



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

**DATE:** November 10, 2021

**SUBJECT:** CLEAN AIR ACT INSPECTION REPORT  
Citgo Petroleum Corporation (Citgo), Lemont, Illinois

**FROM:** Constantinos Loukeris, Environmental Engineer  
AECAB (MI/WI)

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

**TO:** File

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**BASIC INFORMATION**

**Facility Name:** Citgo Petroleum Corporation (Citgo)

**Facility Location:** 135<sup>th</sup> Street & New Avenue, Lemont, Illinois, 60439

**Date of Inspection:** September 13-15, 2021

**EPA Inspectors:**

1. Constantinos Loukeris, Environmental Engineer
2. Veronica Fischer, Environmental Engineer
3. Daniel Heins, Environmental Scientist

**Other Attendees**

1. Jim Lant, Environmental Manager
2. Matt Klickman, Senior Air Environmental Staff
3. Mike Mee, HSE Manager
4. Drew Bollinger, BWON Coordinator

**Contact Email Address:** [jlant@citgo.com](mailto:jlant@citgo.com)

**Purpose of Inspection:** to assess compliance with requirements of NESHAP Subpart FF, NSPS QQQ and Citgo's Consent Decree

**Facility Type:** refinery

**Regulations Central to Inspection:** National Emission Standards for Hazardous Air Pollutants for Benzene Waste Operations (BWON), at 40 C.F.R. Part 61, Subpart FF, New Source Performance Standards for VOC Emissions from Petroleum Refinery Wastewater Systems (QQQ), at 40 C.F.R. Part 60, Subpart QQQ, and Citgo's Consent Decree

**Arrival Time:** September 13, 2021 - 9:40 am

**Departure Time:** September 15, 2021 - 4:55 pm

**Inspection Type:**

- Unannounced Inspection
- Announced Inspection

**OPENING CONFERENCE**

- Credentials Presented
- CBI warning to facility provided

The following information was obtained verbally from Citgo representatives unless otherwise noted.

**Process Description:**

Citgo provided EPA a brief overview of how the benzene wastewater is controlled from the various parts of the refinery. In addition, Citgo provided information as to how QQQ is applicable to the individual drain systems at the refinery. A simplified process water diagram was used to explain how the plant is broken up, and also to provide details of the BWON controlled sewer section of the plant. Citgo operates a North and South Plant. In the North Plant, Citgo indicated there is no QQQ-applicable equipment due to the age of the existing individual drain systems and that no modifications, reconstruction, or construction has occurred to otherwise make them subject. In the South Plant, all the wastewater is hard piped to the South Plant effluent sump (SP PSO), which is the start of the wastewater treatment under BWON. In addition, Citgo operates a two-stage desalter system that includes a hydroclone and a flasher prior to being routed to the SP PSO effluent sump. The desalter is the primary benzene wastewater stream that is being controlled. Citgo also operates a sour water stripper to manage the sour water that is generated in the system.

The BWON controlled system consists of four floating roof tanks used for separation, an induced gas flotation (IGF) tank, two slop oil tanks, and three aeration tanks. Citgo considers the effluent stream of the aeration tanks as controlled to the levels required by BWON (i.e. <10 parts per million by weight benzene), and thus Citgo considers subsequent equipment not part of the BWON controlled system. Subsequent equipment includes two clarifiers and a treated water basin. Slop oil from the four floating roof tanks and the IGF tank used for separation are routed to either slop oil Tank 433 or slop oil Tank 434. Tank 434 was demolished and actively being rebuilt at the time of EPA's inspection.

Citgo conducts monthly visual inspections for equipment subject to QQQ and quarterly EPA Reference Method 21 for equipment subject to BWON and QQQ drains.

**TOUR INFORMATION**

**EPA toured the facility:** Yes

**Data Collected and Observations:**

EPA conducted leak detection and repair monitoring using a Toxic Vapor Analyzer Model 2020 (TVA 2020) flame ionization detector on Citgo’s BWON sewer system components that are required to be designed to operate with no detectable emissions (NDE), which is indicated by an instrument reading of less than 500 ppm. In addition, EPA visually inspected drain hubs and other QQQ affected equipment. EPA also used the TVA 2020 for the QQQ affected equipment when accessible.

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

**Field Measurements:** were taken during this inspection.

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

<b>Component ID</b>	<b>Equipment Type</b>	<b>EPA’s Reading (ppm)</b>	<b>Citgo’s Reading (ppm)</b>	<b>Additional Notes</b>
119HQ115	Drain	825	660	Sight Glass Blowdown to Drain
By D401 in SRU	Stormwater Drain (Grate)	64	-	Not QQQ, sludge liquid on top of drain
102WWML-26	Manhole	25,000	545	-
102WWML-23	Manhole	>10,000	14,000	-
103WWML-19	Manhole	21,000	22,000	
WW590-8	Cover	1,640	924	
WW 113-3	Manhole	1,340	779	2 bolts missing on manhole cover
119HQ31	Cleanout	1,200	2,160	Cracked cover with missing metal seal.
119WWML-8	Manhole	80,000	15,859	Emissions from all around the manhole
102WWML-22	Manhole	20,000	31,000	Open hole on manhole cover
112WWML-3	Manhole	900	1,221	Caulk on sample port in middle of manhole cover cracked and dry

111WWML-13	Manhole	1,180	8,300	Multiple cracks in concrete around the manhole
119WWML-11	Manhole	3,900	16,107	Manhole cover has opening with no bolt/patch
North of 119G-2B	Stormwater Drain (Grate)	21.7	Confirmed	Not QQQ
South of D3 in 119 Process Unit	Stormwater Drain (Grate)	38	28	-
Tag# 844-SPSO LL 00049	PSO Sump Cover	-	12,240	-
844G-444B	Drain	-	3,000	-
844SPSO LL00018	Hatch/Cover	-	30,000	-
Tag# 401247	PSO Sump Cover	-	12,079	-
Tag#401249	PSO Sump Cover	-	14,000	-
Tag#401243	PSO Sump Cover	-	9,600	-

The table below summarizes the number of visual inspections completed by EPA by process unit:

<b>Process Unit/Equipment Type</b>	<b>Number Visually Inspected</b>
<b>Crude Unit</b>	
Drains	33
Manholes	8
Cleanouts	1
<b>Sulfur Recovery Unit</b>	
Drains	128
Manholes	1
Cleanouts	8
<b>Gasoline Hydrotreater</b>	
Drains	42
Manholes	11
Cleanouts	10
<b>Ultra-low Sulfur Diesel</b>	
Drains	56
Manholes	9
Cleanouts	8
<b>Naphtha Hydrotreater</b>	
Drains	10
Manholes	4

Cleanouts	0
<b>Coker Unit</b>	
Drains	10
Manholes	4
Cleanouts	5
<b>FCCU</b>	
Drains	27
Manholes	3
Cleanouts	10
<b>Purge Treatment Unit</b>	
Drains	12
Manholes	0
Cleanouts	5

The table below summarizes the visual inspection observations identified by EPA:

<b>Component ID</b>	<b>Process Unit</b>	<b>Equipment Type</b>	<b>Observation</b>
W111-3	Crude Unit	Manhole	Debris and hose on top of manhole
111HQ25	Crude Unit	Drain	Dry, no water seal
111HQ57	Crude Unit	Drain	Dry, no water seal
111HQ51	Crude Unit	Drain	Water seal appeared oily
111HQ32	Crude Unit	Drain	Drain appears wet on the sides, but no water seal
111HQ28	Crude Unit	Drain	Level is quite high and appeared oily
WWML-13	Crude Unit	Manhole	Multiple cracks in concrete next to manhole cover
119ML-11	Sulfur Recovery Unit	Manhole	Opening on the cover, and also minimal debris on top
119HQ8	Sulfur Recovery Unit	Drain	Dry, no water seal
119HQ5	Sulfur Recovery Unit	Drain	Dry, no water seal
119HQ15	Sulfur Recovery Unit	Drain	Dry, no water seal
119HQ16	Sulfur Recovery Unit	Drain	Dry, no water seal, sulfur odor present
119HQ18	Sulfur Recovery Unit	Drain	Dry, no water seal
119HQ11	Sulfur Recovery Unit	Drain	Dry, no water seal
119HQ20	Sulfur Recovery Unit	Drain	Drain appears wet on the sides, but no water seal
119HQ22	Sulfur Recovery Unit	Drain	Dry, no water seal

119HQ32	Sulfur Recovery Unit	Drain	Dry, no water seal
119HQ36	Sulfur Recovery Unit	Drain	Dry, no water seal
119HQ40	Sulfur Recovery Unit	Drain	Dry, no water seal
119HQ47	Sulfur Recovery Unit	Drain	Dry, no water seal
119HQ45	Sulfur Recovery Unit	Drain	Dry, no water seal, debris was present in the drain hub
119HQ46	Sulfur Recovery Unit	Drain	Dry, no water seal
119HQ51	Sulfur Recovery Unit	Drain	Dry, no water seal
119HQ59	Sulfur Recovery Unit	Drain	Water seal appeared oily
119HQ60	Sulfur Recovery Unit	Drain	Water seal appeared oily
119HQ61	Sulfur Recovery Unit	Drain	Water seal appeared oily
119HQ63	Sulfur Recovery Unit	Drain	Dry, no water seal
119HQ64	Sulfur Recovery Unit	Drain	Dry, no water seal
119HQ70	Sulfur Recovery Unit	Drain	Dry, no water seal
119HQ72	Sulfur Recovery Unit	Drain	Dry, no water seal
119HQ73	Sulfur Recovery Unit	Drain	Dry, no water seal
119HQ116	Sulfur Recovery Unit	Drain	Water seal appeared oily
119HQ121	Sulfur Recovery Unit	Drain	Dry, no water seal, debris was present in the drain hub
119HQ120	Sulfur Recovery Unit	Drain	Dry, no water seal, debris was present in the drain hub
119HQ135	Sulfur Recovery Unit	Drain	Dry, no water seal
119HQ130	Sulfur Recovery Unit	Drain	Dry, no water seal, debris was present in the drain hub
119HQ148	Sulfur Recovery Unit	Drain	Dry, no water seal
119HQ147	Sulfur Recovery Unit	Drain	Dry, no water seal
Near 119F36	Sulfur Recovery Unit	Drain	Dry, no water seal, insulation was present in the drain hub
102HQ39	Gasoline Hydrotreater	Drain	Dry, no water seal, debris was present in the drain hub
102HQ42	Gasoline Hydrotreater	Drain	Dry, no water seal, debris was present in the drain hub
102HQ40	Gasoline Hydrotreater	Drain	Dry, no water seal, water bottle in drain
102HQ43	Gasoline Hydrotreater	Drain	Dry, no water seal
102HQ41	Gasoline Hydrotreater	Drain	Debris on the upper level of the drain, with a water seal below

102HQ22	Gasoline Hydrotreater	Drain	Dry, no water seal, water bottle in drain
102HQ25	Gasoline Hydrotreater	Drain	Dry, no water seal, tube in drain
102HQ5	Gasoline Hydrotreater	Drain	Dry, no water seal, debris was plugging the drain hub
102WWML22	Gasoline Hydrotreater	Manhole	Manhole had an open hole in it
102WWML20	Gasoline Hydrotreater	Manhole	Manhole had a cracked concrete seam
102HQ3	Gasoline Hydrotreater	Drain	Dry, no water seal, debris was plugging the drain hub
102HQ1	Gasoline Hydrotreater	Drain	Dry, no water seal, debris was present in the drain hub
102ML23	Gasoline Hydrotreater	Manhole	Manhole was half covered in dirt and rocks; seal visibly broken on cover
103ML19	Naphtha Hydrotreater	Manhole	Manhole almost entirely covered under dirt
590HQ33	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal, debris was present in the drain hub
590HQ56	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal
590HQ52	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal, cobwebs were present
590HQ41	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal, cobwebs were present
590HQ37	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal, debris was present in the drain hub
590HQ35	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal, debris was present in the drain hub
590HQ45	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal, debris was plugging in the drain hub
590HQ05	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal
590HQ06	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal
590HQ44	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal
590HQ08	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal
590HQ09	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal
590HQ32	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal

590HQ23	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal
590HQ60	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal, debris was present in the drain hub
590HQ61	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal, debris was present in the drain hub
590HQ17	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal, debris was present in the drain hub
590HQ53	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal, debris was present in the drain hub
590HQ22	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal
590HQ55	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal
590HQ39	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal, debris was present in the drain hub
590HQ49	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal
590HQ58	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal, debris was present in the drain hub
590HQ48	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal
590HQ11	Ultra-Low Sulfur Diesel	Drain	Water seal present; however, spray paint can in drain
590HQ47	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal, debris was present in the drain hub
590HQ02	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal, and buried under almost 1 foot of dirt. Citgo indicated was cleaned out a few years ago.
590HQ62	Ultra-Low Sulfur Diesel	Drain	Dry, no water seal, debris was present in the drain hub
103HQ12	Naphtha Hydrotreater	Drain	High level present in drain
103HQ04	Naphtha Hydrotreater	Drain	Dry, no water seal
103HQ11	Naphtha Hydrotreater	Drain	Dry, no water seal
103HQ10	Naphtha Hydrotreater	Drain	Dry, no water seal, debris was present in the drain hub
103HQ07	Naphtha Hydrotreater	Drain	Dry, no water seal
103HQ03	Naphtha Hydrotreater	Drain	Dry, no water seal

103HQ02	Naphtha Hydrotreater	Drain	Dry, no water seal
113HQ22	Coker Unit	Drain	Dry, no water seal
113HQ25	Coker Unit	Drain	Dry, no water seal
113CQ29	Coker Unit	Cleanout	Located under a trailer
WW113-1	Coker Unit	Manhole	Center hold of manhole cover with pipe running through it to backflush/segregate sewer.
HQ01	Purge Treatment Unit	Drain	Dry, no water seal, filled with dirt to the top of hub
113HQ61	Coker Unit	Drain	Dry, no water seal, debris was present in the drain hub
113HQ26	Coker Unit	Drain	Dry, no water seal, debris was present in the drain hub
113 CQ31	Coker Unit	Drain	Cleanout drain dry with debris present and not sealed.
112HQ15	FCCU	Drain	Dry, no water seal

### **CLOSING CONFERENCE**

#### **Requested documents:**

EPA requested the following documents:

- Quarterly BWON reports for 2019 and 2020;
- Total Annual Benzene Report for 2019 and 2020;
- End-of-Line Sampling Reports from 1<sup>st</sup> quarter 2020 through 1<sup>st</sup> quarter 2021;
- Semi-annual QQQ reports for 2019 and 2020;
- Procedure for Preparing H<sub>2</sub>S-containign pumps for Maintenance;
- Leak Detection and Repair Database for BWON and QQQ;
- PSO Design Documentation;
- Internal and External Inspection Reports for Tanks 433, 439, 485, 486, and 487;
- Tank Information on September 15, 2021: approximate level, roof seal type, and average temperature (Tanks 433, 439, 485, 486, and 487);
- 22 pictures provided by Citgo indicating various repairs from the visual observations and Method 21 monitoring.

Citgo provided responses to the requested documents via a Microsoft Onedrive link provided by EPA to Citgo.

#### **Concerns:**

1. EPA identified concerns that numerous QQQ drains were found without a water seal and in several instances, with debris present/plugging the drain hub.

2. EPA identified concerns that the visual inspections for QQQ are not being completed properly or at all, since the presence of some of the debris indicated a significant pileup.
3. EPA observed the Alky flare smoking the entire time EPA was on top of Tank 433.
4. EPA identified the concern that BWON and QQQ manhole covers are not being sealed properly and also found manhole covers covered in dirt in a few instances with broken seals.
5. EPA identified the concern that Citgo did not identify any modifications, reconstruction or construction to the North Plant that would have triggered QQQ.
6. EPA identified the concern of significant peeling and pitting of caulk on the SP PSO sump with detectable emissions above 500 ppm.
7. EPA identified detectable emissions above 500 ppm at drain hubs, plates, and hatches on the South Plant PSO system leading to the induced gas flotation system.
8. EPA identified the concern that the controlled sewer at certain points may not be designed to operate below NDE as required by the BWON.
9. EPA observed that gauge hatches and sample valves on top of the Tanks 433, 439, 485, 486, and 487 were not part of the BWON leak detection and repair program.

## SIGNATURES

Report Author: CONSTANTINOS LOUKERIS Digitally signed by  
CONSTANTINOS LOUKERIS  
Date: 2021.11.10 11:42:16  
-06'00'

Section Chief: SARAH MARSHALL Digitally signed by  
SARAH MARSHALL  
Date: 2021.11.10  
11:58:52 -06'00'

**APPENDIX A: DIGITAL IMAGE LOG**

<b>1. Inspector Name:</b> Constantinos Loukeris	<b>2. Date(s) of Inspection:</b> September 13-15, 2021
<b>3. Company/Facility Name:</b> Citgo Petroleum Corporation (Citgo)	<b>4. Street Address, City, State:</b> Lemont, IL
<b>5. Number of Images:</b> 33	<b>6. Archival Record Location:</b> OneDrive: EPAWork\Citgo\Inspection\Citgo Lemont September 2021 BWON Inspection\FLIR Images and Video

Image Number	File Name	Date	Description of Image
1	MOV_0079.mp4	9/15/2021	VOC emissions imaged from the manway skimmer line on top of Tank 486
2	MOV_0080.mp4	9/15/2021	VOC emissions imaged center vent on top of Tank 439
3	MOV_0082.mp4	9/15/2021	VOC emissions imaged from PSO sump effluent hatch
4	MOV_0083.mp4	9/15/2021	VOC emissions imaged from PSO sump effluent hatch located west of previous one listed.
5	MOV_0084.mp4	9/15/2021	VOC emissions from Drain: 844G-444B
6	MOV_0085.mp4	9/15/2021	VOC emissions from PSO sump effluent hatch
7	MOV_0087.mp4	9/15/2021	VOC emissions imaged from the plate top of the PSO sump, Tag# 401247
8	MOV_0088.mp4	9/15/2021	VOC emissions imaged from the plate top of the PSO sump, Tag# 401249
9	MOV_0089.mp4	9/15/2021	VOC imaged from flange on east end of the PSO sump
10	MOV_0096.mp4	9/15/2021	VOC emissions imaged from Tag# 844-SPSO LL 00049
11	MOV_0097.mp4	9/15/2021	Digital video of hatches by the PSO sump
12	MOV_0106.mp4	9/15/2021	VOC emissions imaged from the external floating roof of Tank 433
13	MOV_0107.mp4	9/15/2021	VOC emissions imaged from the external floating roof of Tank 433

14	MOV_0108.mp4	9/15/2021	VOC emissions imaged from the external floating roof legs of Tank 433
15	MOV_0109.mp4	9/15/2021	VOC emissions imaged from the gauge hatch on top of Tank 433
16	MOV_0111.mp4	9/15/2021	VOC emissions imaged from the external floating roof legs of Tank 433
17	DC90.jpg	9/15/2021	Digital picture tank at PSO sump
18	DC91.jpg	9/15/2021	Digital picture tank at PSO sump
19	DC92.jpg	9/15/2021	Digital picture tank at PSO sump
20	DC93.jpg	9/15/2021	Digital picture tank at PSO sump
21	DC94.jpg	9/15/2021	Digital picture tank at PSO sump
22	DC95.jpg	9/15/2021	Digital picture tank at PSO sump
23	DC98.jpg	9/15/2021	Digital picture tank of the rest of the PSO system
24	DC99.jpg	9/15/2021	Digital picture tank of the rest of the PSO system
25	DC100.jpg	9/15/2021	Digital picture tank of the rest of the PSO system
26	DC101.jpg	9/15/2021	Digital picture tank of the rest of the PSO system
27	DC102.jpg	9/15/2021	Digital picture tank of the rest of the PSO system
28	DC103.jpg	9/15/2021	Digital picture tank of the rest of the PSO system
29	DC104.jpg	9/15/2021	Digital picture tank of the rest of the PSO system
30	DC105.jpg	9/15/2021	Digital picture tank of the rest of the PSO system
31	DC106.jpg	9/15/2021	Digital picture tank of the rest of the PSO system
32	DC107.jpg	9/15/2021	Digital picture tank of the rest of the PSO system
33	DC108.jpg	9/15/2021	Digital picture tank of the rest of the PSO system