SCAQMD Rule 1180 Fenceline Monitoring Plan

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South Coast Air Quality Management District
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Fenceline Monitoring Plan for the Tesoro Refinery in Carson and Wilmington, California

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Monitoring Plan

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Introduction

Rule 1180 Requirements for Fenceline Monitoring Plans

On December 1, 2017, the South Coast Air Quality Management District (SCAQMD) adopted Rule 1180, "Refinery Fenceline and Community Air Monitoring" (South Coast Air Quality Management District, 2017a). Rule 1180 requires petroleum refineries within the SCAQMD to establish air monitoring systems at facility perimeters (fencelines); these systems will measure pollutant concentrations and provide the public with near real-time information about air quality near the refineries. Rule 1180 also requires a detailed fenceline air monitoring plan (this document) that follows SCAQMD guidelines (South Coast Air Quality Management District, 2017b). This plan must be submitted for approval by August 1, 2018.

According to the SCAQMD's guidelines, an air monitoring plan must include detailed information on several elements to justify the measurement and data dissemination approach being proposed to satisfy Rule 1180 requirements. These elements are listed below, along with Section numbers to indicate where each element is discussed in this document.

- "An evaluation of routine emission sources at the refinery (e.g., utilizing remote sensing or other measurement techniques or modeling studies, such as those used for health risk assessments)" (Section 1). *This plan relies on emissions reported in the annual emissions inventory and modeling data submitted to SCAQMD. The EPA benzene fenceline monitoring data was also utilized to determine the location of monitoring paths.*
- "An analysis of the distribution of operations and processes within the refinery to determine potential emissions sources" (Section 1). *This plan describes refinery operations and processes and also assesses on-site emissions sources.*
- "An assessment of air pollutant distribution in surrounding communities (e.g., mobile surveys, gradient measurements, and/or modeling studies used for health risk assessments)" (Section 1). *The plan relies on the facility annual emissions reporting for criteria pollutants and AB2588 toxic air contaminants and AERMOD modeling*.
- "A summary of fenceline air monitoring instruments and ancillary equipment proposed to continuously measure, monitor, record, and report air pollutant levels in real-time near the petroleum refinery facility perimeter (i.e., fenceline)" (Section 2). *This plan relies on both open-path and point instruments to satisfy Rule 1180 requirements.*
- "A summary of instrument specifications, detectable pollutants, and minimum detection limits for all air monitoring instruments" (Section 2). *This plan relies on information provided by reputable instrument manufacturers for instrument specifications applicable for each specific path-length.*
- "Proposed monitoring equipment siting and selected pathways (when applicable) for fenceline instruments, including the justification for selecting specific locations based on the

assessments mentioned above" (Section 2). *This plan covers critical pathways along the fenceline around the refinery and has accounted for the measurement of all chemical species listed in Rule 1180. Meteorological data obtained from two on-site weather stations was used to determine the wind direction.*

- "Operation and maintenance (O&M) requirements for the proposed monitoring systems; an implementation schedule consistent with the requirements of Rule 1180; and procedures for implementing quality assurance and quality control of the collected data" (Sections 2 and 3). *Draft O&M requirements are provided in this plan. Final O&M requirements will be determined once instruments are procured. A draft implementation schedule is provided in this Introduction.*
- "A web-based system for disseminating information collected by the fenceline air monitoring system" (Section 4). *This plan provides the key content of the web system; final design will be created during implementation, after this plan is approved.*
- "Details of the proposed public notification system" (Section 5). *This plan provides the key parameters of the public notification system; final design will be created during implementation, after this plan is approved.*
- "Demonstration of independent oversight" (Section 3). *This plan proposes annual independent instrument and system audits; the independent contractor will be selected after this plan is approved.*

An implementation schedule (**Table 1**) was determined with the assumption that this monitoring plan would be approved by November 2018. Under this assumption, internal operations would be set to begin in November 2019, and official monitoring would begin on January 1, 2020.

Table 1. Proposed implementation schedule for Tesoro LAR Carson and Wilmington Rule 1180 monitoring project.

Project Element	Timing (Dates Depend on Approval Date)
Receive approval of the monitoring plan from SCAQMD.	November 2018
Select instrument types based on measurement needs; order instruments, shelters, and supplies.	October 2018–September 2019
Determine final site locations.	
Develop specifications for infrastructure (shelters, pads, power, mounts, etc.).	
Perform preliminary infrastructure design.	
Perform detailed infrastructure design.	
Support engineering and construction work.	
Complete site infrastructure.	
Acquire instruments.	
Acquire and install shelters.	
Complete and test data management system.	
Install and test instruments and associated equipment; test.	September–October 2019
Finalize Quality Assurance Project Plan (QAPP).	March 2019
Begin internal operations.	November 2019
Operate and maintain equipment, data system, website, and notification system. Perform daily data checks.	December 2019; continuous
Operate and maintain data system, website, and notification system.	January 1, 2020; continuous
Perform daily data checks	January 1, 2019; continuous

Summary of Monitoring Plan for Tesoro LAR Carson and Wilmington Operations

Tesoro's Los Angeles Refinery (LAR) Carson and Wilmington Operations are surrounded on all four sides by various other emissions sources, as well as residential areas. These adjacent emissions sources include the Alameda corridor rail network, multiple chemical plants, other refinery operations, fuel distribution terminals, an asphalt plant, a tank farm, and other commercial and industrial facilities. The distance from the facility to residential areas ranges from 900 to 1,600 feet.

Tesoro proposes to monitor concentrations across **13** open paths, which are shown in **Figure 1**. Tesoro LAR evaluated the following to determine the representative locations of proposed monitoring sites along the fenceline:

1. An evaluation of routine emissions and location of sources/operations at the refinery.
2. An evaluation of distribution and operations of processes within the refinery.
3. Regulatory annual emissions for criteria pollutants and AB2588 reporting for toxic air contaminants (TACs).
4. Regulatory air dispersion modeling for impacts at the refinery fenceline.
5. An evaluation of U.S. Environmental Protection Agency (EPA) benzene fenceline monitoring data and air pollutant distribution in surrounding communities using past monitoring studies (e.g. FluxSense and Atmosphir).
6. An evaluation of meteorological data, wind patterns, and wind roses obtained from two Safer meteorological stations operated at the refinery.
7. Logistical feasibility of shelter, power, and equipment installation, including terrain topography, elevations of sensors and retro-reflectors, and vicinity constraints for refinery equipment, roadways, traffic distribution, vessels, tanks, distillation columns, buildings, asbestos dismantling, pipe-racks, and underground utilities and infrastructure.
8. Consideration of residential and sensitive communities surrounding the refinery.
9. Consideration of the surrounding Alameda corridor rail network, major roads/freeways, traffic pattern, multiple chemical plants, laydown yards, other refinery operations, fuel distribution terminals, asphalt plant, other tank farm, and other commercial and industrial facilities.

The installed instruments will be capable of measuring the pollutants listed in Rule 1180 in near-real-time, and include open-path FTIR and UVDOAS instruments, as well as point monitors for hydrogen sulfide (H_2S) and black carbon (BC, a surrogate for diesel particulate matter), meteorological, and visibility measurements. All required pollutants will be measured as shown in **Table 2**.

The monitoring data will be quality-assured and displayed to the public in real-time via a website. Members of the public will be able to sign up for notifications when thresholds are exceeded, and when other activities affect the monitoring system.

The following sections provide details of the monitoring plan, including a discussion of all items in SCAQMD's fenceline air monitoring plan checklist (see **Appendix A**).

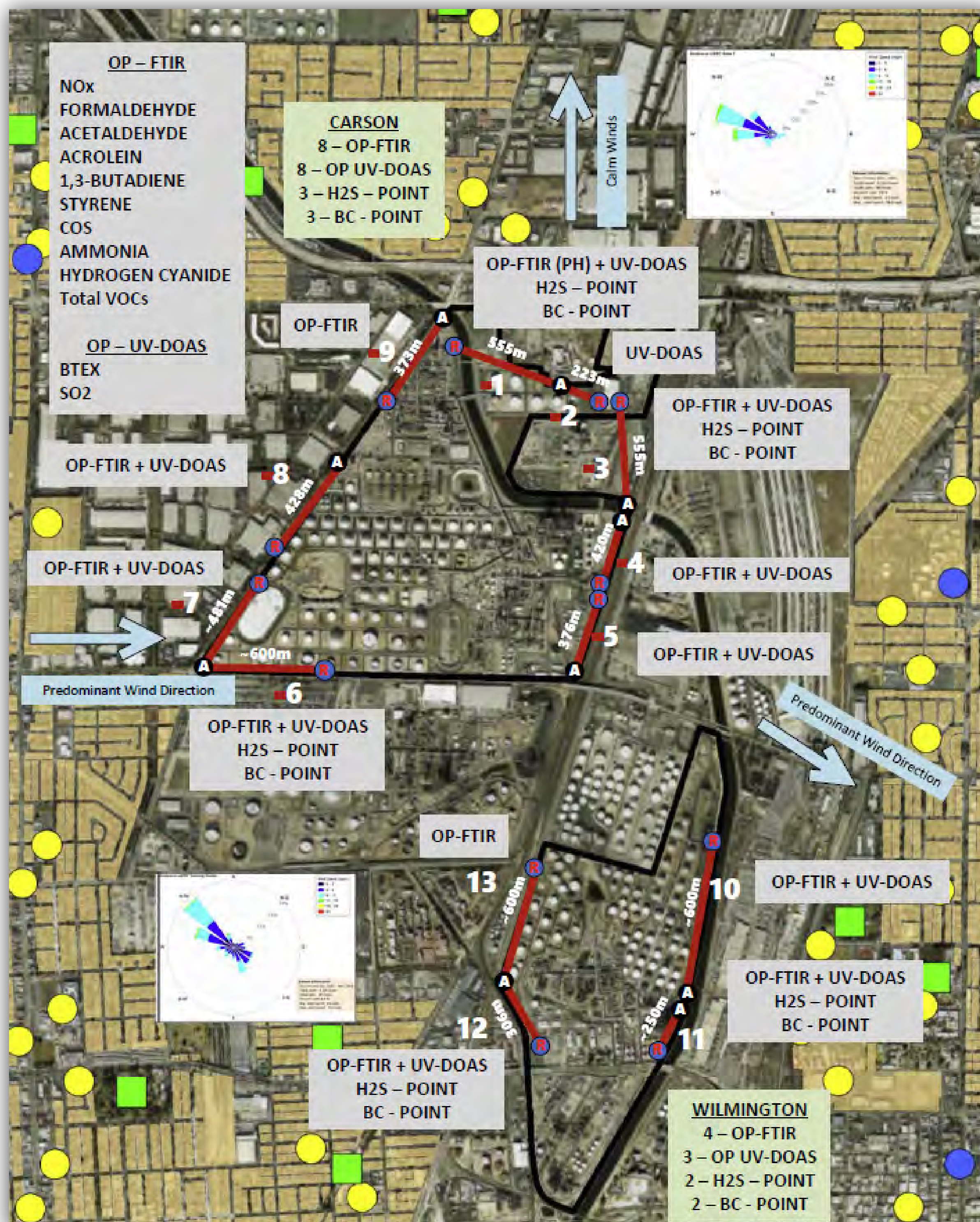


Figure 1. Proposed monitoring sites and paths.

Table 2. List of pollutants to be measured at the Tesoro LAR Carson and Wilmington Operations.

Pollutant	Instrument	Path
Criteria Air Pollutants		
Sulfur Dioxide	OP UVDOAS with Xenon	1-8, 10-12
Nitrogen Oxides	OP FTIR	1-13
Volatile Organic Compounds (VOC)		
Total VOCs	OP FTIR	1-13
Formaldehyde	OP FTIR	1-13
Acetaldehyde	OP FTIR	1-13
Acrolein	OP FTIR	1-13
1.3-Butadiene	OP FTIR	1-13
Styrene	OP FTIR	1-13
BTEX Compounds	OP FTIR OP UVDOAS with Xenon	1-13
Other Compounds		
Hydrogen Sulfide	Point H_2S	1, 3, 6, 11, 12
Carbonyl Sulfide	OP FTIR	1-13
Ammonia	OP FTIR	1-13
Black Carbon	Point Aethalometer	1, 3, 6, 11, 12
Hydrogen Cyanide	OP FTIR	1-13
Hydrogen Fluoride	N/A (not used at this refinery).	N/A

1. Fenceline Air Monitoring Coverage (or Spatial Coverage)

To provide a monitoring network that best serves the community by monitoring the emissions at the refinery fenceline, the following factors were considered while designing the monitoring network: (1) the characteristics of the refinery location, including topology and meteorology, (2) emissions characteristics, (3) sensitive receptors, and (4) the spatial coverage of the monitors. The monitors selected will be described in more detail in Section 2.

1.1 Identify the Facility's Proximity to Sensitive Receptors

This section characterizes the refinery location and the dispersion of subject pollutants to the nearby community. These major factors include the refinery's geographical setting with respect to other non-refinery sources, topography and meteorology, location of sensitive receptors, refinery emissions, and modeling of the dispersion of those emissions to surrounding areas.

1.1.1 Geographical Setting

Tesoro's LAR Carson Operations is located at 2350 East 223rd Street in the city of Carson, California; the Wilmington Operations is located at 2101 East Pacific Coast Highway in the city of Wilmington, California (**Figure 2**). Tesoro's 930-acre property is mostly developed but engineered infrastructure will be required for a fenceline monitoring program. The refinery is surrounded on all four sides by various other emissions sources and residential areas.

Figure 2. Tesoro LAR Carson and Wilmington Operations and the surrounding area. The wind pattern is dominated by west and northwesterly winds. Icons indicate the locations of the Tesoro meteorological monitoring sites at Carson Gate 7 (■) and Tesoro Wilmington Training Center (▲).

1.1.2 Topography and Meteorology

The topography within the refinery location is characterized by fairly flat terrain approximately 10 to 30 feet above sea level. The refinery is close enough to the coast such that, for the vast majority of the time, the winds are dominated by the sea breeze from the west and west-northwest. To assess wind climatology, meteorological data from the Tesoro Carson Gate 7 and Wilmington Training Center meteorological stations (see Figure 2) for 2015, 2016, and 2017 were used to generate the wind roses shown in **Figure 3**. The petals of a wind rose show the direction from which the wind is blowing.

- **Onshore winds.** Based on the data from the Carson Gate 7 site, which sits at the middle of the western fenceline facing Carson, winds most frequently blow from the west toward the east, and west-northwest toward the east-southeast. Based on data from the Training Center in Wilmington, winds blow from the northwest most frequently. These winds move across the refinery and into the residential and commercial areas to the east and southeast of the refinery. These winds are associated with the sea breeze phenomenon, and are strongest during the daytime, early evening, and summer.
- **Offshore winds.** Weak winds occasionally blow from the south and east (at Gate 7) and from the southeast (Training Center) toward the north, northwest, and west of the refinery. These winds are associated with the land breeze phenomenon and tend to be stronger during the nighttime, during early morning hours, and during the winter

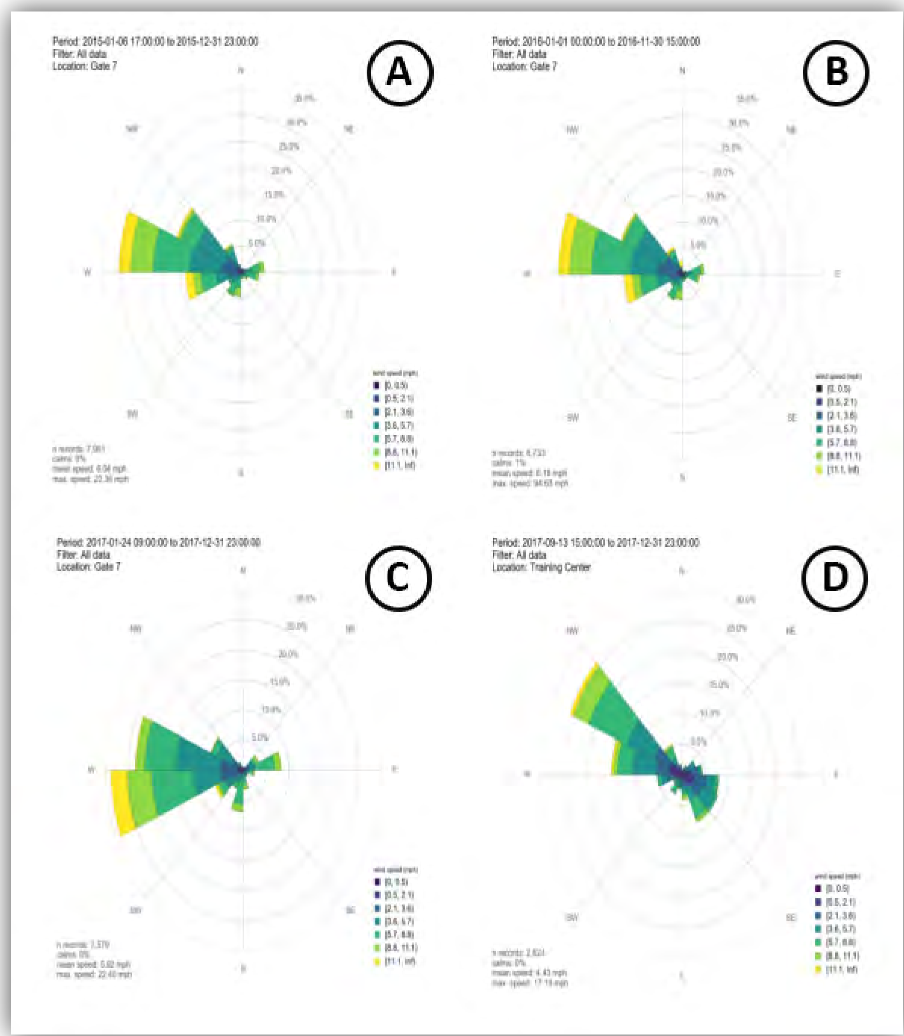


Figure 3. Annual wind roses for 2015, 2016, and 2017, from the Carson Gate 7 site (Figure 3A through 3C), and the wind rose for September 13–December 31, 2017, from the Training Center at Wilmington (Figure 3D). Winds from the west/northwest dominate the flow for Carson, with very infrequent flows from the south and east. For Wilmington, the winds are more from the northwest, with infrequent flows from the southeast.

1.1.3 Stationary Pollution Sources

Major stationary pollutant sources surrounding the Tesoro LAR refinery include (1) the Phillips 66 Refinery just south of the Carson portion; (2) the Valero Asphalt Plant to the west of the Wilmington Operations; (3) and the Kinder Morgan Carson Terminal at the northwest of the Wilmington Operations. Emissions are also generated by the numerous freeway and major surface streets (which carry significant heavy-duty truck traffic from the Ports of Long Beach and Los Angeles) and rail lines that surround the refinery. Additional industrial facilities are located in the surrounding areas. Interstates 405 and 710 and the Alameda corridor are major sources of diesel particulate matter as a result of the large volume of heavy-duty diesel vehicle traffic. All of these sources, at times, may impact the proposed fenceline monitoring network in regards to background levels.

1.1.4 Sensitive Receptors

Figure 4 shows the location of several types of sensitive receptors with respect to the refinery, including schools and childcare facilities, adult health facilities, recreation areas, and residential areas. At least one of each type of receptor is located within a mile of the refinery fenceline. The combination of winds and proximity of sensitive receptors helped guide the placement of the fenceline monitoring systems. Figure 4 and **Table 3** identify the nine schools closest to the refinery. Based on the dominant wind directions and sensitive receptors in residential areas, the north and eastern fencelines are important areas to monitor.

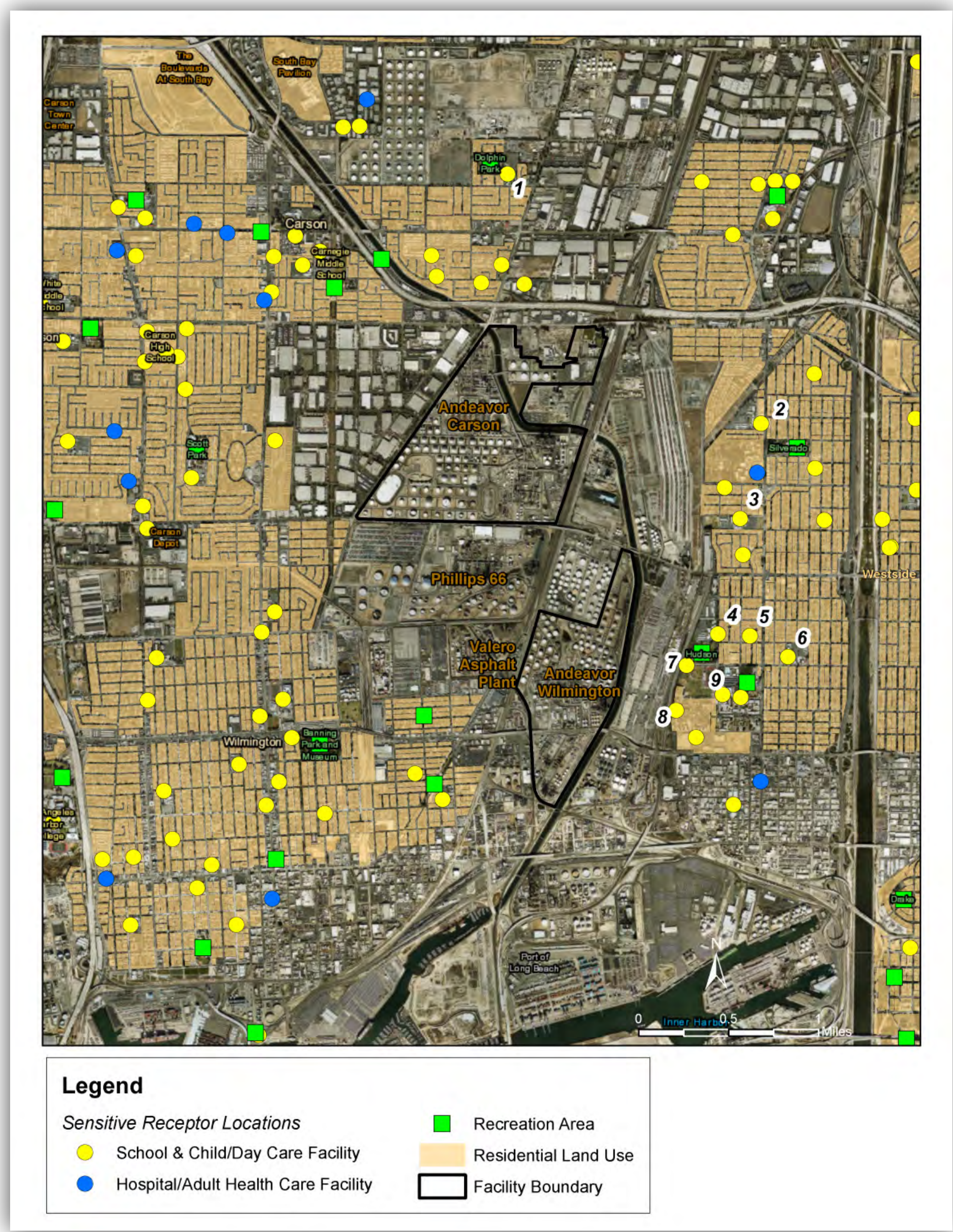


Figure 4. Map of sensitive receptors. The numbered yellow dots indicate the closest schools, which are listed in Table 3. The other nearby yellow dots show child/day care or youth facilities.

Table 3. Numbered schools in Figure 4.

Label in Figure 4	School Name
1	Del Amo Elementary School
2	Webster Elementary School
3	Stephens Middle School
4	Hudson Elementary School
5	Saint Lucy Catholic School
6	Garfield Elementary School
7	Reid High School
8	Mary Bethune School
9	Cabrillo High School

1.2 Describe Historical Facility Emission Patterns and Pollutant Hotspots

This section describes refinery operations, processes, emissions sources, and dispersion modeling. Emissions information, together with the information provided about the topology and geographic setting (Section 1.1), is used as additional basis for the placement of the fenceline monitoring systems.

1.2.1 Operations and Processes within the Facility's Perimeter

Tesoro's LAR Carson and Wilmington Operations manufactures fuel products such as gasoline, jet fuel, diesel fuel, petroleum coke, fuel oil, fuel gases, propylene and calcined coke. LAR distributes all grades of gasoline and ultra-low-sulfur diesel. Its Watson Cogeneration plant produces 400 MW and is the largest cogeneration facility in California.

Crude oil, used to produce gasoline and other refinery products, is delivered by ship to the Long Beach marine terminal and pumped to LAR by existing pipelines or received from offshore sources via pipeline directly to LAR. The crude oil is then processed in the crude units where it is heated and distilled into multiple feedstock components that are later processed elsewhere in LAR. The heavy residual oil leaving the crude units is further distilled in the vacuum units to yield additional, lighter hydrocarbon products and vacuum residuum. The vacuum residuum is processed in the Coker Unit and the lighter hydrocarbon components from the crude units and vacuum units are fed to other refinery units for further processing. Some of the major downstream processes are cracking in the Fluid Catalytic Cracking Unit (FCCU) and hydrocracking unit, processing to recover sulfur in the hydrotreating units, synthesizing in the alkylation unit, and reforming in the reforming unit. Auxiliary systems are also needed to support LAR operations including hydrogen plants (to produce hydrogen needed for certain refinery reactions), boilers to produce steam, cogeneration plants to produce electricity and steam, tail-gas, and wastewater treatment systems.

1.2.2 On-Site Emissions Sources and Emissions Levels

LAR submits Annual Emission Reports (AER) under the SCAQMD Inventory program annually with emissions of air contaminants from permitted sources. Fees for emissions of air contaminants are assessed based on the reported data pursuant to Rule 301, subdivision (e) and paragraph (l)(10) (South Coast Air Quality Management District, 2018).

LAR also submits toxics emissions inventory in accordance with SCAQMD's AB2588 Program for reporting quadrennial updates, per Health and Safety Code Section 44344 (California Air Resources Board, 2003).

Summarized below are some key emission source types:

- Heaters, boilers, and gas turbine generators
- Fluid catalytic cracking units
- Selective catalytic reduction unit ammonia slip
- Flares
- Incinerators
- Internal combustion engines
- Process vents
- Cooling towers
- Storage tanks
- Wastewater treatment
- Fugitives components
- Coke handling and transportation
- Bulk loading, and truck and rail car loading
- Fuel dispensing
- Maintenance activities
- Paint and solvent usage
- Vacuum trucks
- Welding equipment
- Tank and vessel degassing

Tesoro has previously submitted AERMOD dispersion modeling data to SCAQMD. This AERMOD dispersion modeling data was also utilized to determine the fenceline paths and monitors.

Table 4 summarizes the representative annual average emissions (AAE) and maximum hourly emissions (MHE) of Rule 1180 target compounds:

Table 4. Tesoro Carson and Wilmington Operations annual average representative emissions (AAE) and maximum hourly representative emissions (MHE) of Rule 1180 target compounds.

	Carson		Wilmington	
Pollutant	AAE (lb/yr)	MHE (lb/hr)	AAE (lb/yr)	MHE (lb/hr)
NO_x	1,549,017	1.77E+02	1,332,379	1.52E+02
SO_x	800,602	9.14E+01	348,567	3.98E+01
Acetaldehyde	770	1.51E-03	2,561	9.43E-03
Acrolein	65	1.32E-03	2	3.00E-05
Ammonia	363,039	5.92E-01	107,154	2.15E-01
Benzene	1,259	1.28E-03	1,359	1.15E-03
1,3-Butadiene	36	4.60E-04	32	1.50E-04
Carbonyl Sulfide	23	2.63E-03	3,358	9.58E-02
Ethylbenzene	2,386	1.55E-03	901	7.50E-04
Formaldehyde	1,510	1.08E-02	5,407	2.06E-02
HCN	34,338	3.92E+00	29,073[1]	3.32E+00
H_2S	2,000	1.66E-03	2,137	1.86E-03
Naphthalene	563	3.20E-04	207	1.70E-04
Styrene	1	6.80E-04	3	1.00E-05
Toluene	4,757	3.79E-03	7,827	5.92E-03
Xylene	5,014	3.30E-03	1,717	1.98E-03

[1] The Wilmington FCCU will shut down in 2018 so there may be negligible emissions of HCN from other sources.

1.2.3 Summary of Modeling Results

Air dispersion modeling runs using AERMOD and HARP2 were completed to calculate pollutant maximum one-hour average and annual average (over 5 years) concentrations at the Tesoro Carson and Wilmington Refineries.

Modeling was completed using AERMOD (Version 18081) and the California Air Resources Board's HARP2 ADMRT modeling software (dated 18159). AERMOD and HARP2 modeling set-up included:

- Emissions:
  - 2015 Annual Emissions Report (AER) profile for Sulfur Dioxide (SO_2), Nitrogen Oxides (NO_x), and volatile organic compounds (VOCs)
  - 2015 AB2588 quadrennial emissions profile for TACs
  - Urban Dispersion Coefficient, Los Angeles Population = 9,862,049
  - Source Emissions: 1 g/sec
  - Operating schedule for all sources: 24 hrs/day, 7 days/week, 52 weeks/year
  - Meteorological data: Long Beach Airport (2012–2016)
- Receptors:
  - Fenceline receptors: 50 m spacing
  - Grid receptors inside fenceline for contours: 100 m spacing
  - Grid receptors outside of fenceline: 50 m to 200 m
  - Elevated terrain (AERMAP processed with DEM files obtained from CARB)
  - Building downwash processed using BPIP

Hourly and annual average plot files from AERMOD were imported into the HARP2 ADMRT module. Annual and hourly emissions of each pollutant from each source were obtained from 2015 AER and AB2588 submitted reports and imported into the Emission Inventory section of HARP2 ADMRT. Ground Level Concentrations (GLCs) at fenceline and grid receptors were then calculated in HARP2, resulting in 1-hour and period GLC files per pollutant.

The concentrations from emissions occurring at both the Carson and Wilmington refinery sources were included in the modeled results. To better visualize the concentration values at receptors, the attached plots (see Appendix C) are provided in separate graphics for the Carson and Wilmington refineries. The concentration results are shown in isopleths, as well as posted values at receptor locations on the fenceline and out 200 meters from the fenceline.

In some of the 1-hour average concentration isopleth graphics, emissions resulting from one facility contribute to peak concentrations near another facility. For example, the graphic showing 1-hour average acrolein concentrations near the Wilmington facility shows that the highest concentrations are coming from the northwest direction from the Carson refinery, where potential acrolein sources are located. This effect will occur only for those periods where winds blow across one refinery toward the other refinery, leading to potentially additive concentrations at receptor locations.

Table 5 and Table 6 show maximum (worst case scenario) modeled results of GLCs at the Carson and Wilmington facilities for each pollutant. The maximum calculated GLCs for Rule 1180 pollutants are well below Cal-OSHA permissive exposure limits (PELs) and OEHHA reference exposure levels (RELs) thresholds.

Table 5. Modeled fenceline GLC for Rule 1180 pollutants at the Carson facility.

Air Pollutant	Units	AERMOD Predicted Max. 1-Hr Avg. Concentration	AERMOD Predicted Annual Avg. Concentration
Sulfur Dioxide (SO_2)	ug/m^3	52.0	2.42
Nitrogen Oxides (NOx)	ug/m^3	224	8.42
Total VOCs (Non-Methane Hydrocarbons)	ug/m^3	568	28.60
Formaldehyde	ppb	12.9	0.03
Acetaldehyde	ppb	1.45	0.00445
Acrolein	ppb	0.66	0.0013
1,3 - Butadiene	ppt	163	5.59
Styrene	ppt	10.7	0.04
Benzene	ppb	0.58	0.04
Toluene	ppb	5.25	0.45
Ethyl Benzene	ppb	0.61	0.04
Xylenes	ppb	1.90	0.23
Hydrogen Sulfide	ppb	1.59	0.14
Carbonyl Sulfide	ppt	30.5	1.83
Ammonia	ppb	13.9	0.85
Hydrogen Cyanide	ppb	0.64	0.04

Table 6. Modeled fenceline GLC for Rule 1180 pollutants at the Wilmington facility

Air Pollutant	Units	AERMOD Predicted Max. 1-Hr Avg. Concentration	AERMOD Predicted Annual Avg. Concentration
Sulfur Dioxide (SO_2)	ug/m^3	34.8	1.05
Nitrogen Oxides (NOx)	ug/m^3	177	5.23
Total VOCs (Non-Methane Hydrocarbons)	ug/m^3	785	40.52
Formaldehyde	ppb	0.85	0.02
Acetaldehyde	ppb	0.18	0.0045
Acrolein	ppb	0.01	0.00031
1,3 - Butadiene	ppt	44.1	7.34
Styrene	ppt	9.83	1.20
Benzene	ppb	0.69	0.04
Toluene	ppb	2.81	0.21
Ethyl Benzene	ppb	0.49	0.04
Xylenes	ppb	0.85	0.05
Hydrogen Sulfide	ppb	2.56	0.40
Carbonyl Sulfide	ppt	91.1	5.55
Ammonia	ppb	23.2	1.38
Hydrogen Cyanide	ppb	0.21	0.01

The 1-hour GLC files were converted from units of ug/m^3 to ppb (or ppt if modeled results show very low concentrations), and Google Earth (GE) overlays of GLC isopleths in units of ppb, ppt, or ug/m^3 were created for each pollutant's maximum 1-hour impact and annual average impact at each receptor location. The maximum 1-hour impact and annual average impact GLC isopleth and concentration Google Earth overlays for each Rule 1180 pollutant for Carson and Wilmington operations are provided in Appendix C. The scaling has been adjusted to indicate concentration origination within the refinery.

The wind patterns in the area are influenced by the Palos Verdes Peninsula to the west. The wind flows at the north side of the Carson tend to be more westerly during the day, with less southerly component. Further south at the southern end of the Wilmington refinery, a daytime southerly wind component becomes more prominent. The Long Beach Airport wind data used captures these patterns to a certain extent. Use of this data to determine monitoring locations is expected to be conservative for the Wilmington refinery, with higher prevalence of impacts on the eastern fenceline than actually occur.

2. Fenceline Air Monitoring Equipment Description

This section describes the sampling locations, paths, and monitoring equipment selected for fenceline monitoring, the specifications and maintenance requirements for each monitor, and the compounds that will be monitored along each path/location. Since the Rule 1180 guidance stresses the use of open-path measurements wherever possible, point measurements are proposed only for DPM (using BC as a surrogate), as it cannot be measured using open-path technology. The selection of monitoring locations and instrument types was based on the emissions characteristics, locations of sensitive receptors, and dispersion modeling results presented in Section 1.

2.1 Select Sampling Locations Along the Perimeter of the Facility

Tesoro LAR operations are surrounded on all four sides by various other emissions sources, as well as residential areas. These adjacent emissions sources include the Alameda corridor rail network, multiple chemical plants, other refinery operations, fuel distribution terminals, an asphalt plant, a tank farm, and other commercial, and industrial facilities. The distance from the facility to residential areas ranges from 900 to 1,600 feet.

Tesoro LAR evaluated the following to determine the representative locations of proposed monitoring sites along the fenceline:

1. An evaluation of routine emissions and location of sources/operations at the refinery.
2. An evaluation of distribution and operations of processes within the refinery.
3. Regulatory annual emissions for criteria pollutants and AB2588 reporting for toxic air contaminants (TACs).
4. Regulatory air dispersion modeling for impacts at the refinery fenceline.
5. An evaluation of U.S. Environmental Protection Agency (EPA) benzene fenceline monitoring data and air pollutant distribution in surrounding communities using past monitoring studies (e.g. FluxSense and Atmosphir).
6. An evaluation of meteorological data, wind patterns, and wind roses obtained from two Safer meteorological stations operated at the refinery.

7. Logistical feasibility of shelter, power, and equipment installation, including terrain topography, elevations of sensors and retro-reflectors, and vicinity constraints for refinery equipment, roadways, traffic distribution, vessels, tanks, distillation columns, buildings, asbestos dismantling, pipe-racks, and underground utilities and infrastructure.
8. Consideration of residential and sensitive communities surrounding the refinery.
9. Consideration of the surrounding Alameda corridor rail network, major roads/freeways, traffic pattern, multiple chemical plants, laydown yards, other refinery operations, fuel distribution terminals, asphalt plant, other tank farm, and other commercial and industrial facilities.

Tesoro LAR proposes the monitoring sites and paths indicated in **Figure 5** for Rule 1180 fenceline monitoring. The proposed instruments will be capable of measuring the pollutants listed in Rule 1180 in near-real-time (5-min readings), and include open-path FTIR and UVDOAS, as well as point monitors for hydrogen sulfide (H_2S) and black carbon (BC, a surrogate for diesel particulate matter), and visibility measurements. The proposed monitoring sites at the fenceline include consideration for generating data for both upwind and downwind scenarios to differentiate contributions from the facility and external sources.

The proposed monitoring sites, paths, sensor elevations, and instrumentation selection are summarized in **Table 7**.

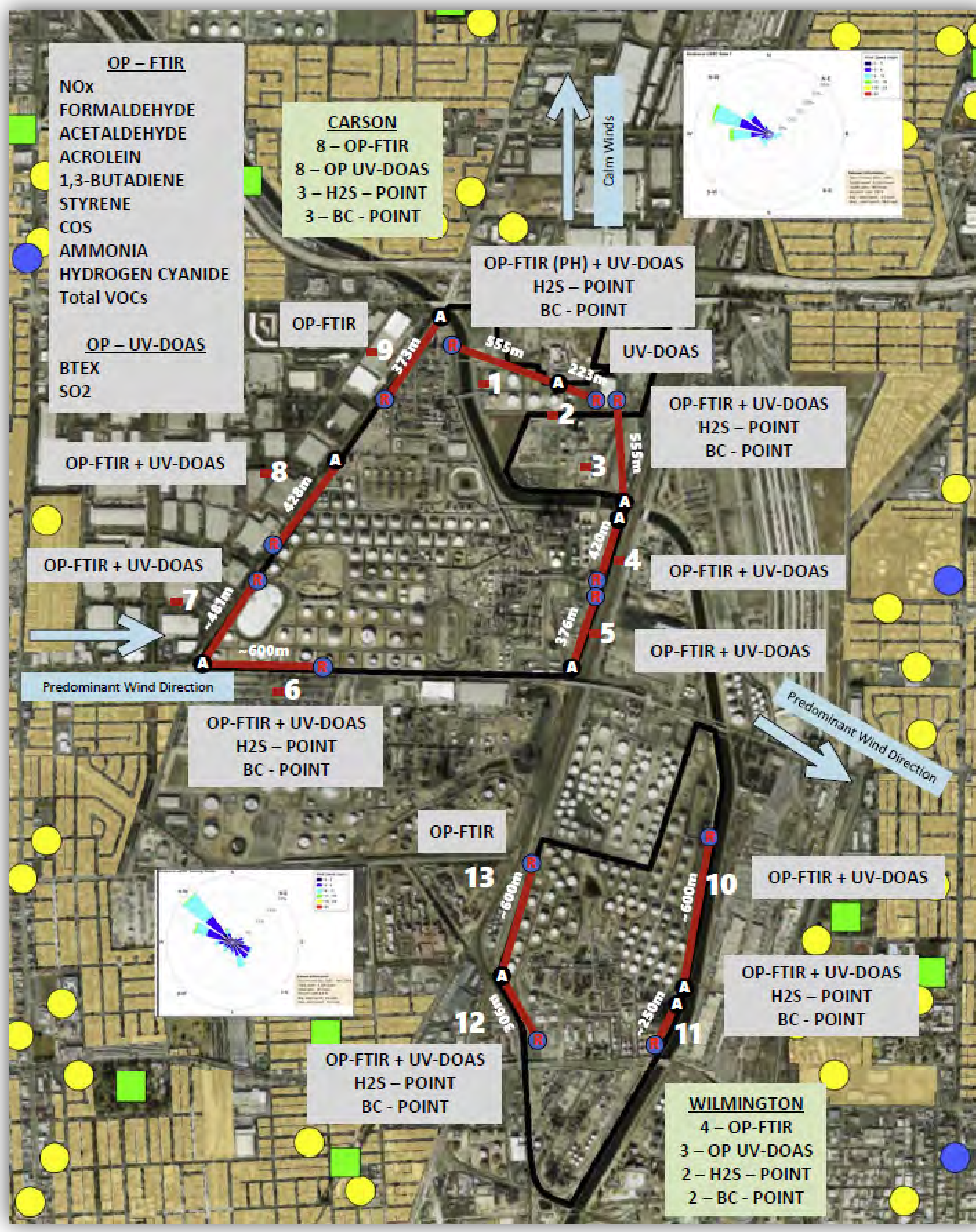


Figure 5. Proposed monitoring sites and paths.

Table 7. Summary of proposed paths, elevations, and selected instrumentation

Skid #	Path Number	Location - see Appendix B for reference	Skid Size	Skid Elevation (floor)	Analyzer Elevation	Reflector Elevation	Skid Location - see Appendix B for reference) **	Shared With	FTIR	UVDOAS	Panning Mount *	Black Carbon - POINT	Visibility	H2S - POINT	Retroreflector Locations	Retro Power
A	1	Carson - North West	8*14	4'	8'	25' (heated)	Contractor parking	2	Y	Y	FTIR only	Y	Y	Y	On exiting structure	Yes
	2	Carson - North East			8'	25'		1	--	Y	--	--	--	--	On Maintenance Building	No
B	3	Carson - East North	10*10	4'	8'	12'	DC bank by RR	4	Y	Y	--	Y	--	Y	On Maintenance Building	No
	4	Carson - East South			8'	25' (heated)	DC bank by RR	3	Y	Y	--	--	Y	--	On new post	Yes
C	5	Carson - East (Far South)	8*8	4'	8'	12' (heated)	South laydown yard	--	Y	Y	--	--	Y	--	On new post	Yes
D	6	Carson Tank Farm (SW Corner) - South	8*14	12'	16'	12'	Inside Tank 10 dike	7	Y	Y	--	Y	--	Y	In new post	No
	7	Carson Tank Farm (SW Corner) - NW				30'	Inside Tank 10 dike	6	Y	Y	--	--	--	--	On existing radio tower	No
E	8	Carson Tank Farm (West Road)	8*8	4'	8'	12'	S Wilmginton & Tank Farm road	--	Y	Y	--	--	--	--	On new post	No
F	9	Carson - NW Corner	8*8	4'	8'	12'	By tree grove & flag pole	--	Y	--	--	--	Y	--	On new post	No
G	10	Wilmington - East (North)	8*8	4'	8'	12'	North side of Water Tank	--	Y	Y	--	--	--	--	On new post	No
H	11	Wilmington - East (South)	8*14	4'	8'	20'	South Side of Water Tank	--	Y	Y	--	Y	--	Y	On existing pipe rack post	No
I	12	Wilmington - West (South)	8*14	4'	8'	12'	In corner of laydown yard	13	Y	Y	--	Y	--	Y	On blue pipe rack	No
	13	Wilmington - West (North)				20'	In corner of laydown yard	12	Y	--	--	--	--	--	On new post	No

* Projects and Engineering team evaluating options to add panning heads whereever feasible.

** Skid Accessories - Integrated cabinet, H2S detector, Lights on motion and utility, Data logger, Monitor, UPS system, 12V/24V DC power supply, Cabinet temperature control, Digital router, Modem, Antenna, Power strip, Exhaust system, Smoke detection system, Utility receptacles

Proposed paths 1 and 2 (Carson-NW and Carson NE) are proposed to provide representative monitoring data from process units located in the northern area of the refinery; however, the locations of the instrumentation will also enclose the Polypropylene plant owned by Ineos. Based on engineering surveys and feasibility analysis, open-path monitoring cannot be conducted across or on either side of the Dominguez Channel. The survey teams could not identify any clear path with line of sight for optical beam. Other constraints and factors include the asbestos field west of the Dominguez Channel; lack of real estate or space, or limited access for shelter or retro-reflectors; blockage to roadway access for routine traffic or heavy rigs; the nearest power supply being some 450 m away; underground constraints; terrain topography; pipe-racks; and the vicinity of hydrogen lines. Tesoro LAR projects team have reviewed other potential options, but have concluded that the proposed paths 1 and 2 are the best option and will provide maximum potential monitoring coverage from refinery operations.

Along similar lines and site constraints, Tesoro LAR projects team indicates that path 5 cannot be extended to the south-west fenceline. Additional constraints include multiple buildings in the area and the south west boundary location is some ~10 feet below the terrain along the south fenceline towards west.

Proposed paths 7 and 8 cannot be combined or extended due to the parking space in between and the roadway constraints. Tesoro LAR projects team indicates that the current proposed paths will provide more data and operational reliability with fewer hindrances or obstruction to the optical beam.

Please note that due to Wilmington Refinery FCCU shutdown, there are no monitoring paths proposed for the southern portion of Wilmington Refinery (south of PCH). In addition, based on the feedback and information from Tesoro LAR projects team, it is highly unlikely we can install a monitoring path along the southern fenceline, north of PCH, due to many obstructions, buildings, parking, utilities, and roadways.

Block diagrams that identify individual refinery process unit descriptions, tank locations, property boundary, roadways, cooling towers, reservoirs, buildings, and parking lots are provided in Appendix B.

Proposed paths 1 and 2, and 3 and 4 (see Figure 5) for Carson Refinery will provide fenceline monitoring concentration data for the following:

- NE tanks (e.g. FCCU feed and distillate)
- Coverage for → N/NE calm winds
- The Del Amo School and residential community towards north and east.
- Prevailing winds towards SE/E for fenceline concentrations from Hydrogen Plant, Hydrocracker, Hydrotreater, Reformer, Light Hydro, and FCCU.

Proposed paths 4 and 5 (see Figure 5) for Carson Refinery will provide fenceline monitoring concentration data for the following:

- Prevailing winds towards SE/E for fenceline concentrations from process units located in the northern, central, and southern refinery area, including coker operations and tank farm located at central and SW portion.
- School, residential, and sensitive communities towards E and SE.

Proposed paths 6 and 7 (see Figure 5) for Carson Refinery will provide fenceline monitoring concentration data for the following:

- Calm winds towards SW/W for fenceline concentrations from process units located in the northern, central, and southern refinery area, including coker operations and a tank farm located at central and SW portion.
- A close-by residential community towards SW.

Proposed paths 8 and 9 (see Figure 5) for Carson Refinery will provide fenceline monitoring concentration data for the following:

- Upwind monitoring data for calm winds towards SW/W.

Proposed paths 10 and 11 (see Figure 5) for Wilmington Refinery will provide fenceline monitoring concentration data for the following:

- Prevailing winds towards SE/E for concentrations from process units and tank farm area located in northern, central, and southern Refinery area including coker operations and a tank farm located at the central and SW portion.
- School, residential, and sensitive communities towards E and SE.

Proposed paths 12 and 13 (see Figure 5) for Wilmington Refinery will provide upwind monitoring data for concentrations from process units and a tank farm area located in the northern, central, and southern refinery area, and upwind residential community for calm winds towards W/NW.

2.2 Select Fenceline Air Monitoring Equipment that is Capable of Continuously Measuring Air Pollutants in Real-time

Tesoro's LAR Carson and Wilmington Operations manufactures fuel products—primarily gasoline, diesel, liquefied petroleum gas (LPG), residual fuel oils, and petroleum coke—through the distillation of crude oil, coking, cracking, hydroprocessing, alkylation, and reforming processes. In consideration of the refinery's products, processes, and potential emissions sources, the rationales summarized in Table 8 were applied to determine which species would be proposed for inclusion in the Monitoring Plan. Literature reviews, site surveys, and interviews with instrument manufacturers were performed to determine the instruments needed to meet Rule 1180 requirements. Both fixed-site and open-path instruments were investigated. Based on the distances that need to be covered by measurements (hundreds of meters), data time-resolution requirements (5 minutes), and current measurement technology, various open-path instruments were selected to best measure the target species. Point monitors were selected for black carbon (BC, a surrogate for diesel particulate matter) and for visibility.

Table 8. Summary of monitoring locations and instruments for species listed in Rule 1180.

Species	Required by the SCAQMD	To Be Measured (Paths)	Instrument(s)	Rationale, Comments
Benzene	Yes	1-13	OP FTIR OP UVDOAS with Xenon	Included.
Toluene	Yes	1-13	OP FTIR OP UVDOAS with Xenon	Included.
Ethylbenzene	Yes	1-13	OP FTIR OP UVDOAS with Xenon	Included.
Xylenes	Yes	1-13	OP FTIR OP UVDOAS with Xenon	Included.
H_2S	Yes	1, 3, 6, 11, 12	Point H_2S	Included.
NO_x	Yes	1, 3-13	OP FTIR	Measures NO_2 only.
SO_2	Yes	1-8, 10-12	OP UVDOAS with Xenon	Included.
Ammonia	Yes	1, 3-13	OP FTIR	Included.
Acrolein	Yes	1, 3-13	OP FTIR	Included.
Acetaldehyde	Yes	1, 3-13	OP FTIR	Included.
1,3-Butadiene	Yes	1, 3-13	OP FTIR	Although not needed because 1,3-butadiene is (1) coincident with benzene, and (2) not emitted by the refinery in high concentrations, concentrations will be monitored since FTIR instruments will be used to monitor NH_3.
Carbonyl Sulfide	Yes	1, 3-13	OP FTIR	Included.
Formaldehyde	Yes	1, 3-13	OP FTIR	Included.

Species	Required by the SCAQMD	To Be Measured (Paths)	Instrument(s)	Rationale, Comments
Hydrogen Cyanide	Yes	1, 3-13	OP FTIR	Included.
Hydrogen Fluoride	Yes, if used	N/A	NA	The refinery does not use hydrogen fluoride.
Styrene	Yes	1, 3-13	OP FTIR	Included.
Total VOCs (non-methane hydrocarbons)	Yes	1, 3-13	OP FTIR	Will report "total hydrocarbons" as propane based on characteristic spectral features.
Black Carbon	Yes	1, 3, 6, 11, 12	Point Aethalometer	Required. BC is a surrogate for diesel particulate matter. BC measurements are also highly correlated with polycyclic aromatic hydrocarbon (PAH) measurements.

2.2.1 Pollutant Detection Limits

Table 9 summarizes the approximate method detection limits (MDLs) and upper detection limits (UDLs) by instrument that will be used in Tesoro's monitoring program. Detection limits are approximate; while they are based on the theoretical capabilities of the instruments, they are supported by manufacturers' lab tests and real-industry applications. Actual detection limits will depend on atmospheric conditions and the specific instrument brand used. The detection limits are for the average species concentration along a path; narrow plumes that only cover a portion of the path would need to have a higher concentration than the MDL to be detected.

Open-path instruments transmit light or infrared energy across a long open path. Energy absorption relates to the average concentration of gases of interest along the path, according to the Beer-Lambert absorption law. Individual gases absorb most effectively at characteristic wavelengths; therefore, measurements of energy absorption at specific wavelengths can be used to infer path-average concentrations for species of interest. The transmitted energy signal is typically either detected remotely by a targeted detector or reflected for detection elsewhere. A combined transmitter-detector unit is often positioned at one end of a path, and a retroreflector—a type of mirror with a geometric shape that gathers and re-focuses the transmitted energy—is positioned at the other end of the path. The retroreflector returns the transmitted energy to the transmitter-detector unit for detection. Figure 6 illustrates the basic concepts of open-path measurements. Rather, the instruments detect average concentrations across the entire distance from the transmitter to the detector (or the distance from the transmitter-detector to a retroreflector, and back again). Periods of poor visibility due to weather-related conditions (e.g., fog) are known to interfere with open-path measurements. Rule 1180 anticipates some data loss due to poor visibility and allows for such data loss if supported by visibility measurements. LAR will monitor visibility using a standard light-scattering device to identify periods of poor visibility that may cause data loss. These visibility sensors will be located on the east side of Carson and Wilmington along paths near cooling towers.

Table 9. Estimated open-path instrument detection limits by technology, species, and path lengths of 454 m and 200 m, as examples of what will be expected in the field. Detection limits for actual path lengths will be determined during operations. The MDL for the black carbon monitor is expected to be about 0.5 µg/m3 with a UDL of about 20 µg/m3.

		Path length of 454 m		Path length of 200 m	
Technology	1180 Compound	MDL	UDL	MDL	UDL
FTIR	1,3-Butadiene (ppb)	1.3	10,500	4.7	24,000
	Acetaldehyde (ppb)	0.9	220,000	3.0	300,000
	Acrolein (ppb)	1.2	9,800	4.2	22,000
	Ammonia (ppb)	3	60,000	1.1	136,000
	Carbonyl Sulfide (ppb)	0.7	TBD*	2.4	TBD
	Formaldehyde (ppb)	0.6	27,500	2.3	62,500
	Hydrocarbons (ppb)	2.2	1,000,000	7.5	1,500,000
	Hydrogen Cyanide (ppb)	0.9	22,000	3.0	50,000
	Nitrogen Dioxide (ppb)	4.2	TBD	14.6	TBD
	Styrene (ppb)	1.7	61,500	6.0	91,500
TDLAS	Hydrogen Sulfide (ppb)	50	TBD	50	TBD
UVDOAS	Acrolein (ppb)	25.1	209,000	40	475,000
	Benzene (ppb)	0.8	35,000	1.4	79,500
	Ethylbenzene (ppb)	0.9	24,000	1.5	54,500
	Naphthalene (ppb)	0.6	200	1.0	430
	Nitrogen Oxide (ppb)	0.9	TBD	1.5	TBD
	Styrene (ppb)	1.9	TBD	3.0	TBD
	Sulfur Dioxide (ppb)	2.1	45,500	3.4	103,000
	Toluene (ppb)	2.6	49,500	4.2	112,000
	Total Xylenes (ppb)	11.6	110,000	1.2	180,000

*TBD – to be determined

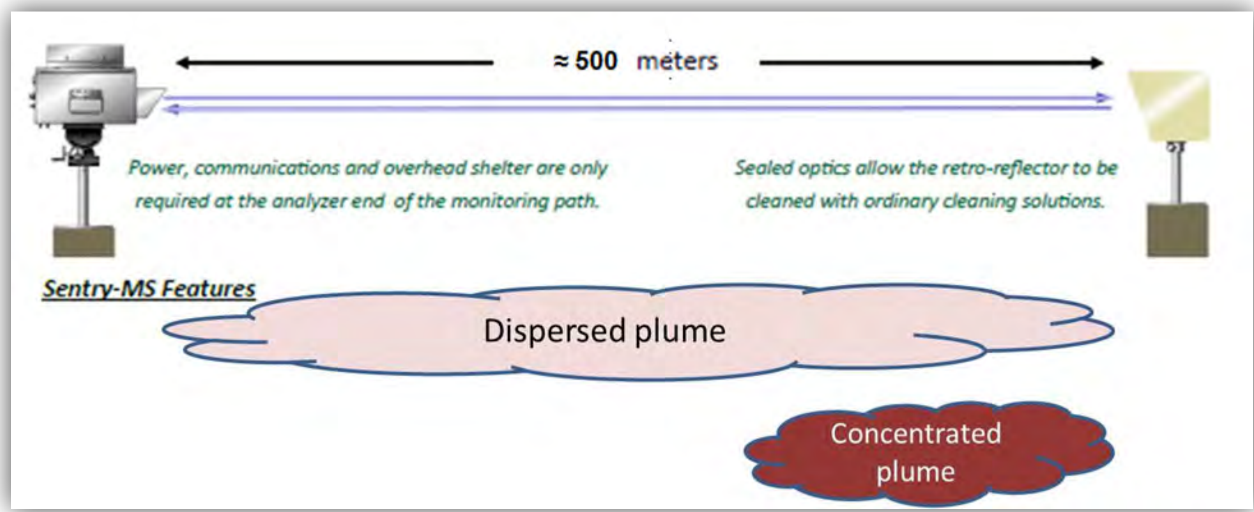


Figure 6. Basic premise for open-path instrument operation. Image from CEREX Sentry-MS monitoring brochure.

Monostatic (as opposed to bistatic) open path instruments have been selected to (1) reduce the need for substantial power at the retroreflector sites, and (2) improve minimum detection limits by increasing effective path lengths. Thus, only the light-source/detector end of the monitoring path requires substantial power, communications equipment, and a large shelter. Limited power is needed at the retroreflectors, but the retroreflector needs to be aligned correctly at its end of the path for maximum performance, and should be cleaned regularly. An example of the exterior and interior of an analyzer shelter are shown in Figure 7, and a retroreflector and shelter is shown in Figure 8.

Figure 7. An example of an analyzer shelter (left) and several analyzers inside a different shelter (right; may not be configuration of actual installation).

Figure 8. An example of a UVDOAS retroreflector (may not be configuration of actual installation).

2.2.2 Point Monitors

An Aethalometer will be used to measure BC. An aethalometer works by pulling air through a filter tape where particulate matter is deposited. The transmission of the filter is monitored as several wavelengths. The BC concentration is calculated from the attenuation of light passing through the filter.

To measure visibility, a light-scattering device will be used. This device shines light through open air to a detector that measures the transmitted light and relates it to the visibility range. When the visibility range gets below approximately 500 to 1,000 meters, the light transmission used by the open-path instruments may be impacted.

2.2.3 Operations and Maintenance

Instrument operations, maintenance, and bump tests include daily checks to ensure that data are flowing consistently, as well as monthly, quarterly, and annual maintenance activities. Further details are provided in the following sections, which describe routine instrument and data management operations. Additional details and documentation, including standard operating procedures (SOPs), for example, are included in the QAPP. Modest adjustments to the operation plans may be needed based on the brand of instruments that are ultimately selected. Meteorological sensors will meet EPA requirements and will be operated to meet EPA operational requirements.

UVDOAS

The UVDOAS system is designed to require only modest service and maintenance. **Table 10** summarizes typical maintenance activities for a UVDOAS system, as recommended by a typical manufacturer. Preventive maintenance frequency depends on the operating environment, and may need to be adjusted beyond the manufacturers' recommendations once the instruments are deployed in the field. System status alarms will alert operators on an as-needed basis to specific issues needing to be addressed.

Table 10. Schedule of typical maintenance activities for the UVDOAS.

Activity	Monthly	Quarterly	Annually
Visually inspect the system.	✓	✓	✓
Inspect optics on detector and retroreflector; clean if necessary.	✓	✓	✓
Inspect system filters.	✓	✓	✓
Confirm the alignment to verify there has not been significant physical movement. Note that this is also automatically monitored.	✓	✓	✓
Download data from detector hard drive and delete old files to free space, if needed.	✓	✓	✓
Ensure no obstructions are between the detector and the retroreflector (such as equipment, vegetation, vehicles).	✓	✓	✓
Change out the UV source.		✓	
Replace ventilation exit and intake filters.		✓	
Clean optics on detector and retroreflector.		✓	
Realign system after service.		✓	✓
Check system performance indicators.		✓	✓
Perform bump test (simulates system-observed gas content at the required path average concentration) to verify the system can detect at or below a lower alarm limit.		✓	
Review and test light and signal levels. Check average light intensity to establish baseline for bulb change frequency.		✓	✓
Verify system settings.			✓

FTIR

The FTIR requires maintenance activities similar to those for the UVDOAS, but is also designed to require only modest service and maintenance. Table 11 summarizes the maintenance activities for a FTIR system, as recommended by a typical manufacturer. Preventative maintenance frequency depends on the operating environment, and may need to be adjusted. System status alarms may alert operators on an as-needed basis to specific issues that need to be addressed. Bump tests are performed on site.

Table 11. Schedule of typical maintenance activities for the FTIR.

Activity	Monthly	Quarterly	Semi-Annually	Annually	Three Years	Five Years
Visually inspect the system.	✓	✓		✓		
Inspect and clean AC system exterior heat sink.			✓			
Inspect and clean AC system interior heat sink.				✓		
Confirm the alignment to verify there has not been significant physical movement. Note that this is also automatically monitored as well.	✓	✓		✓		
Download data from detector hard drive and delete old files to free space, if needed.	✓	✓		✓		
Ensure no obstructions are between the detector and the retroreflector (such as equipment, vegetation, vehicles).	✓	✓		✓		
Change out the IR source.						✓
Realign system after service.		✓		✓		
Check system performance indicators.		✓		✓		
Perform bump test.		✓				
Review and test light and signal levels. Check average light intensity to establish baseline for infrared source change frequency and retroreflector wear.				✓		
Verify system settings.		✓				
Replace cryocooler or swap detector module assembly.					✓	

Aethalometer

The Aethalometer system is designed to require only modest service and maintenance. Table 12 summarizes the typical maintenance activities for an Aethalometer, as recommended by a manufacturer. Preventive maintenance frequency depends on the operating environment and may need to be adjusted beyond the manufacturers' recommendations once the instruments are deployed in the field. System status alarms will alert operators on an as-needed basis to specific issues needing to be addressed.

Table 12. Schedule of typical maintenance activities for Aethalometers.

Activity	Monthly	Semiannual	Annual
Visually inspect the system.	✓	✓	✓
Inlet flow check	✓		
Clean size selective inlet	✓		
Clean cyclone	✓		
Verify date and time	✓		
Inspect optical chamber and clean as necessary		✓	
Calibrate flow		✓	
Change bypass cartridge filter			✓
Check tape roll, install new tape roll if necessary	✓		
Calibrate tape sensor		✓	

H_2S Point Analyzer

The maintenance activities for the H_2S point analyzer will be provided once the final instrument type is selected.

Maintenance and Failure Plan

Normal routine scheduled maintenance for open-path instruments occurs at least once per month. During these maintenance visits, the operator will carry repair parts to the site. It is expected that routine maintenance periods—when the equipment might not be reporting data—will be about 2 hours long.

If between routine visits, monitors fail to report data or appear to be reporting erroneous data, both remote diagnosis and, if necessary, a site visit will be conducted. If the problem cannot be resolved with the equipment or parts on hand, Tesoro will obtain replacement parts from the vendor. After selection of the vendors, Tesoro will negotiate to have spare parts, including major components, available locally for emergency repairs. It is expected that with these measures, the problem can be resolved within about 24 hours. If downtime exceeds 24 hours, Tesoro will respond with the required written notification.

Tesoro will submit the required written notification to the SCAQMD Executive Officer of any equipment failure that results in a failure to accurately provide continuous, real-time air monitoring information for 24-hours or longer. The written notification shall be submitted to the Executive Officer within 24 hours of discovering the equipment failure, and shall include the following:

- An explanation of activities currently being pursued or taken to remedy the equipment failure;
- The estimated time needed to restore the fenceline air monitoring equipment to normal operating conditions that comply with the approved fenceline and community air monitoring plan; and
- Temporary air monitoring measures to be implemented until the fenceline air monitoring system is restored to normal operating conditions.

Tesoro is planning to have a redundant backup monitoring system in case the main fenceline system goes offline for longer than 24 hours to ensure higher availability of the monitoring system. The back-up monitoring system will account for short- and long- term outages due to breakdown, power outages, weather events, and other unplanned scenarios.

2.2.4 Excluded Pollutants

Hydrogen fluoride is not used in Alkylation Units at the LAR Carson and Wilmington Operations; therefore, it will not be measured.

3. Quality Assurance

3.1 Quality Assurance Procedures for Data Generated by the Fenceline Air Monitoring System

Raw data management occurs on a daily, monthly, quarterly, and annual basis. On a daily basis, data are transferred from infield instruments through a data acquisition system (DAS) to a data management system (DMS) in real-time. Data are also stored onsite on instrument computers in case of data network failure.

The DMS can handle the large volumes of data that will be generated in this project. The DMS will be used to automatically quality-control data, detect outliers and problems, and create alerts. The auto-screening and graphical capabilities of the DMS will be used to continuously examine data quality. The DMS will feed auto-screened data to the field operations website and notification system to inform project and facility staff. The operations website will show maps and time-series plots of the pollutants, winds, and visibility data. The auto-QC'd air quality data will be fed to the public website (see Section 4) in near-real time. The DMS data will be backed up on a daily basis. Historical data for up to two years will be made available on the public website while the archived data will be maintained for five years pursuant to Rule 1180.

All data values not associated with bump tests or other instrument maintenance will be displayed to the public in near-real time (i.e., about 10 minutes or less). If data are subsequently proven to be invalid, they will be removed from the public display, and the rationale for data removal will be provided.

A non-public field operations website will be used for daily graphical review of the data (an example is provided in **Figure 9**). Common data problems include flat signal/constant values, no signal/missing data, extremely noisy signal, rapid changes (spikes or dips), and negative concentrations (see annotated **Figure 10** for examples). An initial review, typically of a three-to-five-day running time-series plot of selected parameters for each instrument, allows the analyst to see common problems and verify instruments are operational. If it appears that an instrument is not operating, or the data are missing, the field operator will be notified and further investigation and corrective action will be taken if needed.

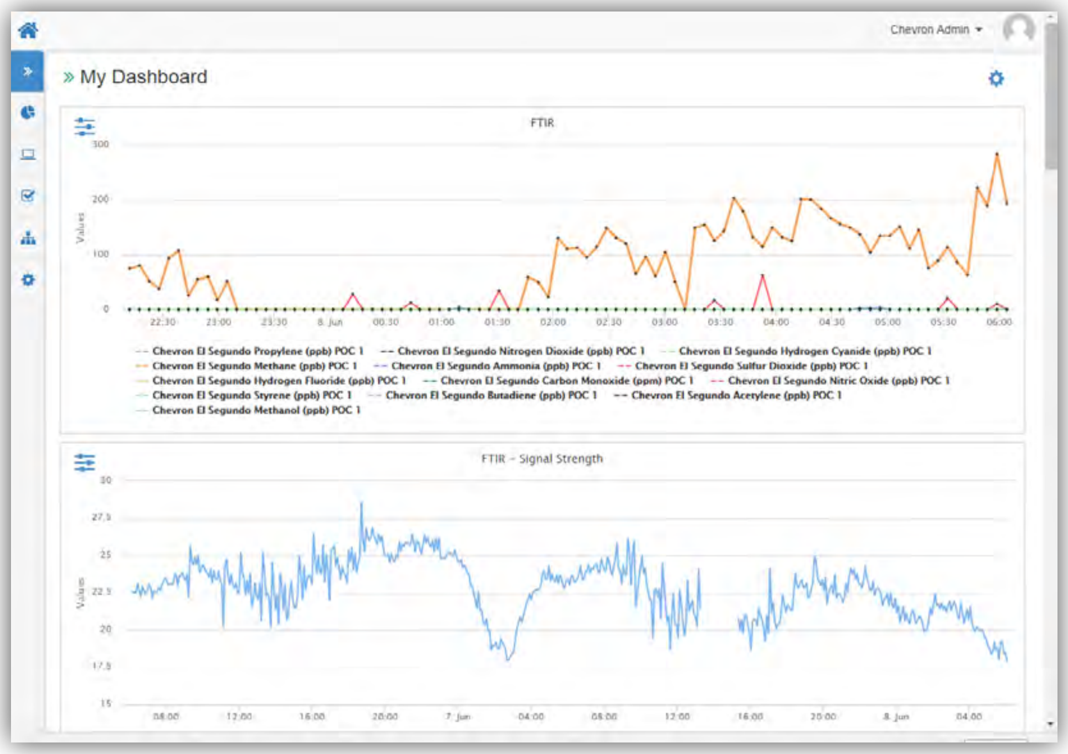


Figure 9. Example of a non-public field operations website used for daily review of instrument operations.

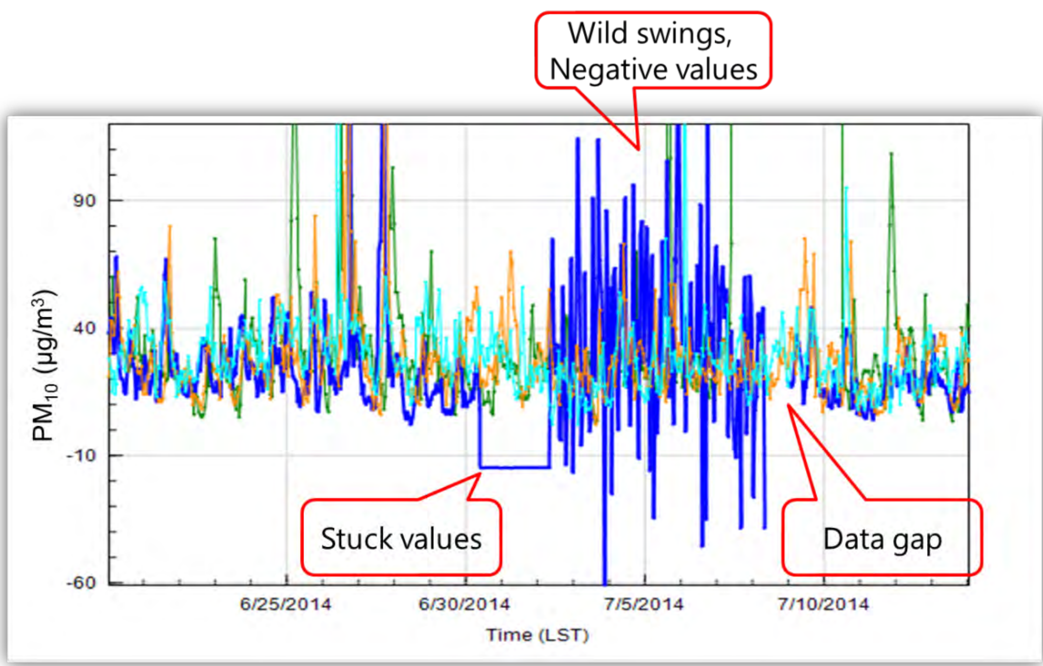


Figure 10. Example of species concentration time series showing stuck values, wild swings, large negative values, and a data gap. Such features in the data indicate instrument issues.

Once it is clear that instruments are operational, the next step will be to review whether the species concentration patterns are reasonable with respect to the time of day, season, meteorology, facility operations, and concentrations expected and observed at other sites. If anomalies are observed, additional analysis will be conducted to determine whether there is an instrument malfunction or the data are truly anomalous, but explainable and valid.

Visual review of data will be augmented by automated data screening within the DMS upon data ingest. Automated screening checks of data feeds are helpful to focus the analyst's efforts on the data that need the most attention and are used to screen out invalid data. All data above notification threshold levels (Section 5) will be flagged as suspect. Screening criteria (flags and rates of change) are preliminary and will be refined during the project based on actual observations and instrument performance. In summary, the DMS auto-screening checks that will be used include:

- **Range.** These checks will ensure the instrument is not reporting values outside of reasonable minimum and maximum concentrations.
- **Sticking.** If values are repeated for a number of sampling intervals, data will be reviewed for validity. Typically, four or more intervals of sticking values are a reasonable time span to indicate that investigation is needed. Sticking checks will not be applied to data below the instrument detection limit.
- **Rate of Change.** Values that change rapidly without reasonable cause will be flagged as suspect and reviewed.
- **Missing.** Missing data will be flagged.
- **Sensor OP Codes and Alarms.** If the instrument assigns operation (OP) codes to data automatically (e.g., for bump tests, internal flow rate checks), the data will be reviewed, the OP codes will be confirmed, and the data flags will be checked.

Additional QC checks for the instruments are summarized in Table 13. Data that fail checks will be flagged in the DMS and brought to the attention of the reviewer. Data are invalidated only if a known reason can be found for the anomaly or automated screening check failure. If the data are anomalous or fail screening, but no reason can be found to invalidate the data, the data are flagged as suspect. Additional analysis may be needed to deem data valid or invalid. Common reasons for invalidation include instrument malfunction, power failure, and bump test data that were not identified as such. As the measurements progress over time, Tesoro will update and refine the screening checks. Screening checks are typically specific to the site, instrument, time of day, and season, and are adjusted over time as more data are collected.

Table 13. Typical instrument QA/QC checks.

QA/QC Checks	Frequency	Acceptance Criteria
UVDOAS		
Bump test (accuracy)	Quarterly and after major service	±20%
Baseline stability	Continuous	±5%
Single beam ratio test (strength of UV source)	Real-time	*To be determined*
Single point bump test in field	Quarterly	±20%
Measurement quality (R2)	Continuous	0.7 to 1.0
Integration time	Continuous	80 to 200 mS *>400 mS integration time results in a warning notification*
Signal intensity	Continuous	>30% *Signal intensity below 30% results in a warning notification*
Aethalometer		
Flow rate	--	±10%
Span check	--	±10%
Zero check	--	<550 ng/m^3 for Ch. 6
FTIR		
Bump test	Quarterly and after major service	±20%
Baseline stability	Continuous	±5%
IR single beam ratio test (background vs. sample intensity)	Real time	*To be determined*
Measurement quality (R2)	Continuous	0.7 to 1.0
Signal intensity	Continuous	>5% *Signal intensity below 5% results in a warning notification*

In addition to auto-screening and daily visual checks, data will be subjected to more in-depth review on a quarterly basis and when data fail screening. Final data sets will be compiled quarterly—60 days after each quarter's end—and will be provided to the SCAQMD. Tesoro will maintain a data record for five years consistent with Rule 1180.

Any corrections or updates will be copied to the website. Validation checks will include:

- Looking for statistical anomalies and outliers in the data.
- Inspecting several sampling intervals before and after data issues, bump tests, or repairs.
- Evaluating monthly summaries of minimum, maximum, and average values.
- Ensuring data reasonableness by comparing to remote background concentrations and average urban concentrations.
- Referring to site and operator logbooks to see whether some values may be unusual or questionable based on observations by site operator.
- Ensuring that data are realistically achievable, i.e., not outside the limits of what can be measured by the instrument.
- Confirming that bump tests were conducted and were within specifications.

These in-depth analyses typically require data not available in real time and ensure that the data on the website are updated.

On a quarterly basis, to ensure daily QC tasks are complete, analysts will:

- Review any instrument bump test results.
- Verify that daily instrument checks were acceptable.
- Review manual changes to operations/data, and verify that the changes were logged and appropriately flagged.
- Ensure that daily bump tests or instrument checks have the appropriate QC codes applied.

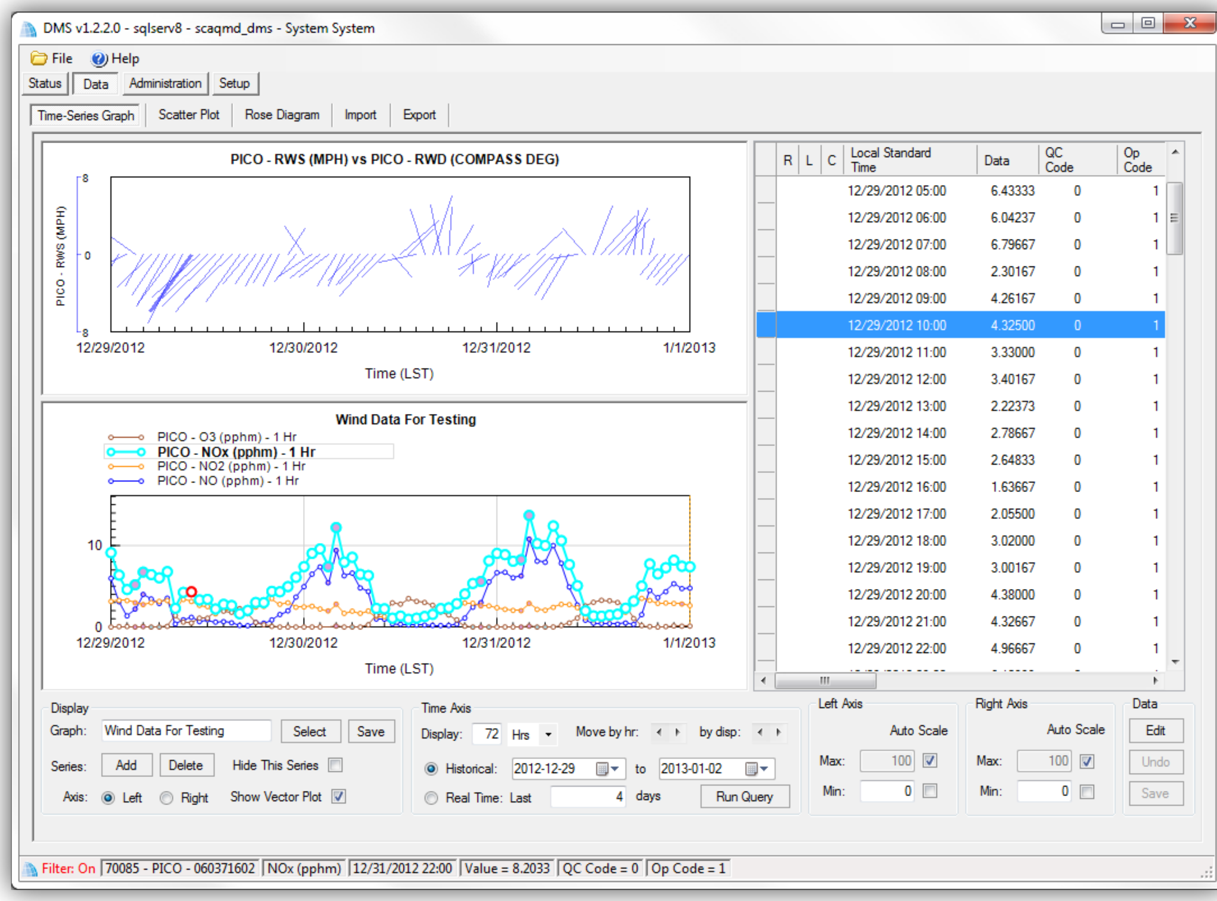
On a quarterly basis, analysts will subject the data to a final QC screening, including filling in missing records with null values, and adding in Null Codes. Additional steps include

- Creating a null record for data completeness purposes if a record is not created for a particular site/date/time/parameter combination.
- Assigning a Null Code to any invalid data to explain why the data is invalid.
- Inspecting data consistency over three months.
- Reviewing ranges of values for consistency—ranges should remain consistent over months of monitoring.
- Checking bump test values for consistency.
- Reviewing data completeness.

To support the traceability of the actions taken to produce the data on the website, all analyst work will be recorded and the raw data will be retained.

On an annual basis, Tesoro or its designated contractor will review the performance of the network by (1) reviewing the data completeness by monitoring path, instrument, and species; (2) reviewing results of bump tests; (3) analyzing the reported values in the context of refinery operations; and (4) analyzing the data in the context of the meteorology. The results will be summarized in a technical memorandum and provided to the SCAQMD upon request.

Data flagged through auto-screening checks (discussed in Section 3.1) will be graphically reviewed. QC flags will be updated as needed with daily, monthly, and quarterly actions (see Figure 11), and the QC flags will be updated on the public website as needed. DMS keeps track of data QC changes.



Local Standard Time	Data	QC Code	Op Code
12/29/2012 05:00	6.43333	0	1
12/29/2012 06:00	6.04237	0	1
12/29/2012 07:00	6.79667	0	1
12/29/2012 08:00	2.30167	0	1
12/29/2012 09:00	4.26167	0	1
12/29/2012 10:00	4.32500	0	1
12/29/2012 11:00	3.33000	0	1
12/29/2012 12:00	3.40167	0	1
12/29/2012 13:00	2.22373	0	1
12/29/2012 14:00	2.78667	0	1
12/29/2012 15:00	2.64833	0	1
12/29/2012 16:00	1.63667	0	1
12/29/2012 17:00	2.05500	0	1
12/29/2012 18:00	3.02000	0	1
12/29/2012 19:00	3.00167	0	1
12/29/2012 20:00	4.38000	0	1
12/29/2012 21:00	4.32667	0	1
12/29/2012 22:00	4.96667	0	1

Figure 11. Screenshot of a typical DMS showing winds and species concentrations. Actual screens may vary.

3.2 Quality Assurance Project Plan

Tesoro LAR intends to submit to SCAQMD a Quality Assurance Project Plan (QAPP) and associated SOPs after the refinery finalizes vendor and instrument selection and before commencing fenceline monitoring on January 1, 2020.

3.3 Routine Equipment and Data Audits

Rule 1180 specifically calls for "procedures for implementing quality assurance by a qualified independent party, including quality control and audits of the fenceline air monitoring systems" (South Coast Air Quality Management District, 2017a). Quality assurance takes two forms; (1) internal quality assessment is conducted or arranged within Tesoro as directed by the QA Manager, and (2) external QA will be provided by a third party, to be determined at a later date.

The following is a list of internal and external assessment tools that will be utilized by the Tesoro refinery:

Internal Audits

- Data quality assessments – as requested by QA Manager
- Performance Evaluations – initial, semi-annual
- Flow rate audits – initial, quarterly
- Internal technical system audits – initial, 3 to 5 years

External Audits (by Third Party)

- Third-party performance audit – initial, annual
- Third-party technical systems audit – every 3 years

The audit function has two components: the system audit (in essence, a challenge to the QAPP), and the performance audit (a challenge to the individual measurement systems).

The system audit provides an overall assessment of the commitment to data validity; as such, all commitments made in the QAPP should be subject to challenge. Typical questions asked in the systems audit include, "Are standard operating procedures being followed?" and "Are there any errors in the data flow from the instrument to the website?" During this audit, the QA Manager reviews the calibration sources and methods used, compares actual test procedures to those specified in this protocol, and reviews data acquisition and handling procedures. The QA Manager also reviews instrument calibration records and gas certificates of analysis. All deficiencies should be recorded in the audit report, along with an assessment of the likely effect on data quality. Corrective actions related to a systems audit should be obvious if the appropriate questions are asked.

The performance audit is similar to a calibration in terms of the types of activities performed—all the performance audit adds is an independent assurance that the calibrations are done correctly and that the documentation is complete and accurate. In the ideal case, when both the auditor and site operator are equally knowledgeable, the auditor functions as an observer while the site operator performs the calibration; in this instance, the auditor functions in a "hands-off" mode. In initial audits, since newly hired site operators may have little or no experience with instruments, the hands-off approach may not be practical or desirable. In these instances, the audit may also function as a training exercise for the site operator (U.S. Environmental Protection Agency, 2000). **Table 14** describes acceptance testing parameters for the sensors described in this monitoring plan. Where possible, NIST-traceable gas standards should be used for the UVDOAS, FTIR, and TDLAS instruments. The Aethalometer should be subjected to both a leak check and flow rate check.

Tesoro LAR maintains and operates one meteorological stations each at Carson and Wilmington Refineries. Tesoro LAR will be using a third-party to certify these meteorological stations in accordance with Rule 1180 requirements. Preventative maintenance, routine certification, and third-party audit details will be provided in the QAPP to be submitted at a later date before the start of the fenceline monitoring regime on January 1, 2020.

The existing meteorological stations at Carson Operations Gate 7 and Wilmington Operations Training Center sites will also be subject to audit. The simplest acceptance test for temperature and temperature difference is a two-point test using room temperature and a stirred ice slurry. A reasonably good mercury-in-glass thermometer with some calibration pedigree can be used to verify agreement to within 1°C. For wind anemometers, the measurement system is challenged with various rates of rotation on the anemometer shaft to test the performance from the transducer in the sensor to the output. The starting torque of the bearing assembly is measured and compared to the range of values provided by the manufacturer. In addition, these meteorological stations will be certified and maintained in accordance with EPA protocols. A third-party audit will be completed on a semi-annual basis to satisfy EPA requirements. The data from these meteorological stations will also be displayed live on the data display website.

The QA Manager, during the course of any assessment or audit, shall identify any immediate corrective action that should be taken to the technical staff performing experimental activities. If serious quality problems exist, the QA Manager is authorized to stop work. Once the assessment report has been prepared, the Field Staff Manager ensures that a response is provided for each adverse finding or potential problem, and implements any necessary follow-up corrective action. The QA Manager shall ensure that follow-up corrective action has been taken.

Table 14. Description of performance audits for the sensor systems planned for this project.

Sensor	Test	Acceptance Criteria
UVDOAS	5 ppm Benzene; 0.5 m QA cell for a 500 m path	±20%
FTIR	5 ppm NH_3; 0.5 m QA cell for a 500 m path	±20%
TDLAS	100 ppb H_2S; 0.5 m QA cell for a 500 m path	±20%
Aethalometer	Bubble flow meter, internal leak check	±10%
Temperature	Two point test	±0.5°C
Relative Humidity	Hygrometer	±7%
Wind Speed	Starting threshold test; transfer function test	±0.25 m/s below 5 m/s and ± 5% above 5 m/s
Wind Direction	Angle verification	±5 degrees
Visibility	Extinction	±10%

4. Data Presentation to the Public

A key part of this monitoring program is disseminating the measured data to the public. This will be accomplished using a public-facing website that is linked to the data management system (DMS) described in Section 3. This section describes how the information will be displayed to the public. For the public website, key components will include:

- Visual display of data in near-real time
- A mechanism for public feedback on the website
- A description of monitoring techniques
- A description of monitored pollutants
- Hyperlinks to related information

4.1 Educational Material that Describe the Objectives and Capabilities of the Fenceline Air Monitoring System

The home page of the public-facing website will be dedicated to providing background on reasons the monitoring is taking place and the type of technology being used in the monitoring system. Figure 12 shows a mockup of a home page of a public-facing website. A brief paragraph written in plain English will explain the monitoring objectives, and give a short overview of the monitoring program. From the home page, a “Resources” page will include web links to Rule 1180 and the rule guidance. Links to other publicly available Rule 1180 monitoring websites will be provided as links on the “Resources” page. As part of the “Resources” page, a frequently asked questions (FAQ) topic will describe the nature of real-time data (5-minute averages reported about 10 minutes after it was measured, allowing for automatic quality checks) vs. non-real-time data (data reported quarterly after it has been validated) so that the public appreciates the rapid nature of the reporting system. FAQs will not necessarily evolve based on public comment and Tesoro may decide to modify FAQs at any time.

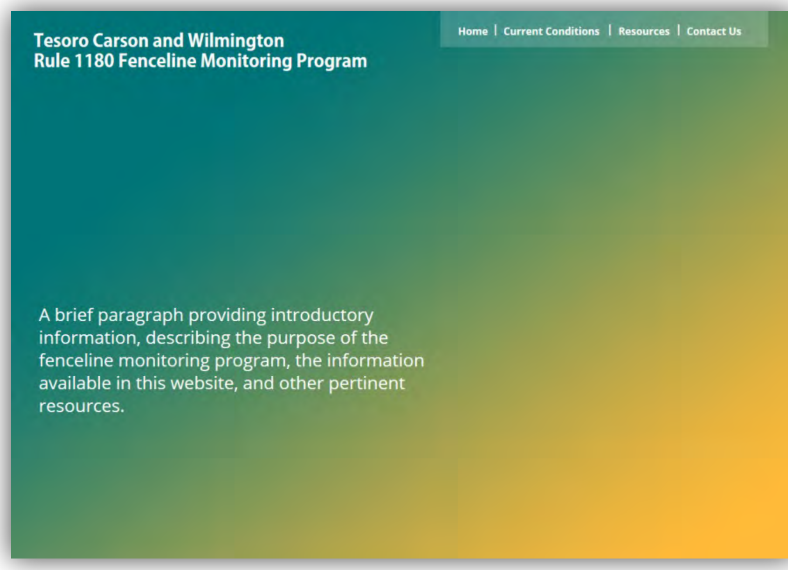


Figure 12. Screenshot showing an example of the home page to the public-facing fenceline monitoring site.

Tesoro LAR will develop education materials in English and Spanish to inform the public of why and how fenceline monitoring is conducted and availability of data reporting. The information will be included on the website and also shared at periodic community forums. Members of the public will be able to access this information via internet portals at local public libraries and other community facilities where internet access is provided to the public. We are currently working with SCAQMD staff and WSPA to develop consistent education materials appropriate for the general public.

4.2 Description of all Pollutants Measured and Measurement Techniques

Data for all pollutants measured will be displayed under a "Current Conditions" section of the website (an example is shown in Figure 13) that is readily available from the home page. In this view, a member of the public has the option of choosing either a "Map View" or a "Table View" of the data. Under the "Map View," the user can select any one of a number of parameters (benzene is selected in Figure 13) to display on the map. Once this action is complete, the concentrations for the selected pollutant are displayed for each monitoring site with the meteorological information.

Figure 13. An example of the "Map View" data display for any subset of the variables measured as part of this monitoring program. This example shows made-up benzene concentrations by site, wind direction, and with a 1-day chart view; a dialog box appears when the user hovers over a data point. Concentrations below the detection limit are shown in the gray-shaded area. After further design efforts, the actual web site may look different, but the same basic information will be presented.

The "Table View" provides a side-by-side display of all pollutants measured at each site, along with on-site meteorological conditions (Figure 14).

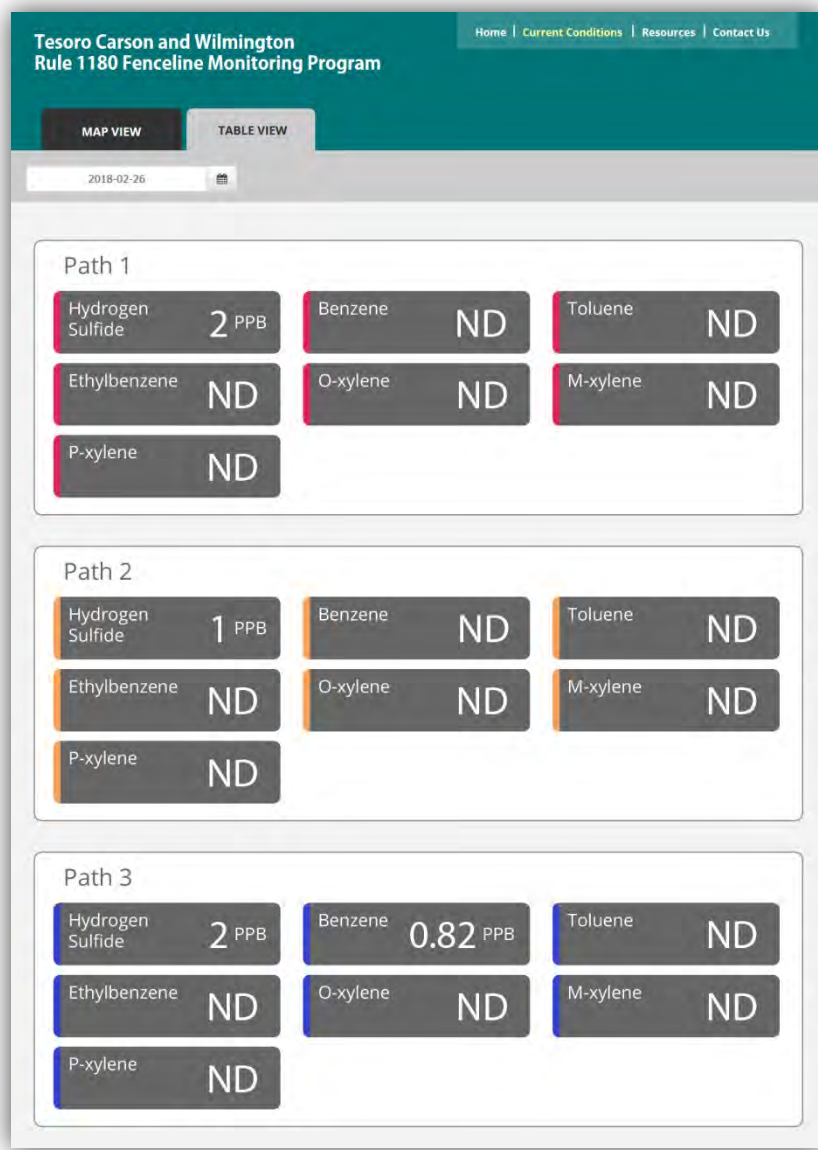


Figure 14. An example of the "Table View" data display for any subset of the variables measured as part of this monitoring program. This example shows hypothetical measurements from multiple pollutants by site, and meteorological conditions. After further design efforts, the actual web site may look different, but the same basic information will be presented.

From both the map view and the table view, historical archived data will be available. As mentioned in the Figure 13 caption, when the user hovers over a data point, a dialog box will appear. This dialog box shows the value (concentration, etc.), time, and any pertinent QC flags.

4.3 Description of Background Levels for All Pollutants Measured and Provide Context to Levels Measured at the Fenceline

Rule 1180 requires that concentration data be set in the context of pollutant concentrations measured elsewhere in the Los Angeles Basin. The public website will display the fenceline monitoring concentrations of the pollutants listed in Rule 1180, along with links to other sources of data such as the SCAQMD Multiple Air Toxics Study (MATES IV or MATES V), or Clearinghouse data links proposed to be hosted by SCAQMD.

4.4 Procedures to Upload the Data and Ensure Quality Control

The pathway followed by the data from the sensor to the public website is shown in **Figure 15**. Depending on the sensor used, data will be collected into a data processing server via a "pulling" or "pushing" method. The data will then be archived and ingested into the DMS. Data will be screened in real time upon upload into the DMS, as described in previous sections. Automated procedures will be used to ensure that data are properly uploaded, stored, processed, and quality-assured, and that products are delivered to a public-facing website in near-real time (defined here as about 10 minutes after data collection).

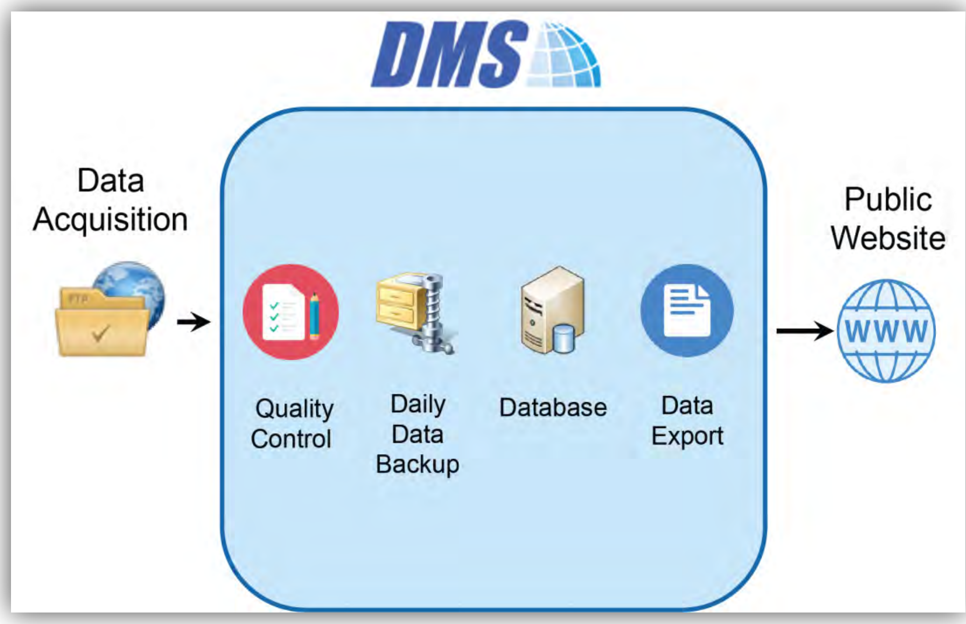


Figure 15. Schematic representation of the flow of data from acquisition at the sensor to the public website.

The preliminary quality-controlled data will be presented as chart (time series) of pollutant concentrations, visibility, and wind speed and direction. Data will be provided as 5-minute averages. Data will be annotated for quality (valid, invalid, suspect, or missing). In the event that high concentration levels occur, Tesoro will follow its existing procedures to determine whether any additional information needs to be provided to the public.

An example of a public-facing website that allows users to explore 5-minute data was shown in Figures 12-14. Displaying the data in a map format showing wind direction further helps to explain observed concentrations.

Web design will be finalized at a later date.

4.5 Further Information to Guide Public Understanding

The data to be collected have high time resolution, are spatially variable, and are chemically complex. To provide the public with context about this complex data set, the following information will be included through a combination of links, graphics, or captions:

- Definitions of abbreviations.
- Discussion of data below method detection limit (MDL).
- Definition of data QC flags and their meaning.
- Quality procedures.

Information will be written at a public-friendly level, and hyperlinks to additional resources will be provided for members of the public who want to delve deeper into the science. Clarity and thoroughness will help reduce the number of questions that arise.

4.6 Means for the Public to Provide Comments and Feedback, and Procedures to Respond

Public feedback will be available through Tesoro's corporate website and community hotline. A log of comments will be made available upon request. The feedback will be delivered to a Tesoro contact responsible for deciding whether and how to respond to the public comments. Tesoro will determine whether some comments warrant a direct response and what that response procedure should be. Although not all comments have to be addressed, they will be made available to SCAQMD upon request. Some of the comments will aid in the creation of FAQs.

4.7 Quarterly Data Summary Reports, Including Relationship to Health Thresholds, Data Completeness, Instrument Issues, and Quality Control Efforts

As part of this monitoring program, quarterly reports will be generated in PDF format. These reports will contain a statistical summary of the data from all sensors, chain of custody information, and graphical views of the historical data. Access to these reports will be available to the public in the form of web links.

5. Notification System

Tesoro will develop an air quality notification system through which the public can choose to be notified when certain pollutant concentrations exceed pre-configured thresholds. The public can also sign up for notifications of new data reports and monitoring system status.

The system will provide the flexibility to add manual alerts and expand to other pollutants and parameters in the future. The notification system will be integrated into (1) the same architecture as the public facing website, (2) the DMS, and (3) the existing QA procedures. The administrator of the public website will be able to make changes to the alert messages (the email list, the distributed message, the concentrations at which alerts are sent out, etc.) via a separate administrator website.

An example of a web page that has the notification functionality is shown in **Figure 16**.

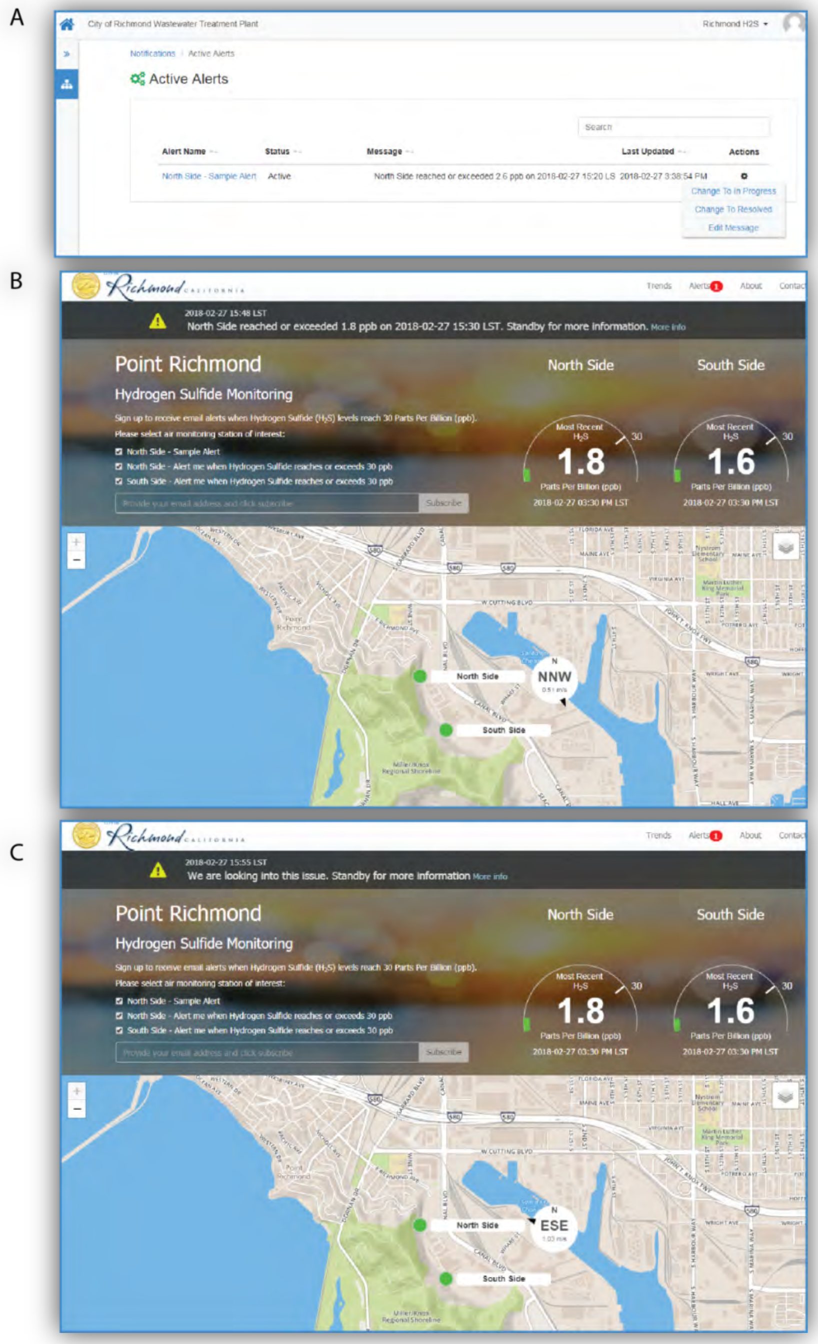


Figure 16. Typical screenshot showing an example of a web page that allows the public to sign up for notifications when pollutants exceed threshold values.

As part of this fenceline monitoring project, a system will be available for the public to sign up for notifications of:

- Activities that could affect the monitoring system
- Exceedances in thresholds

Activities that may affect the monitoring system include calibration, maintenance, power outages, communications outages, etc. For any of these events, a manual notification can be created to explain the activity that triggered the notification. This type of notification will trigger an alert message on the website.

When a notification is triggered for a threshold exceedance, a message will be displayed on the website. Exceedance alerts will be active until they are resolved and cleared through the administrator website, where the administrator can view the alert name, status, message, and the last time the alert was updated.

Public notifications will be triggered automatically when fenceline concentrations exceed the threshold levels listed in **Table 15**. The notification concentrations will be calculated on a 1-hour rolling weighted average that is updated every 5 minutes. These notifications will be accompanied by a message on the home page of the public website. Concentration thresholds at the nearest receptor (1-hour rolling average) will correspond to the OEHHA (Office of Environmental Health Hazard Assessment) acute relative exposure limits (RELs) (California Office of Environmental Health Hazard Assessment, 2017). Additional notifications will be made for activities that could affect the fenceline monitoring system, such as planned maintenance, low visibility conditions, or a drop in open path signal intensity. A drop in open path signal intensity that causes data loss typically occurs when an object or condition (e.g., a bird, vegetation, fog, etc.) blocks the beam path, rendering the instrument incapable of producing concentration values.

Potential pollutant concentration levels at downwind residential areas will be much lower than concentration levels recorded at fenceline monitors. The dispersion tables in *South Coast Air Quality Management District (SCAQMD) Permit Application Package N, for Use in Conjunction with the Risk Assessment Procedures for Rules 1401, 1401.1, and 212*, Version 8.1 and effective as of October 1, 2017, conservatively demonstrate the concentration (or X/Q) decrease with distance. The subject SCAQMD reference and Long Beach Airport (KLGB) meteorological data was used for the potential notification levels using the relationship between the X/Q factor and downwind distance.

The X/Q at the monitor location is then compared to the X/Q at a specific distance to determine the "conservative concentration level" at that distance. The potential "conservative concentration level" is used to estimate the actual normalized exposure at a specific distance away from the fenceline monitor.

Table 15. Proposed thresholds for triggering automated notifications.

Pollutant	Notification Threshold (ppm)
1,3 –Butadiene	4.47
Acetaldehyde	3.91
Acrolein	0.02
Ammonia	23
Benzene	0.13
Black Carbon	NA
Carbonyl Sulfide	4.03
Ethylbenzene	6.91
Formaldehyde	0.67
Hydrogen Cyanide	1.54
Hydrogen Sulfide	0.32
Naphthalene	0.03
Nitrogen Dioxide	NA
Sulfur Dioxide	NA
Styrene	NA
Toluene	49.5
Total Hydrocarbon	NA
Total Xylene	8.0

6. References

California Air Resources Board (2003) H&S 44344 biennial updates. Available at https://www.arb.ca.gov/bluebook/bb03/HS/44344.htm. Accessed July 26, 2018.

California Office of Environmental Health Hazard Assessment (2017) Analysis of refinery chemical emissions and health effects. Draft report, September. Available at https://oehha.ca.gov/media/downloads/faqs/refinerychemicalsreport092717.pdf.

South Coast Air Quality Management District (2017a) Rule 1180: Refinery fenceline and community air monitoring. Final rule adopted December 1, 2017. Available at http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/r1180.pdf?sfvrsn=9.

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South Coast Air Quality Management District (2018) Rule 301. Permitting and associated fees. May 4. Available at http://www.aqmd.gov/docs/default-source/rule-book/reg-iii/rule-301.pdf?sfvrsn=53.

U.S. Environmental Protection Agency (2000) Meteorological monitoring guidance for regulatory modeling applications. Office of Air Quality Planning and Standards, Research Triangle Park, NC, Document EPA-454/R-99-005, February. Available at http://www.epa.gov/scram001/guidance/met/mmgrma.pdf.

Appendix A. Fenceline Air Monitoring Plan Checklist (and Section in This Plan Where the Topic is Discussed)

Fenceline Air Monitoring Plan Checklist	
Fenceline Air Monitoring Coverage (or Spatial Coverage) (Section 1)	
☒	**Identify the facility's proximity to sensitive receptors affected by the refinery operation and provide the information below. (Section 1.1)**
	• Distance from facility to closest sensitive receptor(s) • Location of downwind and upwind communities • Eminent sources of non-refinery emissions surrounding the facility (e.g. non-refinery industrial facilities) • Dispersion modeling†
☒	**Describe historical facility emission patterns and pollutant hotspots based on the following (Section 1.2):**
	• On-site location of operations and processes within the facility's perimeter • On-site location of emissions sources and level of emissions • Facility plot plans and topography • Dispersion modeling†
Fenceline Air Monitoring Equipment Description (Section 2)	
☒	**Select sampling locations along the perimeter of the facility based on the information above. Also, provide the following (Section 2.1):**
	• Locations where equipment will be sited (e.g., GIS coordinates) and measurement pathways • Elevations of equipment and pathways • A description of how the monitoring system will cover all nearby downwind communities
☒	**Select fenceline air monitoring equipment that is capable of continuously measuring air pollutants in real-time and provide the following (Section 2.2):**
	• Specifications for the fenceline instruments (e.g., detection limits, time resolution, etc.) • Explanation of the operation and maintenance requirements for selected equipment • Substantiate any request to use alternative technologies

☒	**Monitor for the pollutants listed in Table 1 of Rule 1180 and include the following:**
	• Specify pollutant detection limits for all instruments and paths measured • Substantiate any exclusion of chemical compounds listed in Table 1 of Rule 1180 or measurement of a surrogate compound
Quality Assurance (Section 3)	
☒	**Develop a Quality Assurance Project Plan (QAPP) that describes the following (Section 3.2):**
	• Quality assurance procedures for data generated by the fenceline air monitoring system (e.g. procedures for assessment, verification and validation data) (Section 3.1) • Standard operating procedures (SOP) for all measurement equipment (Section 3.2) • Routine equipment and data audits (Section 3.3)
Data Presentation to the Public (Section 4)	
☒	**Design a data display website that includes the following:**
	• Educational material that describes the objectives and capabilities of the fenceline air monitoring system (Section 4.1) • A description of all pollutants measured and measurement techniques (Section 4.2) • A description of background levels for all pollutants measured and provide context to levels measured at the fenceline (Section 4.3) • Procedures to upload the data and ensure quality control (Section 4.4) • Definition of QC flags (Section 4.5) • Hyperlinks to relevant sources of information (Section 4.5) • A means for the public to provide comments and feedback; Procedures to respond (Section 4.6) • Archived data that with data quality flags, explains changes due to QA/QC and provides chain of custody information • Quarterly data summary reports, including relationship to health thresholds, data completeness, instrument issues, and quality control efforts (Section 4.7)
Notification System (Section 5)	
☒	**Design a notification system for the public to voluntarily participate in that includes the following (Section 5):**
	• Notifications for activities that could affect the fenceline air monitoring system (e.g., planned maintenance activities or equipment failures) • Notifications for the availability of periodic reports that inform the community about air quality • Triggers for exceedances in thresholds (e.g. Acute Reference Exposure Levels (RELs)

- Communication methods for notifications, such as, website, mobile applications, automated emails/text messages and social media

†Dispersion modeling shall be conducted using U.S. EPA's Preferred and Recommended Air Quality Dispersion Model (e.g., Health Risk Assessment)