, a PSD and NAAQS cumulative analysis is included in the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station.* Table 5 also indicates a maximum PM_{10} 24-hour impact above the De Minimis monitoring requirements. Mesquite Power, LLC proposes to use the existing Palo Verde air monitor to serve as a representative background value for the Project (see response to Comment 3.1 Pre-Application Air Quality Monitoring).

Table 6 presents the maximum extent of the significant impacts (i.e., the significant impact area) for the Project. As seen in the table, the maximum distance for any pollutant is 14.03 km. Projects located within this distance include Palo Verde Nuclear Generating Station, Duke's Arlington Valley Energy Project, Pinnacle West's Capitol Corporation Project, and the El Paso Natural Gas Compressor Station. A complete discussion as well as modeling results and comparisons to PSD Class II SILs, NAAQS, and increment can be found in the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station.*

Table 5
Comparison of Maximum Predicted Project Impacts with the PSD Class II Significant Impact Levels and the PSD De Minimis Monitoring Levels

Pollutant	Averaging Period	General Electric			Westinghouse			PSD Class II Significant Impact Level[b] ($\mu g/m^3$)	Further Analysis Required[c]	PSD De Minimis Monitoring Level[d] ($\mu g/m^3$)	PSD De Minimis Monitoring Level Exceeded?
		Max. Predicted Impact[a] ($\mu g/m^3$)	UTM Location (m)		Max. Predicted Impact[a] ($\mu g/m^3$)	UTM Location (m)					
			East	North		East	North				
NO_x	Annual	2.37	327711.5	3691769.3	2.39	327711.5	3691769.3	1	**Yes**	14	No
CO	1 Hour	479.69	326286.4	3690600.0	479.69	326286.4	3690600.0	2,000	**No**	-	-
	8 Hour	34.72	327711.5	3691769.3	35.12	327711.5	3691769.3	500	**No**	575	No
PM_{10}	Annual	3.95	327711.5	3691769.3	3.59	327711.5	3691769.3	1	**Yes**	-	-
	24 Hour	32.28	327711.5	3691769.3	29.50	327711.5	3691769.3	5	**Yes**	10	**Yes**

[a]For a complete listing of all impacts by year, pollutant, operating scenario, and averaging period refer to Appendix G of the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station*.

[b]Predicted impacts from the Project that are below the specified level indicate that the Project will not have predicted significant impacts for that pollutant and further modeling is not necessary for that pollutant.

[c]If required, further analysis includes ambient air quality impact analysis of the Project and all nearby sources to determine compliance with PSD increment consumption and NAAQS.

[d]This criteria is used to assist in the determination of whether preconstruction ambient air monitoring is required to assess current and future compliance with NAAQS.

Table 6
Significant Impact Areas

Pollutant	Averaging Period	PSD Significant Impact Level ($\mu g/m^3$)	Distance of Significant Impact[a] (km)
NO_x	Annual	1.0	1.46
PM_{10}	Annual	1.0	5.41
PM_{10}	24 Hour	5.0	14.03

[a]The significant impact area for each pollutant and averaging period is defined by the distance shown and is the largest distance of the two turbine vendors' machines (General Electric and Westinghouse).

7.2 Full Impact Analysis

Comment:

There is no discussion or proposed approach to show compliance with the proposed Arizona DEQ Air Toxics Rule.

Response:

A hazardous air pollutants (HAPs) analysis has been performed for the Project in accordance with current draft Maricopa County ESDAQD guidance documents (Air Toxics/Hazardous Air Pollutant Permitting Procedure December 14, 1999, and Arizona Ambient Air Quality Guidelines (AAAQGs) 1999 Update). AAAQGs are residential screening values that are protective of human health by considering the risk from inhalation of contaminants in ambient air. Emissions of HAPs, including ammonia slip associated with the use of Selective Catalytic Reduction (SCR), from the Project has been estimated using the California Air Toxics Emission Factor (CATEF) program and AP-42, Volume I, Fifth Edition. A modeling analysis has been performed using worst case annual average performance parameters for the General Electric combustion turbine. These parameters are assumed to represent emissions from the Project. The modeling analysis uses the ISCST3 air dispersion model to model a nominal 1 g/s emission rate with the fence line receptors and the 50 km nested receptor network. The emission factors and input assumptions for the Air Toxics/HAPs analysis are found back in Table 2. This discussion as well as modeling results and comparisons to the AAAQGs can be found in the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station* Section 6.8.6.

9.0 Class I Impact Analysis

Comment:

There appears to be an exemption from Class I Impact issues proposed in the Workplan.

Response:

As mentioned in Section 2.2 of the Workplan, neither visibility nor regional haze analyses were required for the Superstition, Mazatzal, and Pine Mountain Class I Wilderness Areas at the word of Mr. Peter Lahm of the U.S. Forest Service, representing the Federal Land Manager(s) of these areas. These Class I areas are located approximately 127 km, 132 km, and 135 km respectively from the Project. As justification for the exemption, in addition to the significant distances, the Project will employ the use of clean fuel technology (natural gas) with state-of-the-art pollution control equipment. The relative locations of the Class I areas to the Project also provide for the exemption from these analyses. The large Phoenix metropolitan area, including both NOx and PM10 nonattainment areas, lies between the Project location and the Class I areas. Thus, the transport of a plume from the Project across such an area will not likely adversely affect these Class I areas. Mesquite Power, LLC has, however, placed receptors at the closest boundaries to the Project and modeled maximum ground-level impacts at each of these areas. These ground-level impacts have been compared with the Class I SILs. The Class I SILs are calculated as 4 percent of the PSD Class I increments, as recommended by the National Park Service. This discussion as well as modeling results and comparisons to the Class I SILs can be found in the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station* Section 6.8.5.

11.0 Appendices

Comment:

Minutes from the pre-application meeting and any other correspondence between the proponent and Maricopa County ESDAQD were not included in the Workplan.

Response:

Official minutes for the kickoff meeting with Maricopa County ESDAQD were not recorded by any of the involved parties. A single letter of correspondence to Maricopa County ESDAQD pertaining to the errors found and corrected in the meteorological data set obtained from the county is contained in Attachment 2.

End of Comments and Responses.

Additional Information

Modeled impact on PM_{10} and Ozone Nonattainment Areas

The Project will be located approximately 15 miles west of the Phoenix nonattainment area for PM_{10} and 25 miles west of the Phoenix nonattainment area for CO and NO_x (as a precursor to O_3) PSD pollutants. Maricopa County Rule 240 Section 308.1(e) presumes that any major source of VOCs and NO_x located within 50 km (31 miles) of an ozone nonattainment area contributes to ozone violations unless it can be demonstrated that topographical, meteorological, or other physical factors in the vicinity of the new major source are such that emissions are not expected to contribute to violations of the ozone standards in the adjacent nonattainment areas.

Figure 10 shows a seasonal, daytime wind rose for the Project, the boundary for the ozone nonattainment area, as well as the surrounding terrain and topography. The wind rose represents the hottest months (May through October) and the daylight hours (8 am to 8 pm). These bounds are used to represent the summer ozone period. The prevailing wind is from the southwest (with smaller components from the south). Considering these winds, emissions from the Project would be transported to the northeast along the river valley towards the White Tank Mountains. This keeps the emissions from making further eastward progression towards the ozone nonattainment area. Thus it is not likely, based on meteorological and topographical considerations, that emissions from the Project would be transported through the Buckeye Valley into the ozone nonattainment area of the Phoenix air basin.

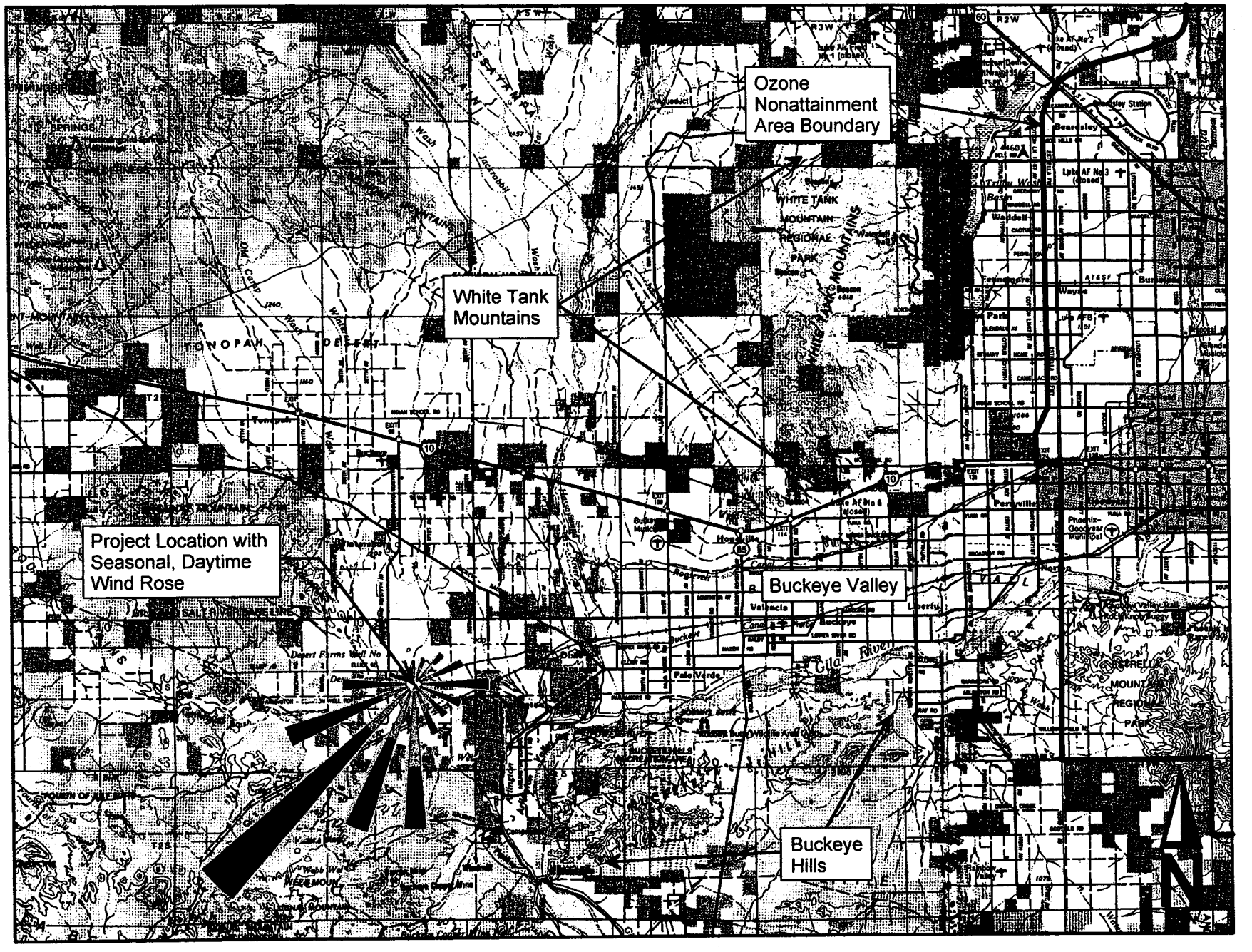
As further consideration of the transport of emissions from the Project into both the ozone and PM_{10} nonattainment areas, each area has been evaluated with a modeling analysis. These areas have been modeled with the ISCST3 air dispersion model to demonstrate there will be no significant impacts of PM_{10} into the PM_{10} nonattainment area and NO_x into the ozone nonattainment area (Because NO_x is a precursor to ozone formation, predicting an insignificant impact of NO_x can be used as a surrogate for determining, an insignificant impact on the ozone nonattainment area).

Receptors were placed along the boundaries of the nonattainment areas and modeled against PSD Class II significant impact levels. Figure 11 illustrates the receptors with respect to the proposed Project location. Modeling results show that the Project will not have a significant impact of NO_x or PM_{10} on the nonattainment areas. In fact, the maximum significant impact area for the Project is only 14.03 km while the distance to the nearest nonattainment boundary is 24 km. This discussion as well as modeling results and comparisons to the PSD Class II SILs can be found in the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station* Section 6.8.1.

In consideration of the above arguments and at the suggestion of Maricopa County ESDAQD, in a conference call on March 15, 2000, Mesquite Power, LLC is requesting a waiver from conducting an ozone impact analysis. Ozone is a regional issue insomuch as it is not entirely adequate to model a single source for its ozone

contribution. It is understood, however, that regional ozone transport may still be of certain concern. For this reason, Mesquite Power, LLC has included NO_x and VOC emission rates in these responses to comments on the Workplan and in the *Prevention of Significant Deterioration And Title V Air Permit Application For The Mesquite Generating Station* document. These data can be used for use in the Maricopa Association of Governments (MAG) analysis for regional ozone.

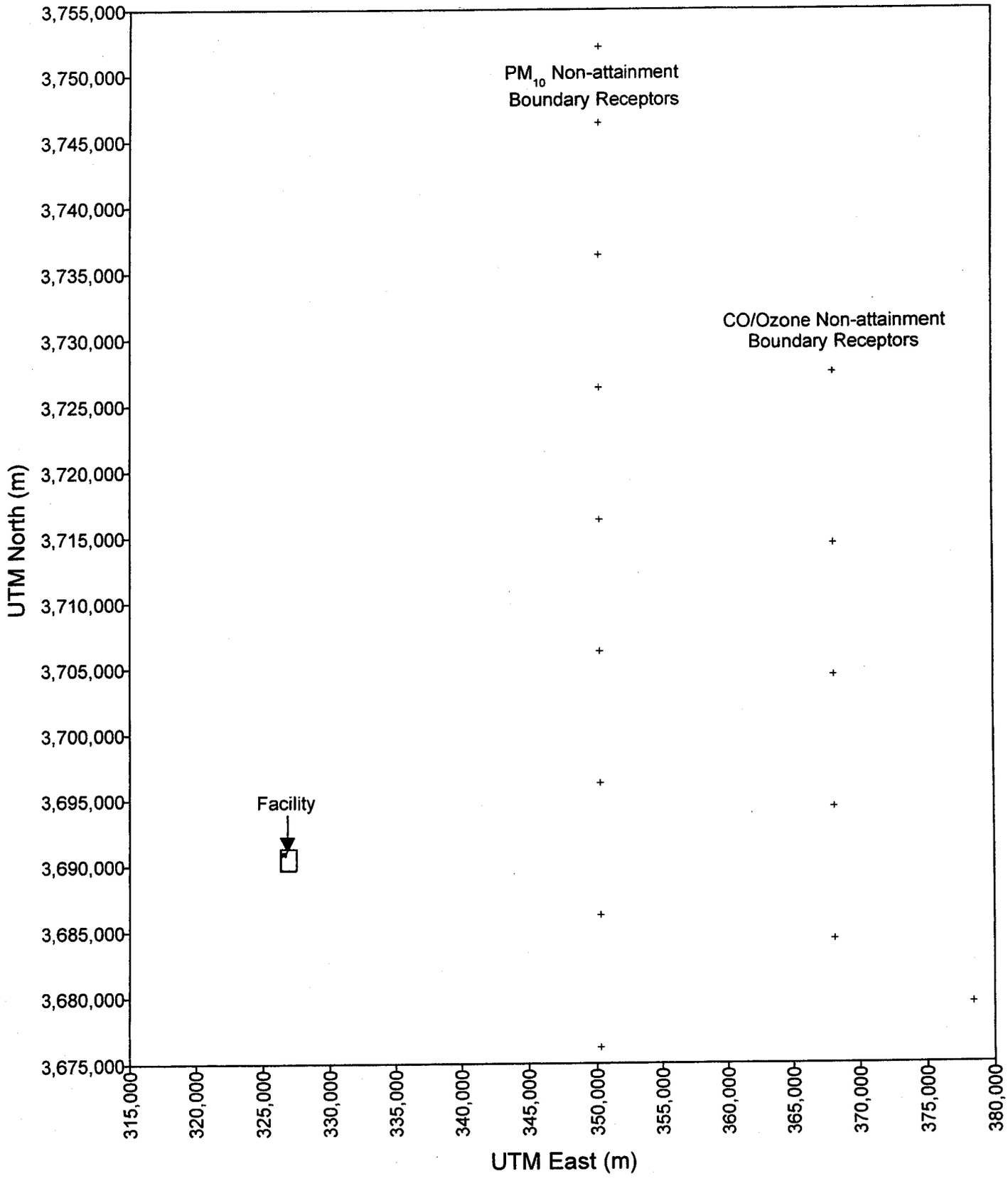
In accordance with PSD review guidelines, if a proposed source has potential VOC emissions in excess of 100 tpy, ozone monitoring may be required if representative data do not exist. The potential VOC emissions for the Mesquite Generating Station are greater than 100 tpy. Mesquite Power, LLC proposes to use the Palo Verde Nuclear Generating Station's air quality monitor (AIRS #04-013-9993) to address the possible need of ozone monitoring. This monitor, operated by the Arizona Department of Environmental Quality, is given periodic precision and accuracy checks consistent with NSR/PSD guidelines (as detailed in correspondence from Peter Hyde in Attachment 6). Background monitored ozone concentrations are given in Table 7. The specifics of this monitor are addressed in the response to Comment 3.4 Background Concentrations.



Wind Rose, Topography, & Ozone Nonattainment Area

Figure 10

nonattainment.srf



Non-attainment Boundary Receptors

Figure 11

NAgrid.srf

Table 7
Representative Ambient Background Monitoring Data

Monitoring Site	Location Latitude/ Longitude (degrees)	Distance from Project (km)	Direction from Project	Year And Pollutant Monitored	Averaging Period	Representative Background Concentration (ppm)
Palo Verde[a]	33.349/ 112.832	3.0	N	1997[b] O_3	1 hour[e]	0.099
Palo Verde[a]	33.349/ 112.832	3.0	N	1997[b] O_3	Monthly[f]	0.048
Palo Verde[a]	33.349/ 112.832	3.0	N	1998[c] O_3	1 hour[e]	0.099
Palo Verde[a]	33.349/ 112.832	3.0	N	1998[c] O_3	Monthly[f]	0.046
Palo Verde[a]	33.349/ 112.832	3.0	N	1999[d] O_3	1 hour[e]	0.090
Palo Verde[a]	33.349/ 112.832	3.0	N	1999[d] O_3	Monthly[f]	0.054

[a]Palo Verde Nuclear Generating Station (AIRS #04-013-9993).
[b]1997 data consists of 8 months of data (April – November).
[c]1998 data consists of 6 months of data (April – Semptember).
[d]1999 data consists of 7 months of data (April – October).
[e]Maximum 1 hour value for the given year.
[f]Maximum monthly average for the given year.

5.2 Regional Climatology

Temperatures range from very hot in summer to mild in winter. Many winter days reach over 70 degrees and typical high temperatures in the middle of the winter are in the 60s. The normal high temperature is over 90 degrees from early May through early October, and over 100 degrees from early June through early September. Many days each summer will exceed 110 degrees in the afternoon and remain above 85 degrees all night. In addition, the climate is very dry. Annual precipitation is only about 7 inches, and afternoon humidities range from about 30 percent in winter to only about 10 percent in June.

10.0 References

U.S. Environmental Protection Agency (EPA), 1985: *Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations),* (Revised), EPA-450/4-80-023R. U.S. EPA Office of Air and Radiation, U.S. EPA Office of Air Quality Planning and Standards. Research Triangle Park, NC.

U.S. Environmental Protection Agency (EPA), 1997: *Guideline on Air Quality Models,* (Revised), EPA-450/2-78-027R-C. Office of Air and Radiation, Office of Air Quality Planning and Standards, Research Triangle Park, NC.

U.S. Environmental Protection Agency (EPA). February 1996. New Source Review Workshop Manual.

U.S. Environmental Protection Agency (EPA). 1998. Compilation of Air Pollutant Emission Factors, AP-42.

Attachments

Attachment 1
Stack Parameters and Emission Tables
&
PTE Spreadsheet

COMPANY NAME & LOCATION Mesquite Power, L L C

EMISSION SOURCES - One of Two Alternative Operating Scenarios

DATE 1/19/2000

Estimated Potential to Emit as per Rule 100.
Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS									
EMISSION POINT (1) General Electric		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION POINT (5)			STACK SOURCES (6) Annual Average Conditions					NONPOINT SOURCES (7)	
NUMBER	Combustion Turbine and Duct Burner NAME	REGULATED AIR POLLUTANT NAME (2)	#/HR. (3)	TONS /YEAR (4)	ZONE	EAST (Mtrs.)	NORTH (Mtrs.)	HEIGHT ABOVE GROUND /feet	HEIGHT ABOVE STRUC. /feet	EXIT DATA DIA. (ft.)	EXIT DATA VEL. (fps.)	EXIT DATA TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
1	unit 1	NOx	22.2	92.4	12	326601.9	3691016.0	170	80	18	64.1	172.1	NA	NA
1	unit 1	CO	21.6	89.8	12	326601.9	3691016.0	170	80	18	64.1	172.1	NA	NA
1	unit 1	PM/PM10	30.4	126.6	12	326601.9	3691016.0	170	80	18	64.1	172.1	NA	NA
1	unit 1	SO2	2.1	8.8	12	326601.9	3691016.0	170	80	18	64.1	172.1	NA	NA
1	unit 1	VOC	16.6	64.8	12	326601.9	3691016.0	170	80	18	64.1	172.1	NA	NA
2	unit 2	NOx	22.2	92.4	12	326601.9	3690980.4	170	80	18	64.1	172.1	NA	NA
2	unit 2	CO	21.6	89.8	12	326601.9	3690980.4	170	80	18	64.1	172.1	NA	NA
2	unit 2	PM/PM10	30.4	126.6	12	326601.9	3690980.4	170	80	18	64.1	172.1	NA	NA
2	unit 2	SO2	2.1	8.8	12	326601.9	3690980.4	170	80	18	64.1	172.1	NA	NA

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 890 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

General Instructions:

(1) Identify each emission point with a unique number for this plant site, consistent with emission point identification used on plot plan, previous permits, and Emissions Inventory Questionnaire. Include fugitive emissions. Limit emission point number to eight (8) character spaces. For each emission point use as many lines as necessary to list regulated air pollutant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, baghouse, fugitive, etc. Abbreviations are O.K.

(2) Components to be listed include regulated air pollutants as defined in R18-2-101. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_x), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.

(3) Pounds per hour (#/HR) is maximum potential emission rate expected by applicant.

(4) Tons per year is annual maximum potential emission expected by applicant, which takes into account process operating schedule.

(5) As a minimum applicant shall furnish a facility plot plan as described in the filing instructions. UTM coordinates are required only if the source is a major source or is required to perform refined modeling for the purposes of demonstrating compliance with ambient air quality guidelines.

(6) Supply additional information as follows if appropriate:
(a) Stack exit configuration other than a round vertical stack. Show length and width for a rectangular stack. Indicate if horizontal discharge with a note.
(b) Stack's height above supporting or adjacent structures if structure is within 3 "stack height above the ground" of stack.

(7) Dimensions of nonpoint sources as defined in R18-2-101.

COMPANY NAME & LOCATION Mesquite Power, L L C

EMISSION SOURCES - One of Two Alternative Operating Scenarios

DATE 1/19/2000

Estimated Potential to Emit as per Rule 100.
Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS										
EMISSION POINT (1) General Electric		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION POINT (5)			STACK SOURCES (6) Annual Average Conditions					NONPOINT SOURCES (7)	
NUMBER	Combustion Turbine and Duct Burner NAME	REGULATED AIR POLLUTANT NAME (2)	#/HR. (3)	TONS /YEAR (4)	ZONE	EAST (Mtrs.)	NORTH (Mtrs.)	HEIGHT ABOVE GROUND /feet	HEIGHT ABOVE STRUC. /feet	EXIT DATA DIA. (ft.)	EXIT DATA VEL. (fps.)	EXIT DATA TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
2	unit 2	VOC	16.6	64.8	12	326601.9	3690980.4	170	80	18	64.1	172.1	NA	NA
3	unit 3	NOx	22.2	92.4	12	326601.8	3690836.8	170	80	18	64.1	172.1	NA	NA
3	unit 3	CO	21.6	89.8	12	326601.8	3690836.8	170	80	18	64.1	172.1	NA	NA
3	unit 3	PM/PM10	30.4	126.6	12	326601.8	3690836.8	170	80	18	64.1	172.1	NA	NA
3	unit 3	SO2	2.1	8.8	12	326601.8	3690836.8	170	80	18	64.1	172.1	NA	NA
3	unit 3	VOC	16.6	64.8	12	326601.8	3690836.8	170	80	18	64.1	172.1	NA	NA
4	unit 4	NOx	22.2	92.4	12	326601.5	3690802.2	170	80	18	64.1	172.1	NA	NA
4	unit 4	CO	21.6	89.8	12	326601.5	3690802.2	170	80	18	64.1	172.1	NA	NA
4	unit 4	PM/PM10	30.4	126.6	12	326601.5	3690802.2	170	80	18	64.1	172.1	NA	NA

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 890 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

General Instructions:

(1) Identify each emission point with a unique number for this plant site, consistent with emission point identification used on plot plan, previous permits, and Emissions Inventory Questionnaire. Include fugitive emissions. Limit emission point number to eight (8) character spaces. For each emission point use as many lines as necessary to list regulated air pollutant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, baghouse, fugitive, etc. Abbreviations are O.K.

(2) Components to be listed include regulated air pollutants as defined in R18-2-101. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_X), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.

(3) Pounds per hour (#/HR) is maximum potential emission rate expected by applicant.

(4) Tons per year is annual maximum potential emission expected by applicant, which takes into account process operating schedule.

(5) As a minimum applicant shall furnish a facility plot plan as described in the filing instructions. UTM coordinates are required only if the source is a major source or is required to perform refined modeling for the purposes of demonstrating compliance with ambient air quality guidelines.

(6) Supply additional information as follows if appropriate:
   (a) Stack exit configuration other than a round vertical stack. Show length and width for a rectangular stack. Indicate if horizontal discharge with a note.
   (b) Stack's height above supporting or adjacent structures if structure is within 3 "stack height above the ground" of stack.

(7) Dimensions of nonpoint sources as defined in R18-2-101.

COMPANY NAME & LOCATION Mesquite Power, L L C

EMISSION SOURCES - One of Two Alternatives Operating Scenarios

DATE 1/19/2000

Estimated Potential to Emit as per Rule 100.
Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS									
EMISSION POINT (1) General Electric		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION POINT (5)			STACK SOURCES (6) Annual Average Conditions					NONPOINT SOURCES (7)	
NUMBER	Combustion Turbine and Duct Burner NAME	REGULATED AIR POLLUTANT NAME (2)	#/HR. (3)	TONS /YEAR (4)	ZONE	EAST (Mtrs.)	NORTH (Mtrs.)	HEIGHT ABOVE GROUND /feet	HEIGHT ABOVE STRUC. /feet	EXIT DATA DIA. (ft.)	EXIT DATA VEL. (fps.)	EXIT DATA TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
4	unit 4	SO2	2.1	8.8	12	326601.5	3690802.2	170	80	18	64.1	172.1	NA	NA
4	unit 4	VOC	16.6	64.8	12	326601.5	3690802.2	170	80	18	64.1	172.1	NA	NA

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 890 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

General Instructions:

(1) Identify each emission point with a unique number for this plant site, consistent with emission point identification used on plot plan, previous permits, and Emissions Inventory Questionnaire. Include fugitive emissions. Limit emission point number to eight (8) character spaces. For each emission point use as many lines as necessary to list regulated air pollutant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, baghouse, fugitive, etc. Abbreviations are O.K.

(2) Components to be listed include regulated air pollutants as defined in R18-2-101. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_X), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.

(3) Pounds per hour (#/HR) is maximum potential emission rate expected by applicant.

(4) Tons per year is annual maximum potential emission expected by applicant, which takes into account process operating schedule.

(5) As a minimum applicant shall furnish a facility plot plan as described in the filing instructions. UTM coordinates are required only if the source is a major source or is required to perform refined modeling for the purposes of demonstrating compliance with ambient air quality guidelines.

(6) Supply additional information as follows if appropriate:
   (a) Stack exit configuration other than a round vertical stack. Show length and width for a rectangular stack. Indicate if horizontal discharge with a note.
   (b) Stack's height above supporting or adjacent structures if structure is within 3 "stack height above the ground" of stack.

(7) Dimensions of nonpoint sources as defined in R18-2-101.

COMPANY NAME & LOCATION Mesquite Power, L.L.C

EMISSION SOURCES - One of Two Alternative Operating Scenarios

DATE 1/19/2000

Estimated Potential to Emit as per Rule 100.
Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS									
EMISSION POINT (1) Westinghouse		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION POINT (5)			STACK SOURCES (6) Annual Average Conditions					NONPOINT SOURCES (7)	
NUMBER	Combustion Turbine and Duct Burner NAME	REGULATED AIR POLLUTANT NAME (2)	#/HR. (3)	TONS /YEAR (4)	ZONE	EAST (Mtrs.)	NORTH (Mtrs.)	HEIGHT ABOVE GROUND /feet	HEIGHT ABOVE STRUC. /feet	EXIT DATA DIA. (ft.)	EXIT DATA VEL. (fps.)	EXIT DATA TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
1	unit 1	NOx	23.6	98.6	12	326601.9	3691016.0	170	80	18	65.4	174.9	NA	NA
1	unit 1	CO	23.0	95.9	12	326601.9	3691016.0	170	80	18	65.4	174.9	NA	NA
1	unit 1	PM/PM10	28.8	118.7	12	326601.9	3691016.0	170	80	18	65.4	174.9	NA	NA
1	unit 1	SO2	2.24	9.3	12	326601.9	3691016.0	170	80	18	65.4	174.9	NA	NA
1	unit 1	VOC	16.1	67.0	12	326601.9	3691016.0	170	80	18	65.4	174.9	NA	NA
2	unit 2	NOx	23.6	98.6	12	326601.9	3690980.4	170	80	18	65.4	174.9	NA	NA
2	unit 2	CO	23.0	95.9	12	326601.9	3690980.4	170	80	18	65.4	174.9	NA	NA
2	unit 2	PM/PM10	28.8	118.7	12	326601.9	3690980.4	170	80	18	65.4	174.9	NA	NA
2	unit 2	SO2	2.24	9.3	12	326601.9	3690980.4	170	80	18	65.4	174.9	NA	NA

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 890 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

General Instructions:

(1) Identify each emission point with a unique number for this plant site, consistent with emission point identification used on plot plan, previous permits, and Emissions Inventory Questionnaire. Include fugitive emissions. Limit emission point number to eight (8) character spaces. For each emission point use as many lines as necessary to list regulated air pollutant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, baghouse, fugitive, etc. Abbreviations are O.K.

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   (a) Stack exit configuration other than a round vertical stack. Show length and width for a rectangular stack. Indicate if horizontal discharge with a note.
   (b) Stack's height above supporting or adjacent structures if structure is within 3 "stack height above the ground" of stack.

(7) Dimensions of nonpoint sources as defined in R18-2-101.

COMPANY NAME & LOCATION Mesquite Power, L L C

EMISSION SOURCES - One of Two Alternative Operating Scenarios

DATE 1/19/2000

Estimated Potential to Emit as per Rule 100.
Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS										
EMISSION POINT (1) Westinghouse		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION POINT (5)			STACK SOURCES (6) Annual Average Conditions					NONPOINT SOURCES (7)	
NUMBER	Combustion Turbine and Duct Burner NAME	REGULATED AIR POLLUTANT NAME (2)	#/HR. (3)	TONS /YEAR (4)	ZONE	EAST (Mtrs.)	NORTH (Mtrs.)	HEIGHT ABOVE GROUND /feet	HEIGHT ABOVE STRUC. /feet	EXIT DATA DIA. (ft.)	EXIT DATA VEL. (fps.)	EXIT DATA TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
2	unit 2	VOC	16.1	67.0	12	326601.9	3690980.4	170	80	18	65.4	174.9	NA	NA
3	unit 3	NOx	23.6	98.6	12	326601.8	3690836.8	170	80	18	65.4	174.9	NA	NA
3	unit 3	CO	23.0	95.9	12	326601.8	3690836.8	170	80	18	65.4	174.9	NA	NA
3	unit 3	PM/PM10	28.8	118.7	12	326601.8	3690836.8	170	80	18	65.4	174.9	NA	NA
3	unit 3	SO2	2.24	9.3	12	326601.8	3690836.8	170	80	18	65.4	174.9	NA	NA
3	unit 3	VOC	16.1	67.0	12	326601.8	3690836.8	170	80	18	65.4	174.9	NA	NA
4	unit 4	NOx	23.6	98.6	12	326601.5	3690802.2	170	80	18	65.4	174.9	NA	NA
4	unit 4	CO	23.0	95.9	12	326601.5	3690802.2	170	80	18	65.4	174.9	NA	NA
4	unit 4	PM/PM10	28.8	118.7	12	326601.5	3690802.2	170	80	18	65.4	174.9	NA	NA

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 890 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

General Instructions:

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(2) Components to be listed include regulated air pollutants as defined in R18-2-101. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_x), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.

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COMPANY NAME & LOCATION Mesquite Power,L L.C

EMISSION SOURCES - One of Two Alternative Operating Scenarios

DATE 1/19/2000

Estimated Potential to Emit as per Rule 100.
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REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS									
EMISSION POINT (1) Westinghouse		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION POINT (5)			STACK SOURCES (6) Annual Average Conditions					NONPOINT SOURCES (7)	
NUMBER	Combustion Turbine and Duct Burner NAME	REGULATED AIR POLLUTANT NAME (2)	#/HR. (3)	TONS /YEAR (4)	ZONE	EAST (Mtrs.)	NORTH (Mtrs.)	HEIGHT ABOVE GROUND /feet	HEIGHT ABOVE STRUC. /feet	EXIT DATA DIA. (ft.)	EXIT DATA VEL. (fps.)	EXIT DATA TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
4	unit 4	SO2	2.24	9.3	12	326601.5	3690802.2	170	80	18	65.4	174.9	NA	NA
4	unit 4	VOC	16.1	67.0	12	326601.5	3690802.2	170	80	18	65.4	174.9	NA	NA

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 890 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

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COMPANY NAME & LOCATION Mesquite Power, L L C

EMISSION SOURCES

DATE 1/19/2000

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REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS									
EMISSION POINT (1)		CHEMICAL COMPOSITION OF TOTAL STREAM	R. AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION POINT (5)			STACK SOURCES (6) Annual Average Conditions					NONPOINT SOURCES (7)	
										EXIT DATA				
NUMBER	NAME	REGULATED AIR POLLUTANT NAME (2)	#/HR. (3)	TONS /YEAR (4)	ZONE	EAST (Mtrs.)	NORTH (Mtrs.)	HEIGHT ABOVE GROUND /feet	HEIGHT ABOVE STRUC. /feet	DIA. (ft.)	VEL. (fps.)	TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
CT1	Cooling Tower 1	PM/PM10	3.86	16.89	12	326441.2	3690969.4	45	10	32	25.30	122.0	NA	NA
CT2	Cooling Tower 2	PM/PM10	3.86	16.89	12	326438.9	3690793.4	45	10	32	25.30	122.0	NA	NA
FWP	Fire Water Pump	NOx	5.59	0.145	12	326574.7	3690920.4	21	1	0.5	227.49	668.0	NA	NA
FWP	Fire Water Pump	CO	1.00	0.026	12	326574.7	3690920.4	21	1	0.5	227.49	668.0	NA	NA
FWP	Fire Water Pump	PM/PM10	0.15	0.004	12	326574.7	3690920.4	21	1	0.5	227.49	668.0	NA	NA
FWP	Fire Water Pump	SO2	0.54	0.014	12	326574.7	3690920.4	21	1	0.5	227.49	668.0	NA	NA
FWP	Fire Water Pump	VOC	0.30	0.008	12	326574.7	3690920.4	21	1	0.5	227.49	668.0	NA	NA

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 890 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

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Mesquite Power, LLC

Determination of Representative Emission and Stack Parameters and Potential to Emit Calculator

Revised 3/1/00
Printed 03/01/2000 3:39 PM

Combined Cycle Operation - Natural Gas

GE7FA

GE = General Electric Turbine
NOTE Ref. 3/4/00 performance data.

Turbine Operation 100 percent 04/29/4

Case Name	Case G1a	Case G1b	Case G1c	Case G2a	Case G2b	Case G2c	Case G3a	Case G3b	Case G3c	Case G4a	Case G4b	Case G4c
Ambient Temp (F)	73	73	73	122	122	122	59	59	59	17	17	17
Evap Cooler	X	X	X	X	X	X	X	X	X			
Duct Firing (y)	X		X			X			X	X		X
STIG			X			X			X			X
Exit Temp (F)	172.3	167.4	172.1	177.7	169.6	169.9	165	160.3	172.7	174.3	167.1	165
Exit Velocity (fps)	64.1	64.6	66.4	61.2	61.0	59.5	64.6	65.2	70.3	66.6	69.4	70.1
Emissions (lb/hr)												
NOX (a)	30.4	15.8	21.1	18.3	14.7	20.5	20.7	16.7	21.3	22.3	19.0	20.1
CO	19.0	16.1	20.5	16.7	14.3	20	20.1	16.3	20.7	21.6	16.7	21.5
PM/PM10 (d)	20.5	19	20.7	20.1	19	20.5	20.1	19	20.7	20.1	19	20.5
SO2 (b)	1.2	1.2	2.3	1.4	1.4	1.6	2.2	1.6	2.6	2.1	1.6	2.1
VOC(h)	14.7	2.4	14.9	13.7	2.3	15.2	14.9	2.5	14.7	15.6	2.6	14.7

Turbine Operation 75 percent

Case Name	Case G1d	Case G2d	Case G3d	Case G4d
Ambient Temp (F)	73	122	59	17
Evap Cooler				
Duct Firing				
STIG				
Exit Temp (F)	176.5	171.1	170.2	170.1
Exit Velocity (fps)	64	65.7	72.1	64
Emissions (lb/hr)				
NOX (a)	13.3	16.6	12.7	13.3
CO	13	16.4	13.3	13.1
PM/PM10 (d)	16	16	16	16
SO2 (b)	1.2	1.6	1.2	1.3
VOC(h)	2	1.6	2	2.1

Turbine Operation 50 percent

Case Name	Case G1e	Case G2e	Case G3e	Case G4e
Ambient Temp (F)	73	122	59	17
Evap Cooler				
Duct Firing				
STIG				
Exit Temp (F)	173.5	175.6	169.6	167.2
Exit Velocity (fps)	42	45.3	45.6	46
Emissions (lb/hr)				
NOX (a)	9.4	9.7	10.1	10.6
CO	9.6	9.5	9.6	10.3
PM/PM10 (d)	10	10	10	10
SO2 (b)	0.8	0.8	0.9	0.9
VOC(h)	1.0	1.4	1.7	1.7

GE7FA

W = Westinghouse Turbine
NOTE Ref. 10/99 performance data.

Turbine Operation 100 percent 04/29/4

Case Name	Case W1a	Case W1b	Case W1c	Case W2a	Case W2b	Case W2c	Case W3a	Case W3b	Case W3c	Case W4a	Case W4b	Case W4c
Ambient Temp (F)	73	73	73	122	122	122	59	59	59	17	17	17
Evap Cooler	X	X	X	X	X	X	X	X	X	X		
Duct Firing (y)	X		X	X	X		X	X	X	X	X	X
STIG			X			X			X			X
Exit Temp (F)	174.5	171.6	175.7	177.2	169.6	169.4	174.3	169.1	173.7	173.3	168.2	171.1
Exit Velocity (fps)	69.4	68.3	71	61.7	62.2	60.9	69.4	67.3	72.2	69	70	74.1
Emissions (lb/hr)												
NOX	21.2	16.9	22.6	18.8	14.8	21.6	21.7	18.3	22.7	22.2	17.2	23.3
CO	20.1	16.6	21.6	16.3	14.6	21	21.1	16.4	22.1	21	16.5	22
PM/PM10	27.1	13.3	28.7	24.9	14	28.3	27.8	15.4	29.7	28.3	16.1	27.3
SO2	2.6	1.6	3.1	1.8	1.4	2.1	2.1	1.5	2.2	2.1	1.6	2.2
VOC	15.3	1.6	16	14.1	1.6	15.4	15.8	2	14.8	15.1	2.1	16

Turbine Operation 75 percent

Case Name	Case W1d	Case W2d	Case W3d	Case W4d
Ambient Temp (F)	73	122	59	17
Evap Cooler				
Duct Firing				
STIG				
Exit Temp (F)	184.7	184.7	184.5	185.3
Exit Velocity (fps)	54	55.1	60.4	55.7
Emissions (lb/hr)				
NOX (a)	15.4	11.8	14.1	15.3
CO	13.1	11.5	13.8	14.2
PM/PM10 (d)	14.1	12.6	14.3	15.3
SO2 (b)	1.3	1.1	1.3	1.5
VOC(h)	2.1	2.1	2.2	2.4

Turbine Operation 50 percent

Case Name	Case W1e	Case W2e	Case W3e	Case W4e
Ambient Temp (F)	73	122	59	17
Evap Cooler				
Duct Firing				
STIG				
Exit Temp (F)	188.1	188.2	187.2	188.4
Exit Velocity (fps)	41	42.4	46	44.1
Emissions (lb/hr)				
NOX (a)	11.2	10.4	12.2	12.2
CO	11.5	10.1	11.9	12.3
PM/PM10 (d)	12.6	11.6	12.8	13.2
SO2 (b)	1.1	1.0	1.2	1.3
VOC(h)	2.1	2.4	2.2	2.4

Both Turbines
Worst Case Load Representative
Emissions and Stack Parameters

Exit Temp (F)	165.50	346.21	K
Exit Velocity (fps)	61.20	18.65	m/s
Emissions (lb/hr)			
NOX	23.00	2.97	g/s
CO	23.00	2.90	g/s
PM/PM10	30.40	3.83	g/s
SO2	2.84	0.36	g/s
VOC	16.00	2.02	g/s

Exit Temp (F)	170.10	354.32	K
Exit Velocity (fps)	46.70	14.23	m/s
Emissions (lb/hr)			
NOX	16.30	1.98	g/s
CO	14.60	1.85	g/s
PM/PM10	19.80	2.37	g/s
SO2	1.90	0.18	g/s
VOC	3.40	0.43	g/s

Exit Temp (F)	167.00	348.43	K
Exit Velocity (fps)	40.30	12.28	m/s
Emissions (lb/hr)			
NOX	13.30	1.68	g/s
CO	13.00	1.61	g/s
PM/PM10	16.80	2.12	g/s
SO2	1.30	0.13	g/s
VOC	3.40	0.43	g/s

GE Turbine
Worst Case Load Representative
Emissions and Stack Parameters

GE 100% Worst Case Parameters

Exit Temp (F)	165.50	346.21	K
Exit Velocity (fps)	61.20	18.65	m/s
Emissions (lb/hr)			
NOX	23.00	2.97	g/s
CO	23.00	2.90	g/s
PM/PM10	30.40	3.83	g/s
SO2	2.10	0.26	g/s
VOC	16.00	2.02	g/s

GE 75% Worst Case Parameters

Exit Temp (F)	170.10	354.32	K
Exit Velocity (fps)	46.30	14.23	m/s
Emissions (lb/hr)			
NOX	13.60	1.72	g/s
CO	12.10	1.53	g/s
PM/PM10	19.00	2.37	g/s
SO2	1.30	0.16	g/s
VOC	2.10	0.26	g/s

GE 50% Worst Case Parameters

Exit Temp (F)	167.00	348.43	K
Exit Velocity (fps)	40.00	12.19	m/s
Emissions (lb/hr)			
NOX	10.40	1.31	g/s
CO	10.00	1.26	g/s
PM/PM10	16.00	2.02	g/s
SO2	1.20	0.12	g/s
VOC	1.70	0.21	g/s

Westinghouse Turbine
Worst Case Load Representative
Emissions and Stack Parameters

W501 100% Worst Case Parameters

Exit Temp (F)	172.10	351.54	K
Exit Velocity (fps)	61.70	18.81	m/s
Emissions (lb/hr)			
NOX	23.00	2.97	g/s
CO	23.00	2.90	g/s
PM/PM10	30.60	3.85	g/s
SO2	2.54	0.32	g/s
VOC	16.10	2.03	g/s

W501 75% Worst Case Parameters

Exit Temp (F)	184.30	362.54	K
Exit Velocity (fps)	55.10	16.79	m/s
Emissions (lb/hr)			
NOX	15.30	1.93	g/s
CO	14.00	1.76	g/s
PM/PM10	19.60	2.47	g/s
SO2	1.40	0.18	g/s
VOC	3.00	0.40	g/s

W501 50% Worst Case Parameters

Exit Temp (F)	187.00	363.71	K
Exit Velocity (fps)	45.00	13.72	m/s
Emissions (lb/hr)			
NOX	12.00	1.51	g/s
CO	12.00	1.51	g/s
PM/PM10	15.70	1.73	g/s
SO2	1.30	0.13	g/s
VOC	3.40	0.43	g/s

Emergency Fire Water Pump - Diesel Fuel(i)

Exit Temp (F)	655
Exit Velocity (fps)	237.40
Emissions (lb/hr)	
NOX	0.97
CO	0.97
PM/PM10	0.1231
SO2	0.046
VOC(j)	0.3361

Emergency Fire Water Pump

Exit Temp (F)	655.00	625.40	K
Exit Velocity (fps)	237.40	55.34	m/s
Emissions (lb/hr)			
NOX	0.97	0.1247	g/s
CO	0.97	0.1247	g/s
PM/PM10	0.12	0.0158	g/s
SO2	0.04	0.0059	g/s
VOC	0.33	0.0477	g/s

1 # of emergency fire water pumps
52 Hours of emergency fire water pump operation per year

NOX	0.10	lb/yr	0.12	lb/yr
CO	1.03	lb/yr	0.62	lb/yr
PM/PM10	0.13	lb/yr	0.02	lb/yr
SO2	0.04	lb/yr	0.01	lb/yr
VOC	0.35	lb/yr	0.01	lb/yr

Cooling Towers

Exit Temp (F)	120
Exit Velocity (fps)	35.3
Emissions (lb/hr)	
PM/PM10	0.32

Cooling Towers

Exit Temp (F)	120.00	322.10	K
Exit Velocity (fps)	35.30	7.71	m/s
Emissions (lb/hr)			
PM/PM10	0.32	0.01	g/s

24 # of cooling tower cells
8760 Hours of emergency fire water pump operation per year

PM/PM10 0.32 lb/hr 28.77 lb/yr

Potential To Emit Calculations

Facility Operating Parameters

GE 7FA/FT

of turbines
8760 Hours of CCCT natural gas operation per year
365 Equivalent days operation per year

GE Annual Worst Case Parameters

PER-COMBINED CYCLE OPERATION

Gas Inlet at 73 F on HO (a)

NOX	24.1 lb/h	208.7 tpy	2.91 g/s
CO	20.80 lb/h	200.2 tpy	2.79 g/s
PM/PM10	24.80 lb/h	238.3 tpy	3.41 g/s
SO2	2.00 lb/h	19.0 tpy	0.26 g/s
VOC	14.00 lb/h	200.1 tpy	1.81 g/s

Exit Temp	172.10 F	352.00 K	
Exit Velocity	64.10 fps	19.54 m/s	

	Turbines PER	Fire Water Pump PER	Cooling Towers PER	Total Facility PER	PSD SOL	Exceed Sig
	Sum	Sum	Sum	Sum	Sum	
NOx	208.87	0.12	NA	208.93	0	No
CO	200.16	0.62	NA	200.78	100	No
PM/PM10	238.30	0.02	28.77	267.10	25/15	No
SO2	19.04	0.01	NA	19.05	40	No
VOC	200.10	0.01	NA	200.10	40	No
HAPs (c)	4.35	0.0	NA	4.35	1	No
Total Reduced Sulfur (TRS) (k)	PNE	PNE	NA	PNE	10	No
Hydrogen Sulfide (H2S)	PNE	PNE	NA	PNE	10	No
Total Fluorides (TF)	PNE	PNE	NA	PNE	3	No
Lead (Pb)	PNE	PNE	NA	PNE	0.1	No

Facility Operating Parameters

GE6 CCCT

of turbines
8760 Hours of CCCT natural gas operation per year
365 Equivalent days operation per year

WES Annual Worst Case Parameters

PER-COMBINED CYCLE OPERATION

Gas Inlet at 73 F on HO (a)

NOX	23.5 lb/h	204.3 tpy	2.88 g/s
CO	23.00 lb/h	201.7 tpy	2.79 g/s
PM/PM10	27.10 lb/h	237.4 tpy	3.41 g/s
SO2	2.12 lb/h	18.3 tpy	0.27 g/s
VOC	16.30 lb/h	200.1 tpy	1.98 g/s

Exit Temp	172.00 F	352.04 K	
Exit Velocity	61.40 fps	18.81 m/s	

	Turbines PER	Fire Water Pump PER	Cooling Towers PER	Total Facility PER	PSD SOL	Exceed Sig
	Sum	Sum	Sum	Sum	Sum	
NOx	204.30	0.12	NA	204.42	0	No
CO	200.20	0.62	NA	200.71	100	No
PM/PM10	237.30	0.02	28.77	266.20	25/15	No
SO2	18.23	0.01	NA	18.24	40	No
VOC	200.00	0.01	NA	200.01	40	No
HAPs (c)	4.37	0.0	NA	4.37	1	No
Total Reduced Sulfur (TRS) (k)	PNE	PNE	NA	PNE	10	No
Hydrogen Sulfide (H2S)	PNE	PNE	NA	PNE	10	No
Total Fluorides (TF)	PNE	PNE	NA	PNE	3	No
Lead (Pb)	PNE	PNE	NA	PNE	0.1	No

Notes

a Worst Case emissions are from 100% load for both scenarios at ambient average temperature of 73 F.
b Combined Total Proposed Sulfur Compounds (including H2S) and Total Proposed Sulfur (including H2S)
c HAPs based on a 10% conversion of SO2 to SO3 and a conversion rate of 1.22 from SO3 to H2SO4 for the duct unit (SCR).
d PM/PM10 emissions represent both filterable and back-half (condensable).
e NOX emissions from the turbines included the effect of selective catalytic reduction (SCR) in 2.5 ppm for natural gas firing only.
f Sulfur content assumed for the Natural Gas = 0.20 grains of sulfur per 100 SCF.
g Stack pressure, stack temperature, stack velocity, and flows calculated by the Gas Turbine.
h VOC emissions are estimated to be 20% of the UHC emissions for the GE Turbines and 50% of the UHC emissions for the Westinghouse Turbines.
i Emergency Fire Water Pump will be operated for 52 hours per year.
j VOC emissions for the Emergency Fire Water Pump were considered to 100% of the hydrocarbon emissions
k Both worst case short-term and annual parameters do not represent a single possible operating mode; the values represent worst case parameters over both load (short-term), or annual average operating scenario.

Attachment 2
Meteorological Data Correction Letter

BLACK & VEATCH

8400 Ward Parkway
P.O. Box 8405
Kansas City, Missouri 64114

Tel: (913) 458-2000

Black & Veatch Corporation

Sempra Energy Resources
Palo Verde Power Project

B&V Project 96210.0020
November 16, 1999

Ms. Elena Gorelik
Maricopa County Environmental Services Department
Air Quality Division
1001 N. Central Ave.
Suite 200
Phoenix, AZ 85004-1942

Subject: Palo Verde Meteorological Data Set

Dear Ms. Gorelik:

We recently received a copy, via Peter Allard (SA&B), of the meteorological data set used by Pinnacle West in their recently submitted air dispersion modeling analysis. This data set is identified as consisting of 1994-1998 Palo Verde Nuclear Generating Station surface meteorological data and 1994-1998 Tucson upper air data.

Upon receiving the data, we proceeded to put the data set through a brief QA/QC process. As part of this process, we checked the data for any extreme outliers. One of the parameters reviewed was ambient temperature. Ambient temperatures greater than 350 K (170 F) were considered to be an error. Several hours were identified in 1997 and 1998 that exceeded this value (a total of ten hours). The value in the data set for these hours was 810.9 K, in every case. The specific dates and hours are listed in the table below. Note that this value is equivalent to 999.9 F. "Four nines" is used in certain meteorological monitoring data processors as an error value. We believe this to the situation here.

Year	Date	Hour	Original Value (K)	Interpolated Value (K)
1997	4-16	14	810.9	302.8
	4-16	15	810.9	303.5
	4-16	16	810.9	304.2
	5-9	15	810.9	307.9
	5-9	16	810.9	308.8
	5-15	10	810.9	303.4
	12-22	2	810.9	282.4
1998	12-4	11	810.9	285.0
	12-4	12	810.9	287.0
	12-4	13	810.9	289.0

To correct this error, we are proposing to interpolate new temperature values for these hours using data immediately preceeding, and following, the "bad" hours. The values we propose to change are also included in the table, above. Screening-level modeling using the erroneously

high temperature values indicated a significant error in the resulting modeled concentrations. This is due to a stack plume temperature significantly less the ambient temperature, resulting a negative thermal buoyancy for the plume and resulting high modeled impacts. We will proceed with our analysis using the corrected data set.

If you have any questions, please don't hesitate to call me at (913) 458-7961.

Very truly yours,

BLACK & VEATCH

Mark J. Bareta
Air Quality Scientist

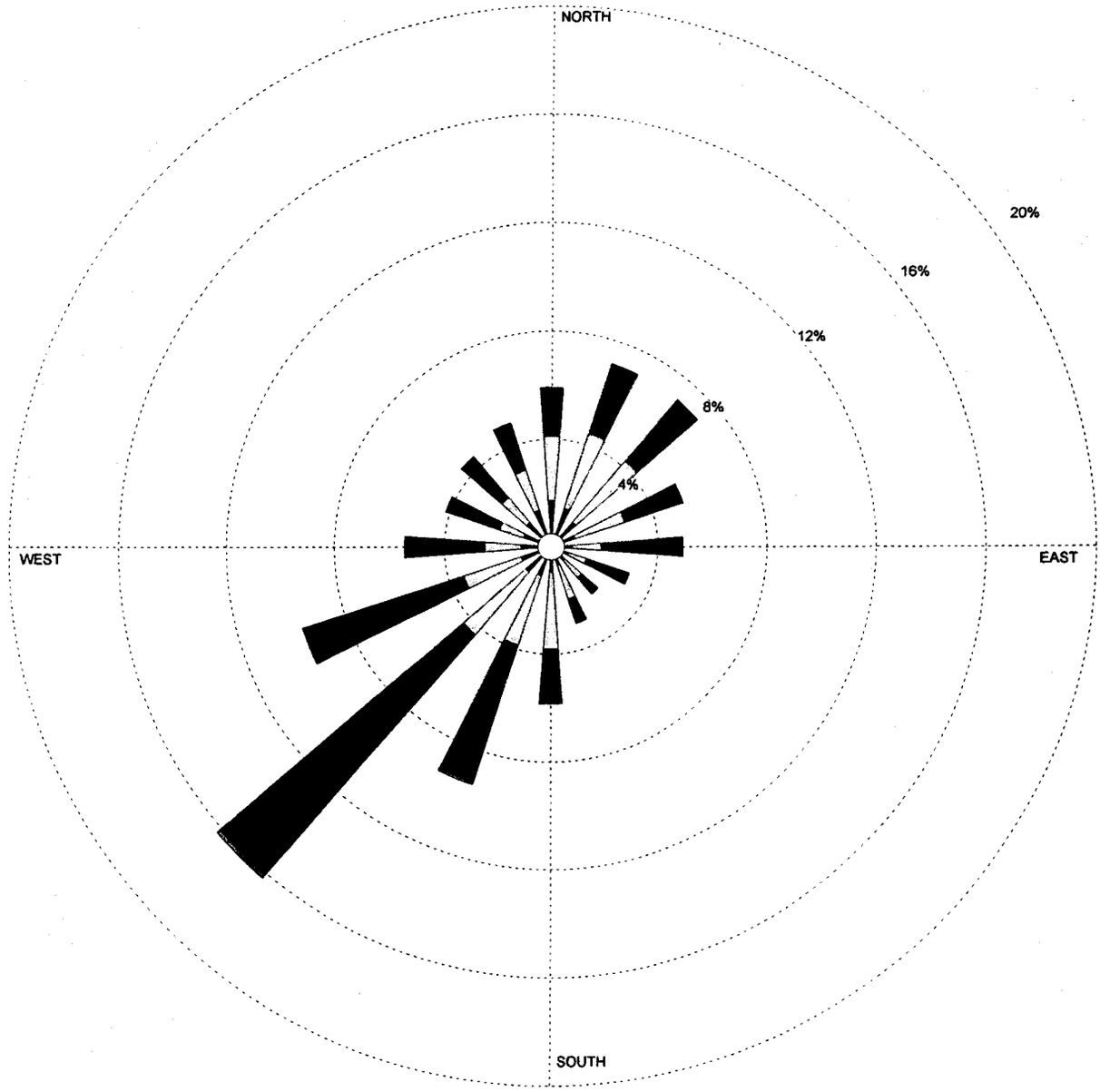
mjb

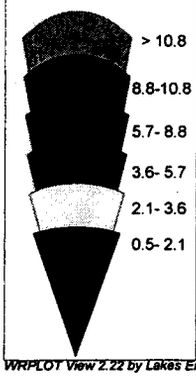
cc:	M. Swartz	Sempra Energy Resources
	C. Sterling	Sempra Energy Resources
	W. Collins	Black & Veatch

Attachment 3
Additional Surface Meteorology Materials

WIND ROSE PLOT

Palo Verde Nuclear Generating Station Meteorological Data 1994-1998





MODELER	DATE	COMPANY NAME
Chris Dillon	**03/24/2000**	**Black & Veatch**
DISPLAY	UNIT	COMMENTS
Wind Speed	**m/s**	**This wind rose contains data for 1994 through 1998.**
AVG. WIND SPEED	CALM WINDS	
3.92 m/s	**0.26%**	
ORIENTATION	PLOT YEAR-DATE-TIME	PROJECT/PLOT NO.
Direction (blowing from)	**23 23 23 23 23 January 1 - December 31 Midnight - 11 PM**	

WRPLOT View 2.22 by Lakes Environmental Software - www.lakes-environmental.com

Frequency Distribution
(Normalized)

Wind Direction (Blowing From) / Stability Classes

	A	B	C	D	E	F	Total
N	0.003468	0.003811	0.006161	0.015083	0.019145	0.012025	0.059693
NNE	0.003605	0.004655	0.006663	0.018095	0.019806	0.019190	0.072015
NE	0.005408	0.006686	0.010017	0.016931	0.018027	0.015905	0.072974
ENE	0.005499	0.007781	0.008671	0.012847	0.009515	0.008260	0.052574
E	0.004609	0.007325	0.010405	0.017388	0.005111	0.004929	0.049767
ESE	0.004564	0.006549	0.006617	0.008215	0.002738	0.002829	0.031512
SE	0.005545	0.005157	0.002464	0.004609	0.002989	0.003149	0.023914
SSE	0.008443	0.007370	0.003058	0.004609	0.003719	0.003628	0.030828
S	0.016247	0.013280	0.008192	0.009721	0.006549	0.005134	0.059123
SSW	0.014353	0.014809	0.014079	0.027519	0.016794	0.005933	0.093488
SW	0.012322	0.016361	0.025808	0.062317	0.036920	0.009173	0.162902
WSW	0.007462	0.009789	0.012938	0.035141	0.024325	0.007621	0.097275
W	0.004746	0.004609	0.006229	0.018346	0.015927	0.005089	0.054947
WNW	0.003195	0.002784	0.004541	0.016566	0.011044	0.004039	0.042169
NW	0.003309	0.002898	0.002966	0.015106	0.015334	0.005454	0.045067
NNW	0.003012	0.002556	0.004290	0.014490	0.016429	0.008420	0.049197
Total	0.105787	0.116420	0.133101	0.296983	0.224375	0.120779	

Frequency of Calm Winds : 0.26%
Average Wind Speed : 3.92 m/s

Attachment 4
Nested Receptor Grid Locations and Elevations

	UTM East	UTM North	Elevation (m)
RE DISCCART	322000.0	3685500.0	278.5
RE DISCCART	322500.0	3685500.0	271.6
RE DISCCART	323000.0	3685500.0	271.3
RE DISCCART	323500.0	3685500.0	268.1
RE DISCCART	324000.0	3685500.0	268.2
RE DISCCART	324500.0	3685500.0	268.1
RE DISCCART	325000.0	3685500.0	261.7
RE DISCCART	325500.0	3685500.0	259.4
RE DISCCART	322000.0	3686000.0	274.6
RE DISCCART	322500.0	3686000.0	271.3
RE DISCCART	323000.0	3686000.0	268.3
RE DISCCART	323500.0	3686000.0	266
RE DISCCART	324000.0	3686000.0	265.5
RE DISCCART	324500.0	3686000.0	264.1
RE DISCCART	325000.0	3686000.0	262.7
RE DISCCART	325500.0	3686000.0	256.7
RE DISCCART	322000.0	3686500.0	271.3
RE DISCCART	322500.0	3686500.0	268.8
RE DISCCART	323000.0	3686500.0	268.2
RE DISCCART	323500.0	3686500.0	265.2
RE DISCCART	324000.0	3686500.0	262.4
RE DISCCART	324500.0	3686500.0	261.9
RE DISCCART	325000.0	3686500.0	259.1
RE DISCCART	325500.0	3686500.0	258.2
RE DISCCART	322000.0	3687000.0	267.9
RE DISCCART	322500.0	3687000.0	268.2
RE DISCCART	323000.0	3687000.0	264.9
RE DISCCART	323500.0	3687000.0	262.2
RE DISCCART	324000.0	3687000.0	261.5
RE DISCCART	324500.0	3687000.0	259.1
RE DISCCART	325000.0	3687000.0	260.9
RE DISCCART	325500.0	3687000.0	259.1
RE DISCCART	322000.0	3687500.0	267.6
RE DISCCART	322500.0	3687500.0	265.2
RE DISCCART	323000.0	3687500.0	263.8
RE DISCCART	323500.0	3687500.0	262.4
RE DISCCART	324000.0	3687500.0	261.5
RE DISCCART	324500.0	3687500.0	260.8
RE DISCCART	325000.0	3687500.0	259.8
RE DISCCART	325500.0	3687500.0	259.1
RE DISCCART	322000.0	3688000.0	265.7
RE DISCCART	322500.0	3688000.0	265.2
RE DISCCART	323000.0	3688000.0	264.3
RE DISCCART	323500.0	3688000.0	262.5
RE DISCCART	324000.0	3688000.0	264.2
RE DISCCART	324500.0	3688000.0	262.3
RE DISCCART	325000.0	3688000.0	261.1
RE DISCCART	325500.0	3688000.0	260.4
RE DISCCART	322000.0	3688500.0	266.1
RE DISCCART	322500.0	3688500.0	265.2
RE DISCCART	323000.0	3688500.0	264.9
RE DISCCART	323500.0	3688500.0	265.2
RE DISCCART	324000.0	3688500.0	264.9
RE DISCCART	324500.0	3688500.0	262.5
RE DISCCART	322000.0	3689000.0	267.6
RE DISCCART	322500.0	3689000.0	267
RE DISCCART	323000.0	3689000.0	266.6
RE DISCCART	323500.0	3689000.0	267
RE DISCCART	324000.0	3689000.0	264.9
RE DISCCART	324500.0	3689000.0	264.3
RE DISCCART	322000.0	3689500.0	271.3
RE DISCCART	322500.0	3689500.0	269.1
RE DISCCART	323000.0	3689500.0	268
RE DISCCART	323500.0	3689500.0	268.9
RE DISCCART	324000.0	3689500.0	268.2
RE DISCCART	324500.0	3689500.0	265.6
RE DISCCART	322000.0	3690000.0	274.6
RE DISCCART	322500.0	3690000.0	271.9
RE DISCCART	323000.0	3690000.0	271.7
RE DISCCART	323500.0	3690000.0	268.2
RE DISCCART	324000.0	3690000.0	267.6
RE DISCCART	324500.0	3690000.0	267.3
RE DISCCART	322000.0	3690500.0	275.2
RE DISCCART	322500.0	3690500.0	273.3
RE DISCCART	323000.0	3690500.0	273.3
RE DISCCART	323500.0	3690500.0	271.3
RE DISCCART	324000.0	3690500.0	267.6
RE DISCCART	324500.0	3690500.0	267.6
RE DISCCART	322000.0	3691000.0	276.3
RE DISCCART	322500.0	3691000.0	275.2
RE DISCCART	323000.0	3691000.0	274.3
RE DISCCART	323500.0	3691000.0	270.7
RE DISCCART	324000.0	3691000.0	270.5
RE DISCCART	324500.0	3691000.0	269.9

RE	DISCCART	322000.0	3691500.0	277.1
RE	DISCCART	322500.0	3691500.0	277.1
RE	DISCCART	323000.0	3691500.0	274.7
RE	DISCCART	323500.0	3691500.0	274.3
RE	DISCCART	324000.0	3691500.0	272.8
RE	DISCCART	324500.0	3691500.0	271.7
RE	DISCCART	322000.0	3692000.0	279.7
RE	DISCCART	322500.0	3692000.0	278.5
RE	DISCCART	323000.0	3692000.0	276.8
RE	DISCCART	323500.0	3692000.0	275.7
RE	DISCCART	324000.0	3692000.0	274.3
RE	DISCCART	324500.0	3692000.0	273.9
RE	DISCCART	322000.0	3692500.0	281.9
RE	DISCCART	322500.0	3692500.0	280.7
RE	DISCCART	323000.0	3692500.0	278.6
RE	DISCCART	323500.0	3692500.0	277.5
RE	DISCCART	324000.0	3692500.0	276.6
RE	DISCCART	324500.0	3692500.0	276.1
RE	DISCCART	322000.0	3693000.0	283.7
RE	DISCCART	322500.0	3693000.0	282.2
RE	DISCCART	323000.0	3693000.0	279.9
RE	DISCCART	323500.0	3693000.0	278.9
RE	DISCCART	324000.0	3693000.0	278.3
RE	DISCCART	324500.0	3693000.0	277.1
RE	DISCCART	325000.0	3693000.0	278.9
RE	DISCCART	325500.0	3693000.0	280.7
RE	DISCCART	322000.0	3693500.0	286.2
RE	DISCCART	322500.0	3693500.0	283.6
RE	DISCCART	323000.0	3693500.0	280.2
RE	DISCCART	323500.0	3693500.0	279.8
RE	DISCCART	324000.0	3693500.0	279.5
RE	DISCCART	324500.0	3693500.0	279.3
RE	DISCCART	325000.0	3693500.0	281
RE	DISCCART	325500.0	3693500.0	283.2
RE	DISCCART	322000.0	3694000.0	291.5
RE	DISCCART	322500.0	3694000.0	283.2
RE	DISCCART	323000.0	3694000.0	282.3
RE	DISCCART	323500.0	3694000.0	282.4
RE	DISCCART	324000.0	3694000.0	280.7
RE	DISCCART	324500.0	3694000.0	281.7
RE	DISCCART	325000.0	3694000.0	316.5
RE	DISCCART	325500.0	3694000.0	283.2
RE	DISCCART	322000.0	3694500.0	286.7
RE	DISCCART	322500.0	3694500.0	290
RE	DISCCART	323000.0	3694500.0	284.3
RE	DISCCART	323500.0	3694500.0	293.3
RE	DISCCART	324000.0	3694500.0	277
RE	DISCCART	324500.0	3694500.0	278
RE	DISCCART	325000.0	3694500.0	277
RE	DISCCART	325500.0	3694500.0	282
RE	DISCCART	322000.0	3695000.0	297.2
RE	DISCCART	322500.0	3695000.0	314
RE	DISCCART	323000.0	3695000.0	286
RE	DISCCART	323500.0	3695000.0	286.6
RE	DISCCART	324000.0	3695000.0	282.7
RE	DISCCART	324500.0	3695000.0	280.8
RE	DISCCART	325000.0	3695000.0	278
RE	DISCCART	325500.0	3695000.0	282
RE	DISCCART	322000.0	3695500.0	298.8
RE	DISCCART	322500.0	3695500.0	287
RE	DISCCART	323000.0	3695500.0	287
RE	DISCCART	323500.0	3695500.0	286.8
RE	DISCCART	324000.0	3695500.0	287
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RE	DISCCART	325000.0	3695500.0	283.4
RE	DISCCART	325500.0	3695500.0	285
RE	DISCCART	328500.0	3685500.0	247.2
RE	DISCCART	329000.0	3685500.0	247.8
RE	DISCCART	329500.0	3685500.0	246.6
RE	DISCCART	330000.0	3685500.0	246
RE	DISCCART	330500.0	3685500.0	245.7
RE	DISCCART	331000.0	3685500.0	246.7
RE	DISCCART	331500.0	3685500.0	250.2
RE	DISCCART	332000.0	3685500.0	248.2
RE	DISCCART	328500.0	3686000.0	249.6
RE	DISCCART	329000.0	3686000.0	249.9
RE	DISCCART	329500.0	3686000.0	248.4
RE	DISCCART	330000.0	3686000.0	247.8
RE	DISCCART	330500.0	3686000.0	247.1
RE	DISCCART	331000.0	3686000.0	248.5
RE	DISCCART	331500.0	3686000.0	250.1
RE	DISCCART	332000.0	3686000.0	247.3
RE	DISCCART	328500.0	3686500.0	251
RE	DISCCART	329000.0	3686500.0	250.2
RE	DISCCART	329500.0	3686500.0	250.1

RE	DISCCART	330000.0	3686500.0	250
RE	DISCCART	330500.0	3686500.0	249.6
RE	DISCCART	331000.0	3686500.0	252.9
RE	DISCCART	331500.0	3686500.0	249.6
RE	DISCCART	332000.0	3686500.0	247
RE	DISCCART	328500.0	3687000.0	253.6
RE	DISCCART	329000.0	3687000.0	252.7
RE	DISCCART	329500.0	3687000.0	253
RE	DISCCART	330000.0	3687000.0	252.1
RE	DISCCART	330500.0	3687000.0	252.9
RE	DISCCART	331000.0	3687000.0	253
RE	DISCCART	331500.0	3687000.0	249.9
RE	DISCCART	332000.0	3687000.0	250.2
RE	DISCCART	328500.0	3687500.0	259.3
RE	DISCCART	329000.0	3687500.0	258.7
RE	DISCCART	329500.0	3687500.0	256.6
RE	DISCCART	330000.0	3687500.0	255
RE	DISCCART	330500.0	3687500.0	256.3
RE	DISCCART	331000.0	3687500.0	254.3
RE	DISCCART	331500.0	3687500.0	252.9
RE	DISCCART	332000.0	3687500.0	249.6
RE	DISCCART	328500.0	3688000.0	262.2
RE	DISCCART	329000.0	3688000.0	261.6
RE	DISCCART	329500.0	3688000.0	259.5
RE	DISCCART	330000.0	3688000.0	257.9
RE	DISCCART	330500.0	3688000.0	260
RE	DISCCART	331000.0	3688000.0	258.5
RE	DISCCART	331500.0	3688000.0	255.4
RE	DISCCART	332000.0	3688000.0	252.3
RE	DISCCART	329500.0	3688500.0	260.9
RE	DISCCART	330000.0	3688500.0	260.9
RE	DISCCART	330500.0	3688500.0	264.3
RE	DISCCART	331000.0	3688500.0	260.2
RE	DISCCART	331500.0	3688500.0	256.9
RE	DISCCART	332000.0	3688500.0	255.6
RE	DISCCART	329500.0	3689000.0	263.8
RE	DISCCART	330000.0	3689000.0	264.8
RE	DISCCART	330500.0	3689000.0	265.2
RE	DISCCART	331000.0	3689000.0	262.1
RE	DISCCART	331500.0	3689000.0	260.5
RE	DISCCART	332000.0	3689000.0	256.2
RE	DISCCART	329500.0	3689500.0	265.5
RE	DISCCART	330000.0	3689500.0	267
RE	DISCCART	330500.0	3689500.0	266.9
RE	DISCCART	331000.0	3689500.0	264
RE	DISCCART	331500.0	3689500.0	261.3
RE	DISCCART	332000.0	3689500.0	257.9
RE	DISCCART	329500.0	3690000.0	267.9
RE	DISCCART	330000.0	3690000.0	268.8
RE	DISCCART	330500.0	3690000.0	267.6
RE	DISCCART	331000.0	3690000.0	265.5
RE	DISCCART	331500.0	3690000.0	261.8
RE	DISCCART	332000.0	3690000.0	259.7
RE	DISCCART	329500.0	3690500.0	270.6
RE	DISCCART	330000.0	3690500.0	271.8
RE	DISCCART	330500.0	3690500.0	269.4
RE	DISCCART	331000.0	3690500.0	266.5
RE	DISCCART	331500.0	3690500.0	263.9
RE	DISCCART	332000.0	3690500.0	264.3
RE	DISCCART	329500.0	3691000.0	274.7
RE	DISCCART	330000.0	3691000.0	273.7
RE	DISCCART	330500.0	3691000.0	270.4
RE	DISCCART	331000.0	3691000.0	267.6
RE	DISCCART	331500.0	3691000.0	266.7
RE	DISCCART	332000.0	3691000.0	268.2
RE	DISCCART	329500.0	3691500.0	277.5
RE	DISCCART	330000.0	3691500.0	275.2
RE	DISCCART	330500.0	3691500.0	272
RE	DISCCART	331000.0	3691500.0	269.4
RE	DISCCART	331500.0	3691500.0	271.3
RE	DISCCART	332000.0	3691500.0	268.2
RE	DISCCART	329500.0	3692000.0	280.3
RE	DISCCART	330000.0	3692000.0	277.7
RE	DISCCART	330500.0	3692000.0	274.1
RE	DISCCART	331000.0	3692000.0	271.8
RE	DISCCART	331500.0	3692000.0	271.5
RE	DISCCART	332000.0	3692000.0	267.1
RE	DISCCART	329500.0	3692500.0	281.9
RE	DISCCART	330000.0	3692500.0	279
RE	DISCCART	330500.0	3692500.0	276.2
RE	DISCCART	331000.0	3692500.0	275.2
RE	DISCCART	331500.0	3692500.0	271
RE	DISCCART	332000.0	3692500.0	267.6
RE	DISCCART	328500.0	3693000.0	281.3
RE	DISCCART	329000.0	3693000.0	283.2

RE	DISCCART	329500.0	3693000.0	283.5
RE	DISCCART	330000.0	3693000.0	280.4
RE	DISCCART	330500.0	3693000.0	279.2
RE	DISCCART	331000.0	3693000.0	277.6
RE	DISCCART	331500.0	3693000.0	271.6
RE	DISCCART	332000.0	3693000.0	270.1
RE	DISCCART	328500.0	3693500.0	282.5
RE	DISCCART	329000.0	3693500.0	284.8
RE	DISCCART	329500.0	3693500.0	285.7
RE	DISCCART	330000.0	3693500.0	283.2
RE	DISCCART	330500.0	3693500.0	281.9
RE	DISCCART	331000.0	3693500.0	277.7
RE	DISCCART	331500.0	3693500.0	273.3
RE	DISCCART	332000.0	3693500.0	273.3
RE	DISCCART	328500.0	3694000.0	284.1
RE	DISCCART	329000.0	3694000.0	286.1
RE	DISCCART	329500.0	3694000.0	286.8
RE	DISCCART	330000.0	3694000.0	286.6
RE	DISCCART	330500.0	3694000.0	285.3
RE	DISCCART	331000.0	3694000.0	280.2
RE	DISCCART	331500.0	3694000.0	276.3
RE	DISCCART	332000.0	3694000.0	277.2
RE	DISCCART	328500.0	3694500.0	286.2
RE	DISCCART	329000.0	3694500.0	288.2
RE	DISCCART	329500.0	3694500.0	289
RE	DISCCART	330000.0	3694500.0	289.9
RE	DISCCART	330500.0	3694500.0	285.1
RE	DISCCART	331000.0	3694500.0	280.9
RE	DISCCART	331500.0	3694500.0	277.7
RE	DISCCART	332000.0	3694500.0	277.9
RE	DISCCART	328500.0	3695000.0	287.4
RE	DISCCART	329000.0	3695000.0	290.2
RE	DISCCART	329500.0	3695000.0	289
RE	DISCCART	330000.0	3695000.0	290
RE	DISCCART	330500.0	3695000.0	285.8
RE	DISCCART	331000.0	3695000.0	283
RE	DISCCART	331500.0	3695000.0	280.3
RE	DISCCART	332000.0	3695000.0	283.2
RE	DISCCART	328500.0	3695500.0	289.3
RE	DISCCART	329000.0	3695500.0	292.6
RE	DISCCART	329500.0	3695500.0	331.4
RE	DISCCART	330000.0	3695500.0	292.3
RE	DISCCART	330500.0	3695500.0	287.2
RE	DISCCART	331000.0	3695500.0	283.3
RE	DISCCART	331500.0	3695500.0	283.3
RE	DISCCART	332000.0	3695500.0	286.8
RE	DISCCART	326000.0	3685500.0	255.7
RE	DISCCART	326500.0	3685500.0	253.3
RE	DISCCART	327000.0	3685500.0	249.9
RE	DISCCART	327500.0	3685500.0	249.9
RE	DISCCART	328000.0	3685500.0	249.6
RE	DISCCART	326000.0	3686000.0	254.3
RE	DISCCART	326500.0	3686000.0	253
RE	DISCCART	327000.0	3686000.0	250.4
RE	DISCCART	327500.0	3686000.0	249.9
RE	DISCCART	328000.0	3686000.0	249.9
RE	DISCCART	326000.0	3686500.0	255.6
RE	DISCCART	326500.0	3686500.0	253.7
RE	DISCCART	327000.0	3686500.0	253.6
RE	DISCCART	327500.0	3686500.0	252
RE	DISCCART	328000.0	3686500.0	250.7
RE	DISCCART	326000.0	3687000.0	257.4
RE	DISCCART	326500.0	3687000.0	256.3
RE	DISCCART	327000.0	3687000.0	254.8
RE	DISCCART	327500.0	3687000.0	252.7
RE	DISCCART	328000.0	3687000.0	253.6
RE	DISCCART	326000.0	3687500.0	258.7
RE	DISCCART	326500.0	3687500.0	257.4
RE	DISCCART	327000.0	3687500.0	255.7
RE	DISCCART	327500.0	3687500.0	256
RE	DISCCART	328000.0	3687500.0	258.5
RE	DISCCART	326000.0	3688000.0	259.4
RE	DISCCART	326500.0	3688000.0	258.8
RE	DISCCART	327000.0	3688000.0	259.2
RE	DISCCART	327500.0	3688000.0	258.8
RE	DISCCART	328000.0	3688000.0	261.3
RE	DISCCART	326000.0	3693000.0	281
RE	DISCCART	326500.0	3693000.0	280.7
RE	DISCCART	327000.0	3693000.0	276.1
RE	DISCCART	327500.0	3693000.0	276.8
RE	DISCCART	328000.0	3693000.0	280.4
RE	DISCCART	326000.0	3693500.0	282.5
RE	DISCCART	326500.0	3693500.0	281.8
RE	DISCCART	327000.0	3693500.0	279.2
RE	DISCCART	327500.0	3693500.0	279.2

RE	DISCCART	328000.0	3693500.0	279.8
RE	DISCCART	326000.0	3694000.0	283.5
RE	DISCCART	326500.0	3694000.0	283.5
RE	DISCCART	327000.0	3694000.0	280.6
RE	DISCCART	327500.0	3694000.0	281.7
RE	DISCCART	328000.0	3694000.0	281
RE	DISCCART	326000.0	3694500.0	285.2
RE	DISCCART	326500.0	3694500.0	285.3
RE	DISCCART	327000.0	3694500.0	283.2
RE	DISCCART	327500.0	3694500.0	282.3
RE	DISCCART	328000.0	3694500.0	282.5
RE	DISCCART	326000.0	3695000.0	286.8
RE	DISCCART	326500.0	3695000.0	287.9
RE	DISCCART	327000.0	3695000.0	286.8
RE	DISCCART	327500.0	3695000.0	286.4
RE	DISCCART	328000.0	3695000.0	285.8
RE	DISCCART	326000.0	3695500.0	288.3
RE	DISCCART	326500.0	3695500.0	290
RE	DISCCART	327000.0	3695500.0	289
RE	DISCCART	327500.0	3695500.0	288.6
RE	DISCCART	328000.0	3695500.0	288.4
RE	DISCCART	317000.0	3680500.0	329
RE	DISCCART	318000.0	3680500.0	432.8001
RE	DISCCART	319000.0	3680500.0	421.5
RE	DISCCART	320000.0	3680500.0	359.7
RE	DISCCART	321000.0	3680500.0	323.1
RE	DISCCART	317000.0	3681500.0	322.9
RE	DISCCART	318000.0	3681500.0	323.7
RE	DISCCART	319000.0	3681500.0	321.9
RE	DISCCART	320000.0	3681500.0	318.5
RE	DISCCART	321000.0	3681500.0	309.4
RE	DISCCART	317000.0	3682500.0	311.1
RE	DISCCART	318000.0	3682500.0	311.8
RE	DISCCART	319000.0	3682500.0	308.4
RE	DISCCART	320000.0	3682500.0	300.4
RE	DISCCART	321000.0	3682500.0	292
RE	DISCCART	317000.0	3683500.0	335.9
RE	DISCCART	318000.0	3683500.0	301.8
RE	DISCCART	319000.0	3683500.0	300.1
RE	DISCCART	320000.0	3683500.0	298.5
RE	DISCCART	321000.0	3683500.0	288.5
RE	DISCCART	317000.0	3684500.0	325.9
RE	DISCCART	318000.0	3684500.0	300.5
RE	DISCCART	319000.0	3684500.0	292.7
RE	DISCCART	320000.0	3684500.0	292.3
RE	DISCCART	321000.0	3684500.0	284.1
RE	DISCCART	317000.0	3685500.0	301.5
RE	DISCCART	318000.0	3685500.0	289.6
RE	DISCCART	319000.0	3685500.0	288.8
RE	DISCCART	320000.0	3685500.0	286.4
RE	DISCCART	321000.0	3685500.0	282.2
RE	DISCCART	317000.0	3686500.0	292.5
RE	DISCCART	318000.0	3686500.0	283.4
RE	DISCCART	319000.0	3686500.0	283.3
RE	DISCCART	320000.0	3686500.0	280
RE	DISCCART	321000.0	3686500.0	277.6
RE	DISCCART	317000.0	3687500.0	283.6
RE	DISCCART	318000.0	3687500.0	278.5
RE	DISCCART	319000.0	3687500.0	278.1
RE	DISCCART	320000.0	3687500.0	274.7
RE	DISCCART	321000.0	3687500.0	271.4
RE	DISCCART	317000.0	3688500.0	278.6
RE	DISCCART	318000.0	3688500.0	275.2
RE	DISCCART	319000.0	3688500.0	271.9
RE	DISCCART	320000.0	3688500.0	271
RE	DISCCART	321000.0	3688500.0	268.5
RE	DISCCART	317000.0	3689500.0	280.4
RE	DISCCART	318000.0	3689500.0	277.1
RE	DISCCART	319000.0	3689500.0	277.3
RE	DISCCART	320000.0	3689500.0	274.3
RE	DISCCART	321000.0	3689500.0	272
RE	DISCCART	317000.0	3690500.0	283.2
RE	DISCCART	318000.0	3690500.0	282.5
RE	DISCCART	319000.0	3690500.0	280.1
RE	DISCCART	320000.0	3690500.0	280
RE	DISCCART	321000.0	3690500.0	277.1
RE	DISCCART	317000.0	3691500.0	289.3
RE	DISCCART	318000.0	3691500.0	286.8
RE	DISCCART	319000.0	3691500.0	284
RE	DISCCART	320000.0	3691500.0	283.8
RE	DISCCART	321000.0	3691500.0	281.3
RE	DISCCART	317000.0	3692500.0	296
RE	DISCCART	318000.0	3692500.0	294.2
RE	DISCCART	319000.0	3692500.0	292.4
RE	DISCCART	320000.0	3692500.0	288.8

RE	DISCCART	321000.0	3692500.0	285
RE	DISCCART	317000.0	3693500.0	301.4
RE	DISCCART	318000.0	3693500.0	304.9
RE	DISCCART	319000.0	3693500.0	297.6
RE	DISCCART	320000.0	3693500.0	293.1
RE	DISCCART	321000.0	3693500.0	288.8
RE	DISCCART	317000.0	3694500.0	307
RE	DISCCART	318000.0	3694500.0	308
RE	DISCCART	319000.0	3694500.0	302
RE	DISCCART	320000.0	3694500.0	297
RE	DISCCART	321000.0	3694500.0	293
RE	DISCCART	317000.0	3695500.0	316.6
RE	DISCCART	318000.0	3695500.0	311
RE	DISCCART	319000.0	3695500.0	305.8
RE	DISCCART	320000.0	3695500.0	299.2
RE	DISCCART	321000.0	3695500.0	418
RE	DISCCART	317000.0	3696500.0	321
RE	DISCCART	318000.0	3696500.0	317
RE	DISCCART	319000.0	3696500.0	308
RE	DISCCART	320000.0	3696500.0	311
RE	DISCCART	321000.0	3696500.0	348.3
RE	DISCCART	317000.0	3697500.0	375
RE	DISCCART	318000.0	3697500.0	319
RE	DISCCART	319000.0	3697500.0	360.3
RE	DISCCART	320000.0	3697500.0	321.3
RE	DISCCART	321000.0	3697500.0	313
RE	DISCCART	317000.0	3698500.0	341.8
RE	DISCCART	318000.0	3698500.0	351.7
RE	DISCCART	319000.0	3698500.0	332.6
RE	DISCCART	320000.0	3698500.0	327.6
RE	DISCCART	321000.0	3698500.0	313
RE	DISCCART	317000.0	3699500.0	358.2
RE	DISCCART	318000.0	3699500.0	580.3
RE	DISCCART	319000.0	3699500.0	384
RE	DISCCART	320000.0	3699500.0	396.4
RE	DISCCART	321000.0	3699500.0	324.7
RE	DISCCART	317000.0	3700500.0	350.7
RE	DISCCART	318000.0	3700500.0	516
RE	DISCCART	319000.0	3700500.0	413.7
RE	DISCCART	320000.0	3700500.0	433.3
RE	DISCCART	321000.0	3700500.0	331
RE	DISCCART	333000.0	3680500.0	237.4
RE	DISCCART	334000.0	3680500.0	232
RE	DISCCART	335000.0	3680500.0	231
RE	DISCCART	336000.0	3680500.0	233.3
RE	DISCCART	337000.0	3680500.0	254.6
RE	DISCCART	333000.0	3681500.0	235.3
RE	DISCCART	334000.0	3681500.0	232
RE	DISCCART	335000.0	3681500.0	231.6
RE	DISCCART	336000.0	3681500.0	235.5
RE	DISCCART	337000.0	3681500.0	250.2
RE	DISCCART	333000.0	3682500.0	235.9
RE	DISCCART	334000.0	3682500.0	234.3
RE	DISCCART	335000.0	3682500.0	232.3
RE	DISCCART	336000.0	3682500.0	231.6
RE	DISCCART	337000.0	3682500.0	281
RE	DISCCART	333000.0	3683500.0	238.7
RE	DISCCART	334000.0	3683500.0	234.7
RE	DISCCART	335000.0	3683500.0	232.8
RE	DISCCART	336000.0	3683500.0	233.2
RE	DISCCART	337000.0	3683500.0	237.4
RE	DISCCART	333000.0	3684500.0	236.8
RE	DISCCART	334000.0	3684500.0	235.3
RE	DISCCART	335000.0	3684500.0	235
RE	DISCCART	336000.0	3684500.0	233.2
RE	DISCCART	337000.0	3684500.0	236.8
RE	DISCCART	333000.0	3685500.0	237.7
RE	DISCCART	334000.0	3685500.0	235.9
RE	DISCCART	335000.0	3685500.0	235
RE	DISCCART	336000.0	3685500.0	234.7
RE	DISCCART	337000.0	3685500.0	235.6
RE	DISCCART	333000.0	3686500.0	243.5
RE	DISCCART	334000.0	3686500.0	236.9
RE	DISCCART	335000.0	3686500.0	235.6
RE	DISCCART	336000.0	3686500.0	234.7
RE	DISCCART	337000.0	3686500.0	235.2
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RE	DISCCART	334000.0	3687500.0	242.3
RE	DISCCART	335000.0	3687500.0	239
RE	DISCCART	336000.0	3687500.0	237.4
RE	DISCCART	337000.0	3687500.0	236.7
RE	DISCCART	333000.0	3688500.0	250.2
RE	DISCCART	334000.0	3688500.0	251
RE	DISCCART	335000.0	3688500.0	249.4
RE	DISCCART	336000.0	3688500.0	243.5

RE	DISCCART	337000.0	3688500.0	260.4
RE	DISCCART	333000.0	3689500.0	254.6
RE	DISCCART	334000.0	3689500.0	255.7
RE	DISCCART	335000.0	3689500.0	250.2
RE	DISCCART	336000.0	3689500.0	268.3
RE	DISCCART	337000.0	3689500.0	272
RE	DISCCART	333000.0	3690500.0	267.9
RE	DISCCART	334000.0	3690500.0	258.2
RE	DISCCART	335000.0	3690500.0	253.2
RE	DISCCART	336000.0	3690500.0	269.6
RE	DISCCART	337000.0	3690500.0	290.8
RE	DISCCART	333000.0	3691500.0	264.9
RE	DISCCART	334000.0	3691500.0	265.4
RE	DISCCART	335000.0	3691500.0	264.9
RE	DISCCART	336000.0	3691500.0	271
RE	DISCCART	337000.0	3691500.0	287.7
RE	DISCCART	333000.0	3692500.0	268.2
RE	DISCCART	334000.0	3692500.0	274.2
RE	DISCCART	335000.0	3692500.0	268.7
RE	DISCCART	336000.0	3692500.0	272.2
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RE	DISCCART	334000.0	3693500.0	280.2
RE	DISCCART	335000.0	3693500.0	273.3
RE	DISCCART	336000.0	3693500.0	278.3
RE	DISCCART	337000.0	3693500.0	280.4
RE	DISCCART	333000.0	3694500.0	279.5
RE	DISCCART	334000.0	3694500.0	283.6
RE	DISCCART	335000.0	3694500.0	277.5
RE	DISCCART	336000.0	3694500.0	284.1
RE	DISCCART	337000.0	3694500.0	281.4
RE	DISCCART	333000.0	3695500.0	285.9
RE	DISCCART	334000.0	3695500.0	287.9
RE	DISCCART	335000.0	3695500.0	283.2
RE	DISCCART	336000.0	3695500.0	287.3
RE	DISCCART	337000.0	3695500.0	284.8
RE	DISCCART	333000.0	3696500.0	291.9
RE	DISCCART	334000.0	3696500.0	292.1
RE	DISCCART	335000.0	3696500.0	289.6
RE	DISCCART	336000.0	3696500.0	293.8
RE	DISCCART	337000.0	3696500.0	283.3
RE	DISCCART	333000.0	3697500.0	298.7
RE	DISCCART	334000.0	3697500.0	298.4
RE	DISCCART	335000.0	3697500.0	295.8
RE	DISCCART	336000.0	3697500.0	299
RE	DISCCART	337000.0	3697500.0	286.6
RE	DISCCART	333000.0	3698500.0	300.3
RE	DISCCART	334000.0	3698500.0	304.3
RE	DISCCART	335000.0	3698500.0	301.4
RE	DISCCART	336000.0	3698500.0	302.4
RE	DISCCART	337000.0	3698500.0	289.9
RE	DISCCART	333000.0	3699500.0	304.8
RE	DISCCART	334000.0	3699500.0	311.1
RE	DISCCART	335000.0	3699500.0	309.7
RE	DISCCART	336000.0	3699500.0	298.8
RE	DISCCART	337000.0	3699500.0	294.4
RE	DISCCART	333000.0	3700500.0	313.3
RE	DISCCART	334000.0	3700500.0	312.8
RE	DISCCART	335000.0	3700500.0	313.9
RE	DISCCART	336000.0	3700500.0	303
RE	DISCCART	337000.0	3700500.0	298.7
RE	DISCCART	322000.0	3680500.0	307.8
RE	DISCCART	323000.0	3680500.0	301.6
RE	DISCCART	324000.0	3680500.0	290.9
RE	DISCCART	325000.0	3680500.0	289.6
RE	DISCCART	326000.0	3680500.0	284.8
RE	DISCCART	327000.0	3680500.0	272.2
RE	DISCCART	328000.0	3680500.0	264.9
RE	DISCCART	329000.0	3680500.0	265.5
RE	DISCCART	330000.0	3680500.0	253.1
RE	DISCCART	331000.0	3680500.0	249.8
RE	DISCCART	332000.0	3680500.0	243.7
RE	DISCCART	322000.0	3681500.0	300.8
RE	DISCCART	323000.0	3681500.0	289.5
RE	DISCCART	324000.0	3681500.0	294.5
RE	DISCCART	325000.0	3681500.0	286.9
RE	DISCCART	326000.0	3681500.0	282.9
RE	DISCCART	327000.0	3681500.0	271.6
RE	DISCCART	328000.0	3681500.0	267.9
RE	DISCCART	329000.0	3681500.0	256.2
RE	DISCCART	330000.0	3681500.0	253
RE	DISCCART	331000.0	3681500.0	243.9
RE	DISCCART	332000.0	3681500.0	240.9
RE	DISCCART	322000.0	3682500.0	286.4
RE	DISCCART	323000.0	3682500.0	284.6

RE	DISCCART	324000.0	3682500.0	281.3
RE	DISCCART	325000.0	3682500.0	277.3
RE	DISCCART	326000.0	3682500.0	267.9
RE	DISCCART	327000.0	3682500.0	266.7
RE	DISCCART	328000.0	3682500.0	264
RE	DISCCART	329000.0	3682500.0	259.5
RE	DISCCART	330000.0	3682500.0	251.8
RE	DISCCART	331000.0	3682500.0	242.7
RE	DISCCART	332000.0	3682500.0	238.3
RE	DISCCART	322000.0	3683500.0	287.2
RE	DISCCART	323000.0	3683500.0	277.4
RE	DISCCART	324000.0	3683500.0	279.2
RE	DISCCART	325000.0	3683500.0	277.8
RE	DISCCART	326000.0	3683500.0	265.1
RE	DISCCART	327000.0	3683500.0	259.8
RE	DISCCART	328000.0	3683500.0	257.4
RE	DISCCART	329000.0	3683500.0	254.6
RE	DISCCART	330000.0	3683500.0	249.6
RE	DISCCART	331000.0	3683500.0	240.5
RE	DISCCART	332000.0	3683500.0	239.1
RE	DISCCART	322000.0	3684500.0	279.7
RE	DISCCART	323000.0	3684500.0	274.4
RE	DISCCART	324000.0	3684500.0	273.3
RE	DISCCART	325000.0	3684500.0	267.7
RE	DISCCART	326000.0	3684500.0	261.6
RE	DISCCART	327000.0	3684500.0	254.6
RE	DISCCART	328000.0	3684500.0	250.2
RE	DISCCART	329000.0	3684500.0	248.4
RE	DISCCART	330000.0	3684500.0	243.6
RE	DISCCART	331000.0	3684500.0	243.2
RE	DISCCART	332000.0	3684500.0	245.4
RE	DISCCART	322000.0	3696500.0	301
RE	DISCCART	323000.0	3696500.0	289
RE	DISCCART	324000.0	3696500.0	290
RE	DISCCART	325000.0	3696500.0	288
RE	DISCCART	326000.0	3696500.0	290.5
RE	DISCCART	327000.0	3696500.0	293.7
RE	DISCCART	328000.0	3696500.0	292.6
RE	DISCCART	329000.0	3696500.0	296.8
RE	DISCCART	330000.0	3696500.0	292.6
RE	DISCCART	331000.0	3696500.0	290.4
RE	DISCCART	332000.0	3696500.0	291.3
RE	DISCCART	322000.0	3697500.0	297
RE	DISCCART	323000.0	3697500.0	292
RE	DISCCART	324000.0	3697500.0	292
RE	DISCCART	325000.0	3697500.0	291
RE	DISCCART	326000.0	3697500.0	295.8
RE	DISCCART	327000.0	3697500.0	312.7
RE	DISCCART	328000.0	3697500.0	296.6
RE	DISCCART	329000.0	3697500.0	299.8
RE	DISCCART	330000.0	3697500.0	295.7
RE	DISCCART	331000.0	3697500.0	296.3
RE	DISCCART	332000.0	3697500.0	294.7
RE	DISCCART	322000.0	3698500.0	300.2
RE	DISCCART	323000.0	3698500.0	296
RE	DISCCART	324000.0	3698500.0	295
RE	DISCCART	325000.0	3698500.0	294.5
RE	DISCCART	326000.0	3698500.0	298.3
RE	DISCCART	327000.0	3698500.0	301.8
RE	DISCCART	328000.0	3698500.0	302.7
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RE	DISCCART	331000.0	3698500.0	303.5
RE	DISCCART	332000.0	3698500.0	299.5
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RE	DISCCART	323000.0	3699500.0	299.8
RE	DISCCART	324000.0	3699500.0	300
RE	DISCCART	325000.0	3699500.0	312.4
RE	DISCCART	326000.0	3699500.0	302.8
RE	DISCCART	327000.0	3699500.0	306.8
RE	DISCCART	328000.0	3699500.0	306.6
RE	DISCCART	329000.0	3699500.0	308.2
RE	DISCCART	330000.0	3699500.0	301.3
RE	DISCCART	331000.0	3699500.0	307.5
RE	DISCCART	332000.0	3699500.0	303.5
RE	DISCCART	322000.0	3700500.0	308.7
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RE	DISCCART	324000.0	3700500.0	304
RE	DISCCART	325000.0	3700500.0	307
RE	DISCCART	326000.0	3700500.0	307.2
RE	DISCCART	327000.0	3700500.0	311.5
RE	DISCCART	328000.0	3700500.0	310.1
RE	DISCCART	329000.0	3700500.0	312.5
RE	DISCCART	330000.0	3700500.0	308.5
RE	DISCCART	331000.0	3700500.0	310.3

RE	DISCCART	332000.0	3700500.0	310.1
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RE	DISCCART	325400.0	3688500.0	261.9
RE	DISCCART	325500.0	3688500.0	261.8
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RE	DISCCART	325700.0	3688500.0	261.5
RE	DISCCART	325800.0	3688500.0	261.2
RE	DISCCART	325900.0	3688500.0	260.9
RE	DISCCART	326000.0	3688500.0	260.9
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RE	DISCCART	326800.0	3688500.0	262.1
RE	DISCCART	326900.0	3688500.0	262.1
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RE	DISCCART	327100.0	3688500.0	262.3
RE	DISCCART	327200.0	3688500.0	261.9
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RE	DISCCART	327400.0	3688500.0	260.4
RE	DISCCART	327500.0	3688500.0	260.8
RE	DISCCART	327600.0	3688500.0	261.8
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RE	DISCCART	328100.0	3688500.0	264.6
RE	DISCCART	328200.0	3688500.0	264.9
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RE	DISCCART	328700.0	3688500.0	265.3
RE	DISCCART	328800.0	3688500.0	264.9
RE	DISCCART	328900.0	3688500.0	264.2
RE	DISCCART	329000.0	3688500.0	263.4
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RE	DISCCART	325800.0	3688600.0	261.6
RE	DISCCART	325900.0	3688600.0	261.4
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RE	DISCCART	326900.0	3688600.0	262.3
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RE	DISCCART	327600.0	3688600.0	262.4
RE	DISCCART	327700.0	3688600.0	262.9
RE	DISCCART	327800.0	3688600.0	263.4
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RE	DISCCART	325100.0	3688700.0	262.4

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RE	DISCCART	325900.0	3688700.0	261.8
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RE	DISCCART	326900.0	3688700.0	263.3
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RE	DISCCART	328700.0	3688700.0	266.2
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RE	DISCCART	325200.0	3688800.0	263
RE	DISCCART	325300.0	3688800.0	263
RE	DISCCART	325400.0	3688800.0	263.1
RE	DISCCART	325500.0	3688800.0	263
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RE	DISCCART	325800.0	3688800.0	262.4
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RE	DISCCART	325400.0	3688900.0	263.9

RE	DISCCART	325500.0	3688900.0	263.4
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RE	DISCCART	328200.0	3688900.0	266.4
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RE	DISCCART	326900.0	3689000.0	265.3
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RE	DISCCART	327400.0	3689000.0	264
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RE	DISCCART	328500.0	3689000.0	267.3
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RE	DISCCART	325400.0	3689100.0	265.3
RE	DISCCART	325500.0	3689100.0	264.6
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RE	DISCCART	325700.0	3689100.0	263.7

RE	DISCCART	325800.0	3689100.0	263.3
RE	DISCCART	325900.0	3689100.0	263
RE	DISCCART	326000.0	3689100.0	262.7
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RE	DISCCART	326200.0	3689100.0	262.1
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RE	DISCCART	326500.0	3689100.0	264.9
RE	DISCCART	326600.0	3689100.0	264.9
RE	DISCCART	326700.0	3689100.0	265.2
RE	DISCCART	326800.0	3689100.0	265.3
RE	DISCCART	326900.0	3689100.0	265.5
RE	DISCCART	327000.0	3689100.0	265.5
RE	DISCCART	327100.0	3689100.0	265.2
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RE	DISCCART	327900.0	3689100.0	265.5
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RE	DISCCART	328300.0	3689100.0	267.6
RE	DISCCART	328400.0	3689100.0	267.9
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RE	DISCCART	329000.0	3689100.0	265.3
RE	DISCCART	325000.0	3689200.0	265
RE	DISCCART	325100.0	3689200.0	265.1
RE	DISCCART	325200.0	3689200.0	265.7
RE	DISCCART	325300.0	3689200.0	266.5
RE	DISCCART	325400.0	3689200.0	266.1
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RE	DISCCART	325800.0	3689200.0	264
RE	DISCCART	325900.0	3689200.0	263.7
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RE	DISCCART	326900.0	3689200.0	265.8
RE	DISCCART	327000.0	3689200.0	265.8
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RE	DISCCART	327200.0	3689200.0	265.2
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RE	DISCCART	327400.0	3689200.0	264.6
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RE	DISCCART	327600.0	3689200.0	264.9
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RE	DISCCART	328600.0	3689200.0	267.5
RE	DISCCART	328700.0	3689200.0	267.1
RE	DISCCART	328800.0	3689200.0	266.7
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RE	DISCCART	326200.0	3690200.0	265.2
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RE	DISCCART	326286.4	3689750.0	264.6
RE	DISCCART	326286.4	3689700.0	264.6

Attachment 5
Additional Discrete Receptors

Additional Discrete Receptors			
	Location		
Receptor Description	UTM East (m)	UTM West (m)	Elevation (m)
Superstition Class I Area	455074.7	3700287.0	619.30
Pine Mountain Class I Area	420190.7	3789220.0	1534.00
Mazatzal Class I Area	444524.8	3751036.0	752.90
Class II Sensitive Receptors			
Gila Bend I.R. 1	329987.4	3656163.3	184.00
Gila Bend I.R. 2	335051.9	3656163.3	224.30
Gila Bend I.R. 3	340116.4	3656163.3	254.10
Signal Mountain W.A. 1	321471.3	3676873.0	329.10
Signal Mountain W.A. 2	317277.7	3677840.7	374.30
Signal Mountain W.A. 3	313535.8	3677453.7	310.90
Woosley Peak W.A. 1	326166.4	3675840.7	354.20
Woosley Peak W.A. 2	330826.1	3675518.2	300.90
Gila River I.R. 1	378890.6	3680550.4	596.90
Gila River I.R. 2	378890.6	3685518.2	505.00
Gila River I.R. 3	378890.6	3690485.9	312.80
Gila River I.R. 4	378890.6	3695389.1	288.00
Eagletail Mountains W.A. 1	291535.8	3692937.5	395.00
Eagletail Mountains W.A. 2	290051.9	3699647.2	395.60
Eagletail Mountains W.A. 3	289148.7	3703260.1	394.00
Big Horn Mountains W.A. 1	302955.2	3732937.5	766.40
Big Horn Mountains W.A. 2	305729.4	3733905.3	768.30
Hummingbird Springs W.A. 1	306697.1	3735324.6	748.30
Hummingbird Springs W.A. 2	310890.6	3741260.1	666.80
Hummingbird Springs W.A. 3	311858.4	3743969.8	693.30
North Maricopa Mountains W.A. 1	358310.0	3668550.4	438.30
North Maricopa Mountains W.A. 2	358116.4	3672679.5	401.60
North Maricopa Mountains W.A. 3	363406.8	3673002.0	368.30
North Maricopa Mountains W.A. 4	366245.5	3674163.3	339.00
North Maricopa Mountains W.A. 5	366826.1	3679066.6	317.00
North Maricopa Mountains W.A. 6	372697.1	3679776.2	365.00
Nonattainment Receptors			
PM_{10} Nonattainment Area	350268.6	3676266.0	311.80
PM_{10} Nonattainment Area	350268.6	3686266.0	267.70
PM_{10} Nonattainment Area	350268.6	3696266.0	286.70
PM_{10} Nonattainment Area	350268.6	3706266.0	421.40
PM_{10} Nonattainment Area	350268.6	3716266.0	630.70
PM_{10} Nonattainment Area	350268.6	3726266.0	498.30
PM_{10} Nonattainment Area	350268.6	3736266.0	521.10
PM_{10} Nonattainment Area	350268.6	3746266.0	596.40
PM_{10} Nonattainment Area	350268.6	3752036.0	682.70
Ozone Nonattainment Area	368091.0	3684418.0	335.90

Additional Discrete Receptors			
	Location		
Receptor Description	UTM East (m)	UTM West (m)	Elevation (m)
Ozone Nonattainment Area	368091.0	3694418.0	273.20
Ozone Nonattainment Area	368091.0	3704418.0	312.40
Ozone Nonattainment Area	368091.0	3714418.0	359.00
Ozone Nonattainment Area	368091.0	3727383.0	408.80
Ozone Nonattainment Area	378430.4	3679570.0	432.80
Receptors on Complex Peaks			
	318250.0	3700461.5	662.03
	320807.7	3695730.8	441.96
	329653.9	3695307.7	383.44
	317000.0	3683923.1	492.25
	318346.2	3680500.0	566.93
	325038.5	3693865.4	338.63
	321692.3	3694230.8	329.18
	318538.5	3682000.0	343.20
	327711.5	3691769.2	377.95
	326750.0	3692576.9	326.14
	332692.3	3690384.6	377.95
	333557.7	3689961.5	347.47
	336750.0	3682230.8	377.95
	336134.6	3681807.7	323.09
	337153.9	3683000.0	319.10
	336826.9	3680903.8	307.85
	319384.6	3680000.0	421.54
	317230.8	3698000.0	438.91
	320250.0	3699692.3	438.91
	321692.3	3699461.5	350.40
	322500.0	3699019.2	346.86
	324461.5	3699192.3	347.47
	320750.0	3696615.4	429.77
	320000.0	3695961.5	359.66
	320807.7	3695730.8	441.96
	321442.3	3696115.4	378.20
	321500.0	3694615.4	368.81
	322500.0	3694788.5	371.86
	323653.9	3694500.0	353.57
	325692.3	3698846.2	366.67
	327096.2	3697384.6	334.67
	329673.1	3695326.9	383.44
	329846.2	3695730.8	349.91
	316375.8	3682012.1	353.26
	318024.2	3682072.7	331.62
	316606.1	3682212.1	341.38
	316666.7	3683787.9	490.42

Additional Discrete Receptors			
	Location		
Receptor Description	UTM East (m)	UTM West (m)	Elevation (m)
Receptors on Complex Peaks (Continued)	317303.0	3684121.2	430.07
	316690.1	3685460.6	338.94
	316339.4	3685569.7	353.57
	322290.9	3693836.4	317.91
	320424.2	3695557.6	326.14
	321757.6	3695545.5	323.09
	320866.7	3696084.8	384.05
	320375.8	3696363.6	359.66
	321363.6	3696593.9	347.47
	321042.4	3696630.3	356.62
	320484.8	3696909.1	356.62
	318745.5	3697109.1	380.39
	317266.7	3697090.9	390.14
	317060.6	3697436.4	374.90
	317557.6	3698484.8	377.95
	318866.7	3697436.4	374.90
	322000.0	3698048.5	326.14
	321521.2	3698169.7	323.09
	320545.5	3697581.8	368.81
	319709.1	3698000.0	354.18
	318787.9	3697660.6	356.62
	318278.8	3699472.7	662.03
	317412.1	3698939.4	405.38
	320066.7	3699454.5	390.14
	318430.3	3700121.2	563.88
	322206.1	3699303.0	356.62
	322503.0	3699787.9	371.86
	324854.5	3699848.5	350.52
	324824.2	3700218.2	356.62
	320133.3	3700345.5	435.86
	319551.5	3700969.7	532.49
	319200.0	3700697.0	457.20
	318581.8	3700654.5	597.41
	326278.8	3698042.4	316.99
	326854.5	3697848.5	329.18
	327733.3	3697303.0	313.94
	326448.5	3697400.0	313.94
	326472.7	3697648.5	313.94
	320969.7	3695460.6	368.81
	317533.3	3697521.2	359.66
	320175.8	3697878.8	338.33
	319878.8	3700727.3	445.01
	325533.3	3699454.5	313.94
	324521.2	3700333.3	323.09

Attachment 6
Ozone Monitor Validity Verification

Dillon, Chris G.

From: Peter Hyde [Hyde.Peter@ev.state.az.us]
nt: Wednesday, March 15, 2000 5:33 PM
: dilloncg@bv.com
Cc: Sandra Wardwell
Subject: Palo Verde Nuclear Ozone Data (Arizona)

README.TXT PAVE1999.09 PAVE1999.10 PAVE1999.08 PAVE1999.07 PAVE1999.06

PAVE1999.05 PAVE1999.04 Quattro for windows Quattro for windows

March 15, 2000

Chris Dillon:

This ozone monitor, like all monitors operated by the Arizona Department of Environmental Quality, is given periodic precision and accuracy checks consistent with NSR/PSD guidelines. Data for 1997 and 1998 are available in column/row format now, and are attached as "wb1" files, an ancient form of Quatropro. Each spreadsheet is divided into pages, one month per page.

The 1999 data are available on an hour-by-hour basis and are attached as a series of text files, one for each month of April-September, the key to which is given in the readme.txt file.

You can reach me at (602) 207-2360 with any questions.

Cordially,

Peter Hyde

BLACK & VEATCH

8400 Ward Parkway
P.O. Box 8405
Kansas City, Missouri 64114

Tel: (913) 458-2000

Black & Veatch Corporation

Mesquite Power, LLC
Mesquite Generating Station

B&V Project 96210.0020
March 30, 2000

Mr. Robert Arpino
Maricopa County Environmental Services Department
Air Quality Division
1001 N. Central Ave.
Suite 200
Phoenix, AZ 850004-1942

Subject: Response to IT's Comments on Ambient Air Quality Impact Analysis Workplan Addendum

Dear Mr. Arpino:

On behalf of Mesquite Power, LLC, please find the attached supplemental responses to IT's comments on the Ambient Air Quality Impact Analysis Workplan Addendum.

Enclosed is the completed ADEQ Air Quality Permit Application – Refined Modeling Protocol Checklist and the Comments on Ambient Air Quality Impact Analysis Workplan Addendum table as provided by IT. These are being submitted for incorporation in, and as a supplement to, the Ambient Air Quality Impact Analysis Workplan Addendum.

We believe that we have now responded to all of IT's comments leading to a finding of administrative completeness for the Ambient Air Quality Impact Analysis Workplan Addendum.

If you have any questions, please don't hesitate to call me at (913) 458-8269.

Very truly yours,

BLACK & VEATCH CORPORATION

W.G. Collins

William G. Collins
Permitting/Compliance Project Manager

Attachments

cc:	M. Swartz	Sempra Energy Resources
	C. Sterling	Sempra Energy Resources
	P. Allard	SA&B
	R. Felty	IT Corporation
	K. Kading	IT Corporation
	E. Valis	IT Corporation
	S. Bohning	EPA Region 9
	D. Lieb	Maricopa County Environmental Services Department – Air Quality Division

Is the Requirement Sufficiently Addressed? (✓ one)			Refined Modeling Protocol Contents (Headings and Chapters should be labeled as follows:)
Yes	No	N/A	
✓			Executive Summary
✓			ADEQ Completeness Checklist
			1.0 Introduction
✓			1.1 Site Description
✓			1.2 Project Description
		✓	1.3 Application Forms
			2.0 Regulatory Status
✓			2.1 Source Designation
✓			2.2 Area Classifications
✓			2.3 Baseline Dates
✓			2.3.1 Major Source Baseline Date
✓			2.3.2 Trigger Date
✓			2.3.3 Minor Source Baseline Date
✓			2.4 Baseline Area
✓			2.5 Increment Consumption and Expansion
			3.0 Ambient Data Requirements
✓			3.1 Pre-Application Air Quality Monitoring
✓			3.2 Post-Construction Air Quality Monitoring
✓			3.3 Meteorological Monitoring
✓			3.4 Background Concentrations
			4.0 Emissions Inventory
✓			4.1 Source Emissions Inventory

✓			4.1.1 The NAAQS Inventory
✓			4.1.2 The Increment Inventory
✓			4.1.3 Noncriteria Pollutants Inventory
			5.0 Topography, Climatology and Meteorology
✓			5.1 Regional Topography
✓			5.1.1 Simple Terrain
✓			5.1.2 Intermediate Terrain
✓			5.1.3 Complex Terrain
✓			5.2 Regional Climatology
✓			5.3 Regional Meteorology
✓			5.3.1 Surface Meteorology
✓			5.3.1.1 Wind Speed and Wind Directions
✓			5.3.1.2 Stability Class
✓			5.3.1.3 Data Capture
✓			5.3.1.4 Treatment of Calms
✓			5.3.2 Upper Air Data
			6.0 Modeling Analysis Design
✓			6.1 Modeling Selection
✓			6.1.1 Screen Modeling
✓			6.1.2 Refined Screen Modeling
✓			6.1.3 Refined Modeling
✓			6.2 Model Input Defaults/Options
✓			6.3 Rural/Urban Classification
✓			6.3.1 Land Use Classification
✓			6.3.2 Rural vs Urban
✓			6.4 Receptor Network

✓			6.4.1 Coarse Receptors
✓			6.4.2 Medium Receptors
✓			6.4.3 Fine Receptors
✓			6.4.4 Tight Receptors
✓			6.4.5 Discrete Receptors
✓			6.4.6 Class I Receptors
✓			6.4.7 Nonattainment Area Boundary Receptors
✓			6.5 Receptor Elevations
✓			6.6 Source Characterization
✓			6.6.1 Point Sources
		✓	6.6.2 Area Sources
		✓	6.6.3 Volume Sources
		✓	6.6.4 Line Sources
		✓	6.6.5 Mobile Sources
		✓	6.6.6 Open Pit/Pit Retention
		✓	6.6.7 Dry Deposition
✓			6.7 Source Locations and Parameters
✓			6.8 Building Wake Downwash and GEP
			7.0 Dispersion Modeling Impact Analysis
✓			7.1 Preliminary Analysis
✓			7.1.1 Preliminary Impact Determination
✓			7.1.2 Sources Within Area of Impact
✓			7.1.3 Sources Omitted
✓			7.1.4 Significant Impacts
✓			7.2 Full Impact Analysis
✓			7.2.1 The NAAQS Analysis

✓			7.2.2 The Increment Analysis
✓			7.2.3 AAAQG Pollutant Analysis
			8.0 Additional Impact Analysis
✓			8.1 Growth Analysis
✓			8.2 Soils and Vegetation Analysis
✓			8.3 Visibility Impairment Analysis
✓			8.3.1 Level One Screening
✓			8.3.2 Level Two Screening
		✓	8.3.3 Level Three Screening
		✓	8.4 Conclusions
			9.0 Class I Impact Analysis
✓			9.1 Class I Increments
		✓	9.2 Air Quality Related Values
		✓	9.2.1 Flora and Fauna
		✓	9.2.2 Water
		✓	9.2.3 Acid Deposition
		✓	9.3 Visibility Impact Analysis
			10.0 References
			11.0 Appendices
✓			Minutes from pre-application meetings
✓			Copies of all correspondence

Comments on Ambient Air Quality Impact Analysis Workplan ADDENDUM
3/29/2000
Mesquite Power, LLC

ADEQ Protocol Checklist Section	Comment	Recommendation	Recommendation to be Addressed in
ADEQ Checklist	The ADEQ Checklist provided in the Addendum has Items 6.6.2 through 6.6.7 not marked as being significantly addressed/not applicable.	Complete form for these items as appropriate.	Workplan
2.5 Increment Consumption and Expansion	The approach of assuming that all increment is available for use is not correct. B&V (Chris Dillon) provided an e-mail on 3/29/99 clarifying what was meant by the prior statement.	The application will need to include the sources that have previously consumed increment and provide the amount of increment remaining.	Application
3.4 Background Concentrations	The use of the NO_2 1-hour average concentration in lieu of an NO_2 annual average is conservative, as noted in the Workplan. It would be beneficial to understand the technical reasoning for this approach (i.e. poor data quality for annual average, not enough data points, etc.)	Further discussion of the reasons for this approach and presentation of 1-hour and annual average NO_2 concentrations from other monitors in the general area would be valuable to confirm that the values are conservative.	Application
4.2 The NAAQS Inventory	Interactive sources should also include those sources (located outside the significant impact area created by the proposed Mesquite project) that have significant impacts in the SIL area created by Mesquite.	Review Maricopa County and ADEQ source inventory to determine potential interactive source candidates that may have a SIL in Mesquite's SIL area.	Application
4.4 Noncriteria Inventory	Table 2 presented as part of the Addendum for this Section, has some missing (i.e. units for the Emission Factors) and conflicting/unexplained (i.e. footnotes c and d conflicting number of	Clarification will be sought as part of the application technical review.	Application

Comments on Ambient Air Quality Impact Analysis Workplan ADDENDUM
3/29/2000
Mesquite Power, LLC

ADEQ Protocol Checklist Section	Comment	Recommendation	Recommendation to be Addressed in
	turbines, rationale for using GE Turbines vs. Westinghouse) information		
5.1 Regional Topography	The comparison of the digital data terrain heights and other information with USGS topographic quadrangles may create data conflicts due to differing datums (i.e. 1929? (topo. Maps) vs. 1983? (digital data))	Verify that the possible differing datums do not cause inaccurate receptors heights or conflicting /inaccurate information.	Application
6.5 Receptor Elevations	Are discrete receptor (i.e. Class 1, sensitive Class 2, Nonattainment boundary) elevations/heights "worst-case" values or actual elevation/height at that point?	Provide a discussion of the discrete receptor elevations/heights. The use of a "worst-case" elevation/height should have been used and described.	Application
11.0 Appendices/Additional Information – Modeled Impact on PM_{10} and Ozone Nonattainment	Sempra is requesting that its contribution of VOCs from operating the proposed plant be considered in a regional impact analysis. Rob Arpino of Maricopa Co. stated in an e-mail dated 3/21/99 that Sempra would be required to submit a proposal, for evaluation by the County, describing how to analyze the ozone impact on the non-attainment area.	Is the Addendum "Additional Information" portion Sempra's "proposal" for demonstrating how the VOC emissions may impact the ozone non-attainment area? If so, Sempra's proposal/request will be forwarded to Region IX EPA office and ADEQ.	Note: Modifications to the Workplan and/or Application may be requested depending upon EPA's and/or ADEQ's comments and requirements.

EXHIBIT
A-3
admitted

BILL KELLER

VICE PRESIDENT, DEVELOPMENT AND OPERATIONS
SEMPRA ENERGY RESOURCES

Bill Keller is Vice President of Project Development and Operations for Sempra Energy Resources, an unregulated subsidiary of Sempra Energy, a San Diego-based Fortune 500 energy services holding company whose subsidiaries provide electricity, natural gas and value-added products and services.

Sempra Energy was formed in June 1998 by the merger of Pacific Enterprises and Enova Corporation.

In his current role, Keller is responsible for assembling technical and manpower resources to develop new generating projects in target markets throughout the United States.

He was instrumental in developing El Dorado Energy, a 480-megawatt power plant jointly owned by Reliant Energy and Sempra Energy. That facility began commercial operation on May 1, 2000, selling electricity into the wholesale power markets of Nevada, California and the southwestern United States. The $280 million natural gas-fired power generating plant, located near Boulder City, Nev., about 40 miles southeast of Las Vegas, is designed to provide reliable, safe and cost-effective power to support the growing economies of the region.

Before joining Sempra Energy Resources, Keller worked for Enova Energy Management, a division of Enova Energy, Inc., from January 1997 to June 1998. A 20-year veteran of the utility industry, Keller previously held various project management and engineering positions, including the implementation of emissions reduction programs at San Diego Gas & Electric (SDG&E), the principal subsidiary of Enova Corporation.

A registered professional mechanical engineer, Keller holds a bachelor's degree in mechanical engineering from Villanova University in Villanova, Pa. and a master's degree in business administration from National University in San Diego. He also served in the United States Navy. Bill is married and has four daughters.

Joseph H. Rowley, P.E.

Sempra Energy Resources – Director, Project Development

EXPERIENCE SUMMARY

20 years of experience in the licensing, design, construction, and operation of power plant and electric transmission projects.

EDUCATION

BS, Chemical Engineering, Magna cum Laude, Bright Young University, 1980
Registered Professional Engineer in Mechanical Engineering, State of California, since 1983

REPRESENTATIVE PROJECT EXPERIENCE

Vice President - Elk Hills Power, LL. (February 1999 to present)
Sempra Energy Resources' project manager for the Elk Hills Power Project, a joint development with Occidental Energy Ventures Corp. Responsible for licensing of this project before the California Energy Commission.

Director, Project Development - Sempra Energy Resources (August 1998 to present)
Responsible for the development of merchant power plant projects in the western United States, including the 1000 MW Mesquite Power Project to be located in Maricopa County, Arizona, the 500 MW Elk Hills Power Project to be located in Ken County, California, and the 500 MW expansion of the El Dorado Energy Project located in Boulder City, Nevada.

Manager, System Operations & Generation - ID Power Dept. (February 1998 to August 1998)
Responsible for Id's energy resource assets, including the energy management center, power contracts, fuel contracts, and 28 generating units (3 steam units, 1 combined cycle, 9 gas turbines, and 15 hydra units) at 13 sites. Also responsible for id's transmission control area operations and telecommunications. Organization included 134 employees with annual OEM and routine capital budgets totaling over $120 million.

Manager, Planning/Engineering/Generation - ID Power Dept. (1993 to February 1998)
Planned and initiated implementation of ID's response to the restructuring of the power industry. Responsible for an organization of 145 professional, technical, and operations employees involved in planning, projects, and day-to-day operations. Organization included transmission planning, resource planning, generating plants (operations and projects), and telecommunications. Annual OEM and routine capital budgets totaled $20 million.

Directed ID transmission and resource planning, including response to FERRIC Order 888 regarding transmission open access, participation in the development of the California Independent System Operator and Power Exchange, and evaluation of resource options.

- Conceived the Metered Subsystem concept included in the Cal-ISO tariffs.
- Directed the Presidential permit application process for an ID transmission line to CFA's Aeropuerto Substation. Directed the CEQA process for several ID transmission lines.

Joseph H. Rowley, P.E.

- Conducted evaluation of ID resource options, including participation in the 1992, 1994, and 1996 Electricity Report proceedings before the CEC.

- Licensed the El Centro Unit 1 Repowering before the Imperial County APCD in 1994-95.

Established a new capital budgeting process based on rigorous resource planning and transmission planning. Directed development of ID's long-term capital budgets and cash flow projections to determine financing needs.

- Directed development of the ID Power Department capital and OEM budgets in 1996 and 1997. Overhauled the budgeting process to provide for greater accountability.

- Developed an improved Power Department cash balance sheet and spearheaded improvements in the accounting system used to track capital projects.

General Superintendent, Power Generation - ID Power Dept. (1991 to 1993)
Managed an organization of 97 employees and 28 generating units. Annual OEM and routine capital budgets totaled over $10 million. Concurrently managed the El Centro Unit 2 Repowering Project, conversion of a 30 MW steam unit into a 115 MW combined cycle.

As project manager/engineer of the El Centro Unit 2 Repowering, directed this project from the beginning of licensing in 1990 through engineering, procurement, construction, and start-up. Placed the project in service on schedule and under its $59.5 million budget in 1993.

- Licensed the Unit 2 Repowering before the California Energy Commission and Imperial County APCD in 1990-91.

- Worked with the CEC and APCD in the development of all permit conditions and was the project's primary witness in hearings before the CEC.

- Conducted permit application preparation, data responses, and workshop participation.

- Directed development of the project's Risk Management and Prevention Plan.

- Project engineer for conceptual engineering, design review, construction, and startup.

- Contract administrator for the project's engineering/procurement/construction contract.

The Unit 2 Repowering was the first fossil-fired project approved by the CEC that was not a cogeneration or R&D project, and was one of the first repowerings to enter service nationwide.

As General Superintendent, Power Generation, was responsible for the operation, maintenance, and regulatory compliance of all ID generating facilities.

- Directed all licensing compliance tasks for the El Centro Unit 2 Repowering.

- Directed stormwater permitting and NPDES permit renewal for the El Centro Generating Station and Rockwood Gas Turbine Plant before the Regional Water Quality Control Board in 1992-93.

Joseph H. Rowley, P.E.

- Directed projects for the abatement of asbestos and other hazardous materials at the El Centro Generating Station.
- Directed and conducted emissions sources tests for ID generating units. Developed responses to air quality data requests from the U.S. EPA Region IX in 1992.
- Supervised engineering of ID plant retrofit projects and design and construction of a major maintenance facility.

Assistant General Superintendent, Power Generation - ID Power Dept. (1990 to 1991)
Experience included under General Superintendent, above.

Senior Engineer - San Diego Gas & Electric Company (1985 to 1990)
Project manager of SDG&E's Gas Turbine Application Feasibility Study in 1988, which provided the basis for the 460 MW Combined Cycle Project and the South Bay Unit 3 Augmentation Project.

As project engineer of SDG&E's 460 MW Combined Cycle Project, directed conceptual design and preparation of a CEC Notice of Intention in 1989-90. Also directed conceptual design of SDG&E's South Bay Unit 3 Augmentation Project in 1989-90.

Provided engineering support of SDG&E resource planning, including participation in the CEC's 1990 Electricity Report process. Authored SDG&E's "Power Generation Options – Data Book" in 1989, which provided cost and performance characterizations of numerous resource options.

While at SDG&E, chaired the EPRI Coal Gasification Power Plant Program Committee from 1988 to 1990. Monitored the Cool Water Coal Gasification Combined Cycle Project through design, construction, and operation. Member of the EPRI Advanced Fossil Power Systems Task Force and subcommittees from 1983 to 1990.

Conducted various engineering projects at SDG&E's South Bay and Encina power plants.

Engineer - San Diego Gas & Electric Company (1982 to 1985)
Conducted various engineering projects at SDG&E' South Bay and Encina power plants. These included installation of cycling retrofits, heat exchangers, fire protection systems, safety relief valve systems, and other power plant systems and equipment.

Provided technical support regarding power plant siting during 1984 General Rate Case hearings concerning SDG&E's Blythe site. Directed the Blythe Site Generation Screening Study performed by Bechtel for SDG&E in 1982.

Conducted emissions sources tests and various power plant performance tests. Authored a combustion/emissions model used at both SDG&E and the ID Power Dept. for mass balance and thermal performance analysis.

Associate Engineer - San Diego Gas & Electric Company (1980 to 1982)
Completed various assignments in support of SDG&E generation facilities, including planning, engineering, and regulatory compliance activities. Provided engineering support of SDG&E resource planning during the CEC's 1982 Electricity Report process.

Marty Swartz
Manager, Project Development
Sempra Energy Resources

Marty Swartz is Manager, Project Development for Sempra Energy Resources, an unregulated subsidiary of Sempra Energy, a San Diego-based Fortune 500 energy services holding company whose subsidiaries provide electricity, natural gas, and value-added products and services. Sempra Energy was formed in June 1998 by merger of Pacific Enterprises and Enova Corporation.

In his current role, Marty Swartz is responsible for the day-to-day management of a Mesquite Power Project from the initial development phases through commercial operation of the plant. These day-to-day activities include the preparation, review, and approval of permit applications, support to obtain such permits, transmission and gas supply, community relations, construction of the facility, and start-up of the facility.

Before joining Sempra Energy Resources, Marty Swartz held various engineering and project management positions with Foster Wheeler Corporation, Ahlstrom-Pyropower Corporation, and Bechtel Power Corporation. These positions encompass 20 years of professional experience in the development, design and construction of gas, oil, coal and nuclear power plants.

Marty Swartz has a Bachelor of Chemical Engineering degree from Cleveland State University and is a registered Professional Engineer (PE) in the Commonwealth of Virginia.

William R. Engelbrecht

Biography

William earned a Bachelor of Science degree in Electrical Engineering from the University of Illinois in 1981, with a specialty in Power. He is a Registered Professional Engineer (PE) in Electrical Engineering in the State of California.

William has 20 years of professional experience in the power industry spending 17 years at San Diego Gas & Electric Co. in the areas of Transmission Planning, Resource Planning, Strategic Planning and Industry Restructuring.

William has spent the last 2½ years with Sempra Energy Resources. He is responsible for the development of the short and long-range assessment of the U.S. electric markets. Associated with this is determination of various "project" revenue sources and projected levels including energy, capacity and ancillary services. He is required to understand the various U.S. market structures including ISO and PX rules, protocols and structure, as well as transmission pricing policies and congestion management. He also identifies market and sub-market opportunities for further development work.

William helps support SER's development efforts by managing transmission planning and interconnection request/study efforts as well as other "market" studies. He also directs SER's Asset Portfolio Management activities, examining risk management options in the forward gas and electric commodity markets.

William has spoken at a number of national conferences, and has testified numerous times before the California Public Utilities Commission, the California Energy Commission, and once before the Connecticut Siting Council.