

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION**

October 29, 2015

PERMIT TO INSTALL
81-13B

ISSUED TO
Aramco Services Company

LOCATED AT
46535 Peary Court
Novi, Michigan

IN THE COUNTY OF
Oakland

STATE REGISTRATION NUMBER
P0445

The Air Quality Division has approved this Permit to Install, pursuant to the delegation of authority from the Michigan Department of Environmental Quality. This permit is hereby issued in accordance with and subject to Section 5505(1) of Article II, Chapter I, Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Pursuant to Air Pollution Control Rule 336.1201(1), this permit constitutes the permittee's authority to install the identified emission unit(s) in accordance with all administrative rules of the Department and the attached conditions. Operation of the emission unit(s) identified in this Permit to Install is allowed pursuant to Rule 336.1201(6).

DATE OF RECEIPT OF ALL INFORMATION REQUIRED BY RULE 203: October 20, 2015	
DATE PERMIT TO INSTALL APPROVED: October 29, 2015	SIGNATURE:
DATE PERMIT VOIDED:	SIGNATURE:
DATE PERMIT REVOKED:	SIGNATURE:

PERMIT TO INSTALL

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Common Abbreviations / Acronyms

Common Acronyms		Pollutant / Measurement Abbreviations	
AQD	Air Quality Division	acfm	Actual cubic feet per minute
BACT	Best Available Control Technology	BTU	British Thermal Unit
CAA	Clean Air Act	°C	Degrees Celsius
CAM	Compliance Assurance Monitoring	CO	Carbon Monoxide
CEM	Continuous Emission Monitoring	CO ₂ e	Carbon Dioxide Equivalent
CFR	Code of Federal Regulations	dscf	Dry standard cubic foot
COM	Continuous Opacity Monitoring	dscm	Dry standard cubic meter
Department/ department	Michigan Department of Environmental Quality	°F	Degrees Fahrenheit
EU	Emission Unit	gr	Grains
FG	Flexible Group	HAP	Hazardous Air Pollutant
GACS	Gallons of Applied Coating Solids	Hg	Mercury
GC	General Condition	hr	Hour
GHGs	Greenhouse Gases	HP	Horsepower
HVLP	High Volume Low Pressure*	H ₂ S	Hydrogen Sulfide
ID	Identification	kW	Kilowatt
IRSL	Initial Risk Screening Level	lb	Pound
ITSL	Initial Threshold Screening Level	m	Meter
LAER	Lowest Achievable Emission Rate	mg	Milligram
MACT	Maximum Achievable Control Technology	mm	Millimeter
MAERS	Michigan Air Emissions Reporting System	MM	Million
MAP	Malfunction Abatement Plan	MW	Megawatts
MDEQ	Michigan Department of Environmental Quality	NMOC	Non-methane Organic Compounds
MSDS	Material Safety Data Sheet	NO _x	Oxides of Nitrogen
NA	Not Applicable	ng	Nanogram
NAAQS	National Ambient Air Quality Standards	PM	Particulate Matter
NESHAP	National Emission Standard for Hazardous Air Pollutants	PM10	Particulate Matter equal to or less than 10 microns in diameter
NSPS	New Source Performance Standards	PM2.5	Particulate Matter equal to or less than 2.5 microns in diameter
NSR	New Source Review	pph	Pounds per hour
PS	Performance Specification	ppm	Parts per million
PSD	Prevention of Significant Deterioration	ppmv	Parts per million by volume
PTE	Permanent Total Enclosure	ppmw	Parts per million by weight
PTI	Permit to Install	psia	Pounds per square inch absolute
RACT	Reasonable Available Control Technology	psig	Pounds per square inch gauge
ROP	Renewable Operating Permit	scf	Standard cubic feet
SC	Special Condition	sec	Seconds
SCR	Selective Catalytic Reduction	SO ₂	Sulfur Dioxide
SNCR	Selective Non-Catalytic Reduction	TAC	Toxic Air Contaminant
SRN	State Registration Number	Temp	Temperature
TEQ	Toxicity Equivalence Quotient	THC	Total Hydrocarbons
USEPA/EPA	United States Environmental Protection Agency	tpy	Tons per year
VE	Visible Emissions	µg	Microgram
		µm	Micrometer or Micron
		VOC	Volatile Organic Compounds
		yr	Year

*For HVLP applicators, the pressure measured at the gun air cap shall not exceed 10 psig.

GENERAL CONDITIONS

1. The process or process equipment covered by this permit shall not be reconstructed, relocated, or modified, unless a Permit to Install authorizing such action is issued by the Department, except to the extent such action is exempt from the Permit to Install requirements by any applicable rule. **(R 336.1201(1))**
2. If the installation, construction, reconstruction, relocation, or modification of the equipment for which this permit has been approved has not commenced within 18 months, or has been interrupted for 18 months, this permit shall become void unless otherwise authorized by the Department. Furthermore, the permittee or the designated authorized agent shall notify the Department via the Supervisor, Permit Section, Air Quality Division, Michigan Department of Environmental Quality, P.O. Box 30260, Lansing, Michigan 48909-7760, if it is decided not to pursue the installation, construction, reconstruction, relocation, or modification of the equipment allowed by this Permit to Install. **(R 336.1201(4))**
3. If this Permit to Install is issued for a process or process equipment located at a stationary source that is not subject to the Renewable Operating Permit program requirements pursuant to R 336.1210, operation of the process or process equipment is allowed by this permit if the equipment performs in accordance with the terms and conditions of this Permit to Install. **(R 336.1201(6)(b))**
4. The Department may, after notice and opportunity for a hearing, revoke this Permit to Install if evidence indicates the process or process equipment is not performing in accordance with the terms and conditions of this permit or is violating the Department's rules or the Clean Air Act. **(R 336.1201(8), Section 5510 of Act 451, PA 1994)**
5. The terms and conditions of this Permit to Install shall apply to any person or legal entity that now or hereafter owns or operates the process or process equipment at the location authorized by this Permit to Install. If the new owner or operator submits a written request to the Department pursuant to R 336.1219 and the Department approves the request, this permit will be amended to reflect the change of ownership or operational control. The request must include all of the information required by subrules (1)(a), (b), and (c) of R 336.1219 and shall be sent to the District Supervisor, Air Quality Division, Michigan Department of Environmental Quality. **(R 336.1219)**
6. Operation of this equipment shall not result in the emission of an air contaminant which causes injurious effects to human health or safety, animal life, plant life of significant economic value, or property, or which causes unreasonable interference with the comfortable enjoyment of life and property. **(R 336.1901)**
7. The permittee shall provide notice of an abnormal condition, start-up, shutdown, or malfunction that results in emissions of a hazardous or toxic air pollutant which continue for more than one hour in excess of any applicable standard or limitation, or emissions of any air contaminant continuing for more than two hours in excess of an applicable standard or limitation, as required in Rule 912, to the Department. The notice shall be provided not later than two business days after start-up, shutdown, or discovery of the abnormal condition or malfunction. Written reports, if required, must be filed with the Department within 10 days after the start-up or shutdown occurred, within 10 days after the abnormal conditions or malfunction has been corrected, or within 30 days of discovery of the abnormal condition or malfunction, whichever is first. The written reports shall include all of the information required in Rule 912(5). **(R 336.1912)**
8. Approval of this permit does not exempt the permittee from complying with any future applicable requirements which may be promulgated under Part 55 of 1994 PA 451, as amended or the Federal Clean Air Act.
9. Approval of this permit does not obviate the necessity of obtaining such permits or approvals from other units of government as required by law.
10. Operation of this equipment may be subject to other requirements of Part 55 of 1994 PA 451, as amended and the rules promulgated thereunder.

11. Except as provided in subrules (2) and (3) or unless the special conditions of the Permit to Install include an alternate opacity limit established pursuant to subrule (4) of R 336.1301, the permittee shall not cause or permit to be discharged into the outer air from a process or process equipment a visible emission of density greater than the most stringent of the following. The grading of visible emissions shall be determined in accordance with R 336.1303. **(R 336.1301)**
 - a) A six-minute average of 20 percent opacity, except for one six-minute average per hour of not more than 27 percent opacity.
 - b) A visible emission limit specified by an applicable federal new source performance standard.
 - c) A visible emission limit specified as a condition of this Permit to Install.

12. Collected air contaminants shall be removed as necessary to maintain the equipment at the required operating efficiency. The collection and disposal of air contaminants shall be performed in a manner so as to minimize the introduction of contaminants to the outer air. Transport of collected air contaminants in Priority I and II areas requires the use of material handling methods specified in R 336.1370(2). **(R 336.1370)**

13. The Department may require the permittee to conduct acceptable performance tests, at the permittee's expense, in accordance with R 336.2001 and R 336.2003, under any of the conditions listed in R 336.2001. **(R 336.2001)**

SPECIAL CONDITIONS

EMISSION UNIT SUMMARY TABLE

The descriptions provided below are for informational purposes and do not constitute enforceable conditions.

Emission Unit ID	Emission Unit Description (Process Equipment & Control Devices)	Installation Date / Modification Date	Flexible Group ID
EUTESTCELL1	Dynamometer capable of testing 603 hp engines without emission controls.	July 15, 2015	FG-TESTCELLS
EUTESTCELL2	Dynamometer capable of testing 430 hp engines without emission controls.	July 15, 2015	FG-TESTCELLS
EUTESTCELL3	Dynamometer capable of testing 430 hp engines without emission controls.	July 15, 2015	FG-TESTCELLS
EUTESTCELL4	Dynamometer capable of testing 1006 hp engines without emission controls.	Early 2016	FG-TESTCELLS
EUTESTCELL5	Dynamometer capable of testing 87 hp engines without emission controls.	Late 2016	FG-TESTCELLS
Changes to the equipment described in this table are subject to the requirements of R 336.1201, except as allowed by R 336.1278 to R 336.1290.			

FLEXIBLE GROUP SUMMARY TABLE

The descriptions provided below are for informational purposes and do not constitute enforceable conditions.

Flexible Group ID	Flexible Group Description	Associated Emission Unit IDs
FG-TESTCELLS	Five dynamometer test cells without emission controls. Two of the dynamometers are capable of testing engines up to 430 hp (320 kW), one is capable of testing engines up to 603 hp (450 kW), one is capable of testing engines up to 1006 hp (750 kW), and one is capable of testing engines up to 87 hp (65 kW). The engines are fueled by gasoline, diesel, oxygenates (alcohols), hydrogen and gaseous hydrocarbon fuels, and various blends of these fuels. Gaseous hydrocarbon fuels include natural gas, compressed natural gas (CNG), liquefied petroleum gas (LPG), and their individual components.	EUTESTCELL1, EUTESTCELL2, EUTESTCELL3, EUTESTCELL4, EUTESTCELL5

The following conditions apply to:
FG-TESTCELLS

DESCRIPTION: Five dynamometer test cells without emission controls. Two of the dynamometers are capable of testing engines up to 430 hp (320 kW), one is capable of testing engines up to 603 hp (450 kW), one is capable of testing engines up to 1006 hp (750 kW), and one is capable of testing engines up to 87 hp (65 kW). The engines are fueled by gasoline, diesel, oxygenates (alcohols), hydrogen and gaseous hydrocarbon fuels, and various blends of these fuels. Gaseous hydrocarbon fuels include natural gas, compressed natural gas (CNG), liquefied petroleum gas (LPG), and their individual components.

Emission Units: EUTESTCELL1, EUTESTCELL2, EUTESTCELL3, EUTESTCELL4, EUTESTCELL5

POLLUTION CONTROL EQUIPMENT: NA

I. EMISSION LIMITS

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Testing / Monitoring Method	Underlying Applicable Requirements
1. CO	85.8 tpy	12-month rolling time period as determined at the end of each calendar month.	FG-TESTCELLS	SC VI.3	R 336.1205(1)(a) & (3)
2. VOC	126.4 lb/day	Daily as determined at the end of each calendar month.	FG-TESTCELLS	SC VI.4	R 336.1225
3. VOC	4.4 tpy	12-month rolling time period as determined at the end of each calendar month.	FG-TESTCELLS	SC VI.3	R 336.1225
4. Acetaldehyde	8.4 lb/day	Daily as determined at the end of each calendar month.	FG-TESTCELLS	SC VI.4	R 336.1225
5. 1,3-Butadiene	1.64 lb/day	Daily as determined at the end of each calendar month.	FG-TESTCELLS	SC VI.4	R 336.1225
6. 1,3-Butadiene	0.0572 tpy	12-month rolling time period as determined at the end of each calendar month.	FG-TESTCELLS	SC VI.2	R 336.1225
7. Formaldehyde	0.0931 tpy	12-month rolling time period as determined at the end of each calendar month.	FG-TESTCELLS	SC VI.3	R 336.1225
8. Benzene	0.1690 tpy	12-month rolling time period as determined at the end of each calendar month.	FG-TESTCELLS	SC VI.2	R 336.1225

Emission Factors:
 CO = 3.12 lb/gallon
 VOC = 0.16 lb/gallon
 Benzene = 3.84 % of VOC
 1,3-Butadiene = 1.30% of VOC
 Formaldehyde = 2.12% of VOC
 Acetaldehyde = 1.18% of VOC
 Acetaldehyde = 0.0144 lb/gal of alcohol/alcohol blends
Emission Factors for gaseous fuels are based on Gasoline Gallon Equivalents (GGE). One GGE is the amount of a fuel which has an energy content equal to one liquid gallon of gasoline, or 130,000 Btu. One GGE is equal to 126.6 ft³ of NG or 43.437 ft³ of LPG.

* Test Protocol shall specify averaging time

II. MATERIAL LIMITS

1. The permittee shall burn only fuels that meet one of the following criteria in FG-TESTCELLS:
 - a) Unleaded gasoline and other unleaded light-distillate petroleum derived research fuels (i.e. gasoline-like fuels)
 - b) Diesel and other middle distillate petroleum derived research fuels (i.e. diesel-like fuels)
 - c) Single component or blended research fuels comprised of one or more of the constituents found in gasoline or diesel
 - d) Hydrogen and gaseous hydrocarbon fuels including natural gas and liquefied petroleum gas (LPG)
 - e) Single component or blended research fuels comprised of one or more of the constituents of natural gas or LPG
 - f) Blended research fuels comprised of (a) through (e)
 - g) Pure alcohol or oxygenates and blends of these with one or more of the above fuels**(R 336.1205(1)(a) & (3), R 336.1224, R 336.1225, R 336.1702, 40 CFR 52.21(c) & (d))**
2. The permittee shall not burn more than 552 gallons of alcohol and predominantly alcohol blends (85% by volume, i.e., e85, or greater) per day in FG-TESTCELLS. **(R 336.1205(1)(a) & (3), R 336.1225, R 336.1702(a))**
3. The total fuel usage for FG-TESTCELLS shall not exceed 790 gallons total per calendar day. Gaseous fuels shall be converted to gasoline gallon equivalents (GGE) and are included in this limit. **(R 336.1205(1)(a) & (3), R 336.1225, R 336.1702(a))**
4. The fuel usage for FG-TESTCELLS shall not exceed 55,000 gallons total per 12-month rolling time period as determined at the end of each calendar month. Gaseous fuels shall be converted to gasoline gallon equivalents (GGE) and are included in this limit. **(R 336.1205 (1)(a) & (3), R 336.1225, R 336.1702(a), 40 CFR 52.21(c) & (d))**

III. PROCESS/OPERATIONAL RESTRICTIONS

NA

IV. DESIGN/EQUIPMENT PARAMETERS

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1201(3))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1201(3))**

1. The permittee shall complete all required calculations in a format acceptable to the AQD District Supervisor by the 15th day of the calendar month, for the previous calendar month, unless otherwise specified in any monitoring/recordkeeping special condition. All records shall be made available to the Department upon request. **(R 336.1205(1)(a) & (3), R 336.1225, R 336.1702(a), 40 CFR 52.21(c) & (d))**
2. The permittee shall maintain monthly records of the types of fuels used in FG-TESTCELLS. The permittee shall keep the records in a format acceptable to the AQD District Supervisor. The permittee shall keep all records on file and make them available to the Department upon request. **(R 336.1205(1)(a) & (3), R 336.1224, R 336.1225, R 336.1702, 40 CFR 52.21(c) & (d))**

3. The permittee shall keep the following information on a monthly basis for FG-TESTCELLS:
- A record of the days that any of the engines were in operation
 - A record of the days that any of the engines were operating while burning pure alcohol or predominantly alcohol blends (85% by volume or greater).
 - Gallons of total fuel used per month and 12-month rolling time period. Gaseous fuels shall be converted to gasoline gallon equivalents (GGE) and are included in this total.
 - CO emission calculations determining the monthly emission rate in tons per calendar month.
 - CO emission calculations determining the annual emission rate in tons per 12-month rolling time period as determined at the end of each calendar month.
 - VOC emission calculations determining the monthly emission rate in tons per calendar month.
 - VOC emission calculations determining the annual emission rate in tons per 12-month rolling time period as determined at the end of each calendar month.
 - Formaldehyde emission calculations determining the monthly emission rates in tons per calendar month.
 - Formaldehyde emission calculations determining the annual emission rate in tons per 12-month rolling time period as determined at the end of each calendar month.
 - 1,3-Butadiene emission calculations determining the monthly emission in tons per calendar month.
 - 1,3-Butadiene emission calculations determining the annual emission rate in tons per 12-month rolling time period as determined at the end of each calendar month.
 - Acetaldehyde emission calculations determining the monthly emission in tons per calendar month from combustion of alcohol and alcohol blended fuels
 - Benzene emission calculations determining the monthly emission in tons per calendar month.
 - Benzene emission calculations determining the annual emission rate in tons per 12-month rolling time period as determined at the end of each calendar month.

The permittee shall keep the records in a format acceptable to the AQD District Supervisor. The permittee shall keep all records on file and make them available to the Department upon request. **(R 336.1205(1)(a) & (3), R 336.1224, R 336.1225, R 336.1702(a), 40 CFR 52.21(c) & (d))**

4. The permittee shall keep the following information on a monthly basis for FG-TESTCELLS:
- Daily total alcohol and predominantly alcohol blends (85% by volume or greater) use calculations, expressed in gallons per day, based upon the monthly alcohol and predominantly alcohol blends (85% by volume or greater) used, divided by the number of days FG-TESTCELLS operated burning monthly alcohol or predominantly alcohol blends (85% by volume or greater) during the calendar month.
 - Daily total fuel use calculations, expressed in gallons per day, based upon the monthly total fuel use divided by the total number of days FG-TESTCELLS operated during the calendar month. Gaseous fuels shall be converted to gasoline gallon equivalents (GGE) and are included in this total.
 - Daily VOC emission calculations, expressed in pounds per day, based upon the monthly VOC emissions divided by the number of days FG-TESTCELLS operated during the calendar month.
 - Daily 1,3-Butadiene emission calculations, expressed in pounds per day, based upon the monthly 1,3-Butadiene emissions divided by the number of days FG-TESTCELLS operated during the calendar month.
 - Daily Acetaldehyde emission calculations, expressed in pounds per day, based upon the monthly Acetaldehyde emissions divided by the number of days FG-TESTCELLS operated during the calendar month.
5. The permittee shall keep, in a satisfactory manner, records of the maximum sulfur content in the diesel for each delivery. The permittee shall keep all records on file and make them available to the Department upon request. **(R 336.1205 (1)(a) & (3), 40 CFR 52.21(c) & (d))**

VII. REPORTING

- Within 30 days after completion of the installation, construction, reconstruction, relocation, or modification authorized by this Permit to Install, the permittee or the authorized agent pursuant to Rule 204, shall notify the AQD District Supervisor, in writing, of the completion of the activity. Completion of the installation, construction, reconstruction, relocation, or modification is considered to occur not later than commencement of trial operation of EUTESTCELL5. **(R 336.1201(7)(a))**

VIII. STACK/VENT RESTRICTIONS

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Diameter/Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV-DYNO1	11.72	39.5	R 336.1225, 40 CFR 52.21(c) & (d)
2. SV-DYNO2	11.72	39.5	R 336.1225, 40 CFR 52.21(c) & (d)
3. SV-DYNO4	11.72	39.5	R 336.1225, 40 CFR 52.21(c) & (d)
4. SV-DYNO4	15.72	39.5	R 336.1225, 40 CFR 52.21(c) & (d)
5. SV-DYNO5	4.00	39.5	R 336.1225, 40 CFR 52.21(c) & (d)

IX. OTHER REQUIREMENTS

NA

Footnotes:

¹This condition is state only enforceable and was established pursuant to Rule 201(1)(b).