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WSPA Comments Regarding Discussion Draft Performance Standards for Continuously Operating Emissions Detection Systems Required by California Senate Bill 1137 for Upstream Oil and Gas Production Facilities in Health Protection Zones

I. Cost Impact

WSPA appreciates that CARB has provided Preliminary Total Implementation Costs (total across 2028-2033) information (Public Workshop slides, July 16, 2026) (Figure 1).

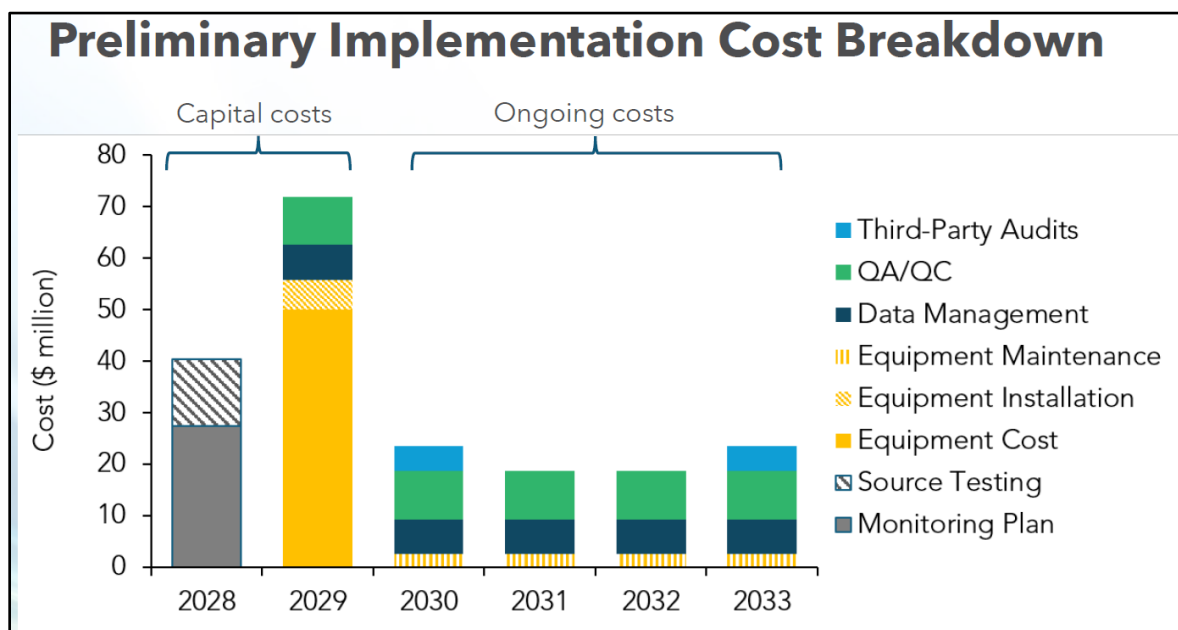


Figure 1. CARB-Estimated costs for statewide SB 1137 implementation from 2028 to 2033

For 2028 and 2029, CARB estimates capital costs including monitoring plan development, source testing/sampling, equipment purchase and installation to be approximately \$96 Million for 3,000 sites (approximately \$32,000 per site). Ongoing costs include annual QA/QC, data management, equipment maintenance, and every three years third party audits. Ongoing costs are expected to be an additional

approximately \$101 Million for 5 years for 3,000 sites (approximately \$33,667 per site). The total implementation costs from 2028 to 2033 are estimated by CARB to be approximately \$197 Million.

WSPA has reviewed the requirements detailed in the discussion draft and compiled cost information for the various compliance steps. A detailed assessment of each required compliance step is provided below:

1. Source Testing/Sampling Costs

Operators are required to use specific test methods to conduct sampling and analysis of produced natural gas at each site (93504(b)). Sampling must include 3 samples per process category for up to 4 processes per site (Up to 12 samples per site). Operators are expected to take 30,000 samples (average 10 samples per site x 3,000 sites) over a period of 6 to 8 months to be able to meet the LDRP submittal deadline of July 1, 2028.

CARB estimates \$13 Million for sampling costs, which is an average of approximately \$4,333 per site with anticipated 3,000 sites. With an average of 10 samples per site, the calculated average cost per sample assumed by CARB is approximately \$433.

WSPA reviewed the costs of sampling for the specified methods. WSPA's cost estimates for sampling are provided below in Table 1. The estimate is based on collection and analysis of approximately 10 gas samples at each site. Laboratory analytical costs assume standard turnaround times and typical market rates for EPA Method 18 or EPA TO-15, and ASTM D1945 analyses. Mobilization includes local travel, vehicle usage, site access, and meeting safety requirements. Sampling and supplies include canister and sample media rental, regulators, tubing, fittings, labels, and consumable field materials. Technician labor includes sample collection, documentation, and chain-of-custody activities. Reporting and QA/QC include laboratory data review, validation, and preparation of a summary memorandum or report. Actual costs may vary depending on analytical requirements, turnaround times, travel distance, site-specific safety requirements, and the number of samples collected.

Table 1. Cost estimates for sampling at each site (average up to 10 samples per site).

Item	Details	Low Estimate	High Estimate
Mobilization	Vehicle, travel, site access, safety requirements	\$ 100.00	\$ 500.00
Sampling & Supplies	Summa canister and regulator rental, Tedlar bag or other sample media, field consumables (tubings, fittings, labels etc.)	\$ 25.00	\$ 100.00
Technician Labor	Sample collection and documentation	\$ 75.00	\$ 200.00
Shipping	Overnight and return shipping	\$ 20.00	\$ 100.00
Laboratory Analysis	\$400 to \$500 per sample for 10 samples	\$ 4,000.00	\$ 5,000.00
Reporting & QA/QC	Data validation and report preparation	\$ 500.00	\$ 1,000.00
Total Sampling Cost per site		\$ 4,720.00	\$ 6,900.00

We may anticipate some efficiency gained for co-located sites. For e.g. two located sites might be completed in a single mobilization event. However, the gain in efficiency is severely limited as the number of samples that can be taken in a single mobilization event per day is most likely limited to 10 to 20 samples even for co-located sites, requiring remobilization. The approximate range of sampling costs per site is \$4,720 to \$6,900 (approximately \$5,810 average cost per site). For 3,000 sites, the cost can range from \$14.2 Million to \$20.7 Million (average \$17.4 Million).

2. Dispersion Modeling Costs

Operators are required to conduct dispersion modeling at each site to identify the REL-level leak rate (93504(h)). Operators are required to use AERMOD for dispersion modeling with input parameters including production equipment locations, receptor grid configurations, source parameters and locations, meteorological data, and terrain data. The costs for dispersion modeling have not been separately identified by CARB.

Dispersion modeling is traditionally used to estimate downwind pollutant concentrations and to estimate health-impact potential at receptor locations as a next step in health risk assessments after simpler conservative screenings. Dispersion modeling requires specialized skill sets and training to develop accurate models that meet the

requirements of air dispersion modeling guidance provided in the OEHHA Air Toxics Hot Spots Program Guidance Manual. Dispersion modeling includes the development of a modeling protocol and assumptions, identification of modeled equipment and locations, sensitive-receptor identification and grid development, selection and processing of meteorological data, REL-level leak rate assessments, alert threshold determination, sensor siting evaluation, and report development.

The costs of dispersion modeling are typically dependent on the site complexity (number of equipment, sensitive receptors, terrain, and meteorology) and consultant rates (operators do not typically have this specialized skill in house). WSPA's cost estimates for dispersion modeling are provided below in Table 2. For smaller sites with 5 to 10 pieces of equipment, the level of effort might be no more than 100 hours for the entire process. For larger sources with dozens to hundreds of pieces of equipment, the level of effort can be 300 to 400 hours for the entire process. As the skill is specialized, the average billing rate for a consultant¹ is estimated to be \$185/hr.

Table 2. Cost estimates for dispersion modeling at each site.

Item	Details	Low Estimate	High Estimate
Protocol development	4 to 40 hours at \$185/hour	\$ 740.00	\$ 7,400.00
Equipment inventory and location mapping	4 to 40 hours at \$185/hour	\$ 740.00	\$ 7,400.00
Sensitive receptor grid mapping	4 to 24 hours at \$185/hour	\$ 740.00	\$ 4,440.00
Selection and processing of meteorological data	4 to 32 hours at \$185/hour	\$ 740.00	\$ 5,920.00
REL-level leak rate assessments	16 to 80 hours at \$185/hour	\$ 2,960.00	\$ 14,800.00
Alert threshold determination and siting evaluation	16 to 32 hours at \$185/hour	\$ 2,960.00	\$ 5,920.00
Report development	40 to 100 hours at \$185/hour	\$ 7,400.00	\$ 18,500.00
Total Dispersion modeling costs per site		\$ 16,280.00	\$ 64,380.00

¹ 2026 average consultant billing rates for AEC firms; For dispersion modeling specialized skills, we used 60% of published dispersion modeling hourly fees charged by BAAQMD per hour to account for the variation across California.

The approximate range of dispersion modeling costs per site is \$16,280 to \$64,380. Assuming 70% of sites are simpler sites with lower efforts and the rest require higher efforts, the average cost of dispersion modeling is \$30,710 ($\$16,280 \times 70\% + \$64,380 \times 30\%$). For 3,000 sites, the total cost of dispersion modeling is approximately \$92.1 Million.

3. LDRP Development Costs

Operators are required to develop LDRP with specific information and assessments as required in Section 93504(m). The LDRP must include operator information, site information including details of equipment, sensitive receptors, natural gas sampling results and assessments of toxics of highest concern, EDS siting and alert threshold analysis methods, air dispersion modeling results as inputs, calculation methods, and results, detailed EDS description, a quality assurance project plan (QAPP), qualifications of qualified personnel, alarm response plan, and an attestation of truth and accuracy. CARB estimates the total LDRP development costs to be \$27 Million for 3,000 sites (approximately \$9,000 per site)

The LDRP plan development is dependent on the complexity of each site. WSPA's cost estimates for LDRP development are provided below in Table 3. For smaller sites with 5 to 10 pieces of equipment, the level of effort might be 100 to 200 hours for the entire process. For larger sources with dozens to hundreds of pieces of equipment, the level of effort can be 300 to 400 hours for the entire process. The average billing rate for an air quality consultant is assumed to be \$150/hr.

Table 3. Cost estimates for LDRP development for each site.

Item	Details	Low Estimate	High Estimate
EDS siting and alert threshold analysis methods	20 to 80 hours at \$150/hour	\$ 3,000.00	\$ 12,000.00
Detailed EDS description	20 to 80 hours at \$150/hour	\$ 3,000.00	\$ 12,000.00
Quality assurance project plan	40 to 80 hours at \$150/hour	\$ 6,000.00	\$ 12,000.00
Other information/agency discussions/re-submittals	20 to 80 hours at \$150/hour	\$ 3,000.00	\$ 12,000.00
Total LDRP development costs per site		\$ 15,000.00	\$ 48,000.00

The approximate range of LDRP development costs per site is \$15,000 to \$48,000. Assuming 70% of sites are simpler sites with lower efforts and the rest require higher efforts, the average cost of LDRP development is \$24,900 ($\$15,000 \times 70\% + \$48,000 \times 30\%$). For 3,000 sites, the total cost of LDRP development is \$74.7 Million. This estimate excludes the cost for dispersion modeling (see section 2) which is also required prior to developing the LDRP.

4. Equipment Costs

CARB has estimated equipment costs for statewide implementation of SB 1137 to be approximately \$50 Million (approximately \$16,667 per site). While CARB did provide a range of cost information by technology, the details of site level equipment cost assessment were not provided.

WSPA conducted an assessment to determine equipment costs per site. To estimate statewide equipment costs for implementation of SB 1137 continuous emissions detection systems (EDS), monitoring technologies were grouped into three representative technology categories rather than evaluating individual vendors or models. This approach aligns with CARB's technology assessment framework, which categorizes commercially available systems into point sensor networks, open-path systems, and scanning/imaging systems. The cost estimates include a meteorological (met) station at each site because meteorological measurements are required per the discussion draft for EDS operation, siting, and alert threshold development.

Equipment costs were developed using representative purchase costs for each technology type together with the cost of a meteorological station. The assumed average costs are summarized below in Table 4:

Table 4. Cost estimates by Technology type

Technology Type	Details	Low Estimate	High Estimate
Point Sensors	3 sensors per site	\$ 9,000.00	\$ 15,000.00
Open-path systems	1 system per site	\$ 30,000.00	\$ 65,000.00
Scanning/Imaging systems	1 system per site	\$ 100,000.00	\$ 200,000.00
Meteorological Station	1 system per site	\$ 10,000.00	\$ 20,000.00

The meteorological station cost was added to each monitoring technology option to develop the total equipment cost per site (Table 5).

Table 5. Cost Estimates for Combined Equipment Scenarios

Combined Equipment Scenario	Details	Low Estimate	High Estimate
Point Sensors + Meteorological Station	3 sensors per site + met station	\$ 19,000.00	\$ 35,000.00
Open-path systems + Meteorological Station	1 system per site + met station	\$ 40,000.00	\$ 85,000.00
Scanning/Imaging systems + Meteorological Station	1 system per site + met station	\$ 110,000.00	\$ 220,000.00

The average cost of equipment using a point sensor network is approximately \$27,000 per site (with a range of \$19,000 to \$35,000 per site). The average equipment cost using an open-path system is approximately \$62,500 per site (with a range of \$40,000 to \$85,000 per site). The average cost of equipment using scanning and imaging systems is approximately \$165,000 per site (with a range of \$110,000 to \$220,000 per site).

(A) Technology Adoption Assumptions

Because SB 1137 does not prescribe a specific monitoring technology, statewide costs were estimated using a representative adoption distribution across available technology categories (Table 6). This distribution assumes most facilities would select either point sensor networks or open-path systems due to lower cost and broader commercial availability, while a smaller percentage of sites would utilize higher-cost scanning/imaging systems.

Table 6. Technology Adoption assumptions statewide

Technology Category	Percent of Sites
Point Sensors	50%
Open-Path System	45%
Scanning/Imaging System	5%

(B) Statewide Equipment Cost Calculation

For a total of 3,000 regulated sites, the average equipment costs per site were used to calculate statewide costs in Table 7.

Table 7. Statewide equipment costs

Technology Category	Details	Average Estimate
Point Sensors	\$27,000 per site x 50% x 3,000 sites	\$40,500,000.00
Open-path systems	\$62,500 per site x 45% x 3,000 sites	\$84,375,000.00
Scanning/Imaging systems	\$165,000 per site x 5% x 3,000 sites	\$24,750,000.00
Total statewide equipment costs		\$149,625,000.00

The average equipment costs per site are approximately \$49,875. The statewide costs of equipment are approximately \$149.6 Million.

(C) Important Assumptions

The equipment costs presented above include monitoring equipment and meteorological stations only. The equipment cost estimates exclude:

- Electrical service and power upgrades
- Communications and telemetry infrastructure

- Mounting structures and foundations
- Replacement parts
- Permitting costs

5. Equipment Installation

CARB estimates equipment installation costs to be approximately \$6 Million (\$2,000 per site). This represents approximately 12% of equipment costs estimated by CARB (\$6 Million ÷ \$50 Million).

WSPA conducted a detailed review of installation costs. Installation includes mobilization and technician travel, site assessment, building of foundations, mounting structures, power infrastructure, telemetry and communications equipment, installation labor, startup and commissioning, engineering and permitting support, project management, and contingency. Installation costs were estimated using representative ranges developed for each monitoring technology category. Scanning and imaging systems were assigned the highest installation costs because they often require larger foundations, elevated mounting structures, visibility considerations, and more extensive commissioning. Point sensor networks were assigned lower installation costs because they typically rely on simpler pole-mounted installations and less complex mounting infrastructure.

For example, a site with 3 point sensors and met station will need the installation components listed in Table 8. This represents approximately 74% of average equipment cost (\$20,000 ÷ \$27,000).

Table 8. Point Sensor Network EDS Installation Costs (3 sensors plus met station)

Item	Quantity	Unit Cost	Total
Mobilization	1	\$ 2,500.00	\$ 2,500.00
Technician labor	1 person-day	\$ 800.00	\$ 800.00
Concrete foundation	1	\$ 2,000.00	\$ 2,000.00
Mounting poles	4	\$ 800.00	\$ 3,200.00
Electrical work	1	\$ 3,500.00	\$ 3,500.00
Telemetry equipment	1	\$ 2,500.00	\$ 2,500.00
Commissioning	1	\$ 2,500.00	\$ 2,500.00
Engineering/Permitting	1	\$ 3,000.00	\$ 3,000.00
Total Installation Cost			\$ 20,000.00

Similarly, a site with one open-path system and met station will need the installation components listed in Table 9. This represents approximately 37% of average equipment cost (\$23,100 ÷ \$62,500).

Table 9. Open-Path System EDS Installation Costs (1 tower + reflectors + met station)

Item	Quantity	Unit Cost	Total
Mobilization	1	\$ 2,500.00	\$ 2,500.00
Technician labor	2 person-days	\$ 800.00	\$ 1,600.00
Concrete foundation	1	\$ 2,000.00	\$ 2,000.00
Mounting poles / Reflectors	1	\$ 2,500.00	\$ 2,500.00
Electrical work	1	\$ 3,500.00	\$ 3,500.00
Telemetry equipment	1	\$ 2,500.00	\$ 2,500.00
Alignment & Surveying	1	\$ 3,000.00	\$ 3,000.00
Commissioning	1	\$ 2,500.00	\$ 2,500.00
Engineering/Permitting	1	\$ 3,000.00	\$ 3,000.00
Total Installation Cost			\$ 23,100.00

Finally, a site with one scanning/imaging system and met station will need the installation components listed in Table 10. This represents approximately 22% of average equipment cost ($\$35,900 \div \$165,000$).

Table 10. Scanning/Imaging System EDS Installation Costs (1 camera mount plus met station)

Item	Quantity	Unit Cost	Total
Mobilization	1	\$ 2,500.00	\$ 2,500.00
Technician labor	3 person-days	\$ 800.00	\$ 2,400.00
Concrete foundation	1	\$ 2,000.00	\$ 2,000.00
Tower / Elevated Mount	1	\$ 12,000.00	\$ 12,000.00
Electrical work	1	\$ 3,500.00	\$ 3,500.00
Telemetry equipment	1	\$ 2,500.00	\$ 2,500.00
Site Visibility Assessment	1	\$ 4,000.00	\$ 4,000.00
Commissioning	1	\$ 2,500.00	\$ 2,500.00
Engineering/Permitting	1	\$ 3,000.00	\$ 3,000.00
Total Installation Cost			\$ 35,900.00

(A) Statewide Equipment Installation Costs Calculation

For a total of 3,000 regulated sites, the average installation costs per site were used to calculate statewide costs in Table 11.

Table 11. Statewide equipment installation costs

Combined Equipment Scenario	Details	Average Estimate
Point Sensors + Meteorological Station	\$20,000 per site x 50% x 3,000 sites	\$30,000,000.00
Open-path systems + Meteorological Station	\$23,100 per site x 45% x 3,000 sites	\$31,185,000.00
Scanning/Imaging systems + Meteorological Station	\$35,900 per site x 5% x 3,000 sites	\$5,385,000.00
Total statewide equipment installation costs		\$66,570,000.00

The average equipment installation cost per site is approximately \$22,190 (44% of average equipment costs per site). The installation costs can range from 22% to 74% of equipment costs compared to 12% estimated by CARB.

6. Quality Assurance and Quality Control (QA/QC) Costs

The discussion draft requires extensive QA/QC procedures for EDS. Operators are required to conduct at least quarterly performance testing to verify field precision is maintained within $\pm 25\%$ at the alert threshold concentrations (93504(d)). Performance testing must be performed using a NIST-traceable standard. An EDS equipped with automated built-in functional verification feature is exempt from manual performance testing. Meteorological monitoring systems must follow EPA meteorological QA guidance, to the extent site conditions allow. This applies to sensor quality, siting, and quality assurance (93504(i)). The regulation also requires a Quality Assurance Project Plan (QAPP) covering installation procedures, protocols for data acquisition, data management, routine maintenance and calibration protocols and tools, requirements for personnel qualifications, system failure procedures, data quality indicators, QA checks, corrective actions, audit templates, reporting, and record retention (93504(m)). The operator is also required to develop and implement data quality indicators for the EDS, including the met station. The operator must develop and implement procedures for tracking data quality indicators and corrective action plans. CARB has estimated \$9 Million for QA/QC costs (approximately \$3,000 per site per year). Additional details have not been provided.

To estimate costs for quality assurance and quality control, WSPA focused on activities associated with quarterly performance testing, data quality review, personnel competencies, and corrective action procedures. Routine maintenance, data management systems, and independent performance audits are estimated separately and therefore are not included in this QA/QC cost estimate.

The QA/QC cost estimate consists of four primary components as required by the discussion draft: quarterly performance testing, data quality review and validation, system failure response and corrective actions, and personnel training. These are recurring annual costs.

(A) Quarterly Performance Testing with NIST-Traceable Standards

The discussion draft requires EDS sensors and monitors to be performance tested at least quarterly using NIST-traceable standards and to maintain specified performance criteria. Sensors that fail testing must be calibrated, repaired, or replaced (93504(d)(3)). EDS equipped with an automated built-in functional verification feature (e.g., optical reference cell, optical filter) that provides a traceable and logged response check equivalent to a manual performance verification test may be exempt from manual quarterly performance verification testing, provided the automated verification is conducted at least quarterly and manufacturer-documented equivalency is maintained (93504(d)(3)(C)).

For cost estimation purposes, each quarterly performance test was assumed to include components in Table 12. The values assumed are for an average site with typical anticipated scenarios identified in Table 5. Complex sites are expected to have higher costs per event. For technologies with automated built-in functional verification feature, the costs may be slightly lower as there is no mobilization. However, remote quarterly verifications are still required.

Table 12. Average costs per quarterly performance testing event for an average site

Component	Average Cost Per Quarterly Test
Mobilization (vehicle, travel, safety, coordination)	\$1,000
Technician Labor (0.5 day at \$100/hr)	\$400
NIST-Traceable Equipment and Gas Certification	\$1,000
MET Station QA	\$500
Total Per Test Event	\$2,900

For four testing events per year, the annual cost per site is:

$$\$2,900 \times 4 = \$11,600 \text{ per site per year}$$

Applying this cost to 3,000 regulated sites results in a statewide annual cost of:

$$\$11,600 \times 3,000 = \$34,800,000$$

(B) Data Quality QA/QC Review

The discussion draft requires operators to implement data quality procedures, evaluate data quality indicators, perform quality assurance checks on monitoring data, and track corrective actions for inclusion in annual reporting (93504(m)(8)(I)).

For this analysis, data quality review was estimated as:

- Average of 1 hour per week of technical review
- Average consultant labor rate of \$150 per hour

Annual cost per site:

$$1 \text{ hour/week} \times 52 \text{ weeks/year} \times \$150/\text{hour} = \$7,800$$

Statewide annual cost:

$$\$7,800 \times 3,000 = \$23,400,000$$

(C) System Failure and Corrective Actions

The discussion draft requires operators to maintain a System Failure Plan and to implement corrective actions when monitoring systems fail quality assurance requirements or become out-of-control (93504(m)(8)(H)).

For estimation purposes, the analysis assumes:

- Average one corrective-action event per site per year
- Average of 8 labor hours per event
- Specialized technician labor rate of \$150 per hour
- On average 5% of sites experience a system failure annually

Annual cost per site:

$$1 \text{ event/year} \times 8 \text{ hours/event} \times \$150/\text{hour} = \$1,200$$

Statewide annual cost:

$$\$1,200 \times 3,000 \times 0.05 = \$180,000$$

(D) Personnel Training

The discussion draft requires training and qualification of personnel responsible for EDS operation, calibration, maintenance, and repairs (93504(m)(9)).

For cost estimation purposes, the following assumptions were used:

- One employee/consultant per 3 sites
- Average of 20 hours of training annually
- Labor rate of \$150 per hour

Annual cost per site:

$$20 \text{ hours} \times \$150/\text{hour} \div 3 = \$1,000$$

Statewide annual cost:

$$\$1,000 \times 3,000 = \$3,000,000$$

The total annual QA/QC costs per site and statewide are summarized in Table 13. The average QA/QC cost per site is approximately \$21,600 per year. The statewide QA/QC costs are estimated to be \$61.4 Million.

Table 13. Estimated average QA/QC costs per site per year and statewide costs per year

Item	Average Annual Cost per Site	Statewide Annual Cost
Quarterly Performance Testing with NIST Standards	\$11,600	\$34,800,000
Data Quality QA/QC Review	\$7,800	\$23,400,000
System Failure and Corrective Actions	\$1,200	\$180,000
Personnel Training	\$1,000	\$3,000,000
Total QA/QC Cost	\$21,600	\$61,380,000

7. Maintenance and Calibration Costs

The discussion draft requires routine maintenance, calibrations procedures and schedules, specialized tools and supplies, and procedures for maintaining EDS performance (93504(m)(8)). CARB has estimated equipment maintenance costs at approximately \$3 Million or \$1,000 per site per year. Additional details have not been provided.

WSPA reviewed typical manufacturer recommendations for maintenance and calibration of technologies to develop cost estimates.

(A) Point Sensor Networks

Manufacturers specify calibration requirements for point sensor networks technologies. Some point sensor network technology vendors calibrate each sensor in the lab prior to deployment in the field across a range of methane concentrations and environmental conditions (humidity, temperature, etc.). Once in the field, an auto-baselining algorithm continuously monitors sensor drift and performs over-the-air updates to re-baseline. Field calibrations may also be required by certain manufacturers of point sensor networks. Routine maintenance is required for all point sensor networks.

Assuming that all adopted point sensor networks require routine calibrations and at least 50% of the adopted point sensor networks will also require field calibrations, the components of maintenance and calibration costs are detailed in Table 14. Costs

associated with quarterly NIST-traceable performance testing, data quality review, and independent audits were estimated separately to avoid double counting.

Table 14. Estimated average routine maintenance and calibration costs for point sensor networks per site per year

Item	Details	Average Estimate
Mobilization	Assumes 2 maintenance events per year (annual calibration + routine maintenance); \$1,000 per visit; 50% require annual calibrations (\$1,000 x 2 x 50%)	\$ 1,000.00
Mobilization	Assumes 1 maintenance event per year (routine maintenance); \$1,000 per visit; 50% don't require annual calibration (\$1,000 x 1 x 50%)	\$ 500.00
Technician Labor	4 hours per event at \$100/hr and 2 events (field and remote)	\$ 800.00
Spare Parts & Consumables	Annual Budget per site	\$ 500.00
Calibration Gases & Standards	Annual Budget per site	\$ 500.00
Communications Maintenance	Annual Budget per site	\$ 500.00
Documentation & Recordkeeping	2 hours per event at \$100/hr and 2 events (field and remote)	\$ 400.00
Total		\$ 4,200.00

The statewide annual costs can be calculated as follows:

$$\begin{aligned}
 &\$4,200 \text{ per site per year} \times 3,000 \text{ sites} \times 50\% \text{ Adoption of Point Sensor Networks} \\
 &= \$6,300,000 \text{ per year}
 \end{aligned}$$

(B) Open-path Systems

Open-path systems that are methane-only typically use automatic optical reference checks for ongoing instrument verification. Systems that measure speciated TACs generally use sealed optical reference cells containing known optical signatures of the target compounds for calibration and routine verification, allowing system performance to be checked without releasing calibration gases. Additional QA/QC tasks may include beam-alignment verification, reflector cleaning, and spectral library checks. Because

TAC-speciating systems rely on interpreting detailed absorption spectra, their calibration and QA/QC activities typically require operators with specialized training in optical measurement and spectroscopic data interpretation (CARB, Review of Commercially Available Operating Emissions Detection System Technologies, October 14, 2025).

CARB's "Evaluation of Potential Performance Standards for Continuous Emissions Monitoring Systems for Upstream Oil and Gas Production Sites in California" (Draft: January 7, 2026), states that commercially available EDS often incorporate automated QA/QC features and sensors or monitors designed for low maintenance with factory pre-calibration. These design elements can reduce the operational burden of QA/QC while helping to maintain data quality. Commercial EDS manufacturers typically integrate automated QA/QC features into their systems, such as built-in calibration cells, self-diagnostic routines, connectivity and system health checks, and automated data validation algorithms. These EDS may flag anomalous readings, account for environmental interferences, and apply automated corrections in near real-time.

While commercially available EDS often integrate automated QA/QC features that can reduce operational effort and support reliable performance, these features alone are not sufficient to ensure long-term data quality. The LDRP should still define and implement comprehensive QA/QC procedures that address all aspects of data quality management, including manual oversight where appropriate. In particular, the LDRP should explicitly identify key data quality indicators, specify acceptable performance thresholds, and establish methods for tracking and documenting corrective actions to maintain confidence in leak detection results over time (CARB, Evaluation of Potential Performance Standards for Continuous Emissions Monitoring Systems for Upstream Oil and Gas Production Sites in California, Draft: January 7, 2026).

Routine maintenance is expected to be required for all open-path systems including cleaning reflectors, checking beam alignment, inspecting power systems, reviewing diagnostics, software updates, telemetry troubleshooting etc. This assessment assumes annual field calibrations are not required. The components of maintenance costs for open-path systems are detailed in Table 15. Costs associated with quarterly NIST-traceable performance testing, data quality review, and independent audits were estimated separately to avoid double counting.

Table 15. Estimated average maintenance costs for open-path systems per site per year

Item	Details	Average Estimate
Mobilization	Assumes 1 maintenance event per year; \$1,000 per visit	\$ 1,000.00
Technician Labor	4 hours per event at \$100/hr; includes cleaning and inspections	\$ 400.00
Spare Parts & Consumables	Annual Budget per site	\$ 500.00
Communications Maintenance	Annual Budget per site	\$ 500.00
Documentation & Recordkeeping	1 hour per event at \$100/hr	\$ 100.00
Total		\$ 2,500.00

The statewide annual costs can be calculated as follows:

$$\begin{aligned}
 & \$2,500 \text{ per site per year} \times 3,000 \text{ sites} \times 45\% \text{ Adoption of Open path systems} \\
 & = \$3,375,000 \text{ per year}
 \end{aligned}$$

(C) Scanning/Imaging Systems

Calibration and QA/QC considerations for scanning/imaging systems vary based on system type. The methane-LiDAR system includes built-in reference features that automatically verify tuning to methane, reducing the need for routine manual calibration. OGI cameras are factory-tuned for their infrared detection bands and typically require only periodic checks to ensure sensitivity has not degraded. More advanced spectral imaging systems (e.g., hyperspectral imagers) may require additional verification steps to confirm correct spectral interpretation, generally necessitating operators with specialized optical measurement training (CARB, Review of Commercially Available Operating Emissions Detection System Technologies, October 14, 2025).

While commercially available EDS often integrate automated QA/QC features that can reduce operational effort and support reliable performance, these features alone are not sufficient to ensure long-term data quality. The LDRP should still define and implement comprehensive QA/QC procedures that address all aspects of data quality management, including manual oversight where appropriate. In particular, the LDRP should explicitly identify key data quality indicators, specify acceptable performance

thresholds, and establish methods for tracking and documenting corrective actions to maintain confidence in leak detection results over time (CARB, Evaluation of Potential Performance Standards for Continuous Emissions Monitoring Systems for Upstream Oil and Gas Production Sites in California, Draft: January 7, 2026).

Routine maintenance costs for scanning and imaging systems are estimated based on periodic optical cleaning, diagnostic review, sensitivity verification, communications and telemetry inspections, meteorological sensor maintenance, software and firmware updates, environmental enclosure maintenance, documentation, and operator training. Maintenance estimates recognize that methane-LiDAR systems may include automated reference verification features that reduce manual calibration requirements, while OGI systems typically rely on periodic sensitivity verification. Advanced spectral imaging systems may require additional verification and personnel with specialized optical measurement expertise. Annual calibrations are not required, and the components of maintenance costs are detailed in Table 16.

Table 16. Estimated average maintenance costs for scanning/imaging systems per site per year

Item	Details	Average Estimate
Mobilization	Assumes 1 maintenance event per year; \$1,000 per visit	\$ 1,000.00
Specialized Technician Labor	20 hours per year at \$150/hr; includes system diagnostic review, sensitivity verification, software updates, spectral verification, and qualifications maintenance	\$ 3,000.00
Technician Labor	2 hours per event at \$100/hr; includes optical cleaning and enclosure maintenance	\$ 200.00
Spare Parts & Consumables	Annual Budget per site	\$ 500.00
Communications Maintenance	1 hour per event at \$100/hr	\$ 100.00
Documentation & Recordkeeping	1 hour per event at \$150/hr	\$ 150.00
Total		\$ 4,950.00

The statewide annual costs can be calculated as follows:

$$\begin{aligned}
 &\$4,950 \text{ per site per year} \times 3,000 \text{ sites} \\
 &\quad \times 5\% \text{ Adoption of Scanning or imaging systems} = \$720,000 \text{ per year}
 \end{aligned}$$

The total annual maintenance costs per site and the total statewide costs are summarized in Table 17. The average maintenance cost per site is approximately \$3,473 per year. The statewide annual maintenance costs are estimated to be \$10.4 Million.

Table 17. Estimated annual average maintenance costs per site per year and statewide costs per year

Item	Details	Average Cost Estimate Per Site Per Year	Average Statewide Cost Estimate Per Year
Point Sensors	3 sensors per site (50% adoption)	\$ 4,200.00	\$ 6,300,000.00
Open-path systems	1 system per site (45% adoption)	\$ 2,500.00	\$ 3,375,000.00
Scanning/Imaging systems	1 system per site (5% adoption)	\$ 4,950.00	\$ 720,000.00
Total		\$ 3,473.00	\$ 10,395,000.00

8. Data Management and Reporting

The discussion draft requires operators to maintain a comprehensive data management program that includes continuous data acquisition, storage of at least five years of monitoring data, quality assurance review and validation, ten years of record retention, annual reporting, alert management, and support for LDRP documentation and compliance activities. Operators must document in the QAPP, data system and operating protocol to be used for data collection and record management including, but not limited to, data logging, data processing, recording, downloading, backup and storage, and reporting (93504(m)(8)(C)). Additionally, data quality assurance procedures must include data quality indicators, QA checks, tracking of data quality indicators, and corrective actions (93504(m)(8)(I)).

Several technology vendors provide data management software solutions with the technology. The software costs are often subscription-based monthly fees. The average subscription costs per site can be lower if an operator has multiple sites. The capabilities of these software solutions to meet all regulatory requirements and operators' data and security needs may vary quite a bit. For certain technologies or a combination of technologies, the operators may need additional infrastructure. CARB estimates the cost of data management to be approximately \$7 Million or \$2,333 per site.

WSPA estimated the data management costs under two implementation models: (1) a vendor-hosted subscription platform and (2) an operator-managed database and reporting system. Regardless of implementation model, operators remain responsible for reviewing monitoring data, maintenance of regulatory records, annual reporting, and compliance documentation required by the LDRP.

(A) Vendor-hosted Subscriptions

The vendor-hosted option assumes the monitoring vendor provides cloud hosting, data storage, data backup, alert management, reporting tools, and technical support through an annual subscription service. See Table 18 for details.

Table 18. Estimated annual data management costs associated with vendor-hosted subscriptions per site.

Component	Annual Cost per Site
Vendor Software Subscription (\$500 per month)	\$ 6,000.00
Cellular Communications (\$100 per month)	\$ 1,200.00
Vendor Data Storage & Retention	Included
Alert Management Platform	Included
Reporting Tools	Included
Technical Support (limited by hours per month)	Included
Total	\$ 7,200.00

WSPA assumes that 60% of the sites will adopt vendor-hosted subscriptions and approximately 25% efficiency gained from operators with multiple sites. The statewide annual costs can be calculated as follows:

$$\begin{aligned} & \$7,200 \text{ per site per year} \times 3,000 \text{ sites} \times 60\% \text{ Adoption of Vendor} \\ & \quad - \text{hosted subscriptions} \times (1 - 0.25) = \$9,720,000 \text{ per year} \end{aligned}$$

(B) Operator-managed Database

This assumes the operator maintains responsibility for data storage, reporting, backups, administration, and regulatory compliance support either directly or through a third-party. The technology vendor provides all raw data to the operator or third party via subscription for data processing and storage. See Table 19 for details.

Table 19. Estimated annual data management costs associated with operator-managed database per site.

Component	Annual Cost per Site
Vendor Software Subscription (\$500 per month)	\$ 6,000.00
Cellular Communications (\$100 per month)	\$ 1,200.00
Third Party Software Licensing	\$ 1,000.00
Database Administration	\$ 1,000.00
Annual Reporting Support (16 hours at \$150/hr)	\$ 2,400.00
Data Backup & Retention	\$ 1,000.00
Cybersecurity & IT Support (\$100 per month)	\$ 1,200.00
Total	\$ 13,800.00

WSPA assumes that 40% of the sites will adopt operator-managed databases and approximately 50% efficiency gained from operators with multiple sites. The statewide annual costs can be calculated as follows:

$$\begin{aligned} & \$13,800 \text{ per site per year} \times 3,000 \text{ sites} \times 40\% \text{ Adoption of Vendor} \\ & \quad - \text{hosted subscriptions} \times (1 - 0.5) = \$8,280,000 \text{ per year} \end{aligned}$$

The total annual data management costs per site and the total statewide costs are summarized in Table 20. The average data management cost per site is approximately \$9,840 per year. The statewide annual data management costs are estimated to be \$18

Million. The costs may be higher depending on the degree of reliance on vendor-provided services and the amount of operator-managed infrastructure required.

Table 20. Estimated annual data management costs per site and statewide estimates.

Item	Annual Estimate per site	Annual State-wide Estimate
Vendor-hosted subscriptions (60%)	\$ 7,200.00	\$ 9,720,000.00
Operator-managed databases (40%)	\$ 13,800.00	\$ 8,280,000.00
Total	\$ 9,840.00	\$ 18,000,000.00

9. Independent Audits

SB 1137 does not mandate imposition of independent performance audits. However, the discussion draft requires operators to conduct independent performance audits initially within 12 months of EDS installation and then every 3 calendar years (93504(n)). The audits must be performed by a qualified independent party hired by the operator. The auditor must not be involved in the implementation of the EDS being audited, including the installation, operation, maintenance, and quality assurance procedures. It is our understanding that the audits will include a field component that will require the auditor to travel to the site. CARB estimates the statewide cost of independent audits is \$4.5 Million or approximately \$1,500 per site. Additional details are not provided.

WSPA estimated the costs of independent audit which includes audit planning, document review, site mobilization, field inspection, review of QA/QC records, evaluation of data management and reporting systems, preparation of audit findings, and follow-up review of corrective actions (Table 21).

Table 21. Estimated audit costs per site during a given year.

Item	Details	Low Estimate	High Estimate
Auditor Mobilization	Travel, mileage, lodging, per diem, site access coordination; \$1,000 to \$3,000 per site	\$ 1,000.00	\$ 3,000.00
Audit Planning & Review	Review of LDRP, EDS configuration, QAPP, previous audit findings; 4 to 8 hrs at \$150/hr	\$ 600.00	\$ 1,200.00
Field Inspection	Physical inspection of monitoring equipment and installation; 4 to 8 hrs at \$150/hr	\$ 600.00	\$ 1,200.00
Data Quality Review	Review of QA/QC records, calibration records, downtime logs, and corrective actions; 4 to 8 hrs at \$150/hr	\$ 600.00	\$ 1,200.00
Meteorological System Review	Review of meteorological monitoring configuration and records; 2 to 4 hrs at \$150/hr	\$ 300.00	\$ 600.00
Data Management Review	Review of record retention, reporting, backups, and data quality processes; 2 to 4 hrs at \$150/hr	\$ 300.00	\$ 600.00
Audit Report Preparation	Documentation of findings and recommendations; 8 to 24 hrs at \$150/hr	\$ 1,200.00	\$ 3,600.00
Corrective Action Review	Follow-up review of corrective actions, if required; 4 to 8 hrs at \$150/hr	\$ 600.00	\$ 1,200.00
Total		\$ 5,200.00	\$ 12,600.00

The approximate range of costs for independent audits per site is \$5,200 to \$12,600. The average cost of an independent audit is \$8,900. For 3,000 sites, the total cost of independent audit is approximately \$26.7 Million during the year audits are performed.

10. Alarm Response Plan Implementation

The discussion draft requires operators to develop an alarm response plan. The EDS must include automated alerting functionality, and the EDS must automatically trigger an alarm whenever the detection target exceeds an approved alert threshold. The notification must be sent to the operator as soon as technically feasible and no later than 15 minutes after the exceedance is detected. The EDS must also generate notifications when a sensor or monitor fails. The alarm response plan must include operator's protocol for inspecting the facility when an alert is triggered and plan for notification of community members and emergency services, if needed, in the event an alert indicates a toxic of highest concern is likely to impact a sensitive receptor (93503). CARB has not provided any costs associated with the implementation of alarm response plan.

WSPA developed cost estimates for the implementation of an alarm response plan at a site (Table 22). Operators may already have teams that respond to emergencies. Therefore, the costs are intended to be estimates of incremental effort required for SB 1137 response. The implementation efforts include standby team for alarm response, alarm validation, field investigation, leak confirmation, notifications, repair coordination, other corrective actions and reporting.

(A) Assumptions

- Standby coverage is maintained throughout the year at 2 hours per month
- Four alarm investigations annually (including any false alarms).
- Two confirmed leak events annually.
- Technician labor rate = \$100/hour.
- Average field investigation = one-half day.

Table 22. Estimated annual average response plan implementation costs per site.

Item	Details	Annual Cost per Site
Standby Response Team	2 hrs/month administrative readiness at \$100/hr	\$ 2,400.00
Alarm Validation	4 alarms/year, 2 hrs/alarm at \$100/hr	\$ 800.00
Field Investigation	4 investigations/year, 4 hrs/investigation at \$100/hr	\$ 1,600.00
Mobilization	4 site visits/year, \$1,000 per site visit	\$ 4,000.00
Leak Confirmation	2 confirmed events, 1 hr at \$100/hr	\$ 200.00
Repair Coordination	2 events, 4 hrs at \$100/hr	\$ 800.00
Other Corrective Actions/Re-Inspection	2 events, 4 hrs at \$100/hr	\$ 800.00
Community/Emergency Notifications	1 event, 2 hrs at \$100/hr	\$ 200.00
Incident Documentation & Reporting	4 alarms/year, 2 hrs/alarm at \$100/hr	\$ 800.00
Total Annual Cost per Site		\$ 11,600.00

The approximate annual cost of implementing alarm response plan per site is \$11,600. Operators with multiple sites may gain efficiencies in having the same teams on standby for multiple sites. WSPA assumes approximately 20% efficiency gained from operators with multiple sites. The statewide annual costs can be calculated as follows:

$$\$11,600 \text{ per site per year} \times 3,000 \text{ sites} \times (1 - 0.2) = \$27,840,000 \text{ per year}$$

For 3,000 sites, the total cost of implementing alarm response plans is \$27.8 Million annually.

11. Overall Cost Summary

The overall costs estimated by CARB for implementation of SB 1137 from 2028 to 2033 are \$197 Million. Based on WSPA's assessment, the overall costs of the program are at least **\$1 Billion** from 2028 to 2033 (at least **5x** the costs estimated by CARB). The annualized ongoing costs for this program beginning 2030 are estimated to be \$131 Million for 3,000 sites. Table 23 provides the overall summary of WSPA estimated costs by category and year. Figure 2 provides a comparison of costs by year for each category described in this section, as required by the discussion draft.

Recommendation: WSPA recommends that CARB update its economic analysis to reflect the full range of capital expenditures and recurring costs of compliance that would result from adoption of the proposed rules.

Table 23. Overall Statewide SB 1137 Implementation Costs by Year and Category

Cost Type	Cost Category	2028	2029	2030	2031	2032	2033	Grand Total
Capital Costs	Data Management and Reporting		\$18,000,000					\$18,000,000
Capital Costs	Dispersion Modeling	\$92,130,000						\$92,130,000
Capital Costs	Equipment Cost		\$149,625,000					\$149,625,000
Capital Costs	Equipment Installation		\$ 66,570,000					\$66,570,000
Capital Costs	LDRP Plan Development	\$74,700,000						\$74,700,000
Capital Costs	Quality Assurance and Control Costs		\$61,380,000					\$61,380,000
Capital Costs	Sampling and Analyses	\$17,430,000						\$17,430,000
Capital Costs Total		\$184,260,000	\$295,575,000					\$479,835,000
Ongoing Costs	Data Management and Reporting			\$18,000,000	\$18,000,000	\$18,000,000	\$18,000,000	\$72,000,000
Ongoing Costs	Equipment Maintenance			\$10,395,000	\$10,395,000	\$10,395,000	\$10,395,000	\$41,580,000
Ongoing Costs	Independent Performance Audits			\$26,700,000			\$26,700,000	\$53,400,000
Ongoing Costs	Quality Assurance and Control Costs			\$61,380,000	\$61,380,000	\$61,380,000	\$61,380,000	\$245,520,000
Ongoing Costs	Response Plan Implementation			\$27,840,000	\$27,840,000	\$27,840,000	\$27,840,000	\$111,360,000
Ongoing Costs Total				\$144,315,000	\$117,615,000	\$117,615,000	\$144,315,000	\$523,860,000
Grand Total		\$184,260,000	\$295,575,000	\$144,315,000	\$117,615,000	\$117,615,000	\$144,315,000	\$1,003,695,000

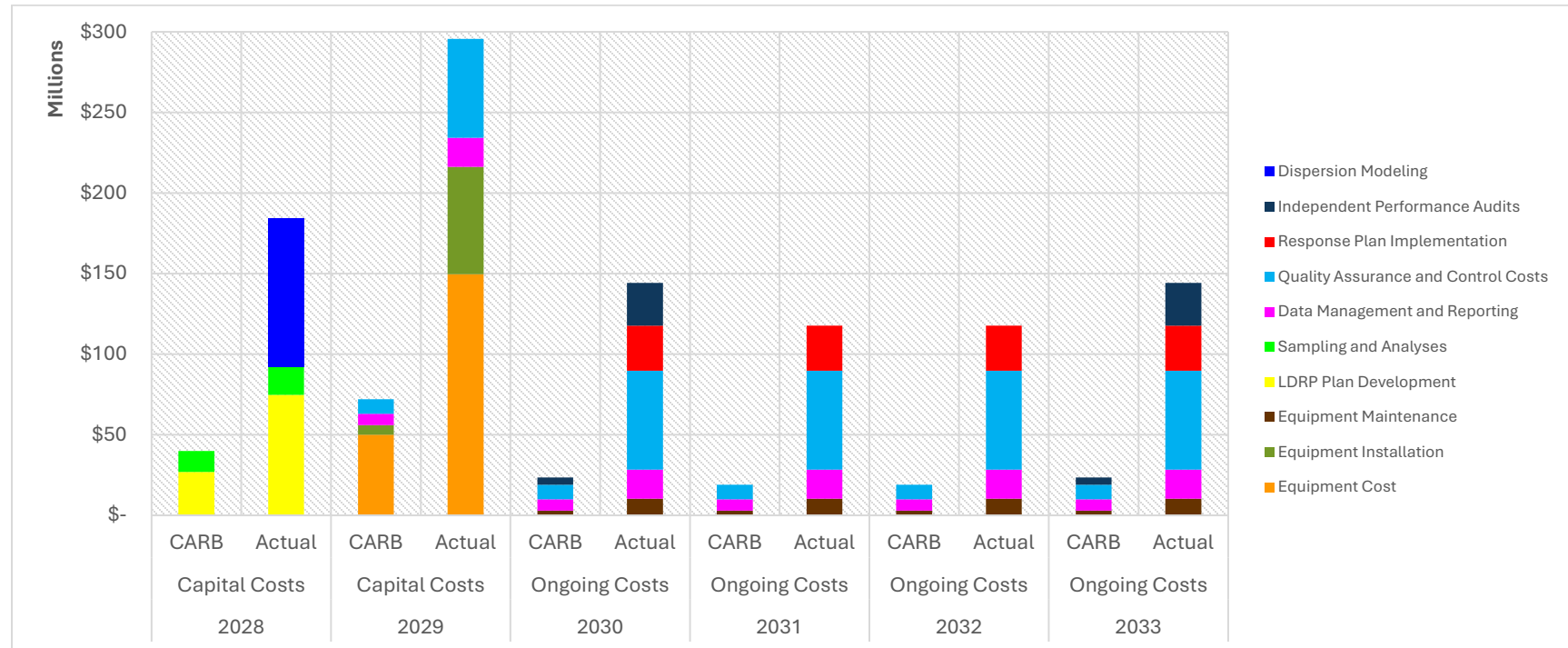


Figure 2. Comparison of CARB's cost estimates with operator estimates by cost category and year.

II. Implementation Schedule

CARB presented their timeline of rulemaking activities in the July 16, 2026, workshop (Figure 3).

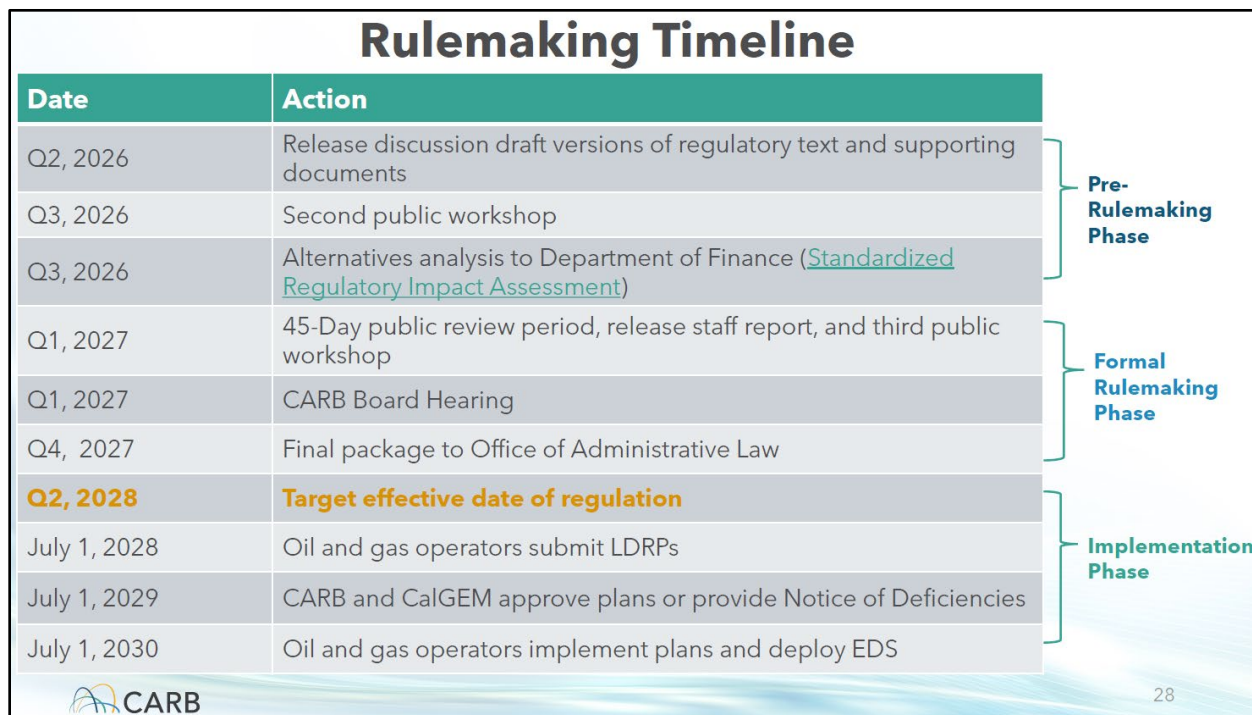


Figure 3. CARB’s rule making timeline

CARB intends to release the formal 45-day package in the first quarter of 2027 and finalize the regulation by the fourth quarter of 2027. Operators would then be required to submit their LDRPs by July 1, 2028, leaving less than one year to develop the plans and submit them to CALGEM for review and approval by July 1, 2029. Following approval, operators would have one year to implement their LDRPs, with implementation required by July 1, 2030.

Implementation of an approved LDRP and installation of a fully functional Emissions Detection System (EDS) by July 1, 2030, primarily involve procurement, installation, integration, testing, and operational deployment of the monitoring system. Operators would need to purchase compliant monitoring equipment, meteorological sensors, communications hardware, data storage and reporting systems, and automated alerting

infrastructure. Installation activities could include permitting, site preparation, construction of mounting structures or utility connections, deployment of sensors and meteorological stations, communications network configuration, software integration, calibration, validation testing, and establishment of automated alarm notifications. Following installation, the operator would need to verify that the system functions as designed, achieves the required monitoring coverage, generates alerts within the required timeframe, stores data appropriately, and is capable of producing the required reports before placing the system into routine operation. The operator would need to train personnel, and finalize response, notification, reporting, and recordkeeping procedures to ensure the EDS is fully operational by July 1, 2030. The EDS must be capable of continuous operation, automated alerts, data storage, and reporting, while meeting the performance standards established under SB 1137.

Several challenges outside an operator's direct control could delay implementation despite diligent efforts. These may include supply-chain constraints and vendor delays affecting the availability of monitoring equipment, sensors, telecommunications infrastructure, or specialized software platforms; extended lead times for qualified contractors; delays in utility service upgrades or communications infrastructure needed to support continuous monitoring; other regulatory review timelines; changes in other regulatory requirements during the implementation period; permitting delays imposed by local agencies; and unforeseen site-access, environmental, weather-related, or third-party property issues that affect equipment installation.

WSPA recommends that CARB recognize that factors outside an operator's control, such as third party or vendor delays, may occur. WSPA recommends that CARB include a variance process where an operator impacted by circumstances beyond their control can demonstrate timely and diligent implementation efforts and request additional time needed to complete the deployment of EDS.

Recommendation: WSPA recommends that CARB consider a variance process for implementation delays caused by factors outside an operator's control. WSPA recommends the following changes to regulatory text in the discussion draft (Appendix A).

Current text

93503(a)

(a) All operators with a production facility or well with a wellhead in a health protection zone shall develop an LDRP that shall be submitted to CalGEM no later than July 1, 2028, and fully implemented by operators by July 1, 2030.

Proposed Changes

(a) All operators with a production facility or well with a wellhead in a health protection zone shall develop an LDRP that shall be submitted to CalGEM no later than July 1, 2028, and fully implemented by operators by July 1, 2030, unless(a)(1) and (2) are applicable.

(1) An operator shall not be deemed out of compliance with the implementation deadline where the operator demonstrates that all of the following requirements are met:

(A) substantial progress toward implementation has been made;

(B) the operator initiated procurement, contracting, permitting, and installation activities in a timely manner;

(C) delays are the result of circumstances beyond the operator's reasonable control; and

(D) the operator requested a variance in a timely manner.

(2) Each variance request will be reviewed by CalGEM and a determination will be made. The operator will be notified by CalGEM of the determination and any actions required of the operator during the variance period.

III. Sampling of Natural Gas

Section 93504(a)(1) of the proposed discussion draft requires operators to conduct site-specific natural gas composition testing to identify the site-specific toxic of highest concern. Section 93504(b) specifies the methodologies, number of samples per process category at each site, and the frequency of sampling.

WSPA appreciates the incorporation of site-specific sampling to identify the toxic of highest concern at each site. Site-specific samples will provide two key pieces of information for LDRP development: 1) Identify toxic of highest concern at each site, and 2) Ratio of methane to toxic of highest concern (if methane is used as surrogate for monitoring).

CARB anticipates the number of sites to be approximately 3,000. The requirement of 3 samples per process category leads to an average of approximately 10 samples per site (Range 9 to 12 samples per site). The total estimated number of statewide samples required is 30,000 (3,000 sites x average 10 samples/site). This is a significant amount of sampling that would need to be conducted prior to any other assessment (such as dispersion modeling) and LDRP development.

As detailed in the cost analysis, collecting and analyzing 30,000 samples is estimated to cost approximately \$17.4 million statewide, or an average of \$5,810 per site.

Additionally, because LDRPs must be submitted by July 1, 2028, operators would have no more than 12 months to complete sample collection and laboratory analysis. Meeting this requirement within the available timeframe would place substantial resource and scheduling demands on both operators and analytical laboratories. At this scale and within the compressed implementation period, the requirement would create an extraordinarily complex statewide logistical challenge and a system-wide resource burden, straining available laboratory capacity, qualified personnel, field resources, scheduling, and administrative coordination across the regulated community.

WSPA recommends that CARB consider the following alternative approaches that consider cost, schedule, and resource impacts while still providing reasonable accuracy of information sought from samples, i.e. toxic of highest concern and ratio of methane to toxic ratio.

1. Benzene as Default Toxic of Highest Concern

CARB can propose a statewide default toxic of highest concern to reduce the costs, resources, and schedule burden of sampling. This lower cost and equally effective option will allow operators to select the CARB-determined default option without having to conduct extensive sampling.

A default statewide toxic can be determined using existing study data and updated as more information becomes available. CARB's assessment of existing speciation data indicates that the primary air toxic of concern at majority of oil and gas production facilities will be benzene. Benzene contributes over 90% of the acute, cancer, and chronic risk across all equipment types and locations. Based on the available speciation profiles and production equipment inventory information, CARB staff conclude benzene is the toxic of greatest concern for potential fugitive emissions across California oil and gas equipment (CARB, Evaluation of Methane as a Surrogate to Identify Leaks and Associated Toxic Emissions from Crude Oil and Natural Gas Production Wells and Production Facilities, October 14, 2025).

Based on CARB's existing speciation analysis, any additional site-specific sampling conducted is expected to simply confirm benzene as the toxic of highest concern at more than 90% of regulated sites. As such, benzene can be considered as the default toxic of highest concern for over 90% of sites as a lower-cost and equally effective alternative to sampling. As additional studies become available in the future, CARB may refine their approach to determining the default toxic of highest concern further. For the initial proposal, CARB can consider Benzene as the default option that can eliminate sampling burden for several operators.

Recommendation: WSPA recommends that CARB consider adding a lower cost and equally effective default option as a toxic of highest concern at a site. WSPA recommends the following changes to regulatory text in the discussion draft (Appendix A).

Current text

93504(a)

The following performance standards are designed to ensure EDS selected and implemented by operators are capable of the Public Resources Code section 3283(a) requirement that EDS continuously provide for rapid detection of target chemical

constituents to identify leaks before emissions impact the surrounding communities as well as other requirements within section 3283. To the extent operators have an emissions detection system in service that qualifies as an EDS, no new emission monitoring system is required and operators may instead submit the system details in their LDRP for approval.

(a) Potential toxics of highest concern that can be used as a detection target for EDS for all regions of California are identified in Table 1.

Proposed Changes

The following performance standards are designed to ensure EDS selected and implemented by operators are capable of the Public Resources Code section 3283(a) requirement that EDS continuously provide for rapid detection of target chemical constituents to identify leaks before emissions impact the surrounding communities as well as other requirements within section 3283. To the extent operators have an emissions detection system in service that qualifies as an EDS, no new emission monitoring system is required and operators may instead submit the system details in their LDRP for approval.

- (a) Operators may use either of the following methods to determine the toxic of highest concern for each site:*
 - (1) Use Benzene as the default toxic of highest concern; or*
 - (2) Determine the potential toxic of highest concern that can be used as a detection target for EDS at a site from the list of chemicals identified in Table 1 using natural gas chemical composition testing identified pursuant to paragraph 93504(a)(2)(A) and (B).*

2. Methane to Benzene Default Ratio

WSPA understands that sampling was also intended to provide methane to toxic ratio for sites that intend to use methane as a surrogate for monitoring. In the absence of sampling, CARB can consider studies that can provide average methane to benzene ratios representative of California's modern oil and gas operations. Existing studies reviewed by CARB in their evaluation are several decades old, not representative of current oil and gas production mix, and use several assumptions about speciation leading to a wide range of methane to benzene ratios (CARB, Evaluation of Methane as

a Surrogate to Identify Leaks and Associated Toxic Emissions from Crude Oil and Natural Gas Production Wells and Production Facilities, October 14, 2025). Therefore, it is infeasible to develop a single average methane to benzene ratio from these existing studies to represent current California oil and gas operations.

WSPA would like CARB to consider development of a default and representative methane to benzene ratio. This default option would need to be developed to be incorporated into the 45-day version of the rule, that is anticipated to be released in Q1 2027.

Recommendation: WSPA recommends that CARB consider adding a lower cost and equally effective default option for methane to benzene ratio (placeholder text x:1). We recommend the placeholder text x:1 be replaced with the actual default methane to benzene ratio once developed. WSPA recommends the following changes to regulatory text in the discussion draft (Appendix A).

Current text

93504(a)(3)

(3) Methane may be used as a surrogate detection target for the site-specific toxic of highest concern if all of the following site-specific criteria are met:

(A) The relationship between methane and the site-specific toxic of highest concern (e.g., benzene) is determined using the site-specific composition source testing methodology in paragraph 93504(b).

(B) The proposed methane EDS shall meet the performance standards pursuant to section 93504.

Proposed Changes

(3) Operators may use methane as a surrogate detection target for benzene or the toxic of highest concern at a site if all of the following criteria are met:

- (A) The relationship between methane and benzene or the toxic of highest concern at a site is determined using one of the following methodologies:**
- 1. Use methane to benzene default ratio of x:1; or**
 - 2. Determine methane to benzene ratio for a site using representative or site-specific natural gas chemical composition testing methodology in paragraph 93504(b); or**
 - 3. Determine methane to identified toxic of highest concern ratio for a**

site using representative or site-specific natural gas chemical composition testing methodology in paragraph 93504(b).

- (B) *The proposed methane EDS shall meet the performance standards pursuant to section 93504.*

3. Representative Sampling

Typically, gas samples do not vary significantly across equipment or processes that serve the same production areas. Wells that produce from the same sub-surface reservoir or production zone or surface field should have similar chemical composition of natural gas. Any minor observed differences are expected to fall within normal analytical measurement variability and would not be statistically significant.

When production from multiple wells that produce from the same sub-surface reservoir or production zone or surface field is comingled and routed to centralized tank systems, the gas composition at the first storage vessel/tank should also be representative of each well as it is expected to be the average of all wells routed to the vessel/tank. Comingled gas can undergo processing including phase separation, dehydration, compression, or other processes prior to being used on site or sold.

Within an HPZ zone, multiple sites can have wells or equipment serving production from the same sub-surface reservoir or production zone or surface field. Sampling at each site within an area containing multiple sites that have wells producing from the same sub-surface reservoir or production zone or surface field can be excessive and unnecessary to understand the toxic of highest concern. Operators should have the option to conduct representative sampling at one or more wells serving the same sub-surface reservoir or production zone or surface field. Similarly, operators should have the option to conduct representative sampling at one or more equipment serving production from the same sub-surface reservoir or production zone or surface field. WSPA recommends that CARB consider incorporating representative sampling option (Appendix A).

Recommendation: WSPA recommends that CARB consider adding the option for representative sampling. WSPA recommends the following changes to regulatory text in the discussion draft (Appendix A).

Current text

93504(a)(1) & (2)

Potential toxics of highest concern that can be used as a detection target for EDS for all regions of California are identified in Table 1.

(1) Site-specific natural gas chemical composition testing pursuant to paragraph 93504(b) is required to identify the site-specific toxic of highest concern.

(2) Site-specific natural gas chemical composition testing pursuant to paragraph 93504(b) shall be repeated when an LDRP is updated as required by Public Resources Code section 3283(e).

Proposed Changes

- (a) *Operators may use any of the following methods to determine toxic of highest concern for each site:*
1. *Use Benzene as default toxic of highest concern at a site; or*
 2. *Determine the potential toxic of highest concern that can be used as a detection target for EDS at a site from the list of chemicals identified in Table 1 using natural gas chemical composition testing identified pursuant to paragraph 93504(a)(2)(A) and (B).*
- (A) *Operators must conduct natural gas chemical composition testing pursuant to paragraph 93504(b) to determine toxic of highest concern at a site using one of the methodologies listed below:*
1. *Conduct representative natural gas chemical composition testing; or*
 2. *Conduct site-specific natural gas chemical composition testing*
- (B) *Representative or site-specific natural gas chemical composition testing pursuant to paragraph 93504(b) shall be repeated when an LDRP is updated as required by Public Resources Code section 3283(e).*

Current text

93504(b)(E)

(E) For the purposes of this sampling method, the production process is divided into four categories for collecting natural gas samples. These process categories will be used to classify sampling site locations within the LDRP. A minimum of three (3) samples shall be collected for each production process associated with production equipment monitored by the EDS.

- 1. Well or wellhead process category*
- 2. Storage equipment process category*
- 3. Processing equipment process category*
- 4. Glycol dehydration process category*

Proposed Changes

- (E) For the purposes of this sampling method, the production process is divided into four categories for collecting natural gas samples. These process categories will be used to classify sampling site locations within the LDRP.*
- 1. Well or wellhead process category*
 - 2. Storage equipment process category*
 - 3. Processing equipment process category*
 - 4. Glycol dehydration process category*
- (F) For representative natural gas chemical composition testing, at least two samples shall be collected for each production process associated with production equipment monitored by the EDS within each field or production zone, as applicable.*
- (G) For site-specific natural gas chemical composition testing, at least one sample shall be collected for each production process associated with production equipment monitored by the EDS within each site, as applicable.*

4. Sampling and Analytical Methods

Section 93504(b) requires operators to use specific test methods for sampling and analysis of natural gas at each site. Sampling methods can include U.S. EPA Method 18 or U.S. EPA Method TO-15A or API MPMS 14.1. Analytical methods can include U.S. EPA Method TO-15A or U.S. EPA Method 18 or ASTM D1945-14. While a few of these methods are used regularly, some of the methods require specialized labs and/equipment for sampling. To sample and analyze for chemicals listed in 93504(a)(1), WSPA recommends that CARB also add methods that are currently used by the oil and gas industry for compliance purposes.

For example, GPA 2166 is commonly used to sample natural gas. Analytical methods that are commonly used include GPA 2286, ASTM 1946, ASTM D5504, ASTM 6228,

The sample methods and analytical methods by each chemical are listed in Tables 24 and 25.

Table 24. Sampling methods by chemical species

Chemical Species	EPA Method 18	EPA TO-15A	API MPMS 14.1	GPA 2166
Benzene	X	X	X	X
Toluene	X	X	X	X
Ortho-xylene	X	X	X	X
Meta-xylene	X	X	X	X
Para-xylene	X	X	X	X
n-Hexane	X	X	X	X
Hydrogen sulfide	X		X	X
Methane	X		X	X

Table 25. Analytical methods by chemical species

Chemical Species	EPA Method 18	EPA TO-15A Extended	ASTM D1945-25	ASTM D1946	GPA 2286 Extended	ASTM D5504	ASTM D6228
Benzene	X	X			X		
Toluene	X	X			X		
Ortho-xylene	X	X			X		
Meta-xylene	X	X			X		
Para-xylene	X	X			X		
n-Hexane	X	X	X	X	X		
Hydrogen sulfide	X					X	X
Methane	X		X	X	X		

Recommendation: WSPA recommends that CARB consider adding options for test methods that are typically used in the oil and gas industry. WSPA recommends the following changes to regulatory text in the discussion draft (Appendix A).

Current text

93504(b)(1)

(1) Conduct site-specific natural gas composition source testing to identify natural gas composition for production equipment monitored by the EDS. Compositional source testing must include the potential toxics of highest concern listed in Table 1 of paragraph 93504(a).

(A) Chemical composition source samples shall be collected by a qualified independent party in accordance with one of the following methods:

1. U.S. EPA Method 18 (April 1, 2025), which is incorporated herein by reference; or
2. U.S. EPA Method TO-15A (September 2019), which is incorporated herein by reference; or
3. API MPMS 14.1 (May 1, 2016), which is incorporated herein by reference.

(B) Sample chemical composition analysis shall be conducted by a qualified independent party in accordance with the following methods:

- 1. U.S. EPA Method TO-15A (September 2019); or U.S. EPA Method 18 (April 1, 2025) for composition analysis of TACs. For the chemical species listed in Table 1 of paragraph 93504(a), the analysis method shall have the capability of detecting these chemical species in the source samples at concentrations as low as one (1) ppmv.*
- 2. As applicable, ASTM D1945-14 (September 26, 2023) for composition analysis of methane, which is incorporated herein by reference.*

Proposed Changes

- (1) Conduct representative or site-specific natural gas composition testing to identify natural gas composition for production equipment monitored by the EDS. Compositional source testing must include the potential toxics of highest concern listed in Table 1 of paragraph 93504(a).*
 - (A) Natural gas chemical composition source samples shall be collected by a qualified independent party in accordance with one of the following methods:*
 - 1. U.S. EPA Method 18 (April 1, 2025), which is incorporated herein by reference; or*
 - 2. U.S. EPA Method TO-15A (September 2019), which is incorporated herein by reference; or*
 - 3. API MPMS 14.1 (May 1, 2016), which is incorporated herein by reference; or*
 - 4. GPA 2166 (Date), which is incorporated herein by reference.*
 - (B) Sample chemical composition analysis shall be conducted by a qualified independent party in accordance with the following methods:*
 - 1. U.S. EPA Method TO-15A (September 2019); or*
 - 2. U.S. EPA Method 18 (April 1, 2025) for composition analysis of TACs. For the chemical species listed in Table 1 of paragraph 93504(a), the analysis method shall have the capability of detecting these chemical species in the source samples at concentrations as*

low as one (1) ppmv; or

3. *As applicable, ASTM D1945-14 (September 26, 2023) for composition analysis of methane, which is incorporated herein by reference; or*
4. *As applicable, ASTM D1946 (Date), which is incorporated herein by reference; or*
5. *As applicable, GPA 2286 (Date), which is incorporated herein by reference; or*
6. *As applicable, ASTM D5504 (Date), which is incorporated herein by reference; or*
7. *As applicable, ASTM D6228 (Date), which is incorporated herein by reference.*

IV. OEHHA Reference Exposure Levels

WSPA appreciates that the discussion draft incorporates the Office of Environmental Health Hazard Assessment (OEHHA) Reference Exposure Levels (RELs) for determining health impact of potential leaks. OEHHA provides standard methods for assessing health impacts of chemicals. These methods have been used by air pollution control agencies in conducting health risk assessments of facilities under several programs (e.g., AB2588).

OEHHA assesses health impacts of a chemical contaminant based on cancer and non-cancer risk and duration of exposure. Each chemical that has the potential for health impact is assigned an REL, each for acute (1-hr), 8-hr, and chronic (annual) exposure durations. A sensitive receptor's exposure of a chemical in concentrations above RELs for the identified durations are considered to have potential health impacts.

Section 93504(b)(2)(D) of the discussion draft requires operators to apply the most current RELs adopted by OEHHA. WSPA is concerned that, because OEHHA operates independently and may revise RELs at any time, operators would be required to continuously monitor regulatory updates and reassess affected site evaluations whenever an applicable REL changes. Such revisions could trigger recurring updates to dispersion modeling, alert thresholds, LDRPs, and EDS configuration or implementation. This ongoing process would impose a substantial administrative and technical burden and could result in repeated plan modifications and regulatory submittals even when site conditions and emissions remain unchanged. Accordingly, WSPA recommends that the regulation specify the OEHHA REL values in effect as of the regulation's effective date and that any subsequent revisions to those values be incorporated through a future rulemaking process.

Recommendation: WSPA recommends that CARB specify the OEHHA REL values in effect as of the regulation's effective date and that any subsequent revisions to those values be incorporated through a future rulemaking process.

V. Dispersion Modeling

Section 93504(e)(1) of the discussion draft requires operators to calculate REL-level leak rates for the production equipment monitored by the EDS using air dispersion modeling results. The calculated REL-level leak rates are used to set alert thresholds to achieve detection of leaks exceeding REL-level leak rates from production equipment monitored by the EDS (93504(e)(3)). Section 93504(h) requires that AERMOD be used for dispersion modeling.

WSPA appreciates that CARB has incorporated dispersion modeling for assessing if the site has the potential to have REL-level leaks, especially for facilities that do not have such potential. However, WSPA is concerned that requiring dispersion modeling for all 3,000 sites will be unnecessarily burdensome on the regulated community. As discussed above, dispersion modeling involves a significant amount of effort which includes protocol development, source characterization, equipment inventory and location mapping, sensitive receptor grid mapping, meteorological and terrain data processing, quality assurance, regulatory documentation, and additional assessments. Dispersion modeling is a specialized skillset that is not typically available in-house and would likely require consultant support. Dispersion modeling can cost an average of \$30,700 per site (Range of \$16,000 to \$64,000). For 3,000 sites, the cost of dispersion modeling is anticipated to be approximately \$92 Million.

Developing approximately 3,000 site-specific air dispersion models within a 12-month period would impose a substantial resource burden on the regulated community and the limited pool of qualified consultants. Because each model requires specialized technical expertise in AERMOD and high level of complex effort, the compressed schedule would create significant competition for trained personnel and could constrain consulting capacity, increase costs, and jeopardize timely completion of technically defensible modeling analyses.

As such, WSPA recommends the following alternative lower cost and equally effective options for CARB's consideration.

1. Alternative Assessment using Predominant Wind Direction and Site Topography

Section 93504(e)(3)(B)(2) allows operators to set alert thresholds at REL at the EDS using site-specific dispersion modeling to determine the EDS siting plan. WSPA

recommends that CARB consider an alternative, technically defensible approach to EDS siting that does not rely exclusively on site-specific air dispersion modeling. Under this approach, the EDS would be located along the facility fenceline, downwind of potential emission sources based on the predominant wind direction and between the equipment and nearby sensitive receptors. The siting evaluation could also incorporate site-specific factors such as topography, equipment configuration, prevailing meteorological conditions, potential emission-source locations, and sensor detection capabilities. Similar risk-based siting methodologies and optimization algorithms are used by monitoring technology providers when developing site-specific monitoring plans. The EDS alert threshold would be established to trigger when the applicable REL is exceeded at the monitoring location, thereby providing notification before the potential emissions plume could reach a sensitive receptor. While this method may lead to lower thresholds compared to thresholds determined using dispersion modeling, the operators can use it as a lower cost and equally effective alternative to dispersion modeling while supporting compliance with SB 1137.

Recommendation: WSPA recommends that CARB consider including a lower cost and equally effective alternative to dispersion modeling to determine the EDS siting plan. WSPA recommends the following changes to regulatory text in the discussion draft (Appendix A).

Current text

93504(e)

(e) The EDS shall be capable of detecting leaks with sufficient sensitivity and timeliness to identify leaks before concentrations of the toxic of highest concern exceed the acute REL at any sensitive receptor located within the health protection zone. The performance standard shall be met by measuring the toxic of highest concern directly, or by measuring methane as a surrogate detection target pursuant to paragraph 93504(b).

(1) REL-level leak rates for the production equipment monitored by the EDS shall be calculated using air dispersion modeling results pursuant to paragraph 93504(h).

(2) The EDS shall be sited to meet the following objectives, as applicable:

(A) If production equipment monitored by the EDS has the potential to leak at the REL-level leak rate(s) calculated pursuant to subparagraph 93504(e)(3):

1. *For EDS that scan or image leaks (e.g., fixed OGI cameras, fixed LiDAR cameras), the EDS shall scan or image all production equipment monitored by the EDS and report measurements at a minimum frequency of one (1) hour.*
2. *For EDS that detect leak plumes downwind of a source (e.g., point sensor network EDS, open-path EDS), the EDS shall be sited to achieve detection on an hourly basis of at least 90 percent of leaks that exceed the REL-level leak rate(s) from the production equipment monitored by the EDS that are transported in the direction of sensitive receptors within the health protection zone.*

(B) If production equipment monitored by the EDS does not have the potential to leak at the REL-level leak rate(s) calculated pursuant to subparagraph 93504(e)(3):

1. *The EDS shall have sufficient sensors to measure upwind and downwind concentrations of the detection target throughout the facility, with at least one (1) sensor located in a predominant upwind location and at least one (1) sensor located in a predominant downwind location.*

Proposed Changes

- (e) *The EDS shall be capable of detecting leaks with sufficient sensitivity and timeliness to identify leaks before concentrations of **benzene** or the toxic of highest concern exceed the acute REL at any sensitive receptor located within the health protection zone. The performance standard shall be met by measuring **benzene** or the toxic of highest concern directly, or by measuring methane as a surrogate detection target pursuant to paragraph 93504(b).*
- (1) ***Alert thresholds for the EDS must measure benzene or the toxic of highest concern or methane as surrogate. The alert threshold determination methodology must be according to one of the following methods:***
 - (A) ***Use default acute REL for benzene or methane equivalent at the EDS calculated pursuant to paragraph 93504(e)(3)(B)(2); or***
 - (B) ***Use default acute REL for the identified toxic of highest concern or methane equivalent at the EDS calculated pursuant to paragraph 93504(e)(3)(B)(2); or***

- (C) *Use REL-level leak rate for the toxic of highest concern or methane equivalent at the production equipment monitored by the EDS, calculated using screening or refined air dispersion modeling results pursuant to paragraph 93504(e)(3)(B)(1) and 93504(h).*
- (2) *The EDS shall be sited to meet the following objectives, as applicable:*
 - (A) *If the operator selects method 93504(e)(1)(A) or (B), the EDS shall be positioned along the portion of the fenceline facing the sensitive receptors within the health protection zone.*
 - 1. *EDS shall be sited predominantly downwind under prevailing wind conditions. The operators must incorporate meteorological data, site topography, location of equipment, and location of sensitive receptors within the health protection zone to determine EDS siting.*
 - (B) *If the operator selects method 93504(e)(1)(C) and if production equipment monitored by the EDS has the potential to leak at the REL-level leak rate(s) calculated pursuant to subparagraph 93504(e)(3):*

2. Alternative Assessment using Screening Models

Section 93504(h) requires operators to use AERMOD for dispersion modeling. WSPA recommends CARB consider screening models for dispersion modeling. Screening models are used in health risk assessments as conservative assessments to provide worst case concentrations. If the worst-case concentrations do not trigger additional regulatory requirements, more refined modeling (i.e. AERMOD) is not required. EPA recognizes screening methods as a first-tier approach designed to estimate concentrations at or above those produced by refined AERMOD modeling, with the degree of conservatism varying by application. The level of effort required by screening models is much lower than a refined dispersion model using AERMOD. Screening models like AERSCREEN (which is also based on AERMOD) produce estimates of “worst-case” 1-hour concentrations. AERSCREEN is intended to produce concentration estimates that are equal to or greater than the estimates produced by AERMOD with a fully developed set of meteorological and terrain data (EPA, <https://www.epa.gov/scram/air-quality-dispersion-modeling-screening-models>).

Accordingly, a conservative screening method could provide a practical, transparent, and substantially lower-cost and equally effective alternative to AERMOD modeling. Using conservative, worst-case concentrations to establish alert thresholds may produce lower thresholds than a site-specific AERMOD analysis. The resulting lower thresholds may increase the frequency of alerts, including alerts for releases that refined modeling would determine are unlikely to cause an REL-level concentration at a sensitive receptor. This tradeoff should be weighed against the substantial cost, schedule, data, and specialized-expertise requirements associated with conducting AERMOD analyses at every regulated site.

Recommendation: WSPA recommends that CARB consider including screening models as a lower-cost and equally effective alternative to dispersion modeling to determine the alert thresholds. WSPA recommends the following changes to regulatory text in the discussion draft (Appendix A).

Current text

93504(h)

(h) Air dispersion modeling of potential leaks from production equipment monitored by the EDS to identify REL-level leak rates shall conform to the air dispersion modeling guidance provided in the OEHHA Air Toxics Hot Spots Program Guidance Manual, which is defined in paragraph 93502(a) of this subchapter.

(1) AERMOD shall be used for air dispersion modeling.

Proposed Changes

(h) Air dispersion modeling of potential leaks from production equipment monitored by the EDS to identify REL-level leak rates shall conform to the air dispersion modeling guidance provided in the OEHHA Air Toxics Hot Spots Program Guidance Manual, which is defined in paragraph 93502(a) of this subchapter.

*(1) **AERSCREEN or** AERMOD shall be used for air dispersion modeling.*

VI. EDS Siting

Section 93504(e)(2) of the discussion draft specifies EDS siting requirements based on REL-level leak rates calculated using dispersion modeling. If the production equipment has the potential to leak at REL-level leak rates, the EDS must be sited to achieve at least 90% of REL-level leaks within one hour.

The probability of detection (POD) is at least 90% for most technologies identified by CARB in their Evaluation of Potential Performance Standards for Continuous Emissions Monitoring Systems for Upstream Oil and Gas Production Sites in California (January 7, 2026). Even with variations in the field, 90% POD is achievable with appropriate siting strategies used by technology vendors.

WSPA supports a performance standard requiring the EDS to be sited to detect at least 90 percent of REL-level leaks that are transported toward sensitive receptors. However, WSPA is concerned that the additional requirement for such detection to occur within each one-hour period is neither expressly required by SB 1137 nor necessary.

The purpose of the siting requirement should be to ensure that an EDS detects a REL-level leak before it reaches a sensitive receptor—not to require detection within an arbitrary period measured from the onset of a leak. A properly sited EDS should therefore satisfy the 90% detection criterion for REL-level leaks that are transported along a pathway toward a sensitive receptor and that remain at concentrations capable of causing an REL-level impact at that receptor.

A REL-level leak may not reach a downwind EDS within one hour for reasons that do not indicate a failure of the monitoring system or an increased risk to the public. For example:

- The plume may disperse below the applicable alert threshold before reaching the EDS and, consequently, before reaching the sensitive receptor.
- Site topography or other physical features may prevent the plume from being transported toward the EDS or the sensitive receptor.
- The wind direction during the event may carry the plume away from both the EDS and the sensitive receptor.
- Low wind speeds may delay plume transport beyond one hour, while still allowing the EDS to detect the plume before it reaches the sensitive receptor.

As such, a one-hour detection requirement may incorrectly characterize a properly designed EDS as not meeting SB 1137 requirements even when the system can detect a potential leak sufficiently early to protect the receptor. The more appropriate performance standard is whether the EDS is sited and operated to detect at least 90 percent of REL-level leaks that can reach a sensitive receptor, with sufficient time for the required response actions to occur before an REL-level impact. Even if the leak reaches the EDS more than one hour after release, the system will still alert the operator, enabling appropriate corrective action within the required 48-hour response period to prevent an REL-level impact at the sensitive receptor, as required by SB 1137.

The one-hour requirement may be applicable in specific situations where a sensitive receptor is located close to the source or EDS (for example within 10% of the 3200 feet radius). For such situations, the monitoring plan should address that site-specific condition through sensor placement, alert thresholds, or other protective measures such as detection within a specified period of time.

Recommendation: WSPA recommends that CARB consider specifying one-hour detection requirement for sites where sensitive receptors are close to equipment or EDS. WSPA recommends the following changes to regulatory text in the discussion draft (Appendix A).

Current text

93504(e)(2)(B)(2)

2. For EDS that detect leak plumes downwind of a source (e.g., point sensor network EDS, open-path EDS), the EDS shall be sited to achieve detection on an hourly basis of at least 90 percent of leaks that exceed the REL-level leak rate(s) from the production equipment monitored by the EDS that are transported in the direction of sensitive receptors within the health protection zone.

Proposed Changes

- 2. For EDS that detect leak plumes downwind of a source (e.g., point sensor network EDS, open-path EDS), the EDS shall be sited to achieve detection ~~on an hourly basis~~ of at least 90 percent of leaks that exceed the REL-level leak rate(s) from the production equipment monitored by the EDS that are transported in the direction of sensitive receptors within the health protection zone.*
- 3. For EDS that detect leak plumes downwind of a source (e.g., point sensor network EDS, open-path EDS) and is located within 300 feet of the closest*

sensitive receptor, the EDS shall be sited to achieve detection on an hourly basis of at least 90 percent of leaks that exceed the REL-level leak rate(s) from the production equipment monitored by the EDS that are transported in the direction of sensitive receptors within the health protection zone.

VII. Meteorological Stations

Section 93504(i) of the discussion draft requires that EDS include a meteorological monitoring system (met station) with sufficient sensors to continuously measure representative meteorological conditions at the site including ambient temperature, ambient pressure, relative humidity, wind speed, and wind direction, with the ability to continuously record measurements at a measurement resolution of one (1) minute or less. The met station must meet requirements specified in the U.S. EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV: Meteorological Measurements.

Some technologies may already have integrated met systems that measure the parameters identified in 93504(i). Some operators may also have existing met stations at their sites that meet the requirements of 93504(i).

Recommendation: WSPA recommends that CARB incorporate the above scenarios into the rule language. WSPA recommends the following changes to regulatory text in the discussion draft (Appendix A).

Current text

93504(i)

(i) The EDS shall include a meteorological monitoring system that shall have sufficient sensors to continuously measure representative meteorological conditions at the facility including ambient temperature, ambient pressure, relative humidity, wind speed, and wind direction, with the ability to continuously record measurements at a measurement resolution of one (1) minute or less.

(1) Meteorological sensor quality, siting, and quality assurance shall, to the extent site-specific conditions allow, adhere to the specifications and guidelines that are specified in the U.S. EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV: Meteorological Measurements (March 24, 2008), which is incorporated herein by reference.

Proposed Changes

(i) The EDS shall include a meteorological monitoring system that shall have sufficient sensors to continuously measure representative meteorological conditions at the facility including ambient temperature, ambient pressure, relative humidity, wind

speed, and wind direction, with the ability to continuously record measurements at a measurement resolution of one (1) minute or less.

(1) The EDS may have an integrated meteorological system that measures meteorological parameters identified in 93504(i) and utilizes these measurements in performing leak source localization and quantification.

(2) Operators may use an existing meteorological system that measures meteorological parameters identified in 93504(i). Existing meteorological sensor quality, siting, and quality assurance shall, to the extent site-specific conditions allow, adhere to the specifications and guidelines that are specified in the U.S. EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV: Meteorological Measurements (March 24, 2008), which is incorporated herein by reference.

(1)(3) Operators may install a new meteorological system that measures meteorological parameters identified in 93504(i). New meteorological sensor quality, siting, and quality assurance shall, to the extent site-specific conditions allow, adhere to the specifications and guidelines that are specified in the U.S. EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV: Meteorological Measurements (March 24, 2008), which is incorporated herein by reference.

VIII. EDS Performance Standards

Performance standards for the EDS are included in multiple sections of the discussion draft. A discussion of the performance standards is provided below.

1. Operational downtime

Operational downtime of the EDS is defined as a period of time for which any sensor or monitor fails to collect or transmit data as specified in subparagraph 93504(c)(1) or any sensor or monitor is out-of-control as specified in subparagraph 93504(c)(2)(C) (Section 93504(c)(2)(B)).

WSPA understands that data transmission is a critical component of continuous monitoring systems because the value of timely leak detection depends on the reliable transfer of data from field sensors to data processing platforms and operator notification systems. However, technology providers have reported that communication interruptions can occur for reasons unrelated to equipment performance, including cellular network outages, insufficient signal strength in remote locations, bandwidth limitations, power disruptions, cybersecurity controls, software-service interruptions, cloud-platform outages, and failures associated with third-party telecommunications providers. These issues may result in delayed transmission of monitoring data, temporary gaps in remote access to real-time information, delayed alert delivery, or interruptions in automated reporting functions.

Data transmission challenges can be particularly significant at geographically isolated facilities where cellular or broadband coverage is limited or inconsistent. Even where monitoring instruments continue to collect and store data locally, communication failures may prevent timely delivery of alerts or data uploads until connectivity is restored. In addition, large-scale events such as severe weather, wildfires, public safety power shutoffs, network congestion, and regional telecommunications outages can affect continuous monitoring alerts and may be outside the operator's ability to prevent or control.

To address these risks, continuous monitoring systems commonly incorporate measures such as local data storage, redundant communication pathways, automated notifications of communication failures, data buffering and retransmission capabilities, backup power supplies, and routine verification of network performance. Accordingly, temporary and intermittent data-transmission outages may occur despite proper system

design, maintenance, and operation, particularly when caused by failures or disruptions in third-party communications infrastructure.

WSPA believes that while interruptions in data collection can be considered true downtime, interruptions in data transmission cannot be considered as true downtime as the data is locally stored for operator use.

Recommendation: WSPA recommends that CARB remove data transmission issues from the definition of operational downtime. WSPA recommends the following changes to regulatory text in the discussion draft (Appendix A).

Current text

93504(c)(2)(B)

Operational downtime of the EDS is defined as a period of time for which any sensor or monitor fails to collect or transmit data as specified in subparagraph 93504(c)(1) or any sensor or monitor is out-of-control as specified in subparagraph 93504(c)(2)(C).

Proposed Changes

Operational downtime of the EDS is defined as a period of time for which any sensor or monitor fails to collect ~~or transmit~~ data as specified in subparagraph 93504(c)(1) or any sensor or monitor is out-of-control as specified in subparagraph 93504(c)(2)(C).

2. Minimum Detection Limit

Section 93504(d)(1) requires that the EDS to have a minimum detection limit at least three (3) times less than the alert thresholds.

WSPA understands that this is a typical requirement for continuous monitoring technologies where methane is the target of detection and regulatory alert thresholds for methane are typically higher. However, OEHHA RELs are established at very low ambient concentrations; for example, the benzene REL is 8 parts per billion (ppb). Consequently, the alert thresholds are anticipated to be lower than typical methane leak detection scenarios. The monitoring technologies may not be able to meet minimum detection limit at least 3 times less than the alert thresholds, if the alert thresholds are too low.

Recommendation: WSPA recommends that CARB add an option for low alert thresholds to have minimum detection limit of no less than 1 PPM methane. WSPA

recommends the following changes to regulatory text in the discussion draft (Appendix A).

Current text

93504(d)(1)

The EDS shall have a minimum detection limit at least three (3) times less than the alert threshold(s).

Proposed Changes

The EDS shall have a minimum detection limit at least three (3) times less than the alert threshold(s) or 1 PPM methane.

3. Manufacturer-documented Precision

Section 93504(d)(2) requires that the EDS have a manufacturer-documented precision within ± 15 percent at the alert threshold concentration(s).

As discussed above, this is a typical requirement for continuous monitoring technologies where methane is the target of detection and regulatory alert thresholds for methane are typically higher. However, OEHHA RELs with very low ambient concentrations are anticipated to lead to alert thresholds lower than typical methane leak detection scenarios. The monitoring technologies may not be able to meet precision within ± 15 percent at the alert threshold concentration(s), if the alert thresholds are too low.

Recommendation: WSPA recommends that CARB add an option for low alert thresholds to have manufacturer-documented precision no less than 1 PPM methane. WSPA recommends the following changes to regulatory text in the discussion draft (Appendix A).

Current text

93504(d)(2)

The EDS shall have a manufacturer-documented precision within ± 15 percent at the alert threshold concentration(s).

Proposed Changes

*The EDS shall have a manufacturer-documented precision within ± 15 percent at the alert threshold concentration(s) **or 1 PPM methane**.*

4. Quarterly Performance Testing: Field Precision

Section 93504(d)(3) requires that the EDS be performance tested at least once per quarter to verify that the field precision is maintained within ± 25 percent at the alert threshold concentration(s).

As discussed above, this is a typical requirement for continuous monitoring technologies where methane is the target of detection and regulatory alert thresholds for methane are typically higher. However, OEHHA RELs with very low ambient concentrations are anticipated to lead to alert thresholds lower than typical methane leak detection scenarios. The monitoring technologies may not be able to maintain field precision within ± 25 percent at the alert threshold concentration(s), if the alert thresholds are too low.

Recommendation: WSPA recommends that CARB add an option for low alert thresholds to have field precision be maintained within 1 PPM methane. WSPA recommends the following changes to regulatory text in the discussion draft (Appendix A).

Current text

93504(d)(3)

EDS sensor(s) or monitor(s) shall be performance tested at least once per quarter to verify field precision is maintained within ± 25 percent at the alert threshold concentration(s). A sensor or monitor that does not meet this criterion shall be calibrated, repaired, or replaced.

Proposed Changes

*EDS sensor(s) or monitor(s) shall be performance tested at least once per quarter to verify field precision is maintained within ± 25 percent at the alert threshold concentration(s) **or within 1 PPM methane**. A sensor or monitor that does not meet this criterion shall be calibrated, repaired, or replaced.*

5. NIST-traceable standards

Section 93504(d)(3)(A) requires that the EDS be performance-tested at least once per quarter using a NIST-traceable standard at concentration(s) equal to the alert threshold(s) of the detection target.

To satisfy this requirement, performance-testing teams would need NIST-traceable calibration gas at concentrations corresponding to each applicable detection or alert threshold. Because threshold concentrations may vary across approximately 3,000 sites, quarterly testing could require thousands of individually certified gas cylinders. Procuring, managing, transporting, and using this volume of alert threshold concentration-specific standards would make performance testing both operationally burdensome and costly. It could also strain laboratory capacity, as suppliers would need to prepare and certify thousands of gas cylinders at specified concentrations on a quarterly basis. WSPA is concerned that this approach is not only expensive but could create a bottleneck for the testing teams to obtain NIST-traceable gases.

Typically, performance testing using NIST-traceable standards includes a range of commercially available gases at standard concentrations that span the measurement capability of the equipment being tested, as recommended by the manufacturer. WSPA recommends that CARB incorporate commercially available standard gas concentrations that span the detection range of the EDS, as recommended by the manufacturer.

Recommendation: WSPA recommends that CARB incorporate standard gas concentrations that span the detection range of the EDS as recommended by the manufacturer. WSPA recommends the following changes to regulatory text in the discussion draft (Appendix A).

Current text

93504(d)(3)(A)

Testing shall be performed using a NIST-traceable standard at concentration(s) equal to the alert threshold(s) of the detection target.

Proposed Changes

Testing shall be performed using a NIST-traceable standard at concentration(s) ~~equal to the alert threshold(s) of the detection target.~~ that span the detection range of the EDS, as recommended by the manufacturer.

IX. Independent Performance Audits

Section 93504(n) of the discussion draft requires operators to hire a qualified independent party to perform an audit of EDS performance within 12 months of installation and every 36 months thereafter, and within 3 months after any material modification that requires a new LDRP. If the audit identifies deficiencies, the operator must develop a corrective action plan. All corrective actions must be completed within three calendar months. Following the audit and corrective actions, CARB is required to review the EDS portion of the LDRP and advise CalGEM whether the EDS component is acceptable or deficient.

WSPA is concerned that the proposed recurring independent performance-audit requirement extends beyond the express mandates of SB 1137 and unnecessarily establishes a duplicative layer of oversight.

- SB 1137 does not mandate independent performance audits. By requiring an initial audit within 12 months of EDS installation and recurring audits every three calendar years, CARB is imposing a substantive compliance obligation that exceeds the authority granted by SB 1137.
- This additional layer of third-party review is unnecessary because the discussion draft already includes multiple safeguards to ensure EDS effectiveness and reliability, including CARB review and approval of each LDRP, ongoing QA/QC requirements, quarterly performance testing, corrective-action procedures, and comprehensive reporting and recordkeeping obligations. Collectively, these measures provide continuous verification of system performance and regulatory compliance.
- Requiring operators to hire an independent auditor who had no role in implementing the EDS—and to support document review, field inspection, data-system review, reporting, and follow-up—would add a costly and burdensome process on top of an already exceptionally expensive regulatory program without a demonstrated corresponding benefit. An additional third-party audit would cost an estimated \$8,900 per facility, or \$26.7 million statewide in each audit year for approximately 3,000 facilities, while also imposing substantial administrative and operational burdens.
- The requirement to retain qualified independent auditors—particularly auditors with specialized expertise in EDS technologies, QA/QC procedures, data management, and regulatory compliance—could strain the limited pool of

available qualified professionals. Requiring audits across approximately 3,000 facilities on a recurring schedule may create resource bottlenecks, increase costs, and cause scheduling delays

In light of the robust oversight framework already incorporated into the draft regulation, CARB should determine whether recurring independent audits would provide measurable improvements in system reliability that justify significant incremental cost.

Recommendation: WSPA respectfully recommends that CARB remove the independent audit requirement, as the existing QA/QC, performance testing, reporting, and regulatory review provisions provide sufficient oversight to ensure EDS reliability and compliance. WSPA's recommended changes to regulatory text in the discussion draft **are** below and included in Appendix A.

Current text

93504(n)

(n) A qualified independent party hired by the operator shall conduct and complete independent performance audits to verify that EDS data continues to meet the data quality objectives defined in the QAPP of the approved LDRP.

(1) Independent performance audits shall be completed according to the following schedule:

(A) An independent performance audit shall be completed within 12 calendar months after the installation and operation of the EDS.

(B) Subsequent independent performance audits shall be completed once every 36 calendar months and/or within three (3) calendar months of material modification to the facility such that a new LDRP would be required.

(C) Independent performance audits shall be included with the information provided to CalGEM under Public Resources Code section 3286 for that applicable calendar year.

(2) The independent performance audit shall be documented in a report that shall be signed by the party that conducted the independent performance audit, certifying under penalty of law, based on information and belief formed after reasonable inquiry, that the statements and information in the audit report and in all attachments and other materials are true, accurate, and complete.

(3) The independent performance audit shall identify any deficiencies in EDS data meeting data quality indicator acceptance criteria in the performance audit validation template pursuant to subparagraph 93504(m)(8)(I). If the independent performance audit report identifies deficiencies, the operator shall cause the following tasks to be completed within three (3) calendar months of the independent audit report:

(A) Develop a corrective action plan describing all corrective actions that will be taken to address identified deficiencies and restore EDS performance to the performance level specified in the approved LDRP.

(B) Perform all corrective action(s).

(C) Maintain a record indicating when the corrective action(s) have been completed.

Proposed Changes

(n) The operator shall submit an annual report to CalGEM providing details of EDS performance for the previous calendar year, certifying under penalty of law the statements and information in the annual report and in all attachments and other materials are true, accurate, and complete.

(1) The annual report shall include the following (PRC 3286(a)):

(A) Total duration the emissions detection system was not operating.

(B) The number of validated alarms, and the reasons for the alarms.

(C) The number of leaks that occurred, the time needed to repair the leak, and a brief description of the leak.

(D) The number of times the surrounding community was notified after a leak persisted for 48 hours.

(E) The number of times and length of time production and injection operations and other use of the facility were suspended due to leaks.

*(2) The **annual report** shall identify any deficiencies in EDS data meeting data quality indicator acceptance criteria in the performance audit validation template pursuant to subparagraph 93504(m)(8)(I). If the **annual report** identifies deficiencies, the operator shall cause the following tasks to be*

completed within three (3) calendar months of the report submittal:

- (A) Develop a corrective action plan describing all corrective actions that will be taken to address identified deficiencies and restore EDS performance to the performance level specified in the approved LDRP.*
- (B) Perform all corrective action(s).*
- (C) Maintain a record indicating when the corrective action(s) have been completed.*

X. Definitions

Based on above discussions, WSPA recommends that the following definitions (Section 93502(a)) be added or edited to align with WSPA's proposed changes.

Recommendation: WSPA's recommended changes to definitions in the discussion draft are below and included in Appendix A.

“Corrective action plan” means a plan that details the actions an operator will execute to correct any deficiencies identified in ~~an independent audit~~the annual report.

“Detection target” means the specific chemical constituent that has been identified as the toxic of highest concern or methane surrogate for detection by the EDS.

“Field,” in the context of oil and gas systems, means oil and gas fields identified in the United States as defined by the Energy Information Administration Oil and Gas Field Code Master List 2008, DOE/EIA 0370(08), January 2009, which is hereby incorporated by reference.

~~“Independent performance audit” means an assessment conducted by a qualified independent party with relevant technical expertise in EDS that was not involved in the implementation of the EDS being audited, including the installation, operation, maintenance, and quality assurance procedures.~~

“Production zone: means a subsurface geologic formation or reservoir from which oil or natural gas is produced.

“Reference exposure level” or “REL” means a concentration level at or below which no adverse noncancer health effects are anticipated for the specified exposure duration. RELs adopted by OEHHA are presented in the “OEHHA Acute, 8-hour and Chronic Reference Exposure Level (REL) Summary,” August 2020, with webpage date of October 23, 2023, and any subsequent revisions or updates OEHHA may make to the REL summary webpage thereto. For the purposes of this regulation, operators must use RELs for potential toxics of highest concern as listed in Table 1 of Section 93504(a).

“Sensitivity” means the ability of an EDS to detect the presence of leaks at the ~~REL-level leak rates of the production equipment~~alert threshold monitored by the EDS.

“Toxic of highest concern” means the TAC identified by CARB as the default toxic of highest concern or the TAC present in representative or site-specific natural gas chemical composition testing with highest calculated weighted risk contribution using

OEHHA inhalation risk factor for acute exposure as determined using 93504(b)(2). ~~that would exceed its associated acute REL at a sensitive receptor first.~~

APPENDIX A

Recommended Changes to Discussion Draft Text