

Marathon Petroleum Company LP

**Sewer Vapor Investigation Work
Plan**

Marathon Petroleum Company LP
Michigan Refining Division

February 2011



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**Sewer Vapor Investigation
Work Plan**

Michigan Refining Division

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1. Introduction

On behalf of the Marathon Petroleum Company (MPC) LP's Michigan Refining Division (MRD), ARCADIS has prepared this Sewer Vapor Investigation Work Plan (Work Plan) to evaluate the potential movement of benzene vapors and other volatile organic compounds (VOCs), such as toluene, ethylbenzene, and xylene, through the existing City of Detroit Water and Sewerage Department (DWSD) sewer lines and connections to residential dwellings served by the DWSD sewer. The U.S. Environmental Protection Agency (USEPA) has requested that MRD evaluate potential vapor intrusion into the nearby neighborhood including residential homes as well as the potential for

vapors to migrate upstream within the DWSD sewer lines. A detailed Work Plan for conducting the residential connection investigation and the DWSD sewer line investigation is presented in the sections below.

The Objectives of this investigation are to:

- Ensure the safety of the local residents, employees and contractors involved in the investigation
- Develop and manage a coordinated effort in the investigation activities
- Establish and unified command structure
- Implement the agreed upon a work plan
- Provide communications to agencies and residents

2. Background

MRD discharges pre-treated effluent into the DWSD sewer lines under an industrial pre-treatment permit (# 074-27370-IU) issued by DWSD (the Permit). This discharge has been on-going since the 1950s. MRD monitors certain parameters of the effluent in accordance with the monitoring requirements of the Permit. These parameters include pH, flow rate, Total Suspended Solids (TSS), Biochemical Oxygen Demand (BOD), ammonia, selected phenols, selected metals, and fats/oil/grease. In addition, the refinery monitors benzene concentrations in its effluent in accordance with Benzene Waste Operations National Emissions Standards for Hazardous Air Pollutants (NESHAPs). Weekly sampling results are reported to USEPA on a quarterly basis.

MRD has been actively working with USEPA, Michigan Department of Natural Resources and the Environment (MDNRE), and the DWSD to address complaints related to potential movement of vapors from the DWSD sewer lines into nearby homes. On January 19, 2011, USEPA monitoring of the DWSD sewer lines found benzene levels between 1 and 13 parts per million (ppm) from the intersection of Pleasant and Liebold Street to the Fort Street outfall. The week of January 20, 2011, MRD conducted its own monitoring of benzene concentrations in the DWSD sewer lines using an UltraRAE 3000. The UltraRAE is a portable Photoionization Detector (PID) capable of detecting VOCs from 0.05 ppm to 10,000 ppm and benzene from 0.05 ppm to 200 ppm.

MRD conducted an interview and sewer inspection at 12516 Pleasant Street on January 13. During this visit, a camera was snaked down the sewer line and based on

the lack of any trap, sewer plugs were installed. On January 24, MRD and USEPA set 24-hour Summa canisters within the basement at this residence to evaluate chemical specific concentrations. These sampling events found benzene levels between 8.6 and 12 ppb in the basement of the home on Pleasant Street. USEPA and MRD discussed the results with the residents of 12516 Pleasant Street on January 28 and continue to work with them.

MRD conducted an interview and sewer inspection at 779 Patricia Street on February 1. During the visit, a camera was snaked down the three basement drains. All drains had the proper traps; however, one of the traps was dry. MRD flushed the sewer line with water to establish the proper water seal. The residents were informed of the results and told that they may want to add water to the drains periodically to ensure a proper trap is maintained. AreaRAE and UltraRAE monitoring results showed no indications of sewer gases or VOCs in their home. The AreaRAE and UltraRAE detection limits for VOC are 0.1 ppm and 0.05 ppm, respectively.

3. Residential Home Evaluation

A step-wise approach has been developed to evaluate potential migration of vapors from DWSD sewer lines into the remaining residential homes on Liebold and Pleasant Avenues (Figure 2). As outlined below and in Section 3.1 and 3.2, the step-wise approach starts with a request to sign a License for Access to Property.

The License for Access to Property is a written agreement allowing MRD and its contractors' access to the residence in order to conduct the evaluation. If the License for Access to Property is granted by the property owner, then MPC will schedule and initiate the home inspections. As stated in the License for Access, MPC will schedule home inspection and repair activities at least three days in advance of entering the property. A flow chart illustrating the approach below is provided as Figures 1a and 1b and included in Sections 3.1 and 3.2.

If a License for Access to Property is not granted by the resident, MPC will notify MDNRE and USEPA of the resident's decision and no further action will be initiated.

3.1 Sewer Connection Inspections

To start the evaluation of residential homes the following steps will be followed.

1. Interviews will be conducted with residents regarding hydrocarbon odors in the residence. As part of the interview, MRD will request written access for a

licensed plumber to conduct a sewer and drain inspection to evaluate if there is a functional p-trap that can maintain a water seal.

- Under City of Detroit Ordinance Section 9-1-443 a resident's sewer lines are required to be free of "defects, leaks and obstructions". Typically, households that drain water and waste water are required to have a p-trap comprised of a tailpiece, the curved trap piece, and a drain elbow. The p-trap has a water seal along the curve of the trap. The seal prevents vapors from flowing from the sewer line through the sewer connection.
 - The sewer connection inspection will focus on ensuring that the p-trap and water seal are operational and can prevent vapors from flowing into the residence.
 - The inspection will be conducted at no cost to the residents, and a written report will be provided to the resident describing the inspection findings within three days.
2. During the sewer connection inspection, indoor air concentrations of benzene will be investigated using the UltraRAE 3000; concentrations of VOCs will be evaluated using an AreaRAE.
 3. Depending on the findings of the P-Trap inspection and the monitoring results, the following actions will be taken. See Figures 1a and 1b.
 - If a working p-trap is present, and VOCs or benzene are not detected above background with the AreaRAE or UltraRAE, no further action will be taken.
 - If a working p-trap is present, yet VOCs or benzene are detected above background with the UltraRAE or AreaRAE, the source is likely not the sewer. MRD will assess the area for VOC containing materials, remove them and ventilate the area, if possible. MPC will then conduct Summa canister sampling (6 liter, 24-hour) after flushing and re-sealing the sewer drain. If benzene or VOCs are still detected above background, MRD will provide information to the resident on potential background sources.
 - If a working p-trap is not present, and VOCs or benzene are not detected above background with the UltraRAE or AreaRAE, MRD will collect an indoor air sample using Summa canisters (6 liter, 24-hour). MRD will consult with the Detroit Department of Health and Wellness (DHWP) concerning the results of the survey. After the collection of the indoor air sample, MRD will work with the residents to permanently seal or repair the sewer connection. Within three days of fixing the sewer connection, MRD

will contact the residents to conduct follow-up Summa canister sampling (6 liter, 24-hour) per Section 3.2 to confirm that benzene and VOCs are still not present.

- If a working p-trap is not present, and VOCs or benzene are detected above background with the UltraRAE or AreaRAE, MRD will consult with the DHWP regarding a possible recommendation that the residents temporarily leave the home. Based upon such consultation, DHWP and MRD may jointly recommend such action for the residents with MRD assistance. MRD will access the area for VOC containing materials, remove them and ventilate the area, if possible. MRD will conduct Summa canister (6-liter, 24-hour) sampling prior to initiating repair. MRD will work with the residents to permanently seal or repair the sewer connection. Within three days of fixing the sewer connection, MRD will contact the residents to conduct follow-up Summa canister sampling (6 liter, 24-hour) per Section 3.2. If benzene and VOCs continue to be detected both in the floor drain and in basement air, MRD will re-evaluate the sewer connection.

3.2 Indoor Air and Sewer Connection Sampling

Indoor Air Sampling

- Summa Canister
 - All samples will be collected in 6-liter Summa canisters with attached pre-set flow regulators to allow the sample to be taken for a 24-hour period.
 - The Summa canister will be placed at the breathing height (4 to 5 feet) in the approximate center of the room, both pre and post repair, where the sewer drain is located. In the event that there are numerous sewer drains, the sample will be taken in the room of the uncontrolled sewer line closest to the main trunk line.
 - The Summa canisters will be checked, if possible, at least once during a 24-hour sampling process in order to note progress on the sampling log.
 - **For all samples, the valve on the Summa canister will be closed when approximately 5 inches of Hg vacuum remains in the canister. Leaving a vacuum in the canister is a means for the laboratory to verify the canister does not leak while in transit.**

- Samples will be submitted under chain of custody protocols to an MPC approved laboratory for analysis of benzene and other VOCs in accordance with USEPA Method TO-15.
- UltraRAE 3000
 - The UltraRAE 3000 will be calibrated at the start of each day that sampling will be conducted.
 - The UltraRAE 3000 will be bump checked in the upstairs of the residence near an exterior door before and after sampling to ensure the monitor is functioning accurately.
 - The UltraRAE 3000 sample will be obtained at the breathing height (4 to 5 feet) in the approximate center of the room where each sewer drain is located.
- AreaRAE
 - The AreaRAE will be calibrated at the start of each day that sampling will be conducted.
 - The AreaRAE sample will be obtained at the breathing height (4 to 5 feet) in the approximate center of the room where each sewer drain is located.

Sewer Drain Sampling

- Summa Canister
 - All samples will be collected in 6-liter Summa canisters with attached pre-set flow regulators. Pre-repair samples will be collected for a 24-hour period. Post-repair samples will be collected for a 24-hour period.
 - The Summa canister sample will be collected using Teflon-lined tubing attached to the Summa canister that is inserted and sealed into the floor drain. In the event that there are numerous sewer drains, the sample will be taken in the non-functioning drain closest to the main trunk line that has been repaired.
 - The Summa canisters will be checked, if possible, at least once for a 24-hour sampling process in order to note progress on the sampling log.
 - **For all samples, the valve on the Summa canister will be closed when approximately 5 inches of Hg vacuum remains in the canister, leaving a vacuum in the canister as a means for the laboratory to verify the canister does not leak while in transit.**

- Samples will be submitted under chain of custody protocols to an MPC approved laboratory for analysis of benzene and other VOCs in accordance with USEPA Method TO-15.
- UltraRAE 3000
 - The UltraRAE 3000 will be calibrated at the start of each day that sampling will be conducted.
 - The UltraRAE 3000 will be bump checked in the upstairs of the residence near an exterior door before and after sampling to ensure the monitor is functioning accurately.
 - The UltraRAE 3000 sample will be obtained at the approximate center of the opening of each sewer drain at a height of approximately 2 inches.
- AreaRAE
 - The AreaRAE will be calibrated at the start of each day that sampling will be conducted.
 - The AreaRAE sample will be obtained at the approximate center of the opening of each sewer drain at a height of approximately 2 inches.

4. Ambient Air Sampling

In addition to residential home sampling, MRD will also conduct an evaluation of ambient air in the residential neighborhood located near Pleasant, Liebold, and Liddesdale Avenues. Ambient sampling will be conducted as follows:

1. MRD will conduct monthly sampling of ambient air from four neighborhood locations as shown on Figure 3.
2. MRD will notify USEPA via email 72 hours prior to the planned sampling event.
3. The ambient air samples will be collected over a 24-hour period into preset 6-liter Summa canisters obtained from an MRD chosen laboratory.
4. Summa canister sampling will be targeted on a day when weather conditions are predicted to be relatively stagnant (i.e., no rain and wind speed of 3-7 miles per hour over 24 hours). If wind speeds exceed the targeted level, this information will be recorded in the report, but sampling will not be redone.
5. Additional locations will be determined on the day of sampling, based on the predicted wind direction, so that the additional locations are located upwind of

the community area to be monitored. The locations of the additional Summa canisters will be noted in the sampling report. Monthly sampling will continue for twelve months ending in January 2012.

5. Sewer Line Evaluation

In addition to residential sampling, USEPA, MDNRE, and DWSD requested that MRD evaluate the DWSD sewer lines laterally off of Pleasant Avenue to determine if there are other areas of concern. Based on the Unified Command meeting of February 10, 2011, the following sampling plan was agreed upon.

1. MRD will work with DWSD to map out the four existing sewer manhole locations in the area north and south of Pleasant Avenue. Water within the sewer lines south of Pleasant Avenue flows north towards the Oakwood Lift Station.
2. MRD will work with DWSD to identify manholes that will be sampled on February 14, 2011. Any further sample locations will need an additional work plan.
3. Air sampling will be conducted above the sewer manhole in the locations noted above.
 - Samples will be taken using a 1-liter preset Summa canister that will run for five minutes, obtained from an MRD chosen laboratory.
 - The Summa canister will be set up as close as possible to the manhole vents.
 - Care will be taken to prevent moisture from entering the Summa canister which may affect readings.
 - MRD will document the type of manhole at the sampling location and approximate distance of the Summa canisters to the vents.

Based on the results of the sewer manhole evaluation, another agreed upon plan may be developed.

6. Schedule and Reporting

USEPA and MDNRE will be notified prior to commencement of the residential work outlined in Section 3.1 and 3.2. The agencies or their representative may be present

during work. Monthly ambient air monitoring and the sewer line inspection will be initiated within two weeks of approval of this Work Plan.

At the completion of all home inspections and residential sampling events, MRD will prepare a report that provides the results of the inspections and air samples, if collected. A separate report will be submitted that contains the results of the monthly ambient air sampling and the sewer line inspection. All reports will be circulated to the following individuals:

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7. Addendums

Addendum to Section 5 - Sewer Line Evaluation Plan

In accordance with the sewer line evaluation contained in Section 5 of Sewer Vapor Investigation Work Plan dated February 2011, Marathon Petroleum Company (MPC) LP's Michigan Refining Division (MRD) proposes to conduct further sewer line evaluations between Pleasant and Leonard Avenues and conduct home-by-home Residential Home Evaluations along Patricia, Liebold and Liddesdale Avenues.

1. MRD will work with the City of Detroit Water and Sewerage Department (DWSD) to map the existing sewer manhole locations in the area south of Pleasant Avenue and north of Leonard Avenue along Patricia, Liebold and Liddesdale Avenues (Figure 5).
2. MRD and DWSD will identify all manholes on each of the sewer lines in the area.
3. MRD will sample the next manholes upstream from Pleasant Avenue along the Patricia Ave., Liebold Ave., and Liddesdale Ave in accordance with the sampling method contained in this plan.
4. The sampling results will be reviewed by MRD, U.S. Environmental Protection Agency (USEPA), and Michigan Department of Natural Resources and the Environment (MDNRE). Based on the joint review and decision, MRD will sample the next upstream manhole. This step may be repeated to Leonard Avenue.
5. MRD will also sample the manhole located prior to the sanitary sewer line entering the lift station. According to the DWSD map, this manhole is located on Liddesdale Avenue between Pleasant and Sanders Avenues and is identified as S-19 in Figure 5.
6. Air sampling will be conducted above the sewer manhole in the locations noted above.
 - Samples will be taken using 1-liter Summa canisters that will run for five minutes, obtained from an MRD chosen laboratory.
 - One Summa canister will be set up as close as possible to the manhole vents.

- One Summa canister will be set upwind at a distance of around 5 feet and at ground level of the manhole to determine ambient background concentrations
 - Care will be taken to prevent moisture from entering the Summa canister which may affect readings.
 - MRD will document the type of manhole at the sampling location and approximate distance of the Summa canisters to the vents.
 - The Summa canisters will be analyzed per USEPA Method TO-15
7. MPC will survey the area south of Pleasant Avenue for potential sources that may contribute benzene and VOCs to the sewer system.
 8. MPC will conduct home-by-home Residential Home Inspections in the area south of Pleasant Avenue and north of Leonard Avenue along Patricia, Liebold, and Liddesdale Avenues. These inspections will be conducted in accordance with Sections 3, 3.1 and 3.2 of this Work Plan.

FIGURE 1a FUNCTIONING P-TRAP

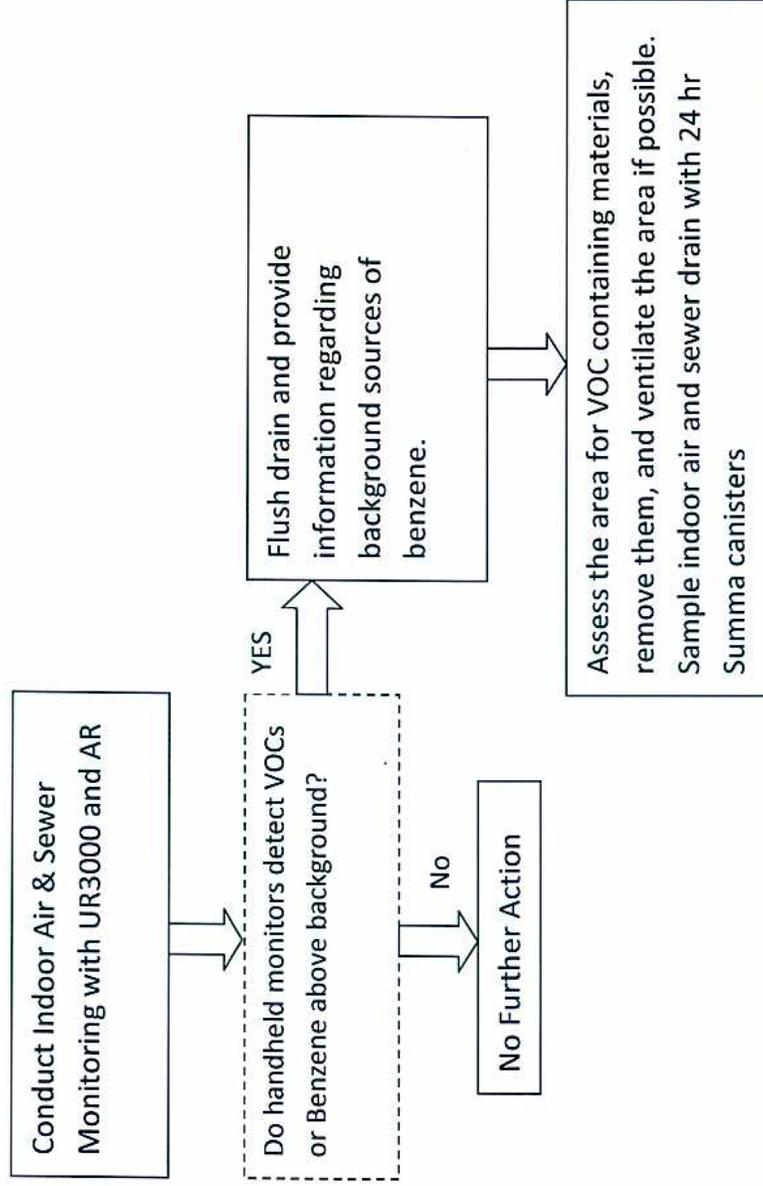
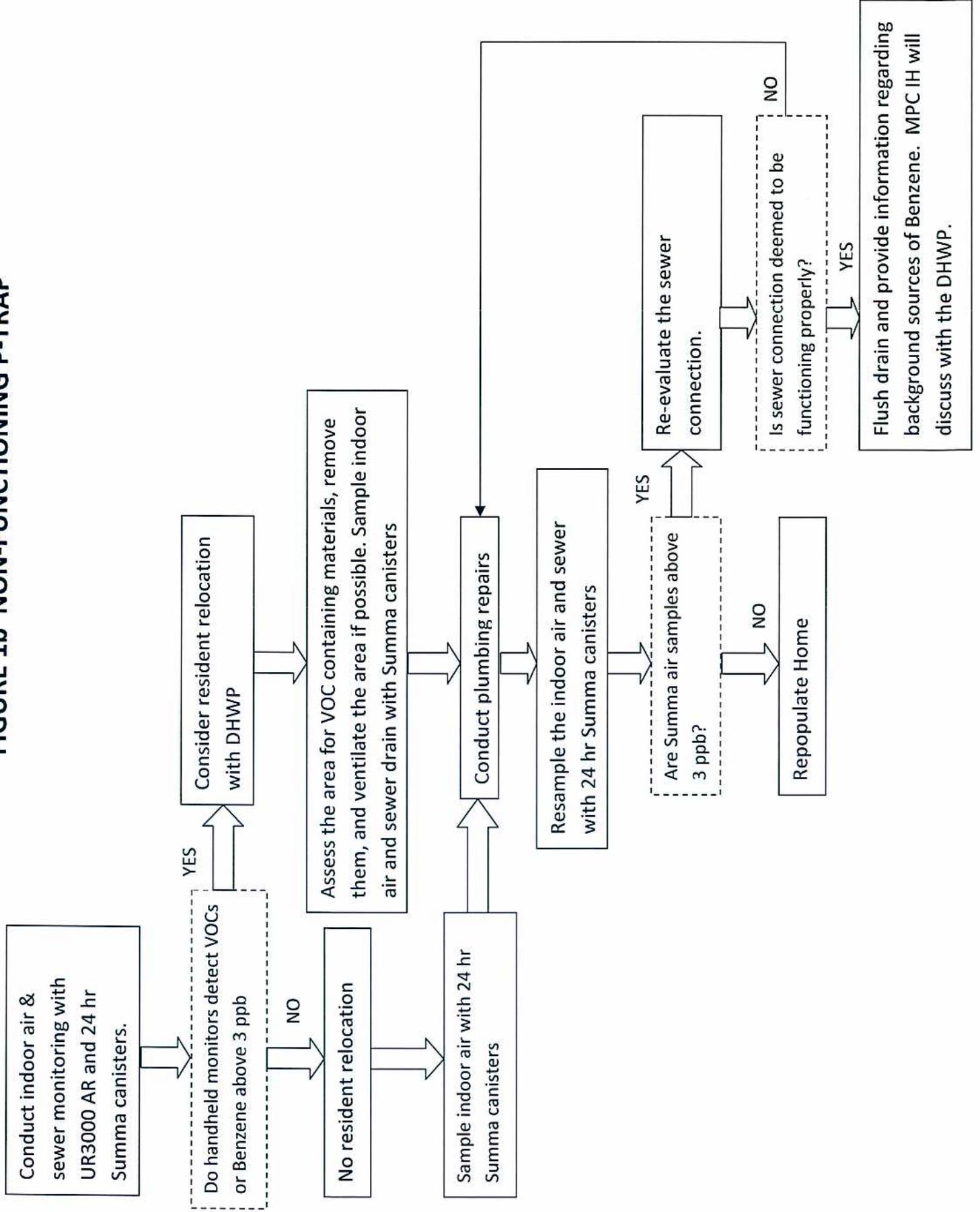


FIGURE 1b NON-FUNCTIONING P-TRAP



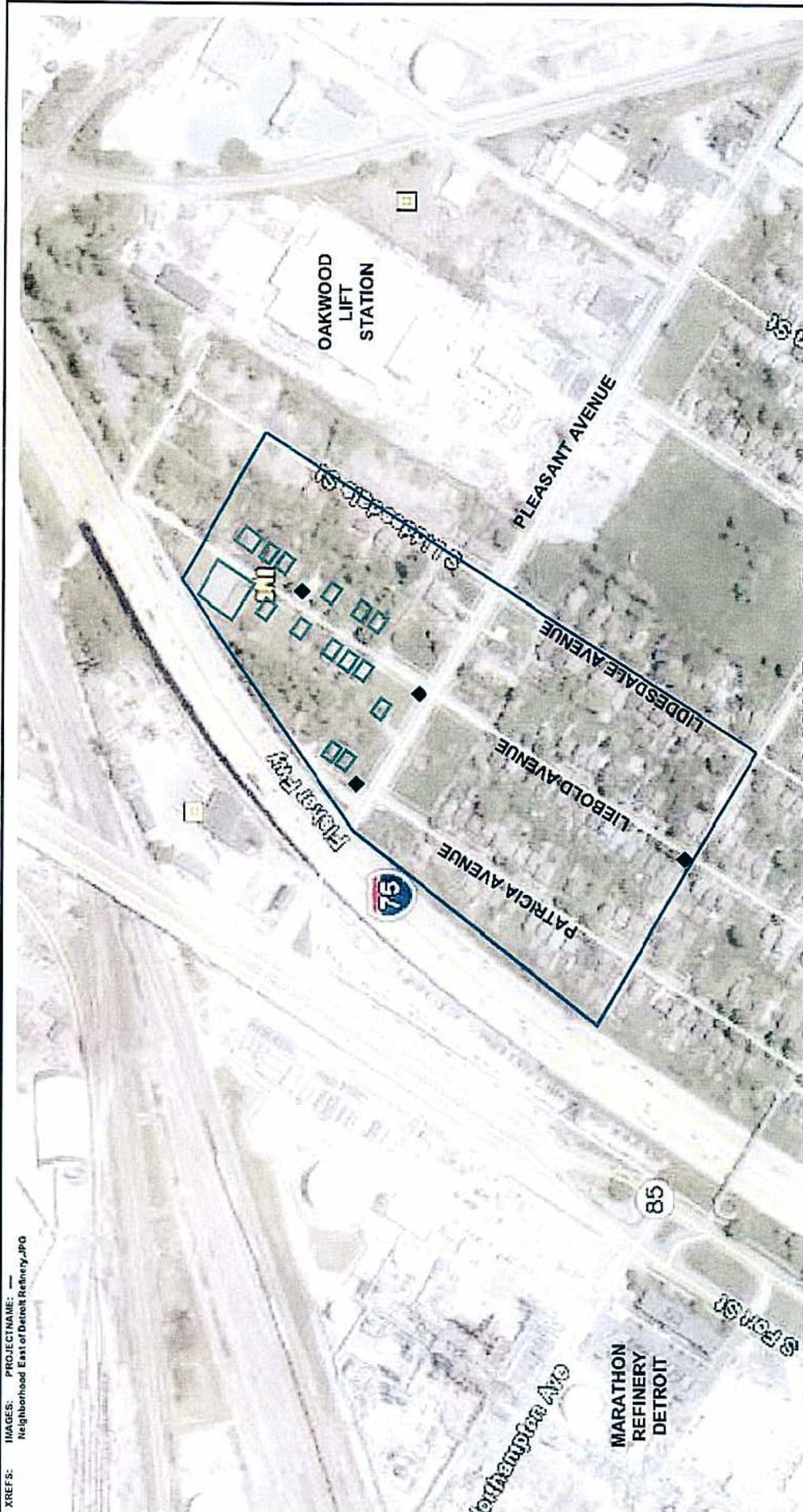


LEGEND
 HOMES TO BE EVALUATED



NOT TO SCALE

MARATHON PETROLEUM COMPANY LP MARATHON REFINERY DETROIT SEWER VAPOR INVESTIGATION WORK PLAN	
RESIDENTIAL HOMES TO BE EVALUATED	
	FIGURE 2



LEGEND

- SEWER EVALUATION AREA
- ◆ HOMES TO BE EVALUATED
- ◆ AMBIENT AIR SAMPLES TO BE COLLECTED MONTHLY



NOT TO SCALE

MARATHON PETROLEUM COMPANY LP
 MARATHON REFINERY, DETROIT
 SEWER VAPOR INVESTIGATION WORK PLAN

AMBIENT AIR SAMPLE LOCATIONS



FIGURE
3

MPC's Detroit, MI Refinery - Wastewater Conveyance System

Figure 4

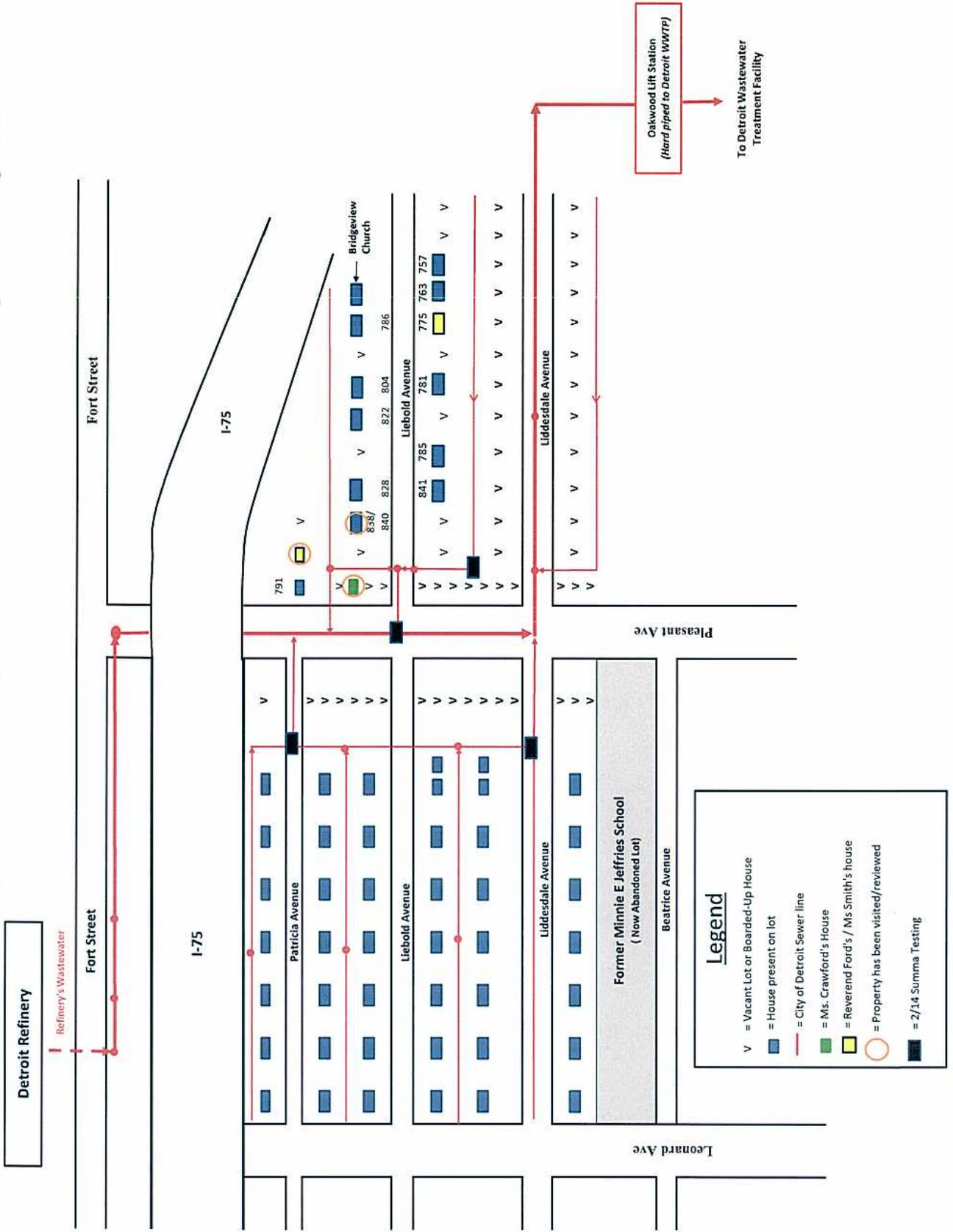
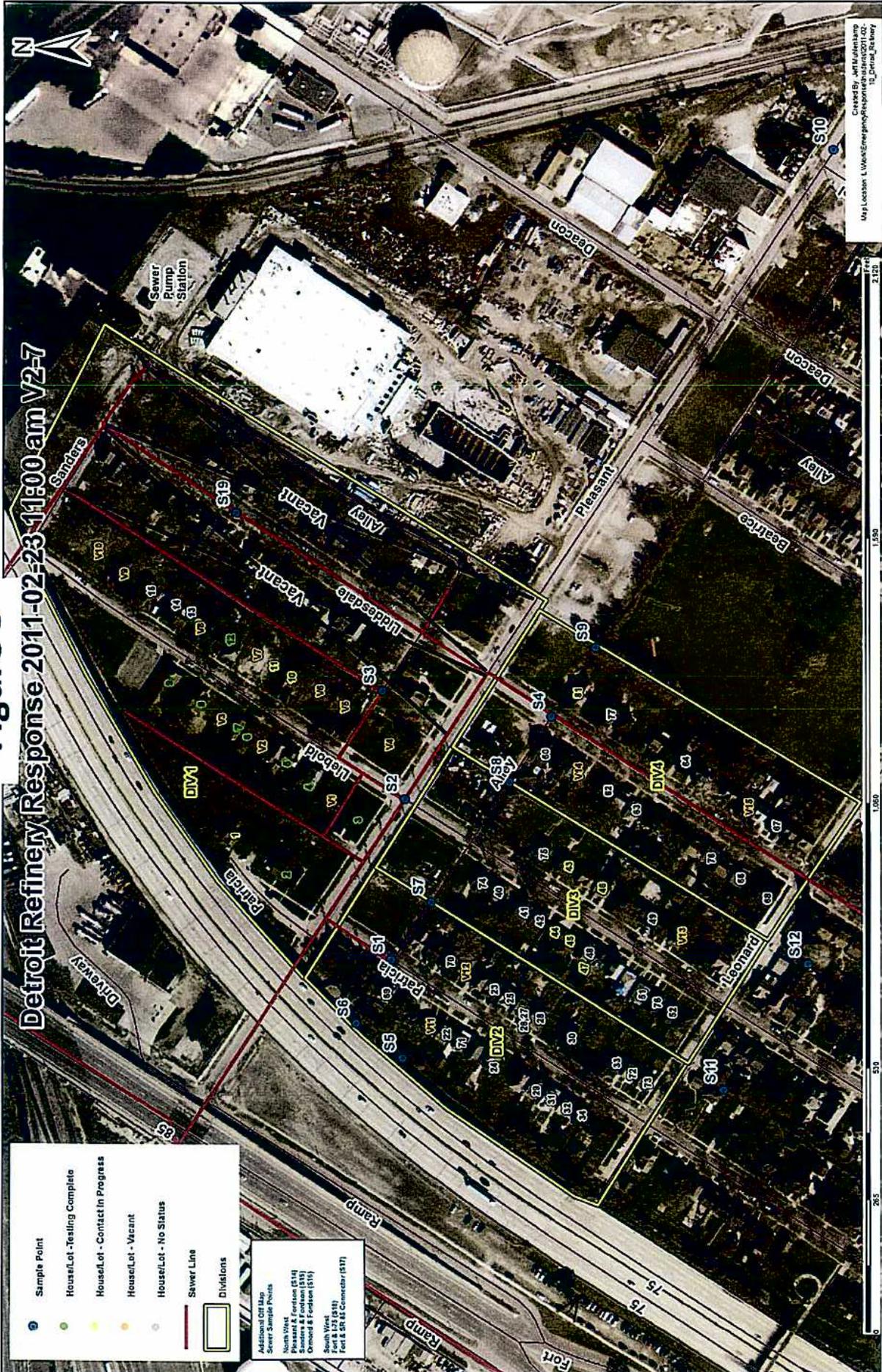


Figure 5

Detroit Refinery Response 2011-02-23 11:00 am V2-7



- Sample Point
- House/Lot - Testing Complete
- House/Lot - Contact in Progress
- House/Lot - Vacant
- House/Lot - No Status
- Sewer Line
- ▭ Divisions

Additional OIT Map
 Sewer Sample Points
 North West
 Pleasant & Fortson (S14)
 Pleasant & Fortson (S15)
 Pleasant & Fortson (S16)
 South West (S17)
 Fort & SR 82 Connector (S17)