Gill Ranch Storage

Gill Ranch Underground Storage Facility Monitoring Plan

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Natural Gas Underground Storage Facility Monitoring Requirements

For Submittal to:
California Air Resources Board

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1. Introduction and Purpose

This document outlines Gill Ranch Storage, LLC's (GRS) monitoring plan for the facility located at 163000 Avenue 3, Madera, CA 93637 (the Facility) as required by the California Air Resources Board (CARB) Greenhouse Gas Emission Standard for Crude Oil and Natural Gas Facilities, referred to as the CARB Oil and Gas Rule, promulgated under 17 CCR, Division 3, Chapter 1, Subchapter 10, Article 4, Subarticle 13 (the Subarticle), Section 95668(h)(1).

The monitoring plan addresses the following three key areas, as specified in Section 95668(h)(4) of the Subarticle:

(A) Continuous Ambient Monitoring;
(B) Wellhead Daily or Continuous Leak Screening; and
(C) Well Blowout Procedures.

In accordance with Section 95668(h)(1)(B) of the Subarticle, GRS submitted the updated monitoring plan to CARB in June 2024. CARB provided comments to the monitoring plans in January 2025 and GRS is submitting this updated monitoring plans per Section 95668(h)(2)(A) of the Subarticle.

Within 180 days of CARB's approval of this monitoring plan, and consistent with Section 95668(h)(3) of the Subarticle, GRS will begin monitoring the Facility in accordance with this updated monitoring plan. GRS will continue to monitor the Facility in accordance with the previously approved monitoring plan while awaiting CARB's approval for this updated monitoring plan.

2. Facility Description

As shown in Figure 1 below, the Facility is located primarily in western Madera County in central California's San Joaquin Valley. The Facility is approximately 20 miles west of the City of Fresno and approximately 7 miles northeast of the City of Mendota. The Facility is under the jurisdiction of the San Joaquin Valley Air Pollution Control District (SJVAPCD) as the local air district. A portion of the Facility spans the San Joaquin River into Fresno County. The Facility is approximately 5,020 acres and is surrounded by flat agricultural space. The predominant geological feature nearby is the San Joaquin River, which travels from the southeast to the west side of the Facility.

The Facility receives natural gas via pipeline and operates five compressors. Gas is injected into a naturally occurring underground sandstone reservoir for storage. Eight well pads are located onsite; four as observation wells and four as injection/withdrawal wells. There are a total of 12 injection/withdrawal wells at the Facility. Observation wells are located on individual well pads or, in some cases, share a pad with the injection withdrawal wells. Natural gas is not injected into or withdrawn from observation wells and there is minimal potential for natural gas to leak from an observation well. A map of the wellhead and observation well at the Facility is included in Figure 2.

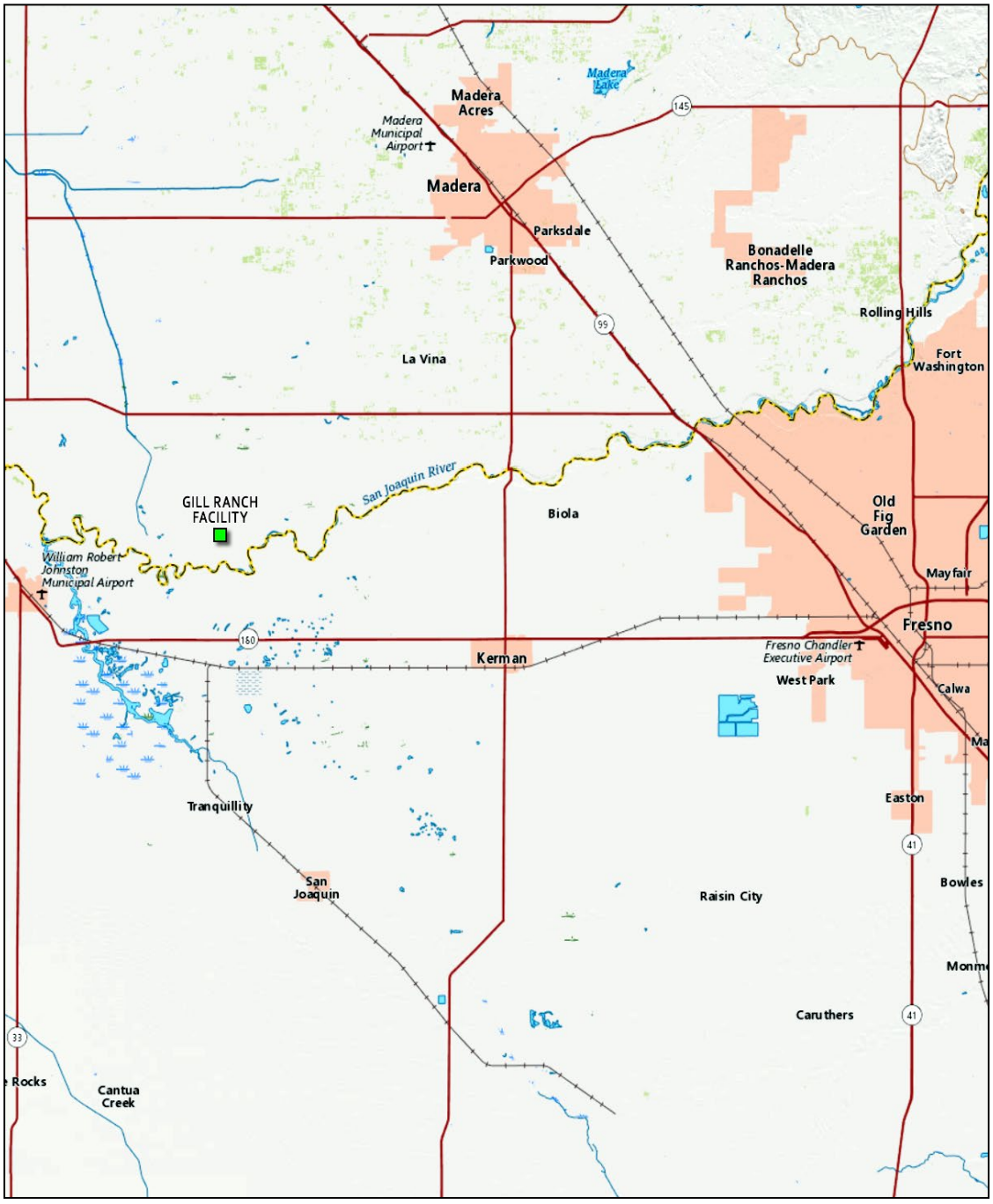


Figure 1: Location Map of Gill Ranch Facility in Madera County

3. Continuous Ambient Monitoring

3.1 Placement of Ambient Air Monitors

As required by Section 95668(h)(4)(A)(1) of the Subarticle, the Facility operates two ambient air monitors, one at the predominant upwind location (named "West Monitoring Station") and one at the predominant downwind location (named "East Monitoring Station"). Additionally, the Facility also installed a meteorological station. Figure 2 below identifies the upwind and downwind locations for the ambient monitors at the Facility, as well as the location for the meteorological monitor location.

The prevailing wind direction at the Facility is from the northwest. Wind roses, based on annual data, are shown in Figure 2. Seasonal wind roses are shown in Appendix A. Additional discussion of the wind data is included below.

The West Monitoring Station is located on a well pad adjacent to Avenue 3 and Road 6, upwind and northwest of the Facility. The East Monitoring Station is located on a well pad adjacent to a utility road off Avenue 3, downwind and southeast of the Facility. Figure 3 shows the distance between the well pads, compressor station, and the locations for the ambient monitors.

The ambient monitoring locations were chosen to meet the requirements of Section 95668(h)(4)(A)(1) of the Subarticle. Monitor site selection guidance presented in 40 CFR Part 58, Appendices A & E and EPA's Meteorological Monitoring Guidance for Regulatory Modeling Applications was utilized. EPA's Quality Assurance Handbook for Air Pollution Measurement Systems: Volume II: Ambient Air Quality Monitoring Program and Volume IV: Meteorological Measurements Versions 2.0 were also referenced. The monitoring locations were selected based on suitability of terrain and distance from obstructions to ensure that representative data of the Facility's emissions are collected. Availability of power and accessibility to the Facility were also important considerations in choosing the location of the monitors. Section 3.1.1 of this monitoring plan discusses supporting documentation on the locations of the ambient monitors.

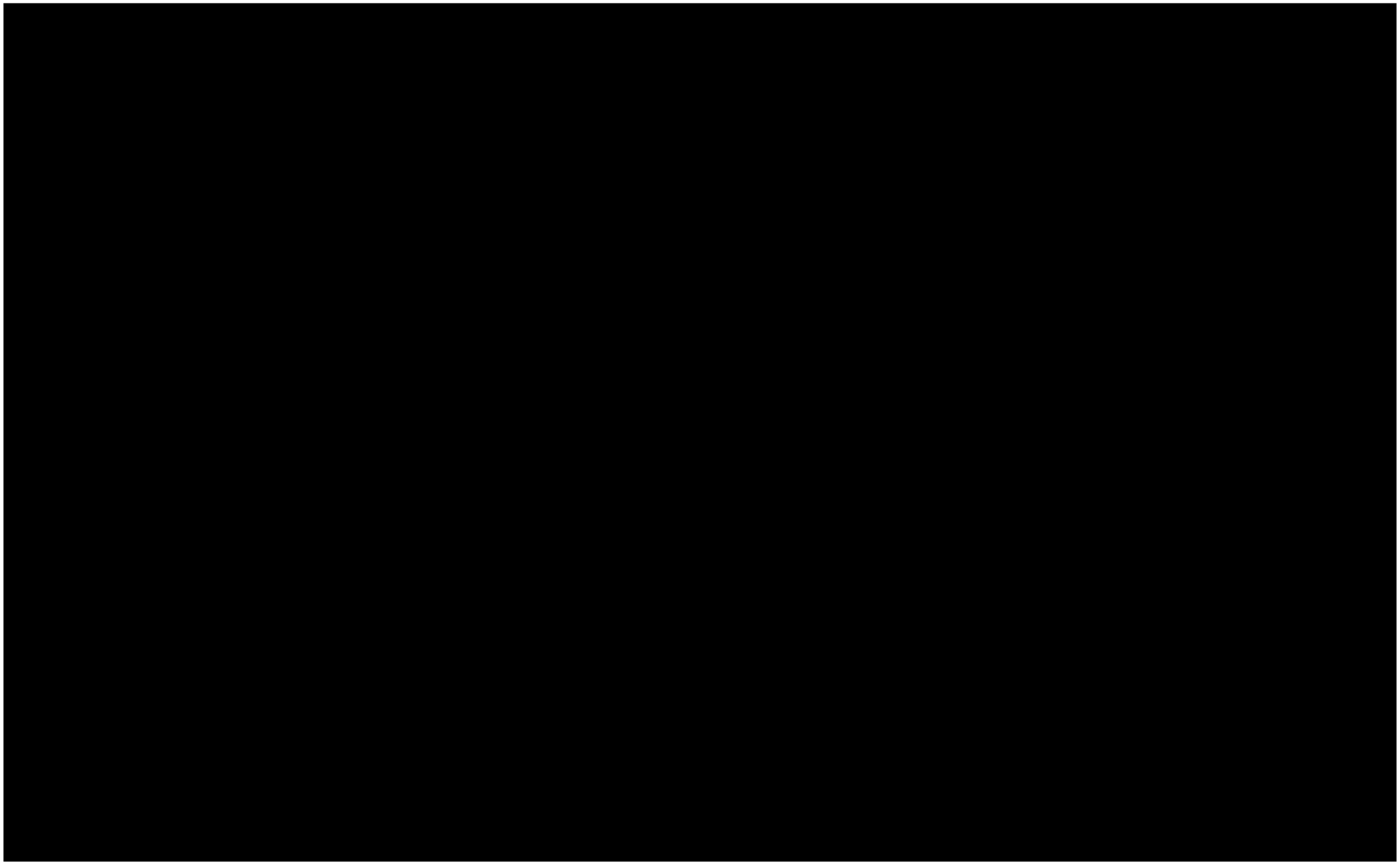


Figure 2: Location of the Ambient Monitors and Meterological Station at the Gill Ranch Storage Facility

Figure 3: Distance Between Well Pads and Ambient Monitors at the Gill Ranch Storage Facility

3.1.1 Supporting Wind Data

When GRS was first determining the locations for the ambient monitors, annual wind roses were reviewed. These wind roses were generated using meteorological data from the following established stations: Fresno Airport (KFAT), Madera Municipal Airport (KMAE), Firebaugh Citizen Weather Observer Program (CWOP), and Route 145 and Avenue 5 ½ (Route 145)[1]. Potential upwind and downwind monitoring locations were determined based on these wind roses. The locations of the established wind monitors are presented in Table 1. Furthermore, the upwind and downwind locations of the monitors are further supported by the onsite meteorological station installed in 2019.

Table 1. Established Meteorological Stations

Station	Coordinates (UTM)	Elevation (ft)	Distance from Facility
Madera Airport	10, 757165, 4097123	253	15.62 mi NE
Route 145	10, 762553, 4079940	246	11.31 mi E
Fresno Airport	11, 257314, 4073917	336	29.67 mi E
Firebaugh	10, 720419, 4076293	203	15.27 mi W

3.2 Ambient Air Monitor Technology and Operation

3.2.1 Technology

As required by Section 95668(h)(4)(A)(1)(a) of the Subarticle, the ambient monitoring instruments are capable of measuring a minimum of 250 ppb for ambient methane concentrations with resolution of one-minute data. GRS uses the Airpointer ambient monitors equipped with the methane/non-methane module (or equivalent) with supporting instrumentation that provides automated zero/span verifications.[2] These monitors provide a minimum methane detection level of 10 ppb, surpassing the required 250 ppb accuracy. Detailed instrument specifications have been provided in Appendix B.

All monitor placement and siting comply with requirements found in 40 CFR Part 58, Appendix E. The sites are characterized as a microscale type monitoring station according to spatial scale definitions found in 40 CFR Part 58, Appendix D. As such, the inlet probes are placed between two and seven meters above ground level. GRS placed the inlet probes at approximately 2.5 meters above ground level and at a distance of approximately one meter vertically and horizontally from any supporting structure.

3.2.2 Operation

As required by Section 95668(h)(4)(A)(1)(b) of the Subarticle, GRS will calibrate the ambient air monitors at least once annually or at the manufacturer's recommended frequency. GRS will repair or replace any defective air monitors within 14 calendar days from the date of calibration or discovery of malfunction. In the event that parts or equipment needed to complete the necessary repairs are unavailable within this timeframe, GRS will request a delay of repair from the CARB Executive Officer in accordance with Section 95670.1 of the Subarticle. Additionally, in accordance with Section 95668(h)(4)(A)(10) of the Subarticle, GRS shall keep records of any

[1] Mesowest/Synoptic Labs (2017), *Data made available from governmental agencies, commercial firms, and educational institutions*, Retrieved from https://mesowest.utah.edu
[2] GRS is continuing to evaluate other more economical options for ambient monitors. Should any of these options be considered viable, GRS will update the draft monitoring plan accordingly.

time the monitoring system is inactivated, including an explanation of the reason for the system being inactivated, and when the monitoring system is reactivated.

3.3 Meteorological Measurements

As required by Section 95668(h)(4)(A)(2) of the Subarticle, the ambient monitoring system includes instrumentation that will allow for continuous measurement and recording of ambient temperature, ambient pressure, relative humidity, wind speed, and wind direction. GRS utilizes one 10-meter meteorological measurement tower at the Facility to collect the required data. GRS believes that one station is adequate to provide sufficient meteorological data that are representative of conditions at the Facility due to the relatively flat terrain surrounding the Facility. The meteorological station is located downwind of the compressor station as shown in Figure 2. The meteorological station is located in an open area free from obstructions and surrounded by low-level vegetation and row crops.

Table 2 summarizes the meteorological instrumentation installed downwind at the Facility.

Table 2. Gill Ranch Meteorological Equipment

Parameter (Manufacturer/Model)	Specified Accuracy
Wind Speed RM Young Model 5305 - Wind Monitor AQ	±0.20 m/s or 1% of reading
Wind Direction RM Young Model 5305 - Wind Monitor AQ	±3 degrees
Temperature Campbell Model EE181	±0.2°C @ 23°C
Relative Humidity Campbell Model EE181	±1.3% RH @ 23°C
Barometric Pressure Vaisala Model PTB110	±0.3 mb @ +20°C

3.4 Data Handling

3.4.1 Data Validation and Storage

The necessary practices and procedures in the following EPA documents will be utilized to validate data being captured by the ambient monitoring system:

- *40 CFR Part 58, Appendix A – Quality Assurance Requirements for Monitors used in Evaluations of National Ambient Air Quality Standards (NAAQS);*
- *Quality Assurance Handbook for Air Pollution Measurement Systems, Vol. IV: Meteorological Measurements, EPA-454/B-08-002, March 2008;*
- *Quality Assurance Handbook for Air Pollution Measurement Systems, Vol. II: Ambient Air Quality Monitoring Program, EPA-454/B-17-001, January 2017; and*
- *Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-005, February 2000.*

The procedures outlined in the reference documents listed above represent best practices for ambient air quality monitoring and provide sound data validation protocols.

To perform sampling and analysis operations consistently, standard operating procedures (SOPs) for the GRS monitoring network has been developed. The SOPs ensure consistent performance with organizational practices; serve as training aids; provide ready reference and documentation of proper procedures; reduce work effort; reduce error occurrences in data; and improve data comparability, credibility, and defensibility. Each SOP is sufficiently clear and written in a step-by-

step format to be readily understood by a person knowledgeable in the general concept of the procedure.

Pursuant to Section 95668(h)(4)(A)(3) of the Subarticle, GRS' ambient air monitoring system, including the meteorological station, has the ability to store at least 24 months of continuous data with the capability to generate hourly, daily, weekly, monthly, and annual reports.

3.4.2 Data Reporting

Pursuant to Sections 95668(h)(4)(A)(5), 95673(a)(11), and 95673(b)(2) of the Subarticle, GRS will continue to provide an annual report of all meteorological data and ambient air data collected at the Facility to CARB electronically at oilandgas@arb.ca.gov with the subject line "Natural Gas Underground Storage Reporting". Additionally, GRS will continue to make all data collected by the monitoring system to be made available at the request from the CARB Executive Officer.

3.5 Baseline Concentration Values

Per Section 95668(h)(4)(A)(6) of the Subarticle, GRS established baseline monitoring conditions for the Facility using at least 12 months of continuous monitoring data from September 4, 2019 through September 3, 2020. The baseline condition was established from the 98th percentile of 12-month continuous 1-hour measurements. GRS submitted the baseline data and calculation in December 2020 and received approval of the baseline concentration on February 1, 2021. A summary of the baseline concentration at the Facility's West and East Monitoring Stations is presented in Table 3 below.

Table 3. GRS Baseline Concentration Values

	West Monitoring Station	East Monitoring Station
Approved Baseline Concentration (ppm)	15.92	7.67
Alarm Threshold (ppm)[1]	63.68	30.68

[1] Alarm system is triggered when the sensor detects a reading that is greater than or equal to 4 times the baseline concentration value.

For a full operating hour (any clock hour with 60 minutes of monitor operation), at least 45-minutes of data will be required to calculate the hourly average. Hourly data for the baseline period and the downwind ambient monitor will not include data collected when maintenance or quality-assurance activities are performed on the monitors. Pursuant to Section 95668(h)(4)(A)(9), GRS recognizes that the upwind (West Monitoring Station) and the downwind (East Monitoring Station) baseline conditions may be re-evaluated every 12 months for changes in local conditions and must be approved by CARB.

3.6 Alarm System and Monitoring Baseline Conditions

Pursuant to Section 95668(h)(4)(A)(4) of the Subarticle, GRS has established an integrated alarm system connected to the ambient air monitors that is continuously audible and visible in the control room at the Facility, and any remote control rooms, as necessary. Per Section 95668(h)(4)(A)(7) of the Subarticle, the alarm system will be triggered under the following conditions:

- Any time the downwind ambient air monitor detect a reading that is greater than or equal to four (4) times the sensor baselines (see Table 3); or

- In the event that the West or East Monitors has a sensor failure.

In the event that an alarm is triggered, GRS will confirm that an alarm condition has occurred and then contact the following agencies within 24 hours of the alarm trigger in accordance with Section 95668(h)(4)(A)(8):

- CARB;
- California Department of Convervation Geologic Energy Management Division (CalGEM); and
- SJVAPCD.

The following represent examples of scenarios where, if an alarm is triggered, GRS will investigate the cause of any resultant alarms, document the cause of the alarm, and provide CARB, CalGEM, and SJVAPCD a notification via email within 24 hours. GRS will include an explanation for the alarm condition in the notification when an explanation if available:

1. Natural gas blowdown events; and
2. Natural gas releases due to maintenance activities or emergency shutdowns.

4. Wellhead Daily Monitoring and Reporting

4.1 Daily or Continuous Monitoring

In accordance with Section 95668(h)(4)(B)(1) of the Subarticle, GRS has been conducting and will continue to conduct daily leak screening at each injection/withdrawal wellhead and attached pipelines using a combination of Heath Remote Methane Leak Detector (RMLD) and Heath Gasurveyor 700 (GS700) described in Section 4.1.1 below. Should GRS choose to use continuous leak instrumentation to meet the requirements of Section 95668(h)(4)(B) of the Subarticle, GRS will submit a request to CARB to amend the monitoring plan to reflect the use of this instrumentation in lieu of the daily leak survey.

Under the CalGEM-approved inspection and leak detection protocol (provided in Appendix C), GRS currently performs daily leak surveys. GRS proposes to continue to use these procedures to meet the leak screening requirement under the CARB Oil & Gas Rule.

Pursuant to Section 95668(h)(4)(B)(1)(a) of the Subarticle, GRS will report a delay of inspection if wildlife is found to be present on a component and inspection must be halted or postponed within a certain distance of the wildlife in order to comply with state and federal wildlife regulations. The notification will include a description of the type of wildlife and the regulations requiring work to be halted. Once the reason for the inspection delay is resolved, GRS will resume inspection and notify CARB within 24 hours of resuming the daily leak inspections.

4.1.1 Leak Screening Technology

GRS currently uses a Heath RMLD-IS (RMLD-IS) to conduct daily leak screening at the wellheads. The RMLD-IS detects leaks by tunable diode laser absorption spectroscopy. If a leak is detected, GRS utilizes GS700, a Method 21 approved instrument for analysis. The GS700 instrument uses high-performance infrared technology and data-logging functionality to ensure the integrity of sampling. The RMLD-IS personal monitor and the GS700 are approved under the CalGEM requirements and meet the leak screening requirements of Section 95668(h)(4)(B)(1) of the Subarticle. Detailed specifications for the RMLD-IS personal monitor and the GS700 are provided in Appendix D.

4.2 Monitoring Discovery and Repair

4.2.1 Monitoring Discovery

In accordance with Section 95668(h)(4)(B)(3) of the Subarticle, within 24 hours of detecting a leak through the daily monitoring procedures, GRS will perform leak measurements in accordance with EPA Method 21, using a Heath GS700 monitor or equivalent.

Pursuant to Section 95669(i) of the Subarticle, the following procedures will be completed upon leak detection:

1. GRS will affix a weatherproof readily visible tag that identifies the date and time of leak detection and the measured leak concentration to the leaking component.
    a. The minimum leak threshold concentration is 1,000 ppmv total hydrocarbon per Section 95669(h) of the Subarticle.
2. The tag will remain affixed to the leaking component until the leaking component has been successfully repaired or replaced.
    b. Successful repair or replacement will be confirmed by re-measuring the component using EPA Method 21 to determine that the component is below the minimum leak threshold after repair or replacement.
3. Tags will be removed from components following successful repair or replacement.

4.2.2 Leak Repair

After determining the leak rate using EPA Method 21, GRS will repair the leak according to the following timelines, as outlined in Sections 95669(h) and (i) of the Subarticle and Table 4 below.

Table 4. Leak Rate and Repair Timeframe

Leak Rate	Repair Time Period
1,000 – 9,999 ppmv	First repair attempt within 5 calendar days; successful repair within 14 calendar days
10,000 – 49,999 ppmv	5 calendar days
≥ 50,000 ppmv	2 calendar days
Critical Component or Critical Process Unit Leak	By next process shutdown or within 12 months, whichever is sooner

4.3 Leak Reporting and Recordkeeping

4.3.1 Individual Leak Reporting

In accordance with Section 95668(h)(4)(B)(6) of the Subarticle, GRS will report the following leaks identified during daily leak screening at each injection/withdrawal wellhead and attached pipelines to CARB, CalGEM, and SJVAPCD within 24 hours of measurement:

- Any leaks measured above 50,000 ppmv total hydrocarbons; and
- Any leaks measured above 10,000 ppmv total hydrocarbons, if leak persists for more than 5 continuous calendar days

In accordance with Section 95668(h)(4)(B)(8) and Section 95673(a)(9) of the Subarticle, GRS will report on a quarterly basis, the following information required per Table 5 of Appendix A of the Subarticle, for leaks identified as a result of a Method 21 measurement performed in conjunction with the daily leak screening measurements:

- Inspection Date
- Method 21 Instrument Make and Model
- Method 21 Instrument Calibration Date

- Component Type
- Component ID, if applicable
- Equipment ID or description
- Active or Idle Well, if applicable
- Initial Leak Concentration (ppmv)
- Repair Date
- Concentration After Repair (ppmv)

4.3.2 Recordkeeping

In accordance with Section 95668(h)(4)(B)(7) of the Subarticle, GRS will maintain and make available to the CARB Executive Officer, records of the initial and final leak concentration measurements for leaks identified during the daily monitoring process that are above the minimum allowable leak thresholds specified in Section 4.2. GRS will maintain records which contain all information as specified in Appendix A, Table A5 of the CARB Oil and Gas Rule.

5. Well Blowout Procedures

Per Section 95667(a)(3) of the Subarticle, “blowout” means the uncontrolled flow of gas, liquids, or solids (or a mixture thereof) from a well to the surface.

5.1 Optical Gas Imaging (OGI) Procedures

OGI, as defined under Section 95667(a)(46) of the Subarticle, means an instrument that makes emissions visible that may otherwise be invisible to the naked eye. Per Section 95668(h)(4)(C) of the Subarticle, GRS will direct a qualified technician with a certification or training in basic thermal science, OGI camera operation and safety, and OGI inspections (e.g. OGI Certification or equivalent training) to obtain daily OGI video footage of a leak resulting from a well blowout according to the timeline outlined below.[3]

- As soon as possible after GRS has confirmed that a well blowout event has occurred, a qualified technician will collect 10 minutes of OGI video footage of the leak resulting from the well blowout.
- The qualified technician will continue to record OGI video footage of the leak for a minimum of 10 minutes every 4 hours until the blowout is capped.
- Within one business day after recording OGI video footage, GRS will post the video footage on a facility-maintained public internet website.

Pursuant to Section 95668(h)(4)(C)(3) of the Subarticle, GRS will provide OGI video footage to the CARB Executive Officer upon request, for publication on a CARB-maintained public internet web site.

[3] In the event of a well blowout, GRS will utilize an outside contractor to capture the required OGI footage. Therefore, the specifications for OGI equipment cannot be provided in this plan. Prior to collecting the footage, GRS will ensure the OGI equipment meets the criteria in 40 CFR 60.5397a.

Appendix A – Seasonal Windroses

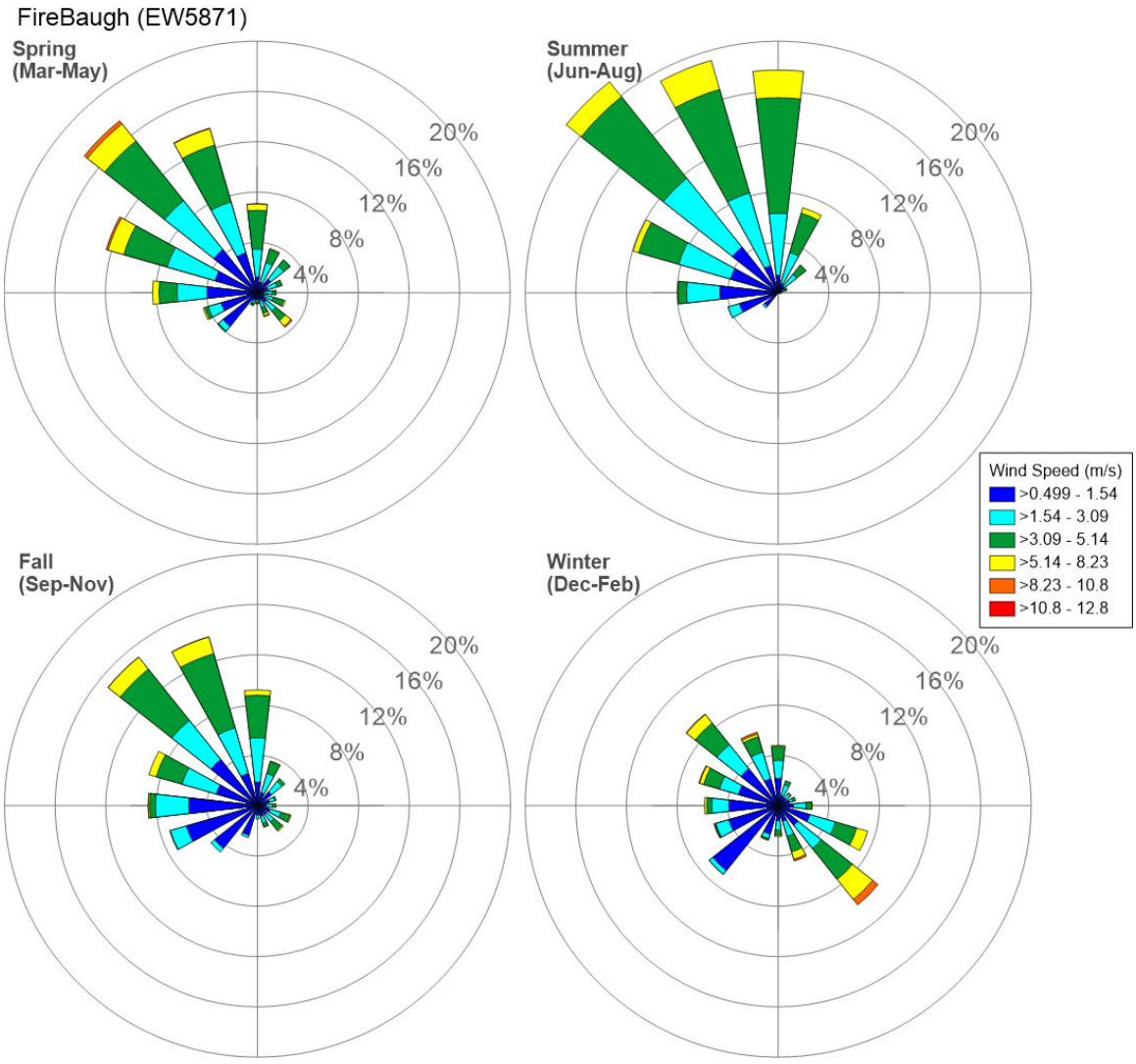


Figure A-1. Seasonal Windroses for FireBaugh Meteorological Station

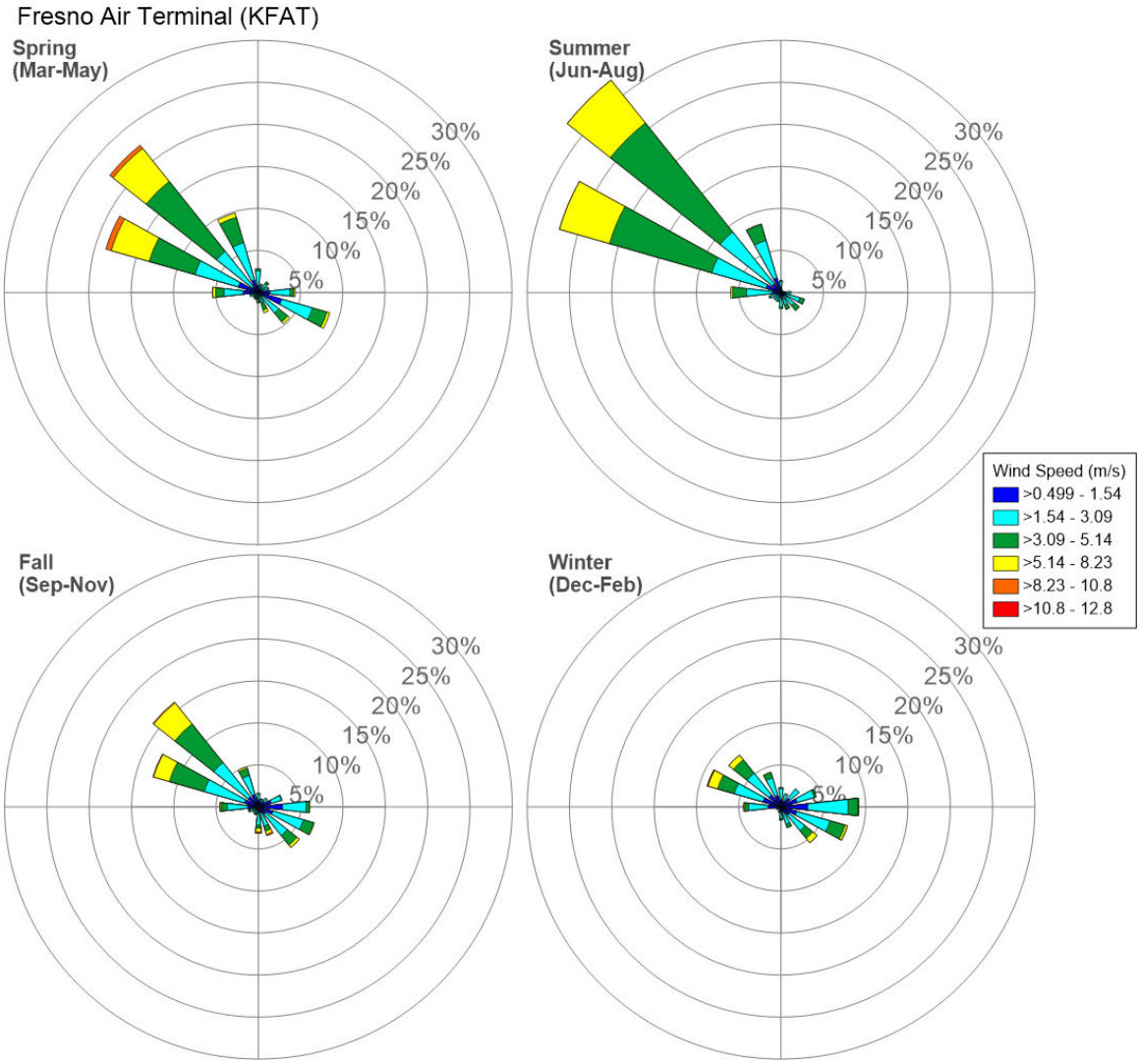


Figure A-2. Seasonal Windroses for Fresno Air Terminal Meteorological Station

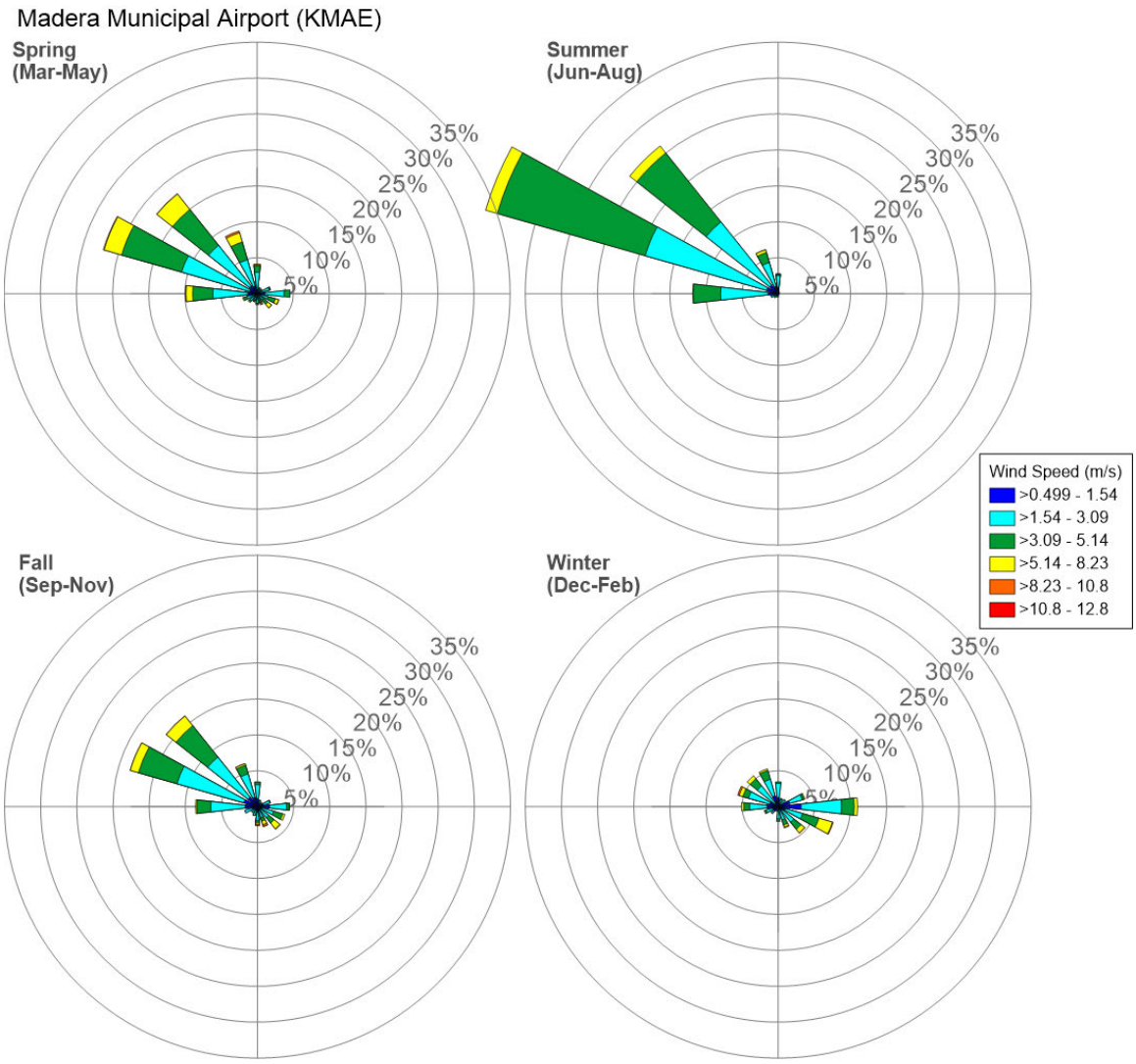


Figure A-3. Seasonal Windroses for Madera Municipal Airport Meteorological Station

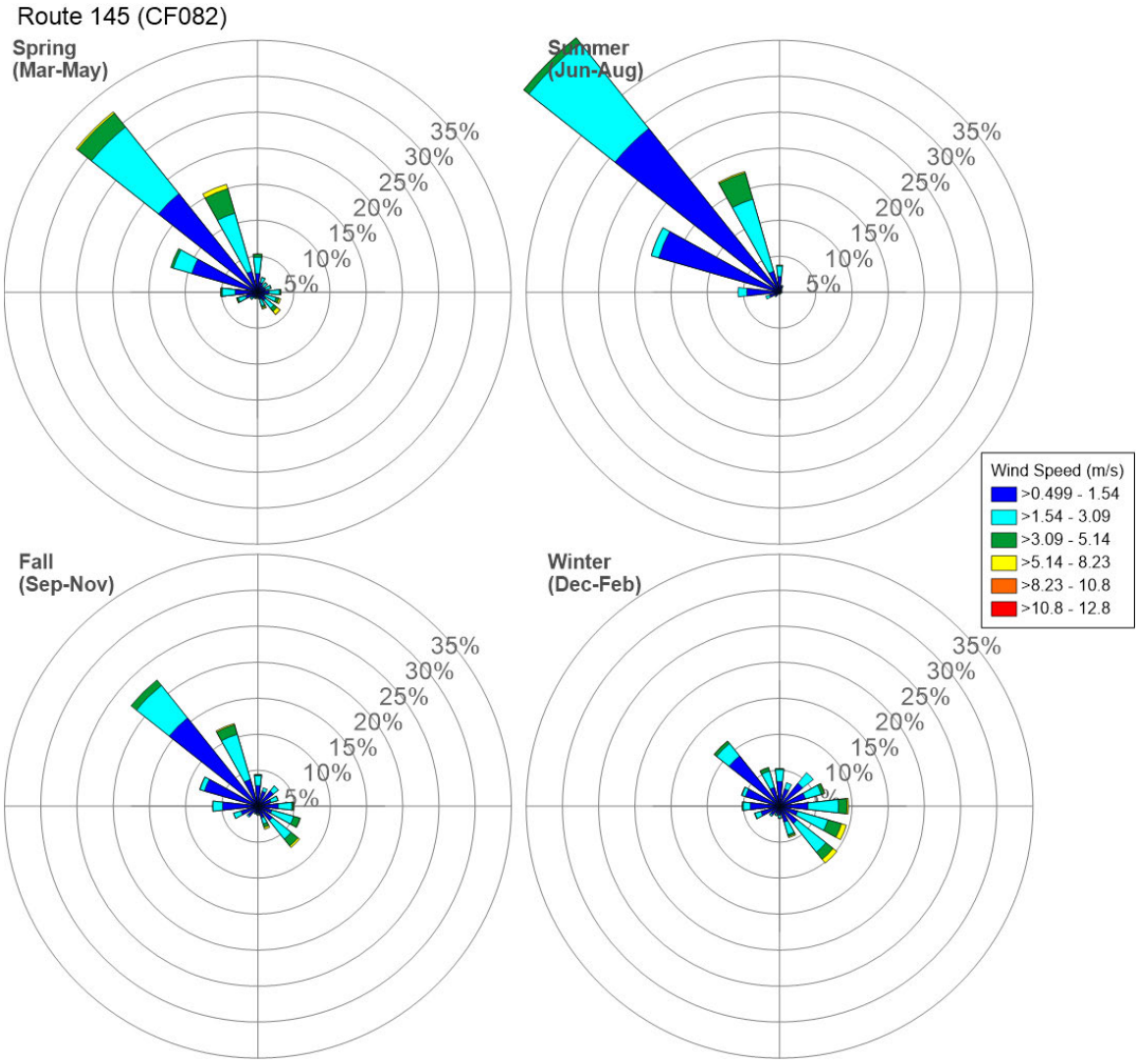


Figure A-4. Seasonal Windroses for Route 145 Meteorological Station

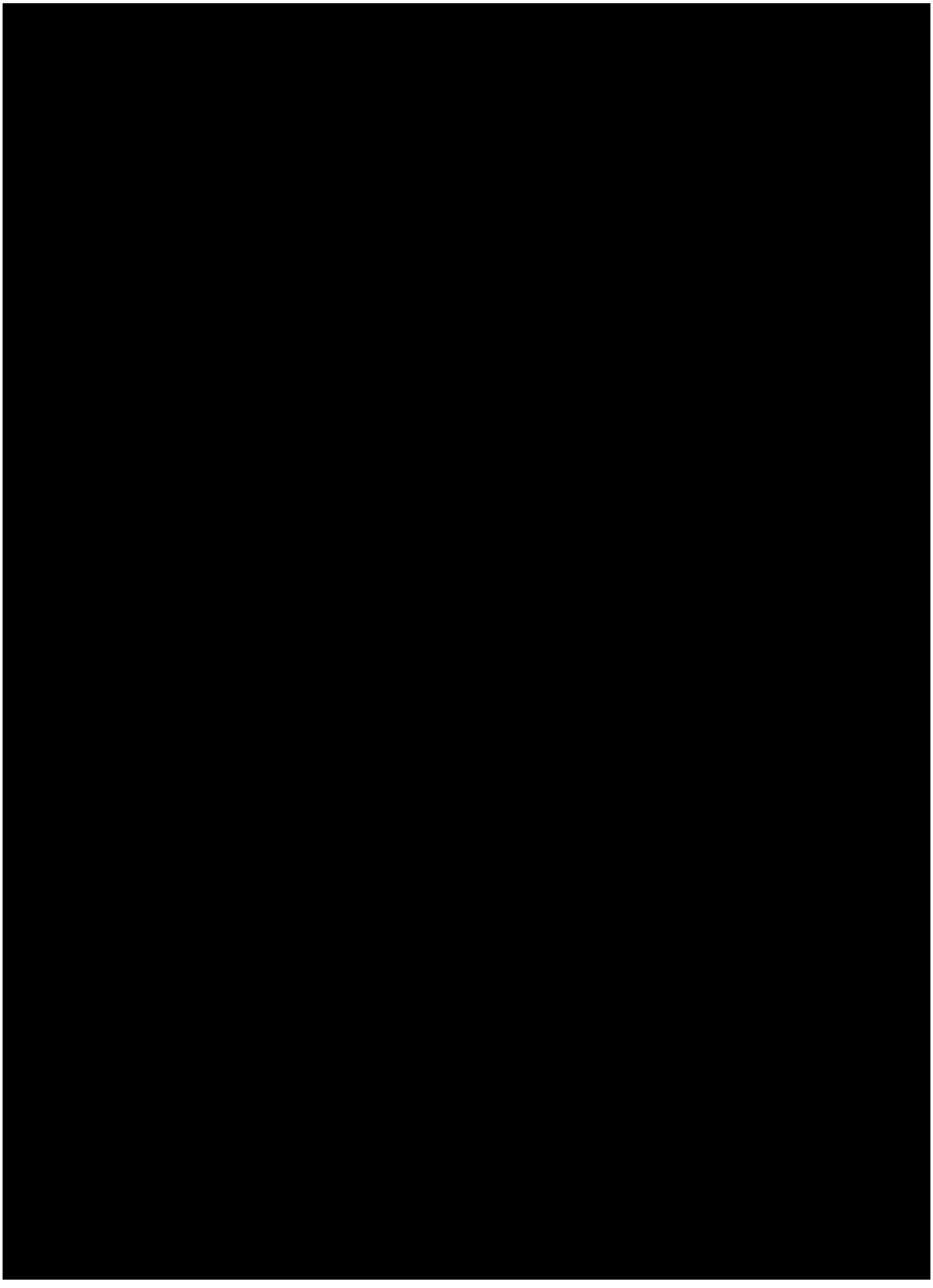
Appendix B – Ambient Air Monitor Specifications

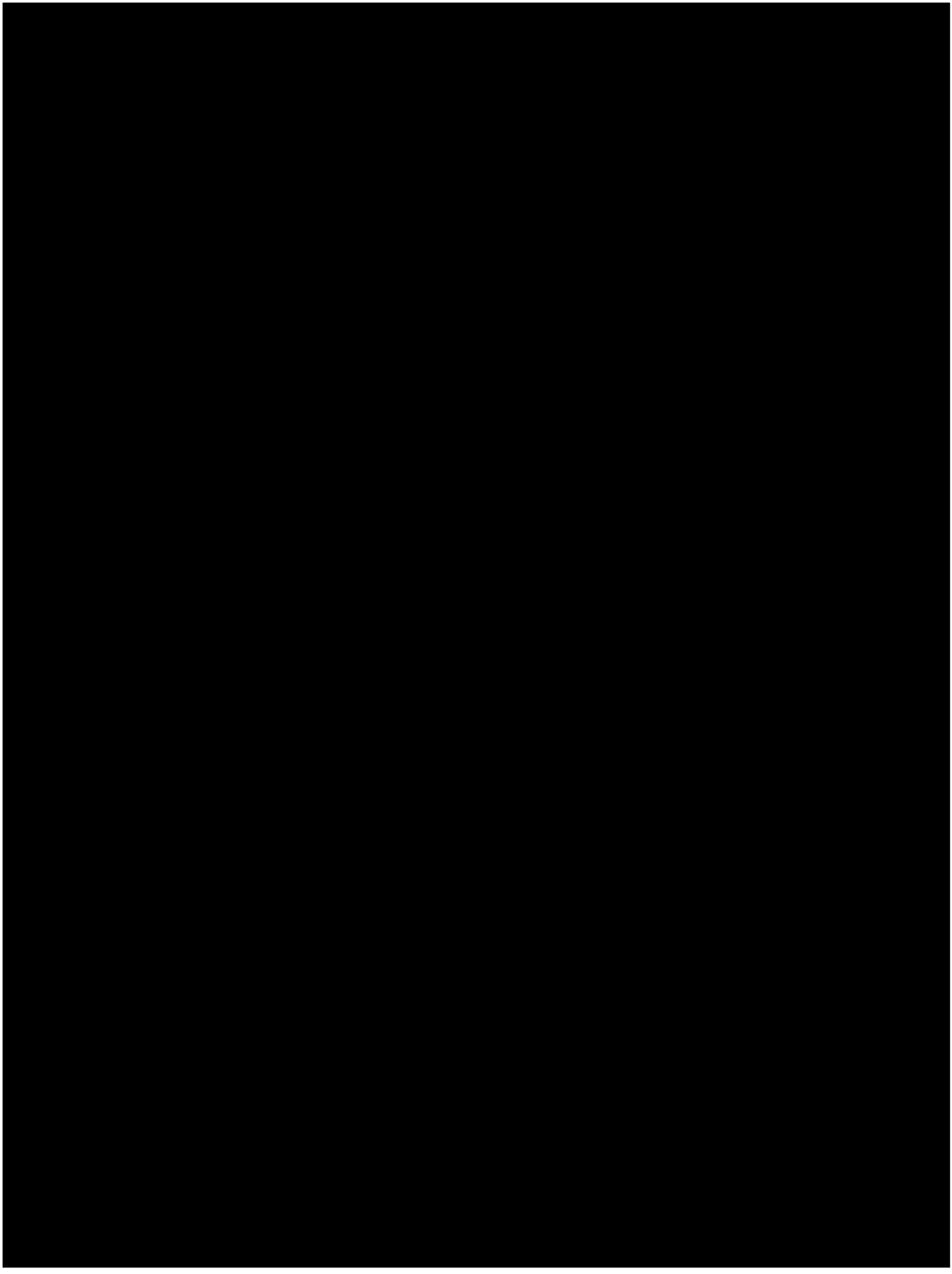
	airpointer 2D	airpointer 4D	airpointer PM (HC)
Pollutants Standard modules	2 of the following modules	4 of the following modules	4 of the following modules
	$NO/NO_2/NO_x/NH_3$	Weight: 12.0 kg/26.5 lbs, see page 12 for technical specifications; optional: span module	
	O_3	Weight: 5.8 kg/12.8 lbs, see page 13 for technical specifications; optional: span module	
	SO_2 (H_2S)	Weight: 8.5 kg/18.7 lbs, see pages 14-15 for technical specifications; optional: span module; optional: H_2S module	
	CO/CO_2	Weight: 9.0 kg/19.8 lbs, see page 16 for technical specifications; optional: span module	
	PM10/PM2,5	Type approved PM10 and PM2,5 (Met One BAM1020 or EDM 180C)	
More sensor modules			
	BTX/TVOC	see page 17 for technical specifications;	
	Standard Modules Dust Monitoring: Nephelometer for indicative PM monitoring (PM10, PM2,5) or Multi PM (laser spectrometer) for indicative PM monitoring (PM10, PM4, PM2,5, PM1 and TSP)		
	Meteorological sensors: wind direction, wind velocity, temperature, air pressure, relative humidity, precipitation, made by various manufacturers		
	Traffic data sensors: traffic count, made by various manufacturers		
	Noise sensors, made by various manufacturers		
	Electrochemical sensors for formaldehyde, ethane, chlorine… For industrial applications, environmental hygiene, and indoor air quality monitoring (IAQ)		
	Sensors for monitoring indoor CO_2 (IAQ)		
	Navigation system (GPS) for linking monitoring data with geographical data		
Features (Model)			
Dimensions (H/W/D, w/o sample inlets)	890/920/400 mm 34,80/36.22/15.75 in.	1120x920x400mm 44,09x36,22x15,75 in.	1480x920x650mm 58,28x36,22x25,59 in.
Weight	65.8 kg/145.1 lbs	73.9 kg/162.9 lbs	110 kg/242.5 lbs
Power consumption*	max. 670 W	max. 670 W	max. 2000 W
Flow without Dust:	<2000 ccm/min	<3000 ccm/min	<3000 ccm/min
Common features			
Construction	Well-isolated double aluminium construction		
	Standard monitoring modules on removable drawers		
	Rugged, inconspicuous burglar-proof design		
Standard equipment	Internal air conditioning and temperature control		
	Maintenance door		
	Cylinder lock (standard)		
	Zero air supply		
Operating temperature	-20 °C/-4°F to +42 °C/108°F (optional heating for down to -40 °C/-40°F) (+50°C for HC)		
Options	Various types of mounting brackets		
	Wireless communication (LTE/UMTS/3G Modem,…)		
	Sample gas conditioning (high relative humidity, high PM exposure)		
	Integration of external devices and instruments (e.g. 4-20 mA, RS-232, Modbus via IP,…)		
	Solutions to communicate with external data systems (e.g. TCP-IP, Modbus via IP, RS-232, 4-20 mA,…)		
	Various base frames and handling devices for on-site operation (roadside, workshop, indoor, pickup truck, trailer,…)		

Airpointer Methane Monitor Specifications

Parameter	**Specification**
Technology Type	FID, with integrated hydrogen generator
Range	0.02 ppm to 50 ppm
Repeatability	± 1% of full scale response
Zero Drift	± 0.01% of full scale over 24 hours
Span Drift	± 1% of full scale over 24 hours
Response Time	< 30 seconds to 90% of concentration point
Switching Time Between Channels	< 3 minutes
H2 Flow	35 cc/min
Air Flow	175 cc/min

Appendix C – Daily Leak Monitoring Procedure





Appendix D – RMLD-IS and GS 700 Wellhead Monitoring Equipment Specifications

TECHNICAL SPECIFICATIONS:

Detection Method:	Tunable Diode Laser Absorption Spectroscopy (TDLAS)
Measurement Range:	0 to 99,999 ppm-m
Sensitivity:	5 ppm-m at distances from 0 to 50 ft (15 m) 10 ppm-m or better at distances 50 to 100 ft (15 to 30 m)
Intrinsic Safety:	Class 1 Division 1 Group D, T3 in accordance with UL 913 & CSA C22.2 No 157, MetLab Listing #E112840
Detection Distance:	100 ft (30 m) nominal. Actual distance may vary due to background type and conditions.
Beam Size:	Conical in shape with a 22" diameter at 100 ft (56 cm at 30 m)
Detection Alarms Modes:	Digital Methane Detection (DMD): Audible tone relative to concentration when detection threshold exceeded Adjustable Detection Alarm Level from 0 to 255 ppm-m Pure Tome: Continuous audio tone relative to concentration Adjustable Volume: 8 Levels
System Fault Warning:	Unique audible tone and indication on the display
Self Test & Calibration:	Built-in Self Test and Calibration function verifies operation and adjusts laser wavelength for maximum sensitivity. Test gas cell integrated within carrying case.
Compliance:	EMC (EN61000-6-2, EN6100-6-4)
Laser Eye Safety: (CDRH, ANSI and IEC)	IR Laser: Class I Green Spotter Laser: Class IIIa; **Do not stare into beam or view directly with optical instruments**
Communications:	RS232 Standard, Bluetooth optional
Display:	Large, easy to read backlit LCD (.75" Numeric)
Operating Temperature:	0° to + 122° F (-17° to 50° C)
Humidity:	5 to 95% RH, non-condensing
Enclosure:	IP54 (Water splash and Dust resistant)
Instrument Weight:	10 lbs (Transceiver 3 lbs, Controller 7 lbs); (4.5 kg; 1.3 kg , 3.2 kg)
Carry Case:	14 lbs; 34" x 9 ½" x 14" (6.4 kg; 86 cm x 24 cm x 36 cm)
Battery:	Internal, rechargeable, Li ion battery pack, 11.1 Vdc
Battery Run Time:	8 hours at 32° F without backlight on, minimum
Battery Charging:	External, in-line, 110-240 Vac, 50 / 60 hertz, international, 19 Vdc power supply
Charge Time, Maximum:	8 hours
Charging Indicator:	Integrated into controller panel
Shoulder Strap:	Single over the shoulder padded strap with Ergonomic dual strap and belt system

HEATH CONSULTANTS

1-800-HEATH-US ■ www.heathus.com

RMLD-IS®

Remote Methane Leak Detector

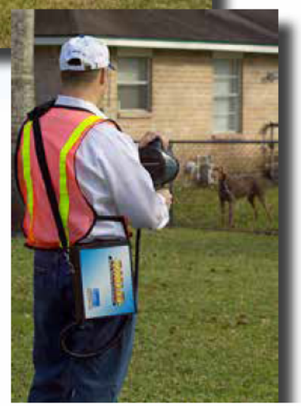
R&D 100

Award Winner

Recognized as one of the 100 most technologically significant products introduced to the marketplace.

RMLD-IS®
Remote Methane Leak Detector

Faster...Safer...Reliable...Efficient



Revolutionary Technology

The portable, reliable Remote Methane Leak Detector (RMLD-IS®) changed the way methane surveys are conducted.

Instead of having to walk the entire length of the service line to check for methane leaks…the RMLD-IS quickly and efficiently detects leaks up to one hundred feet away allowing remote detection of hard-to-reach areas and difficult terrains. Remote detection allows the user to safely survey difficult to reach areas, such as busy roadways, yards with large dogs, locked gates, compressor stations, offshore platforms and other hard to access places.

For utilities and their employees, this time-saving method represents the potential for significant productivity gains, reduced operations and maintenance costs, and a safer survey.

Tunable Diode Laser Absorption Spectroscopy

Available gas detectors that deploy technologies such as flame ionization must be positioned within the leak plume to detect the presence of methane. The RMLD-IS does not have to be within the gas plume because it uses laser technology known as Tunable Diode Laser Absorption Spectroscopy. When the laser passes through a gas plume, the methane absorbs a portion of the light, which the RMLD-IS then detects. This quantum leap in technology makes it possible to detect methane leaks along the sight line without always having to walk the full length of the service line.

Components

The RMLD-IS consists of two interactive components; a transceiver subsystem and a signal processing/user interface controller. The transceiver has two lasers; an infrared laser beam that is non-visible and is continuously on while the unit is turned on. The green spotter laser is similar to those used for presentation pointers and is turned on by the operator depressing the trigger button.

How Does It Work?

When the infrared laser beam is transmitted from the launch port some of the laser light is reflected by a normal background such as brick, concrete, grass, etc., to the detector. This reflected light is collected and converted to an electrical signal that carries the information needed to deduce the relative methane concentration. This signal is processed so that methane concentrations can be reported in parts per million meter or ppm-m. The laser has a nominal distance of up to 100 feet and is selective to methane only. It will not false alarm on other hydrocarbons.

RMLD-IS Intrinsically Safe

With its intrinsically safe rating the RMLD-IS opens a new realm of survey applications such as:

- Offshore Platforms
- Plant and Industrial Inspections
- Compressor Stations
- Production Facilities
  - gas gathering, drilling sites etc.
- LNG Ship Inspections
- First Responders for Leak Investigation
- First Responders to Odor Complaints
- Gas Processing Plant Inspections

GASURVEYOR 700 SERIES

HEATH CONSULTANTS

Your Safety...Our Commitment

Utilizing the latest infrared gas detection technology in a robust and reliable design, the Gasurveyor 700 (GS700) is a highly configurable instrument with leading performance and a user-friendly interface which makes it the perfect choice for all gas utility applications.

Ensuring Compliance

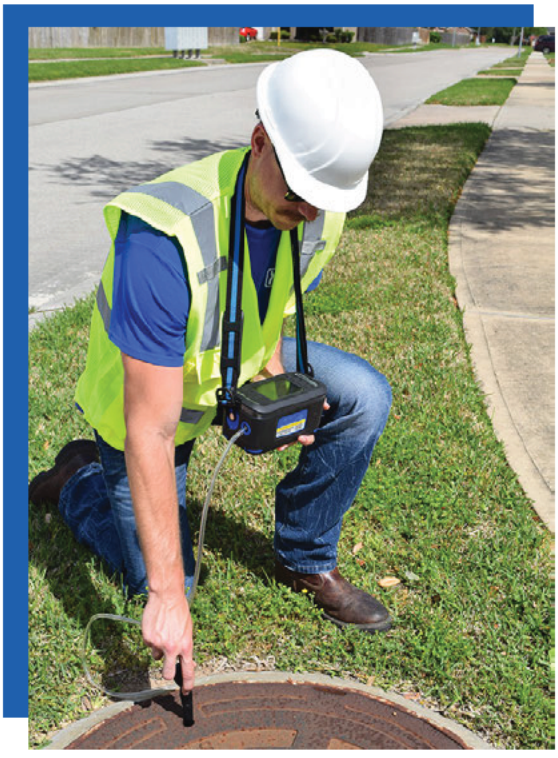
Intelligent data-logging functionality together with otional GPS mapping simplifies data gathering. Our cloud based Instrument Management System (IMS) improves fleet management by providing access to field usage reports, calibration history, investigation mapping and many other bespoke reports; making it easier for our customers to demonstrate compliance.

Natural Gas Discrimination

Quickly determines the source of gas leaks, whether it's pipeline gas or naturally occurring biogas; saving valuable time and reducing detection related costs.

Flexible Configuration

The GS700 can be configured to meet specific application needs and can be customized to suit a range of user settings and languages.



Application Ready

Highly configurable to our customers' gas detection needs, providing flexibility of use without compromising on performance.

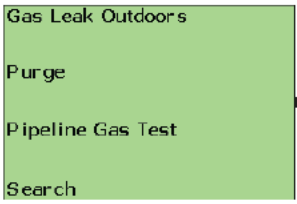
Application modes include:

- Gas leak outdoors
- Pipeline gas test
- Purge
- Search
- Barhole
- Confined space

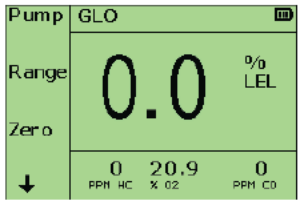
Additional Features

- LEL & Volume Gas (infrared)
- Optional sensors including: PPM, O_2, CO, H_2S
- Barhole mode - configurable
- Soft-key operation
- Communication: IrDA & optional Bluetooth
- 360° Alarms
- Lightweight and rugged
- Ingress protection - IP55
- Alkaline or rechargeable battery options

The GS700 is a configurable combination instrument that fully meets the needs of gas utilities. The large display simplifies operation and allows the user to access multiple functions.



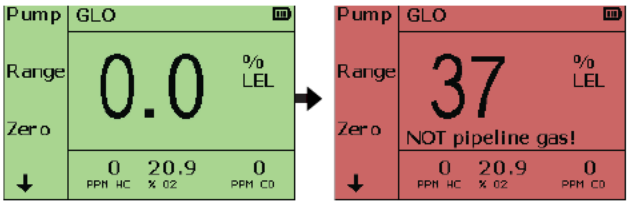
Mode Options



Gas Leak Outdoors (GLO)

Pipeline Gas Test (PGT)

Is the gas coming from your pipeline?
Avoid unnecessary excavations with this invaluable feature. Instantaneous confirmation that the gas is not from your pipeline (e.g. landfill or swamp gas).
Simple user interface:



Barhole Mode

Barholing allows underground leaks to be located. The GS700 incorporates a Barhole Mode that allows compliant and consistent barholing.

Features include:

- Fixed time sampling
- Peak and sustained readings displayed
- Simple user menu to view previous reading
- Datalogging - including location data (GPS optional)

TECHNICAL SPECIFICATIONS

Size:	7.5 x 3.6 x 4.2 inches
Weight:	3.1 lbs (Alkaline) 2.9 lbs (Rechargeable)
Display:	Monochrome LCD with automatic backlighting
Temperature:	-4°F to +122°F (-20°C to +50°C)
Humidity:	0 - 90% RH non-condensing
Sampling:	Integral pump with flow fail sensor; sample path is protected by a hydrophobic and cotton filter
Alarms:	360° Highly visible flashing LED Sounder ~90 dB at 0.3 m
Datalogging:	Capacity: 500 session logs Session log: user ID, date & time, gas readings, alarms, calibration/bump test data, barhole data, PGT logs • Log extraction: Infrared or Bluetooth (optional) • Location data via GPS (optional)
Battery:	3 x LR20 'D' size Alkaline Cells or Rechargeable Battery Pack
Battery Life:	Typically 15 hrs Alkaline, 20 hrs Rechargeable
Charge Time:	Typically 6 hrs
Construction:	Antistatic Polycarbonate ABS with conductive TPE over-moulding
Rating:	IP55 (Protected from dust & water jets)
Certification:	IECEx / ATEX CE Ex II 2G (Ta = -20°C to +50°C) Ex db ia IIC T4 Gb or Ex db ia IIB T3 Gb (when fitted with a PPM gas sensor) CSA SP Class I Div. 1 Groups A, B, C, D T4 or Class I Div. 1 Groups C, D T3 (when fitted with a PPM gas sensor)
Warranty:	2 years

SENSOR SPECIFICATIONS

GAS	RANGE	RESOLUTION	*T90	SENSOR TYPE
HC	0-1,000ppm 0-10,000ppm	1ppm 1ppm	-	Semiconductor Semiconductor
HC	0-9.9% LEL 10-100% LEL	0.1% 1%	<6s	Infrared
HC	0-100% Volume	1%	<6s	Infrared
O_2	0-20.9% 21-25%	0.1% 1%	<15s	Electrochemical
CO	0-1,000ppm	1ppm	<7s	Electrochemical
H_2S	0-100ppm	1ppm	-	Electrochemical
PGT	Decision made if sample: 1.5% VOL gas			Infrared

*Instrument without probe T90 response times.
Complies to standards: BS EN / IEC 60079-29-1, BS EN 45544, BS EN 50104

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