



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, ILLINOIS 60604**

SUBJECT: CLEAN AIR ACT INSPECTION REPORT
Flint Hills Resources Pine Bend Refinery, Rosemount, MN

FROM: Brittany Cobb, Environmental Engineer
AECAB (MI/WI)

THRU: Sarah Marshall, Section Supervisor
AECAB (MI/WI)

TO: File

BASIC INFORMATION

Facility Name: Flint Hills Resources Pine Bend Refinery

Facility Location: 13775 Clark Rd, Rosemount, MN 55068

Date of Inspection: 7/25/2022 – 7/28/2022

EPA Inspector(s):

1. Constantinos Loukeris, Environmental Engineer
2. Brittany Cobb, Environmental Engineer
3. Tess Russell, Environmental Engineer
4. Karyn Defranco, Environmental Engineer

Other Attendees:

1. Jon Carlson, Environmental Director
2. Anne Lee, Environmental Manager (LDAR)
3. Chris Koerner, Environmental Manager (Air Program)
4. Chris Buresh, Senior Wastewater Engineer
5. Robert Covey, Wastewater Compliance Supervisor
6. Shelly Stanton, BWON Compliance Supervisor
7. Sean Tuff, Wastewater Operations Engineer
8. Nick Peyer, LDAR Supervisor
9. Katie Plas, Legal Intern
10. Matt Tamminga, Business Team Leader for Wastewater Plant
11. Andrew Paulsen, Wastewater Lead Operator
12. Candy Meyer, Compliance and BWON Specialist

13. Mark Williamson, Senior Environmental Engineer (corporate office)
14. Erin Connell, Environmental Compliance Data & Systems Coordinator
15. Jim Bean, Senior Inspector – API Gap Seal Inspector

Contact Email Address: anne.lee@fhr.com

Purpose of Inspection: Determine Compliance with the Clean Air Act

Facility Type: Refinery

Regulations Central to Inspection: 40 C.F.R Part 61, Subpart FF - National Emission Standard for Benzene Waste Operations (BWON); 40 C.F.R Part 60 Subpart QQQ - Standards of Performance for VOC Emissions From Petroleum Refinery Wastewater Systems (QQQ)

7/25/2022

Arrival Time: 2:30 PM CT

Departure Time: 5:00 PM CT

7/26/2022

Arrival Time: 8:30 AM CT

Departure Time: 5:00 PM CT

7/27/2022

Arrival Time: 8:00 AM CT

Departure Time: 5:30 PM CT

7/28/2022

Arrival Time: 8:30 AM CT

Departure Time: 11:30 AM CT

Inspection Type:

- ☒ Unannounced Inspection
- ☐ Announced Inspection

OPENING CONFERENCE

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

The following information was obtained verbally from employees at Flint Hills Resources Pine Bend Refinery (Flint Hills) unless otherwise noted.

Process Description:

Flint Hills is a fuels refinery. The facility receives heavy and light crude oil from Canada and North Dakota and produces approximately 350,000 barrels of refined product per day. In addition, the refinery produces asphalt, molten sulfur, and ammonia bisulfate (fertilizer) as byproducts. There are three (3) crude units that run in parallel, three (3) coke units, three (3) hydro processing units to remove sulfur to sell as elemental sulfur, four (4) flares, a wastewater treatment plant, and numerous miscellaneous units. The North Flare is steam-assisted, the East and West Flares are air-assisted, and the Utility Flare has no assist and is used only for emergency flaring.

Wastewater treatment plant (WWTP)

Wastewater is collected around the facility in the oily water sewer, one of seven major sumps or one of the many minor sumps that feed the major sumps. The BWON controlled system consists of the sumps, underground API (OWS API), Siemens API, tanks 205/206, vessel 49, equalization basins 7A/B, Dissolved Nitrogen Floatation (DNF) A/B, old Dissolved Air Floatation (DAF), new DAF, sludge storage basins 2A/B/C, tank 336, vessel 26, tanks 63/64 and the aeration/biological treatments basins 3A/B/C. The system becomes uncontrolled when the wastewater hits the splitter box and clarifiers. The closed vent system feeds one of two thermal oxidizer (TO) units, H1 and H3; H3 is only used for back-up.

Staff Interview:

Flint Hills conducts monthly visual inspections for equipment subject to QQQ; all carbon canisters including those associated with the wastewater treatment system sumps are monitored daily, and breakthrough is considered at 100 ppm. Quarterly gap seal inspections are conducted on equalization basins 7A/B, subject to Subpart Kb, as well as quarterly visual inspections for BWON. Flint Hills uses a contractor (HydroChemPSC) to perform the bulk of the annual EPA Method 21 LDAR – Determination of Volatile Organic Compound (VOC) Leaks – monitoring on equipment subject to BWON.

Flint Hills reported approximately 376 Mg Total Annual Benzene in 2021 and the quantity of benzene that was considered not controlled and therefore counted under BWON was 0.0187 Mg. Flint Hills has therefore been exempt from treating benzene in the waste streams. The facility's target flow into the DNFs is 1350 gallon/minute.

TO unit H1 was replaced approximately 15 years ago; TO unit H3 has not changed in approximately 22 years but is only used for back-up.

Facility representatives mentioned that low-emission valves are most commonly used on site.

Flint Hills closed out their former Consent Decree in 2018.

Tanks 205/206 are controlled with internal floating roofs (IFRs).

TOUR INFORMATION

EPA Tour of the Facility: Yes

Data Collected and Observations:

EPA conducted leak detection and repair (LDAR) monitoring using Toxic Vapor Analyzer Model 2020 (TVA 2020) flame ionization detectors (FID) on Flint Hills's BWON controlled sewer system components, which are required to be designed to operate with no detectable emissions (NDE), as indicated by an instrument reading of less than 500 ppm (*see* Appendix B).

EPA also monitored the primary and secondary carbon canisters used to control benzene emissions for breakthrough. Flint Hills uses a photoionization detector (PID) to conduct this breakthrough monitoring. EPA observed that the PID was not detecting concentrations as high as EPA's FID, and in many Flint Hills was not detecting breakthrough at 100 ppm whereas EPA was above 100 ppm. (*see* Appendix B) In addition, EPA visually inspected drain hubs and other QQQ affected equipment.

EPA took 20 forward looking infrared radiation (FLIR) videos to detect leaks. EPA observed VOCs venting from rain caps on equalization basin 7A (*see* MOV_0437.mp4 and MOV_0438.mp4). EPA was informed by Jim Bean that the rain caps regularly open straight to atmosphere and vent benzene and VOCs. EPA also observed leaks from the seals on tank 63, tank 64 and vessel 49 (*see* MOV_0430.mp4, MOV_0432.mp4, MOV_0440.mp4, and MOV_0441.mp4).

EPA observed excess dirt from foam spills from aeration/biological treatments basins 3A/B on sludge basins 2A/B/C (*see* IMG_0157.JPG and IMG_0158.JPG). EPA also observed that the hatch on T205 was open.

EPA inspected 31 drains in the hydrocracker unit (Unit 29). The table below summarizes the observations from the visual inspections:

Inspection Number	Component ID	Observation
1	29DC1014OWS	Oil/water mix
2	29DC1015OWS	Oil
3	29DC1016OWS	Dust, couldn't see liquid
4	29DC1017OWS	Oil
5	29DC1018OWS	Water
6	29DC1019OWS	Water and oil
7	29DC1020OWS	Oil
8	29DC1021OWS	Oil
9	29DC1022OWS	Oil
10	29DC1023OWS	Oil
11	29DC1024OWS	Oil
12	29DC1025OWS	Oil
13	29DC1034OWS	Water with debris
14	29DC1035OWS	Oil
15	29DC1036OWS	Water
16	29DC1037OWS	Water and oil

17	29DC1038OWS	Water with debris
18	29DC1039OWS	Water
19	29DC1040OWS	Oil
20	29DC1041OWS	Water
21	29DC1042OWS	Water
22	29DC1043OWS	Water
23	29DC1044OWS	Oil
24	29DC1045OWS	Water
25	29DC1046OWS	Water
26	29DC1047OWS	Oil
27	29DC1048OWS	Oil
28	29DC1049OWS	Oil
29	29DC1052OWS	Oil
30	29DC1061OWS	Oil
31	29DC1062OWS	Water with debris
31	29DC2001OWS	Gaps and dirt at seams where bolts are

EPA inspected 5 junction boxes in the hydrocracker unit (Unit 29) and naphtha unit (Unit 28). The table below summarizes the observations from the visual inspections:

Inspection Number	Unit	Component ID /Description	Observation
1	Naphtha unit	28SB5191OWS	Cracks and broken seal (IMG_0166.JPG)
2	Naphtha unit	28SB5202OWS	Cracks in seal (IMG_0165.JPG)
3	Naphtha unit	28SB5210OWS	No cracks or gaps
4	Naphtha unit	South Battery limits	No cracks or gaps
5	Hydrocracker	37SB4354OWS	No cracks or gaps

Photos and/or Videos: were taken during the inspection.

Field Measurements: were taken during this inspection.

RECORDS REVIEW

- Process flow diagram

CLOSING CONFERENCE

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

Requested documents:

- Temperature of H1 & H3 TO (hourly) for the past 3 years
- Most recent performance tests for H1 and H3
- Destruction efficiency for H1 and H3 (if not included in the most recent performance tests)
- Inspection reports for equipment subject to QQQ and FF for the past 3 years, including visual observations and LDAR monitoring
- Standard procedures for BWON and Subpart QQQ visual inspections
- Corrective action for foam events, for the past 3 years
- Semi-annual Subpart QQQ reports for 2019, 2020, and 2021
- Quarterly BWON reports for 2019, 2020 and 2021
- Records of carbon canister monitoring for 2022
- End-of Line BWON sampling reports at the biobasins for the past 2 years
- Engineer design for equipment to show that it will be compliant with BWON
- Evidence of correction/repairs that took place as a result of the EPA inspection

Concerns:

1. EPA identified concerns that numerous QQQ drains had oil in them instead of water seal.
2. EPA identified concerns that the visual inspections for QQQ are not being completed properly because Flint Hills is checking for liquid rather than water, as indicated by Flint Hills operations personnel.
3. EPA identified detectable emissions above 500 ppm at sumps, underground API (OWS API) inlet, Siemens API, and 7A/B inlet/outlet boxes.
4. EPA identified concerns that the visual inspections for BWON are not being completed properly or at all, since numerous locations where EPA identified detectable emissions above 500 ppm had visible leaks and cracks.
5. EPA identified concerns with leaks observed from V49, 7A/B and tank 63/64 with the FLIR. V49 recently had a seal inspection.
6. EPA identified the concern that the controlled WWTP may not be designed to operate below NDE as required by BWON.
7. EPA identified concern with the concentration of VOCs that was measured in the exhaust vent stream of numerous carbon canisters and the discrepancy between concentrations measured with EPA/Flint Hills' TVA and Flint Hills' photo ionization detectors.
8. EPA identified concern with the substantial amount of dried caulk on the top of the old DAF/new DAF.
9. EPA identified concern with the dirt on 2A/B/C basins as it impedes BWON visual observations.
10. EPA identified concern that the refinery's may not be meeting its current 2 Mg compliance option.
11. EPA identified concern with the hatch on T205 being open when not in use instead of being bolted, as T205 is subject to Subpart Kb.

DIGITAL SIGNATURES

Report Author: Brittany Cobb

Digitally signed by
Brittany Cobb
Date: 2022.09.19
09:43:46 -05'00'

Section Supervisor: SARAH MARSHALL

Digitally signed by
SARAH MARSHALL
Date: 2022.09.19
10:01:10 -05'00'

APPENDICES AND ATTACHMENTS

- 1. Digital Image Log**
- 2. FLIR video log**
- 3. Field Measurement data**

Facility Name: Flint Hills Resources Pine Bend Refinery
Facility Location: 13775 Clark Rd, Rosemount, MN 55068
Date of Inspection: 7/25/2022 – 7/28/2022

APPENDIX 1: PHOTO LOG

1. Inspector(s) Name: Brittany Cobb and Tess Russell	2. Archival Record Location: <i>EPA's OneDrive folder and Electronic Records System (ERC)</i>
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Image Number	File Name	Date and Time (Central Time) YYYY:MM:DD Time	Description of Image
1	IMG_0072.JPG	2022:07:26 10:38:24	Crack in southwest corner of forebay inlet - detectable emission measured
2	IMG_0073.JPG	2022:07:26 10:41:21	East side of forebay inlet, peeling caulk and visible leak - detectable emissions with TVA
3	IMG_0074.JPG	2022:07:26 10:42:35	Crack on southwest corner of forebay inlet - detectable emissions with TVA
4	IMG_0075.JPG	2022:07:26 10:51:17	Crack on east side of trash rack - detectable emissions with TVA
5	IMG_0076.JPG	2022:07:26 10:55:41	Crack in caulk on east side of forebay - detectable emissions with TVA
6	IMG_0077.JPG	2022:07:26 11:00:55	Crack and 8th and 9th bolts on west side of trash rack - detectable emissions with TVA
7	IMG_0078.JPG	2022:07:26 11:05:12	Crack on east side of trash rack - detectable emissions with TVA
8	IMG_0079.JPG	2022:07:26 11:13:16	Crack in northeast side of trash rack - detectable emissions with TVA
9	IMG_0080.JPG	2022:07:26 11:26:13	Crack in caulk, north side of trash rack - detectable emissions with TVA
10	IMG_0081.JPG	2022:07:26 11:32:05	Crack in caulk - detectable emissions with TVA
11	IMG_0082.JPG	2022:07:26 11:40:52	Caulk on ground - detectable emissions with TVA
12	IMG_0083.JPG	2022:07:26 11:57:38	Caulk west of walkway - detectable emissions with TVA
13	IMG_0084.JPG	2022:07:26 11:57:44	Duplicate photo
14	IMG_0085.JPG	2022:07:26 12:02:16	Loose caulk seal north of walkway, forebay - detectable emissions with TVA
15	IMG_0086.JPG	2022:07:26 12:06:50	Third bolt southwest of walkway over forebay, visible leak - detectable emissions with TVA
16	IMG_0087.JPG	2022:07:26 12:10:14	Second bolt southwest of walkway over forebay, detectable emissions with TVA
17	IMG_0088.JPG	2022:07:26 12:16:15	Oil spill on the underground API
18	IMG_0089.JPG	2022:07:26 12:16:47	Rain cap on underground API
19	IMG_0090.JPG	2022:07:26 12:17:32	Caulk on the roof of API
20	IMG_0091.JPG	2022:07:26 12:18:30	South half of API - oil spills visible

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21	IMG_0092.JPG	2022:07:26 12:23:57	North plate of underground API, a lot of caulking and very high detectable emissions with TVA
22	IMG_0093.JPG	2022:07:26 12:25:05	North plate of underground API, a lot of caulking and very high emissions detected with TVA
23	IMG_0094.JPG	2022:07:26 12:27:32	South plate with caulk
24	IMG_0095.JPG	2022:07:26 12:32:06	5th rain cap from walkway on south side of roof on API, visible oil
25	IMG_0096.JPG	2022:07:26 12:33:07	Oil spill on south side of underground API roof
26	IMG_0097.JPG	2022:07:26 12:33:50	Caulk on south side of underground API roof
27	IMG_0098.JPG	2022:07:26 12:34:36	Oil spills on 10th and 11th section of API roof (south side)
28	IMG_0099.JPG	2022:07:26 12:35:22	Oil spill and caulking on south roof of underground API
29	IMG_0100.JPG	2022:07:26 12:37:35	Caulk on skim sump, equipment 94 S2
30	IMG_0101.JPG	2022:07:26 12:38:36	Caulk on bolt - skim sump, equipment 94 S2
31	IMG_0102.JPG	2022:07:26 12:47:01	Cracks in the north face of north side of API roof, next to skim sump, equipment 94 S2
32	IMG_0103.JPG	2022:07:26 12:50:01	Eighth panel of north roof, crack in cement with caulking - detectable emissions with TVA
33	IMG_0104.JPG	2022:07:26 12:51:39	Bolt on skim sump, equipment 94 S2 - detectable emissions with TVA
34	IMG_0105.JPG	2022:07:26 12:54:37	Warped cap with caulk, west side of skim sump, equipment 94 S2 - detectable emissions with TVA
35	IMG_0106.JPG	2022:07:26 13:01:32	Third bolt east, north side of skim sump, equipment 94 S2 - detectable emissions with TVA
36	IMG_0107.JPG	2022:07:26 15:14:41	First bolt on northwest corner of skim sump 94 S2 - detectable emissions with TVA
37	IMG_0108.JPG	2022:07:26 15:18:34	North roof of underground API - visible oil
38	IMG_0109.JPG	2022:07:26 15:18:43	North roof of underground API - visible oil
39	IMG_0110.JPG	2022:07:26 15:19:35	North roof of underground API, rain caps with visible leaks
40	IMG_0111.JPG	2022:07:26 15:20:05	Northeast side of underground API roof
41	IMG_0112.JPG	2022:07:26 15:24:09	Entrance to east sump area (aft bay), elevated readings on TVA
42	IMG_0113.JPG	2022:07:26 15:26:19	Northwest corner of afterbay - detectable emissions with TVA
43	IMG_0114.JPG	2022:07:26 15:26:36	Caulk around bolt on aft bay

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44	IMG_0115.JPG	2022:07:26 15:28:47	Northeast corner of aft bay, visible leaks in bolt and caulking - detectable emissions with TVA
45	IMG_0116.JPG	2022:07:26 15:33:34	Caulking along the eastern middle part of underground API (north end)
46	IMG_0117.JPG	2022:07:26 15:35:33	Caulking along the eastern middle part of underground API (south side)
47	IMG_0118.JPG	2022:07:26 15:38:08	South end of aft bay plate - visible leaks in caulking
48	IMG_0119.JPG	2022:07:26 15:40:41	Location where grease is added for bearings - south end of aft bay
49	IMG_0120.JPG	2022:07:26 15:46:55	P-tray on Siemens tank
50	IMG_0121.JPG	2022:07:26 16:46:03	Top of Siemens tank (94-ME-259A) - visual leak around bolt, TVA measured 120 ppm
51	IMG_0122.JPG	2022:07:26 16:56:32	Caulk on pressure relief hatch on Siemens 259A - detectable emissions with TVA
52	IMG_0123.JPG	2022:07:26 16:56:37	Caulk on pressure relief hatch on Siemens 259A - detectable emissions with TVA
53	IMG_0124.JPG	2022:07:26 17:05:57	Caulk and visible leaks on pressure relief hatch on Siemens B - detectable emissions with TVA
54	IMG_0125.JPG	2022:07:26 17:08:13	Pressure relief hatch (Siemens A)
55	IMG_0126.JPG	2022:07:26 17:08:27	Pressure relief hatch (Siemens A)
56	IMG_0127.JPG	2022:07:27 10:10:49	Crack in inlet box on west side of tank 7B - detectable emissions with TVA
57	IMG_0128.JPG	2022:07:27 10:24:19	Visible oil on top of tank 7B
58	IMG_0129.JPG	2022:07:27 10:30:15	Equipment 94S12, visible leak around caulk - detectable emissions with TVA
59	IMG_0130.JPG	2022:07:27 10:33:02	Equipment 94S12, visible leak and loose caulk - detectable emissions with TVA
60	IMG_0131.JPG	2022:07:27 10:39:22	Southwest corner of equipment 94S12, seam of level indicator - detectable emissions with TVA
61	IMG_0132.JPG	2022:07:27 10:39:33	West end of equipment 94S12, caulking peeling - detectable emissions with TVA
62	IMG_0133.JPG	2022:07:27 10:45:24	West plate of equipment 94S12, large gap in plate - detectable emissions with TVA
63	IMG_0134.JPG	2022:07:27 10:49:16	Hole in metal plate - equipment 94S12
64	IMG_0135.JPG	2022:07:27 10:52:10	Seam in plate cover, west side of equipment 94S12
65	IMG_0136.JPG	2022:07:27 10:54:04	Equipment 94S12 - spray painted areas where detectable emissions were detected with TVA

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66	IMG_0137.JPG	2022:07:27 11:04:09	Outbox hatch on equipment 94S12 - detectable emissions with TVA
67	IMG_0138.JPG	2022:07:27 11:08:04	West side of equipment 94S12
68	IMG_0139.JPG	2022:07:27 11:08:39	Middle of equipment 94S12 - detectable emissions with TVA
69	IMG_0140.JPG	2022:07:27 11:10:42	Equipment 94S12, gap in seal of plate
70	IMG_0141.JPG	2022:07:27 11:14:14	Outlet box of tank 7A - detectable emissions with TVA
71	IMG_0142.JPG	2022:07:27 11:16:38	Waterman gate lift on equipment 95S12
72	IMG_0143.JPG	2022:07:27 11:22:30	Northeast corner of 7A
73	IMG_0144.JPG	2022:07:27 11:50:29	Caulking on DNF A - 94-ME-430A
74	IMG_0145.JPG	2022:07:27 11:55:57	Hatch/connector on DNF A with method 21 tags
75	IMG_0146.JPG	2022:07:27 11:56:45	Northeast corner of 94-ME-430B - detectable emissions with TVA
76	IMG_0147.JPG	2022:07:27 12:11:45	Northwest corner of east hatch, equipment 94-ME-430B - detectable emissions with TVA
77	IMG_0148.JPG	2022:07:27 12:14:45	Caulk on north side corner of equipment 94-ME-430A (DNFA)
78	IMG_0149.JPG	2022:07:27 12:19:52	New DAF - Equipment 94V21
79	IMG_0150.JPG	2022:07:27 12:21:46	Caulk on south side of new DAF
80	IMG_0151.JPG	2022:07:27 12:26:18	Caulk and oil on top of 94-V21 - north side of equipment
81	IMG_0152.JPG	2022:07:27 12:45:04	Southeast corner of the top of DAF-94-V4
82	IMG_0153.JPG	2022:07:27 12:45:15	South side of the top of DAF-94-V4
83	IMG_0154.JPG	2022:07:27 12:47:02	Top of DAF-94-V4
84	IMG_0155.JPG	2022:07:27 14:33:29	Roof of vessel 2C
85	IMG_0156.JPG	2022:07:27 14:35:42	Conservation vent over sludge with caulk and cracks (in between 2C and 2B)
86	IMG_0157.JPG	2022:07:27 14:40:49	Dirt from foam event on top of sludge basin, in between 2B and 2A
87	IMG_0158.JPG	2022:07:27 14:41:00	Dirt from foam event on top of sludge basin, in between 2B and 2C
88	IMG_0159.JPG	2022:07:27 14:43:39	Wood on top of sludge basin, in between 2B and 2A
89	IMG_0160.JPG	2022:07:27 15:12:08	Caulk on all of the drill/nail locations - tank 2A
90	IMG_0161.JPG	2022:07:27 15:15:05	No caulk on drill/nail locations - vessel 2B
91	IMG_0162.JPG	2022:07:27 15:17:49	Crack in viewing window of vessel 2A
92	IMG_0163.JPG	2022:07:27 15:23:23	Vessel 2A, trans pump area, caulk on handles
93	IMG_0164.JPG	2022:07:27 15:27:33	Vessel 2A, crack and caulk in viewing window
94	IMG_0165.JPG	2022:07:28 11:00:50	28SB5202OWS Junction Box

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95	IMG_0166.JPG	2022:07:28 11:02:55	28SB5191OWS Junction Box
96	DC_0444.JPG	2022:07:28 10:32:40	LDSN Sensor No. DC444

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APPENDIX 2: FLIR VIDEO LOG

Video Number	File Name	Date and Time YYYY:MM:DD Time (Central Time)	Description of Image
1	MOV_0423.mp4	7/26/2022 11:58	API external roof
2	MOV_0424.mp4	7/26/2022 12:10	Rain cap on API external roof
3	MOV_0425.mp4	7/26/2022 15:56	Aft Bay seam on east side plate between the second and third bolt from the North; sample collection.
4	MOV_0426.mp4	7/26/2022 16:31	Tank 205 conservation vents
5	MOV_0428.mp4	7/26/2022 16:49	OWS API gap check
6	MOV_0429.mp4	7/26/2022 17:00	ERROR
7	MOV_0430.mp4	7/27/2022 10:11	V49 – west seal
8	MOV_0431.mp4	7/27/2022 10:14	V49 – north PRV
9	MOV_0432.mp4	7/27/2022 10:18	V49 – south seal
10	MOV_0433.mp4	7/27/2022 10:21	V49 - south slotted guide pole
11	MOV_0434.mp4	7/27/2022 10:31	V49 - south/middle slotted guide pole
12	MOV_0435.mp4	7/27/2022 10:43	7B - Southeast corner of mixer hatch
13	MOV_0436.mp4	7/27/2022 10:52	West of hatch on 71806
14	MOV_0437.mp4	7/27/2022 11:05	7A rain cap – middle row, 4 th from middle wall
15	MOV_0438.mp4	7/27/2022 11:10	7A rain cap
16	MOV_0439.mp4	7/27/2022 11:14	7A - base of inlet box
17	MOV_0440.mp4	7/27/2022 11:34	West seal on tank 63
18	MOV_0441.mp4	7/27/2022 11:43	West seal on tank 64
19	MOV_0442.mp4	7/27/2022 11:49	S12 Sump ME121
20	MOV_0443.mp4	7/27/2022 12:25	Location where EPA summa canister taken

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APPENDIX 3: FIELD MEASUREMENT DATA

The table below summarizes EPA's TVA 2020 monitoring results:

TVA - SL1555					
Number	Component ID	Equipment Type	EPA's Reading (ppm)	Flint Hills' Confirmation Reading (ppm)	Additional Notes
1	94 B1	Underground sump leading into the API forebay	1000	1640	At caulk seal
2	94 B1	Underground sump leading into the API forebay	860	5079	Crack in cement
3	94 B1	Underground sump leading into the API forebay	770	1020	Crack in cement
4	94 B1	Underground sump leading into the API forebay	6800	42000	Crack in caulk seal
5	94 B1	Underground sump leading into the API forebay	998	16555	Crack in cement
6	94 B1	Underground sump leading into the API forebay	1600	10000	Crack in cement
7	94 B1	Underground sump leading into the API forebay	770	1189	Crack in cement
8	-	West of walkway over inground API	578	572	Caulk seal
9	-	West of walkway over inground API	1031	787	Caulk seal
10	-	West of walkway over inground API	700	833	Caulk seal
11	-	Third bolt on the west side of walkway over inground API	1520	1699	
12	-	Second bolt on the west side of walkway over inground API	717	-	

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13	94 S2	Bolt	7000	2002	Crack in caulk seal around bolt in NW corner
14	94 S2	Corner of cement	750	1386	
15	259A Siemens	First pressure relief hatch	10000	2500	
16	259A Siemens	First pressure relief hatch	600	667	
17	259A Siemens	Second pressure relief hatch	763	535	
18	-	Gasket	1200	1779	Near third pressure relief hatch
19	-	Inlet box for 7B	3795	3200	Crack in cement
20	94 S12	Sump	20000	1283	Crack in caulk next to fire extinguisher
21	94 S12	Sump	4000	10000	Gap in sheet metal cover
22	94 S12	Sump	700	604	Northeast corner of 446C
23	94 S12	Sump	530	1100	Between 446C and 446 A
24	94 S12	Sump	1085	1305	East of 446A
25	94 S12 – 446A	Sump	1300	3000	Caulk on ground
26	7A	Outlet box hatch	3800	5191	
27	7A	Outlet box hatch	760	1200	
28	-	Primary carbon can next to 94 S12	4000	-	Flint Hills' PID read 57 ppm
29	-	Secondary carbon can next to 94 S12	1031	-	Flint Hills' PID read 0 ppm
30	-	Primary carbon can near parking lot – sewer system	2800	800	Flint Hills' PID read 0 ppm
31	-	Secondary carbon can near parking lot – sewer system	2800	2500	Flint Hills' PID read 0 ppm
32	39ME12B – 49B	Primary carbon can for sump	2050	4569	Flint Hills' PID read 186 ppm
33	39ME12B – 49B	Secondary carbon can for sump	-	31	Flint Hills' PID read 0 ppm
34	39ME12B – 49D	Primary carbon can for sump	180	283	Flint Hills' PID read 5 ppm

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35	39ME12B – 49D	Secondary carbon can for sump	76	27	Flint Hills' PID read 0 ppm
36	18ME133 – 50	Primary carbon can for sump	252	260	Flint Hills' PID read 87 ppm
37	18ME133 – 50	Secondary carbon can for sump	55	11	Flint Hills' PID read 7 ppm
38	45ME245 – 62B	Primary carbon can for sump	4	4	Flint Hills' PID read 0 ppm
39	45ME245 – 62B	Secondary carbon can for sump	4	4	Flint Hills' PID read 0 ppm
40	45ME245 – 62A	Primary carbon can for sump	79	24	Flint Hills' PID read 0 ppm
41	45ME245 – 62A	Secondary carbon can for sump	164	649	Flint Hills' PID read 0 ppm
42	33ME91A – 60	Primary carbon can for sump	174	267	Flint Hills' PID read 0 ppm
43	33ME91A – 60	Secondary carbon can for sump	14	12	Flint Hills' PID read 0 ppm
TVA – A56575					
44	94ME176	4 th bolt cement	3500	586	
45	94ME176	SW corner cement	10,000	6500	
46	94ME176	8 th bolt North on west side	2800	19568	
47	94ME176	Crack in cement between 6 th and 7 th bolt on west side	785	1435	
48	94ME176	Crack in cement by 15 th bolt on west side	1850	3211	
49	-	Inlet chamber and trash racks to API forebay; Seam running N-S crack between cover plates	5600	19008	
50	-	Inlet chamber and trash racks to API forebay; North wall corner cement foundation by 8 th bolt east	43000	7606	
51	-	Forebay rain cap on NW floating roof API	1547	2145	

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52	-	Forebay out of service auger	131	-	
53	-	Forebay top corner of API roof north wall	13500	11399	
54	-	Forebay seal of SW API roof	2600	2599	
55	Sump 9452	North wall API crack on sump wall	680	1827	
56	Sump 9452	Bolt on west side	10300	13130	
57	Sump 9452	Bolt on west side	6800	33110	
58	Sump 9452	Seam on west side	26900	-	Pump turned off before a confirmatory reading could be done by company
59	Sump 9452	Seam on west side	722	1200	
60	-	Aft Bay plate (NW corner)	973	1140	
61	-	Aft Bay plate (N side)	1015	1901	
62	-	Aft Bay plate (E side)	22,000	30,000	Location where summa canisters were taken by EPA
63	-	Aft Bay wall (S side) where external API roof meets Aft Bay	8000	20551	
64	-	Aft Bay seam in concrete where external API roof meets Aft Bay	3800	670	
65	-	Aft Bay wall (N side) where external API roof meets Aft Bay	800	727	
66	-	Aft Bay wall (SW corner) where external API roof meets Aft Bay	1988	5325	
67	-	Prong on top of metal plate (SW corner)	2081	2217	

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68	94512	Outlet box to 7A and 7B; SW corner plate	1015	1440	
69	94512	Outlet box to 7A and 7B; plate near base level gage (ID 71805)	636	884	
70	94512	Outlet box to 7A and 7B; W side plate	1.10%	605	
71	94512	Outlet box to 7A and 7B; W side plate	4096	3001	
72	94512	Outlet box to 7A and 7B; NW side plate	2.42%	45000	
73	-	Outlet box to 7A and 7B S12; North plate (near tag ID #94P446B)	7056	2465	
74	-	Outlet box to 7A and 7B S12; base of tag ID #71797)	682	-	Company unable to confirm
75	-	Outlet box to 7A and 7B S12; seam between North and South plate	3.5%	40901	
76	-	Outlet box to 7A and 7B S12; seam of plate	2036	682	
77	-	Outlet box to 7A and 7B S12; seam of plate	968	5300	
78	94ME430B	DNF B west hatch (NE corner)	659	555	
79	94ME430B	DNF B west hatch (NE corner)	1336	1000	
80	94ME430B	DNF B east hatch (NW corner)	680	934	
81	39 Unit Major Sump-49A	Carbon canister primary	1370	1803	Company PID measured 34
82	39 Unit Major Sump-49A	Carbon canister secondary	124	77	Company PID measured 0

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83	39 Unit Major Sump- 49C	Carbon canister primary	1211	1219	Company PID measured 26
84	39 Unit Major Sump- 49C	Carbon canister secondary	83	39	Company PID measured 0
85	18ME130-51	Carbon canister primary	223	11000	Company PID measured 76; EPA TVA flamed out
86	18ME130-51	Carbon canister secondary	3558	3100	Company PID measured 0
87	17ME270-52	Carbon canister primary	41	86	Company PID measured 0
88	17ME270-52	Carbon canister secondary	3	6	Company PID measured 0
89	45ME25- 61A	Carbon canister primary	4	-	Company PID measured 0
90	45ME25- 61A	Carbon canister secondary	3	-	Company PID measured 0
91	45ME25- 61B	Carbon canister primary	4	-	Company PID measured 0
92	45ME25- 61B	Carbon canister secondary	4	-	Company PID measured 0

Calibration and Instrument Information

EPA used two ThermoFisher Toxic Vapor Analyzers 2020 (TVA2020). The EPA TVA2020 response times are about 4 seconds.

7/26/2022 Calibration

	A56575	SL1555
8:41 average calibration reading, 500 ppm gas	497 ppm	492 ppm
13:43 bump check reading, 500 ppm gas	501 ppm	498 ppm

7/27/2022 Calibration

	A56575	SL1555
8:25 average calibration reading, 500 ppm gas	517 ppm	496 ppm
13:05 bump check reading, 500 ppm gas	499 ppm	498 ppm

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Calibration Gas Information

EPA calibration gases Manufacturer	Composition	Lot #	Expiration
CALGAZ	Air zero grade THC <1 ppm	1486172	May 2026
GASCO	Methane in air 500 ppm	304-402110297-2	May 2025
GASCO	Methane in air 1960 ppm	304-402110299-1	May 2025
GASCO	Methane in air 10,000 ppm	304-402110296-1	May 2025