Corrective Action Framework
Respondent: CITGO Petroleum Corporation
Facility Name: CITGO Terminal
Address: 2500 East Chicago Avenue
City, State: East Chicago, Indiana
EPA ID: IND 095 267 381
Adopted Date: 06/01/2020
Revision Date: TBD

The Corrective Action Framework (CAF) is a tool intended to summarize the goals and expectations of the U.S. Environmental Protection Agency – Region 5 (EPA) and CITGO Petroleum Corporation (CITGO) (Respondent) that will facilitate performance of Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) at the CITGO Terminal (CITGO Terminal). This CAF is part of and incorporated by reference into an Administrative Order on Consent (AOC) between EPA and CITGO titled, CITGO Terminal, East Chicago, Indiana (RCRA-05-2020-0005) and dated January 24, 2020. The CAF is not a legally binding document and does not alter any legal requirements under any permit or order applicable to the CITGO Terminal. Nor is the CAF a substitute for a permit or order. The CAF is not expected to address every technical or administrative aspect or detail of the RFI. Rather, the CAF describes the discussions that took place during the CAF meeting held on March 12, 2020 or any subsequent meetings. The CAF also documents material exchanged during the CAF meeting(s), which are necessary for the RFI to efficiently commence. Note that this CAF is a "living document" and is subject to change considering new information or data. The CAF will be updated to reflect goals and expectations concerning the RFI as the project progresses.

The development and implementation of the corrective action will follow the process and meet the objectives outlined in this CAF. Relevant EPA guidance documents which may include, as appropriate to the facts and data of the case: the Documentation of Environmental Indicator Determination Guidance (Feb. 5, 1999); relevant portions of the Model Scopes of Work for RCRA Corrective Action and the RCRA Corrective Action Plan, OSWER Directive 9902.3-2A (May 1994); the Resource Conservation and Recovery Act Facilities Investigation Remedy Selection Track (RCRA FIRST) A Toolbox for Corrective Action; and EPA's risk assessment guidance shall be considered during the development and implementation of the corrective action.

EPA may require supplemental information or investigation from CITGO if EPA determines that any submission required under the general steps outlined in this CAF process does not provide an adequate basis to:

(a) Determine all current human exposures to contamination at or from the CITGO Terminal are under control;
(b) Determine groundwater contamination migration is stabilized; or
(c) Select interim corrective measures that will protect human health and the environment from the release of hazardous waste and hazardous constituents at or from the CITGO Terminal.

The steps of the anticipated corrective action process are described below. Each of the steps builds on information developed in prior steps.

At each stage, the parties will typically begin by discussing the results of prior steps, and the impact of those results on the next measures needed to achieve the corrective action objectives. The parties may agree that upcoming steps as outlined below may be modified, consolidated, truncated, or expedited based on the results of previous steps in the corrective action process.

Where possible the nature, extent, objectives, deliverables, and timing necessary for each step of the work will be developed by consensus at an initial scoping/planning meeting or meetings. Based on that consensus, the Respondent will develop a work plan for EPA review and approval.

If the parties do not reach full consensus within the timeframes described below (or as revised by subsequent agreement of the parties), the parties may jointly decide to elevate consideration of disputes over fundamental issues they have not been able to resolve, in order to receive input and direction from senior management.

I. CAF Meeting Participants

The CAF meeting was attended by:

- Mike Beedle, EPA
- Todd Gmitro, EPA
- Renee Wawczak, EPA
- Scott Buckner, CITGO
- Rick Passmore, OXY
- Mike Tomka, GHD

II. Historical Site Characterization

CITGO and OXY USA, Inc. (Oxy) are proceeding under separate AOCs and CAFs for their respective portions of a contiguous property that was once owned by Cities. In this CAF, appropriate reference will be made when referring specifically to the CITGO Terminal, covered by this CAF, or the Former Cities Refinery (Former Refinery), not covered by this CAF, of the former contiguous property.

This section provides a discussion of the overall property history, a physical property description, and a summary of previous investigations. These topics will help provide some overall context to the CAF and will help guide the RFI.

a. <u>Overview of Property History</u>

From approximately 1929 to 1983, Empire Refining Company, and then Cities, or subsidiaries of Empire or Cities operated a refining and bulk storage terminal complex consisting of approximately 322 total acres (see Figure 1) [note: the Preliminary Assessment/Visual Site Inspection (PA/VSI) refers to 300 acres], of which the crude oil

refinery operations were located on portions of the 93.5 acre Former Refinery. The refining operation ceased on or about 1972. The bulk storage terminal continued to operate subsequent to closure of the refinery and has been owned and operated by CITGO since 1983.

CITGO owns and operates a petroleum bulk storage terminal, which receives petroleum products of various grades. Petroleum products are received by pipeline and stored in various bulk storage tanks. The CITGO Terminal occupies approximately 228.5 acres. The PA/VSI dated December 2, 1991, identified 58 tanks with capacities of 10,000 to 140,000 barrels. The current bulk storage area contains 53 tanks and a total capacity of approximately 179,570,000 gallons. All tanks have soil berms providing secondary containment. Petroleum products are shipped from the CITGO Terminal to customers via pipeline or truck.

b. Environmental Characteristics

Approximately 4,500 feet of consolidated bedrock, consisting of sandstones, carbonates, and shale, overlie Precambrian basement rock in northwest Indiana. The most recent stage of glaciation deposited a clay till on the surface of the bedrock. As Lake Michigan water levels fluctuated over time, a series of beaches and dunes were formed, which accounts for the deposition of thick sand deposits in the area. The water table is generally less than 6 feet deep in the area with little groundwater flow, although groundwater in the area generally flows toward the Grand Calumet River and Lake Michigan.

A 1996 investigation at a portion of the CITGO Terminal determined that the water table was 1.5-2 feet below ground surface (bgs). Calculated hydraulic conductivities using slug tests in three wells at that location determined an average linear groundwater flow velocity at the water table of 3.8×10^{-5} feet/minute or approximately 20 feet per year. Fine to medium grained sands were encountered to a depth of 12 feet bgs.

The land surrounding the CITGO Terminal is mainly industrial/commercial with some residential homes immediately adjacent to the western property boundary. The Gary Municipal Airport Air Operations Area (AOA) boundary is about 1 mile to the east of the Facility. No drinking water wells are present on the CITGO Terminal. Additionally, no drinking water wells were identified within a 1-mile radius of the CITGO Terminal. Drinking water for the area is obtained from Lake Michigan. The chief water bodies in Lake County are the Grand Calumet River, Lake Michigan, and Wolf Lake, a large recreational lake. Surface water in the area is used for recreational purposes. The primary pathways of concern from the CITGO Terminal are surface water which discharges to storm sewers and then to the Grand Calumet River; and onsite groundwater and contamination which may move offsite.

c. Solid Waste Management Units/Areas of Concern

The PA/VSI dated December 2, 1991, identified three solid waste management units (SWMUs), and two areas of concern (AOCs). Refer to Figure 2 for the locations of the SWMUs and AOCs at the CITGO Terminal. It appears that the three SWMUs and the

first AOC are or were located at the CITGO Terminal, and the second AOC was located at the Former Refinery.

SWMUs:

1. Oil/Water Separator: The oil/water separator is used for separating oil and fuel residues (D001) from stormwater runoff. The oil/water separator is an open-air in-ground holding tank that consists of four chambers that are 20-foot x 10-foot, four chambers that are 20-foot x 47-foot and four chambers that are 20-foot x 64-foot. Each chamber is approximately 16 feet deep. It is constructed of concrete and has a capacity of 1,000,000 gallons. Oil is skimmed from the untreated side and placed in a tank for recycling. Water is discharged by gravity from the treated side under a National Pollutant Discharge Elimination System (NPDES) permit.

   The unit has been in operation since 1929. Since 1976, the oil/water separator has been used for stormwater only. In 1982, a leachate collection system was added to one chamber of the oil/water separator. The unit is currently active. No releases from the unit have been documented. Based on the PA/VSI, no further action was suggested.

2. Former Tank No. 195: Oil/water emulsion waste from tank bottoms (D001, D008) was generated until about late 1980 and was stored in Tank No. 195. The tank had a capacity of 150,000 gallons and was made of steel. A startup date for the tank is unknown. The Former Tank No. 195 had no known releases. It was cleaned and dismantled in 1982. The closure steps included disposal of the waste material and tank materials and appurtenances. The PA/VSI found no evidence that EPA or the Indiana Department of Environmental Management (IDEM) approved the closure activities for Tank No. 195. On October 15, 1986, IDEM sent a Closure of Tank Storage/Notice of Compliance letter to Cities and CITGO. The PA/VSI concluded that no further action is required.

3. Tank No. 88: The oily residue (D001) from the oil/water separator was accumulated in Tank No. 88 until 2005. It was made of steel and concrete with a 10,000-gallon capacity. The startup date for Tank No. 88 was 1935. In 2005, Tank No. 88 was cleaned and gas-freed, and the waste was removed from the CITGO Terminal in 2006. Tank No. 88 was dismantled in 2006. Prior to 1997, Tank No. 88A was used for temporary (less than 90 day) hazardous waste storage. Tank No. 88A was taken out-of-service, cleaned and gas-freed following the issuance of an IDEM Inspection Summary Letter dated December 31, 2003. Tank No. 88A is now in additive service. Since 2005, oily residue from the oil/water separator is managed as an “off-spec” product that is sent for recycling. No releases from this unit have been documented and none were noted during the VSI.

AOCs:

1. Former Oil-Saturated Soil Area: In May 1984, CITGO requested a permit from Indiana Environmental Management Board (IEMB) to dispose of 1,700 cubic yards of oil-saturated soil. CITGO reported that it had analyzed the waste in accordance

with EPA Extraction Procedure (EP) toxicity testing and found it to be non-hazardous. The oil-saturated soil was removed in 1985. According to CITGO employees, the soil was removed until the areas were visibly clean. The PA/VSI noted that vegetation in the area appeared to be brown, or dead. In addition, most of the soil throughout the area was "spongy" and often appeared black, as if it contained oily residue. CITGO does not have records indicating whether additional soil testing was conducted after the soil removal. Based on the PA/VSI, sampling the area surrounding the former saturated soil was recommended to confirm conditions.

2. Former Asbestos-Contaminated Soil Area: In July 1983, CITGO contracted the removal of 75 cubic yards of asbestos-contaminated soil from the idle refinery site. In 1983, IEMB issued a permit for the removal with specified disposal procedures. On November 8, 1983, a Consent Decree initiated by EPA ordered Cities to clean up the asbestos-contaminated soil. The Consent Decree was filed January 30, 1984. In January 1984, CITGO applied for an extension of the Indiana State Board of Health (ISBH) permit to allow removal and disposal of 75 cubic yards of asbestos-contaminated soil. The asbestos-contaminated soil was removed and disposed of off-site. The Consent Decree was subsequently dismissed by the U.S. District Court on April 4, 1984. Based on the PA/VSI, sampling the area surrounding the former asbestos-contaminated soils was recommended to confirm conditions.

d. Previous Releases and Waste Management

Over time, spills and waste streams have been generated and managed at the CITGO Terminal. These events are documented below:

Spill History:

September 30, 1991: Approximately 200 gallons of No. 2 Fuel Oil leaked from Tank No. 56 through a crack in the tank floor. The product was retained within the diked area. Product was recovered with a vacuum truck. Contaminated soils were excavated and properly disposed of. The tank was removed from service for repairs. The incident was reported to IDEM.

December 17, 1991: Approximately 200 gallons of No. 2 Fuel Oil was released through a leak in the bottom of Tank No. 58. Free product was recovered, and contaminated soil excavated and disposed of. The tank was removed from service for repairs. The incident was reported to IDEM.

March 1, 1996: Approximately 10,000 gallons of turbine fuel was released when a chime weld on Tank No. 18 split. Product was recovered. The tank was removed from service for repairs. The incident was reported to IDEM.

May 14, 1996: An unknown quantity of turbine fuel was released from a flanged connection in Dike Yard No. 4. Free product was recovered with a vacuum truck. The incident was reported to IDEM. Soil and groundwater sampling were conducted in December 1996 and is documented in a Site Investigation Report dated

November 7, 1997, prepared by Natural Resource Technology (NRT). Results indicate no constituents of concern above American Society for Testing and Materials (ASTM) Risk Based Corrective Action levels.

May 21, 1996: Approximately 100 gallons of turbine fuel was released when a valve near the main switching manifold ruptured during a hydrostatic test of terminal piping. Free product was removed with a vacuum truck. The incident was reported to IDEM.

March 20, 2001: Approximately 4,000 gallons of turbine fuel was released in Dike Yard No. 6 through an internal corrosion piping anomaly. Free product was removed with a vacuum truck and the incident was reported to IDEM.

October 24, 2001: Approximately 10 gallons of hydraulic fluid was released in Dike Yard No. 31 when a transfer pump failed. Product was padded up and notifications were completed.

June 6, 2005: Approximately 100 gallons of gasoline was released from the top ring of Tank No. 8 through a bullet hole in the tank.

February 26, 2007: Approximately 200 gallons of gasoline was released from an internal corrosion pit on the N. Gasoline Fill line in Dike No. 5.

December 16, 2008: Approximately 20 gallons of fuel oil leaked out of a cracked 2-inch nipple in the northeast corner of Tank No. 19 Dike Yard.

April 20, 2012: Approximately 30 gallons of Reformulated Gasoline Blend-Stock for Oxygen Blending (RBOB) was released into Tank Dike No. 53 from an internal corrosion pit in the tank receipt line.

May 29, 2013: Less than 1 gallon of gasoline was released from the South Gasoline Fill line in the Tank No. 37 Dike. The leak was the result of an improper girth weld.

August 7, 2013: Less than 3-gallons of fuel oil was released from a tee in the South Fuel Oil Fill line in the Tank No. 19 Dike Yard. The leak was the result of improper welds on the homemade branch connection tee.

March 11, 2014: Approximately 500 gallons of diluent was released from the South Gasoline Fill line in the Tank No. 46 Dike Yard. The leak was the result of an improper girth weld.

June 13, 2015: Less than 5 gallons of diluent was released as a result of an internal corrosion anomaly in the 33/34 suction line in the Tank No. 32 Dike Yard.

October 13, 2016: Less than 3 gallons of diesel fuel was released from the Wolverine gravitometer pump.

March 9, 2017: Less than 25 gallons of turbine fuel was released as a result of internal corrosion on the D-Line in the Tank No. 1 Dike Yard.

Interim Measures:

In 1981, Cities removed and disposed of approximately 15,000 cubic feet of asbestos-contaminated waste material (from an unspecified location at the CITGO Terminal and/or Former Refinery) at an off-site landfill as approved by the IEMB.

In 1982, Cities removed and disposed of approximately 600 cubic yards of asbestos piping insulation from an unspecified location at the CITGO Terminal and/or Former Refinery. The asbestos waste was disposed of at an off-site landfill as approved by the IEMB.

In 1981 or 1982, Cities stored and disposed of approximately 342,000 gallons of oil saturated tank bottoms at an off-site landfill as approved by the IEMB. The waste was generated because of clean-up operations at the abandoned refinery site.

In 1981, Cities disposed of approximately 425,000 gallons of opaque water and oil emulsion from an unspecified location at the Former Refinery at an off-site landfill as approved by the IEMB.

In 1984, Cities disposed of approximately 1,700 cubic yards of oil-saturated soil from the CITGO Terminal at an off-site landfill.

In 1982 or 1983, Cities disposed of approximately 3,700 cubic yards of API separator sludge (K052) at an off-site landfill as approved by the IEMB. It appears that the sludge was classified as K052 because this may have been the first cleaning of the oil/water separator following the discontinuation of the refinery operations.

Periodically, the CITGO Terminal has generated scrap metal when bulk storage tanks are removed from service and disassembled. Currently, the CITGO Terminal transports tank bottoms and tank cleaning materials to an approved offsite recycler. In the past, hazardous waste containers were placed on a concrete pad located just west of the Quonset Building located due north of Tank No. 22. Containers holding hazardous waste have not been accumulated at the CITGO Terminal since 2006. Historically, the CITGO Terminal also has generated D008 and D002 waste streams. Other wastes generated at the Terminal include general office refuse and universal wastes (light bulbs). Previously, used oil was generated at the Terminal. In addition, blasting grit is periodically generated because of tank cleaning or maintenance activities.

e. RCRA Regulatory History

Cities submitted a Notification of Hazardous Waste Activity Form as a generator of hazardous waste on August 18, 1980. This notification listed Cities' waste as ignitable and toxic. Subsequent manifests coded the waste as D001 and D008 (lead).

On November 19, 1980, Cities submitted another Notification of Hazardous Waste Activity Form, amending its original notification to indicate that the combined property was storing waste for greater than 90 days. When the original notification was submitted, Cities planned to have already closed Tank No. 195, which contained 149,000 gallons of oil and water emulsion waste (D001 and D008). By November 19, 1980, the tank had not been closed, and Cities applied for interim status as a storage facility by submitting a Part A Permit Application for the storage of waste contained in this tank.

In March 1981, EPA inspectors conducted a RCRA compliance inspection of Cities as a generator of hazardous waste. No major violations were discovered in the inspection. In May 1981, after reviewing the inspection report, EPA determined that Cities would no longer operate as a treatment, storage, and disposal (TSD) facility. On March 18, 1983, CITGO took over operations of the terminal portion. CITGO submitted a Notification of Hazardous Waste Activity Form on November 28, 1983, as a generator of hazardous waste.

In November 1981, Cities initiated closure of Tank No. 195. In June 1982, Cities sent a detailed history of Tank No. 195 and its removal to EPA, stating that Tank No. 195 was no longer needed to store hazardous waste. Subsequently, CITGO submitted a letter to EPA requesting closure of the tank and indicated that the CITGO Terminal would remain a generator of hazardous waste.

In April 1985, ISBH performed a closure inspection of the area where Tank No. 195 had been placed. The ISBH inspector found no remaining signs of the tank, as well as no signs of soil stains. The ISBH inspector requested that CITGO submit a new closure plan to ISBH.

In June 1985, ISBH issued a Notice of Violation to Cities citing the alleged closure of Tank No. 195 and disposal of waste from the tank. Although the CITGO Terminal was CITGO at the time, Cities was still in existence as a subsidiary of OXY and responded by letter to IDEM detailing how the tank closure was performed. The closure steps included disposal of the waste material from Tank No. 195. On October 15, 1986, IDEM sent a Closure of Tank Storage/Notice of Compliance letter to Cities and CITGO indicating no further action was warranted and that tank storage of hazardous materials no longer applies to the overall property.

f. Other Permitted Activities

Air Permits:

Both the City of East Chicago and the State of Indiana require permits at the CITGO Terminal for air emissions from the storage tanks. All the tanks containing gasoline have internal floating roofs with a primary seal; some have a secondary seal as well. Distillate tanks have conical roofs to help control air emissions. The City of East Chicago issued a permit for each of the 58 tanks; IDEM issued one permit for all the tanks. The truck loading rack is also permitted by the City of East

Chicago for possible air emissions. Each year, CITGO calculates its emissions to air as part of the City of East Chicago permit requirements.

1. Registration and Operation Status issued on January 9, 1990.
2. Operation Permit, Control No. 20811, Identification Number 45-11-93-0592 issued on March 28, 1990.
3. Part 70 Operating Permit T089-7566-00307 issued on December 31, 1998 and subsequent renewals/modifications.

Wastewater Permits:

A former NPDES permit (No. IN 0000 159) allowed the CITGO Terminal to discharge water from the oil/water separator into the Grand Calumet River. Under the NPDES permit requirements, CITGO samples the effluent on a monthly basis and reports the results in discharge monitoring reports to the IDEM. General NDPES permit (No. ING340009) for discharges from petroleum products terminals for the CITGO Terminal supersedes the former individual NPDES permit.

g. Access or Physical Constraints

Access may be obtained through coordination with the CITGO Terminal project manager.

h. Other

There does not appear to be any other information, reports, or agreements [e.g., Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or state cleanup actions] related to the characteristics and history of the CITGO Terminal that are not covered under the above headings. This section may be amended in the future if additional information, reports, or agreements become available.

III. Conceptual Site Model

The following section outlines the Baseline Conceptual (CSM), based on the information provided in the Investigation Results Report – Phase I dated October 31, 2019.

a. Current and Future Site Land Use

Current Land Use: Industrial
Projected Future Land Use: Industrial

b. Current and Future Surrounding Property Land Use

The current and future land use surrounding the property includes mixed residential, commercial, industrial with limited recreational usage.

c. Sources and Extent of Known Contamination

Sources of contamination could include former petroleum refinery related operations and current petroleum terminal related operations. Previous investigations have identified the presence of select volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals. Sufficient data is not currently available to conclusively determine the extent of contamination. The extent of impacts of VOCs, SVOCs, 1,4-dioxane, and metals in soil and groundwater will be confirmed in subsequent phases of the RFI.

d. Contamination Transport/Migration Pathways

Contaminant transport and migration pathways include the following:

- Hydrocarbon migration through the subsurface to groundwater
- Groundwater to surface water (Grand Calumet River)
- Hydrocarbon vapor intrusion potential

e. Geology

Phase I investigation results, historical stratigraphic logs, and soil particle size analysis identify values characteristic of silty sand across both the CITGO Terminal and Former Refinery. Baseline stratigraphy is as follows:

- Shallow Fill: 0-2 feet bgs
- Silty Sand (SP-SM): 0-35 feet bgs
- Clay confining layer at 35 feet bgs

f. Hydrogeology

Phase I investigation results and historical investigations on both the CITGO Terminal and Former Refinery properties, support the following:

- Unconfined water table is generally present from approximately 1.5 to 5.5 feet bgs
- Subsurface utilities are present at the Facility
- Groundwater flow is generally to the south, however, the shallow water levels measured from historical wells were generally limited to select areas of the Facility. Shallow water levels were obtained from the hydraulic profiling tool (HPT) data collected during the Phase I investigation.
- Groundwater flow velocity has been calculated at the Facility ranging from 0.01 to 0.055 feet/day; based on hydraulic conductivity (K) values ranging from 0.947 to 2.49 feet/day, hydraulic gradient (i) with average values ranging from 0.0028 to 0.0044 foot/foot, and porosity values ranging from 20% to 25% (based on assumed typical average porosities of the unconfined aquifer)

Groundwater flow direction is to be confirmed in subsequent phases of the RFI.

g. Exposure Receptors

Potential on-site exposure receptors include:

- Routine workers
- Maintenance or construction workers
- Trespassers

Potential off-site exposure receptors include:

- Routine workers
- Maintenance or construction workers
- Trespassers
- Residential

Potential off-site ecological receptors include:

- Natural area to the south
- Grand Calumet River

Exposure point and exposure mediums include:

- Surface soil
- Subsurface soil
- Groundwater
- Indoor air

h. Exposure Routes

Potential exposure routes include:

- Soil dermal direct contact
- Soil or groundwater ingestion
- Soil vapor inhalation from contaminated soil or groundwater
- Inhalation of fugitive dust

It is noted that institutional or engineering controls will be employed to prevent exposure by any of these potential exposure routes, and that none of these pathways have been confirmed to exist as of this date but will continue to be investigated as part of the RFI.

i. Discussion of Unknowns and Uncertainty

The delineation of Constituents of Potential Concern (COPCs) is currently unknown and ongoing. Historical data and knowledge are being used to design a biased sampling plan for the CITGO Terminal.

The current COPCs, as supported by historical investigations, for soil and groundwater are as follows:

- Target compound list (TCL) VOCs (Method 8260),
- TCL SVOCs (Method 8270),
- Target analyte list (TAL) metals (Method 6010/7470), and
- 1,4-dioxane

IV. RFI

a. Objectives of the Investigation

Scope and objectives of the investigation include characterization of the nature and extent of any releases of hazardous waste and hazardous constituents at or from the facility that may pose an unacceptable risk to human health and the environment. The RFI will be completed in a phased approach.

CITGO and OXY may coordinate efforts to increase efficiency and avoid duplication for elements of the corrective action of relevance to both parties. CITGO and OXY are proceeding under separate AOCs and CAFs for their respective portions of the property that was once owned by Cities.

b. Work Performed

CITGO and OXY jointly conducted a soil and groundwater screening investigation as set forth in the Site Perimeter Screening Investigation Work Plan dated April 5, 2019 (approved by EPA). The investigation utilized real-time field screening technologies designed to qualitatively detect polycyclic aromatic hydrocarbons (PAHs) and VOCs, using laser-induced fluorescence (LIF) and membrane interface probe (MIP). The Phase I screening investigation was conducted in May 2019, however due to unforeseen circumstances, (such as weather, access restrictions, equipment limitations, and safety concerns) the full scope was not completed. In August 2019, CITGO and OXY jointly conducted a supplemental screening investigation.

On September 24, 2019, CITGO and OXY met with EPA to present the Phase I results.

On October 31, 2019, CITGO and OXY submitted the Investigation Results Report – Phase I. The Phase I investigation was completed in accordance with the EPA-approved Work Plan. The Phase I investigation results allowed for the completion of the Baseline CSM and will be utilized to identify additional investigation activities (Phase II). Refer to the Investigation Results Report – Phase I for details on the Phase I methodology, results, and the Baseline CSM.

c. RFI Work Plan (including Sampling & Analysis Plan and Quality Assurance Project Plan)

Using the Phase I investigation, and historical investigation activities as a basis, the Respondent submitted an RFI Work Plan to EPA on February 24, 2020 for review and

approval. The RFI Work Plan (including sampling locations, vertical extent of sampling, density of sampling, and screening data), shall be reviewed and approved by EPA consistent with the approved CAF systematic planning process.

The soil and groundwater sampling design and procedures shall be consistent with applicable guidance, including but not limited to: Soil Screening Guidance (EPA 1996, 2002); Guidance on Choosing a Sampling Design for Environmental Data Collection (EPA 2002); and Incremental Sampling Methodology [Interstate Technology Regulatory Council (ITRC) 2012]. Sample analysis must include the COPCs identified in Section IV(f). Contaminants of concern found above EPA-approved screening criteria must be fully delineated unless the parties agree otherwise.

Vapor intrusion will be assessed in areas of existing regularly occupied buildings. For the purposes of evaluating and addressing the vapor intrusion to the indoor air inhalation pathway in connection with any release of petroleum, the process outlined in the ITRC Petroleum Vapor Intrusion Guidance Document (PVI-1, Oct 14) will be followed.

Additional phases of the RFI may be required to:

(1) Describe the nature and extent of any releases of hazardous waste and hazardous constituents at or from the CITGO Terminal
(2) Explain whether each release poses an unacceptable risk to human health and the environment
(3) Provide the basis for those conclusions, including an evaluation of the risks; and
(4) Provide a basis for developing the final corrective measures for the CITGO Terminal

Additional phases may include a subsequent off-site groundwater investigation, if needed. Subsequent sampling locations, vertical extent of sampling, and density of screening data shall be reviewed and approved by EPA consistent with the approved CAF systematic planning process.

Sampling and Analysis Plan:

To support the several stages of the investigation, Respondent will develop a Sampling and Analysis Plan (SAP). Unless the parties agree otherwise, the SAP will include procedures to assure quality data is gathered in all stages of the corrective action, including real-time field screening technologies, and more conventional soil and groundwater sampling and analytical techniques. The SAP is included as Appendix A to the RFI Work Plan, dated February 24, 2020.

Quality Assurance Project Plan:

Respondent will consider EPA's Data Quality Objectives Process to develop reliable data to determine the nature and extent of any soil and groundwater contamination when preparing the SAP. See Guidance for the Data Quality Objectives Process (EPA 1994).

The Quality Assurance Project Plan (QAPP) is included as Appendix B to the RFI Work Plan, dated February 24, 2020. The QAPP addresses sample analysis and data handling regarding the Work under corrective action orders, establishing Data Quality Objectives and Standard Operating Procedures to be employed during the investigation. The QAPP must include a detailed explanation of Respondent quality assurance, quality control, and chain of custody procedures for all sampling, monitoring, and analytical activities. The QAPP may be supplemented to address subsequent phases of sampling.

The QAPP will be developed consistent with "EPA Requirements for Quality Assurance Project Plans," QA/R-5, EPA/240/B-01/003 (Mar. 2001, reissued May 2006), "Guidance for Quality Assurance Project Plans," QA/G-5, EPA/240/R 02/009, (Dec. 2002), and "Uniform Federal Policy for Quality Assurance Project Plans," Parts 1-3, EPA/505/B-04/900A though 900C (Mar. 2005), or other applicable guidance as the parties agree. The QAPP must be reviewed and revised by Respondent, at a frequency of no less than five years, and updated as needed to reflect changes in project personnel and scope.

The SAP and the QAPP shall be reviewed and approved by EPA consistent with the approved CAF systematic planning process.

Field activities will begin within 60 days of EPA approval of the RFI Work Plan.

Once the Site has been sufficiently characterized to identify the nature and extent of contamination at or from the Facility that may pose an unacceptable risk to human health and the environment (including evaluation of potential cross-media contamination), an RFI report will be prepared and submitted to EPA for review and approval no later than October 1, 2021 (unless EPA agrees to extend that deadline). The RFI report will describe the nature and extent of any releases of hazardous waste and hazardous constituents at or from the Facility that do or do not pose an unacceptable risk to human health and the environment, and provide the basis for those conclusions, including an evaluation of the risks. The investigation shall include a consensus driven balance between qualitative and quantitative high-resolution investigation techniques. The investigation may proceed in phases, as appropriate, to provide timely support for any interim corrective measures the Respondent may elect to perform.

d. Screening Levels

The RFI investigation will include sampling sufficient to define the vertical and horizontal extent of COPC-impacted soil and groundwater to the 2019 IDEM screening and closure tables, which are based on the 2018 EPA Regional Screening Levels (RSLs) (residential at property boundary and industrial at the CITGO Terminal). For chemicals with maximum contaminant levels (MCLs), they will be used in lieu of IDEM screening levels for drinking water. COPC impacts will be delineated to residential land use criteria at the property boundary, but any corrective actions will consider actual land use (i.e., industrial, on site) and may incorporate institutional/engineering controls to eliminate potential exposure pathways.

IDEM published background levels for metals may be used to segregate CITGO Terminal-related risk from background risk.

e. Adaptive Approach

An adaptive approach should be used in the RFI Work Plan to identify flexible and adaptable sampling approaches (e.g., iterative sampling) that could improve the efficiency and timeliness of the investigation by reducing the number of field mobilizations and/or exchanges between parties during phases of the investigation (dynamic strategies and high resolution). Decisions on the need for further data collection will be made by professional judgment based on the quantitative and qualitative evaluation results, and in consultation with EPA.

f. Sampling Analysis

Characterization will include analysis for the following COPCs: Initial screening will include TCL VOCs (Method 8260), TCL SVOCs (Method 8270), TAL metals (Method 6010/7470) and 1,4-dioxane. The COPCs may be reduced during subsequent phases of the RFI, as agreed to by the parties.

g. Modeling

Risk assessment models may be used, if appropriate, based on CITGO Terminal conditions. The type of modeling, assumptions, and use of models will be discussed with the EPA.

h. CSM

Using all sampling data from the CITGO Terminal and informed by information about historical operations and physical setting of the CITGO Terminal, Respondent will create and maintain a project lifecycle CSM. EPA's systematic planning process - the Environmental Cleanup Best Management Practices: Effective Use of the Project Life Cycle Conceptual Site Model (EPA 2011) shall be considered in the preparation of the CSM. A Baseline CSM was included in the Investigation Results Report – Phase I dated October 31, 2019, and will be updated following subsequent phases of the RFI.

The CSM will identify all locations at the CITGO Terminal for which Respondent knows of present or past treatment, storage, disposal, or management of hazardous waste or hazardous constituents and describe the current conditions at said locations. The CSM must include a data management and visualization plan. Respondent will update the CSM regularly to reflect additional data collection. CSM updates may be completed utilizing the RCRA First Tool 5: Conceptual Site Model Iterative Evaluation/Update Tool.

After each stage of data collection, EPA will discuss with Respondent whether the following Environmental Indicators have been achieved, and if not, what measures may be appropriate to achieve these benchmarks:

- All current human exposures to contamination at or from the CITGO Terminal are under control. That is, there are no significant or unacceptable exposures for any media known or reasonably suspected to be contaminated with hazardous wastes or hazardous constituents above risk-based levels and for which there are complete pathways between contamination and human receptors.

- Migration of contaminated groundwater at or from the CITGO Terminal is stabilized, that is, the migration of all groundwater known or reasonably suspected to be contaminated with hazardous wastes or hazardous constituents above acceptable levels is stabilized to remain within any existing areas of contamination as defined by monitoring locations designated at the time of the demonstration. In addition, any discharge of groundwater to surface water is either insignificant or currently acceptable according to an appropriate interim assessment.

The parties will work together consistent with the approved CAF systematic planning process to demonstrate and document achievement of these Environmental Indicators as promptly as possible.

i. Risk Assessment

All Work Plans for each stage of the investigation must identify or reference CAF-approved risk screening criteria appropriate for current and potential future use scenarios. The CITGO Terminal will be evaluated for commercial/industrial use, although some neighboring areas beyond the perimeter are residential. Each step of the investigation must evaluate releases for their potential to pose unacceptable risk to human health and the environment. Risk assessment approaches will be part of the parties' initial discussions at each stage of the process.

Any risk assessments must estimate human health and ecological risk under reasonable maximum exposure for both current and reasonably expected future land use scenarios. In conducting the risk assessments, Respondent will consider the Risk Assessment Guidance for Superfund (RAGS) or other appropriate EPA guidance. Respondent will use appropriate conservative screening values when screening to determine whether further investigation is required. Appropriate screening values, which will be determined by EPA after consultation between EPA, OXY, and Respondent, may include those derived from Federal MCLs, EPA RSLs for Chemical Contaminants, EPA Region 5 Ecological Screening Levels, RAGS, OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air Publication 9200.2-154, Indiana screening levels, and EPA technical documents and tools.

If volatile or semi-volatile organic compounds discovered in soil or groundwater exceed the 2019 IDEM screening and closure tables values in locations with regularly occupied buildings, Respondent must also submit a vapor intrusion investigation work plan for EPA review and approval. Soil, groundwater, and non-aqueous phase liquid (NAPL) vapor intrusion will be assessed using the OSWER June 2015 VI Guidance 9200.2-154

and Documentation for EPA's Implementation of the Johnson and Ettinger Model to Evaluate Site Specific Vapor Intrusion into Buildings, version 6.0, September 2017. For the purposes of evaluating and addressing the vapor intrusion to the indoor air inhalation pathway in connection with any release of petroleum, the process outlined in the ITRC Petroleum Vapor Intrusion Guidance Document (PVI-1, Oct 14) may be followed. Occupational exposure limits will be used to assess on-CITGO Terminal worker exposures which are subject to Occupational Safety and Health Administration (OSHA) regulations. RME risk estimates will be used for off-CITGO Terminal exposures. They will also be developed for future on-CITGO Terminal worker exposures to evaluate vapor intrusion risks in the hypothetical scenario in which the CITGO Terminal is no longer subject to OSHA regulation. If and when Respondent first receives verified data showing an exceedance, it will promptly notify EPA, and within 60 days of that notice, the project managers and other appropriate persons will meet to discuss the scope, expectations, timing, and objectives for the Vapor Intrusion Investigation work plan. These discussions will consider current and reasonably anticipated future uses of property potentially requiring assessment and management of potential vapor intrusion issues.

j. Use of Historical and Third-Party Site Data

No third-party data has been agreed to be used as part of the CITGO Terminal characterization activities.

k. Health and Safety Plan

A site-specific Health and Safety Plan (HASP) has been prepared for the CITGO Terminal. This HASP is followed in conjunction with CITGO Terminal safety procedures including its work permit program. No work is performed within the CITGO Terminal without written authorization from CITGO personnel.

l. Community Involvement and Environmental Justice

The Respondent has established a public repository at the public library located at 2401 East Columbus Drive, East Chicago, Indiana for information regarding site activities, and conduct public outreach and involvement activities. Information can also be found on the public EPA webpage at: https://www.epa.gov/hwcorrectiveactionsites/hazardous-waste-cleanup-former-cities-service-refinery-east-chicago-indiana.

m. Administrative Requirements

Respondent will provide quarterly progress reports to EPA by the fifteenth day of the month after the end of each quarter. The report will list work performed to date, data collected, problems encountered, any community involvement, project schedule, and percent project completed.

The parties will communicate frequently and in good faith and will meet (either by phone or in-person) on at least a semi-annual basis to discuss the work proposed and performed as part of the RFI.

Respondent will consider green remediation best management practices when developing remediation plans and activities. Respondent will document such consideration in reports, documentation, and plans Respondent submits to EPA. This includes, but is not limited to, consideration of green remediation practices for site investigation, excavation, and surface restoration, integrating renewable energy into site cleanup, soil vapor extraction and air sparging, pump and treat technologies, landfill cover, and energy production activities, as applicable.

Respondent will consider job creation, both temporary and permanent, when developing remediation plans and activities. Respondent will report on number and types of jobs created in reports, documentation, and plans Respondent submits to EPA.

n. RFI Schedule

April 5, 2019: The Phase I Screening Investigation Work Plan was submitted to EPA and was subsequently approved.

May 2019: Phase I Screening Investigation Field activities were completed. The full scope of work was not completed during this field mobilization.

August 2019: Supplemental Phase I Screening Investigation Field activities were completed.

September 24, 2019: CITGO, OXY, and EPA project managers met to discuss the results of the Phase I Soil and Groundwater Screening Investigation.

October 31, 2019: CITGO and OXY submitted a data report for the Phase I screening investigation activities, including a Baseline CSM.

February 24, 2020: CITGO submitted an RFI Work Plan, including a SAP and QAPP, for EPA review and approval.

Within 45 days of the effective date of the order, CITGO and EPA project managers will meet to discuss the expectations, level of detail, timing, and objectives for the CAF and provide to EPA for review and approval a draft CAF. A conference call between CITGO and EPA was held on March 12, 2020.

Within 60 days of EPA approval of the Work Plan RFI field activities begin.

By no later than October 1, 2021: Provide an investigation report to EPA for review and approval (unless EPA agrees to extend that deadline) to describe the nature and extent of any releases of hazardous waste and hazardous constituents at or from the Facility that do or do not pose an unacceptable risk to human health and the environment, and provide the basis for those conclusions, including an evaluation of the risks.

This CAF will be revised considering new information or data, to reflect the progress of the work, and if subsequent phases of the RFI are required to provide timely support for any interim corrective measures the Respondent may elect to perform. Subsequent proposed phases shall be reviewed and approved by EPA consistent with the approved CAF systematic planning process.

V. Interim Measures

Previous interim measures have been described in Section II above. No additional interim measures are identified at this time but may be implemented with EPA consent if deemed necessary.

Respondent may propose to conduct interim corrective measures in advance of the final corrective measures. Interim corrective measures may include, but are not limited to, measures necessary to control human exposures to contamination or to stabilize the migration necessary to control current human exposures to contamination or to stabilize the migration of contaminated groundwater. At least 90 days prior to commencing any proposed interim corrective measures, Respondent must submit a work plan and a project schedule for EPA review and approval. The EPA Project Manager(s) will determine whether any public participation activities are appropriate prior to acting on the request for approval.

VI. Goals and Expectations

Prior to and during the CAF meeting, EPA and CITGO identified the following goals and expectations.

a. Land Use/Reasonably Expected Future Use in Relation to Characterization and Remediation

Future on-site land use expected to be limited to prohibit residential use as defined by Indiana law. An environmental covenant will be executed to ensure non-residential future use.

b. Existing Background Conditions and Consideration in RFI

Background metal characterization or use of metals background data approved by IDEM may be used in the RFI.

c. Use of Historical and Third-Party Site Data

Existing data from previous investigations may be used for site characterization in the RFI. EPA will consider environmental data collected from adjacent property owned or leased by third parties.

d. Groundwater Use/Process for Addressing Groundwater Contamination, including State, Federal, and Local Requirements

No drinking water wells are present on the CITGO Terminal. Additionally, no drinking water wells were identified within a 1-mile radius of the CITGO Terminal. The RFI and any corrective measures will consider actual and potential future groundwater use in the area including, but not limited to, off-site sources of contamination and local use restrictions. At present, the City of East Chicago does not have an existing environmental ordinance prohibiting the use of groundwater as potable. An environmental covenant will be executed prohibiting the use of groundwater as a potable source.

e. Vapor Intrusion

Vapor intrusion will be evaluated for existing regularly occupied buildings. Vapor intrusion will not be assessed in areas without regularly occupied buildings.

In the future, should regularly occupied buildings be proposed, either a vapor intrusion assessment will be completed, or engineering controls will be installed assuming a vapor intrusion issue will be present.

Soil, groundwater, and NAPL vapor intrusion will be assessed using the OSWER June 2015 VI Guidance 9200.2-154 guidance document and Documentation for EPA's Implementation of the Johnson and Ettinger Model to Evaluate Site Specific Vapor Intrusion into Buildings, version 6.0, September 2017. Occupational exposure limits will be used to assess worker exposures that are subject to OSHA regulation. RME risk estimates will be used for off-CITGO Terminal exposures. They may also be developed for future on-CITGO Terminal worker exposures to evaluate vapor intrusion risks in the hypothetical scenario in which the CITGO Terminal is no longer subject to OSHA regulation.

Soil, groundwater, and NAPL vapor intrusion from petroleum hydrocarbons will be assessed using the process outlined in the ITRC Petroleum Vapor Intrusion Guidance Document (PVI-1, Oct 14).

f. Ecological Assessment

Currently no habitat is present at the CITGO Terminal; therefore, no ecological assessment is required.

g. Coordination with Other Programs

Corrective action will be coordinated with IDEM, as necessary.

h. Risk Range Issues (Target Cancer Risk and Non-Cancer Hazard Index)

Off-site risk assessments will be based on a cumulative cancer risk of 1E-4 to 1E-6 and a non-cancer hazard index of 1. On-site risk assessments will be based on a cumulative cancer risk of 1E-4 and a non-cancer hazard index of 1.

i. Expected Process for Addressing Remediation

The RFI will include an investigation to sufficiently characterize source areas of contamination including NAPL.

j. Source Removal vs. Source Control (Containment)

Source removal versus source control will depend on locations of impacts and the collection of additional data. Source areas which contribute to ongoing groundwater contamination may be removed or remediated. Off-site contamination in soil above residential risk criteria may be removed to the extent feasible.

k. Use of Institutional Controls and/or Engineering Barriers

Institutional controls and engineered barriers may be used to prevent exposure. Institutional controls may include soil management plans for areas above industrial risk criteria. Pathway elimination approach (environmental restrictive covenant) is likely to be employed to address prohibitions on potable use of groundwater and future non-residential uses. Institutional controls and engineered barriers will comply with IDEM regulations.

l. Format for Data/Information Exchange/Submissions

EPA believes electronic submittals will be sufficient for purposes of review. Report copies can be submitted in electronic format via electronic mail, on USB Flash Drives or can be uploaded to a document sharing website created by Respondent. If any deliverables include maps, drawings, or other exhibits that are larger than 8.5 inches by 11 inches, Respondent shall also provide EPA with paper copies of such exhibits. Routine correspondence between technical experts can be accomplished via electronic mail. The Respondent has established a public repository at the public library located at 2401 East Columbus Drive, East Chicago, Indiana for information regarding site activities, and conduct public outreach and involvement activities. Information can also be found on the public EPA webpage at: https://www.epa.gov/hwcorrectiveactionsites/hazardous-waste-cleanup-former-cities-service-refinery-east-chicago-indiana.

Source: NAIP 2016.

0 300 600ft

Coordinate System:
IN83-WF

LEGEND

CITGO TERMINAL (228.5 ACRES)
FORMER REFINERY (93.2 ACRES)

GHD

CITGO TERMINAL
EAST CHICAGO, INDIANA

11194478-00

May 27, 2019

FACILITY LOCATIONS

FIGURE 1

CAD File: P:\drawings\11194000s\11194478\11194478-PRES\11194478-00(PRES002)\11194478-00(PRES002)GN\11194478-00(PRES002)GN-WA001.DWG

SOLID WASTE MANAGEMENT UNITS (SWMU)
1. OIL-WATER SEPARATOR
2. FORMER TANK NO. 195
3. FORMER TANK NO. 88

AREAS OF CONCERN (AOC)
1. FORMER OIL-SATURATED SOIL AREA (OSS)
2. FORMER ASBESTOS-CONTAMINATED SOIL AREA

NOTE: FORMER ASBESTOS-CONTAMINATED SOIL AREA NOT IDENTIFIED (AOC 2)

DRAFT FOR REVIEW

Source: NAIP 2016.

0 300 600ft

Coordinate System: IN83-WF

LEGEND

CITGO TERMINAL (228.5 ACRES)
FORMER REFINERY (93.2 ACRES)
1 SWMU
1 AOC

GHD

CITGO TERMINAL
EAST CHICAGO, INDIANA

11194478-00
May 29, 2019

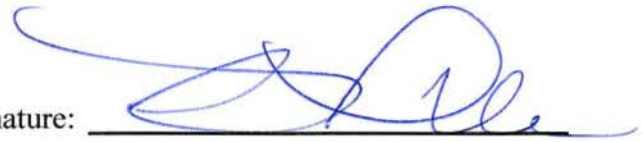
SWMU/AOC LOCATIONS

FIGURE 2

CAD File: P:\drawings\11194000s\11194478\11194478-PRES\11194478-00(PRES002)\11194478-00(PRES002)GN\11194478-00(PRES002)GN-WA002.DWG

DOCUMENT CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: 

Name: Scott Buckner

Title: EHSS Manager

Date: 5/28/2020