DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: On-site Inspection

P044562889

FACILITY: ARAMCO SERVICES COMPANY		**SRN / ID:** P0445
LOCATION: 46535 PEARY COURT, NOVI		**DISTRICT:** Warren
CITY: NOVI		**COUNTY:** OAKLAND
CONTACT: Tarek Zamzam , HS&E Advisor		**ACTIVITY DATE:** 05/11/2022
STAFF: Kaitlyn Leffert	**COMPLIANCE STATUS:** Compliance	**SOURCE CLASS:** SM OPT OUT
SUBJECT: FY2022 Scheduled Inspection		
RESOLVED COMPLAINTS:		

On May 11th, 2022, I, Kaitlyn Leffert, conducted a scheduled inspection of Aramco Services (Source Registration Number: P0445), located at 46535 Peary Court, Novi, Michigan. The purpose of the inspection was to determine the facility's compliance with the requirements of the Federal Clean Air Act; Article II, Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1944 PA 451, as amended (Act 451); the administrative rules; and the conditions of Permit to Install (PTI) Number 81-13B.

Aramco Services is a research branch of Aramco, which is a petroleum and natural gas company. The Aramco Services facility in Novi focuses on research of vehicles and engines, specifically with a focus on developing low-emissions fuel-burning engines. The facility is permitted to operate five dynamometers, ranging in engine size capacity.

I contacted Burke Davis, Business Manager, Aramco Services, in advance of the inspection to request the required records and schedule the in-person portion of the inspection. He connected me with Tarek Zamzam, Health, Safety, and Environmental, Aramco, and the inspection was scheduled for May 11th.

I arrived at the facility at 9 am on Wednesday, May 11th and met with Tarek Zamzam, HS&E Advisor, Aramco Research Center. We first went to a conference room to go over the required recordkeeping. Records of fuel usage and emissions calculations are maintained in an excel spreadsheet, which I was provided a copy of to review following the inspection.

After our initial meeting, Tarek led me on a walk through of the facility. Aramco operates five dynamometers, as well as two chassis dynamometers. The chassis test cells are not subject to regulation by the EGLE Air Quality Division, as they are considered mobile sources of emissions. Each of the five dynamometers has a control room area adjacent to the test cell. Each dynamometer is assigned to a technician who operates all tests out of that given cell. At the time of my inspection, tests were currently being set up or operating in Test Cells 1 and 3.

The types of fuels supplied to each dynamometer are controlled out of the fuel room. Aramco has four underground fuel storage tanks, which supply fuel to the fuel room, where fuel is directed to a given test cell. Fuel usage is tracked in each dynamometer by a digital meter. The meters are read daily and recorded in a daily tracking sheet. The meters are also reset every month and monthly fuel usage is recorded at the end of the month.

Aramco is permitted to use unleaded gasoline, diesel, oxygenates (alcohols), hydrogen, and gaseous hydrocarbon fuels in the dynamometers (S.C. II.1). Currently, the primary fuels used at the facility

are unleaded gasoline and diesel. The facility also plans to add the capability to test with hydrogen fuel on a larger scale.

I observed the two chassis test cells. The one chassis dynamometer is used for testing of semi-trucks, while the other is used to test standard sized vehicles. A semi-truck was currently being tested at the time of the inspection, while the other chassis dyno was empty.

Adjacent to the larger semi-truck chassis test cell is a re-working area, with a variety of tools and equipment used to re-work the engines. Work on the engines may be done to tweak characteristics of the engines to see how they perform. The equipment in this area included a drill press, saw, sand blast unit, sanding equipment, grinder, and lathe. All of this equipment vented to the general in-plant environment and is considered exempt from the requirement to obtain a permit to install according to Rule 285(2)(l). The facility also operates welding equipment, which is considered exempt according to Rule 285(2)(i).

The facility also has two cold cleaners. The cold cleaners have a surface area of less than 10 square feet and therefore are considered exempt according to Rule 281(2)(h). During my inspection, both cold cleaners had the lids shut and operating instructions were posted on the equipment. The solvent used in the cold cleaners is Safety Klean. The cold cleaners appear to be operating in compliance with the requirements of Rule 707. In addition, there was a parts washer that used only hot water and soap.

Aramco operates an emergency generator, which is subject to 40 CFR Part 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Combustion Engines. I reviewed records of generator operation and maintenance during the pre-inspection meeting. The generator runs weekly for maintenance, but otherwise has only run one time in the past year due to a power outage over one weekend, resulting in a total of 62.9 hours of operating time from June 2020 to December 2021. The last maintenance on the generator was on December 7, 2021. The generator appears to be operating in compliance with 40 CFR Part 60, Subpart JJJJ.

Records Review

Following the inspection, I reviewed the provided records for compliance with permitted fuel usage material limits and emission limits. All recordkeeping required by S.C. VI.2 through VI.4 was accounted for in the provided records.

Fuel Usage

Aramco is permitted to only use the following fuels: unleaded gasoline, diesel, research fuels, hydrogen fuels, pure alcohol, or oxygenates and blends with one or more of the previously listed fuels (S.C. II.1). Aramco primarily uses various liquid hydrocarbon blends. As mentioned previously, the facility does intend to expand its use of hydrogen in the future, which is allowed by PTI No. 81-13B. The fuel records indicate that Aramco is operating in compliance with S.C. II.1.

Aramco is permitted to use up to 552 gallons of alcohol or predominantly alcohol blends per day in the five dynamometers (S.C. II.2). Tarek Zamzam informed me that the facility has not tested using alcohol blends in a few years. According to the records, the last time alcohol blends were used at the facility was in August 2019.

Total fuel usage at the facility is limited to 790 gallons per day and 55,000 gallons per year (S.C. II.3). The fuel usage records provided by the facility indicate that daily fuel usage ranged from 8.0 to 89.4 gallons per day over the period of January 2019 to present. The annual fuel usage in the 12-month rolling period ending in April 2021 was 8,909.8 gallons/year. The highest 12-month rolling total fuel usage over the previous three years was recorded in June 2019 at 10,821.5 gallons/year.

Emissions Limits

The provided records included emissions calculations for carbon monoxide (CO), volatile organic compounds (VOCs), acetaldehyde, 1,3-Butadiene, formaldehyde, and benzene. The emissions were calculated using the emission factors identified in the emissions table in the permit to install. Table 1 (below) shows a summary of the permitted emission limits and the 12-month rolling emission calculations from the provided records.

Table 1: Summary of Annual Permit Limits and Recorded 12-Month Rolling Emissions

Pollutant	Permit Limit (tpy)	12-Month Rolling Emissions in April 2022 (tpy)	Highest 12-Month Rolling Emissions* (tpy)
Carbon Monoxide (CO)	85.8	13.9	16.9
Volatile Organic Compounds (VOCs)	4.4	0.71	0.87
1,3-Butadiene	0.0572	0.01	0.01
Formaldehyde	0.0931	0.02	0.02
Benzene	0.1690	0.03	0.03

*For CO and VOCs, the month with the highest 12-month rolling emissions was June 2019. For 1,3-Butadiene, formaldehyde, and benzene, the highest 12-month rolling emissions value was recorded in multiple months over the previous three years.

In addition to the annual emission limits, the permit also limits emissions of VOCs, acetaldehyde, and 1,3-butadiene on a daily basis. Daily emissions are calculated by taking the total emissions at the end of the month and dividing by the number of days the facility operated the dynamometers.

Table 2: Summary of Daily Emissions Limits and Calculated Average Daily Emissions

Pollutant	Permit Limit (lb/day)	Daily Emissions in April 2022 (lb/day)	Highest Daily Emissions* (lb/day)
VOCs	126.4	5.66	14.30
Acetaldehyde	8.4	0.07	0.17
1,3 – Butadiene	1.64	0.07	0.19

*The highest daily emissions for all three pollutants were recorded in January 2019.

Sulfur Content

Aramco is required to maintain records of the maximum sulfur content in each diesel fuel delivery (S.C. VI.5). During the inspection, I reviewed some of the diesel delivery records. The diesel fuel supplier provides records identifying the sulfur content of the fuel, and Aramco also does their own testing of the fuels prior to using the fuel in the test cells. The records indicated that sulfur content

of each diesel fuel delivery ranged from 7.0 to 15.0 ppm. Testing by Aramco showed the sulfur content of the diesel to be 7.1 ppm.

Conclusion

Based on my on-site inspection and review of the fuel usage and emissions calculation records, Aramco appears to be operating in compliance with all conditions of PTI No. 81-13B, as well as all other applicable state and federal air quality regulations.

NAME Kaitlyn Leffert DATE 06/24/2022 SUPERVISOR K. Kelly