

Analysis of the suitability of the Martinez SO₂ SLAMS to fulfill the monitoring requirement of the SO₂ Data Requirements Rule

The SO₂ Data Requirements Rule (SO₂ DRR), finalized by EPA on August 21, 2015, requires states to characterize ambient sulfur dioxide (SO₂) concentrations in areas around sources emitting greater than 2000 tons per year (tpy) of SO₂. The rule includes the flexibility for areas to meet this requirement through ambient air monitoring, modeling, or by the source adopting enforceable limits to bring emissions below 2000 tpy. On March 18, 2016, EPA sent a letter to the California Air Resources Board, informing the state that they considered three sources in Martinez, California, to be aggregated with respect to triggering compliance with the SO₂ DRR ambient air characterization requirements. These facilities and their 2014 calendar year emissions are listed in Table 1, below.

Table 1: Martinez Facility SO₂ Emissions for Calendar Year 2014

Facility Name	Source Type	SO ₂ (tons/yr)
Shell	Petroleum Refinery	1,093
Eco Services (formerly Solvay)	Sulfuric Acid Plant	186
Tesoro	Petroleum Refinery	962
Aggregated Total	-	2,241

Martinez is situated in a small basin bordered on the north by the Carquinez Strait, connecting the San Pablo and Suisun Bays, and in the other directions by hills that range in height from 200-400 meters. Due to the complicated topography and meteorology of the area surrounding these sources, heavily influenced by sea-breezes and orographic forcing, typical dispersion modeling does not accurately characterize ambient concentrations of pollutants. However, such modeling can be used to help identify areas of relative maximum concentration.

The Bay Area Air Quality Management District (“Air District”) completed 1-hour SO₂ modeling for the Martinez area using the AERMOD dispersion model to evaluate the normalized ambient SO₂ concentrations resulting from the combined SO₂ source emissions from Shell, Tesoro, and Eco Services. The modeling was performed according to the following specifications:

- A 16 km x 16 km special receptor grid containing 16,600 discrete receptor locations centered on UTM: 580,124 E, 4,208,805 N.
- A combined total of 30 sources of SO₂ at Shell, Tesoro and Eco Services were included in the model. Source locations and stack parameters were previously provided by the facilities.
- SO₂ emission rates used in the model were considered to be maximum values.
- Elevations for sources and receptors were taken from the National Elevation Dataset (NED) using 10 meter horizontal resolution data.

- Five consecutive years of meteorological data (2009 – 2013) from a centrally located meteorological station (called Shell East) was used.

Figure 1 below shows an outline of the domain used for the modeling, the fence lines of the included facilities, and nearby SO₂ monitors. The Air District's SO₂ monitors, also known as state or local air monitoring stations (SLAMS) are labeled with the site name and the monitor type. More detailed information about the modeling protocol, including model inputs, are available upon request to the Air District.

As shown in Figure 2 below, based on the five-year modeling period results, the higher normalized 1-hour SO₂ concentrations are expected to occur generally at elevated areas. The resulting maximum normalized 1-hour SO₂ concentration is about 0.5 km southwest of the existing Air District SO₂ SLAMS. Access to power is very limited in this sparsely populated hilly area, similar to many of the elevated areas surrounding Martinez. Therefore, the Martinez SLAMS current location is likely the closest feasible location to the modeled concentration maximum, given power and siting constraints, as well as being representative of the actual population exposure of the likely maximum 1-hour SO₂ concentrations.

Given the complexity of the area and the resulting challenges in modeling, the Air District performed two additional 5-year modeling runs using the same parameters, but meteorological data from two other nearby meteorological stations (Shell-West, and Tesoro). These runs show other areas of potential high SO₂ concentrations in addition to the consistent high concentration location uphill from the current monitoring SLAMS (see Figures 3 and 4 below). The Air District believes that the varied modeling results support the current monitoring location as adequate to satisfy the monitoring requirement for the SO₂ DRR for the sources EPA identified, however, the Air District will continue to evaluate the appropriateness of this location to meet this objective in each 5-year network assessment. Any such assessment will utilize new information that may become available, such as data from upcoming community monitoring sites. In the next few years, the Air District expects to install monitors in the communities surrounding the five Bay Area refineries to further characterize the air quality near those sources as required by our Regulation 3.

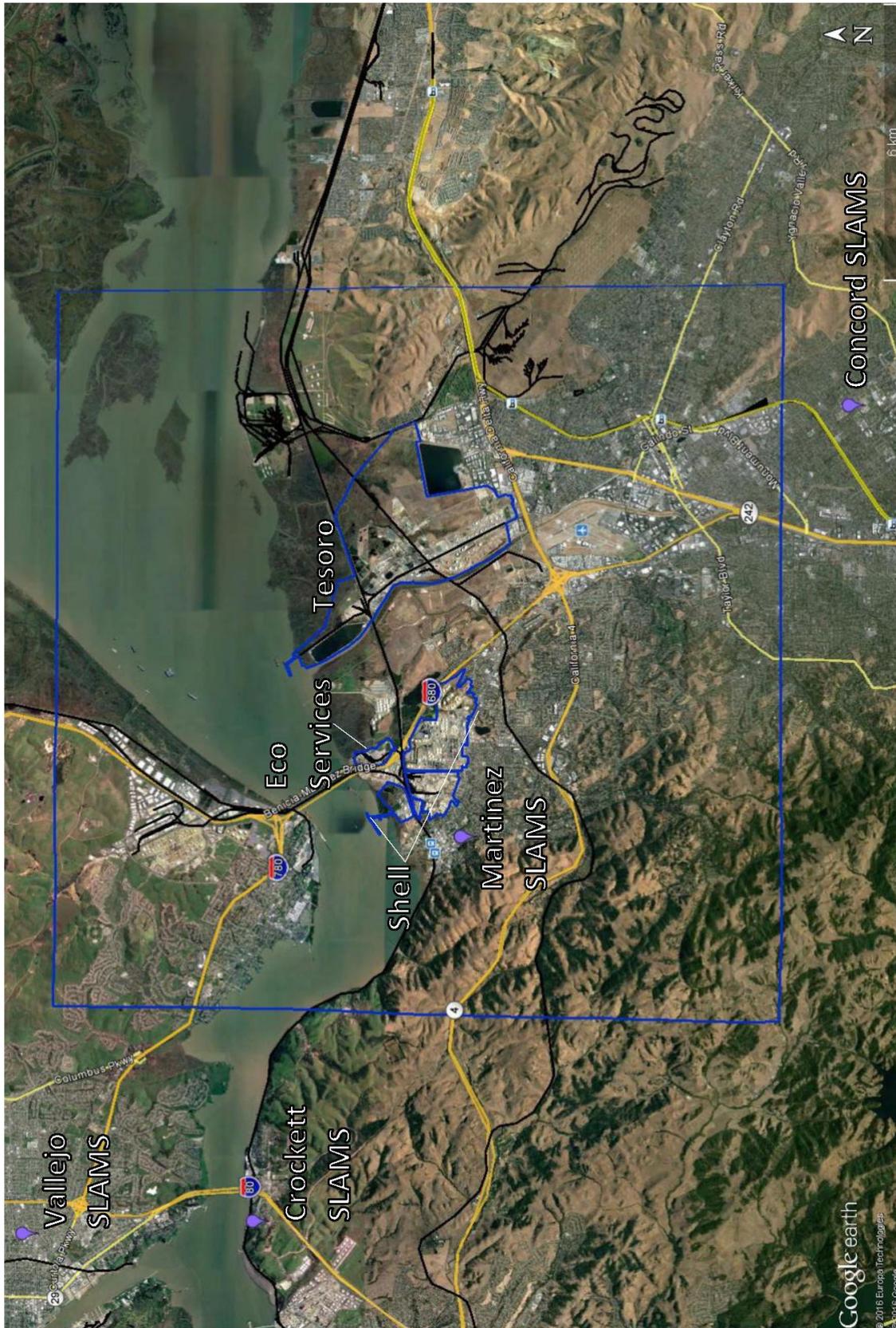


Figure 1: Area overview including the AERMOD modeling domain (blue rectangle), facilities subject to the SO₂ DRR, and nearby SO₂ monitoring sites

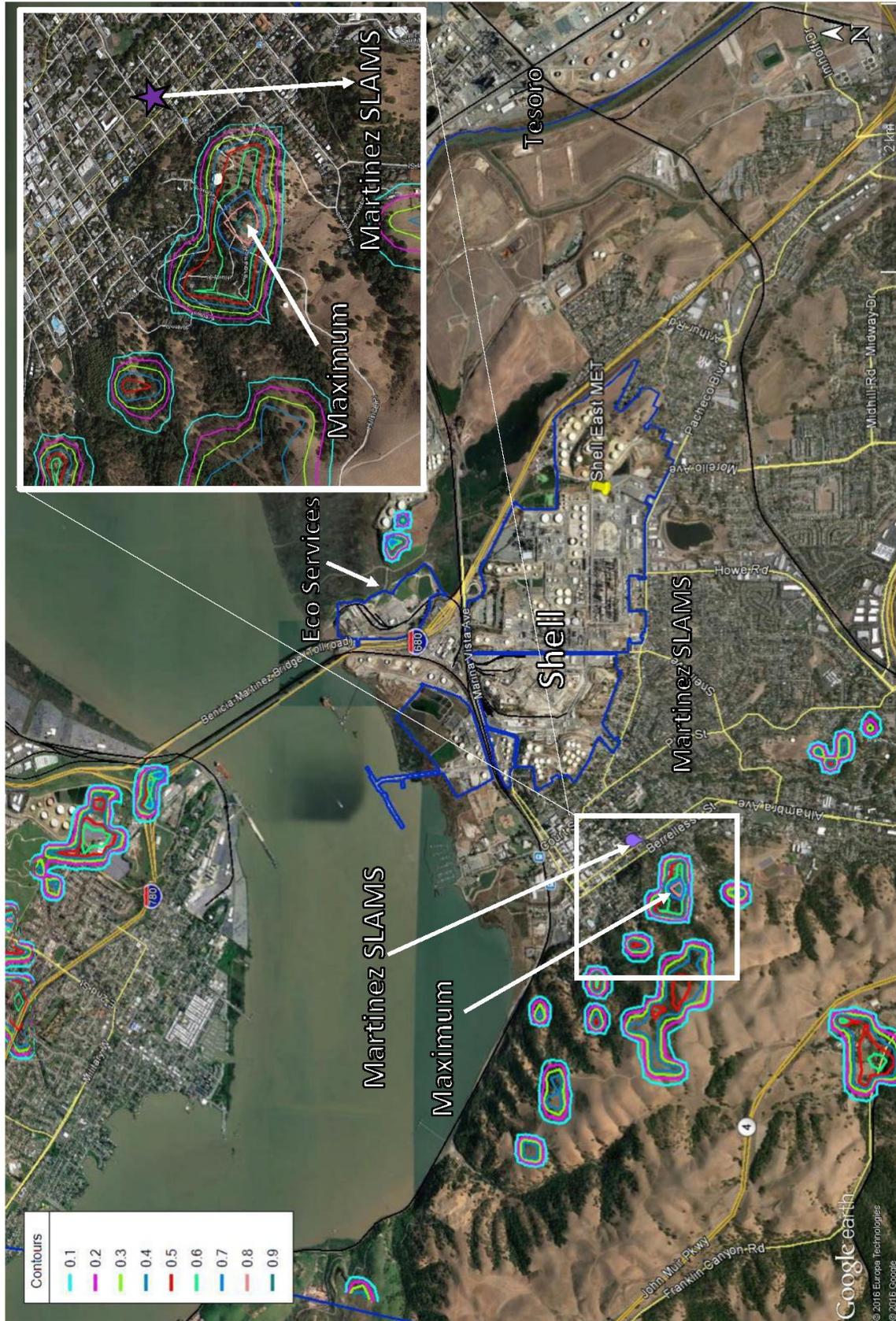


Figure 2: Maximum normalized 1-hour SO₂ concentrations from AERMOD modeling using emissions from Shell, Tesoro, and Eco Services, and 2009-2013 Shell-East meteorological data

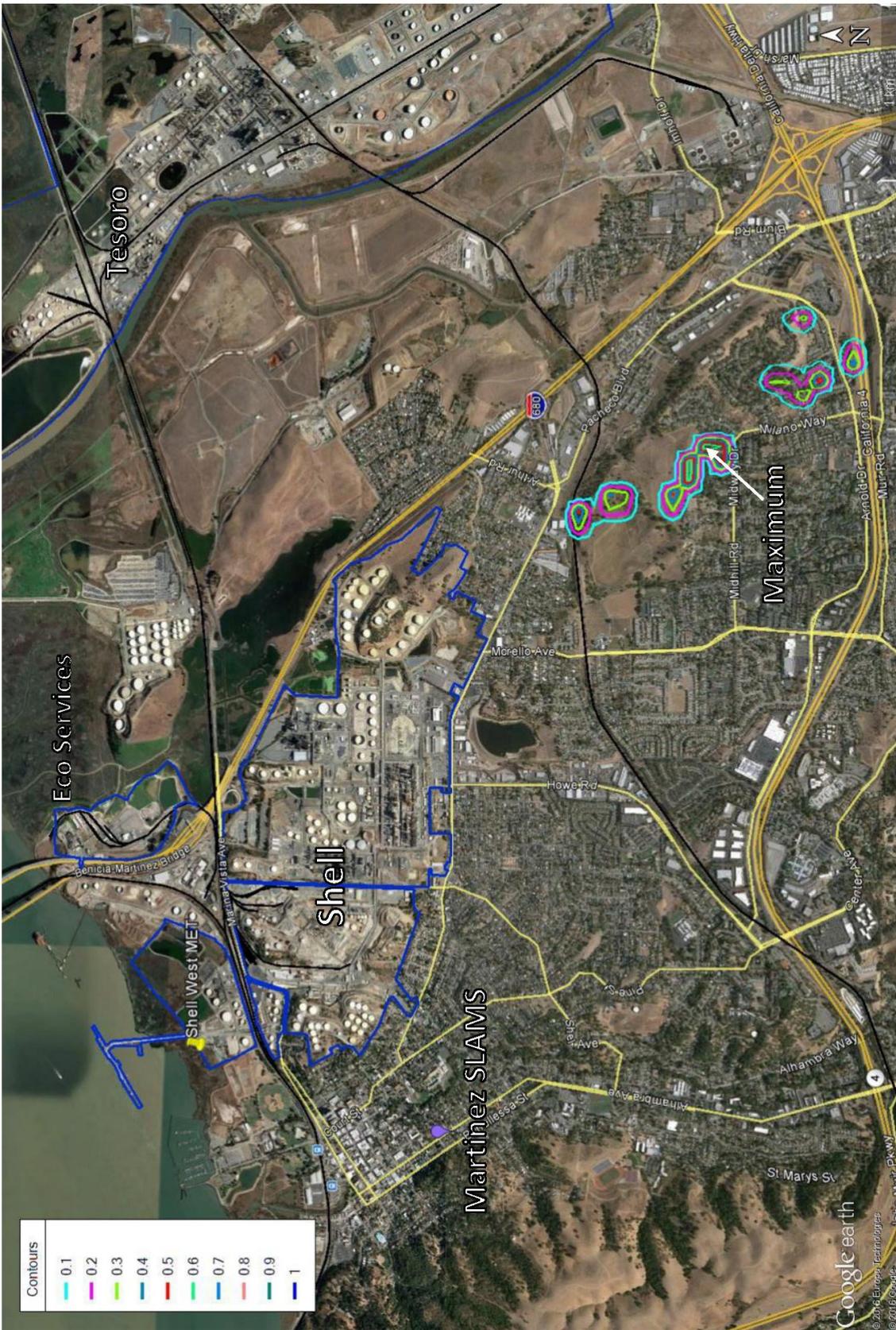


Figure 3: Maximum normalized 1-hour SO2 concentrations from AERMOD modeling using emissions from Shell, Tesoro, and Eco Services, and 2009-2013 Shell-West meteorological data

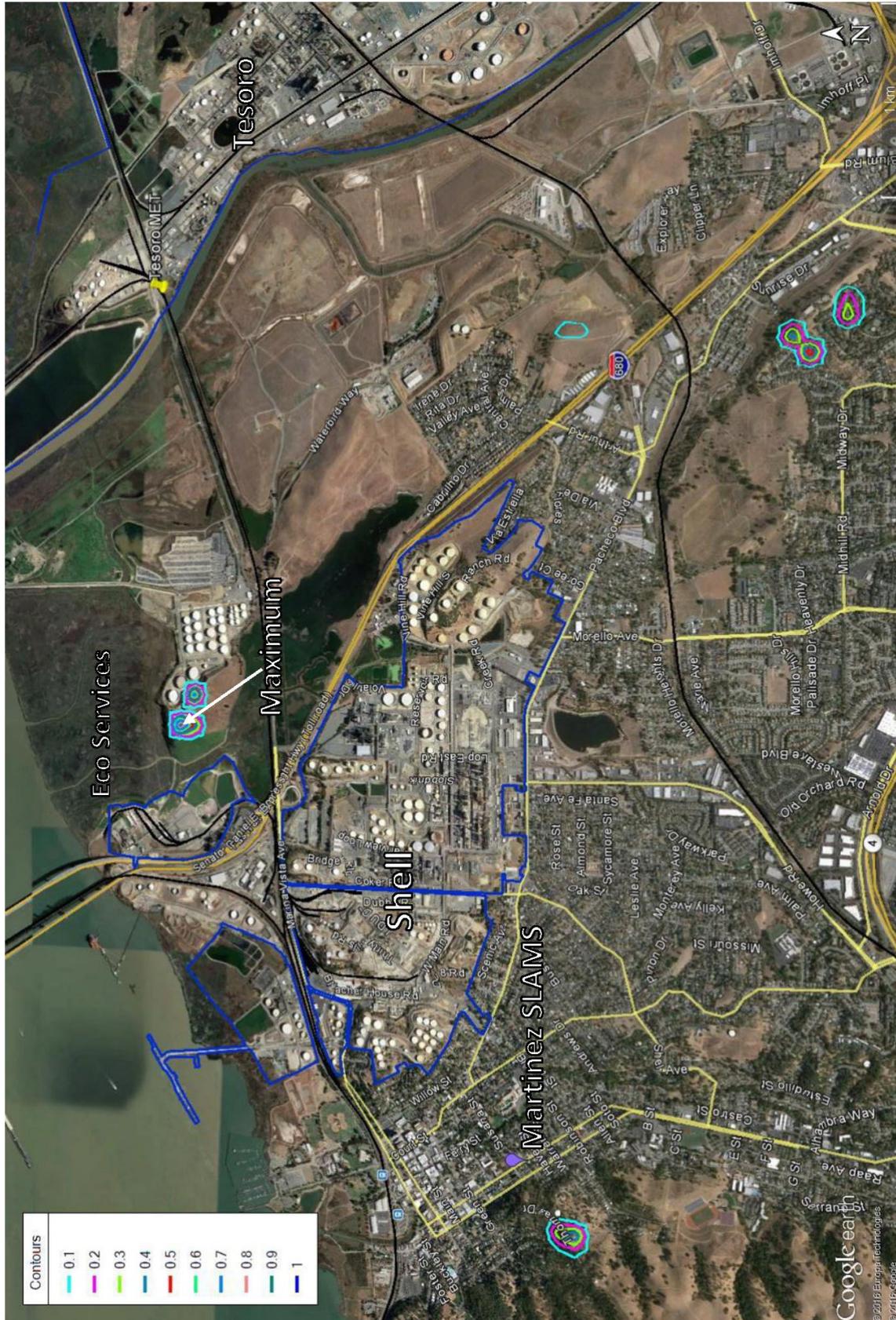


Figure 4: Maximum normalized 1-hour SO2 concentrations from AERMOD modeling using emissions from Shell, Tesoro, and Eco Services, and 2009-2013 Tesoro meteorological data