

APPENDIX G SUMMARY OF SO₂ MODELING

A screening level AERMOD modeling analysis for SO₂ emissions from the Mesquite Generating Station (MGS) was prepared. AERMOD was run in screening mode that fully utilized the refined-level AERMOD components of BPIP (building downwash pre-processor) and AERMAP (AERMOD's terrain pre-processor) along with screening level meteorological data. In conducting the BPIP analysis, the building heights shown in the attached figure were used for the modeling.

The screening level meteorological data was developed using USEPA MAKEMET model. MAKEMET generates a site-specific matrix of meteorological conditions for input to AERMOD. The matrix is generated based on looping through a range of wind speeds, cloud covers, ambient temperatures, solar elevation angles, and convective velocity scales for user-specified surface characteristics of surface roughness, Bowen ratio, and albedo.

AERMOD was run in a screening mode using the SO₂ emissions from the 4 turbines at 100% load with duct firing as found in page 1 of Appendix D of the Title V renewal application, as well as the fire water pump emissions and stack parameters as found on the last page of Appendix A of the Title V renewal application. Modeled SO₂ concentrations were then added to ambient background from a nearby monitor in Phoenix, AZ. The total impacts (modeled plus background) were compared against the air quality standards found in Table 1 below. The first model run assessed SO₂ compliance using the current permitted fuel sulfur content of 0.003 grains/dscf for the 4 turbines. Since this run showed compliance with all standards (as shown below in Table 1), a subsequent model run was conducted using a higher fuel sulfur content of 0.0075 grains/dscf for the turbines. As shown in Table 1, the modeling results using the higher sulfur content indicate compliance with the air quality standards.

**Table 1
AERMOD SO₂ Modeling Results**

Averaging Period	Predicted Max SO₂ Concentration @ 0.003 grains/dscf (µg/m³)	Predicted Max SO₂ Concentration @ 0.0075 grains/dscf (µg/m³)	Ambient SO₂ Concentration (µg/m³)⁽¹⁾	Total SO₂ Concentration @ 0.003 grains/dscf (µg/m³)	Total SO₂ Concentration @ 0.0075 grains/dscf (µg/m³)	SO₂ Air Quality Standard (µg/m³)	Compliant?
1-hour SO ₂ NAAQS	32.0	50.0	23.9 ⁽²⁾	55.9	73.9	196 ⁽³⁾	Yes
1-hour	32.0	50.0	180.8 ⁽⁴⁾	212.8	230.8	850	Yes
24-hour	19.2	30.0	18.3 ⁽⁵⁾	37.5	48.3	250	Yes
72-hour ⁽⁶⁾	19.2	30.0	18.3 ⁽⁵⁾	37.5	48.3	120	Yes

(1) Ambient SO₂ concentrations measured at the 1645 E Roosevelt St-Central Phoenix, AZ monitor.

(2) Based on the 3-year average of the 1-hour daily maximum 99th percentile SO₂ concentrations.

(3) 1-hour SO₂ NAAQS and is based on 3-year average of the 1-hour daily maximum 99th percentile concentrations.

(4) Based on the 3-year maximum highest second highest 1-hour SO₂ concentrations.

(5) Based on the 3-year maximum highest second highest 24-hour SO₂ concentrations.

(6) AERMOD does not produce a 72-hour average concentration so the 24-hour concentrations are used conservatively as a surrogate for the 72-hour concentrations.

The modeling files are included on a CD as an attachment to this Appendix.

