

Gran Tierra Energy Inc.

alt-FEMP Pilot Program (formerly i3 Energy) 2024 Performance Report

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Executive Summary

Gran Tierra Energy Inc. (Gran Tierra) acquired i3 Energy Canada Ltd. (i3 Energy) in 2024. The assets acquired included the facilities covered by this alt-FEMP in the Western Canadian Sedimentary Basin. In 2023, the alt-FEMP was issued for two full compliance years: January 2023 – December 2024.

For methane detection, this alt-FEMP utilized Optimum Results (Optimum) optical gas imaging cameras (OGI) along with Bridger Photonics' (Bridger) aerial site-level emission-screening technology.

With the alt-FEMP screenings and surveys completed, Gran Tierra Energy Inc. will continue to use the data collected to track progress towards methane reduction targets and inform areas of improvement. This report summarizes data collected during the alt-FEMP screenings, follow-up OGI surveys and Control Region OGI surveys. The schedule of the program was as followed:

<u>Quarter-Year</u>	<u>Site Level Screening</u>	<u>OGI Surveys</u>	<u>Status</u>
Q3 2023	Aerial-based, site-level screening by Bridger of alt-FEMP facilities.	Followed by Optimum OGI follow-up surveys at the top 20% of all screened LSDs ranked by total emission rate for fugitive emission localization and repair.	Completed
Q4 2023	Aerial-based, site-level screening by Bridger of alt-FEMP facilities.	Followed by Optimum OGI follow-up surveys at the top 40% of all screened LSDs ranked by total emission rate for fugitive emission localization and repair.	Completed
Q2 2024	Aerial-based, site-level screening by Bridger of alt-FEMP facilities.	Followed by Optimum OGI follow-up surveys at the top 20% of all screened LSDs ranked by total emission rate for fugitive emission localization and repair.	Completed
Q4 2024	Aerial-based, site-level screening by Bridger of alt-FEMP facilities.	Followed by Optimum OGI follow-up surveys at the top 20% of all screened LSDs ranked by total emission rate for fugitive emission localization and repair.	Completed

1. Screening Data

Table 1 summarizes various statistics regarding the screening campaigns across the alt-FEMP. Please note emissions detected during the screenings can be a combination of fugitive, vented and sporadic operations-related emissions. The detailed screening data is provided in an Excel attachment with this report, and the tables summarizing each site's total and individual emissions detected during each screening are provided in Appendix B and C, respectively.

Table 1. Combined summary of screening data for 2023 and 2024.

<u>Parameter</u>	<u>2023</u>	<u>2024</u>
Number of sites screened	526	542
Number of screened sites with detections	193	190
Number of detections during screenings	291	279
Percentage of screened sites with detections (%)	37%	35%
Average emissions per screened site with a detection (m ³ /day)	256	248
Total emission rate identified (m ³ /day)	49 360	47 187
Number of sites followed-up on	151	173
Percentage of sites followed-up on vs. screened (%)	29%	32%
Number of follow-up sites with no screening detections	5	0
Number of follow-up emissions with emission source not detected by the screening technology	5	0
Average time between detection and follow-up to site (days)	56	47
Percentage of follow-up sites that are recurring (%)	40%	53%
Number of emissions from the screenings that were followed-up on	237	180
Number of emissions from the screenings that were followed-up and identified as fugitive emissions	55	68
Total emission rate of fugitives identified and repaired for the calendar year (m ³ /day)	366	905.4

2. Follow-up Data

Table 2 summarizes statistics regarding the OGI follow-up surveys of the alt-FEMP region conducted after a screening campaign. The raw detailed follow-up data is provided in an Excel attachment with this report and the tables summarizing each site's total and individual emissions detected during each screening are provided in Appendix D and E, respectively.

OGI has the capability to localize emissions to a source-level. Also, the OGI operator can normally determine the emission type. Table 3 shows the emission source equipment types for all identified fugitive emissions including the number and volume of emissions for each equipment type.

Table 2. Summary of OGI follow-up data.

Year		2023	2024
Number of sites followed-up on for the year		151	173
Percentage of screened sites followed-up on (%)		29%	32%
Percentage of sites with screening detections followed-up on (%)		78%	64%
Number of follow-up surveys where no emissions were found		89	107
Average time between detection and follow-up to site (days)		56	47
Percentage of follow-up sites that are recurring (for the calendar year – following-up on a site more than once)		40%	53%
Identified emission source types per follow-up per screening campaign (vent, fugitive, methane slip, other)		Fugitives and Vents	Fugitives
Number of detections by emission source type (n)	Fugitives	92	101
	Vents	15	N/A
	Total	107	101
Volume of detections by emission source type (m ³ /day)	Fugitives	981.0	936.9
	Vents	85.5	N/A
	Total	1066.5	936.9
Average emissions per follow-up site (m ³ /day)		7.0	6.0

Identified emission source equipment types per follow-up per screening campaign (e.g., tank, compressor seal)	10	8
Number of recurring leaks observed (if the leak occurred more than once per year)	N/A	0

Table 3. Number and volume (m³/d) of emission detections by equipment type as determined by follow-up OGI surveys.

Identified emission source equipment types	2023		2024	
	Number of detections by equipment type	Volume of detections by equipment type (m ³ /d)	Number of detections by equipment type	Volume of detections by equipment type (m ³ /d)
controlled tank				
dehydrator	7	188.6	3	72.4
flare stack	1	0.9		
header				
heater			2	20.9
meter	2	5.8	1	1
other	13	77.3	33	692.6
pig sender/receiver				
pipeline - aboveground				
pipeline - buried				
pneumatic instrument				
pneumatic pump				
reciprocating compressor	15	85.5	1	2.9
screw compressor	20	304.7		
separator	40	371.4	49	104.7
surface casing vent				
sweetening process treater				
uncontrolled tank	1	2.9	2	11.5
vent stack				
wellhead	8	29.5	10	30.9
Total	107	1066.5	101	936.9

3. Emissions Summary

3.1 Screening Summary

Figure 1 shows the distribution for site-total methane emission rates detected during screening campaigns in 2023 and 2024, capturing all types of methane emissions (fugitives, vents, methane slip and others). The graph allows one to discern how many site-total emission measurements reported emission rates within a certain range (e.g. emissions with rates between 0 and 100 m³/day where individual emissions on a single site from one screening are summed).

Figure 2 shows the distribution for individual emission rates detected during the 2023 and 2024 screening campaigns. Screening technologies are generally unable to determine the type of methane emission measured (fugitives, vents, methane slip and others). The graph allows one to discern how many individual emission measurements had an emission rate within a certain range (e.g., emissions with rates between 0 and 100 m³/day).

Screening Site-Emissions Distribution

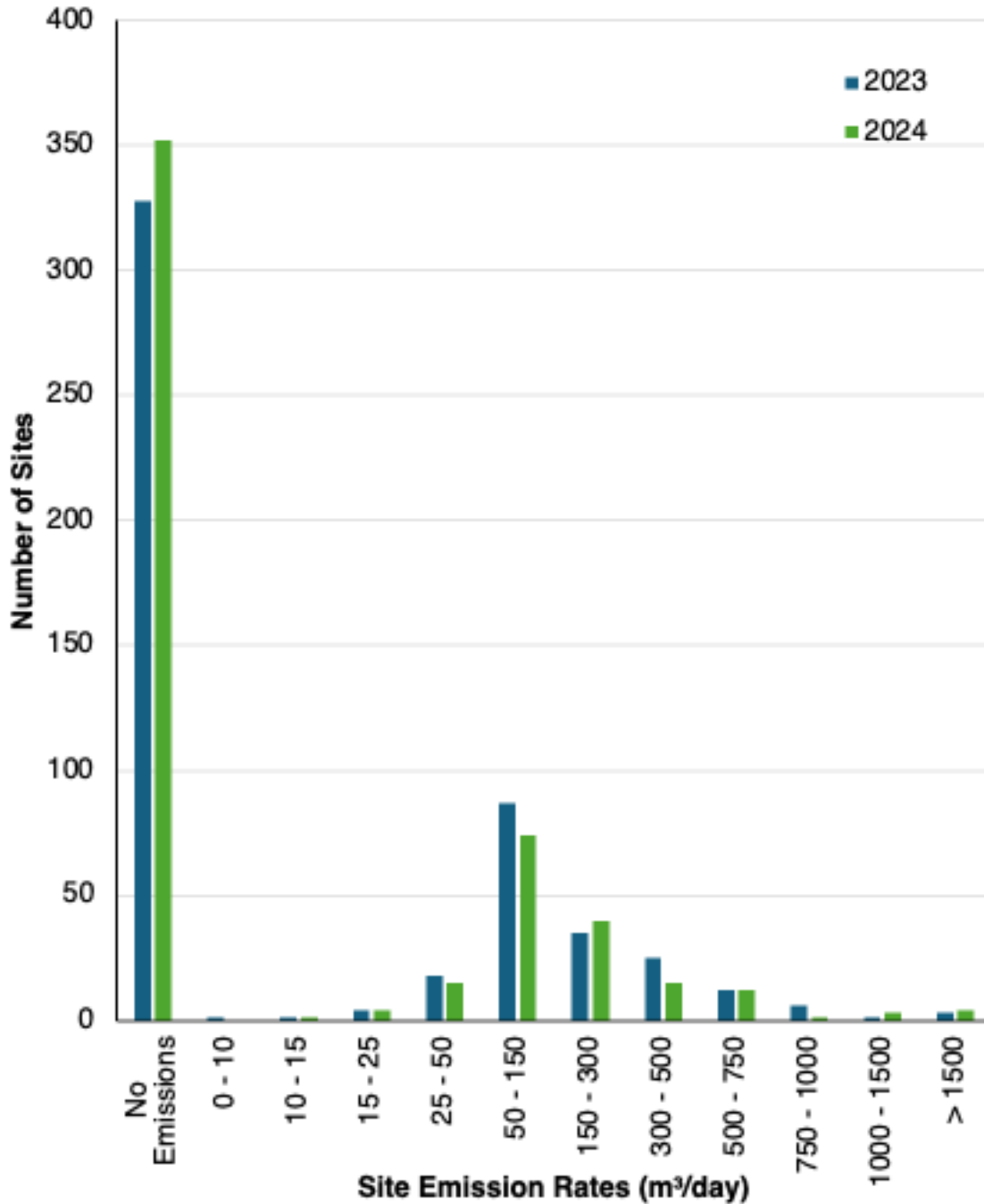


Figure 1: Distribution of site-total emission rates measured during screening campaigns.



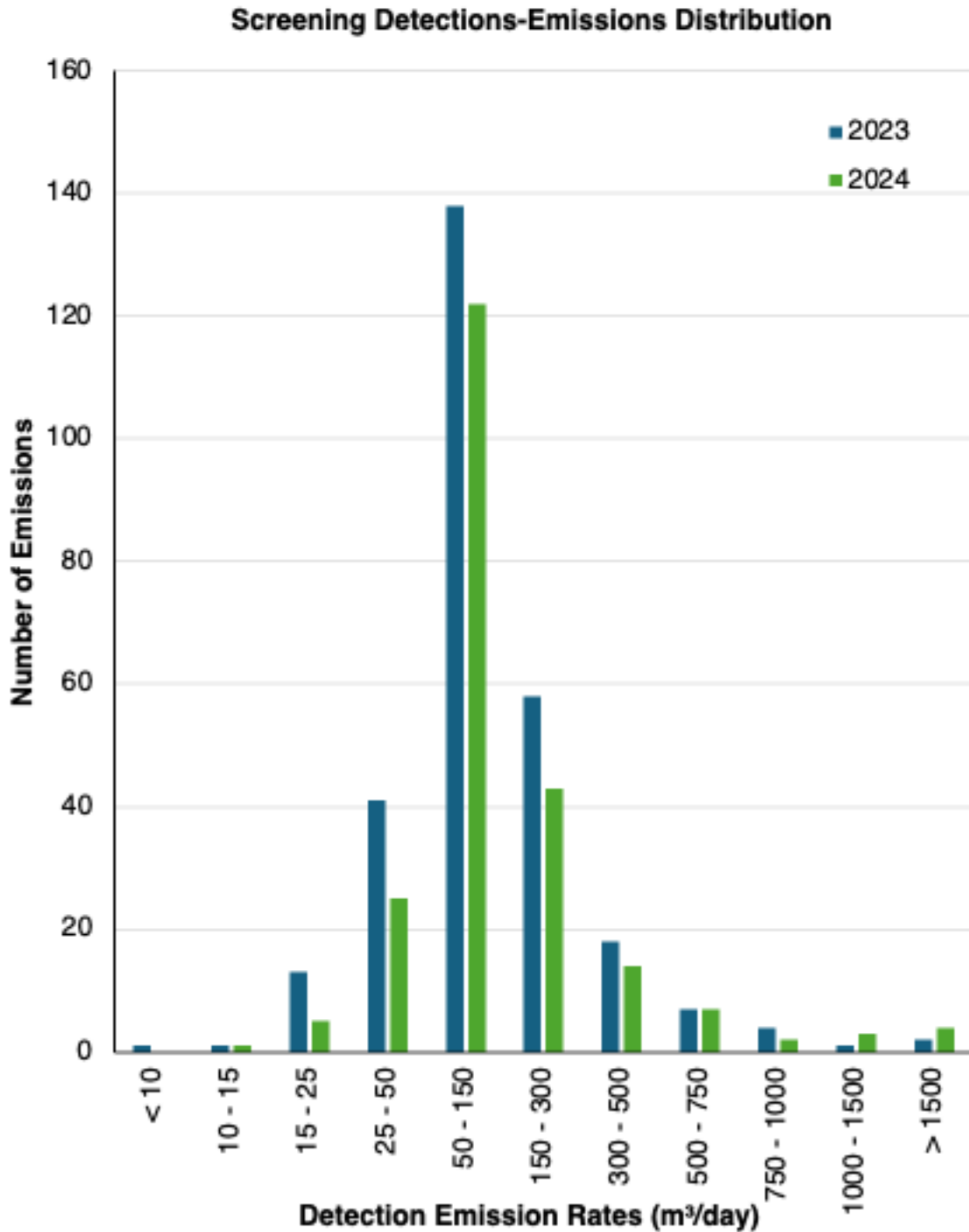


Figure 2: Distribution of individual emissions, by rate, measured during screening campaigns.



In general, screening technologies cannot discern fugitive emissions from other emission types, thus a graph depicting the emissions distribution specifically for fugitives detected during screenings could not be generated.

3.2 OGI Survey Summary

Figure 3 shows the emission rate distribution for site-total emissions detected during OGI survey campaigns of the alt-FEMP region, aggregating all methane emissions measured during that OGI campaign. The graph allows one to discern how many site-total emission measurements, by OGI, reported an emission rate within a certain range.

Figure 4 below shows the emission rate distribution for individual emissions detected during OGI survey campaigns. The graph allows one to discern how many individual OGI measurements had an emission rate within a certain range.

Survey Site-Emissions Distribution

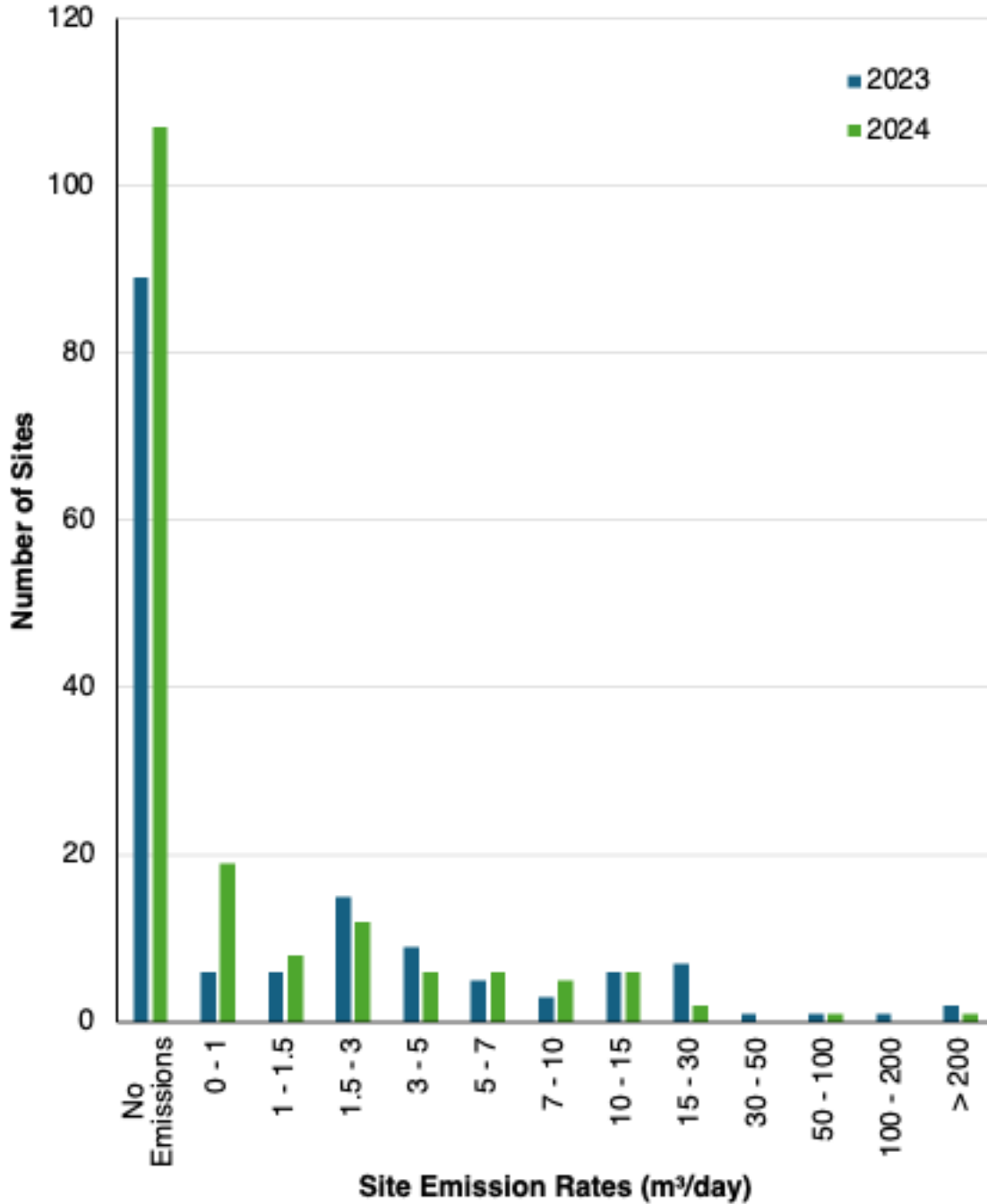


Figure 3: Distribution of site-total emission rates measured during OGI survey campaigns (e.g. follow-up and independent campaigns) of the alt-FEMP region.



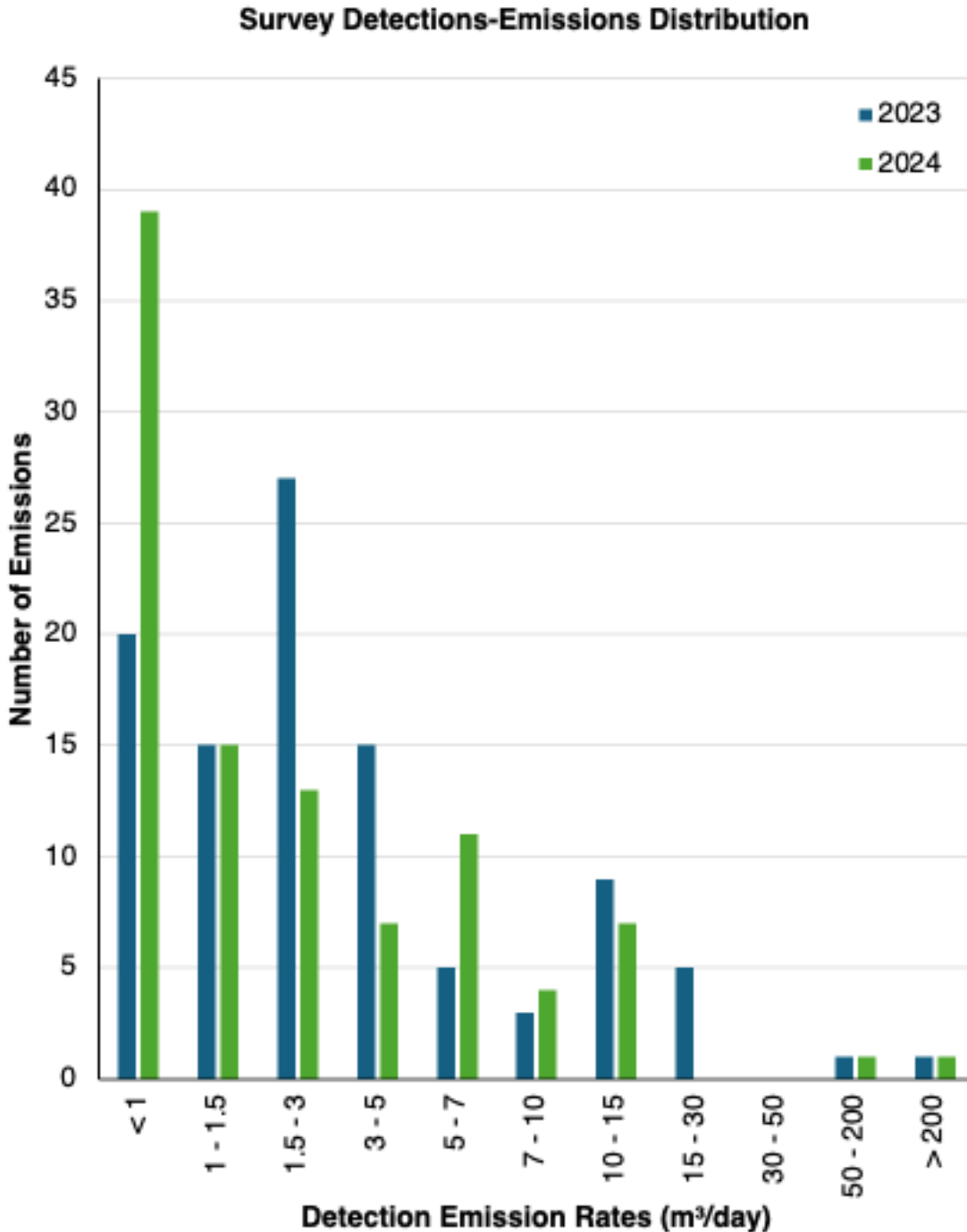


Figure 4: Distribution of individual emissions, by rate, measured during OGI survey campaigns (e.g. follow-up and independent campaigns) of the alt-FEMP region.



Figure 5 below shows the emission rate distribution for individual fugitive emissions detected during OGI survey campaigns. The graph allows one to discern how many individual fugitive emission measurements reported an emission rate within a certain range.

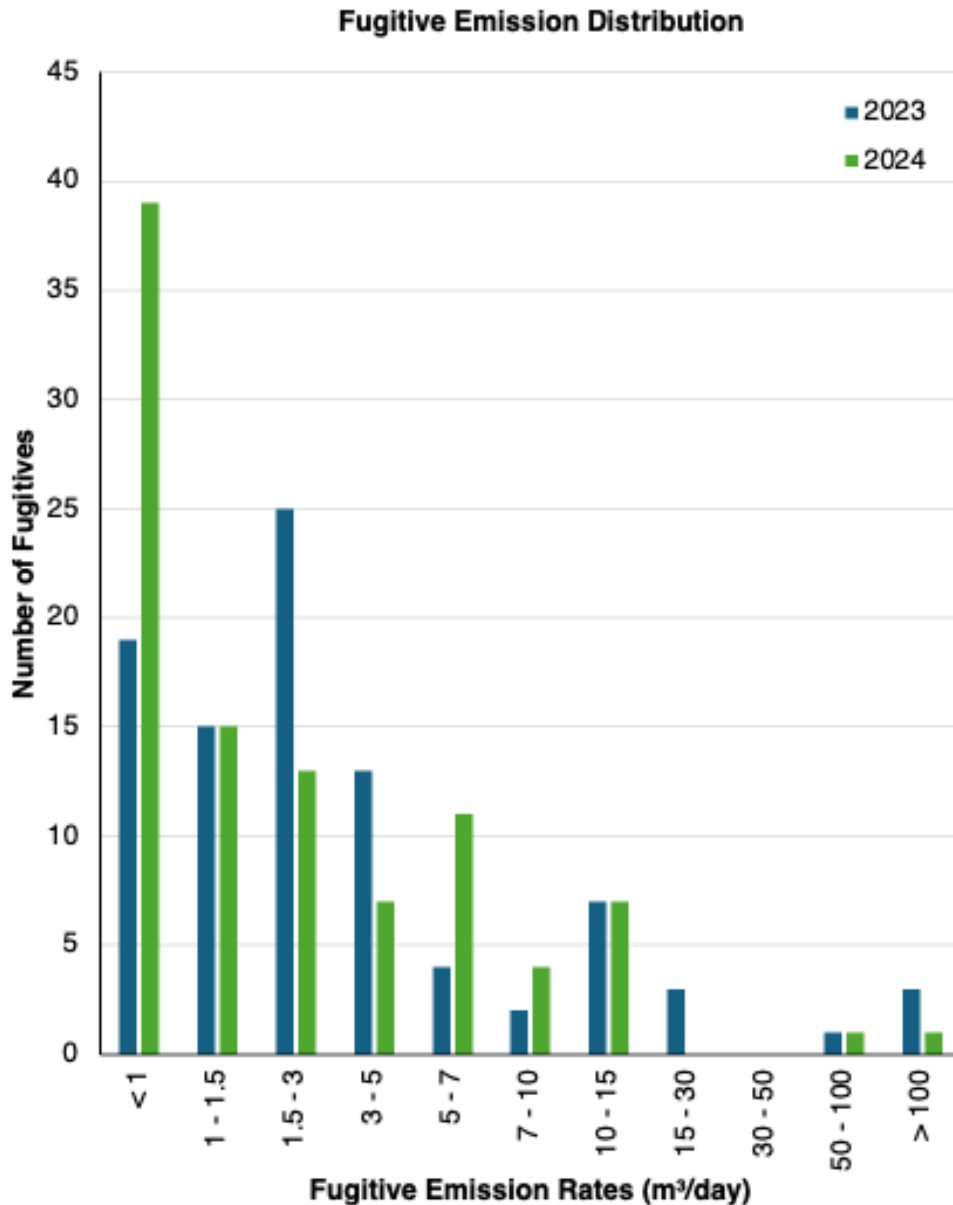


Figure 5: Distribution of fugitive emissions, by rate, measured during OGI survey campaigns (e.g. follow-up) of the alt-FEMP region.



3.3 Control vs. alt-FEMP Summary

Table 4 compares several metrics related to the sites surveyed and emissions detected via OGI surveys in the alt-FEMP vs. Control regions for 2024. The average rates in the table are calculated per site per survey (e.g. the control site was surveyed six times in the two years and the average of these six was taken).

Table 4. Comparison of the alt-FEMP and Control regions in 2024.

Item	alt-FEMP Region	Control Region
Number of Sites Surveyed	173	56
Number of Surveyed Sites with Emissions Detected	66	27
Percentage of Surveyed Sites with Emissions Detected (%)	38.2%	48.2%
Number of Emissions Detected at Surveyed Sites	101	37
Number of Surveyed Sites with Fugitive Emissions Detected	66	27
Percentage of Surveyed Sites with Fugitive Emissions Detected (%)	38.2%	48.2%
Number of Fugitive Emissions Detected	101	37
Number of Vent Emissions Detected	0	0
Total Rate of Emissions Detected (m ³ /day)	936.9	835
Total Rate of Fugitive Emissions Detected (m ³ /day)	936.9	835



Total Rate of Vent Emissions Detected (m ³ /day)	0	#N/A
Average Fugitive Rate per Site with Fugitive Emissions Detected (m ³ /day)	14.2	36.3
Average Fugitive Rate for all Fugitive Emissions Detected (m ³ /day)	9.3	22.6
Number of Fugitive Emissions Repaired	88	35
Percentage of Fugitives Repaired (%)	87%	95%
Average time to repair (days)	37	30

4. Emission Reduction Summary

The fugitive emission data collected during the alt-FEMP was used to generate the as-found “measured fugitive emission distribution”. This consisted of all fugitive emissions recorded during surveys of both the alt-FEMP. Figure 6 shows a comparison of the as-found “measured fugitive emission distribution” to the “assumed fugitive emission distribution” employed in the modelling initially used to design the approved alt-FEMP. Additionally, the minimum detection limit (MDL) at 90% probability of detection (PoD) for the screening technology is displayed for reference.

A default Directive 060 FEMP program and the executed Gran Tierra Energy Inc. program were re-modelled using the as-found fugitive distribution using the AroFEMP software (Arolytics). The traditional default FEMP was predicted to emit 10% less in methane fugitives compared to the alt-FEMP. The as-found distribution was significantly shifted to smaller fugitives which is believed to have contributed to the change in performance.

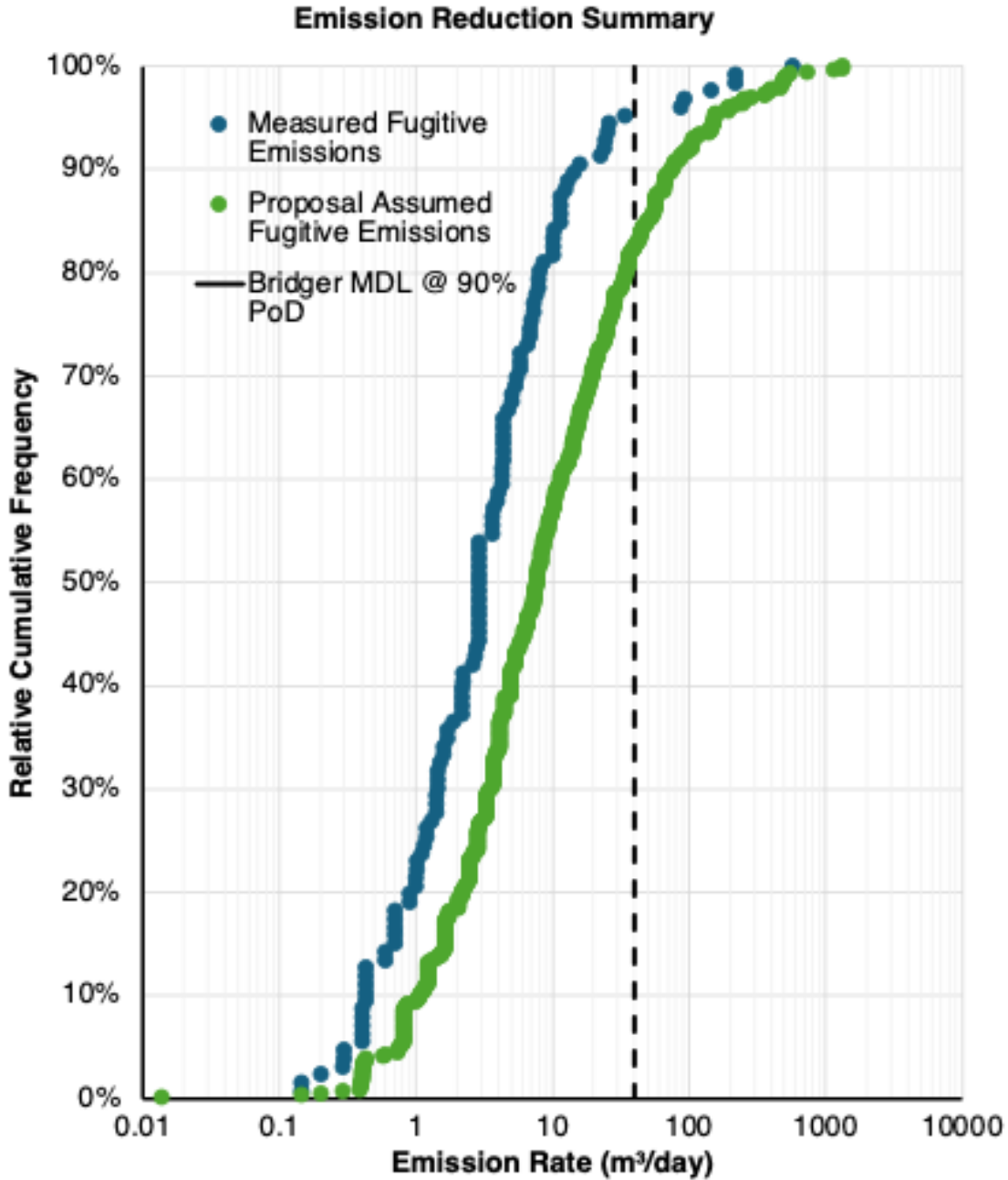


Figure 6. Comparison of relative cumulative frequencies for the “as-found” measured fugitive emissions versus the proposal-assumed fugitive emissions.



5. Technology Limitations

Bridger's detection sensitivity depends on factors including flight speed, flight altitude, measurement swath width, and wind speed. Many of these factors can be controlled by Bridger to tighten or loosen the sensitivity as required. Bridger's GML is an active, laser-based system, rather than a passive remote sensor that relies on the environment, so conditions such as cloud cover or shadows that can impair other aerial sensor technologies do not negatively impact GML. Regarding operations at northern latitudes, GML is moderately limited by snow cover and standing water. While GML will detect methane when there is snow on the ground, the detection sensitivity of the data is degraded. With standing water, Bridger's laser 'bounces' off and, as a result, no measurement is made. In several areas of Alberta, the muskeg landscape holds pockets of water in the warmer months. Based on testing and commercial projects completed in Alberta, the muskeg landscape has not negatively impacted Bridger's GML measurements. As a result of high winds rapidly dispersing emissions, Bridger limits its survey operations to ground wind speeds less than or equal to 25 mph. Bridger also implements a wind speed protocol to detect emissions at the lower end of GML's detection sensitivity. To avoid Bridger's limitations in snow, Bridger will only implement GML in snow-free months (between late Spring and early Winter). Bridger will also limit its survey operations to average ground wind speeds less than or equal to 25 mph.

6. Success of the alt-FEMP

The alt-FEMP was designed to meet methane emission equivalency to a default FEMP using alternative site screening technologies combined with OGI surveys. The execution of this program has been successfully completed.

7. Nonperforming Program Elements

None to report.

8. Additional Control Measures

Any sites that were missed during screenings were automatically added to be followed-up on by OGI survey.

9. Additional Information

Following the Q2 Bridger screening in 2024, control region sites ended up in the follow-up list. This was corrected after the follow-up was completed and the missed alt-FEMP sites were followed-up at a later date, overall resulting in extra surveys being completed.

Vent data is collected and maintained by Gran Tierra and their field operators using in-house software and Intricate. This data is submitted to Petrinex and OneStop where further details on vent data can be obtained.

10. Key Performance Indicators

- Gran Tierra Energy Inc. was successful in implementing alternative technologies to conduct LDAR screening, where emissions were detected at 383 of the 1068 screened sites.
- A default D060 program would result in 408 site visits compared to the 173 that were visited with OGI under the alt-FEMP in 2024 showcasing efficient LDAR program execution.
- In 2023 and 2024, a total of 96 547 m³/day of methane was found to be emitting by screening technologies on 570 detections. Of which, 1918 m³/day was identified as fugitive emissions when followed-up with OGI.
- 87% of fugitive emissions sources were repaired under the alt-FEMP. Some of the remaining are still scheduled to be completed, waiting to be updated into data management platforms, and others are waiting for a shutdown so they can be properly accessed.
- A comparison of the alt-FEMP and control regions can be found in Table 4 for 2024.
- On average, leak repairs were completed 37 days after an OGI follow-up under the alt-FEMP. In the Control Region, on average, leak repairs were completed 30 days after an OGI survey.

Appendix A: Raw Detailed Data

Please refer to the attached excel file of the raw data collected during the screening and follow-up surveys titled “Gran Tierra 2024 femp-screening-data.xlsx”.

Appendix B: Screening Data – Site-total Emissions by Campaign

See attached “Gran Tierra AER-altFEMP-2024 PerformanceReport-Appendix.xlsx”.

Appendix C: Screening Data – Individual Emissions

See attached “Gran Tierra AER-altFEMP-2024 PerformanceReport-Appendix.xlsx”.