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EASTERN COACHELLA VALLEY AMBIENT AIR PESTICIDE MONITORING INVESTIGATION

Prepared by
Community Air Monitoring Branch
Monitoring and Laboratory Division
2022

Monitoring Plan Approval

Plan Title: Eastern Coachella Valley Ambient Air Pesticide Monitoring Investigation
Approval: The following air monitoring plan has been reviewed and approved by the Community Air Monitoring and Northern Laboratory Branches.

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Date

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Date

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1. Form Community Partnerships

In December 2019, the Eastern Coachella Valley (ECV) was designated as one of Assembly Bill 617 (AB617) Year 2 Communities. The ECV community includes the City of Coachella, the City of Indio, a small portion of the City of La Quinta, and the unincorporated areas of Thermal, Oasis, Mecca, and North Shore, and is home to approximately 81,000 people.¹ Residential centers in the rural community are surrounded by areas zoned for agricultural use.

The ECV Community Steering Committee (CSC) was formed in January 2020 and consists of members representing current residents, community organizations, businesses, agencies, schools/universities, and offices of elected officials.

2. Purpose for Air Monitoring

The CSC identified pesticides as one of the top air quality priorities given the amount of agricultural activity in the ECV. CSC concerns include unknown health effects from pesticides and potential toxicity from possible exposure. As part of the Community Emissions Reduction Plan (CERP), the South Coast Air Quality Management District (South Coast AQMD) held public meetings, workshops, and communicated with committee members and responsible local, county, and state agencies, including the California Air Resources Board (CARB), to develop actions and details to address the community's concerns about pesticide emissions and exposures.

The purpose for air monitoring is to measure the concentrations of three prioritized pesticides in the community. The resulting measurements will be compared to reference exposure levels to assess potential health risks of these pesticides in the ECV community.

A secondary purpose for air monitoring is to engage with the community on their health concerns possibly attributable to air pollution. This community engagement includes sharing an understanding and expertise in pesticide monitoring to potentially address some human health impacts of community concern with the South Coast AQMD and the ECV community.

The proposed pesticides for monitoring are the result of research² by the CARB, California Office of Environmental Health Hazard Assessment (OEHHA), and the Department of Pesticide Regulation (DPR) which took into consideration pesticide use reporting data, CalEnviroScreen 4.0 pesticide indicators, and information from peer-reviewed literature and publicly accessible data.

The proposed prioritized pesticides are:

- Metam sodium
 - Methyl Isothiocyanate (MITC) will be monitored as it is the main breakdown product with pesticidal activity of metam sodium, metam potassium, and dazomet.

¹ 2019 Community Recommendations Staff Report – CARB (https://ww2.arb.ca.gov/sites/default/files/2019-12/2019_community_recommendations_staff_report_november_8_acc_3.pdf)

² February 2022, Pesticide prioritization and Monitoring in the Eastern Coachella Valley. Available upon request.

- 1,3-Dichloropropene (1,3-D)
- Chloropicrin

Each of these pesticides is used as a fumigant, meaning its pesticidal activity is in the vapor or gas phase. Each is also a designated Toxic Air Contaminant.³

3. Scope of Actions

South Coast AQMD has identified metrics and actions to measure the progress of the CERP actions. Tables 1 and 2 summarize these actions and metrics.

This investigation will generate quantitative, ambient pesticide concentration data to provide the community with information to make more informed decisions so it can achieve its air monitoring goals as proposed in the CERP. Per Table 2, the air monitoring data will be available to South Coast AQMD, OEHHA, and DPR to evaluate. Potential actions include measures to reduce emissions of, and/or exposure to, these pesticides of concern.

³ AB 1807 - Toxics Air Contaminant Identification and Control | California Air Resources Board/Department of Pesticide Regulation (<https://ww2.arb.ca.gov/resources/documents/ab-1807-toxics-air-contaminant-identification-and-control>)

Table 1 - CERP Actions, Responsible Entities, and Timelines⁴

Goal: Gather Information and Conduct Air Monitoring for Pesticides					
	Action	Responsible Entity	Metric	Timeline	
				Start	Complete
A	<ul style="list-style-type: none"> Identify pesticides used in ECV (e.g., frequency, amount, and ingredients) Share information on statewide efforts for a pesticide notification system Provide consultation on field activities Support data analysis and interpretation 	DPR and Ag. Commissioner	<ul style="list-style-type: none"> Data collected on pesticide use in ECV Updates provided to the CSC 	4 th quarter, 2021	1 st quarter, 2022
B	<ul style="list-style-type: none"> Develop a screening approach for agricultural pesticides commonly used in ECV Support prioritization of pesticides for potential air monitoring based on screening criteria and other relevant information 	OEHHA	<ul style="list-style-type: none"> Updates provided to the CSC 	2 nd quarter, 2022	1 st quarter, 2023
C	<ul style="list-style-type: none"> Support protocol development for pesticide sampling and analysis Coordinate sampling and analysis of pesticides 	CARB and South Coast AQMD	<ul style="list-style-type: none"> Development of protocols for pesticide sampling and analysis 	1 st quarter, 2022	1 st quarter, 2023
D	<ul style="list-style-type: none"> Participate in field activities Analyze pesticide samples Support data analysis and interpretation 	CARB, South Coast AQMD, and DPR	<ul style="list-style-type: none"> Data collected through air sampling Samples analyzed Updates provided to the CSC 	2 nd quarter, 2023	TBD

⁴ Dates listed in Table 1 are from the South Coast AQMD July 2021 CERP. Actual field activity start dates may vary.

Table 2 - ECV CSC Pesticides Metrics

Goal: Pursue Pesticides Emissions and Exposure Reductions					
	Action	Responsible Entity	Metric	Timeline	
				Start	Complete
A	Evaluate potential community health risks/impacts based on air monitoring results and other relevant information	OEHHA and DPR	<ul style="list-style-type: none"> • Presentation of results to CSC • Written report on findings • Updates to the CSC 	2 nd quarter, 2024	TBD
B	<ul style="list-style-type: none"> • Assist the ECV CSC in determining pesticide exposures and risks • Identify opportunities to develop or amend pesticide regulations. (DPR works through an established pesticide Toxic Air Contaminant (TAC) process with its partner agencies (i.e., OEHHA, CARB, Air Districts, and CACs) to develop TAC-related regulations. • Support the ECV CSC’s exploration of a pesticide notification system • In collaboration with U.S. EPA, hold a Pesticides Workshop with the ECV Community and provide outreach materials, and information that include pesticide use enforcement, worker protection (including PPE and exposure reduction), and pesticide incident reporting • In consultation with South Coast AQMD, CARB and the CSC, develop community emission reduction plan (CERP) strategies for pesticides, if warranted 	DPR and Ag. Commissioner	<ul style="list-style-type: none"> • Workshop held for the community • Regulations developed or amended • Updates to the CSC 	4 th quarter, 2021	1 st quarter, 2025
C	Identify funding for exposure reduction projects (e.g., air filtration systems and weatherization projects)	South Coast AQMD	<ul style="list-style-type: none"> • Number of projects implemented 	4 th quarter, 2021	4 th quarter, 2024
D	Pursue a collaborative partnership with Growing Coachella Valley Local Farmer and Growers to reduce emissions and exposure in ECV	South Coast AQMD	<ul style="list-style-type: none"> • Number of opportunities identified and pursued to reduce pesticide emissions and exposure 	4 th quarter, 2021	4 th quarter, 2024

4. Air Monitoring Objectives

The primary air monitoring objective is to conduct an air monitoring investigation for ambient pesticides. This includes monitoring specifically for MITC, 1,3-D, and chloropicrin in the ambient air during the high-use months of December, January, and February in ECV.

The necessary actions to achieve this objective are:

- Identify three monitoring sites that satisfy criteria for ambient air sampling
- Collect 24-hour samples following a seasonal, intensive monitoring model
 - Air sampling will occur four days a week for 13 weeks
 - Sampling will not start before November 2022 and will not have a duration greater than 16 weeks
- Apply relevant quality assurance (QA) and quality control (QC) practices to maintain sample integrity
 - Practice QA procedures to ensure proper sampler operation
 - Collect QC samples such as field spikes (FS), field blanks (FB), and collocated duplicate samples (Co) to validate primary samples
 - Each QC type to be collected once per week
 - Proper handling of samples to maintain data accuracy
- Perform laboratory quantification of the target pesticides in air samples
- Provide ambient air concentration information to stakeholders so they can make informed decisions to improve community air quality in the ECV

A summary of the proposed sampling activity is included in Table 3.

Table 3 - Summary of Sampling Activities

Analyte	Measurement /Sampling Frequency	Sample Duration (Hours)	Site 1	Site 2	Site 3	Additional QC (One each/week)	Total number of samples/week ⁵
1,3-D	4x/week	24±1	X	X	X	FB, FS, Co	15
Chloropicrin	4x/week	24±1	X	X	X	FB, FS, Co	15
MITC	4x/week	24±1	X	X	X	FB, FS, Co	15

5. Roles and Responsibilities

The study is multi-agency collaborative effort including the following agencies and subgroups:

- DPR – California Department of Pesticide Regulation
- Ag Commissioner - Riverside County Agricultural Commissioner’s Office
- CARB – California Air Resources Board
 - OCAP – Office of Community Air Protection
 - CAMB - Community Air Monitoring Branch
 - NLB - Northern Laboratory Branch
 - AQPSD/SAB – Air Quality Planning and Science Division/Special Assessments Branch (AQview)
- South Coast AQMD – South Coast Air Quality Management District
- OEHHA – California Office of Environmental Health Hazard Assessment

DPR and the Ag Commissioner will provide pesticide use information and historical use information that will assist in the planning of the placement and timing of the samplers. Monitoring will target historical high-use periods using the most recent pesticide use data available.

CARB/OCAP will facilitate discussions between the agencies and coordinate sharing information and updates with the community.

CARB/CAMB will survey monitoring locations and determine the most appropriate location(s) to place the monitors for optimum data quality taking security and sampler needs (power, accessibility, etc.) into consideration. Staff will initiate the monitoring efforts in the community. CARB/CAMB staff will set up and operate the samplers to best capture high quality data.

CARB/NLB staff will perform laboratory analysis of samples, validate all laboratory data, and share final analytical data with CAMB once it has been reviewed and validated.

⁵ Alternative methods may be utilized that meet the applicable QA/QC criteria outlined in the NLB Laboratory Quality Control Manual (QCM). For pesticide monitoring other DQO’s, such as spike recovery, collocated duplicate samples, and blanks are study-dependent and somewhat variable. These will be assessed and reported and will assist with data analysis and interpretation.

CARB/AQview team in AQPSD/SAB will host all the ambient air monitoring data, perform data quality checks, ensure the transparency of the data, and make the data accessible to the public via AQview data download tool.

South Coast AQMD monitoring staff will assist CARB in surveying monitoring locations, operation of samplers, and collection and processing of samples.

OEHHA and DPR will evaluate health risks of the targeted pesticides using the air quality data generated from this monitoring study, published reference exposure levels, and other relevant information.

6. Data Quality Objectives

Sampling will follow existing protocols and standard operating procedures (SOP) to collect the highest quality data. Table 4 summarizes the field and laboratory QA and QC that will be implemented.

DRAFT

Table 4 - Field and Laboratory QA/QC

Pesticide	Media	Sampling Duration (Hours)	Sampling Flowrate (SCCM)	Field QC Components	Laboratory QC Components	SOP	Laboratory Instrument
1,3-D	Multi-sorbent thermal desorption tubes, such as Markes 'universal' tubes	24±1	25±10%	FS, FB, Co	ICAL, CCV, Control, MB, Replicate. See SOP for QC criteria.	MLD080	GC/MS
Chloropicrin	XAD-4 sorbent tubes, 600/200mg, custom SKC, or two 400/200mg tubes in tandem (SKC item #226-175)	24±1	100±10%	FS, FB, Co	ICAL, CCV, Control, LCS, MB, Replicate. See SOP for QC criteria.	MLD075	GC/MS or GC/MS/MS
MITC	Multi-sorbent thermal desorption tubes, such as Markes 'universal' tubes	24±1	25±10%	FS, FB, Co	ICAL, CCV, Control, MB, Replicate. See SOP for QC criteria.	MLD080	GC/MS

Note:

Data quality objectives may be subject to change based on real-world performance and analytical objectives. Additional information regarding blanks and other QA/QC components may be found in each method's respective standard operating procedure (SOP).

Alternative methods may be utilized that meet the applicable QA/QC criteria outlined in the NLB Laboratory Quality Control Manual (QCM).

For pesticide monitoring other DQOs, such as spike recovery, collocated duplicate samples, and blanks are study-dependent and somewhat variable. These will be assessed and reported and will assist with data analysis and interpretation.

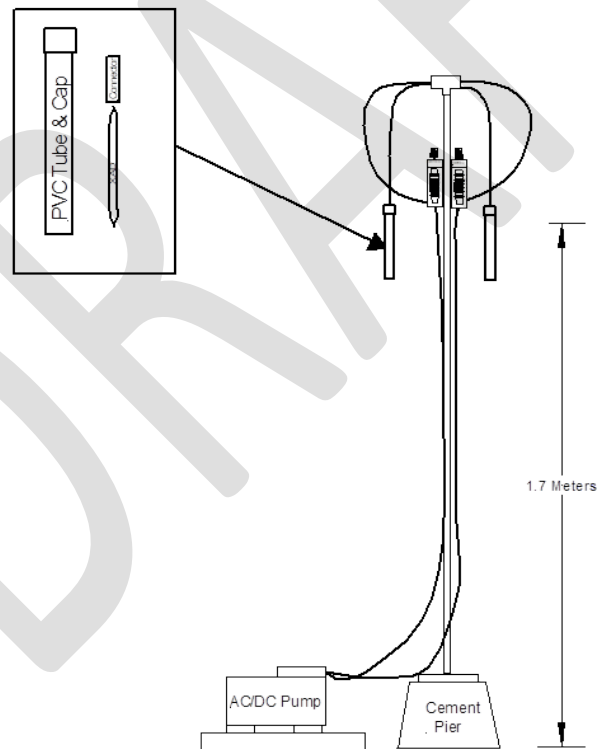
7. Monitoring Methods and Equipment

Field sampling will consist of cartridge samplers that will incorporate vacuum air pumps and rotameters flowing at 25 SCCM and 100 SCCM, for MITC/1,3-D and chloropicrin, respectively.

The air samplers will consist of an AC or DC powered pump capable of drawing at least 1000 SCCM. Sample flow will be controlled by an in-line rotameter and will be adjusted prior to each sample run. The flow rate of the samplers will be set to the pre-determined value $\pm 10\%$. The end flow shall be within 20% of the pre-determined value upon sample retrieval to be considered a valid sample. Sample flow rates will be checked with a National Institute of Standards and Technology (NIST) traceable flow meter. Each sample will run 24 ± 1 hours. Sampling start and end times may vary. Samples outside of the flow and time criteria will be flagged.

The air intake of such sampler will be at least 1.7 meters off the sampling platform or ground. A diagram of a sampler can be seen in Figure 1.

Figure 1 - Setup of Air Samplers



CARB staff will set up two cartridge samplers at each of the selected monitoring locations to run for the duration of the study. A duplicate set of samplers will be set up at the pre-determined QC location to collect field blanks, field spikes, and collocated samples.

Samplers may be set up in elevated locations and on rooftops without safety railings. Field staff safety will be prioritized. In the event of inclement weather such as high winds or rain, field staff will determine if it is safe to set up and retrieve samples. If it is determined that it is unsafe to proceed and a sampling event is missed, a make-up sample may be collected if time and resources permit.

Laboratory methods will follow the SOPs as covered in Methods 075 and 080.⁶

8. Monitoring Area

Monitoring will be conducted at three locations within the ECV AB617 community boundaries. The locations were chosen after community consultation, with the intent to monitor near sensitive receptors, locations of concern, and in residential neighborhoods downwind of known pesticide use areas. Locations are identified in Table 5 and Figure 2. Figure 3 shows a map of the sensitive receptors and residential regions within the ECV community boundaries.

Table 5 - Pesticide Monitoring Sites

Site Name	Address
Mecca Fire Station 40	91350 66th Ave, Mecca, CA 92254
Torres Martinez Desert Cahuilla Indians air monitoring station	66725 Martinez Rd, Thermal, CA 92274
Atlantic Aviation	86400 Lightning St, Thermal, CA 92274

⁶ Data quality objectives may be subject to change based on real-world performance and analytical objectives. Additional information regarding blanks and other QA/QC components may be found in each method's respective standard operating procedure (SOP).

Alternative methods may be utilized that meet the applicable QA/QC criteria outlined in the NLB Laboratory Quality Control Manual (QCM).

For pesticide monitoring other DQO's, such as spike recovery, collocated duplicate samples, and blanks are study-dependent and somewhat variable. These will be assessed and reported and will assist with data analysis and interpretation.

Figure 2 - Pesticide Monitoring Sites

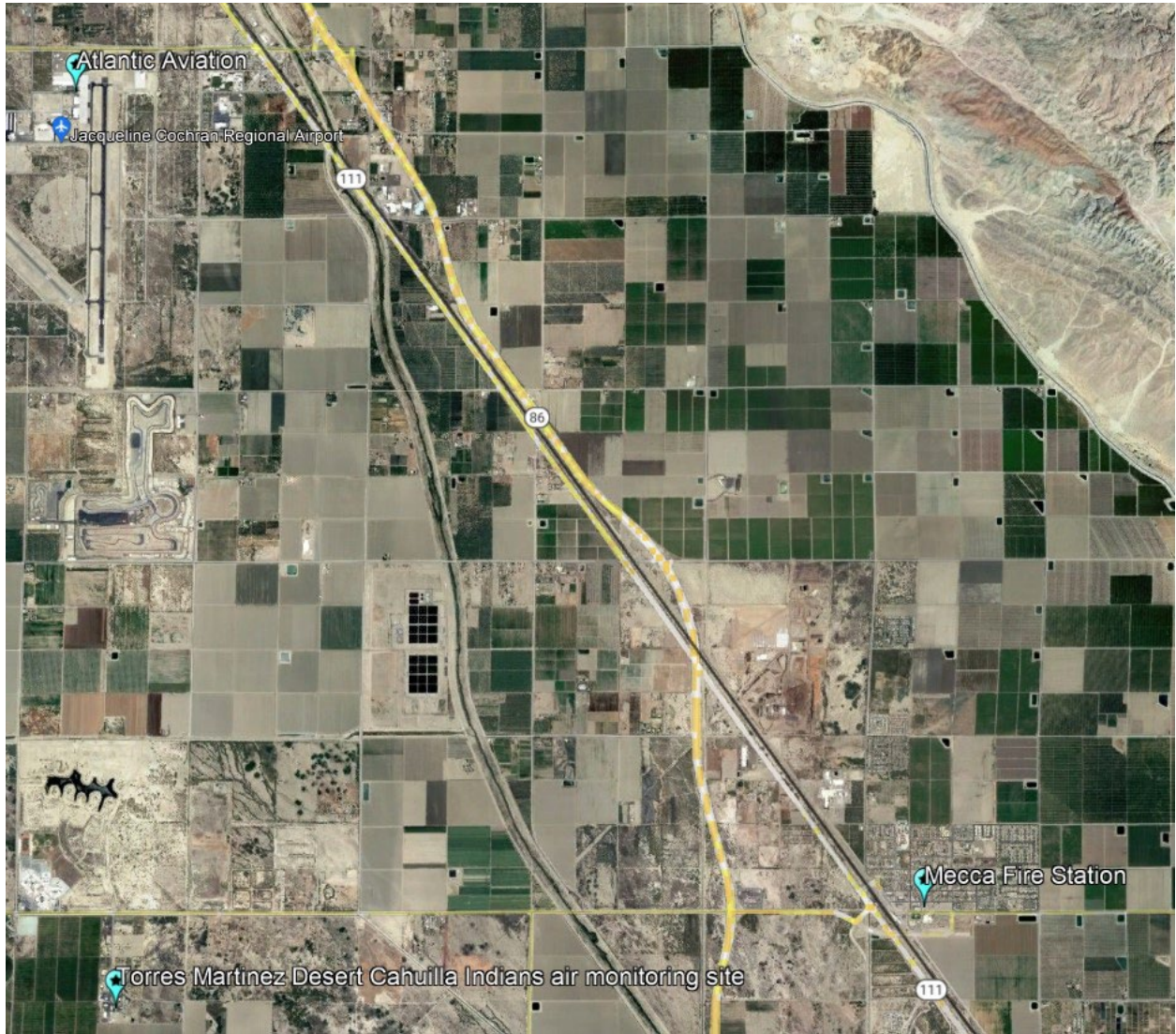
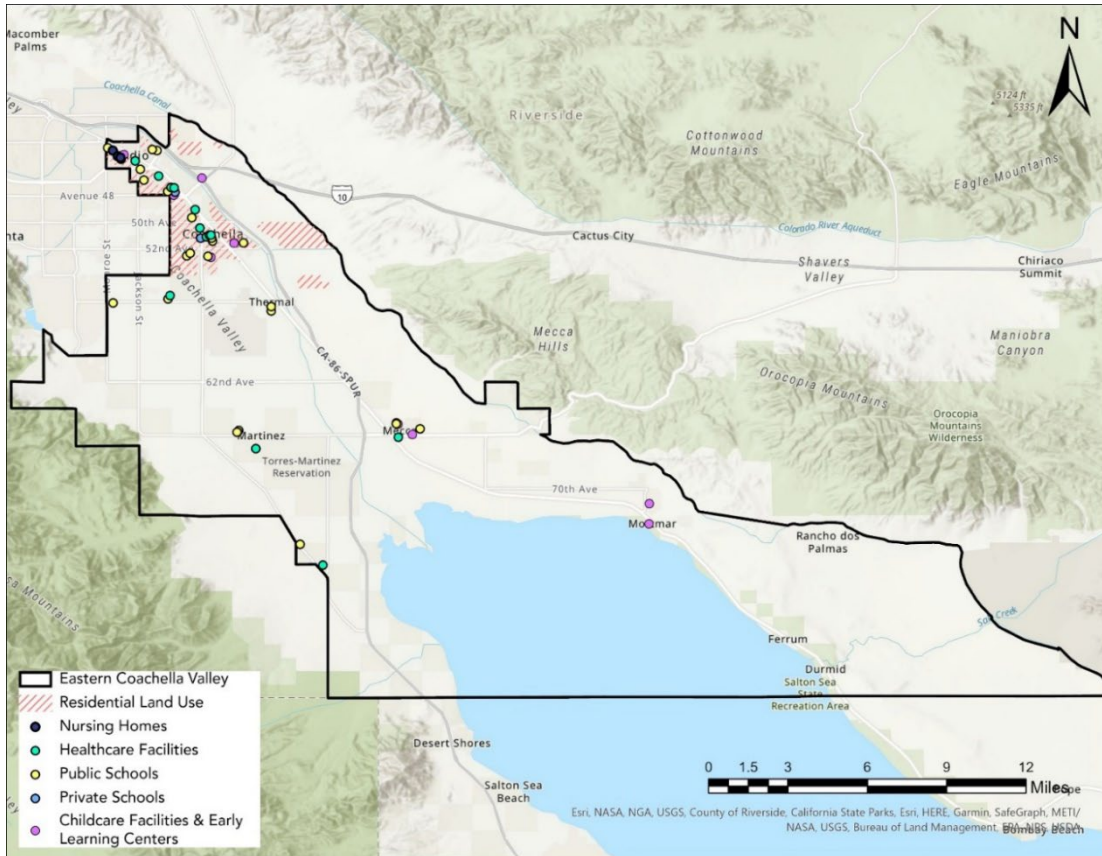


Figure 3 - Sensitive Receptors and Residential Regions within the Eastern Coachella Valley



9. Quality Assurance and Quality Control Procedures

QA and QC procedures will follow the instrument operating manual or CARB standard operating procedures, if available.

Instrument flow checks will be performed prior to set up and just before retrieval of each sample. The average of both values will be used in calculations of the ambient concentration values. Flow checks will be performed using National Institute of Standards and Technology (NIST) traceable Alicat Whisper digital flow meters with the appropriate flow range. The instruments will also be checked for general operating errors and flow obstructions.

QC samples will be collected each week and may include blanks, spikes, and collocated duplicate samples. Each of the appropriate QC samples will be collected once per week at the selected QC location.

10. Data Management

Sample parameters will be recorded on a chain-of-custody (COC) record for each pair of MITC/1,3-D and chloropicrin set. Sampling parameters may include sampling start and stop times, start and end flow

rates, and ambient weather conditions. The appropriate staff will fill out the necessary portions of the form upon sample receipt. Data will be analyzed for completeness and instrument errors.

Laboratory samples and data will be managed by the internal Laboratory Information Management System (LIMS).

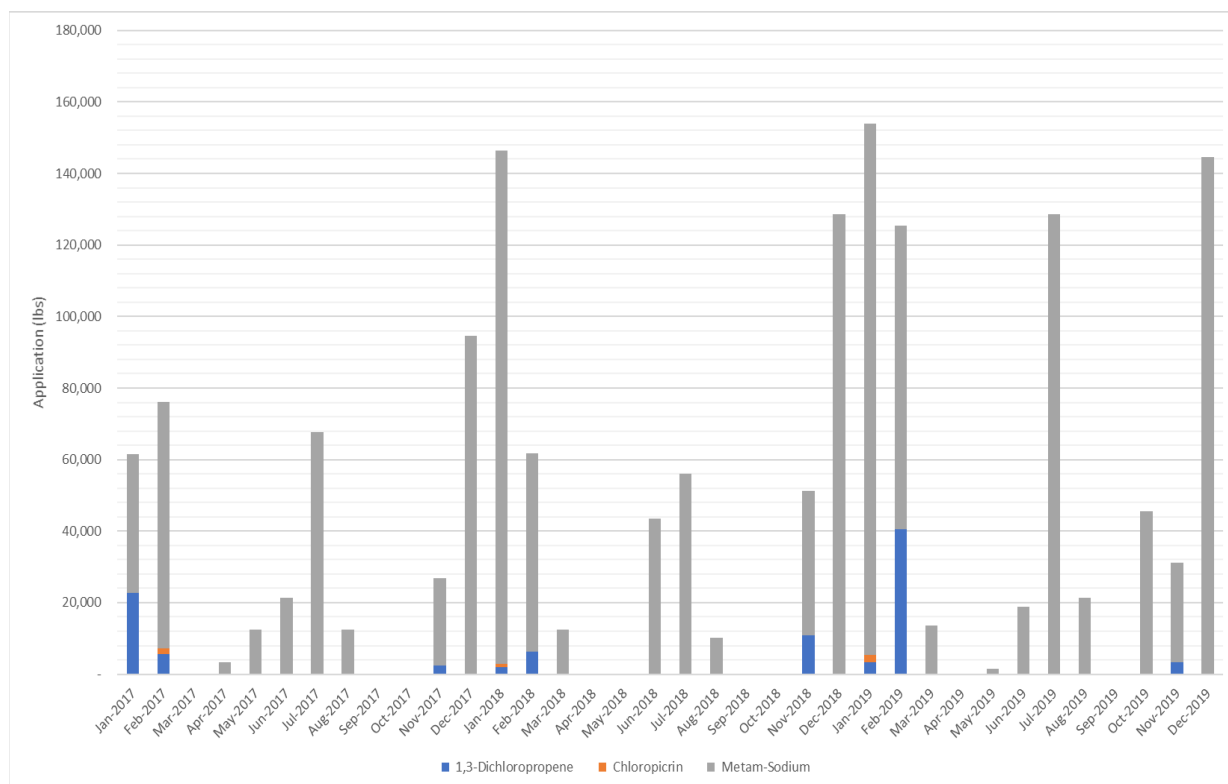
11. Work Plan for Field Measurements

Monitoring will focus on the high-use time periods for each of the targeted compounds. The high-use months are December (metam sodium), January (chloropicrin), and February (1,3-D) based on the latest available pesticide use data (2017-2019). Information of the reported monthly application of each of the prioritized compounds is included in Table 6. Figure 4 presents the data in a graphical format.

Table 6 - ECV Monthly Pesticide Use in Pounds (2017 - 2019)

Month-Year	1,3-Dichloropropene	Chloropicrin	Metam-Sodium
Jan-2017	22,735.44	-	38,713.58
Feb-2017	5,631.50	1,606.23	68,960.55
Mar-2017	-	-	-
Apr-2017	-	-	3,395.07
May-2017	-	-	12,361.25
Jun-2017	-	-	21,428.15
Jul-2017	-	-	67,746.61
Aug-2017	-	-	12,488.25
Sep-2017	-	-	-
Oct-2017	-	-	-
Nov-2017	2,358.17	-	24,448.19
Dec-2017	-	-	94,560.20
Jan-2018	1,872.17	1,025.38	143,554.37
Feb-2018	6,353.96	-	55,339.30
Mar-2018	-	-	12,399.57
Apr-2018	-	-	-
May-2018	-	-	-
Jun-2018	-	-	43,453.02
Jul-2018	-	-	56,088.43
Aug-2018	-	-	10,202.27
Sep-2018	-	-	-
Oct-2018	-	-	-
Nov-2018	10,761.49	-	40,418.59
Dec-2018	-	-	128,645.39
Jan-2019	3,431.18	1,879.25	148,579.81
Feb-2019	40,580.81	-	84,901.11
Mar-2019	-	-	13,630.91
Apr-2019	-	-	-
May-2019	-	-	1,587.49
Jun-2019	-	-	18,761.33
Jul-2019	-	-	128,619.60
Aug-2019	-	-	21,291.84
Sep-2019	-	-	-
Oct-2019	-	-	45,508.04
Nov-2019	3,432.45	-	27,734.59
Dec-2019	-	-	144,455.30
Total	97,157.15	4,510.86	1,469,272.82

Figure 4 - ECV Monthly Pesticide Use Chart (2017 - 2019)



Figures 5, 6, and 7 depict the heat maps of the target compounds within the community boundaries based on 2017 – 2019 data.

Simultaneous monitoring will occur to capture samples of the targeted compounds at three locations throughout ECV. Field staff will set up and retrieve samples that will consist of four consecutive ~24-hour samples per sampling week. In addition to primary samples, QC samples will be collected once per week for each QC type (FS, FB, Co) at the QC location.

Short and long-term health risks will be assessed, including potential cancer and noncancer risks. DPR and OEHHA produce health guidance values to assist in the interpretation of the exposures.

Figure 5 - Metam Sodium - Reported Usage 2017-2019

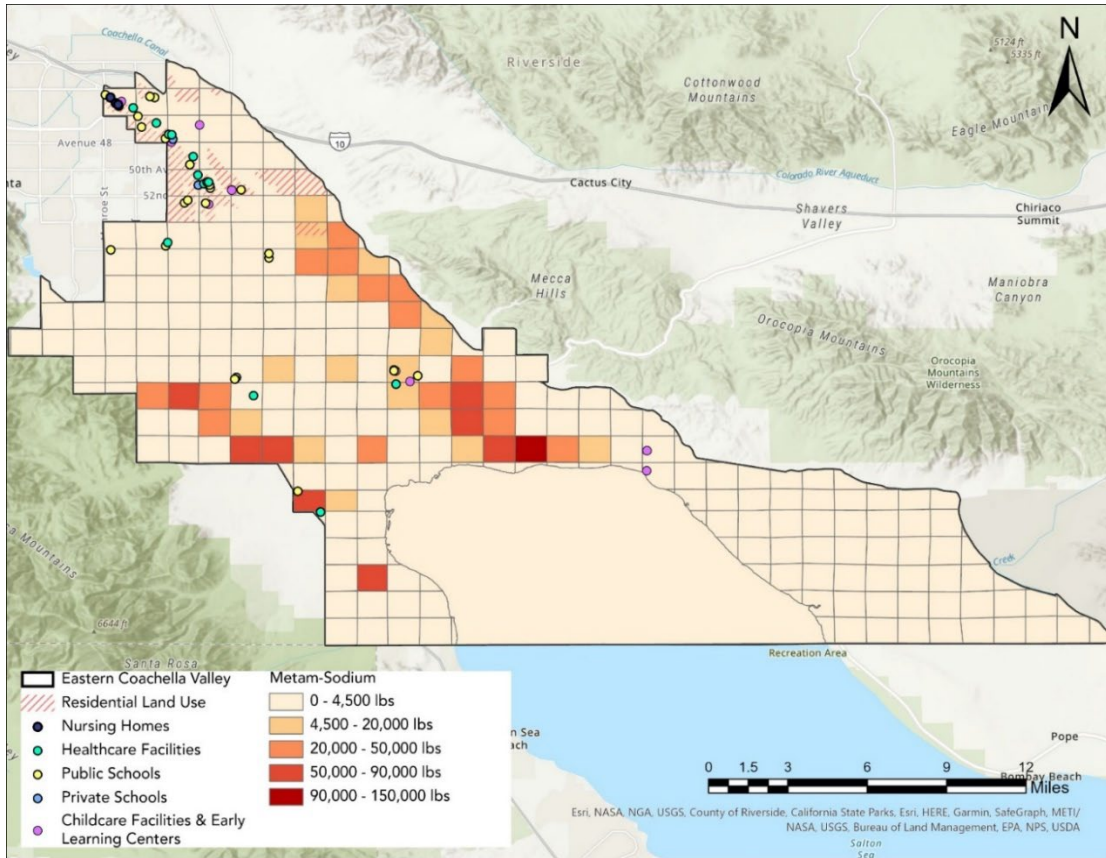


Figure 6 - 1,3-Dichloropropene - Reported Usage 2017-2019

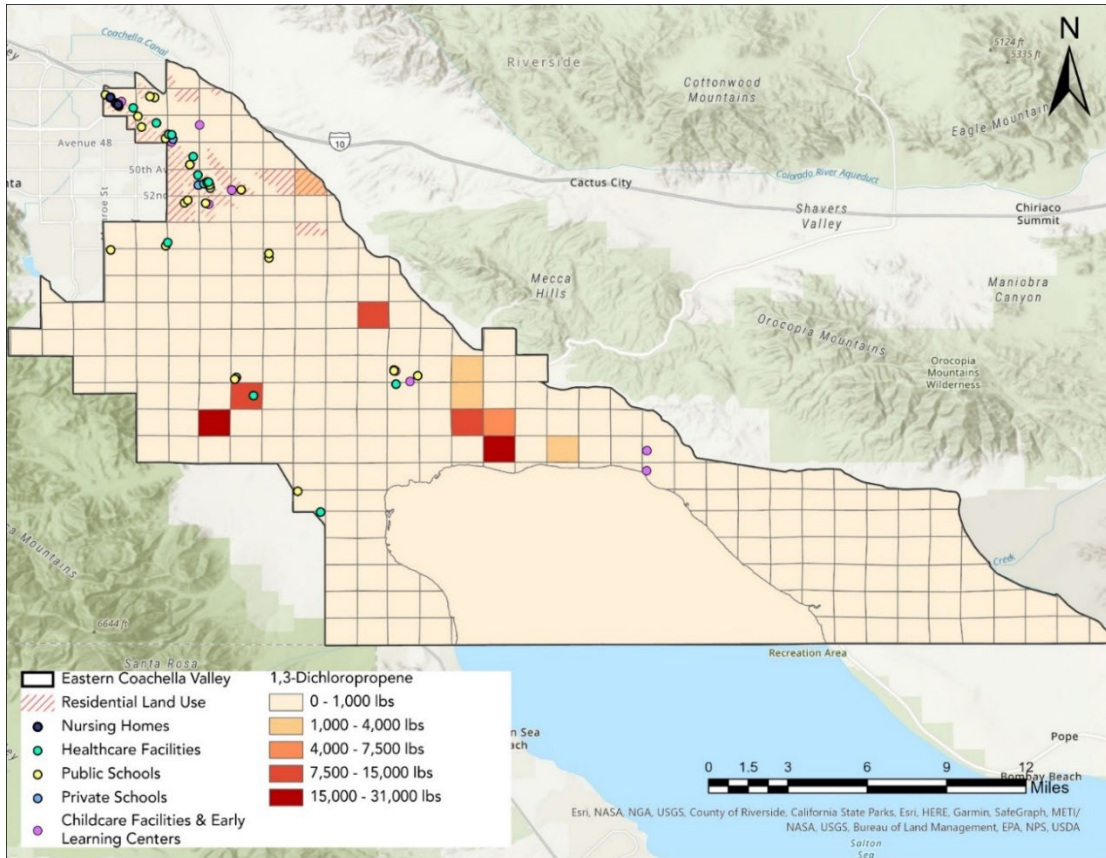
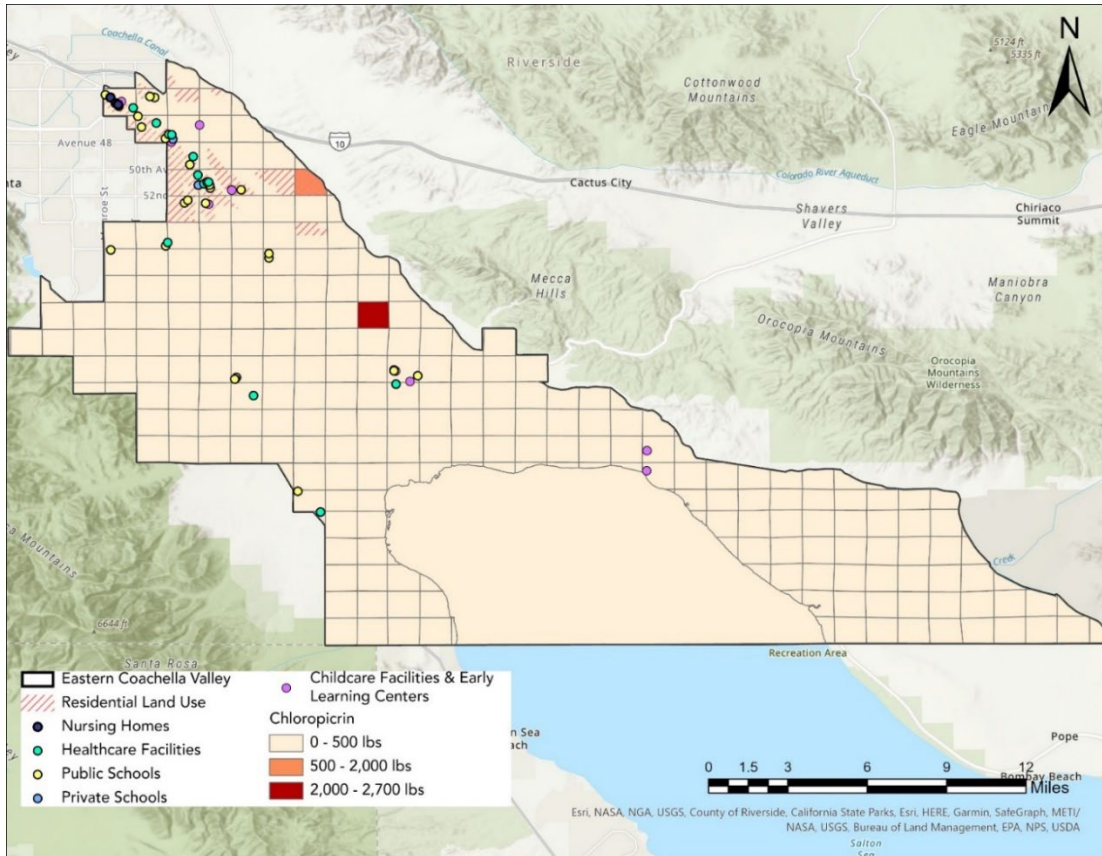


Figure 7 - Chloropicrin - Reported Usage 2017-2019



12. Evaluating Effectiveness

Each week, CARB/CAMB and CARB/NLB staff will review the previous week's sample completeness and the latest spike, blank, and collocated duplicate measurements to ensure high data capture and accurate and precise data.

13. Data Analysis and Interpretation

CARB staff will review and provide validated pesticide concentration data to OEHHA for interpretation and analysis of potential exposures and adverse health effects. The assessment will consider the concentration, duration, and frequency of possible exposures. OEHHA and DPR will compare these data to acute, subchronic, and chronic reference exposure levels (RELs) and other health guidance values, such as those from OEHHA, DPR, US EPA/Agency for Toxic Substances and Disease Registry (ATSDR), and the European Food Safety Authority (EFSA) to determine health impacts of the three fumigant pesticides within the ECV community. OEHHA and DPR will calculate averages from the duration of monitoring to estimate cancer risk using health guidance values from OEHHA, DPR, and US EPA. Different exposure durations will be assessed because potential mitigations for each type of exposure may differ.

OEHHA RELs are air concentrations or doses at or below which adverse noncancer health effects are not expected, even in sensitive members of the general population under specified exposure scenarios.

OEHHA’s acute RELs are generally for infrequent 1-hour exposures that occur no more than once every two weeks in a given year. OEHHA’s chronic RELs are for 24 hour per day exposures for at least a significant fraction of a lifetime, defined as about 8 years. OEHHA has an acute and chronic RELs for chloropicrin of 29 µg/m³ (4.3 ppb) and 0.4 µg/m³ (0.05 ppb), respectively. OEHHA also establishes potencies for chemicals that cause cancer. For 1,3-D, OEHHA has adopted a potency of 0.19 per mg/kg-day (oral & inhalation routes of exposure).

The current exposures assessed by DPR are summarized in the table below. DPR uses two different categories of reference exposure level. A screening level (SL) is the pesticide air concentration used to assess probable health effects. A measured concentration that is above the SL does not necessarily indicate a health concern, but it does indicate the need for a refined evaluation. A regulatory target (RT) is the pesticide air concentration target established based on complete assessments of possible health risks. A measured concentration that is above the RT does not necessarily indicate an adverse health effect has occurred, but it does indicate that restrictions on the pesticide use may need to be modified. Measured and average concentrations can be compared to these reference concentrations. Rolling averages will need to be calculated for the comparisons.

Table 7 - Current DPR Reference Exposure Levels

Active Ingredient	Acute Category	Acute ppb	Acute Duration	Sub-Chronic Category	Sub-Chronic ppb	Sub-Chronic Duration
1,3-D	RT	55	72 hours	SL	3.0	13 weeks
Chloropicrin	RT	73	8 hours	SL	0.350	13 weeks
MITC	RT	220	8 hours	SL	1.0	4 weeks

14. Communicate Results

The ambient air and quality control concentration values will be shared with the CSC and made available to the public via CARB’s AQview⁷ data download tool.

NLB will report validated lab data in analytical units (e.g. ng/sample) to CAMB within 45 days after the month of collection. CAMB will calculate the final aerometric concentration using the lab and field data and validate the final result before releasing to clients. If concentrations are reported at a level with possible adverse health effects resulting from acute or subchronic exposure, CARB will disclose these values and discuss possible actions with the public, DPR, OEHHA, the Ag Commissioner, and the South Coast AQMD.

CARB and OEHHA will prepare and present a two-part report detailing all pesticide measurements and the health effects which might be attributable to those measurements.

⁷ Available at <https://aqview.arb.ca.gov/>