



Standard AIR CONTAMINANT DISCHARGE PERMIT REVIEW REPORT

Department of Environmental Quality
 Northwest Region

Source Information:

SIC	5093
NAICS	423930

Source Categories (Table 1 Part, code)	B, 64
Public Notice Category	IV

Compliance and Emissions Monitoring Requirements:

FCE	
Compliance schedule	
Unassigned emissions	
Emission credits	
Special Conditions	

Source test [date(s)]	X
COMS	
CEMS	
PEMS	
Ambient monitoring	

Reporting Requirements

Annual report (due date)	February 15
Quarterly report (due dates)	

Monthly report (due dates)	
Excess emissions report	
Other (specify)	

Air Programs

Synthetic Minor (SM)	
SM -80	
NSPS (list subparts)	Dc
NESHAP (list subparts)	JJJJJ
Part 68 Risk Management	
CFC	

NSR	
PSD	
RACT	
TACT	
Other (specify)	

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PERMITTING

PERMITTEE IDENTIFICATION

1. American Petroleum Environmental Services
11535 N Force Avenue
Portland, OR 97217

PERMITTING ACTION

2. The proposed permit is a renewal and a complex technical modification of an existing Standard Air Contaminant Discharge Permit (ACDP) that was issued on 4/1/2009 and was originally scheduled to expire on 12/1/2013. The existing ACDP remains in effect until final action is taken on the renewal application because the permittee submitted a timely and complete application for renewal.

OTHER PERMITS

3. Other permits issued or required by the DEQ for this source include a storm water runoff permit and a solid waste transfer station and material recovery facility permit.

ATTAINMENT STATUS

4. The source is located in a maintenance area for carbon monoxide and ozone. The area is attainment for all other criteria pollutants.
5. The source is not located within 10 kilometers of any Class I Air Quality Protection Area.

SOURCE DESCRIPTION

OVERVIEW

6. The permittee operates a used oil processing and recycling facility. The facility was built prior to baseline year 1978; however all of the current oil processing equipment has been installed and/or modified after the baseline period.
7. Since the last permit renewal the permit has had two non-technical permit modifications to change the legal name of the facility.
8. The current facility is a used oil refinery, taking deliveries of used oils and processing them to create VGO (Vacuum Gas Oil) as the main product. Secondary products are a #2 distillate fuel, which is combusted on site to heat the refinery, and heavy oil.

The refinery previously had three effluent points. Under form AQ104 NOC (submitted 9/30/2016) they were reduced to one, to include Typically Available Control Technology (TACT) in accordance with OAR 340-226-0130. Per the MAO, the front plant cooking process was decommissioned, eliminating this emission source. Oil Heater #4 was relocated to the back of the facility and re-purposed to provide additional heat for the refinery. The effluent from the PESCO refinery will continue to be routed through Oil Heater #3, the effluent of which is combined with that from Oil Heater #4, SULFO-1, and OPS-1 in a single, 2-can Regenerative Thermal Oxidizer (natural gas fired). The Regenerative Thermal Oxidizer provides a >90% energy efficiency increase from Direct Fired TOs by utilizing the heat of combustion to preheat the inlet effluent.

9. The facility additions include two new processes: (1) Oil Sulfonation, (2) Oil Polishing, for the purpose of generating a Group II Base Oil for sale.
 - a. Oil sulfonation involves the reaction of the VGO from the refinery with sulfur trioxide (SO_3). The process starts with the combustion of molten elemental sulfur in the presence of compressed air inside of a refractory lined pressure vessel to create sulfur dioxide (SO_2). Air is compressed and dried using desiccant filled vessels to prevent acid formation in the gas plant. The SO_2 is then catalytically converted to SO_3 and cooled to ambient temperature. The SO_3 (diluted in air to <2%v) is sent to an Annular Falling Film Reactor (AFFR), where it contacts and reacts with the VGO for the purpose of removing contaminants, color bearing agents and aromatic compounds in the form of sulfonic acid. The sulfonic acid is a tarry, black liquid suspended in the oil and must be removed in order for the oil to become group II. This is achieved in the oil polishing system. The air effluent from the sulfonation plant (which will contain SO_2 , SO_3 , and variable but minuscule amounts of mercaptens) is sent through a treatment process. It first is processed through a packed column continuously flushed with dilute caustic soda (NaOH) to absorb the SO_2 . It is then sent through a constantly irrigated (water) brownian motion filter, where the SO_3 and any entrained oil is removed. Finally the effluent is passed through the thermal oxidizer. This process is engineered, designed, and built by the Chemithon Corporation of Seattle, WA. Chemithon has over 60 years of experience in sulfonation and effluent clean up for their process, including over 400 installations worldwide. A system narrative for the sulfonation process is attached to this submittal.
 - b. The oil polishing system has two distinct steps: (1)Sulfonic Acid Separation, (2) Clay Filtration. The sulfonic acid will be separated from the oil and sent to the existing asphalt flux product, where it can be combined and sold as a product. From there, the oil will be sent to a PESCO Beam clay filtration system (CFS). This system utilizes Bauxite filled columns which "polish" the oil, removing sulfur (color causing compound). The Bauxite columns must be regenerated as part of the process, achieved through thermal desorption. Thermal desorption is a process that uses either indirect or direct heat exchange to heat organic contaminants to a temperature high enough to volatilize and separate them from a contaminated solid medium. Air, combustion gas, or an inert gas is used as the transfer medium for the vaporized components.

Thermal desorption systems are physical separation processes that transfer contaminants from one phase to another. They are not designed to provide high levels of organic destruction, although the higher temperatures of some systems will result in localized oxidation or pyrolysis. Thermal desorption is not incineration, since the destruction of organic contaminants is not the desired result. The bed temperatures achieved and residence times used by thermal desorption systems will volatilize selected contaminants, but usually not oxidize or destroy them. System performance is usually measured by the comparison of untreated solid contaminant levels with those of the processed solids. The contaminated Bauxite is typically heated up to 1,000 F. The effluent from the CFS is then sent to the thermal oxidizer to achieve TACT. The clean oil is then classified as group II base oil and stored for sale. The clay filtration system is designed and built by PESCO Beam Environmental Systems, and reputable, world-wide leader in the used oil re-refining industry.

PROCESS AND CONTROL DEVICES

10. Existing air contaminant sources at the facility consist of the following:

Quantity	Equipment	Size	SCC	Installed/modified
1	Oil heater (HTR-3) diesel fired	10 mmBtu/hr	3-06-001-02	1998
1	Oil heater (HTR-4) diesel fired	12 mmBtu/hr	3-06-001-02	2003 moved from front plant 2017
1	PESCO oil refinery heated by HTR-3&4			2003
1	Oil polishing system (OSP-1)	14.2 GPM; 6,816,000 GPY		2017
1	Sulfonation system (SULFO-01)	14.2 GPM; 6,816,000 GPY		2017
1	Thermal oxidizer (TO-01) to control VOC emission from all above	1 mmBtu/hr 9,337 ACFM		2017
2	Molten Sulfur tank boilers NG fired	0.503 mmBtu/hr each		2017
49	Storage tanks with PV relief valves	Table below		1998 to 2017
	Fugitives from valves, flanges, truck loading, etc.			1998 to 2017

HTR-4 (moved from decommissioned front plant) and HTR-3 are used to supply heat for the PESCO oil refinery.

Storage tanks on site

TANK ID	TANK #	PRODUCT IN TANK	CAPACITY (gallons)
Pre-process 1	1	On spec used oil	20,000
Pre-process 2	2	On spec used oil	20,000
Pre-process 3	3	On spec used oil	20,000
Pre-process 4	4	On spec used oil	20,000
Process 5	5	Used oil	20,000
Process 6	6	Used oil	20,000
Water Storage	1	Process water	20,000
Jail	1	Used oil	20,000
Jail	2	Used oil	20,000
Jail	3	Used oil	24,500
Jail	4	Used oil	24,500
Jail	5	Used oil	27,000
Jail	6	Used oil	27,000
Jail	7	Used oil	20,000
Jail	8	Used oil	20,000
Jail	9	Used oil	20,000
Jail	10	Used oil	25,000
Jail	11	Used oil	25,000
VGO	1	VGO	27,000
IT	100-1	100 Base oil	24,880
IT	100-2	100 Base oil	26,190
IT	220-1	220 Base oil	23,575
IT	220-2	220 Base oil	20,000
WLE	1	Water/#2 Distillate	24,880
AF	1	Flux storage	24,880
Plant fuel	1	Front plant fuel	3,000
Plant fuel	2	Back plant fuel	6,000
TANK	30	Fuel certification tank	4,150
EG-1	1	Spent antifreeze	10,000
EG-2	2	Spent antifreeze	5,000
EG-3	3	Spent antifreeze	5,000
NewAF-1	1	New antifreeze concentrate	5,000
NewAF-2	2	New antifreeze concentrate	5,000
NewAF-3	3	New antifreeze 50/50	1,000
NewAF-4	4	New antifreeze 50/50	1,000
Tank 12	1	Used oil	200,000
UO-1	1	Used oil	20,000
UO-2	2	Used oil	20,000
UO-3	3	Used oil	20,000
UO-4	4	Used oil	20,000
UO-5	5	Used oil	20,000
UO-6	6	Used oil	20,000

NEW TANKS (2017)			
GP-1		Base oil color 1	20,000
GP-2		Base oil color 2	20,000
BL-1		Base oil	20,000
GO-1		Group II Base oil	20,000
GO-2		Group II Base oil	20,000
GO-3		Group II Base oil	20,000
GO-4		Group II Base oil	20,000
SO-1		Sulfonated Oil	5,000
SO-2		Sulfonated Oil	5,000

CONTINUOUS MONITORING DEVICES

11. The facility has the following continuous monitoring devices: thermal oxidizer temperature monitor.

COMPLIANCE

12. The facility was inspected on 6/17/2015, 2/8/2016 & 7/26/2016 and found to be in compliance with permit conditions.
13. During the prior permit period there were numerous odor complaints recorded for this facility.
14. Since the last permit renewal, a mutual agreement and order has been initiated to require the installation of a thermal oxidizer to control emissions and odors. There is a compliance schedule in the permit for oxidizer installation and operation.

SPECIAL CONDITIONS

15. Special conditions contained in the permit include:
 - a. a prohibition on combusting any hazardous waste;
 - b. a requirement to inspect the facility for leaks on a regular schedule and repair any leaks found;
 - c. maintaining properly operating pressure/vacuum relief valves on all storage and process tanks; and
 - d. limits on true vapor pressure of petroleum liquids stored in tanks.

EMISSIONS

16. In the baseline year 1978, a 2.1 mmBtu/hr hot oil heater was operating 3 days per week and a 1.1 mmBtu/hr boiler was operated 3 hours per day and diesel was the source of fuel.
17. The amounts of residual and distillate oil processed in 1978 were 1,428,000 gallons and 25,000 gallons, respectively. Emissions of particulate matter (PM) was calculated at 0.03 tons per year. Emissions of sulfur dioxide (SO₂) was calculated at 0.60 tons per year. VOC emissions from the cook tanks were calculated at 5.78 tons per year.
18. The normal operating schedule for the facility is 24 hrs/day, 7 days/wk and 52 wks/yr.
19. The maximum projected annual facility throughput is as follows:
 - a. 6,816,000 gallons per year thru oil sulfonation process
 - b. 6,666,667 gallons per year thru oil polishing system
 - c. 12,000,000 gallons per year used oil thru the PESCO refinery
 - d. 52,870 gallons per year oil lost thru oil polishing system (combusted in oxidizer)
 - e. 406,000 gallons per year diesel #2 burned in either heater # 3 (HTR-3) or heater # 4 (HTR-4)
 - f. 8,490,000 cubic feet per year natural gas burned in thermal oxidizer (TO-1)
 - g. 8,540,000 cubic feet per year natural gas burned in boilers (B-1 and B-2) to maintain the molten sulfur tank within an appropriate temperature range
 - h. 49 storage tanks ranging from 1,000 to 200,000 gallon capacity each
20. Proposed PSEL information:

Pollutant	Baseline Emission Rate (tons/yr)	Netting Basis		Plant Site Emission Limits (PSEL)		
		Previous (tons/yr)	Proposed (tons/yr)	Previous PSEL (tons/yr)	Proposed PSEL (tons/yr)	PSEL Increase (tons/yr)
PM	0	0	0	24	24	0
PM ₁₀	0	0	0	14	14	0
PM _{2.5}	NA	NA	0	NA	9	9
SO ₂	1	1	1	39	39	0
NO _x	0	0	0	39	39	0
CO	0	0	0	99	99	0
VOC	6	6	0	39	39	0
GHG (CO ₂ e)	0	NA	NA	NA	74,000	74,000

- a. The baseline emission rate was established in previous permitting actions and there is no new information that effects the previous determination.

- b. For Standard ACDPs, the netting basis is equal to the baseline emission rate minus emission reductions required by rule plus emission increases approved in accordance with OAR 340, division 224 (NSR rules). TACT (OAR 340-226-0130) is being implemented by this permit modification and is considered a rule required reduction, so the proposed VOC netting basis is being reduced by the 97% control efficiency required by the TACT analysis.
- c. The previous PSEL is the PSEL in the last permit.
- d. Referring to the emission detail sheets attached to the review report for emission calculations
- e. The PSEL is a federally enforceable limit on the potential to emit.
- f. PM_{2.5} and GHG PSELs have been added to this permit because they became regulated pollutants subject to PSELs. This does not represent an increase in allowed emissions, just an acknowledgement that the pollutants exist.

SIGNIFICANT EMISSION RATE ANALYSIS

- 21. For each pollutant, the proposed Plant Site Emission Limit is less than the Netting Basis plus the significant emission rate, thus no further air quality analysis is required.

TITLE V MAJOR SOURCE APPLICABILITY

- 22. A major source is a facility that has the potential to emit 100 tons/yr or more of any criteria pollutant or 10 tons/yr or more of any single HAP or 25 tons/yr or more of combined HAPs. This facility is not a major source of emissions. The basis for this determination can be found in the emission detail sheets attached to this review report.

HAZARDOUS AIR POLLUTANTS

- 23. This source is not a major source of hazardous air pollutants. Provided below is a summary of the HAP emissions.

Hazardous Air Pollutant	Potential to Emit (tons/year)
ORGANICS	
Benzene	1.43E-02
Benzo(a)pyrene	3.26E-03
Bis(2-ethylhexyl)phalate	1.79E-03
Chlorbenzene	4.89E-04
Dibenzo(a,h)anthracene	3.26E-03
Dibutylphthalate	2.77E-05
Dichlorobenzene	6.52E-07

Hazardous Air Pollutant	Potential to Emit (tons/year)
ORGANICS	
Ethylbenzene	4.89E-04
Formaldehyde	4.97E-02
Hexane	9.78E-02
Isomers of Xylene	2.28E-03
Naphthalene	4.89E-04
Phenanathrene	8.96E-03
Phenol	1.96E-03
Pyrene	5.78E-03
Toluene	1.43E-02
METALS	
Arsenic	4.56E-04
Beryllium	2.85E-04
Cadmium	2.85E-04
Chromium	2.85E-04
Lead	1.03E-03
Manganese	6.84E-04
Mercury	2.85E-04
Nickel	2.85E-04
Selenium	1.71E-03
Total from fuel combustion	0.11
Total from storage tanks	0.2
Total from Condenser Vent-cookers	4.4
Total (tons/year)	4.71

TOXICS RELEASE INVENTORY

24. The permittee did not report emissions to the EPA toxics release inventory in 2015.

ADDITIONAL REQUIREMENTS

NSPS APPLICABILITY

25. 40 CFR Part 60, Subpart Dc is applicable to oil heaters HTR-3 and HTR-4 source because they were installed after the 1989 applicability date, they have a heat input capacity of 10 mmBtu/hr or greater and they use an oil as a heat transfer medium. Subpart Dc is not applicable to the steam boilers (B-1 and B-2) because the boilers are below the size threshold for the subpart.

NESHAPS/MACT APPLICABILITY

26. 40 CFR Part 63 subpart JJJJJ (6J) tuning requirements are applicable to oil heaters HTR-3 and HTR-4. Subpart 6J is not applicable to the steam boilers (B-1 and B-2) because the boilers are natural gas fired only.

RACT APPLICABILITY

27. The facility is located in the Portland AQMA, but it is not one of the listed source categories in OAR 340-232-0010, thus the RACT rules do not apply

TACT APPLICABILITY

28. The source will be meeting TACT/Highest and Best Rules for VOC by installing and operating a thermal oxidizer to control VOC emissions from the PESCO refinery, oil heater #3 (HTR-3), oil heater #4 (HTR-4), oil sulfonation process (SULF-1) and oil polishing system (OPS-1).

SOURCE TESTING

PROPOSED TESTING

29. The thermal oxidizer will be tested at least once during the permit term for VOC, SO₂, CO, NO_x and metals emissions, and at least every 24 months for VOC control efficiency. The following production and control device parameters will be recorded during the tests:
 - a. Oxidizer temperature
 - b. Quantity of oil processed thru PESCO refinery
 - c. Type and quantity of fuel burned in oil heater #3 and #4
 - d. Quantity of oil process thru the sulfonation system
 - e. Quantity of oil processed thru the oil polishing system

PUBLIC NOTICE

30. Pursuant to OAR 340-216-0066(4)(a)(A), issuance of Standard Air Contaminant Discharge Permits require public notice in accordance with OAR 340-209-0030(3)(c), however DEQ has decided to process this permit modification and renewal as a category IV public notice. A public information meeting was held on March 7, 2017. In addition, a public hearing was held on June 21, 2017, with the comment period open until July 3, 2017, to allow interested persons to submit oral or written comments regarding the conditions of the draft permit.
 - DEQ received comments and questions during the public notice period. Those comments and DEQ's responses are located in a separate document.

dpk:mro