UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 6TH AVENUE
SEATTLE, WASHINGTON 98101

DATE:	See date of Section Chief signature
SUBJECT:	CLEAN AIR ACT INSPECTION REPORT Republic Services Coffin Butte Landfill, Corvallis, OR
FROM:	Daniel Heins, Environmental Scientist Air Toxics Enforcement Section, EPA Region 10
THRU:	Derrick Terada, Acting Section Chief Air Toxics Enforcement Section, EPA Region 10
TO:	File

BASIC INFORMATION

Facility Name: Republic Services Coffin Butte Landfill

Facility Location: 28972 Coffin Butte Road, Corvallis, OR 97330

Date of Inspection: On Site Inspection: June 23, 2022
Virtual Conference: July 11, 2022

EPA Inspector(s):

1. Daniel Heins, Environmental Scientist [a,b]

Other Attendees:

1. Ian MacNab, Environmental Manager – Republic Services [a,c]
2. Phil Caruso, Environmental Specialist – Republic Services [a,b]
3. Brock Kienholz, Operations Manager – Republic Services [c]
4. Nikki Wuestenberg, Operations Support (Nationwide) – Republic Services [a]
5. Melissa Green, Environmental Consultant – Weaver Consultants [a]
6. Yuki Puram, Air Inspector & Permit Engineer – Oregon Department of Environmental Quality [a,b]

[a] Attended virtual conference
[b] Present for all of on-site, including SEM
[c] Present during on site conferences but not during SEM

Contact Email Address: imacnab@republicservices.com

Facility Type: Muncipal solid waste (MSW) landfill

Purpose of Inspection: Surface emissions monitoring (SEM) and evaluating compliance with landfill air rules.

Regulations Central to Inspection: 40 C.F.R. Part 60, Subpart WWW; Oregon State Plan for 40 C.F.R. Part 60, Subpart Cf; 40 C.F.R. Part 63, Subpart AAAA

On Site (6/23) Arrival Time: 09:00
On Site (6/23) Departure Time: 17:50
Virtual Conference (7/11) Start Time: 13:00
Virtual Conference (7/11) End Time: 15:00

Inspection Type:
☐ Unannounced Inspection
☒ Announced Inspection

SITE OVERVIEW

The following information was obtained verbally from Republic Services representatives, including their consultants, during the virtual conference, unless otherwise stated.

Operations Overview:
The Coffin Butte Landfill (the "Landfill") is owned and operated by Republic Services ("Republic"). Republic acquired the Landfill in 2008. Republic representatives were uncertain of exactly how old the Landfill is, stating that they believed it began as a military dump site in the 1940s. Daniel Heins confirmed this via information online from DEQ, which stated that landfilling began in the 1940s in association with Camp Adair. The areas that predate the Resource Conservation and Recovery Act of 1976 (RCRA) have a clay foundation. Some historic waste that predates the 1970s has been re-located from these unlined sections to the post-RCRA lined areas to facilitate construction of future lined cells in those areas.

The Landfill is permitted for 178 acres and has a permitted capacity of 35,514,471 according to the Landfill's 2020 Part 98 Greenhouse Gas Report. The Facility receives approximately 3,500 to 4,500 tons per day of waste. Wastes received include MSW, petroleum contaminated soils, construction and demolition (C&D) waste, C&D material recovery facility (MRF) residuals, and other industrial wastes. Based on current waste acceptance rate, the Landfill has approximately 20 years left under its current permit. Republic has room to expand the site on its property beyond the current permitted footprint.

Final cover on the Landfill is compacted soils with a synthetic membrane, with penetrations booted and plastic welded. Interim cover is at least 24 inches of soils. Much of the interim cover area is covered in tarps or, in areas without work planned for a few years, a thicker layer of EPDM. In both cases, this is with the primarily goal of reducing water infiltration into the

Landfill. Daily cover is 6 inches of soil or approved alternative daily cover (ADC). Republic uses C&D MRF shaker fines, MSW incinerator ash, and tarps as ADC at the Landfill.

Leachate flows by gravity to sumps and is pumped to covered storage ponds. Leachate collected varies by year based on the weather but typically is around 25 to 30 million gallons. Condensate is routed to the leachate system. Leachate is trucked to local publicly owned treatment works (POTWs). No leachate is recirculated, and no liquid wastes are added to the Landfill.

The gas collection and control system (GCCS) contains over 300 landfill gas (LFG) collection points, including horizontal wells, vertical wells, and parts of the leachate system with gas collection. Collected landfill gas partially routed to a separately owned/operated gas to energy plant run by PNGC Power. The energy plant has five Caterpillar gas engines – three 3516s and two 3520s. Excess gas not routed to the energy plant is controlled via flares at the Landfill. The landfill has two open flares, with capacities of 1000 standard cubic feet per minute (scfm) and 2000 scfm. Recently the Landfill has been collecting 2600 scfm for the full site, with 1600 scfm going to the energy plant and 1000 scfm to the flares.

SITE TOUR — JUNE 23, 2022

☒ Presented Credentials
☒ Stated authority and purpose of inspection
☐ Provided Small Business Resource Information Sheet
☒ Small Business Resource Information Sheet not provided. Reason: Not a small business
☒ Provided CBI warning to facility

Data Collected and Observations:
Daniel Heins arrived on site and met with the site staff for introductions and a brief site orientation/safety briefing at the Landfill's office. During this meeting, Ian MacNab stated that while there was a Method 21 instrument available and that Phil Caruso is their monitoring technician, that he would not take the opportunity to check EPA readings / provide confirmation readings, as a matter of Republic Services corporate policy. Daniel Heins explained that facilities typically prefer to check and confirm EPA readings and he gave advance notice to provide Republic the opportunity to confirm his TVA readings. Ian MacNab re-iterated that as a corporate policy that they would not provide confirmation readings.

After that brief meeting, Daniel Heins began the SEM. Phil Caruso accompanied EPA for the Surface Emission Monitoring (SEM). EPA showed all readings to Phil Caruso for visual confirmation of the readings and instructed him to state if he had any concerns with EPA's monitoring methods at any point. EPA used a ThermoFisher Toxic Vapor Analyzer 2020 (TVA) to perform EPA Reference Method 21 for the SEM.

In the morning (9:50 - 12:45), Daniel Heins conducted the monitoring with the TVA, covering a loop on the western portion of the Landfill. In the afternoon (13:30 - 17:15), he continued monitoring with the TVA, covering a loop on the eastern portion of the Landfill. Over the course of the day, Daniel Heins identified 61 points in exceedance of 500 parts per million (ppm), exhausting his supply of marking flags. Of these, 21 flagged exceedances were above 10,000

ppm. Many flagged exceedances represented clusters of exceedances at multiple points or broad areas of exceedances. Of the flagged exceedances, 26 were at or partially at gas collection wells (including both active and abandoned or decommissioned). Eight exceedances were at leachate cleanouts. Daniel Heins focused monitoring on areas under intermediate cover, though the first six exceedances were in final cover areas. During the afternoon monitoring, Daniel Heins measured multiple exceedances that continued to be above 500 ppm multiple feet in the air, with multiple feet lateral distance from the emission source, indicating substantial landfill gas plumes (flag #26, 46, and 51).

Flag #51 was by a broad area where the tarp was visibly inflated with gas. The tarp was not moving in the wind, it looked to be being pushed out steadily over a wide area towards the top of the south slope on the central area of the landfill, being held down by straps, cover anchors, and sandbags. Neither Daniel Heins nor Phil Caruso could identify any place where the wind could be lifting under the tarps, as the tarp edges were sandbagged and staked down. Daniel Heins measured a concentration of 2% at flag #51 before pulling away to avoid maxing out his instrument. He measured the methane concentration to be 2000 ppm at 3' in the air at this location, indicating a plume of gas coming out from the inflated tarp area. Along the top of this section of tarp, from flag #52 to #54, every post or tarp hole Daniel Heins monitored exceeded the surface methane standard, with readings of up to 7% shown before the instrument maxed out.

Phil Caruso did not dispute any of the readings, though noted that he would not have checked many of the exceedance locations, that he would have spent less time monitoring, or that he would have considered a higher location to be "the ground" when placing his probe 5 to 10 centimeters (cm) above the ground per the SEM regulations.

At an exceedance (flag #1) with a hole in the ground from an animal burrow, Phil Caruso stated that he would have considered the "ground" to be where the ground would have been if an animal didn't dig a hole into it at that location, rather than the ground at the base of the hole, and thus measured from a significantly higher location than Daniel Heins. At an exceedance (flag #2) between overlapped tarp material, with one piece of tarp raised above the other with a gap of air in between, Phil Caruso stated that he would have monitored with his probe above the upper tarp, rather than measuring the 5 to 10 cm from the tarp against the ground.

When Daniel Heins was monitoring a cluster of decommissioned wells with a patch of distressed soil (flag #3), Phil Caruso stated that he would have moved on after not directly getting above 500 ppm within twice his instrument response time even if there was an increase in reading, rather than moving around the penetration points slowly to find maximum reading point and then waiting twice the response time at this maximum reading location.

When Daniel Heins was monitoring at leachate cleanouts, Phil Caruso stated that he does not monitor at these and that they are not fully penetrating the cover. Daniel Heins responded that it was likely that many of these ultimately did penetrate the cover, especially in areas of thinner intermediate cover, and that regardless he recommended checking these as they were proving to be repeated sources of extremely elevated emissions, many over an order of magnitude above the surface methane standard. Phil Caruso stated that he was not required to monitor these. Daniel Heins and Phil Caruso had a similar discussion at the valve box dug into the cover with a reading

of 4% methane (flag #37), with Phil Caruso stating that this was not a penetration and thus he did not have to monitor this.

When Daniel Heins was monitoring at a horizontal penetration of the cover associated with a well (flag #16), Phil Caruso stated that he would not have monitored this as a penetration.

Phil Caruso stated that he would not have monitored the Cell 5 leachate riser that Daniel Heins measured multiple exceedances at, as it was outside of the waste mass.

Photos and/or Videos: were taken during the inspection. See Appendix A.
Field Measurements: were taken during this inspection. See Appendix B.

INSPECTION CONFERENCE — JULY 11, 2022

☒ Provided U.S. EPA point of contact to the facility
☒ Provided CBI warning to facility

Staff Interview:
The Landfill is subject to the Oregon State Plan implementing the Part 60 Subpart Cf Emission Guidelines, having previously been subject to Part 60 Subpart WWW. The Landfill is also subject to Part 63, Subpart AAAA, and has opted-in to demonstrating compliance with the Oregon State Plan through the Subpart AAAA requirements where allowed.

Republic stated that they were unsure if they were excluding non-degradable waste from their maximum gas generation rate calculations in their Design Plan or any other gas modeling runs they have done to size their GCCS. Republic stated that as the operations personnel were not present, they were unable to speak to what types of industrial wastes are received in any further detail. The Landfill does not accept refrigerants. The Landfill receives asbestos. It packages asbestos waste and deposits it in a dedicated asbestos mono-fill that is the only area excluded from the GCCS.

Leachate system components are connected for LFG collection on a case-by-case basis per recommendations of the engineer(s) involved in designing the GCCS.

Republic is aware of a one-off test of the sulfur content of the LFG requested by DEQ and stated that it read at non-detectable levels.

The Landfill has an alternative monitoring plan (AMP) approved by DEQ dating to when the Landfill operated under Subpart WWW. The AMP has allowances for positive pressure, temperatures above 145 degrees Fahrenheit, and elevated oxygen readings. No wells currently are above 145 degrees Fahrenheit. Republic does make use of the positive pressure allowances for wells with high oxygen levels.

Republic stated that they do not consistently check water levels in wells but has done so in the past. All new (at least since 10 years ago) wells are constructed with dewatering pumps, as a best

practice for a landfill in a wet climate. Republic does not typically add pumps to old wells. As wells are typically constructed with steel casings at the Landfill, redrills are rarely needed.

The Landfill has gas migration probes placed outside the area without synthetic liner but has typically seen readings at gas non-detect levels.

For cover integrity monitoring, Republic stated that they look for holes and cracks in the soils and wind damage on the tarps, but that there was no set answer for what degree of tarp damage would necessitate repair.

For surface emissions monitoring, Republic only excludes active filling areas and other areas with active heavy equipment as "dangerous." When Daniel Heins noted that the drawn paths in the submitted SEM reports went straight through the drawn "dangerous areas," Republic stated that the paths on the maps are general and do not reflect the actual walked paths. Republic monitors penetration points during its serpentine path. Phil Caruso stated that in addition to penetrations, he would go off the serpentine path if he saw distressed vegetation or cracks in the cover, and that those were the only examples of places where visual observations indicate elevated concentrations of landfill gas that he considered. Republic was unable to speak to the what the historic SEM exceedance rate had been in past surveys.

Daniel Heins asked if the GCCS was operational on the day of the SEM inspection or if there was anything different from standard operations that could have impacted the results of the monitoring. Republic stated that nothing was operating differently than normal, with all wells in operation and collection running. Republic did note that construction above exceedance flags #48 through 58 would have impacted the cover in the construction area.

Daniel Heins asked if Republic viewed the inflated tarps as a concern or something to acted on. Republic disputed that the tarps were inflated with landfill gas, claiming that the wind has blown them up. Daniel Heins noted the extremely elevated methane concentrations detected by the inflated tarps and that the tarps appeared to be in a static inflated state without any steady wind or apparent way for the wind to lift the tarps.

Republic noted that construction of additional gas collection on the top of the Landfill is in progress and will be completed this summer.

Requested documents:
The following documents were requested and supplied ahead of the inspection:

- Two most recent semi-annual NSPS reports
- Results of any cover integrity reports and quarterly SEM monitoring events that have been occurred since the most recent semi-annual
- GCCS map
- Map of cover by type in place (final vs intermediate vs daily cover)

The following documents were requested during the conference and confirmed via subsequent email:

- Constructed acres and acreages by cover type
- Past 5 years of flare monitoring data
- Flare/blower design specs and any performance tests on file for it
- Past year of migration probe data and a map of the probe locations
- Current GCCS Design Plan, along with any versions that have been active in the past 5 years and them most recent LandGEM run used for GCCS sizing (if not in the Design Plan)
- A map of the GCCS showing extent of any horizontal collectors if these are utilized to demonstrate a sufficient density of gas collection
- Landfill cell map and year of first waste placement for each cell
- 2021 Part 98 Greenhouse Gas Report
- Annual waste deposited tonnages by type from 2016 to present
    - Include a list of the primary sources of industrial wastes and a description for any special wastes listed
    - Outline of what wastes (if any) are classified as non-degradable for LandGEM maximum expected gas generation (Design Plan) along with the basis for this classification
    - Outline of what wastes are classified as "inert" for Part 98 reporting along with the basis for this classification
- Rest of the past 5 years of Annual/Semi-Annual Reports
    - Include all NSPS/NESHAP/EG reports, SSM reports, and air permit reports as applicable
    - If the full SEM reports are not included in the above, please include those for the past 5 years
    - Include the most recent SEM reports, or at least as much of it as has been completed by the end of July, even if they are not a part of any final semi-annual
- Any versions of the SSM plan that have been in place in the past 5 years
- Past 5 years of wellhead parameter monitoring
- Past 5 years of gas flow to the energy plant
- Any H2S or sulfur gas testing results from the past 5 years, or most recent if not within the past 5 years
- Map of wells being added this summer since the inspection
- The Alternative Monitoring Plan and approval letter
- Identification of which wells have dewatering pumps
- General description of final cover construction

Concerns:
Daniel Heins expressed potential concerns with Republic's SEM/Method 21 procedures. Despite Republic having seen no more than 6 exceedances in the recent SEM reports supplied ahead of the inspection that included penetration monitoring, including reports with 0 exceedances, he identified 61 points in exceedance of 500 ppm, including 21 points above 10,000 ppm, with 26 exceedances at gas collection wells that Republic should have specifically been monitoring on a quarterly basis since the Oregon State Plan became effective in November 2020.

Daniel Heins expressed concerns with the areas of tarp that were inflated with and leaking out landfill gas, as detected during the SEM, noting that in additions to compliance concerns with the surface methane standard that such an accumulation of flammable gas creates a potential safety concern.

DIGITAL SIGNATURES

DANIEL HEINS
Digitally signed by DANIEL HEINS
Date: 2022.09.19 14:26:56 -07'00'

Daniel Heins, Report Author

DERRICK TERADA
Digitally signed by DERRICK TERADA
Date: 2022.09.19 14:51:00 -07'00'

Derrick Terada, Acting Section Chief

APPENDICES AND ATTACHMENTS

Appendix A: Digital Image Log
Appendix B: Field Measurement

APPENDIX A: DIGITAL IMAGE LOG

Inspector Name: Daniel Heins
Archival Record Location: US EPA SharePoint

2022-06-23 Images

Image #	File Name	Time (PDT)	Flag #	Description
1	20220623_100838.jpg	10:08:38	1	Animal burrow by cleanout
2	20220623_101327.jpg	10:13:27	2	Overlapping tarps
3	20220623_101816.jpg	10:18:16	3	Discolored soil/distressed vegetation by INE9, multiple decommissioned wells
4	20220623_102219.jpg	10:22:19	3	Discolored soil/distressed vegetation by INE9, multiple decommissioned wells
5	20220623_102231.jpg	10:22:31	3	Discolored soil/distressed vegetation by INE9, multiple decommissioned wells
6	20220623_102717.jpg	10:27:17	4	Cleanout
7	20220623_103235.jpg	10:32:35	5	Decommissioned well and surrounding wells by RE8 manifold
8	20220623_103515.jpg	10:35:15	5	Decommissioned well and surrounding wells by RE8 manifold
9	20220623_104050.jpg	10:40:50	6	Decommissioned PVC well (W9?)
10	20220623_105243.jpg	10:52:43	7	Hole in liner
11	20220623_110338.jpg	11:03:38	8	cleanout with gap in liner
12	20220623_111123.jpg	11:11:23	9	Unmarked well with gap in liner and gap between well and dirt, plus nearby holes
13	20220623_111129.jpg	11:11:29	9	Close up on gap on liner and in dirt
14	20220623_111216.jpg	11:12:16	9	Hole in liner near unmarked well
15	20220623_111452.jpg	11:14:52	10	Liner tear and adjacent hole
16	20220623_112408.jpg	11:24:08	11	3V91 Manifold, both at tarp edge and at multiple penetrations
17	20220623_113216.jpg	11:32:16	12	Hole in liner
18	20220623_113733.jpg	11:37:33	13	3V92 wells with tarp gap
19	20220623_114521.jpg	11:45:21	14	3B0V0351 bad liner seal at base
20	20220623_115250.jpg	11:52:50	15	Decommissioned well with tarp tear/gap
21	20220623_115912.jpg	11:59:12	16	3H94 where horizontal intersects tarp
22	20220623_120314.jpg	12:03:14	16	3H94 penetration cluster
23	20220623_120746.jpg	12:07:46	17	Cleanout by unknown well out of liner
24	20220623_121307.jpg	12:13:07	18	Liner that had been pulled back from unknown well by chopped off pipe segment on ground
25	20220623_122009.jpg	12:20:09	19	Unknown well at liner seam

2022-06-23 Images, continued

Image #	File Name	Time (PDT)	Flag #	Description
26	20220623_122332.jpg	12:23:32	20	Riser with bad liner seal
27	20220623_123220.jpg	12:32:20	21	Well 3COV3 with liner gap
28	20220623_140422.jpg	14:04:22	22	Cell 5 leachate riser complex
29	20220623_140538.jpg	14:05:38	22	Cell 5 leachate riser complex
30	20220623_140921.jpg	14:09:21	22	Cell 5 leachate riser complex - pipe connector
31	20220623_140924.jpg	14:09:24	22	Cell 5 leachate riser complex - pipe connector
32	20220623_140927.jpg	14:09:27	22	Cell 5 leachate riser complex
33	20220623_141045.jpg	14:10:45	22	Cell 5 leachate riser complex
34	20220623_142020.jpg	14:20:20	23	Well 5V40 in liner
35	20220623_143317.jpg	14:33:17	24	Tarp anchor
36	20220623_143735.jpg	14:37:35	25	Tarp anchor
37	20220623_144405.jpg	14:44:05	26	4B55 well cluster
38	20220623_144407.jpg	14:44:07	26	Mystery pipe with improvised cap with folded plastic wrap
39	20220623_144923.jpg	14:49:23	27	2V114 at base in dirt
40	20220623_145332.jpg	14:53:32	28	Hole near edge of liner, and in neighboring hole
41	20220623_145705.jpg	14:57:05	29	Tarp edge
42	20220623_150256.jpg	15:02:56	30	Tarp hole and neighboring holes
43	20220623_150616.jpg	15:06:16	31	Hole at tarp anchor
44	20220623_150954.jpg	15:09:54	32	Abandoned well
45	20220623_150957.jpg	15:09:57	32	Liner hole near abandoned well
46	20220623_151520.jpg	15:15:20	33	4V53 - well surrounded by sandbags in lined area
47	20220623_151822.jpg	15:18:22	34	Anchor and nearby liner hole
48	20220623_154015.jpg	15:40:15	35	Cleanout coming out of dirt
49	20220623_154916.jpg	15:49:16	36	Vertical cleanout in dirt
50	20220623_155053.jpg	15:50:53	37	Circular valve box
51	20220623_155522.jpg	15:55:22	38	Hole in liner
52	20220623_160008.jpg	16:00:08	39	Cleanout / hole in liner
53	20220623_160336.jpg	16:03:36	40	Tarp hole and neighboring holes
54	20220623_160711.jpg	16:07:11	41	PH2101, 2H101 - whole cluster of wells (some tarp gaps)
55	20220623_160900.jpg	16:09:00	41	PH2101, 2H101 - whole cluster of wells (some tarp gaps)
56	20220623_161111.jpg	16:11:11	42	3AV68 and nearby hole in liner
57	20220623_161551.jpg	16:15:51	43	2V100 well in tarp area
58	20220623_161847.jpg	16:18:47	44	3V73 well in tarp gap
59	20220623_162101.jpg	16:21:01	45	Tarp stake
60	20220623_162525.jpg	16:25:25	46	Hole in tarp
61	20220623_162743.jpg	16:27:43	47	Tarp edge
62	20220623_163203.jpg	16:32:03	49	tarp edge
63	20220623_163313.jpg	16:33:13	50	2H86 cluster in tarp
64	20220623_163646.jpg	16:36:45	51	Series of tarp tears near inflated tarp area
65	20220623_163710.jpg	16:37:10	-	Tarped slope showing buildup of gas inflating tarps over slope
66	20220623_163718.jpg	16:37:18	-	Tarped slope showing buildup of gas inflating tarps over slope

2022-06-23 Images, continued

Image #	File Name	Time (PDT)	Flag #	Description
67	20220623_163934.jpg	16:39:34	52	Tarp stake
68	20220623_164213.jpg	16:42:13	53	Tarp stake in area of continuously elevated readings
69	20220623_164217.jpg	16:42:17	-	Tarped slope showing buildup of gas inflating tarps over slope
70	20220623_164219.jpg	16:42:19	-	Tarped slope showing buildup of gas inflating tarps over slope
71	20220623_164221.jpg	16:42:21	-	Tarped slope showing buildup of gas inflating tarps over slope
72	20220623_164521.jpg	16:45:21	54	Tarp stake in area of continuously elevated readings
73	20220623_164718.jpg	16:47:18	55	Tarp edge, inflated tarps visible
74	20220623_164914.jpg	16:49:14	56	Broad area of dirt/waste uphill of tarp area
75	20220623_164917.jpg	16:49:17	56	Broad area of dirt/waste uphill of tarp area
76	20220623_165102.jpg	16:51:02	57	2H94 well cluster - all
77	20220623_165319.jpg	16:53:19	58	Tarp edge
78	20220623_165637.jpg	16:56:37	59	3V89 well cluster in dirt
81	20220623_170040.jpg	17:00:40	60	2V113 - well with some tarp wrapped in dirt area
82	20220623_170947.jpg	17:09:47	61	Valve with well at haul road above cell 5

APPENDIX B: FIELD MEASUREMENT DATA

Measured Exceedances

Flag #	Reading	Description	Latitude	Longitude
1	1%	Animal burrow by cleanout	44.69737457	-123.2356198
2	1000 F/O	Overlapping tarps	44.69745665	-123.2357082
3	1000	Discolored soil/distressed vegetation by INE9, multiple exceedances including multiple decommissioned wells	44.69766687	-123.2360485
4	2000	Cleanout	44.69775127	-123.2362152
5	1%	Decommissioned well and surrounding wells by RE8 manifold	44.69786105	-123.236267
6	700	Decommissioned PVC well (W9?)	44.69782839	-123.2365858
7	1500	Hole in liner	44.69865701	-123.2365257
8	1.20%	cleanout with gap in liner	44.69790548	-123.2358232
9	1.20%	Unmarked well with gap in liner weld and gap between well and dirt, plus nearby holes	44.69829911	-123.2354937
10	2.70%	Liner tear and adjacent hole	44.69842096	-123.23558
11	3700	3V91 Manifold, both at tarp edge and at multiple penetrations	44.69885999	-123.2350488
12	2.20%	Hole in liner	44.69830399	-123.2350079
13	5000	3V92 wells with tarp gap	44.69837287	-123.2347328
14	1200	3B0V0351 bad liner seal at base	44.69822886	-123.2340741
15	1200	Decommissioned well with tarp tear/gap	44.69836899	-123.2337448
16	9000	3H94 where horizontal intersects tarp, and multiple penetrations in cluster	44.698248	-123.2334448
17	4700	Cleanout by unknown well out of liner	44.69812972	-123.2337702
18	5500	Liner that had been pulled back from unknown well by chopped off pipe segment on ground	44.69811411	-123.2338379
19	2000	Unknown well at liner seam	44.69804442	-123.2344811
20	8000	Riser with bad liner seal	44.69804447	-123.2345951
21	1220	Well 3COV3 with liner gap	44.69784857	-123.2333245
22	2400	Cell 5 leachate riser complex - multiple risers and at pipe connection	44.70181118	-123.2257475
23	800	Well 5V40 in liner	44.70167582	-123.2273125
24	3000	Tarp anchor	44.70101596	-123.2273626
25	600	Tarp anchor	44.70114084	-123.2274474
26	1%	4B55 at base of cluster as well as top of mystery pipe with improvised cap with folded plastic wrap	44.70115072	-123.2275846
27	4000	2V114 at base in dirt	44.70111214	-123.2278246
28	1% F/O, 3%	Hole near edge of liner, and in neighboring hole	44.70103128	-123.2276965
29	4500	Tarp edge	44.70082423	-123.2275253
30	1%	Tarp hole and neighboring holes	44.70072043	-123.2273274
31	1500	Hole at tarp anchor	44.70068672	-123.227044

Measured Exceedances

Flag #	Reading	Description	Latitude	Longitude
32	3200	At abandoned well and nearby hole in liner	44.70068362	-123.2267606
33	1200	4V53 - well surrounded by sandbags in lined area	44.70057706	-123.2263945
34	1100	Anchor and nearby liner hole	44.7005098	-123.2261782
35	1%	Cleanout coming out of dirt	44.69962827	-123.2287076
36	1200	Vertical cleanout in dirt	44.69926032	-123.2301237
37	4%	Circular valve box	44.69922726	-123.2302603
38	1500	Hole in liner	44.69923732	-123.2303614
39	1200	Cleanout / hole in liner	44.69906809	-123.2308424
40	1600	Tarp hole and neighboring holes	44.69912191	-123.2309496
41	1%	PH2101, 2H101 - whole cluster of wells (some tarp gaps)	44.69926451	-123.230824
42	2%	3AV68 and nearby hole in liner	44.69929347	-123.2310994
43	3% F/O	2V100 well in tarp area	44.69920828	-123.2314229
44	1200	3V73 well in tarp gap	44.69913826	-123.2316593
45	2%	Tarp stake	44.6990841	-123.2318812
46	2%	Hole in tarp	44.69927783	-123.2319267
47	2500	Tarp edge	44.69937083	-123.2319
48	6000	3V74 - whole well cluster	44.69942123	-123.2320147
49	5000	tarp edge	44.69944725	-123.2316747
50	7000	2H86 cluster in tarp	44.69950461	-123.2315035
51	2%	Series of tarp tears near inflated tarp area	44.69964525	-123.2311715
52	2000	Tarp stake	44.69970317	-123.2309795
53	2%	Tarp stake (and every tarp stake between 52 and 53)	44.69985738	-123.2307325
54	7%	Tarp stake (and every tarp stake between 53 and 54)	44.69994174	-123.2304609
55	3%	Tarp edge	44.70001207	-123.2302193
56	800	Broad area of dirt/waste uphill of tarp area	44.70011566	-123.2300539
57	8000	2H94 well cluster - all	44.7001631	-123.2301332
58	2000	Tarp edge	44.70021131	-123.2296507
59	4000	3V89 well cluster in dirt	44.7005688	-123.2284677
60	4000	2V113 - well with some tarp wrapped in dirt area	44.70062987	-123.2276513
61	800	Valve with well at haul road above cell 5	44.70159276	-123.2253808

All readings are given as methane parts per million, except for readings above 10,000 ppm which are given as percent methane. “F/O” refers to instrument flame out, indicating readings above 5% that have exceeded the TVA measurement range.

Calibration and Instrument Information

Daniel Heins used a ThermoFisher Toxic Vapor Analyzer 2020 (TVA2020), designated as TVA A95732. The EPA TVA2020 response time is approximately 4.5 seconds.

	Calibration gas ppm	A95732 ppm
9:15 calibration check	500	500
13:30 drift check	500	464
17:50 drift check	500	462

EPA calibration gases

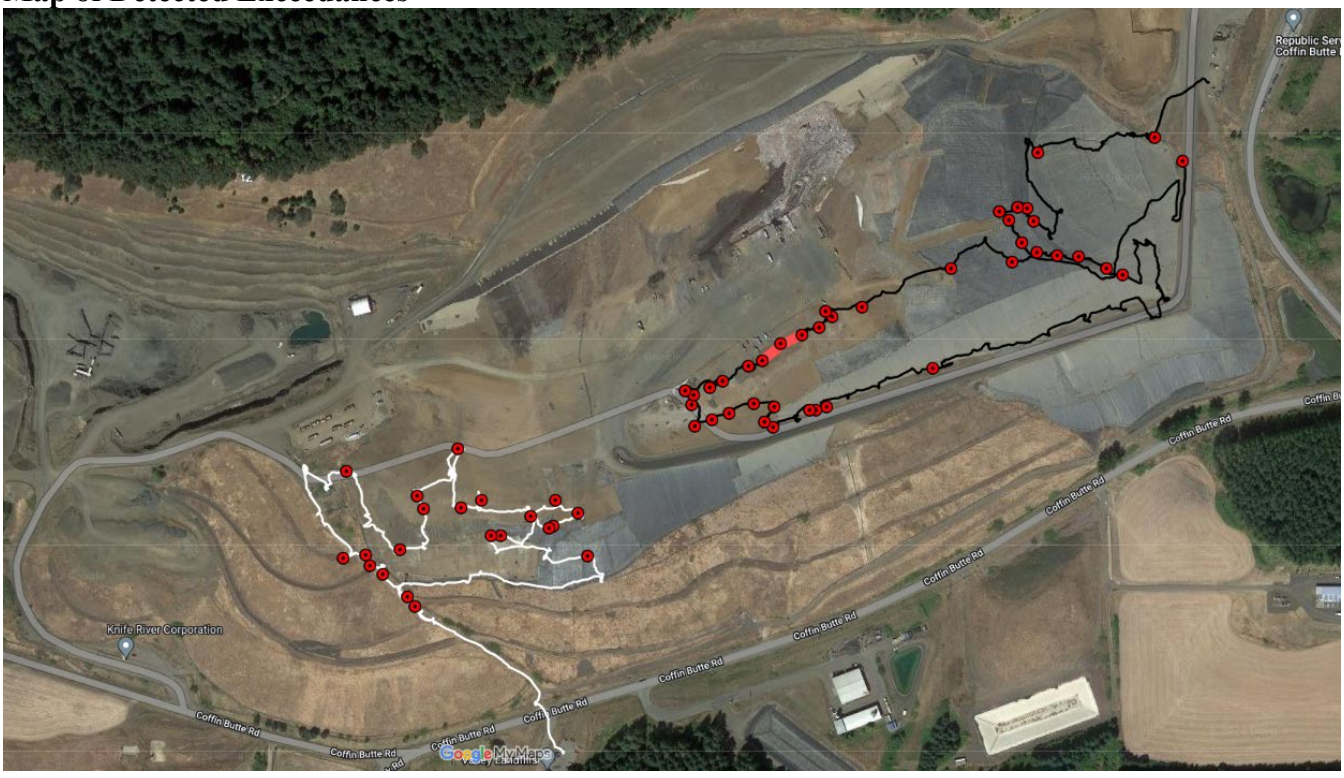
Composition	Lot #	Expiration
Air zero grade THC <1 ppm	DBJ-1-24	March 2023
Methane in air 500 ppm	1-167-64	June 2024

Background readings:

Upwind: 0 ppm

Downwind: 3 ppm

Map of Detected Exceedances



SEM exceedance locations plotted over Google Maps satellite imagery. Approximate monitoring paths included, derived from GPS data. Morning path shown in white, afternoon in black. Line of continuous exceedance at every tarp hole between flags 52 and 54 is highlighted in red.