San Joaquin Refinery

Rule 4460 Air Monitoring Plan

Rev. 5

November 19, 2024

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List of Acronyms

AERMOD - U.S. EPA AMS/EPA Regulatory Model

AEGL – Acute Exposure Guidelines

ATSDR – Agency for Toxic Substances and Disease Registry (Minimal Risk Level for chronic exposure)

BTEX – Benzene, Toluene, Ethylbenzene, Xylene

CA/DIR – California Department of Industrial Relations (personal exposure limit)

CAL/OSHA – California Division of Occupational Safety and Health

CARB – California Air Resources Board

EPA – Environmental Protection Agency

H_2S – Hydrogen Sulfide

LDL – Lower Detection Limit

OEHHA – Office of Environmental Health Hazard Assessment

MET – Meteorological Station

NAAQS – National Ambient Air Quality Standards

NO – Nitric Oxide

NO_2 – Nitrogen Dioxide

PEL – Personal Exposure Limit

ppb – parts per billion

QA/QC – Quality Assurance / Quality Control

QAPP – Quality Assurance Project Plan

REL – Recommended Exposure Limit

SJVAPCD – San Joaquin Valley Air Pollution Control District

SJR – San Joaquin Refining

SO_2 – Sulfur Dioxide

SOP – Standard Operating Procedure

UDL – Upper Detection Limit

Overview

On December 19, 2019, the San Joaquin Valley Air Pollution Control District (SJVAPCD) adopted Rule 4460 entitled "Petroleum Refinery Fence line Air Monitoring." SJR's Air Monitoring Plan required by Rule 4460 was approved by the SJVAPCD on April 7, 2021, and included the mandatory monitoring for six compounds; BTEX, H_2S, and SO_2. Rule 4460 was amended on October 20, 2022 by adding additional compounds to the fence line monitoring list. The amended rule requires real-time monitoring for the additional compounds, provided in Table 1 of the rule, with the following caveat:

"Should owner or operator of a petroleum refinery propose to not monitor one or more of the specified pollutants in Table 1, sufficient justification shall be included in the proposed fence line air monitoring plan in accordance with the Rule 4460 Petroleum Refinery Fence line Air Monitoring Plan Guidelines." In a July 17, 2023, letter to SJR from the SJVAPCD, SJR was informed that "to demonstrate that emission levels are either below detection limits or pose insignificant risks, the maximum potential emissions based on equipment capacity should be utilized in the dispersion and risk modeling, instead of estimated actual emissions from the emissions inventory."

The updated Air Monitoring Plan added naphthalene, listed in Table 1 of the amended rule, and also NO2. The updated plan also provides an estimate of pollutant risk associated with maximum emissions based on equipment capacity. The remaining pollutants are either not emitted by SJR, are emitted at mass rates that pose an insignificant risk at the closest sensitive receptor, or real-time monitoring is not possible. Appendix A includes SJR's justification for not including the remaining Table 1 pollutants in this plan, and also pollution dispersion maps with the locations of sensitive receptors indicated with yellow diamonds.

On June 7, 2024, the SJVAPCD approved the amended plan. SJR now proposes to add three 17,000 barrel tanks to store San Joaquin heavy crude oil. The tanks are contiguous to SJR's southern property line. SJR proposes to add a point monitor for SO_2 and H_2S, as shown in Figure 2.2, of the type approved by the SJVAPCD. Otherwise, this plan is the same as the plan approved by the SJVAPCD.

The purpose of this monitoring plan is to evaluate potential hazards to at-risk populations located near the refinery, present a list of air monitoring systems to be used to measure the pollutant concentrations at the boundary of the refinery, and to present the information from the air monitoring systems to the public on a real-time basis.

The critical tasks addressed in the development of the plan are included in the following sections:

- Section 1 presents an evaluation of emission sources and community impact associated with emissions from SJR. This includes locating the individuals and organizations who might be considered sensitive receptors within one mile of the refinery, along with dispersion modeling and wind rose analysis to evaluate downwind impacts to communities.
- Section 2 presents the types and locations of the air monitoring systems.

- Section 3 presents an overview of the presentation of the fence line data to the public including a real-time public access website.
- Section 4 presents the data management program including an outline of the Quality Assurance Project Plan to be developed after this plan is approved.
- Appendix A presents SJR's monitoring list, an explanation for why some Rule 4460 compounds will not be monitored, and pollution rose maps generated by the AERMOD program.

Section 1 – Evaluation of Emission Sources and Community Impact

1.1 Facility Description

SJR is in Bakersfield, California and specializes in supplying products for applications including printing inks, lubricants, rubber and plastics, adhesives, paints and coatings, electrical insulation, fuels, road paving, asphalt recycling, and roofing. SJR feed stock includes San Joaquin Valley Heavy Naphthenic crude oil for developing its products. The facility processes 15,000 barrels of crude oil per day, or about 0.9% of the crude oil capacity in the state.[1] Unlike other refineries, SJR does not have a coker, FCCU, turbine, or alkylation unit which are common sources of emissions.

1.2 Sensitive Receptors

SJR identified the sensitive receptors within a one-mile radius of the refinery. A real-time website will enable sensitive receptors as well as any individual in the community to evaluate when a detection of pollutants from the fence line system is above normal background levels. This information can then be used by the interested parties to take appropriate action to minimize exposure from refinery emissions. Table 1.1 lists the potential sensitive receptors based on direction from the refinery. Table 1.2 shows a list of sensitive receptors located within one mile of the refinery.

Table 1.1 – Potential Sensitive Receptors Based on Direction from Refinery

	Sensitive Receptors within a One-mile Area of the Bakersfield Refinery Fence Line			
Cardinal Direction from Fence Line	**Schools/Daycare**	**Recreation Areas**	**Hospitals/Adult Health Facilities**	**Residential**
North				
Northwest	X		X	X
Northeast	X			X
South		X		X
Southwest		X		
Southeast		X	X	X
East			X	
West				

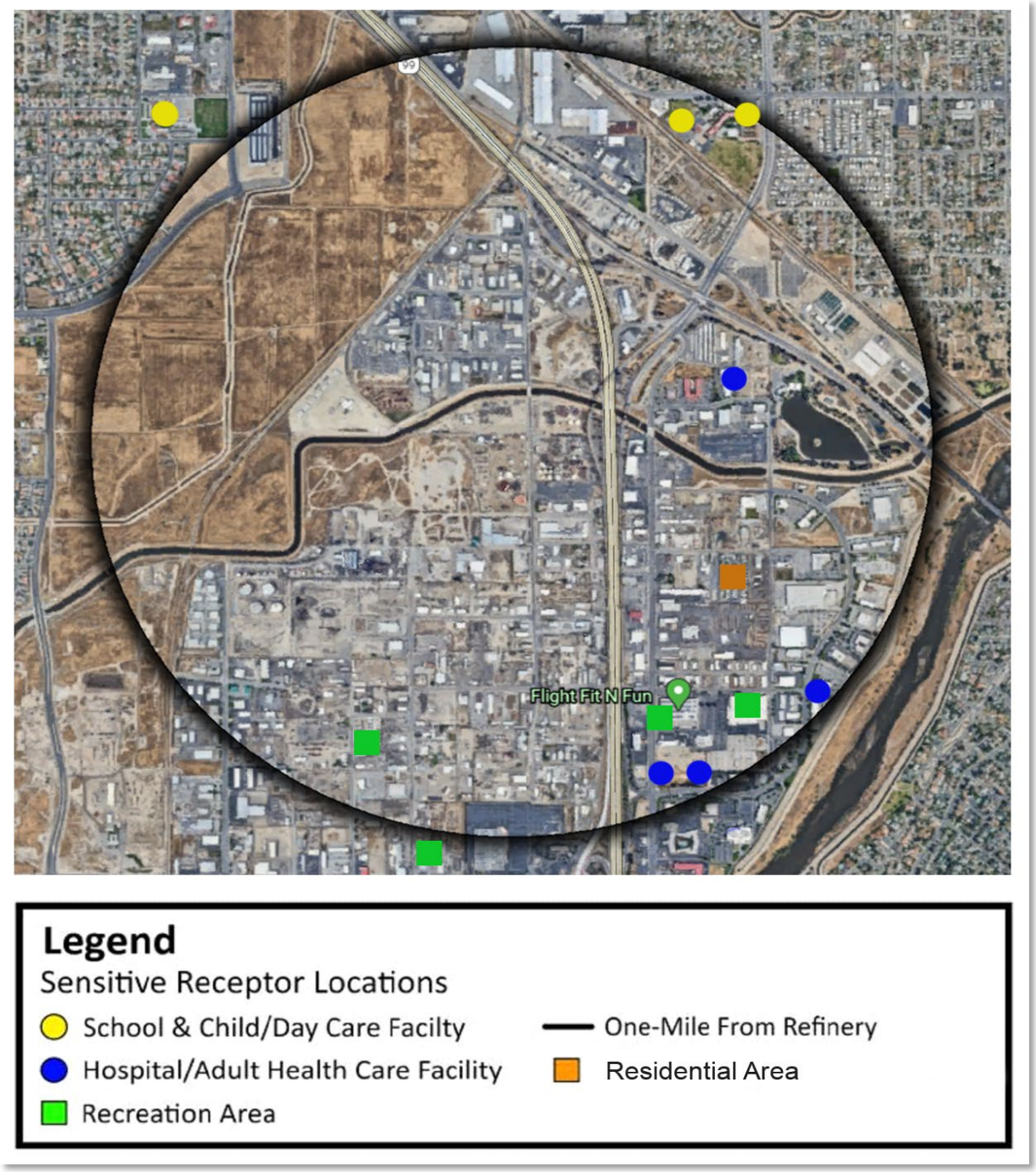
[1] https://www.energy.ca.gov/data-reports/energy-almanac/californias-petroleum-market/californias-oil-refineries

Table 1.2 – SJR Sensitive Receptors with Addresses and GPS Coordinates

Name and Type	Address	GPS Coordinates
Beardsley Junior High School-School	1001 Roberts Ln, Bakersfield, CA 93308	35.420160, -119.058740
Beardsley Elementary School-School	1001 Roberts Ln, Bakersfield, CA 93308	35.420160, -119.058740
San Lauren Elementary School-School	5210 Victor St, Bakersfield, CA 93308	35.407870, -119.060440
Kern River Transitional Care	5151 Knudson Drive Bakersfield, CA 93308	35.406336, -119.059586
Flight Fit N Fun - Recreation Center	3200 Buck Owens Blvd Ste 100, Bakersfield, CA 93308	35.388760, -119.042220
Galaxy Gymnastics & Tumbling - Recreation Center	3101 Gilmore Ave #200, Bakersfield, CA 93308	35.388770, -119.040970
MCS CrossFit - Recreation Center	2620 Gibson St, Bakersfield, CA 93308	35.384720, -119.051700
Ferny Jiu Jitsu - Recreation Center	3104 Fairhaven Dr, Bakersfield, CA 93308	35.388450, -119.054310
Care Medical - Health Care	3232 Rio Mirada Dr # B3, Bakersfield, CA 93308	35.399310, -119.040470
Coram Healthcare - Health Care	3101 Sillect Ave # 109, Bakersfield, CA 93308	35.387780, -119.038210
Priority Care Clinic - Health Care	3012 Sillect Ave suite c, Bakersfield, CA 93308	35.386100, -119.040480
Kern Family Health Care - Health Care	2900 Buck Owens Blvd, Bakersfield, CA 93308	35.386100, -119.040480
Bakersfield Mobile Home Park - Residential	33219 Gulf St, Bakersfield, CA 93308	35.393030, -119.040200
Rio Mirada Villas Apartments	3300 Rio Mirada Dr, Bakersfield, CA 93308	35.399083, -119.041778
Residential Area, The Palms, Kern River Transitional Care, et.al.	One mile to the NW of SJR	35.404729, -119.061398
Residential Area	0.6 miles to the NE of SJR	35.403838, -119.037425
House	Intersection of Gulf and Ethyl Streets	35.393194, -119.045577

Figure 1.1 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. Appendix A pollution maps show the location of all sensitive receptors listed in Table 1.2.

Figure 1.1 – Sensitive Receptors within a Mile Radius of the SJR Refinery Fence Line

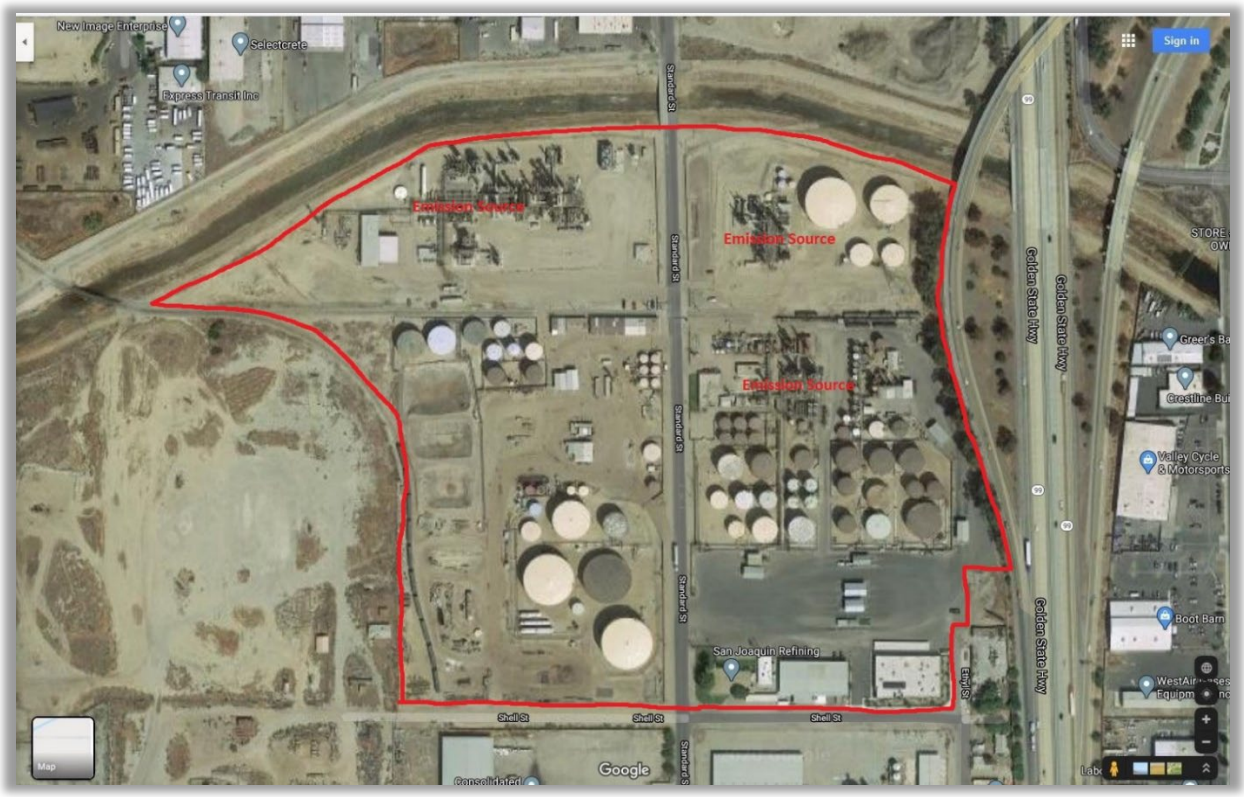


1.3 Emission Sources

To determine the optimal locations for fence line air monitoring equipment at SJR, emissions of all Rule 4460 pollutants at maximum refinery capacity were used for input into a dispersion model, which was then used to determine conservative estimates of downwind impact on local communities. Emission rates were determined by SJR using the U.S. EPA AP-42, Chapter 5 (Refineries) emission factors, and unit-specific factors at maximum capacity. Total facility emissions used for the modeling, and the process of evaluating and determining their potential impact on downwind communities, followed guidelines outlined by the SJVAQMD.

A map of the emission sources at SJR is shown in Figure 1.2.

Figure 1.2 - Map of Emission Sources



During routine operations, the refinery reported a combined emission rate of 24.3 tons per year of the Rule 4460 compounds in 2020. The combined maximum emission rate used for the dispersion modeling in this analysis is 4,495 tons per year.

SJR used the AERMOD dispersion model to estimate the highest pollutant concentrations at sensitive receptors based on maximum emission rates and the hourly weather data recorded from January 1, 2022, to October 8, 2023 at the Meadows Field Airport located in Bakersfield. AERMOD is one of the industrial

source dispersion models described by the SJVAPCD as useful for regulatory purposes (Guidance for Air Dispersion Modeling, September 2022). The dispersion model was run for each emission source at maximum capacity and the highest impacts were plotted on pollution rose maps for each of the Rule 4460 compounds. The maps are included in Appendix A and show the pollution impacts by area, and yellow diamonds indicate the receptor locations.

The result of this dispersion modeling using maximum operations is shown in Table 1.3. These pollutants may also be present during an unplanned release. The fence line system will include technologies that measure ambient concentrations of BTEX, SO_2, and H_2S,, which are the mandatory compounds, and naphthalene which is listed in the amended rule. NO_2 will also be measured. Other health standards are listed in Table 1.3 as alternatives when not listed by OEHHA.

Table 1.3 – Maximum Hourly Impact of Pollutants Modeled for Maximum Operations Alternative Sources are Cited When Not Listed by OEHHA

Rule 4460 Pollutant	Recommended Exposure Limit (ug/m3)	Source	Maximum Hourly Ground Level Concentration at Closest Receptor (540 m) (ug/m3) *
Benzene	3	OEHHA	0.001
Toluene	300	OEHHA	0.035
Ethylbenzene	260	ATSDR	0.5
Xylenes	700	OEHHA	0.02
SO_2	660	OEHHA	200
H_2S	1,045	AEGL-1	0.01
NO_2	470	NAAQS	15
Naphthalene	9	OEHHA	<0.004

*Does not include background concentrations.

1.4 Wind Rose Analysis

In addition to the modelling data, wind roses were generated and presented in Figures 1.3 through 1.7. They show the wind roses from annual and seasonal data in 2018 and are superimposed on the SJR site location. The residential community closest to the refinery is located to the southeast. Data source - Bakersfield Municipal Airport

Figure 1.3 – Winter (December – February) Wind Rose at San Joaquin Refinery

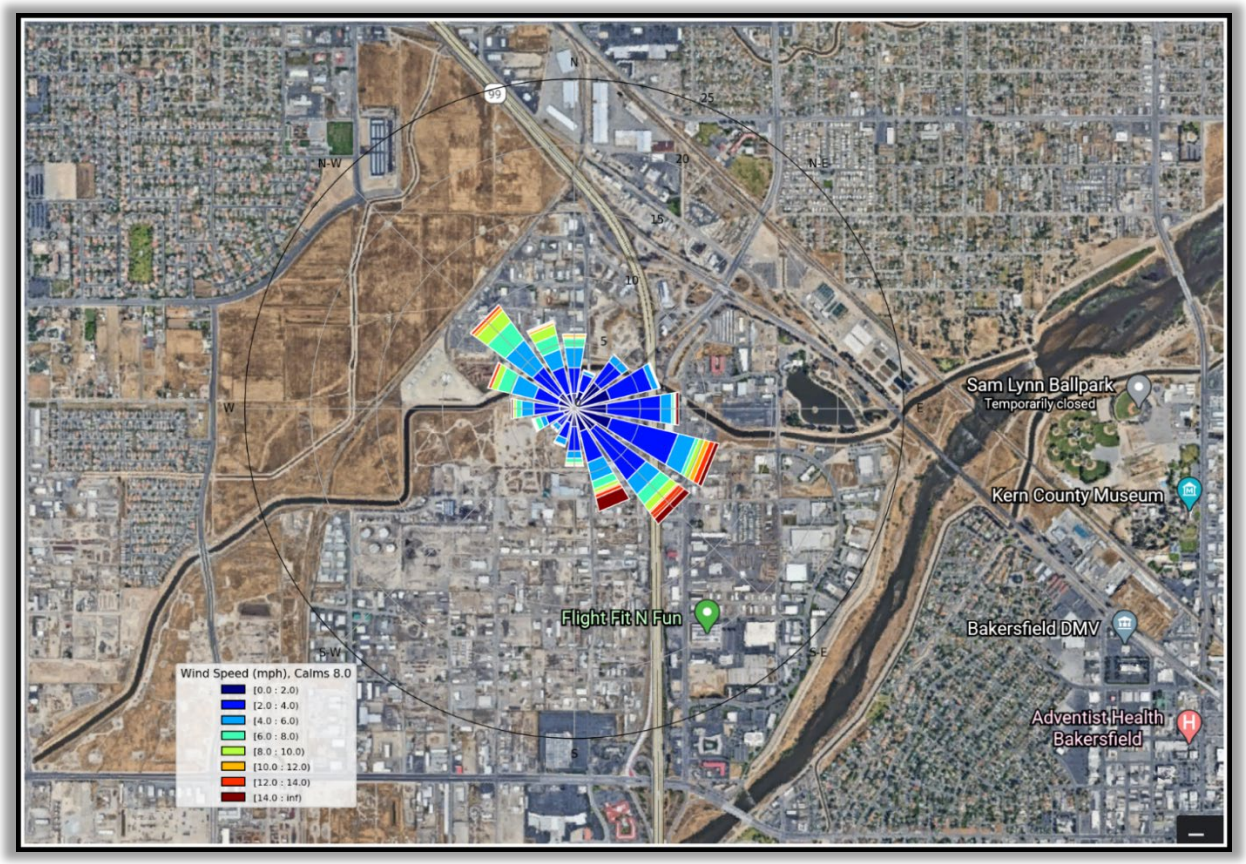


Figure 1.4 – Spring (March – May) Wind Rose at San Joaquin Refinery

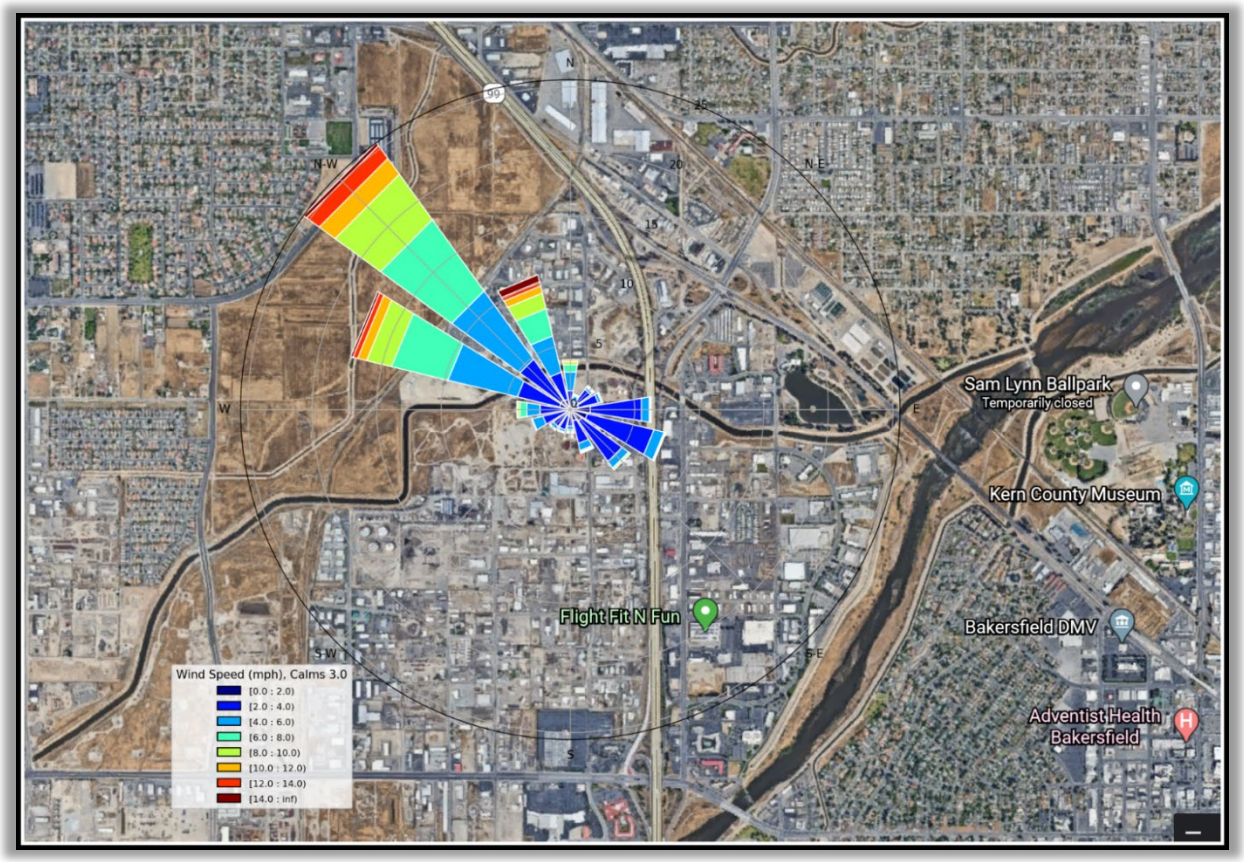


Figure 1.5 – Summer (June – August) Wind Rose at San Joaquin Refinery

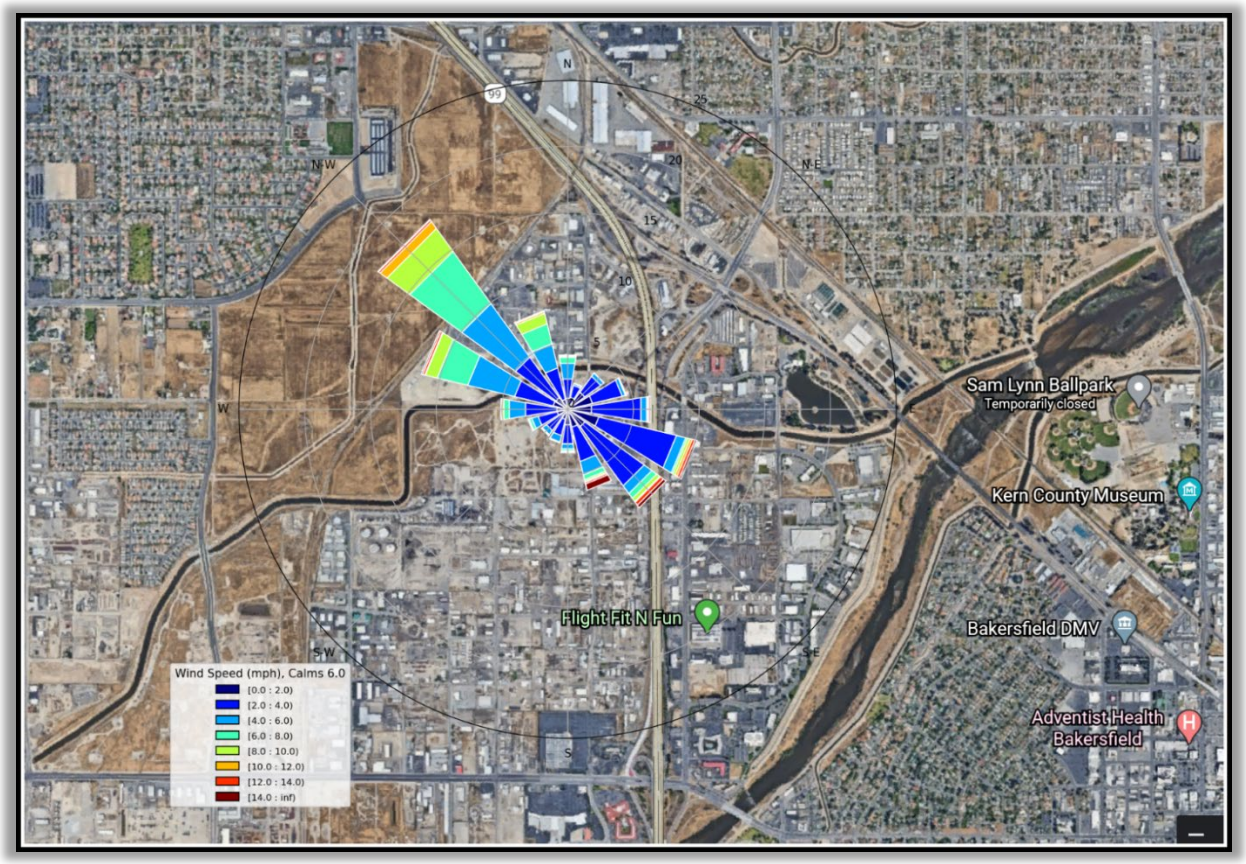


Figure 1.6 – Fall (September – November) Wind Rose at San Joaquin Refinery

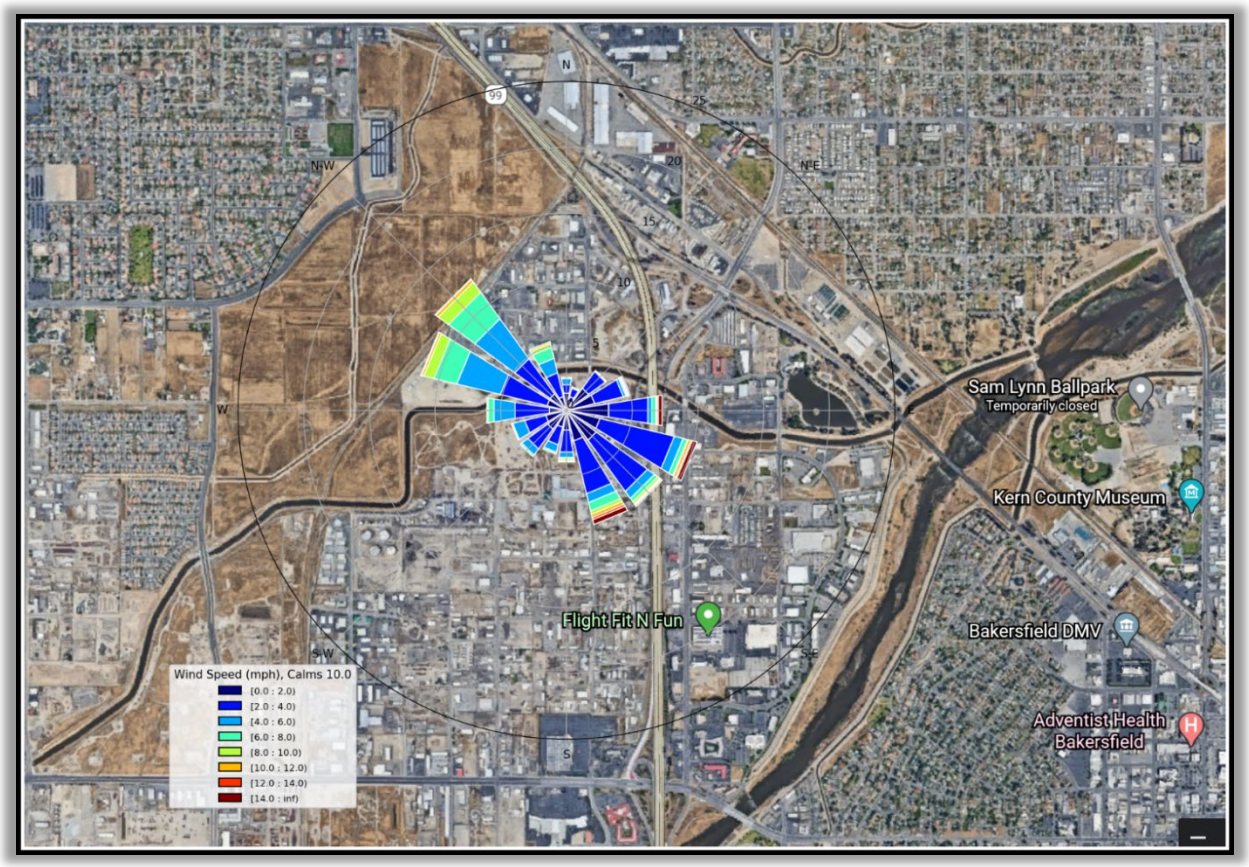
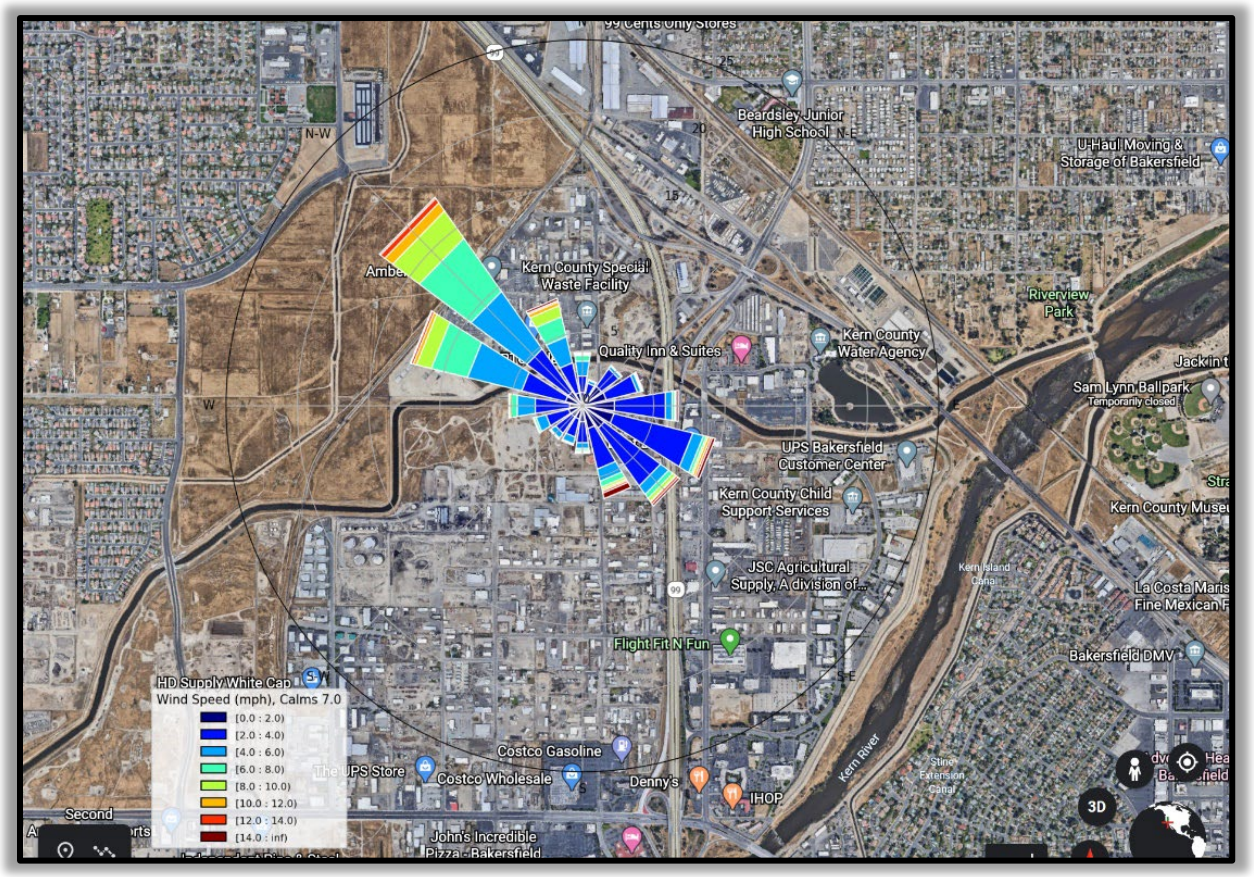


Figure 1.7 shows the wind rose generated from annual and seasonal data in 2018 superimposed on the SJR site location.

Figure 1.7 - Annual Wind Rose



Section 2 – Proposed Fence line Monitoring Systems and Site Locations

Systems that can detect refinery emissions will be used as described below.

2.1 Monitoring Technology Descriptions

Open-path UV Air Monitoring Systems

The measurements of BTEX gases, SO_2, NO_2 and naphthalene will be achieved using open-path UV DOAS air monitors which measure gas concentrations over a distance. The UV DOAS air monitors detect gases in a real-time using beams of ultraviolet light. A beam of light is projected in the open air to a reflector at the other end of the beam path. The light beam is then transmitted back to the base unit where the light spectra is analyzed. Alternatively, an emitter telescope is used to project a beam to the base unit instead of a reflector. The system identifies gases by examining the wavelengths of UV light that have been

absorbed by the gases present in the light beam. The exact distances of the light paths at SJR will be finalized based on on-site testing of signal strength but will be on the order of 100 m to 500 m. The amount of gas in the air is proportional to the amount of light absorbed at specific wavelengths.

The system uses a multivariate method to quantify data. This analytical approach ensures that false detections of gas do not occur. Each target gas has a spectral library of gases covering the concentration range of the analyzer. It also includes libraries of potential interfering gases such as oxygen and ozone. In addition, the system undergoes data and quality assurance checks in the field by using a sealed gas cell that contains the target gases. The length of time needed for routine maintenance will be less than four hours per month.

Hydrogen Sulfide Point Monitoring System

Hydrogen sulfide will be monitored using a Teledyne/Advanced Pollution Instrumentation (Teledyne/API) T101 hydrogen sulfide analyzer. In the T101 analyzer, sulfur dioxide is removed from the sample gas in a scrubber. Hydrogen sulfide in the sample gas is then converted to sulfur dioxide in a molybdenum converter operating at 315 °C, designed to minimize conversion of reduced sulfur species other than hydrogen sulfide. Sulfur dioxide is then measured through excitation by ultraviolet (UV) light, where sulfur dioxide molecules absorb UV light and become excited at one wavelength, then decay to a lower energy state emitting UV light at a different wavelength. The emitted light is captured on a photomultiplier tube through a bandpass filter tuned to wavelengths emitted by excited sulfur dioxide molecules and is translated into a reading of hydrogen sulfide concentration. The instruments will be configured to collect and record data in five-minute averages.

Hydrogen Sulfide and Sulfur Dioxide Point Monitoring System

A T101 analyzer, described above, will be located at the three tanks shown in Figure 2.2, below, and will be operated in a switching mode to measure both SO_2 and H_2S.

Meteorological Station

A meteorological station will be installed at 10 m elevation, away from local influences on wind direction. The station will provide wind speed, and wind direction using a 2-axis sonic anemometer, and separate instruments will be installed to measure temperature and relative humidity.

Table 2.1 – Monitoring Technology Detection Limits

100 meters	UV DOAS	
Gas	**LDL** (ppb)	**UDL** (ppb)
Benzene	0.9	5,483
Toluene	2.8	2,742
Ethylbenzene	12	5,483
Xylenes	1.6	2,742
Sulfur Dioxide	2.1	2,202
Hydrogen Sulfide	5	500
NO_2	3	900
Naphthalene	1.0 (estimated)	Per test results

The LDL and UDL values in table 2.1 are approximate and vary by the UV DOAS path length. The LDLs are lower than health-based levels of concern.

Backup Monitoring Equipment

In the event the UV DOAS system is offline for extended periods of time, (> 96 hours), SJR will provide temporary monitoring using 24-hr volatile organic compound (VOC) canister sampling upwind and downwind of the site.

2.2 Proposed Locations for Monitoring Equipment

Based on the AERMOD dispersion model and wind roses, emissions that may affect sensitive receptors are transported from the refinery in southeastern and northwestern directions most of the time. For this reason, the locations of the monitoring equipment are intended to capture pollutants transported in these directions where a community or other sensitive receptors are within one mile of the refinery fence line.

Figure 2.1 presents the proposed locations for the fence line air monitoring systems at the San Joaquin Refinery.

Figure 2.1 - Map of Fence line Monitoring (red lines are UV DOAS, point monitor locations are noted)

Figure 2.2 – Proposed Storage Tank Addition to Monitoring Plan (point monitor indicated by red star)

2.3 Generic Timeline for SJR System Implementation (Figure 2.2)

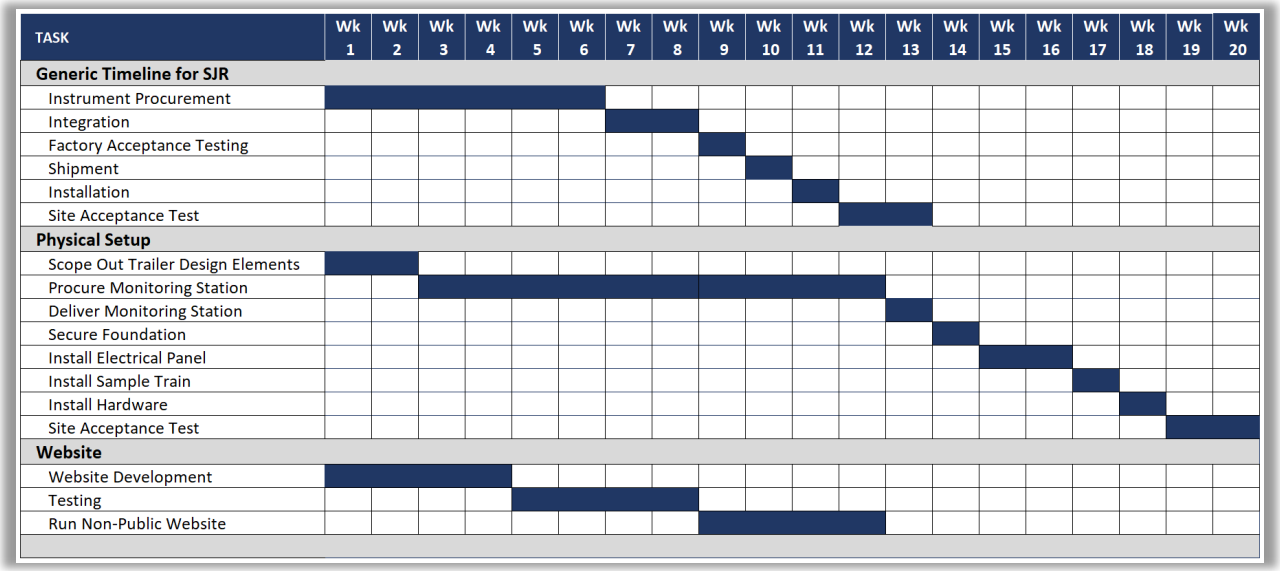


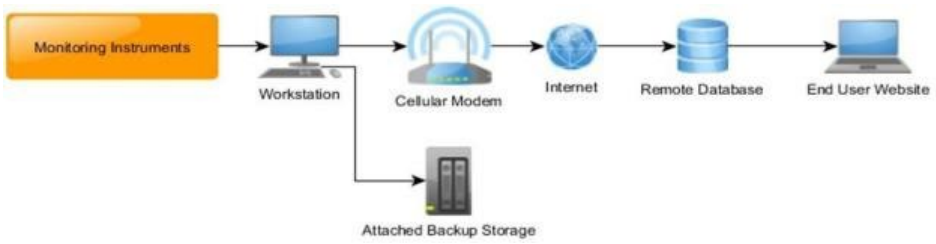
Table 2.3

Generic Timeline for SJR	Weeks
Instrument Procurement	6
Integration	2
Factory Acceptance Testing	1
Shipment	1
Installation	1
Site Acceptance Test	2
Physical Setup	**Weeks**
Scope Out Trailer Design Elements	2
Procure Monitoring Station	10
Deliver Monitoring Station	1
Secure Foundation	1
Install Electrical Panel	2
Install Sample Train	1
Install Hardware	1
Site Acceptance Test	2
Website	**Weeks**
Website Development	4
Testing	4
Run Non-Public Website	4

Section 3 – Data Presentation to the Public

All air monitoring equipment specified for the SJR fence line system will collect data from the analyzer every five minutes and be transmitted to an Internet website where the real-time results can be viewed by the public. Figure 3.1 provides an example of how the monitoring data will be communicated.

Figure 3.1 - Data Communication System



The community website will include a message board to inform the public of relevant information as needed. For example, the message board may be updated when an analyzer is undergoing maintenance, QA/QC checks are being conducted, or in other conditions where an analyzer is not in an operational state for an extended period. In addition, the public will be able to send E-mails suggesting enhancements to the public access website or any other issue of interest to the community. Data from the fence line monitors will be transmitted to an Internet website where the near-real-time results can be viewed.

General Description of the Community Website

As part of the fence line monitoring program, a public website will be created to educate the public on the information provided by the fence line monitoring system. The site will present air monitor readings and is designed as an educational tool to inform the community, as well as answer questions about the air monitoring system used to capture these readings. The website will include four major sections:

- Learning Center
- Resources and Contacts
- Real-time Data
- Reports and Archives

Learning Center

The website will include a learning center to educate the public on the information provided on the site, which will include the following elements:

- Where the fence line monitors are located
- Why these locations were selected
- What chemicals are being monitored
- What equipment is being used
- Terms and definitions

Resources and Contacts

Resources and contact information will be provided for the general public to inquire about this website, the monitoring program, and resources associated with the possible health effects of the toxics being monitored. Resource links will include:

- The 24-hour phone number provided by SJR
- The contractor operating and maintaining the fence line system
- The San Joaquin Valley Air Pollution Control District (SJVAPCD)
- The California EPA Air Resources Board (CARB)
- The California Division of Occupational Safety and Health (Cal/OSHA)
- The California Office of Environmental Health Hazard Assessment
- The U.S. Environmental Protection Agency
- The World Health Organization

Real-time Data Display

Data will be updated from the analyzer every five minutes and displayed as one-hour and eight-hour averages. In addition, the website will include a method for the general public to sign up for notifications that will give them status updates associated with the community website. These updates will include notifications when instrument readings are above preset levels, an instrument is offline or inoperable, when maintenance is being performed on the instruments, and when any other significant event associated with the fence line monitoring programs occurs. The website will include the following:

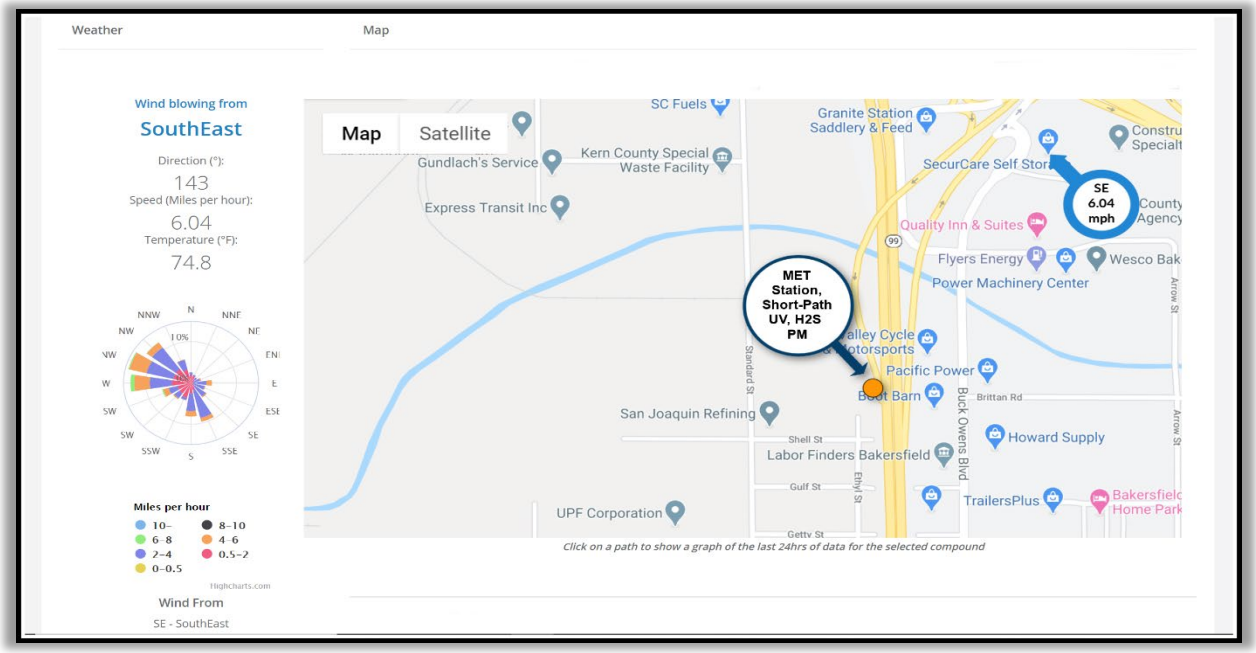
- Information regarding the analyte measured and the measurement techniques
- Discussion of levels of concern for each measured analyte
- Definition of data QC flags
- When monitor or system is offline, flag/notification identified online explaining the loss of data
- Links to additional sources of information, as necessary
- Details of how the public can report experiences and provide comments and feedback for improvement of the website and other data dissemination tools and the monitoring activities in general

Reports and Archives

The public will be provided access to an archive of air quality monitoring reports gathered by the air quality monitoring system. Figures 3.2 through 3.4 present the website concept for the monitoring system.

Figure 3.2 – San Joaquin Refinery Community Website Home Screen

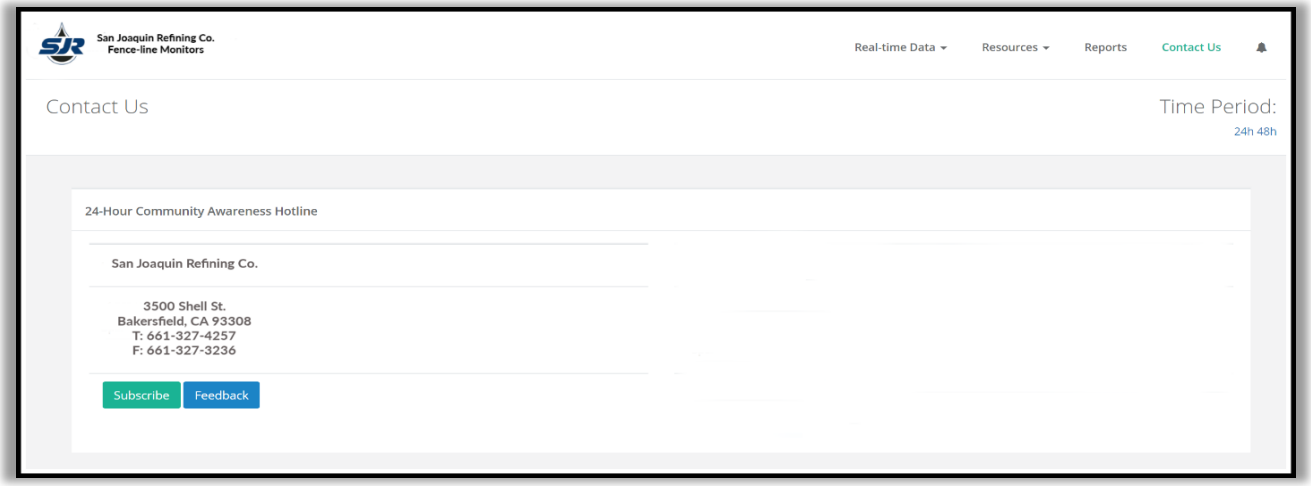
Figure 3.3 – San Joaquin Refinery Community Website Interactive Map Concept Page



When the San Joaquin button is clicked, an interactive map will be seen that consists of:

- UV monitor, H_2S Point Monitor, PM, and MET, with labels (SJR boundar added, if needed)
- An information box with an accompanying arrow to indicate wind direction and speed
- A consistently updating table below the map (not shown in this concept) that lists all the detectable gases, and their current detected concentrations

Figure 3.4 – Email Notifications



Alternative Communications Methods

Other methods of communicating the data to the public include the following:

- Automated email notification system
  - Click on the "subscribe" button on the Contact Us page.
  - Enter email for notifications.
- Published quarterly data summary reports

Section 4 – Data Management

Data generated by the fence line monitors will undergo review throughout the measurement and reporting process. Included in this process are automated QA/QC checks that occur before data is reported on the real-time website. A complete description of the quality assurance project plan (QAPP) is included in the Quality Assurance Project Plan for the San Joaquin Fence line Monitoring Program. Under normal circumstances, a measurement will appear on the website within 10 minutes of the end of the measurement period. All data generated by the monitors will be retained for a period of five years after collection.

The data uploaded may be affected by Internet traffic. An automated system conducts the Q/A checks before the data is reported to the website. The site will also make available a rolling 24-hour trend of the five-minute data for each gas reported. Table 4.1 lists the real-time automated data quality checks.

Table 4.1 – Real-time Data Quality Checks

Real-Time Check	Check	Action
Instrument Error Code	Instrument Error Code	Real-time website reports "offline" message. E-mail sent to SJR and fence line contractor. Website message board updated to inform community that analyzer troubleshooting underway. Website updated when system is back online.
Instrument Workstation Offline	Instrument Communication Check	Real-time website reports "offline" message. E-mail sent to SJR and fence line contractor. Website message board updated to inform community that computer workstation troubleshooting underway. Website updated when system is back online.
Internet Connection Lost	Backup Connection Enabled	E-mail sent to SJR and fence line contractor. Community is not notified because backup connection will be enabled.
High Detection	Valid Data Detection Above Threshold	Real-time website indicates detection above alarm threshold by color change for gas. Notification sent to SJR and fence line contractor. Contractor will examine raw data to validate detection. SJR will initiate investigation into source. Message board on website will be updated with information as available.

The entire fence line system is continually monitored for system performance. This includes the instruments, workstations, and Internet communication hardware. If at any time an element of the system fails to meet performance criteria, a message is generated and sent to key personnel at SJR and the contractor who will begin activities to correct the problem. If an issue cannot be immediately corrected, the real-time website will be updated with a notification explaining the problem and the corrective action activities. Table 4.2 lists elements and the performance thresholds.

Table 4.2 - Real-time Instrument Performance Checks

Problem	Notification	Action
Analyzer offline	Notification sent to contractor and SJR	Website updated with analyzer offline message. Technician dispatched to correct issue.
Workstation fails	Notification sent to contractor and SJR	Website updated with analyzer offline message. Technician dispatched to correct issue.
Internet communication failure	Notification sent to contractor and SJR	Backup Internet connection activated

In addition to the real-time data checks, data from the fence line system will be reviewed and validated monthly with the results stored in a separate portion of the monitoring database from the raw data. Data review and validation include but are not limited to the following:

- Non-field data such as calibration data
- Spurious data associated with power or mechanical issues

Data that has been flagged as non-valid will be retained along with a notation for the reason it was flagged. Table 4.3 summarizes the process by which monitoring data is reviewed and post processed.

Table 4.3 – Monthly Data Validation Checks

Post Process Data Check	Check	Action
Non-field Data Check	Maintenance logs and QA/QC logs will be checked to see when systems were not in normal operating mode.	Quality Assurance Manager will flag any data that meets these criteria. Data will be excluded from QA/QC report.
Spurious Data	Instrument error codes will be checked and flagged if instrument error codes are recorded.	Quality Assurance Manager will flag any data that meets these criteria. Data will be excluded from QA/QC report.

4.1 Quality Assurance Project Plan (QAPP) and Standard Operating Procedures (SOPs)

The QAPP and SOPs will be living documents that will be updated and revised as SJR and its contractors gain experience operating, maintaining and managing their fence line monitoring system. These documents will be reviewed periodically and revised and reapproved as needed. This will include an annual review and five-year updates or more frequently if significant changes are made. The QAPP and SOPs will be submitted for review and approval by SJV when the final equipment is selected for the fence line program. The plan will be reviewed by a third-party auditing process that will be reviewed by SJVAPCD. Finally, it is understood that SJVAPCD may periodically audit the QAPP and SOPs. The following items will be included in the QAPP:

Outline - Quality Assurance Project Plan for Fence line Monitoring Program

- Document Control Page
- Signatory Page
- Table of Contents
- Distribution List

Section #1 - Project Management

- Fence line Monitoring Task Organization
- Key Refinery Personnel
- Key Contractor Personnel
- Contractor Program Manager
- Contractor Quality Assurance Manager
- Contractor Data Processing Manager
- Contractor Field Technician

Section #2 - Description of the Fence line Program

- Objective of the monitoring program
- Site map
- Physical description of equipment location including GPS coordinates, elevations, and monitoring equipment
- Upper and lower detection limits for each pollutant

Section #3 – Description of Hardware

- Analyzer description
- Meteorological station
- Data collection equipment
- Workstations
- Routers

- Remote restart equipment
- Cloud-based data storage

Section #4 - Quality Management System

Instrument Quality Assurance Quality Control

Level 0 Continuous Real-time Operational Checks

- Monitor instrument error codes

Level 1 Monthly Checks

- Evaluate system noise
- Calibration checks

Level 2 Quarterly Checks

- Detection limit checks
- Precision, linearity, accuracy checks

Level 3 Annual Checks

- Annual servicing of instruments
- Preventive maintenance
- Validate systems are meeting original factory acceptance specifications

Data Management Quality Assurance Quality Control

Level 0 – Continuous Real-time Checks

- Real-time validation of the data using two methods for quantification

Level 1 – Daily Review of Data

- Operational staff daily review

Level 2 – Weekly Review Data

- Validation staff review considering historical and similar measurements

Level 3 – Monthly Review of Data

- Supervisor level review with consideration of interrelationships with other data

Monitoring Program Response

Level 0 – Real Time System Checks

- Real-time notification of instrument error code
- Real-time notification light signal from open-path monitoring

Level 1 – Daily System Checks

- Check community website three times per day

Level 2 – Monthly Report and Review of Operational Performance

- Review on-stream efficiency

Level 3 – Annual Audit

- Annual independent audit of fence line monitoring program

Section #5 - System Maintenance

- Maintenance and service based on real-time error code
- Monthly maintenance check of instruments
- Quarterly preventive maintenance
- Annual service from certified manufacture representative

Section #6 – Training

- Field work training
    - System alignment
    - Routine analyzer maintenance
    - QA checks on site
- Data analysis
    - Verification of detections
    - Data validation

Section #7 – Document Control

- Management and Organization
    - Quality Assurance Project Plan for Fence line Monitoring Program
    - Organizational chart
    - Personnel and training
    - Support contract
- Site Information
    - Site maps
    - Equipment registers
- Field work
    - SOPs
    - Field notebooks
    - Sample handling check sheets
    - Maintenance check sheets
    - QA check sheets
- Raw data
    - Description of raw data files generated by instruments
- Data Reporting
    - Realtime website
    - Monthly reports
- Data Management
    - Database structure

    - Data management flowchart
    - Database backup plan
- Quality Assurance
    - Site audits
    - Corrective action reports
    - System audits
    - Data quality assessments

Appendix A – Maximum Emissions and Monitoring List

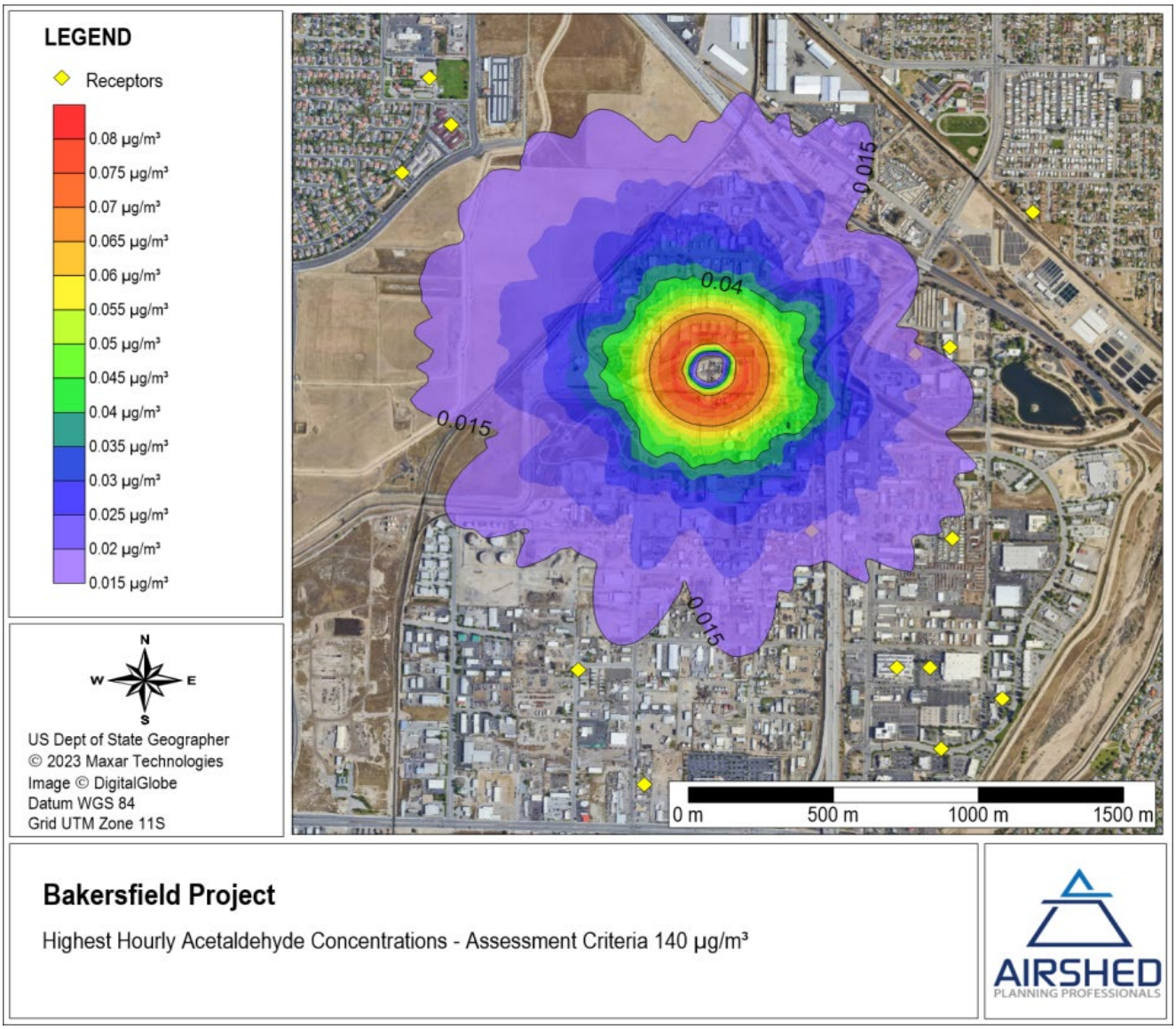
Pollutant to be Measured	Maximum Emission Rate (lbs/yr)
Benzene	2,434
Toluene	1,357
Ethylbenzene	21,629
Xylenes	1,038
Sulfur Dioxide	8,269,558
Hydrogen Sulfide	876
NO_2	10,787
Naphthalene	38

Excluded Rule 4460 Compound	Rationale for Exclusion - Based on Highest Concentration
Acetaldehyde	The public health risk benchmark is 140 ug/m^3 (OEHHA REL). The concentration from maximum refinery operation at the nearest receptors is 0.02 ug/m3. Insignificant risk. See Map 1.
Ammonia	SJR stores up to three 150-pound cylinders of ammonia. Ammonia is used in a manufacturing process where it is consumed. Ammonia is not emitted to the atmosphere.
1,3-Butadiene	The public health risk benchmark is 2 ug/m^3 (OEHHA REL). The concentration from maximum refinery operation at the nearest receptor is less than 0.00000008 ug/m^3. Insignificant risk. See Map 3.
Cadmium	The public health risk benchmark is 0.5 ug/m^3 (OEHHA REL). The concentration from maximum refinery operation at the nearest receptor is 0.000006 ug/m^3. Insignificant risk. See Map 4.
Formaldehyde	The public health risk benchmark is 1,105 ug/m^3 (AEGL-1). The concentration from maximum refinery operation at the nearest receptor is 0.6 ug/m^3. Insignificant risk. See Map 6.
Hydrogen Fluoride, Diethanolamine	These compounds are not used at the refinery nor are they emitted by any process.
Manganese	The public health risk benchmark is 0.3 ug/m^3. The maximum concentration at the nearest receptor is less than 0.0005 ug/m^3. Insignificant risk. See Map 8.

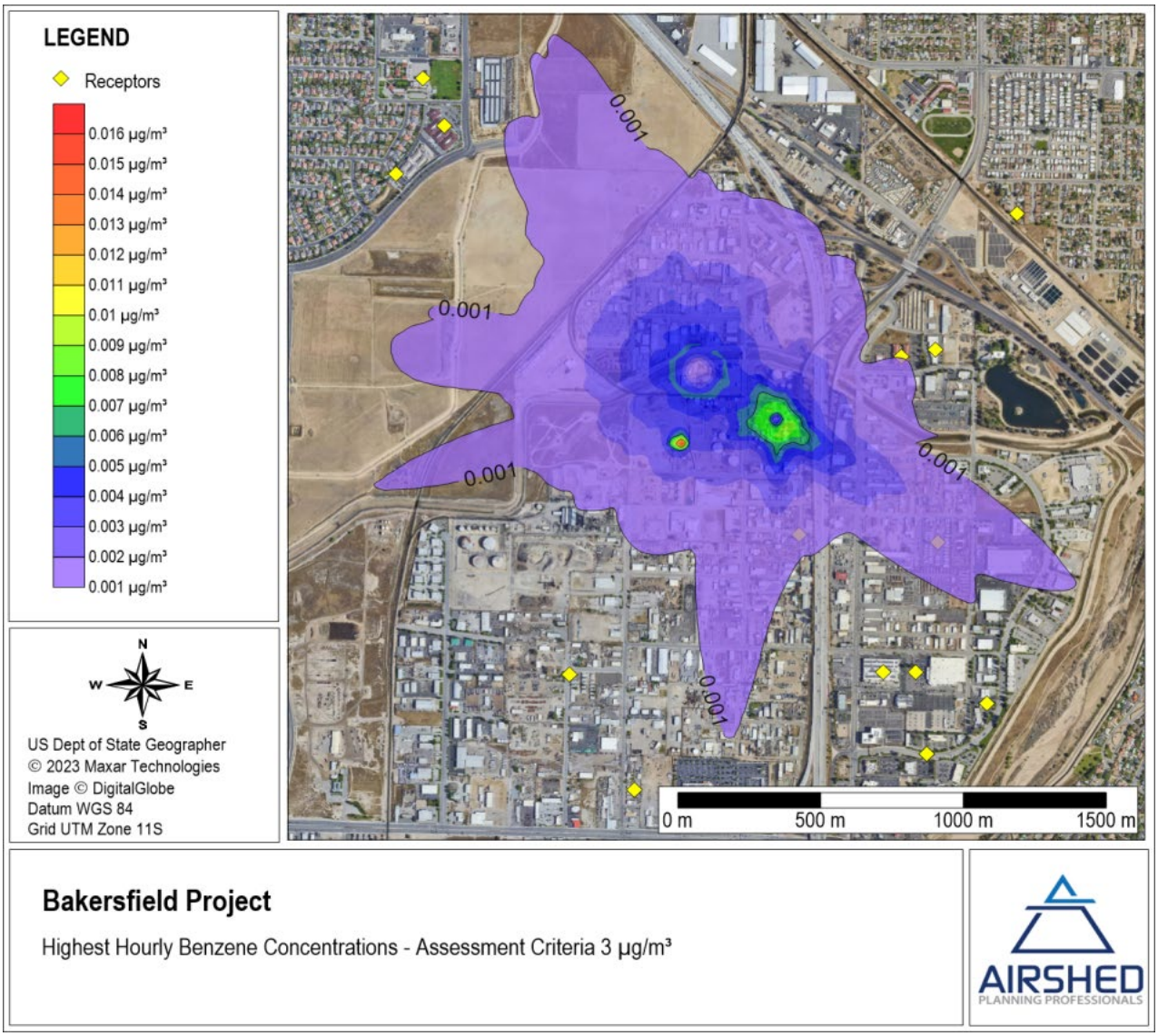
Nickel	The public health risk benchmark is 0.014 ug/m^3 (OEHHA REL). The concentration from maximum refinery operation at the nearest receptor is 0.0008 ug/m^3. Insignificant risk. See Map 10.
NO	There is apparently no published public health risk level for nitric acid. CAL/DIR set a PEL for the compound at 25,000 ug/m^3. The maximum concentration from SJR's emissions at the closest receptor 15 ug/m3. Insignificant risk. See Map 11.
PAHs	The public health risk benchmark is 0.002 ug/m^3 (Rfc) based on benzo(a)pyrene, recommended by OEHHA (reference cited below) as a surrogate marker for combined PAHs. The concentration from maximum refinery operation is 0.001 ug/m^3 at the nearest receptor. The Rule 4460 requirement for continuous monitoring cannot be met because the monitoring technology for reliable quantification of the surrogate marker does not exist. See, "Air Monitoring Guideline for Petroleum Refineries," Bay Area Air Quality Management District, August 2015, regarding the Ecochem PAS 2000. Naphthalene is a PAH and will be measured. See Map 13.
PM2.5	SJR used its maximum emissions of PM10 and modeled the 24-hour maximum impact as though all of the PM was PM2.5. The health risk level is 35 ug/m^3 for 24 hours; the maximum impact from refinery emissions at the nearest receptor is 0.8 ug/m^3. Insignificant risk. See Map 14.
Sulfuric Acid	Can only be measured by air sampling for laboratory analysis.

OEHHA RELs are used. For compounds that are not listed by OEHHA, "Analysis of Refinery Chemical Emissions and Health Effects," March 2019, other public health benchmarks are used.

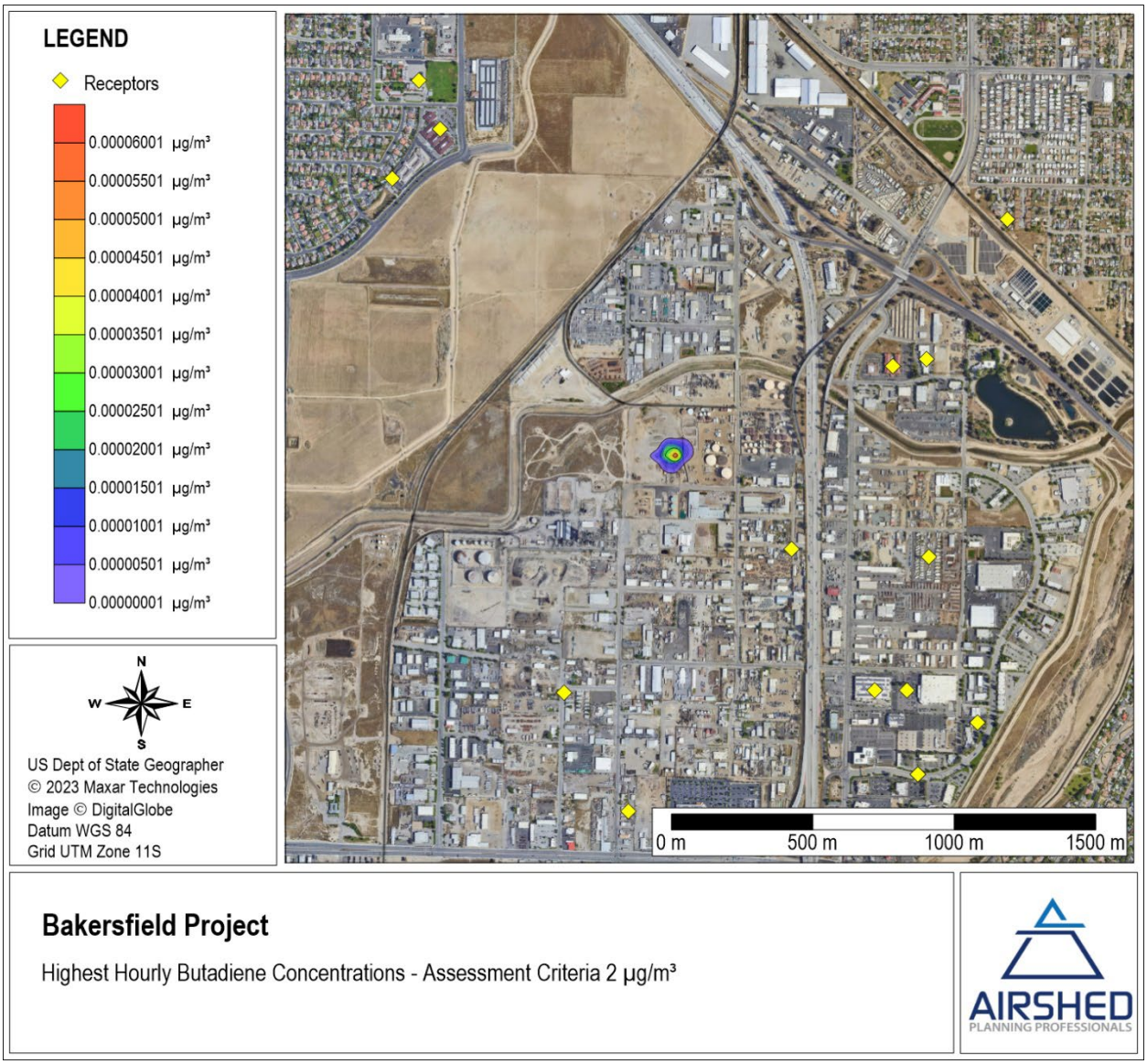
Map 1. Acetaldehyde



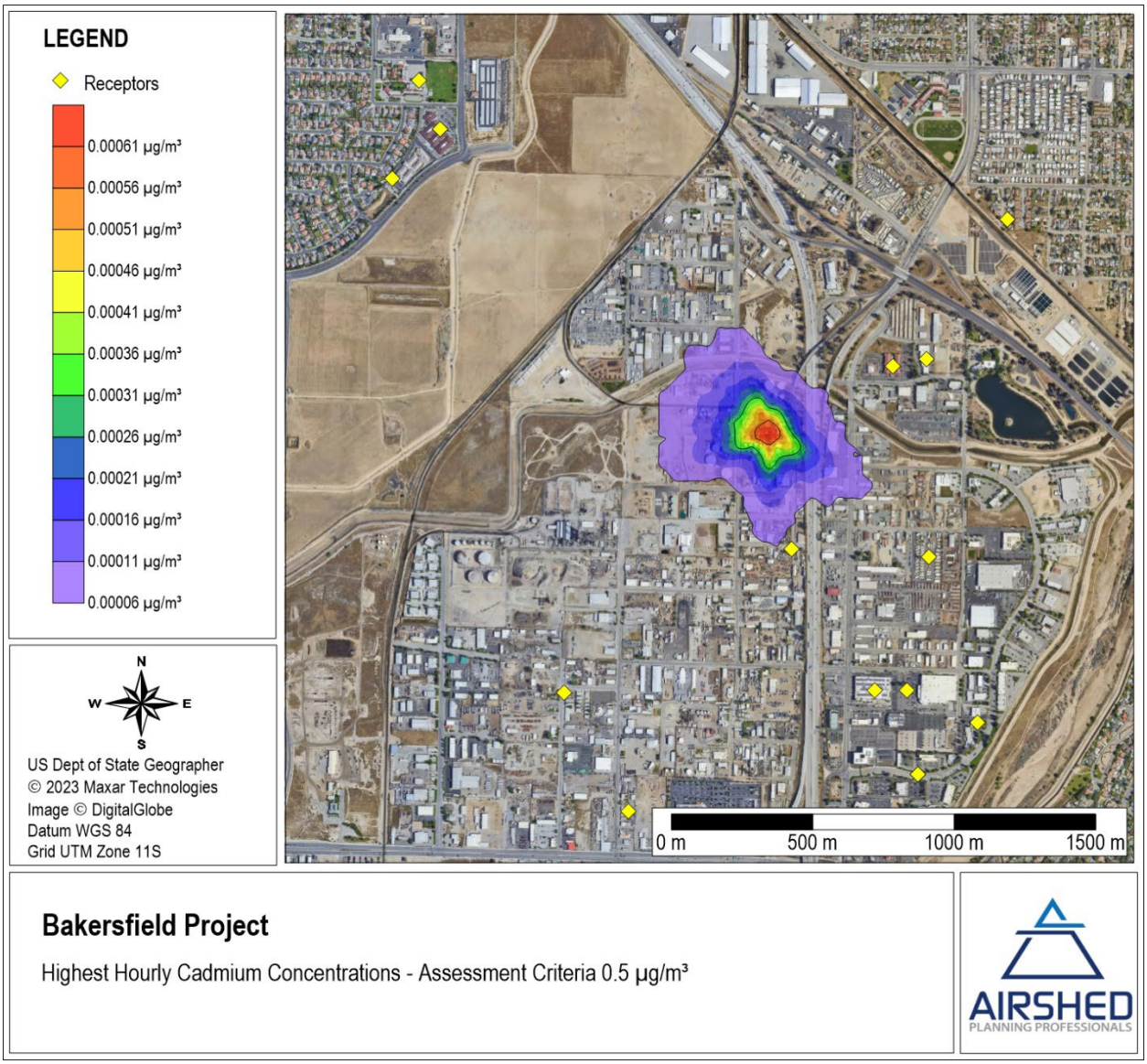
Map 2. Benzene



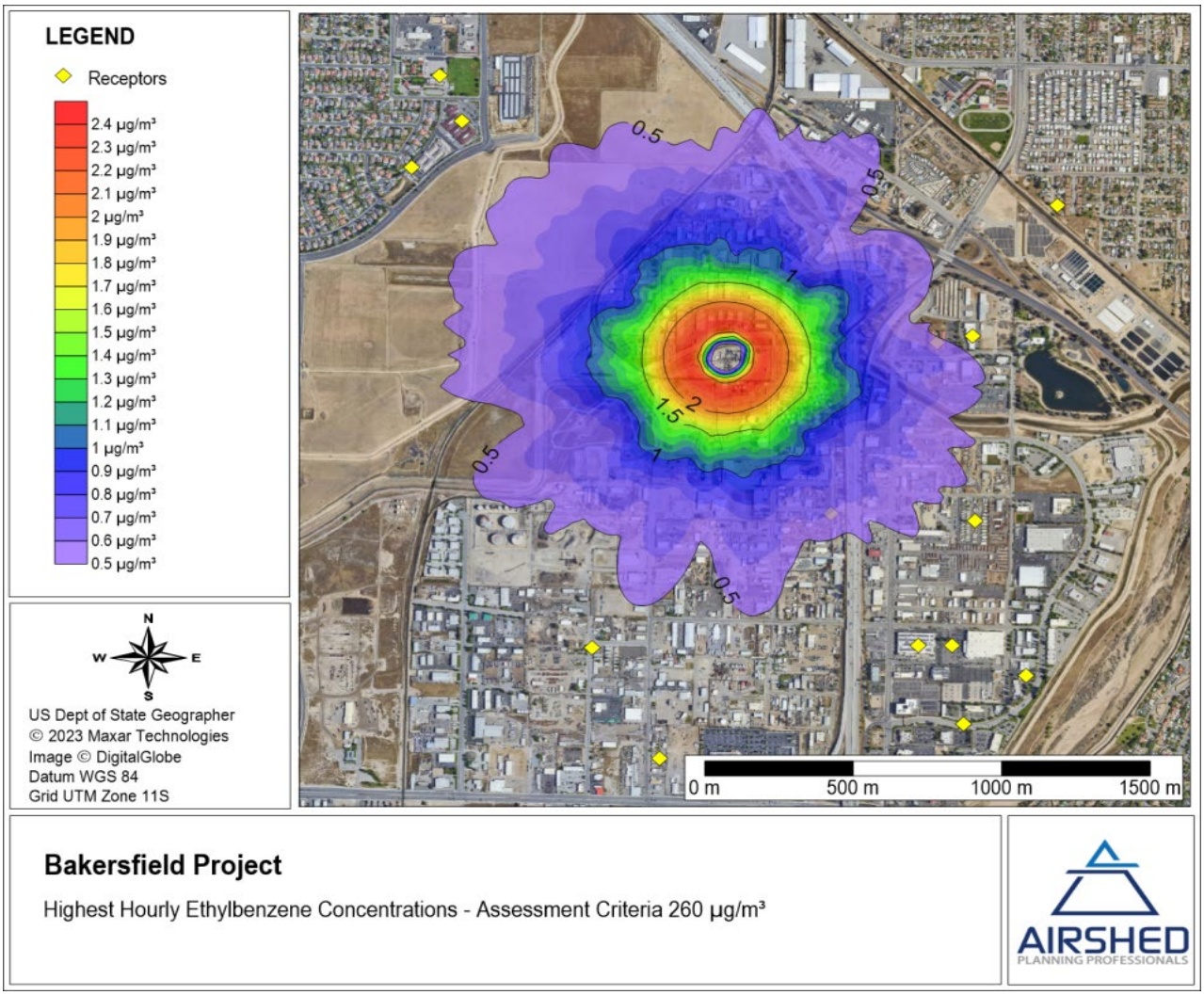
Map 3. 1,3-Butadiene



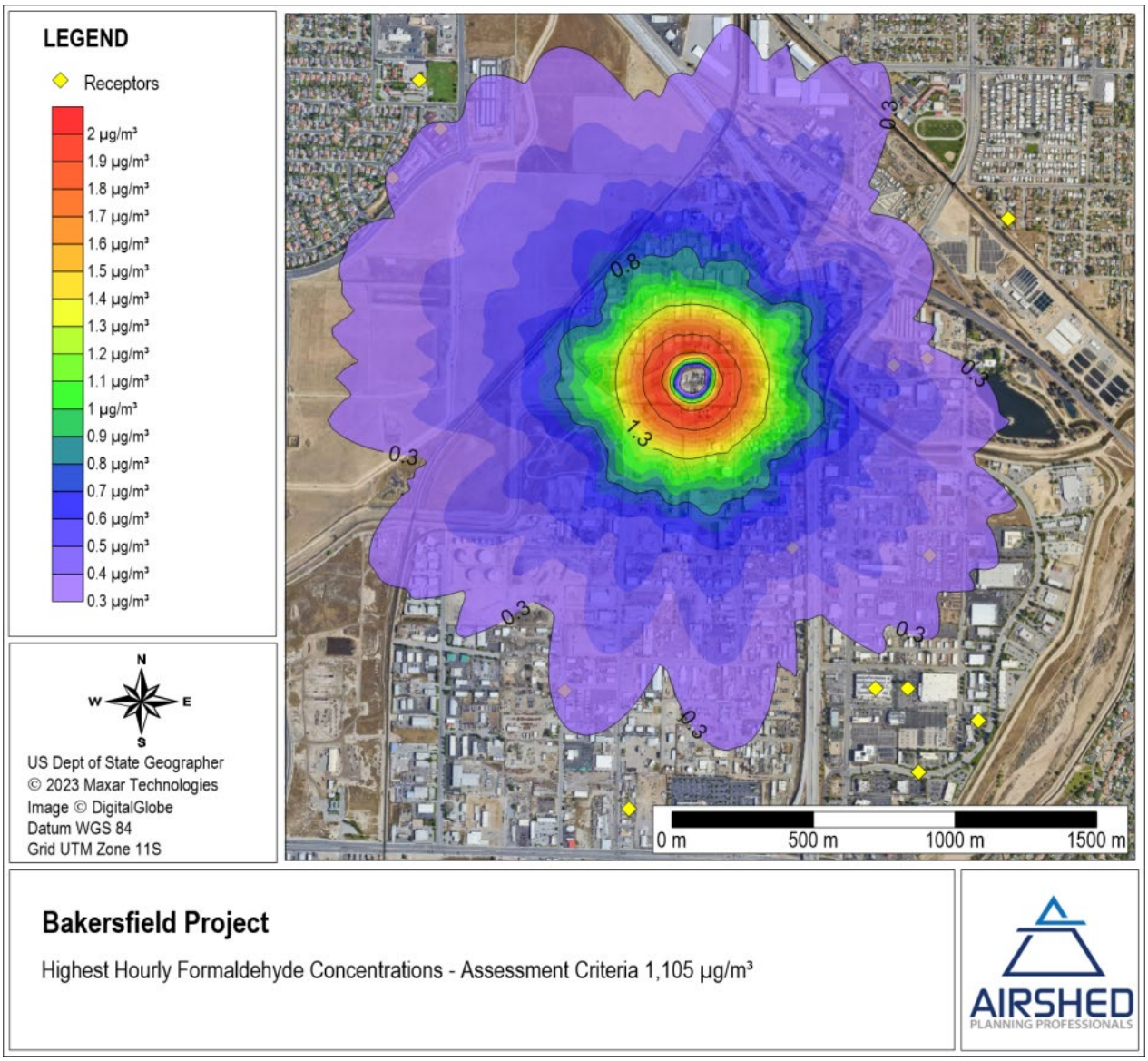
Map 4. Cadmium



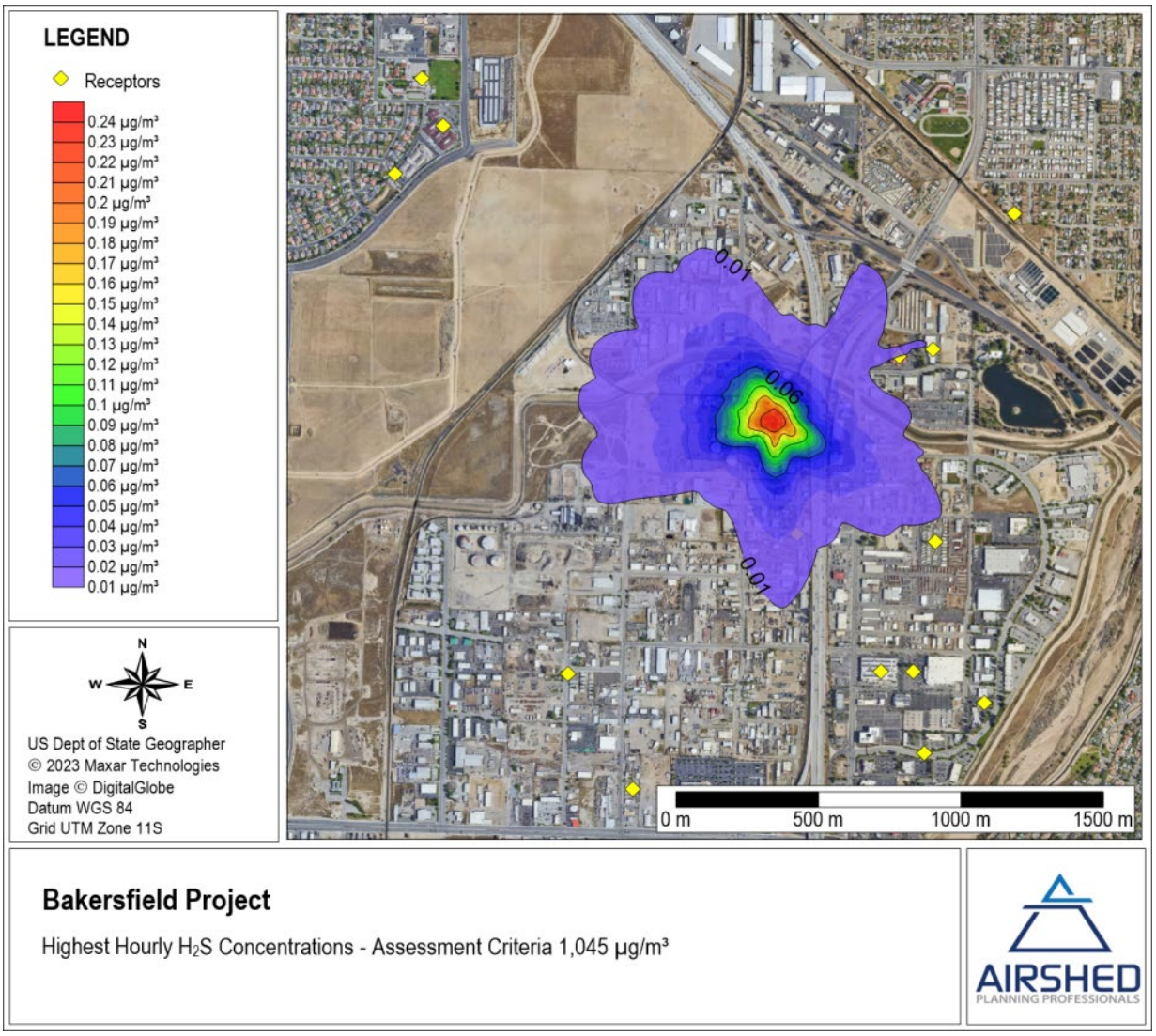
Map 5. Ethylbenzene



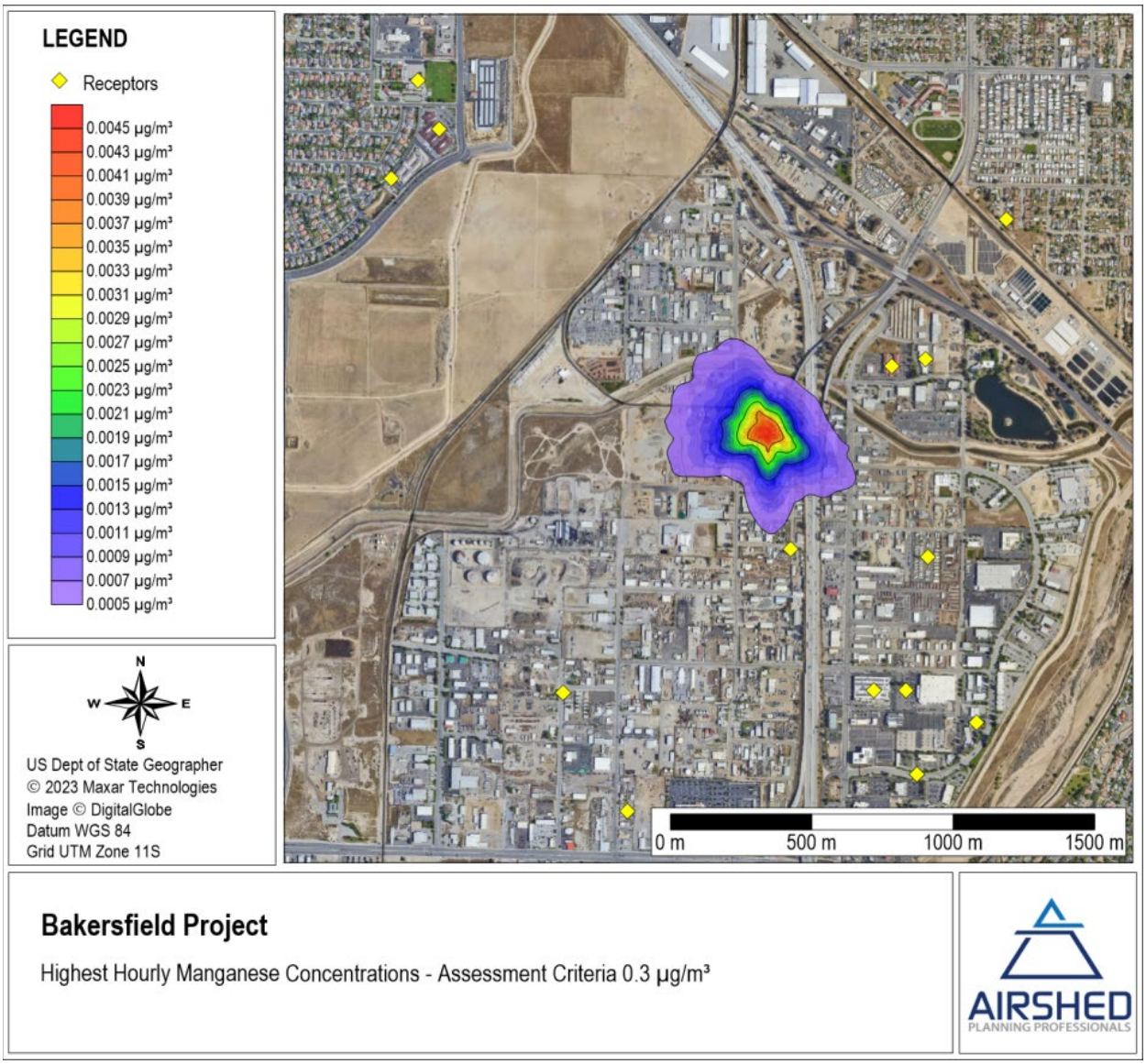
Map 6. Formaldehyde



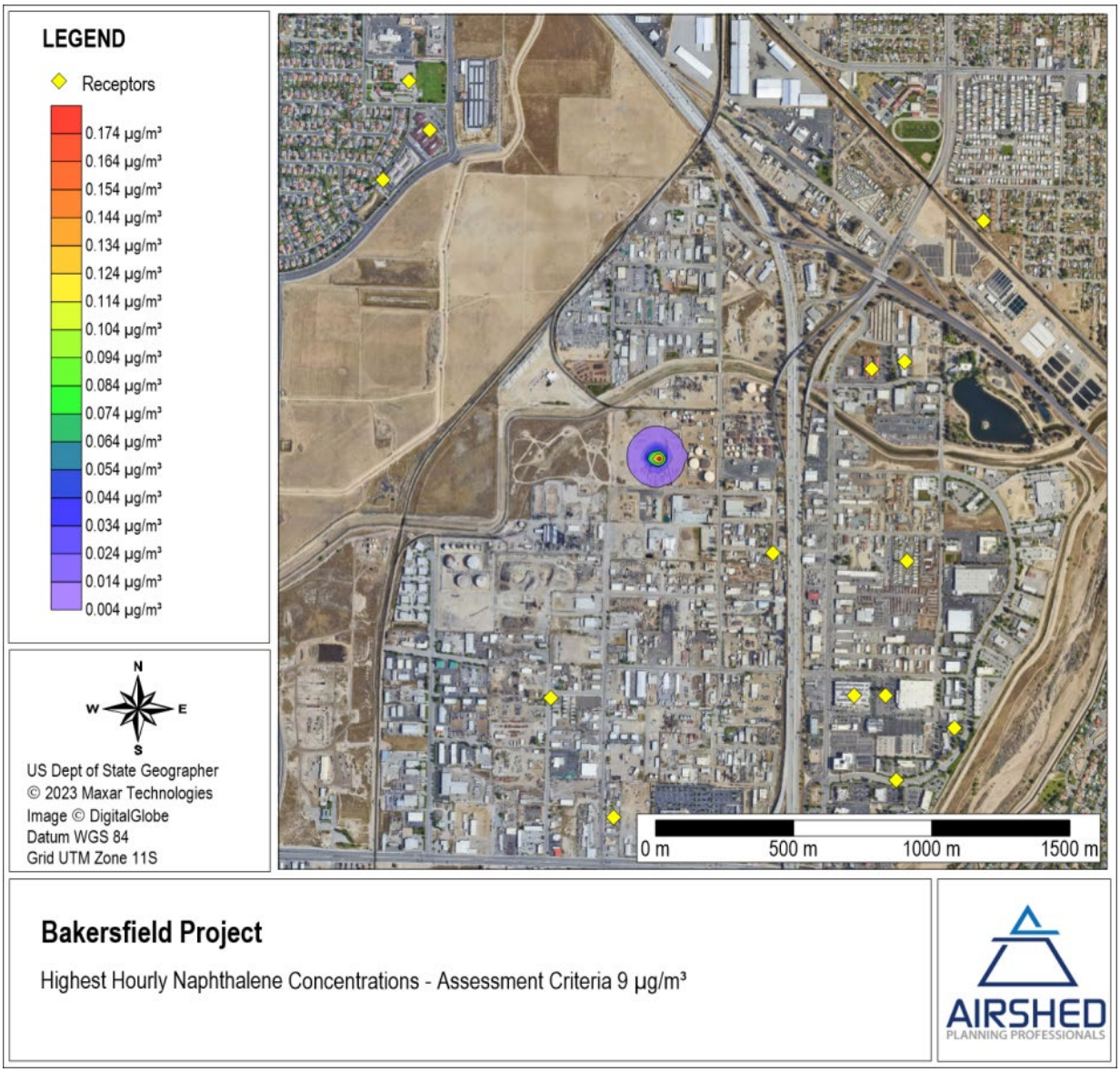
Map 7. Hydrogen Sulfide



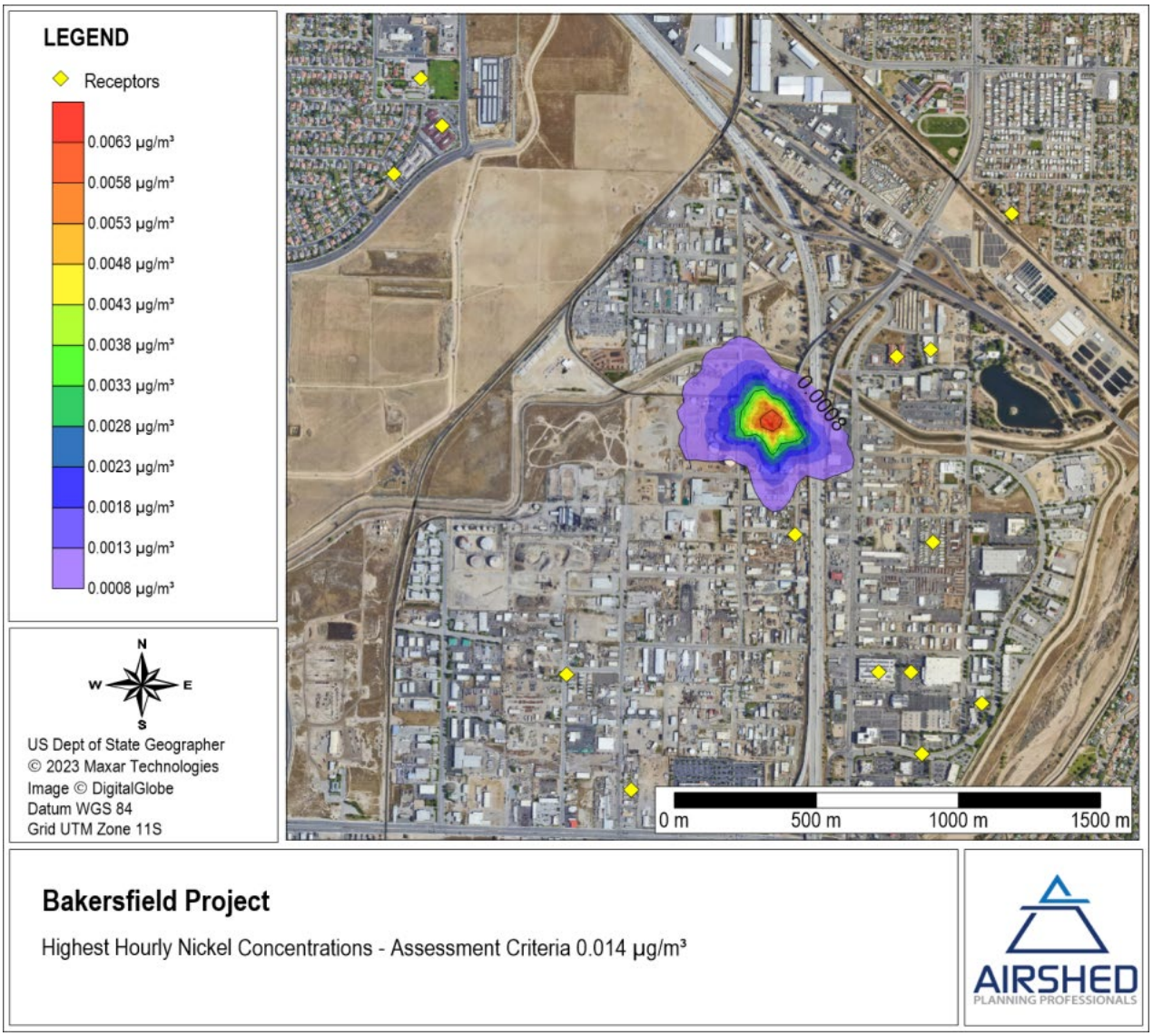
Map 8. Manganese



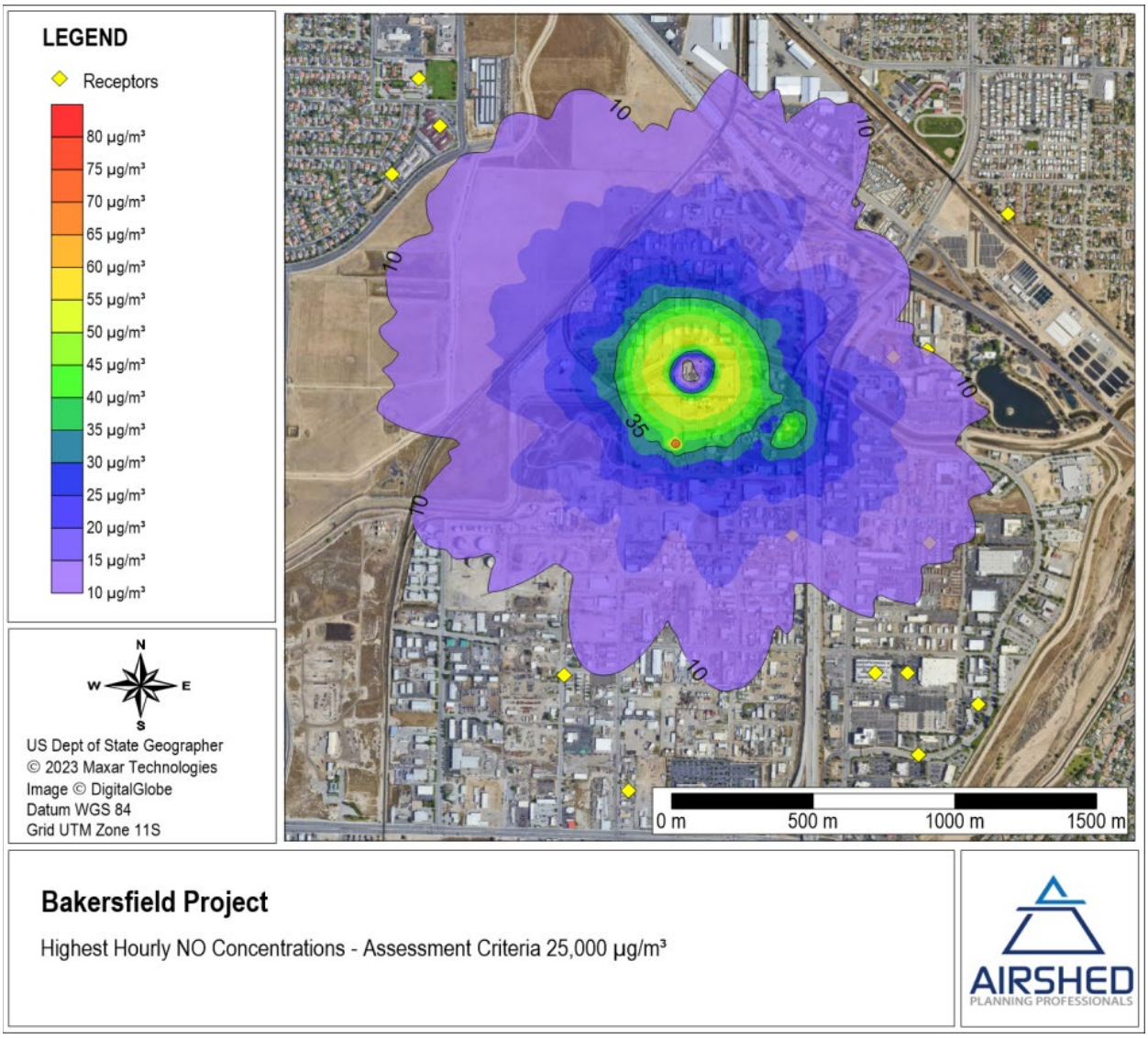
Map 9. Naphthalene



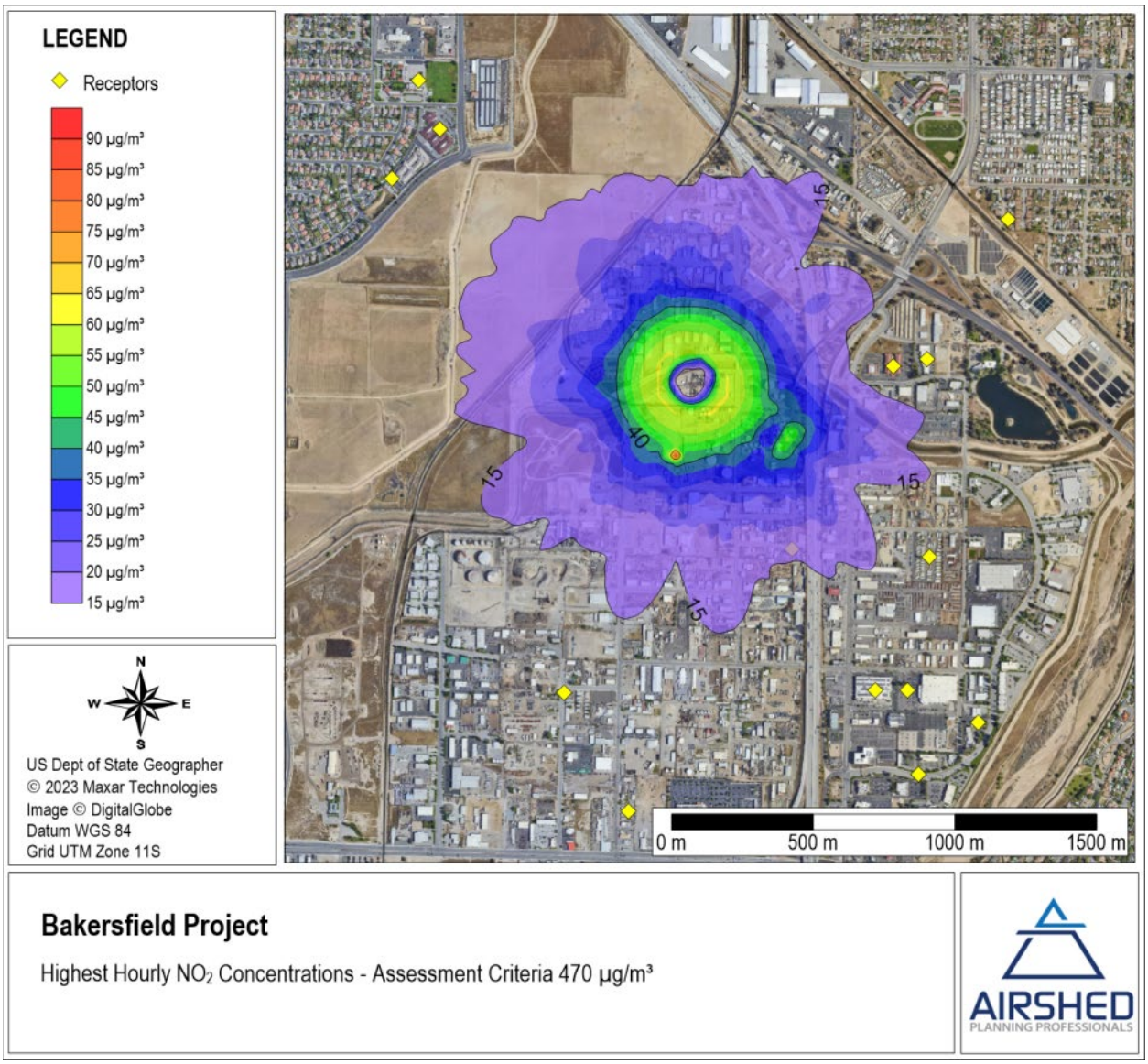
Map 10. Nickel



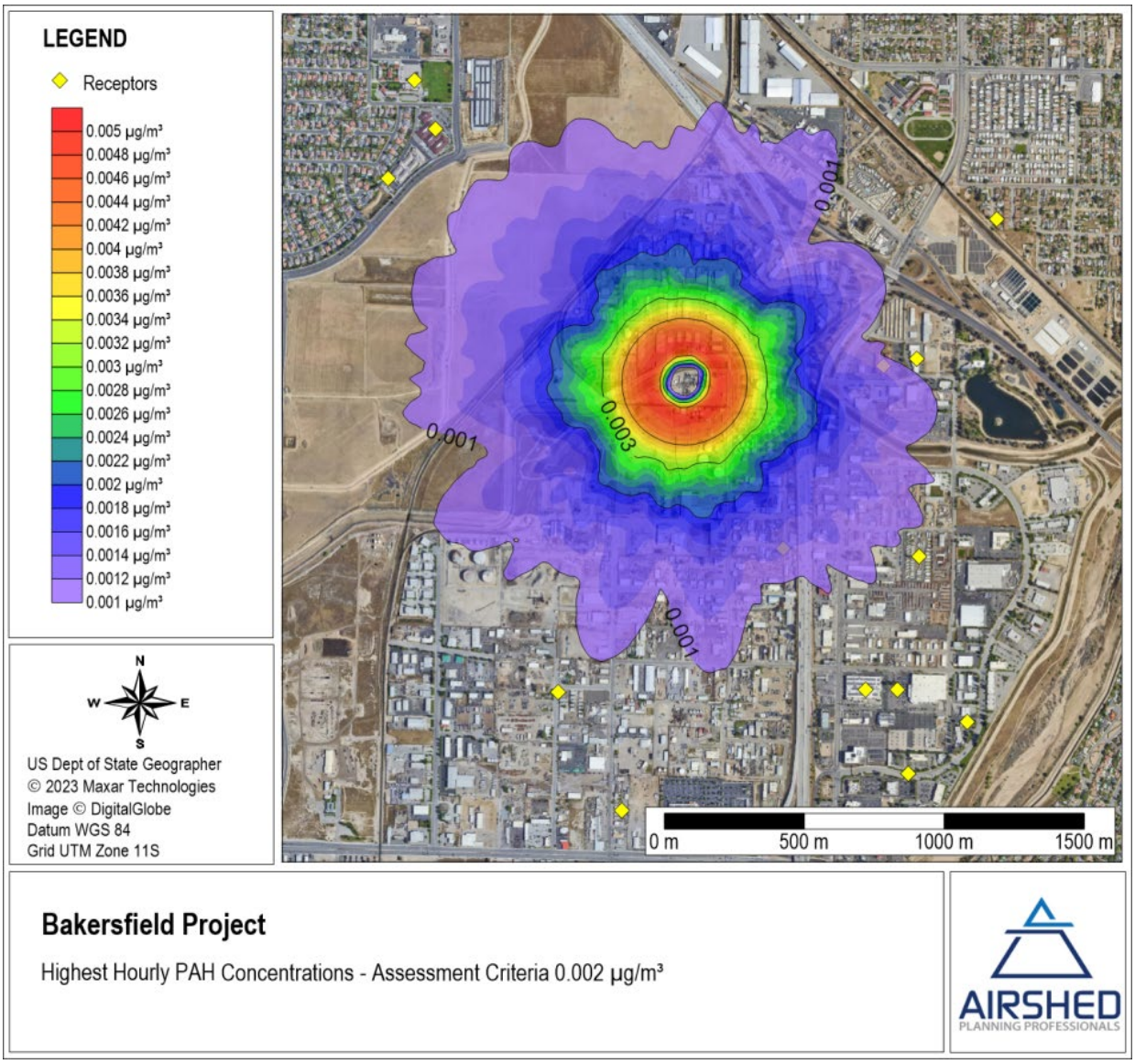
Map 11. Nitric Oxide



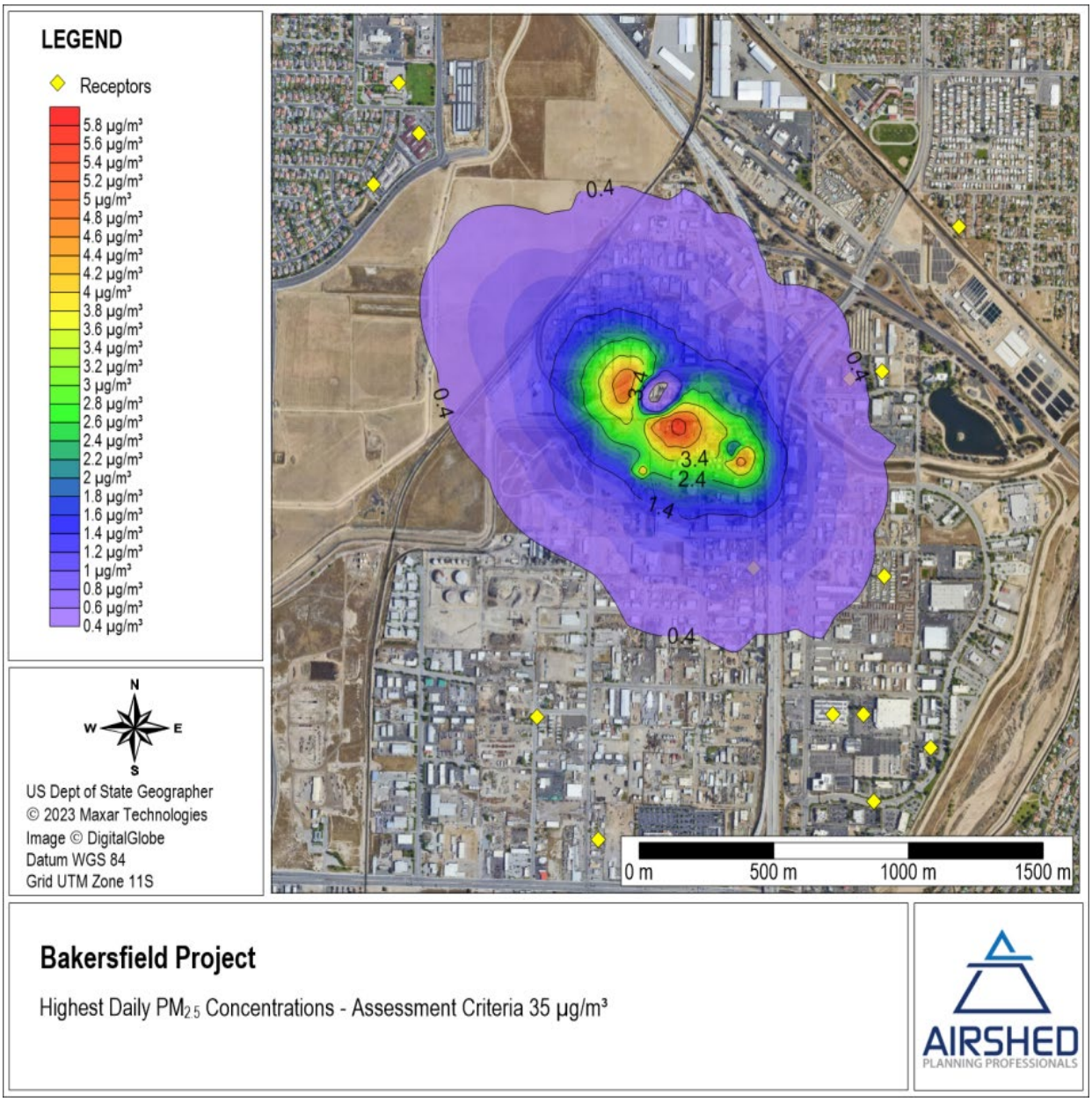
Map 12. Nitrogen Dioxide



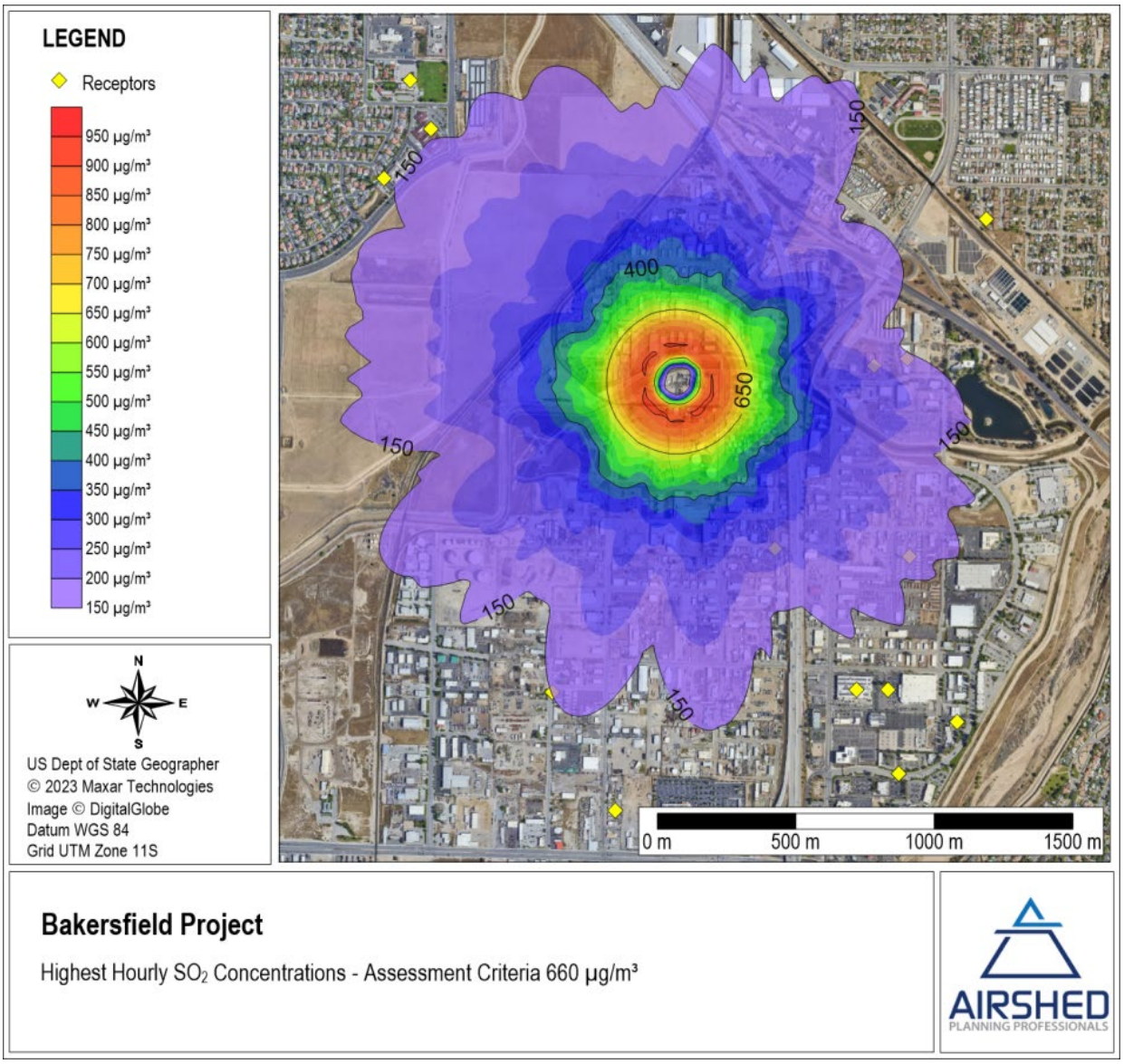
Map 13. Polycyclic Aromatic Hydrocarbons



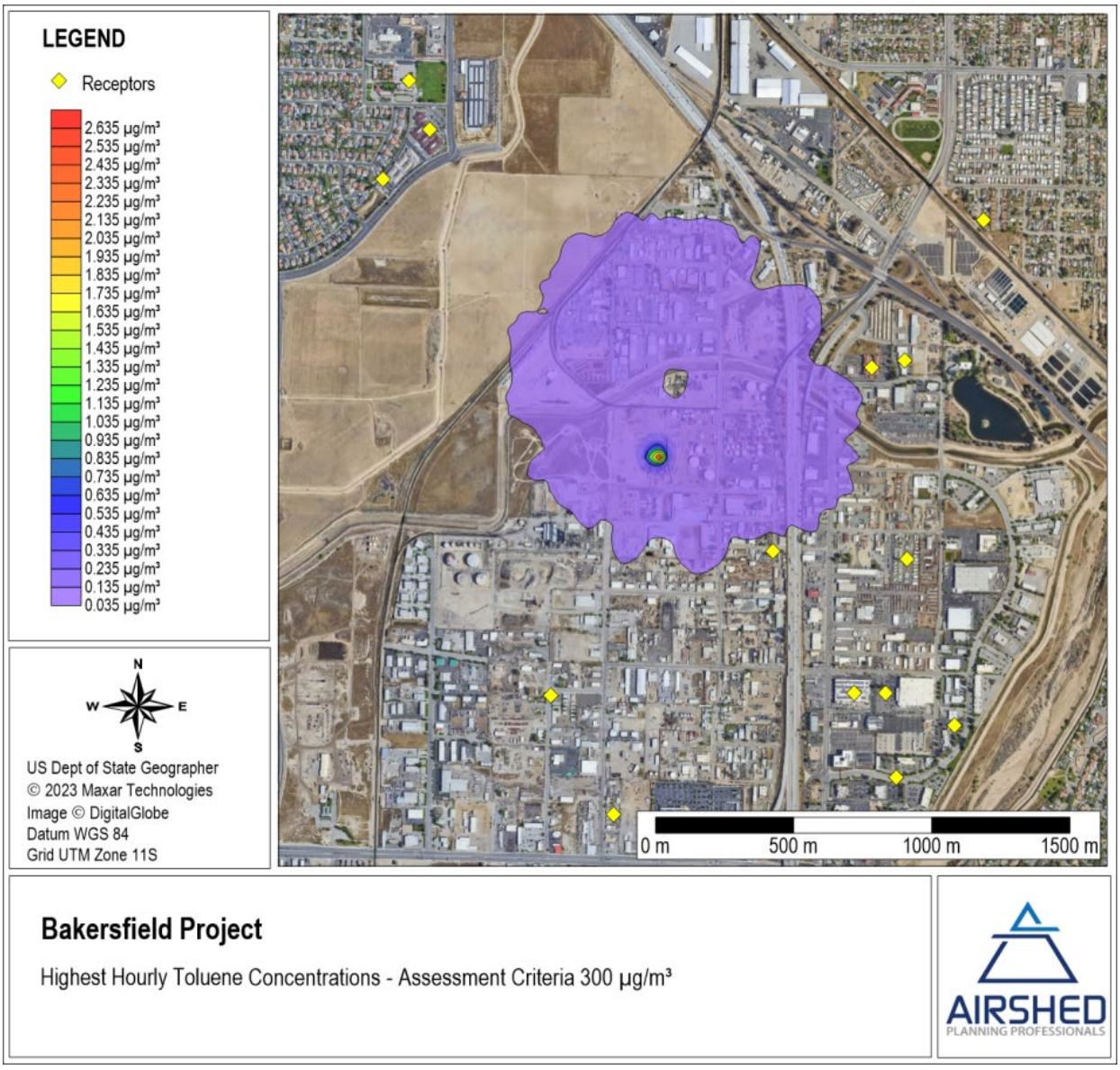
Map 14. Particulate Matter 2.5 Microns



Map 15. Sulfur Dioxide



Map 16. Toluene



Map 17. Xylenes