Region 2 Caribbean Environmental Protection Division
Multimedia Permits and Compliance Branch
Air Protection Team

CAA Inspection Report

Inspection Date: May 2, 2024

Facility Name: Municipality of Toa Baja Landfill

Facility Address: PR-866 Km 1.5 Sec. Candelaria, Toa Baja Puerto Rico

EPA Lead Inspector: Alex Rivera, 787-977-5845, rivera.alex@epa.gov

EPA Asst. Inspector(s): Gloria Díaz-Galarza, 787-977-5882, diaz-galarza.gloria@epa.gov
Daniel Heins, 202-565-0070, heins.daniel@epa.gov
Steven Rapp, 202-250-8961, rapp.steve@epa.gov
Victor Tu, 212-637-3476, tu.victor@epa.gov
Katherine Marmanides, 212-637-4063, marmanides.katherine@epa.gov

Facility Contact(s): Cynthia B. Otero, Conwaste Environmental Compliance Division, (787) 366-6776, cotero@conwastepr.com; Miguel Sosa, Operations Manager, msosa@conwastepr.com

This report is a summary of observations and information gathered from the facility at the time of the inspection. The information provided does not constitute a final decision on compliance with Clean Air Act ("CAA") regulations or applicable permits, nor is it meant to be a comprehensive summary of all activities and processes conducted at the facility.

Summary of Onsite Observations

A. Opening Conference

The representatives of the United States Environmental Protection Agency (USEPA), Alex Rivera, Gloria Diaz-Galarza, Victor Tu, Katherine Marmanides, Steven Rapp, and Daniel Heins arrived at the Municipality of Toa Baja Landfill ("MTL" or "facility") located in PR-866, Km 1.5, Candelaria Sector in Toa Baja, PR. at approximately 9:30 am. The inspectors contacted Ms. Cynthia B. Otero, Conwaste's Environmental Compliance Division via phone. Ms. Otero agreed on joining the inspection at a later time during the day and asked the inspectors to meet Mr. Miguel Sosa, Operations Manager, who was assigned to assist EPA representatives ("the inspectors") during the inspection. The EPA inspectors met with Mr. Sosa, showed credentials and explained the main purpose of the inspection was to conduct surface emission monitoring ("SEM"). The inspectors proceeded with the inspection opening conference, which consisted of a general

discussion with Mr. Sosa about the facility operations. The following is a summary of the conversation with Mr. Sosa:

1. Gas collection and control system (GCCS) – Mr. Sosa informed that the facility has 100 landfill gas monitoring regulatory wells, all vertical. Mr. Sosa stated that at the time of the inspection there were eight (8) disconnected landfill gas monitoring wells, all located in the northwest portion of the landfill, which is being used as active area. Mr. Sosa also added that three (3) landfill gas monitoring wells are out for repairs and that all of these wells were disconnected around a week before EPA's inspection and should be placed back in service in approximately a week.
2. Leachate collection – Mr. Sosa indicated that the facility has leachate collection infrastructure located in the southwest portion of the landfill.
3. SEM – Mr. Sosa informed that the facility conducts SEM with in-house personnel and that normally finds three (3) to four (4) leaks per SEM event. EPA informed Mr. Sosa that two (2) Inficon Irwin devices will be used for conducting the SEM inspection and asked about the facility SEM technician availability to join the inspection. Mr. Sosa informed that Mr. Jekser Dávila, GCCS operator/SEM technician, was available to join the inspection. The inspectors also informed Mr. Sosa, that they would capture digital images of the facility wells and any other operation using a digital point and shoot camera and forward-looking infrared camera.
4. Gas to Energy Units – Mr. Sosa informed that the facility has two (2) engines that uses landfill gas to produce the facility power demand. The facility has two (2) flares, two burn the residual landfill gas, each of same capacity. One (1) of the flares is kept in stand-by mode. Mr. Sosa added that the landfill normally produces around 1,000 scfm, but that at the time of the inspection it was producing around 900 scfm due to the series of disconnected wells in the active area.
5. Cover material – Mr. Sosa stated that the facility uses dirt (clay) as daily cover and that approximately 8-12 inches of dirt are applied. Mr. Sosa also informed that no areas within the landfill has final cover.
6. Mr. Sosa also stated that the landfill does not have any closed areas, and that all landfill areas have liner.
7. Safety – Mr. Sosa instructed the inspectors to be wary of heavy trucks transit and slippery conditions during the SEM survey.

B. Walkthrough/SEM

After completing the opening conference, the inspectors agreed with Mr. Sosa and Mr. Dávila to split in two (2) survey teams, A Survey (Mr. Dávila, Victor Tu, Steven Rapp, Katherine Marmanides and Gloria Diaz-Galarza) and B Survey (Mr. Sosa, Daniel Heins and Alex Rivera). The inspectors agreed with Mr. Sosa on providing a detailed summary of the SEM inspection observations during the inspection closing meeting. The SEM inspection started around 10:15 AM.

During the SEM, both survey teams found areas with significant vegetation growth affecting the proper implementation of SEM and cover integrity issues such as exposed waste and erosion gullies creating avenues for gases to migrate through the landfill surface into the atmosphere. Also, both survey teams found 44 locations with surface concentrations of methane over 500 ppm, two (2) greater than 50,000 ppm. The inspectors observed several of the high

concentrations measured were from wells that were offline and capped but from which the gas was not being collected. The facility representatives confirmed that their SEM activities rarely find locations with surface concentrations of methane over 500 ppm. The inspectors noted multiple wells bent over with adjacent surface emissions, indicating potential well damage from landfill settlement which could adversely impact gas collection.

The inspectors surveyed approximately 32 acres of the eastern of half of the landfill, out of approximately 88 acres of total waste area. After returning to the office/flare station, the inspectors then drove to the leachate riser and tank on the western edge of the landfill. Thick vegetation prevented effective monitoring of the waste area on the west.

The inspectors concluded the SEM inspection around 1:50 PM. See Appendix A (SEM Data), Appendix B (SEM Map), Appendix C (Photo Log), Appendix D (Instrument & Calibration Data) and closing meeting discussion summary for further details about the SEM findings and observations.

Closing Meeting

At approximately 2:00 PM, the inspectors returned to the facility office trailer for a closing conference with Mr. Sosa and Ms. Cynthia Otero, who joined the inspection around noon. As agreed during the inspection opening meeting, the inspectors discussed with Mr. Sosa and Ms. Otero the main findings and observations during the SEM inspection, the following is a summary of the conversation:

1. As confirmed by the facility representatives, its SEM quarterly reports rarely contain SEM methane results over 500 ppm. Although the monitoring activity did not cover the entire extent of the facility SEM plan, the inspectors were able to find 44 different locations with surface concentrations of methane over 500 ppm, some greater than 50,000 ppm.
2. The inspectors informed Mr. Sosa and Ms. Otero that the SEM data along with a map of the survey locations will be shared with them either towards the end of the day or the day after the inspection. The inspectors also indicated that the next facility SEM quarterly report should include the SEM inspection findings and the required corrective actions and that the corrective actions clock will start from the date when EPA shares the SEM data.
3. The inspectors noted that gas collection could be improved, and emphasized on the areas with offline wells, which resulted in elevated surface methane readings, some greater than 50,000 ppm.
4. Mr. Sosa confirmed that the landfill receives around 30,000 tons of waste in a monthly basis and that it has been in operation since the 1980s.
5. Mr. Sosa and Ms. Otero confirmed that the landfill property covers around 213 acres, and that 81 acres are impacted with waste.
6. Cover integrity issues generating avenues for gases to migrate through the landfill surface into the atmosphere. Mr. Sosa indicated that heavy rain events affected their ability to maintain proper coverage. The inspectors further indicated that exposed waste, erosion gullies and unmanaged vegetation observed during the SEM inspection show that not all issues found were a result of the recent rain events.

7. SEM inspection findings and walkthrough conversations showed potential lack of SEM training. The inspectors mentioned the lack of sampling all around wells as an example of inadequate SEM implementation.
8. Significant vegetation growth in certain areas of the landfill presents a challenge to properly conduct SEM.
9. The inspectors encouraged the used of practices such as using tarps to cover areas for keeping water from infiltrating the waste, reducing leachate breakouts, and minimizing erosion issues.
10. The coverage conditions observed during the SEM inspection showed that eight (8) inches of daily cover material could not be enough, leaving areas too vulnerable to erosion. Mr. Sosa stated that the facility main challenge has been to obtain consistent quantity and quality of cover material.
11. Mr. Sosa confirmed that the facility has 20 wells with dewatering pumps.
12. Mr. Sosa stated that the facility wells have boot skirts to reduce penetrations leaks and air intrusion.
13. The inspectors recommended to conduct SEM at leachate risers.
14. M. Otero confirmed that Conwaste operates the Fajardo, Mayagüez and Carolina municipal landfills. The Carolina and Fajardo Landfills are equipped with GCCS and Mayagüez Landfill will have GCCS soon.
15. The inspectors informed about EPA's climate change initiatives focused on landfills methane emissions reduction.
16. Ms. Otero asked the inspectors about the use of drones for conducting SEM. The inspectors confirmed that it could be a good option, but recommended to keep in mind that drones alternative will be limited in vegetated areas such as the ones observed in the landfill.
17. The inspectors also informed Mr. Sosa and Ms. Otero that an inspection report will be prepared and shared with them within approximately 60 days.

The inspectors expressed gratitude for all the assistance provided during the inspection and all the cooperation to provide the information needed to complete the inspection. The inspectors concluded the inspection at 2:30 PM.

Appendices

Appendix A - SEM Data

Appendix B - SEM Map

Appendix C - Photo Log

Appendix D - Instrument & Calibration Data

End of Report

Lead Inspector's Name: Alex Rivera

ALEX RIVERA

Digitally signed by ALEX RIVERA
Date: 2024.06.14 11:29:14 -04'00'

Supervisor's Name: Nancy Rodríguez

NANCY RODRIGUEZ

Digitally signed by NANCY RODRIGUEZ
Date: 2024.06.14 11:41:11 -04'00'

Appendix A: SEM Data

SEM Exceedances

ID	Description	Reading (ppm)	Time	Latitude	Longitude
B1	Exposed waste	1489	10:31	18.42239	-66.20230
B2	WH2	2463	10:33	18.42248	-66.20243
B3	Well	773	10:38	18.42243	-66.20289
B4	Erosion rill/exposed waste	3000	10:42	18.42215	-66.20289
B5	Slanted well	9401	10:44	18.42203	-66.20301
B6	Cushion (exposed waste)	2280	10:50	18.42156	-66.20317
B7	Well 48 + Header penetration nearby	3200 at header 1383 at wellhead	10:52	18.42179	-66.20353
B8	WH14+exposed waste	7206	10:58	18.42220	-66.20354
B9	WH53	2263	11:02	18.42127	-66.20346
B10	Well	7087	11:04	18.42138	-66.20312
B11	Well 51	7716	11:08	18.42106	-66.20303
B12	Well 55 header + exposed waste	12727	11:14	18.42022	-66.20336
B13	WH71	15748	11:27	18.41958	-66.20333
B14	Exposed waste	1474	11:34	18.42058	-66.20349
B15	Exposed waste	1017	11:37	18.42080	-66.20366
B16	WH57	3330	11:39	18.42100	-66.20404
B17	WH4? + exposed waste	74713	11:43	18.42153	-66.20421
B18	WH46	16863	11:49	18.42215	-66.20402
B19	Tire	951	11:55	18.42186	-66.20447
B20	Cushion (exposed waste)	9011	12:03	18.42150	-66.20443
B21	Shallow pit	1073	12:05	18.42097	-66.20423
B22	Exposed waste	2165	12:07	18.42071	-66.20409
B23	Well by haul road	4443	12:09	18.42053	-66.20403
B24	WH33	6748	12:23	18.42264	-66.20499
B25	WH31	24551	12:27	18.42310	-66.20518
B26	WH29	30000	12:33	18.42322	-66.20456
B27	Foam block (exposed waste)	2512	12:34	18.42336	-66.20449
B28	WH19	3848	12:36	18.42358	-66.20447
B29	From concrete stormwater conveyance and nearby exposed waste	2620	12:48	18.42330	-66.20307
A1	WH1	26000	10:24	18.42218	-66.20220
A2	Leachate breakout with bubbles	1300	10:40	18.42182	-66.20260
A3	WH5	1271	10:44	18.42211	-66.20260
A4	WH11	22107	10:51	18.42133	-66.20260
A5	Exposed waste in mud	1422	10:55	18.42094	-66.20254
A6	WH50 (capped)	20644	10:57	18.42072	-66.20260
A7	Disconnected well	1007	11:01	18.42044	-66.20290

ID	Description	Reading (ppm)	Time	Latitude	Longitude
A8	White capped pipe, at cap and bottom	59000 at cap; 38500 at base	11:05	18.41993	-66.20290
A9	WH75	8686	11:10	18.41928	-66.20300
A10	Pipe into concrete	3684	11:13	18.41882	-66.20260
A11	WH79	850	11:22	18.41866	-66.20370
A12	Capped pipe / exposed waste	17952	11:30	18.41921	-66.20359
A14	WH30 hole by well base	29578	12:21	18.42262	-66.20430
A15	WH28	2141	12:34	18.42320	-66.20406
A16	WH16	44254	12:39	18.42313	-66.20366

Exceedances in the B survey were detected using the R2 IRwin by Dan Heins and Alex Rivera. Exceedances in the A survey were detected using the AED IRwin by Steven Rapp, Victor Tu, Katherine Marmanides and Gloria Diaz-Galarza.

Probe tips were fixed on hiking poles 8 cm from the base of the pole, all readings taken from 8 to 10 cm from the ground with the exception of the secondary reading at A8 measuring gas leaking from the pipe cap.

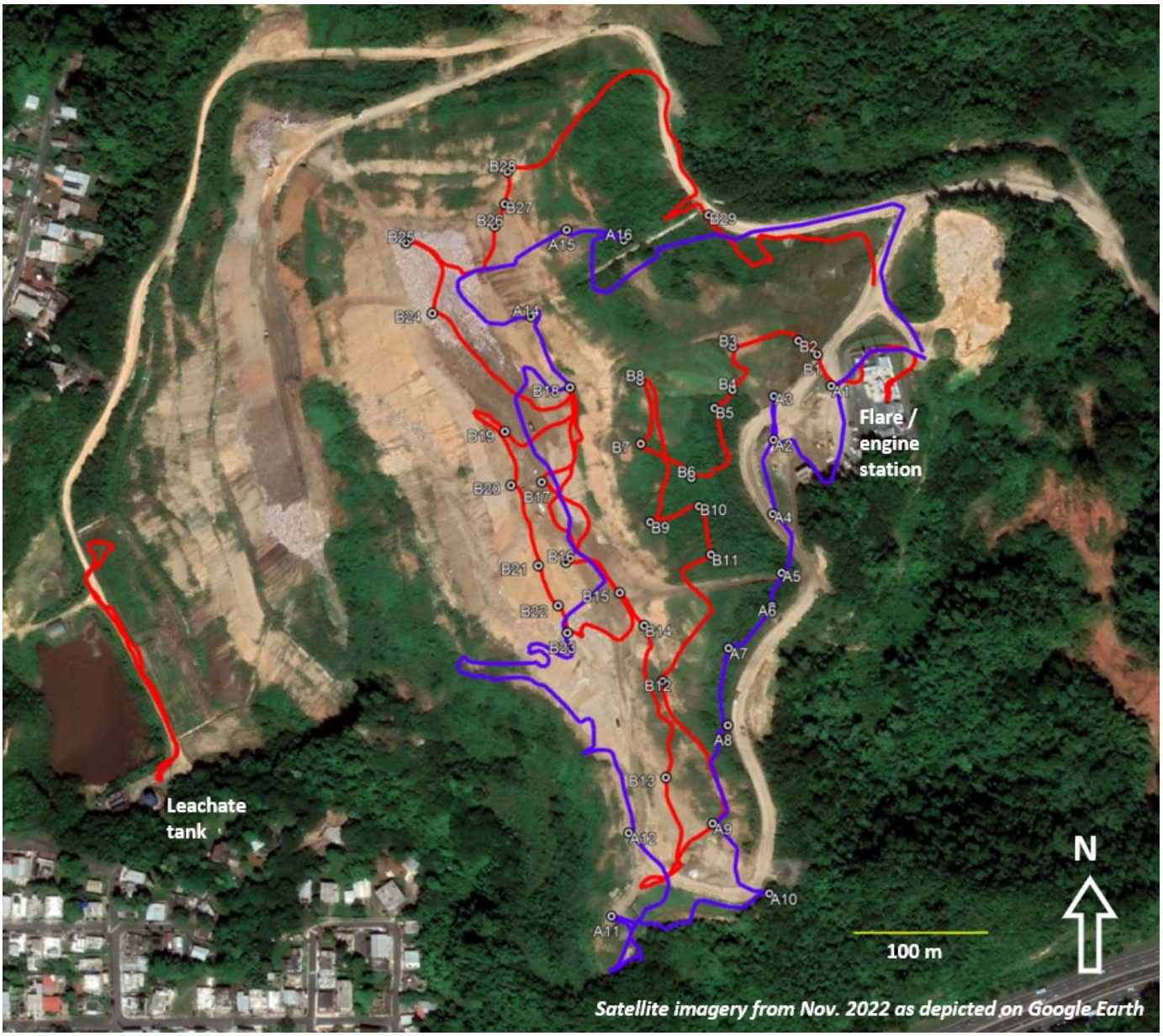
Background readings:

Upwind: 0 ppm
Downwind: 0 ppm

44 exceedances total:

500 – 1,000 ppm: 3
1,000 – 5,000: 21
5,000 – 10,000: 7
10,000 – 50,000: 11
50,000 – 100,000: 2

Appendix B: SEM Map



Blue and red lines trace each team's monitoring path. Exceedances are plotted and labeled as described in Appendix B.

The primary surveys covered approximately 32 acres on the eastern half of the landfill (with some gaps in that area, as depicted), in addition to approximately 175 meters on the western perimeter, including the leachate riser, with minimal survey over the waste mass on that side.

Appendix C: Photo Log for Municipality of Toa Baja Landfill, Toa Baja, PR		
Facility Address: PR-866, Km. 1.5, Candelaria Sector, Toa Baja PR	**EPA Inspectors:** Alex Rivera, Gloria Diaz-Galarza, Daniel Heins, Steven Rapp, Katherine Marmanides, and Victor Tu	**Image numbers:** P5020001 through P5020035 (B Survey Team) and P5020065 through P5020084 (A Survey Team) **Camera(s) Used:** Olympus TG-6 Digital Cameras

Image Number	File Name	Description	Date Taken	Time taken
1	P5020001.JPG	 Exposed waste	5/2/2024	1032
2	P5020002.JPG	 Landfill gas monitoring well #2	5/2/2024	1035

3	P5020003.JPG	 Exposed waste	5/2/2024	1036
4	P5020004.JPG	 Exposed waste	5/2/2024	1044

5	P5020005.JPG	 Slanted unidentified landfill gas monitoring well	5/2/2024	1046
6	P5020006.JPG	 Exposed waste	5/2/2024	1051

7	P5020007.JPG	 Landfill gas monitoring well #48 header pipe penetration	5/2/2024	1053
8	P5020008.JPG	 Exposed waste	5/2/2024	1056

9	P5020009.JPG	 Landfill gas monitoring well #14	5/2/2024	1100
10	P5020010.JPG	 Landfill gas monitoring well #53	5/2/2024	1104

11	P5020011.JPG	 Slanted unidentified landfill gas monitoring well	5/2/2024	1106
12	P5020012.JPG	 Landfill gas monitoring well #51	5/2/2024	1109

13	P5020013.JPG	 Exposed waste	5/2/2024	1110
14	P5020014.JPG	 Exposed waste	5/2/2024	1115

15	P5020015.JPG	 Leachate breakout	5/2/2024	1116
16	P5020016.JPG	 Landfill gas monitoring well #71	5/2/2024	1129

17	P5020017.JPG	 Exposed waste	5/2/2024	1136
18	P5020018.JPG	 Exposed waste	5/2/2024	1138

19	P5020019.JPG	 Landfill gas monitoring well #57	5/2/2024	1140
20	P5020020.JPG	 Exposed waste	5/2/2024	1142

21	P5020021.JPG	 Landfill gas monitoring well #40	5/2/2024	1145
22	P5020022.JPG	 Landfill gas monitoring well #46	5/2/2024	1150

23	P5020023.JPG	 Exposed waste	5/2/2024	1159
24	P5020024.JPG	 Exposed waste	5/2/2024	1204

25	P5020025.JPG	 Exposed waste	5/2/2024	1206
26	P5020026.JPG	 Exposed waste	5/2/2024	1208

27	P5020027.JPG	 Unidentified landfill gas monitoring well by active area haul pad	5/2/2024	1210
28	P5020028.JPG	 Landfill gas monitoring well #33	5/2/2024	1224

29	P5020029.JPG	 Landfill gas monitoring well #31	5/2/2024	1228
30	P5020030.JPG	 Landfill gas monitoring well #29	5/2/2024	1233

31	P5020031.JPG	 Exposed waste	5/2/2024	1235
32	P5020032.JPG	 Landfill gas monitoring well #19	5/2/2024	1237

33	P5020033.JPG	 Exposed waste by stormwater collection concrete culvert	5/2/2024	1249
34	P5020034.JPG	 Leachate breakouts	5/2/2024	1251

35	P5020035.JPG	 Leachate breakouts	5/2/2024	1252
36	P5020065.JPG	 Landfill gas monitoring well #1	5/2/2024	1028

37	P5020066.JPG	 Exposed waste	5/2/2024	1035
38	P5020067.JPG	 Leachate breakout/waterfall with bubbles	5/2/2024	1040

39	P5020068.JPG	 Landfill gas monitoring well #5	5/2/2024	10:46
40	P5020069.JPG	 Exposed waste (apparent electronic waste)	5/2/2024	1049

41	P5020070.JPG	 Landfill gas monitoring well #11	5/2/2024	1053
42	P5020071.JPG	 Exposed waste (northeast portion)	5/2/2024	1055

43	P5020072.JPG	 Landfill gas monitoring well #50 (capped)	5/2/2024	1057
44	P5020073.JPG	 Unidentified landfill gas monitoring well	5/2/2024	1102

45	P5020074.JPG	 Unidentified landfill gas monitoring well (capped)	5/2/2024	1106
46	P5020075.JPG	 Landfill gas monitoring well #75	5/2/2024	1110

47	P5020076.JPG	 Landfill gas monitoring well #75	5/2/2024	1110
48	P5020077.JPG	 Landfill gas collection pipeline (side of access road)	5/2/2024	1113

49	P5020078.JPG	 Landfill gas monitoring well #79	5/2/2024	1123
50	P5020079.JPG	 Unidentified landfill gas monitoring well (capped)	5/2/2024	1130

51	P5020080.JPG	 Landfill gas monitoring well #68	5/2/2024	1135
52	P5020081.JPG	 Landfill gas monitoring well #46	5/2/2024	1216

53	P5020082.JPG	 Landfill gas monitoring well #30	5/2/2024	1223
54	P5020083.JPG	 Landfill gas monitoring well #28	5/2/2024	1234

55	P5020084.JPG	 Landfill gas monitoring well #16	5/2/2024	1239

Appendix D: Instrument and Calibration Data

The survey was conducted using two Inficon IRwin devices using the Elkins Earthworks software. They are referred to throughout this report as the “AED IRwin” and the “R2 IRwin”

Instrument Information

	Instrument Type	Formal Identifier
AED IRwin	Inficon IRwin	SX # 580-01092006439
R2 IRwin	Inficon IRwin	SX # 580-01092005497

Calibration Checks

Date/Time	Gas Concentration (ppm)	R2 IRwin Reading (ppm)	AED IRwin Reading (ppm)
2024-05-02 08:55	500	500	500
2024-05-02 15:15	500	400	450

Both instruments were calibrated according to Method 21 and manufacturer instructions with zero gas and 500 ppm methane. Bump checks were conducted before and after the survey.

Pre-survey bump checks show successful calibration. Post-survey bump check shows downward drift, possibly resulting in false negatives (ie, missed exceedances) and potential underestimation of the severity of measured exceedances.

Response Time and Precision Check

		R2 IRwin		AED IRwin	
Trial	Calibration Gas ppm	Reading (ppm)	Time (s)	Reading (ppm)	Time (s)
1	500	500	5	500	5
2	500	500	5	500	4
3	500	490	4	500	5

Both instruments were calibrated and checked for response time and precision on April 30, 2024 at 10:00 AM using zero air and 500 ppm methane. All readings are within 10% of the known calibration value. Response times are approximately 4-5 seconds, under the maximum of 30 seconds.

Calibration Gas

Composition	Manufacturer	Lot Number	Expiration Date
Zero air <1 ppm total hydrocarbon	Airgas	304-402941563-1	2/23/2028
500 ppm methane in air	Airgas	304-402960982-1	2/2/2028

These were used for the calibration and bump checks on May 2, 2024 for the inspection and during the response time and precision checks on April 30, 2024.