Updated Public Notice

Information Meeting About DEQ Permitting at American Petroleum Environmental Services – New Meeting Location

DEQ invites the public to an information meeting on American Petroleum Environmental Services' application for a modification of their standard air contaminant discharge permit and application for a solid waste permit.

Please Note:

DEQ has moved the location of the meeting from the Oxford Suites to the Red Lion Hotel. See the Meeting Details below for information on the new location.

Summary

American Petroleum proposes to modify their existing air quality permit to add an oil sulfonation process and an oil polishing process along with a thermal oxidizer to control volatile organic compound emissions. In addition, per DEQ's request, American Petroleum is applying for a solid waste permit for processing used oil filters and other oily solids.

How do I participate?

Attend the meeting to learn about the permit application, provide input and ask any questions you might have.

Meeting details

When: 6:00 pm
Tuesday, March 7, 2017

Where: Red Lion Hotel
909 N. Hayden Island Drive
Portland, Oregon 97217

About the facility

American Petroleum is a used oil re-refinery, taking deliveries of used oil and processing them into reusable oil and fuel. The proposed additions to the facility include an oil sulfonation process and an oil polishing process, in addition to a thermal oxidizer to reduce volatile organic compounds and odor emissions.

The air quality permit application is for a complex modification to a standard air contaminant discharge permit for American Petroleum Environmental Services located at 11535 N. Force Avenue, Portland, Oregon. The existing air permit was issued on April 1, 2009 and originally scheduled to expire on Dec.1, 2013.

A timely application for renewal was received by DEQ, so the existing permit remains in force until final action is taken on the renewal application.

Two non-technical permit modifications to change the legal name of the facility have been issued since the last permit renewal.

DEQ has determined that acceptance of used oil filters and oily solids for transfer to metal recovery facilities or for disposal should be regulated under a DEQ solid waste permit. DEQ required American Petroleum to submit an application for a solid waste permit for their used oil filter processing and oily solids collection by March 2, 2017.

What air pollutants would the permit regulate?

This permit regulates emissions of the pollutants listed in the table at the end of this document.

What would the solid waste permit regulate?

The solid waste permit will regulate acceptance, processing and transfer of oily solids and used oil filters.

How does DEQ determine permit requirements?

DEQ evaluates the types and amounts of pollutants, site processes, and the facility's location, and determines permit requirements according to state and federal environmental regulations.

How does DEQ monitor compliance with the permit requirements?

This permit would require the facility to monitor pollutants using federally-approved monitoring practices and standards.

State of Oregon
Department of Environmental Quality

Northwest Region
700 NE Multnomah St Ste 600
Portland, OR 97232

Phone: 503-229-5263
800-452-4011
Fax: 503-229-6945

Air Quality Permit Writer:
David Kauth, PE
Phone: 503-229-5053

Solid Waste Permit Writer:
Heather Kuoppamaki, PE
Phone: 503-229-5125
www.oregon.gov/DEQ

Search for American Petroleum, Info Meeting

DEQ is a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.

DEQ provides documents electronically whenever possible in order to conserve resources and reduce costs.

If you received a hard copy of this notice, please consider receiving updates via email instead. Send your request to: subscriptions@deq.state.or.us

Please include your full name and mailing address so that we can remove you from our print mailing list.

American Petroleum currently submits annual reports to demonstrate compliance with the existing air quality permit. Periodic onsite inspections are conducted to evaluate compliance status. The modified permit will address additional requirements based on the proposed changes to the facility.

For the solid waste permit, DEQ requires permittees to develop an operations plan to address how waste is accepted and managed on site.

The permittee submits annual reports on the quantity and types of wastes received and processed. DEQ conducts periodic inspections to verify that the permittee is in compliance with solid waste and other applicable regulations and the DEQ solid waste permit.

What happens after the meeting?

DEQ considers all comments received during the information meeting when drafting the air quality permit modification and solid waste permit, but will not provide a formal response to those comments. DEQ will proceed with drafting a revised air quality permit and a solid waste permit for American Petroleum. Once DEQ has drafted these permits, DEQ will issue public notice(s) to receive written public comments on the draft permits as well as schedule public hearing(s) to receive verbal comments on the draft permits.

Where can I get more information?

Find out more and view the application at http://www.oregon.gov/deq/Get-Involved/Pages/Public-Notices.aspx or contact:

Northwest Region AQ Permit Coordinator:

Phone: 503-229-5582 or 800-452-4011
Fax: 503-229-6945
Email: nwraqpermits@deq.state.or.us

You can also contact the Solid Waste Permit Coordinator directly using the following contact information:

Phone: 503-229-5353 or 800-452-4011
Fax: 503-229-6957
Email: DEQNWR.SolidWastePermitCoordinator@deq.state.or.us.

View the application and related documents in person at the DEQ office in Portland at 700 NE Multnomah St Ste 600. For a review appointment, call Susan Curry at 503-229-6736.

Accessibility information

Documents can be provided upon request in an alternate format for individuals with disabilities or in a language other than English for people with limited English skills. To request a document in another format or language, call DEQ in Portland at 503-229-5696, or toll-free in Oregon at 1-800-452-4011, ext. 5696; or email deqinfo@deq.state.or.us.

Emissions limits

Criteria Pollutants: Table 1 below presents maximum allowable emissions of criteria pollutants for the facility. The current emission limit reflects maximum emissions the facility can emit under the existing permit. The proposed emission limits will be establish when drafting the permit modification and will reflect maximum emissions the facility would be able to emit under the proposed permit. Typically, a facility's actual emissions are less than maximum limits established in a permit; however, actual emissions can increase up to the permitted limit.

Table 1

Criteria Pollutant	Current Limit (tons/yr)	Proposed Limit (tons/yr)
Particulate matter	24	TBD
Small particulate matter	14	TBD
Fine particulate mater	NA	TBD
Nitrogen oxides	39	TBD
Sulfur dioxide	39	TBD
Carbon monoxide	99	TBD
Volatile organic compounds	39	TBD

For more information about criteria pollutants, go to: www.epa.gov/air/urbanair/

DEQ-DC1

EcoLube Recovery
A ClearLube Re-Refining Company, LLC

Clear Lube Re-Refining, LLC
40 Lake Bellevue Drive
Suite 100
Bellevue, WA 98005

January 25, 2017

Michael Orman
Northwest Region Air Quality Manager
Oregon Department of Environmental Quality
700 Multnomah Street, Suite 600
Portland, OR 97232-4100

RE: Construction and Complex Technical Modification ACDP Submission
American Petroleum Environmental Services
11535 N. Force Ave
Portland, OR, 97217
Multnomah County

Dear Mr. Orman:

American Petroleum Environmental Services (APES) in conjunction with Clear Lube Re-Refining, hereby submit their ACDP for the construction of the planned Sulfonation (Sulfo-1) and Oil Polishing Systems (OPS-1) at the APES facility referenced above

The ACDP, prepared in compliance with the MAO executed between the Oregon DEQ, CLRR, and APES on 27 December 2016, proposes significant improvements to the current facility. The Sulfo-1 and OPS-1 units will provide CLRR the opportunity to create a true oil-recycling facility, returning used oil to clean base oil for re-use in the industry. We believe our process to be of the utmost value to the environment, saving millions of gallons of used oil from being refined into fuel for combustion. The decommissioning of the front plant cooking process will result in a more energy efficient process, with less emissions to the environment.

Combined with the improved and advanced effluent control systems to be installed through the MAO, CLRR and APES will operate a facility friendly to the environment, community, and economy.

Please give this application all due consideration, and please do not hesitate to contact me with any questions, concerns, or clarifications. We at CLRR and APES look forward to a continuing successful relationship with the DEQ, and the expedient approval of this application.

Sincerely,

Colin A. Gregg
Operations and Technology Director, Clear Lube Re-Refining

Attachments (13): AQ101NWR, AQ102, Site Plan, Effluent PFD, City Map 1, City Map 2, AQ230 (Sulfo-1), AQ230 (LPS-1), Overall Process PFD, AQ306, AQ403, EF Sheet, PTE Calculations, Sulfonation Process & Equipment Description

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Print Form

ADMINISTRATIVE INFORMATION

FORM AQ101
ANSWER SHEET

DEQ
State of Oregon Department of Environmental Quality

FOR DEQ USE ONLY	
Permit Number:	Type of Application:
Application No:	RNW☐ MOD☐ NEW☐ EXT☐
Date Received :	
Regional Office:	Check No. Amount $

1. Company	**2. Facility Location**
Legal Name: American Petroleum Environmental Services	Name: American Petroleum Environmental Services
Mailing Address: 11535 N. Force Ave	Street Address: 11535 N. Force Ave
City, State, Zip Code: Portland, OR 97217	City, County, Zip Code: Portland, Multnomah, OR 97217
Number of employees (corporate): 41	Number of employees (facility): 13
3. Facility Contact Person	**4. Industrial Classification Code(s)**
Name: Colin Gregg	Primary SIC and NAICS: 5093 / 423930
Title: Operations and Technology Director	Secondary SIC and NAICS:
Telephone number: (503) 445-7780	**5. Other DEQ Permits** 26-321-ST-01
Fax. number: N/A	
e-mail address: colin.gregg@ecoluberecovery.com	

6. Permit Action:

- ☐ New Simple ACDP
- ☒ New Construction ACDP
- ☐ New Standard ACDP
- ☐ New Standard ACDP (PSD/NSR)
- ☐ Renewal of an existing permit without changes (include form AQ403 for Standard ACDPs)
- ☒ Renewal of an existing permit with changes (include form AQ403 for Standard ACDPs)
- ☐ Revision (or Modification) to an existing permit application

7. Signature

I hereby apply for permission to discharge air contaminants in the State of Oregon, as stated or described in this application, and certify that the information contained in this application and the schedules and exhibits appended hereto, are true and correct to the best of my knowledge and belief.

Michael P. Mazza — Name of official (Printed or Typed)

President / 253-538-5252 — Title of official and phone number

[signature] — Signature of official

01/26/2017 — Date

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FEE INFORMATION
(Make the check payable to DEQ)

Note: The initial application fees and annual fees specified below (OAR 340-216-8020, Table 2, Parts 1 and 2) are only required for initial permit applications. These fees are not required for an application to renew or modify an existing permit. The appropriate specific activity fee(s) specified below (OAR 340-216-8020, Table 2, Part 3) applies to permit modifications or may be in addition to initial permit application fees.

OAR 340-216-8020, Table 2, Part 1 – INITIAL PERMITTING APPLICATION FEES:		
Short Term Activity ACDP	☐	$3,600.00
Basic ACDP	☐	$144.00
Assignment to General ACDP	☐	$1,440.00
Simple ACDP	☐	$7,200.00
Construction ACDP	☒	$11,520.00
Standard ACDP	☐	$14,400.00
Standard ACDP (Major NSR or Type A State NSR)	☐	$50,400.00
OAR 340-216-8020, TABLE 2, PART 2 - ANNUAL FEES:		
Simple ACDP Low Fee Class	☐	$2,304.00
Simple ACDP – High Fee Class	☐	$4,608.00
Standard ACDP	☐	$9,216.00
OAR 340-216-8020, TABLE 2, PART 3 - SPECIFIC ACTIVITY FEES:		
Non-Technical Permit Modification	☐	$432.00
Basic Technical Permit Modification	☐	$432.00
Simple Technical Permit Modification	☐	$1,440.00
Moderate Technical Permit Modification	☐	$7,200.00
Complex Technical Permit Modification	☒	$14,400.00
Major NSR or type A State NSR Permit Modification	☐	$50,400.00
Modeling review (outside Major NSR or Type A State NSR)	☐	$7,200.00
Public Hearing at Source's Request	☒	$2,880.00
State MACT Determination	☐	$7,200.00
TOTAL FEES		**$ 28,800.00**

SUBMIT TWO COPIES OF THE COMPLETED APPLICATION TO:

New or Modified Permits (include fees):	Permit Renewals (no fees):
Oregon Department of Environmental Quality Business Office 811 SW Sixth Avenue Portland, OR 97204-1390	Oregon Department of Environmental Quality Air Quality Program, Northwest Region Office 700 NE Multnomah Street, Suite 600 Portland, Oregon 97232

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ADMINISTRATIVE INFORMATION

FORM AQ101
ANSWER SHEET

DEQ
State of Oregon Department of Environmental Quality

CONTACT LIST

1. **Company Information:**

Legal Name:	Other company name (if different than legal name):
American Petroleum Environmental Services, Inc.	

2. **Site Contact Person**: *(A person who deals with DEQ staff about equipment problems.)*

Name:	Telephone number:
Colin Gregg	425 599 9035
Title:	**E-mail address:**
Operations and Technology Director	colin.gregg@ecoluberecovery.com

3. **Facility Contact Person:** *(If other than the site contact person, a person involved with all environmental issues at the facility although they may be housed at a different site.)*

Name:	Telephone number:
Mike Mazza	253-533-6007
Title:	**E-mail address:**
President	mmazza@apes-inc.com

4. **Mailing Contact Person:** *(If other than the site contact person, a person to whom the company would like all agency communications directed.)*

Name:	Telephone number:
Joe Stanaway	425 429 3616
Title:	**E-mail address:**
Chief Executive Officer	joe.stanaway@ecoluberecovery.com

5. **Invoice Contact Person**: *(If other than the site contact person, a valid contact information to which invoices and communications related to resolving invoice questions can be directed.)*

Name:	Telephone number:
Mike Mazza	253-533-6007
Title:	**E-mail address:**
President	mmazza@apes-inc.com

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FACILITY DESCRIPTION

FORM AQ102
ANSWER SHEET

DEQ
State of Oregon Department of Environmental Quality

Facility Name: American Petroluem Environmental Services Permit Number: 26-3021-ST-01

1. Description of facility and processes:

The current facility is a used oil refinery, taking deliveries of used oils and processing them through to create VGO (Vaccuum 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 currently has three effluent points. Under form AQ104 NOC (submitted 9/30/2016) they will be 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 will be decommissioned, eliminating this emission source. Oil Heater #4 will be 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 will be 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.

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.

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.

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.

2. Attach plot plan.

3. Attach process flow diagram.

4. Attach a city map or drawing showing the facility location.

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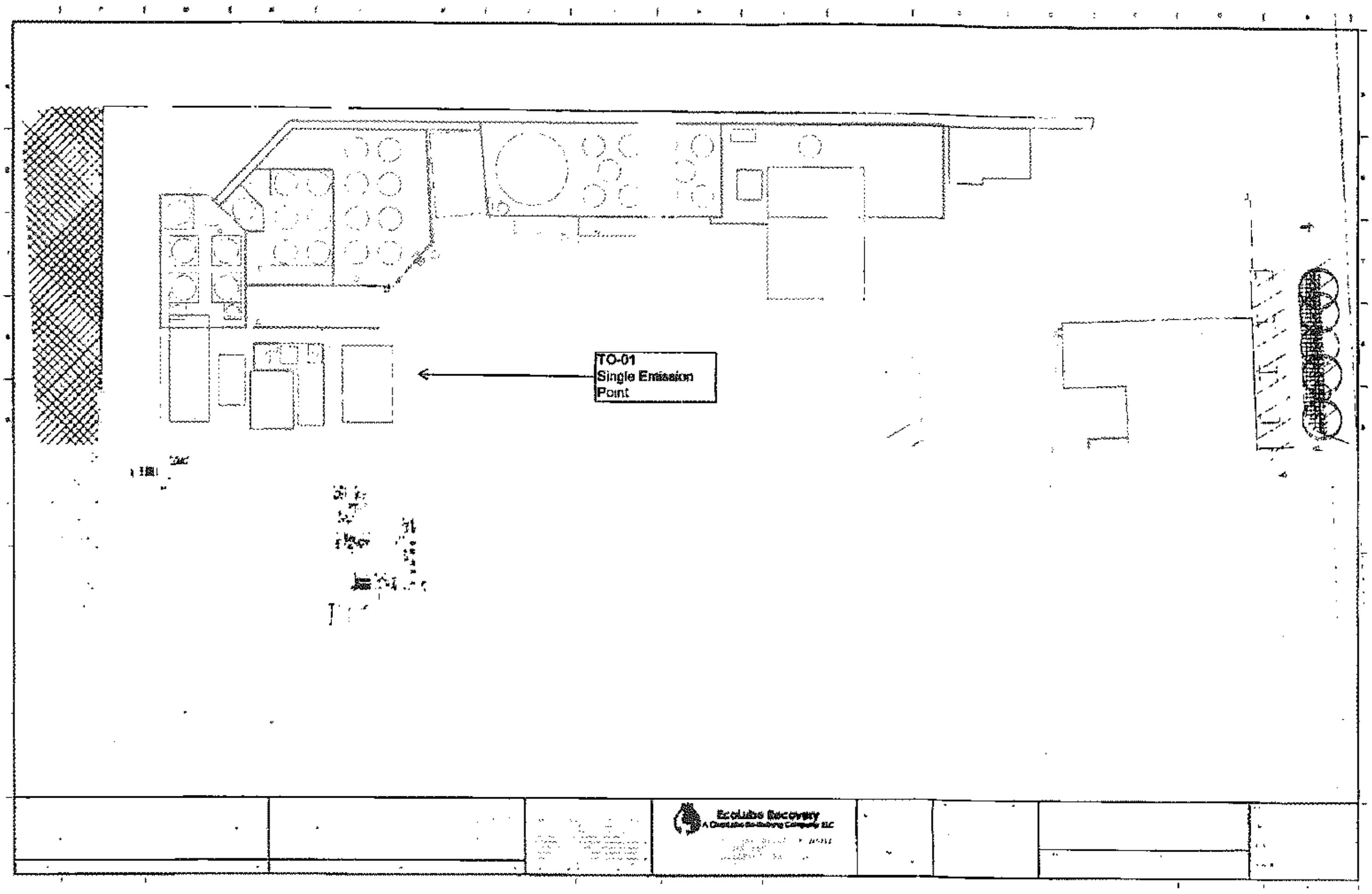
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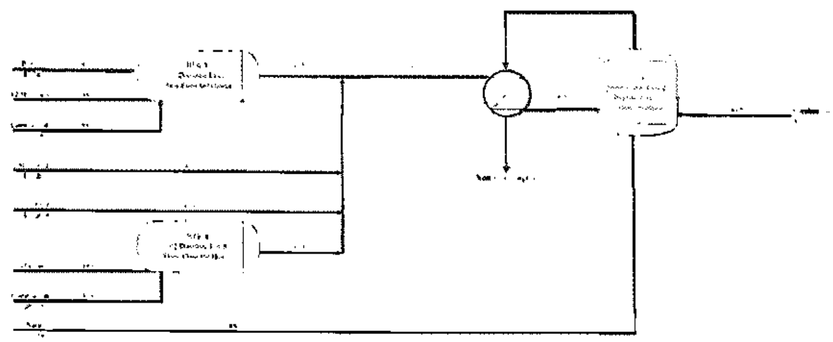
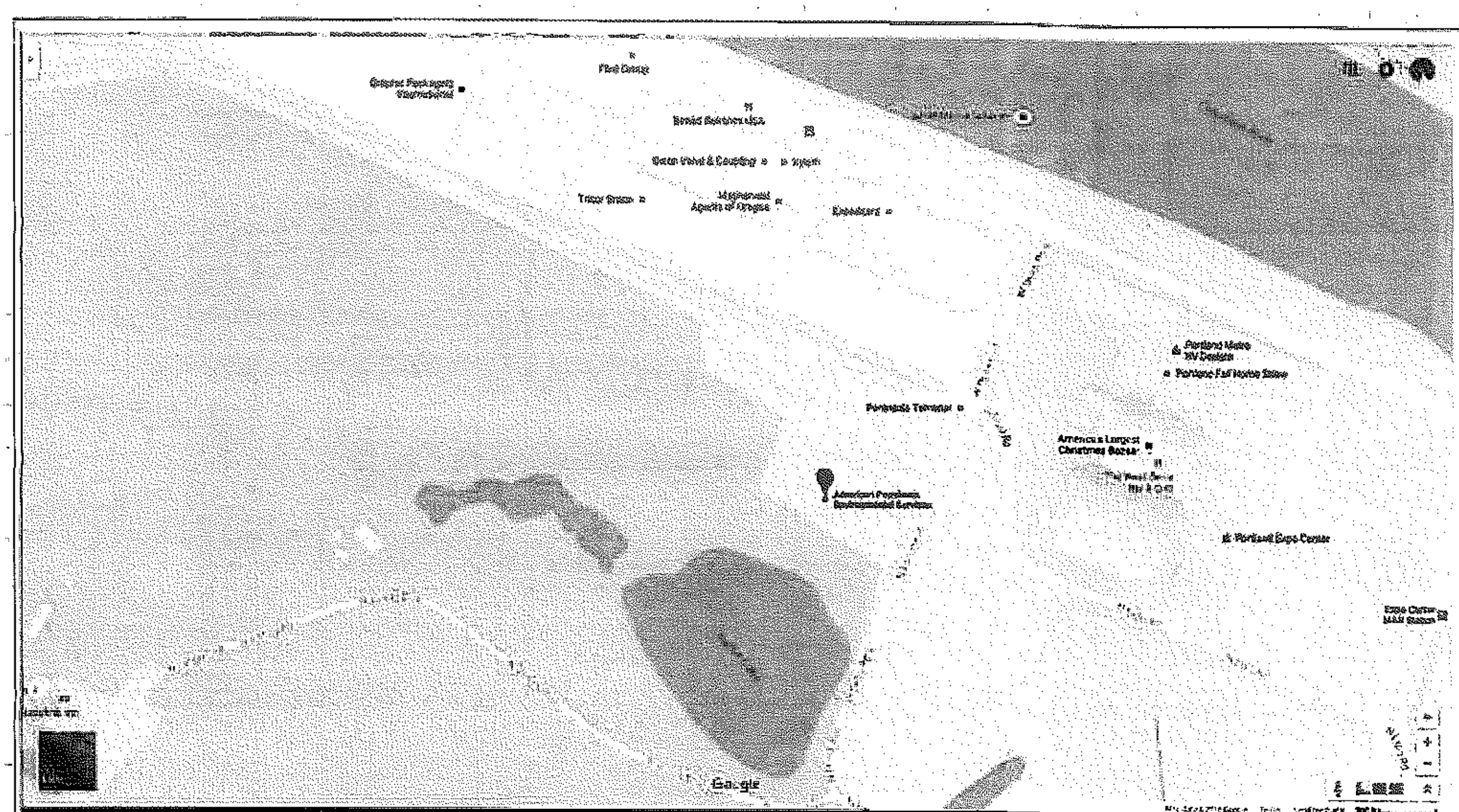


Ecolube Recovery

THERMAL OXIDATION SYSTEM
Process Flow Diagram (PFD)

AMERICAN PETROLEUM
ENVIRONMENTAL SERVICES, INC

MPA 1-29



EcoLube Recovery

Ecolube Recovery

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DEQ

State of Oregon Department of Environmental Quality

MISCELLANEOUS PROCESS OR DEVICE

FORM AQ230
ANSWER SHEET

Facility Name: American Petroleum Environmental Services   Permit Number: 26-321-ST-01

Process Information

1. ID Number	Sulfo-1
2. Descriptive name	Oil Sulfonation Process
3. Existing or future?	Future
4. Date commenced	3/1/2017
5. Date installed/completed	7/1/2017

6. Description of process:

Oil sulfonation involves the reaction of the VGO from the refinery with sulfur trioxide (SO3). 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 (SO2). Air is compressed and dried using desiccant filled vessels to prevent acid formation in the gas plant. The SO2 is then catalytically converted to SO3 and cooled to ambient temperature. The SO3 (diluted in air to <4%) 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 SO2, SO3, and variable but miniscule amounts of mercaptans) is sent through a treatment process. It first is processed through a packed column continuously flushed with dilute caustic soda (NaOH) to absorb the SO2. It is then sent through a constantly irrigated (water) brownian motion filter, where the SO3 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.

Operating Schedule

7. Seasonal or year-round?	Year-round
8. Batch or continuous operation?	Continuous
9. Projected maximum hours/day	24
10. Projected maximum hours/year	8000

11. Process/device capacity:	Short term capacity		Annual usage	
Raw materials	Amount	Units	Amount	Units
Molten Sulfur	45	lb/hr	163	Tons/Year
VGO	14.2	GPM	6,816,000	Gallons/Year
Caustic Soda (25% NaOH)	41	lb/hr	149	Tons/Year
Products				
Sulfonated Oil	14.2	GPM	6,816,000	Gallons/Year
98% Sulfuric Acid (Reagent Grade)	138	lb/hr (intermittant)	2	Ton/Year
Sodium Sulfate (<6% aq)	0.8	GPM	384,000	Gallons/Year

12. Control devices(s) (yes/no): Yes

If yes, provide the ID number and complete and attached the applicable series AQ300 form(s).

TO-01

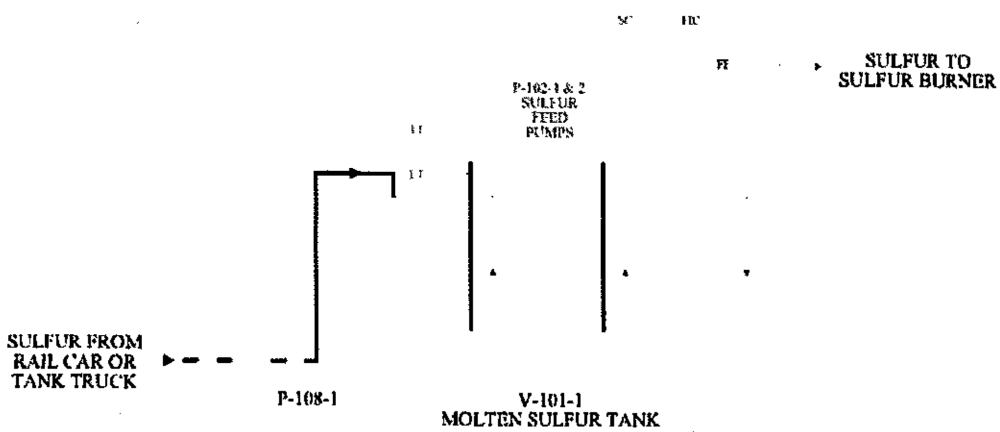
Process and Equipment Description

The sulfonation process consists of a number of distinct process operations as illustrated above. This section of the proposal is intended to assist the reader in understanding the complete sulfonation process by describing the process and equipment for each of the unit operations involved.

Chemithon is responsible for the most advanced sulfonation process systems currently available anywhere in the world. Seattle-based research and development has been conducted in this field has produced equipment that is far superior to that offered by any of our competitors.

Sulfur Supply System

Sulfur is supplied to the sulfur burner from one of two submerged gear pumps (see Figure below) located in the molten sulfur tank. The submerged pumps provide accuracy, reliability and ease of maintenance. Steam jacketed mechanical seals, which are prone to failure, are eliminated by submerging the pumps in molten sulfur. Dual pumps are provided in order to minimize down time during sulfur pump maintenance. *Chemithon was the first to develop submerged sulfur pump systems.*



Sulfur Supply System

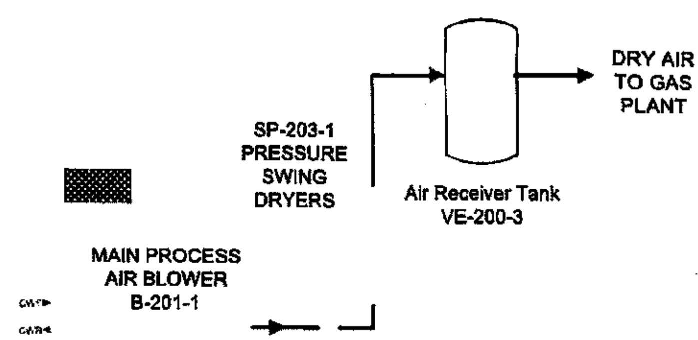
The SO_3 to organic mole ratio is a very important parameter to control in the sulfonation and sulfation processes. In order to achieve the precision required to produce the finest quality surfactants. Chemithon supplies a highly accurate mass flow meter for measuring the sulfur to the burner. A customized temperature interlock in the mass flow transmitter reduces failures due to operating the system with frozen sulfur in the meter. *Chemithon was the first—by many years—to use a mass flow system to control the sulfur flow. Chemithon assisted MicroMotion to develop a suitable mass flow meter for this service.* The molten sulfur storage tank comes complete with level indicator panel and sulfur unloading system. A steam and condensate system is utilized to supply the necessary tracing circuits for all the sulfur supply piping and the sulfur melter. Optionally, a sulfur melter system is available for those areas using powder sulfur.

Chemithon's 50 years of experience in designing and building jacketed sulfur supply systems enables us to supply a highly reliable and easy to use sulfur delivery system for use in sulfonation and sulfation plants..

Air Supply System – High Pressure Type

The Chemithon sulfonation process requires a continuous flow of dry air-SO_3 gas. A reliable source of dry air is necessary in order to meet this requirement. In Chemithon's air supply systems, air is supplied at a constant flow rate and does not change due to down-line process variations. An Atlas Copco two stage, water cooled, oil free rotary screw compressor and a packaged pressure swing dryer system is also provided. Process air flow and pressure can then be easily regulated to the pilot plant as required by the process.

The high pressure 8.4 kg/cm2 (120 psig) compressor and pressure swing air dryers eliminate the need for recovering heat from the gas plant to regenerate the air dryers (as is typically done in commercial scale plants.) This system will enable the plant to have a wide turndown range and potentially produce SO_3 at a low enough rate as to avoid gas flow splitting to the SO_3 absorber during operation of the pilot plant. The pressure swing dryers and air receiver are part of the gas plant skid.



Air Supply System

The Chemithon sulfonation process requires a continuous flow of dry air. A reliable source of dry air is necessary in order to meet this requirement.

Sulfur Burning SO3 Gas Generator System

The skid-mounted SO_3 Gas Generator System will produce the required amount of SO_3 gas to meet the rated capacity of the sulfonation equipment.

In addition to being highly reliable and easy to operate, the Chemithon SO_3 gas generators will achieve the precise and uniform flow of SO_3 required by the sulfonation process. Do to the very low sulfur flow rate desired, an oversized "spray type" sulfur burner is proposed. The combustion air is heated by an inline ignition air heater which immediately ignites the sulfur in the burner.

The metered sulfur is delivered to the refractory-lined sulfur burner (see Figure below) where combustion with the dry process air generates sulfur dioxide (SO_2). The sulfur dioxide gas leaving the burner is cooled (radiant heat loss) in the SO_2 piping prior to being delivered to a two-stage catalytic converter.

In the Chemithon converter the SO_2 gas is filtered and converted to sulfur trioxide (SO_3). The conversion efficiency of the converter is typically over 98% using vanadium oxide catalysts. As the SO_2 is oxidized to SO_3, heat is liberated which increases the gas temperature. Since the conversion of SO_2 to SO_3 is limited by temperature, the gas mixture is cooled by use of a radiant cooler between the first and second catalyst beds.

Chemithon uses water to gas cooler for final SO_3 gas temperature adjustment, the inlet gas temperature to the sulfonation reactor can be precisely controlled to the temperature desired (40- 55 C). The SO_3 passes through an inlet mist eliminator to remove any oleum mist that may be in the gas prior to being sent to the different sulfonation systems.

The control of amount of heat loss due to the equipment size and low sulfur flow rates is critical. An inline electrical ignition air heater is used to heat the combustion air stream for sulfur burner preheating, ignition, and for operating at reduced rates. The sulfur burner, outlet gas line and converter all have electric "heat hold" system that can be controlled independently not only during shutdown periods, but also during operation of extremely low sulfur flow conditions. This will keep the gas at the proper temperature for sulfur burning and for SO_2 to SO_3 gas conversion. This type of operation can be demonstrated at Chemithon in one of our current pilot gas plants.

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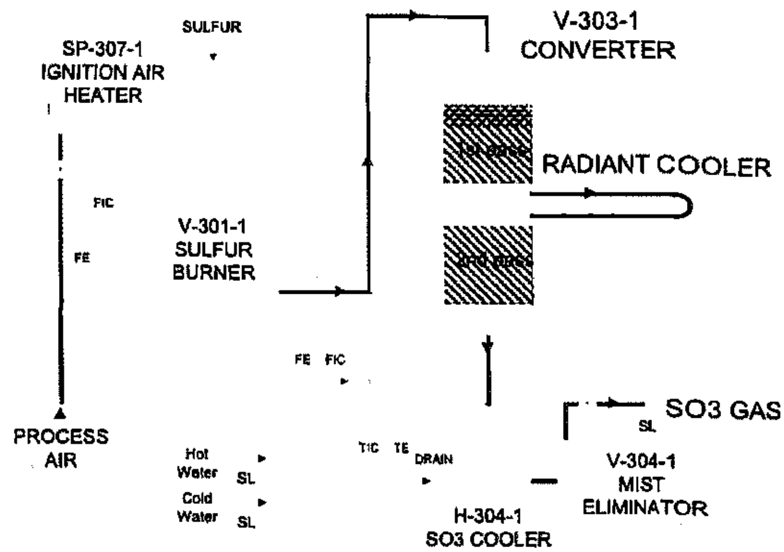


Gas Plant System

AFFR Sulfation System

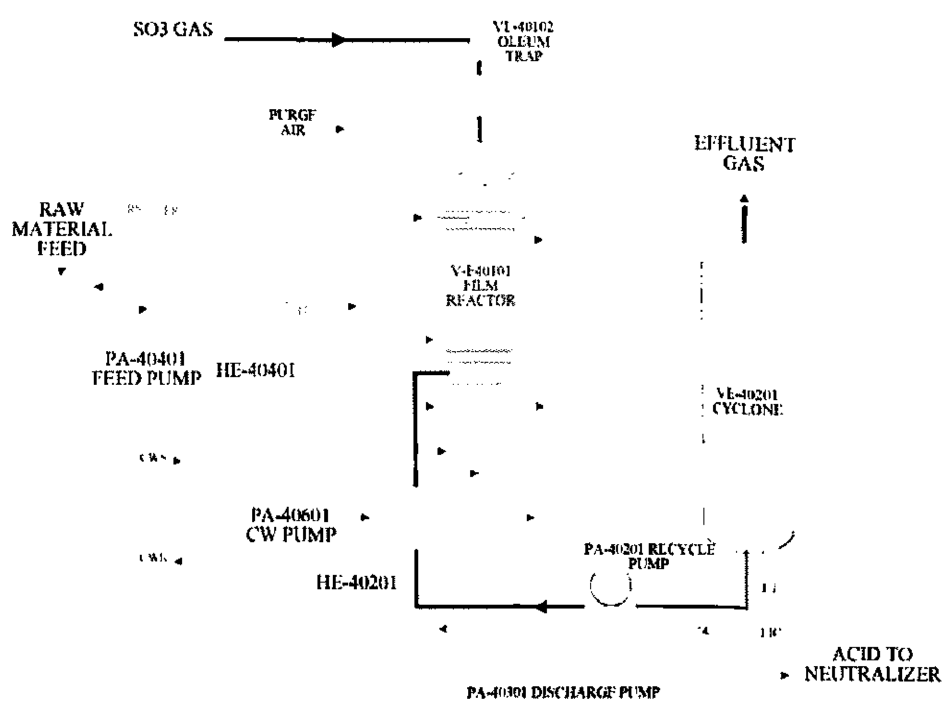
Chemithon sulfation systems enable our Buyers to produce the finest quality products achievable from available organic feedstocks. One of the important control parameters in the sulfonation process is the SO_3 -to-organic mole ratio. In order to obtain precise control of the SO_3 -to-organic mole ratio in the sulfonation process, Chemithon designs utilize mass flow meters on the sulfur and organic feed systems, an atomizing sulfur burner for uniform combustion of sulfur and a reactor designed for excellent distribution of the organic feedstock and the air-SO_3 gas.

The sulfonic acid forms in the unit when an SO_3-in-air mixture is injected into a Chemithon Falling Film Reactors (see Figure below) simultaneously with the desired organic feed. The Annular Falling Film Reactor is accepted as more reliable than other designs. Shutdowns for reactor maintenance are normally not required. The removable organic distribution flanges are factory calibrated by Chemithon prior to installation in the reactor and, due to the unique design and materials of construction (316 stainless steel and high nickel alloys), do not require periodic recalibration. Uniform distribution of the air-SO_3 gas is the result of symmetrical gas flow through the reactor. Reactor distribution can be easily checked during operation by use of the sample ports conveniently located at the bottom reaction section.

Reaction temperature is also a very important parameter to control in sulfonation and sulfation processes. Cooling jackets in the reactor remove a significant portion of the heat of reaction. *The Chemithon design is the only one that can ensure consistent cooling at any point in the reaction.* Additional cooling is achieved through the use of a quench cooled recycle system. Recycled acid from the product cyclone is cooled through heat exchangers and fed to the lower quench zone of the reactors. These unique measures precisely control the reaction temperature.

The Chemithon Annular Falling Film Reactor offers the following additional advantages over other designs, resulting in up to 0.5% better conversion of all feeds:

- Better heat transfer and lower peak product temperatures
- Cooler product discharge temperatures
- Shorter residence time in reactor at elevated temperatures
- Higher gas velocity produces a thinner liquid film, leading to better mass transfer
- Recycle allows quench cooling, shorter reactor and results in the highest reaction completeness which is essential to produce high quality products
- Compact reactor is easier to install and maintain
- Liquid flow rate is controlled at less than ±1.5% variance between any two points
- Washouts are a short, simple process
- Liquid/gas contact is mechanically controlled and does not rely on fluctuations in product completeness
- Oleum separator in the gas line prevents reactor fouling from small amounts of oleum in the SO_3 line
- Feedstock changeover is easily accomplished without shutting down
- The recycle system provides an additional reaction zone that assists with gas scrubbing



Sulfonation System

Organic feed rate to the reactor vessels is measured by means of a highly accurate mass flow meter and controlled by a control valves. The organic feed rate is controlled based on the preset sulfur-to-organic mole ratio.

Spent gas is separated from the acid recycle stream in the liquid separator and cyclone vessels. Because of the superior Chemithon cyclone design, cyclone product losses are less than 0.2% of product throughput. The net result is improved conversion of feedstock to product. Acid product is discharged from the recycle stream at a controlled rate, maintaining continuity of the quantity of material in the recycle system.

The Chemithon sulfonation system will produce the amount of acid needed to meet the rated capacity of the sulfonation plant

SO_3 Absorber System

This unit is capable of treating the total output from the SO_3-air system to form 98% sulfuric acid. Chemithon highly recommends the use of an SO_3 absorber system for the following reasons:

Sulfur burning SO_3 gas plants can take up to a few hours to develop a stable SO_2 to SO_3 conversion rate during startup. The SO_3 absorber system offers a convenient and reliable method of handling the process gas during startups. The SO_3 strength is unknown during startup. The SO_3 absorber system uses conductivity to measure the sulfuric acid concentration in the absorber recycle and adjusts the concentration by adding process water and therefore operates without the knowledge of inlet SO_3 gas concentrations. The sulfonation system uses mole ratio from a known sulfur and assumed SO_2 to SO_3 conversion efficiency to meter the organic to the reactor. Significant amounts of off-spec (over or under sulfonated) product would be made if the sulfonation system was utilized during gas plant startups.

The SO_3 absorber system also offers a convenient and reliable method of handling the process gas during plant shutdowns, upsets, and product changeovers when the sulfonation system must be fully drained and washed out. During plant shutdowns the sulfur is turned off but the residual gases in the gas plant vessels are best purged through the absorber to eliminate fouling the sulfonation reactor and/or making off-spec product. During product changeovers the gas plant can be kept on-line (steady state) by utilizing the absorber system as an alternate path through the plant.

SO_3 and air enter the alloy 20 absorber column (see Figure below), where they contact 98% sulfuric acid. SO_3 is absorbed into the acid, which separates from the remaining air in the scrubber body. A mist eliminator removes entrained mist from the air as it exits the vessel. The co-current packed tower design minimizes the carryover of sulfuric acid mist. Water is added to the scrubber as it flows through the

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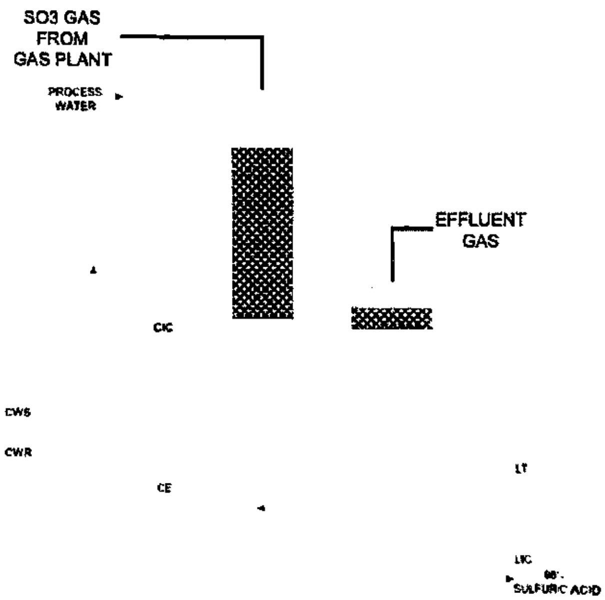
acid circulation system. A control system utilizing dual conductivity sensors holds the acid concentration at 98% by controlling water addition. There are high and low level alarms on the sulfuric acid tank level. A heat exchanger in the circulation loop removes heat of dilution. The SO_3 absorber is designed so that the gas pressure drop across the absorber column is the same as that across the sulfonation reactor. This results in a smooth, bumpless transfer between SO_3 absorption and sulfonation. The result is improved product quality because mole ratio control is not lost due to a pulse in SO_3 gas flow. The SO_3 absorber is mounted on the Gas Plant Skid.



SO_3 Absorber System

Effluent Gas Treatment System

Effluent process gases leaving the sulfonation system or SO_3 absorber are virtually free of residual SO_3, but contain any unconverted SO_2 gas and entrained particulate anionic materials (acidic mists of sulfonic and sulfuric acids). This gas stream is not suitable for direct discharge to atmosphere. Chemithon provides effluent gas treatment equipment with its SO_3 sulfonation plants to suit the Buyer's particular requirements.

The recommended system employs a proprietary electrostatic precipitator designed to collect particulate mists and a packed tower scrubber to absorb SO_2 gas in a dilute caustic. Final effluent gases are suitable for discharge to the atmosphere.

SO_2 Absorber:

The packed tower SO_2 absorber system is designed to operate with minimal

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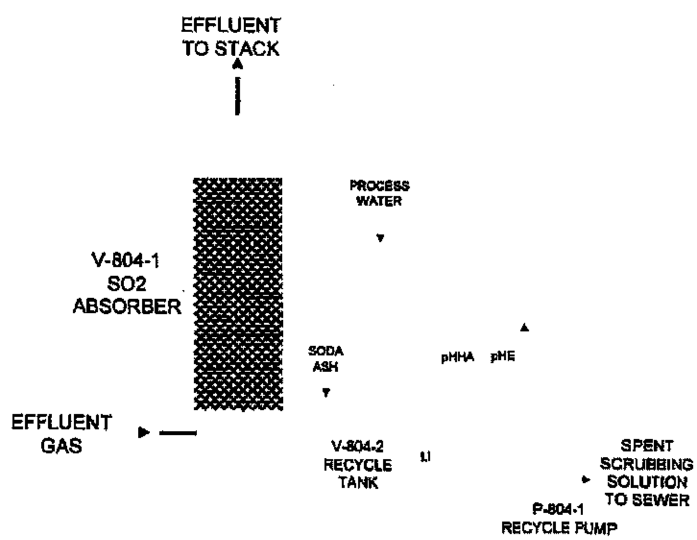
operator attention as a semi-continuous batch recycle absorber. The recycle tank is charged with a dilute caustic soda solution which is recirculated to the top of the absorber tower. The gas contacts the scrubbing solution counter-currently as it passes upward through the tower to the final stack. The SO_2 gas present in the effluent stream is absorbed in the scrubbing solution and reacts with the caustic soda forming Na_2SO_3. As the caustic soda is consumed, the pH of the scrubbing solution falls, and a pH sensing/transmitter eventually activates an alarm to alert the operation that a new batch of scrubbing solution must be charged to the tank. The batch time is planned so that under normal steady state running conditions, the recycle tank requires caustic and make-up water addition no more than once per shift. When caustic is added, the tank is pumped down and recharged with fresh make-up water diluent so that the system never operates at solids concentrated above 8 wt% or with a pH less than 9. The sodium sulfite that is formed is oxidized to sodium sulfate (except during startup), achieving 85% oxidation (or better) to Na2SO4.

The SO_2 absorber system is skid mounted and the effluent is sent to the outlet mist filtration system.

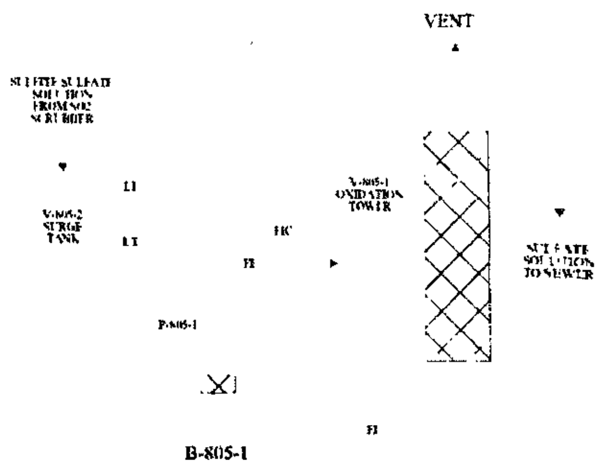


SO_2 Absorber System

Sulfite Oxidation System:

The sulfite oxidation system is designed to convert the 15% Na_2SO_3 (sodium sulfite, ~1% wet basis) batch discharge from the SO_2 absorber system (at a pH between 9 and 9.5) to a continuous stream containing 400 ppm, or less, of Na_2SO_3 (wet basis). Oxidation is achieved by bubbling air through a special packed column to contact the water/sulfite mixture. Discharge pH is typically between 8.5 and 9.5.

MPA 1-20



Sulfite Oxidation System

Effluent Gas Filter

The terminal system in the effluent gas treatment train is a high efficiency (Brownian motion) filter. designed to collect fine organic and acid mists. This vessel is equipped with a filter candle designed to capture fine particles of liquid from the effluent gas stream. and then to coalesce them into a liquid phase that is drained from the bottom of the vessel. The unit includes a spray system for continuously spraying a small stream of wash water (or aqueous solution) to the filter candles. This helps to dissolve any solids (salts primarily) that may be carried into the filter. and keeps the filter media clean and longer-lasting. The unit is equipped with differential pressure sensor/transmitter to indicate when filter elements require attention. The filtered effluent gas is discharged to the customer supplied thermal oxidizer.

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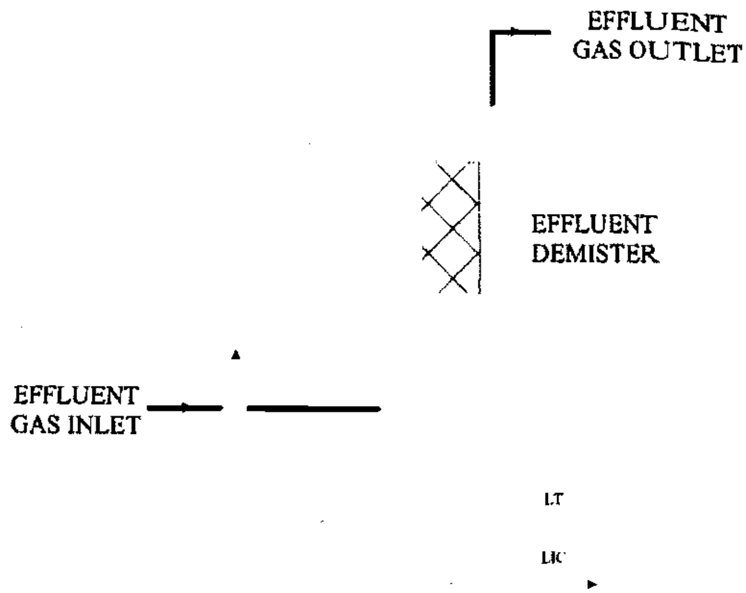

Effluent Gas Filter System

MPA
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MISCELLANEOUS PROCESS OR DEVICE

FORM AQ230
ANSWER SHEET

State of Oregon Department of Environmental Quality

Facility Name: American Petroleum Environmental Services — Permit Number: 26-321-ST-01

Process Information

1. ID Number	OPS-1
2. Descriptive name	Oil Polishing System
3. Existing or future?	Future
4. Date commenced	3/1/2017
5. Date installed/completed	7/1/2017

6. Description of process:

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 (odor causing compounds). 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 soil contaminant levels with those of the processed solids. The contaminated medium is typically heated up to 1,000 F. The effluent from the CFS is then sent to the two 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.

Operating Schedule

7. Seasonal or year-round?	Year-round
8. Batch or continuous operation?	Continuous
9. Projected maximum hours/day	24
10. Projected maximum hours/year	8000

11. Process/device capacity:	Short term capacity		Annual usage	
Raw materials	Amount	Units	Amount	Units
Sulfonated Oil	14.2	GPM	6,816,000	GPY
Products				
Group II Base Oil	14.2	GPM	6,816,000	GPY
Sulfonic Acid (To Asphalt Flux)	28.3	lb/hr	103	Tons/Year

12. Control devices(s) (yes/no): Yes

If yes, provide the ID number and complete and attached the applicable series AQ300 form(s).

TO-01

MPR 1-21

DEQ
State of Oregon Department of Environmental Quality

MISCELLANEOUS PROCESS OR DEVICE

FORM AQ230
ANSWER SHEET

Facility Name: American Petroleum Environmental Services   Permit Number: 26-321-ST-01

Process Information

1. ID Number	COOK-1
2. Descriptive name	Front Plant Oil Cooking Process
3. Existing or future?	Existing
4. Date commenced	3/1/2017
5. Date installed/completed	4/31/2017

6. Description of process:

The front plant cooking process is currently used to boil off and recover light end oil (No. 2 Distillate) and water. This process will be decommissioned and the existing tanks used only for storage of feed oil for the refinery. The refinery, as installed, will remove the water/light ends as part of the continuous process with the only requirement being additional heat. To achieve this, HTR-4 will be relocated to the back part of the property near the refinery. By making the refinery completely continuous (no batch cooking), the heaters will inherently operate more efficiently, requiring less fuel consumption, and generating lower emissions. The process device/capacity table below is empty to show that the cooking process is decommissioned. There is no control device listed, because the tanks will generate no emissions.

Operating Schedule

7. Seasonal or year-round?	Year-round
8. Batch or continuous operation?	Continuous
9. Projected maximum hours/day	24
10. Projected maximum hours/year	8760

11. Process/device capacity:	Short term capacity		Annual usage	
Raw materials	Amount	Units	Amount	Units
Products				

12. Control devices(s) (yes/no) No

If yes, provide the ID number and complete and attached the applicable series AQ300 form(s).

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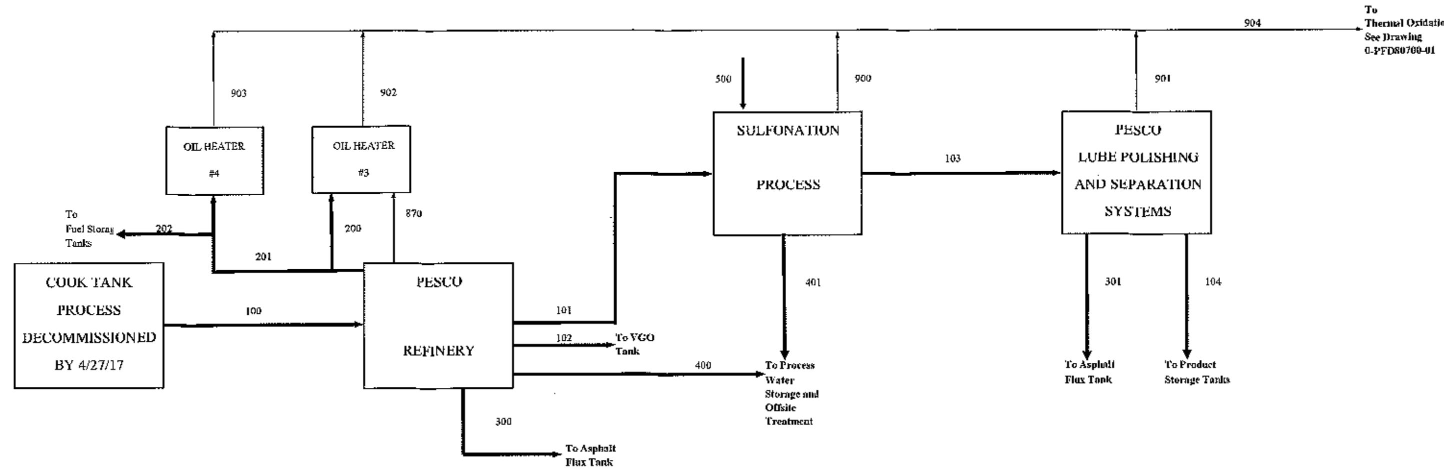

Equipment									TOTALS
Connected, HP									0.0
Brake HP									0.0
MMBTU/hr									0.00

* Feed Oil is defined as "on-specification used oil per CFR 40 279.11"

Stream	100 Feed Oil	101 VGO	102 VGO	103 Sulf. Oil	104 Product Oil	200 No. 2 Distillate	201 No. 2 Distillate	202 No. 2 Distillate	300 Refinery Flux	301 Sulfonic Bottoms	400 Process Water	401 Process Water	500 Molten Sulfur
Mass Flow													
Feed Oil, lb/hr*	9059												
VGO, lb/hr		5033	1245										
Sulfonated Oil, lb/hr				5145									
Sulfur, lb/hr													45
Product Oil, lb/hr					5120								
No. 2 Distillate, lb/hr						270	65	571.07					
Refinery Flux, lb/hr									1811.78				
Sulfonic Bottoms, lb/hr										26			
Sodium Sulfite, lb/hr												0.30	
Sodium Sulfate, lb/hr												24.0	
Water, lb/hr											634.12	385	
TOTAL, lb/hr	9058.88	5032.71	1245.45	5145.21	5119.61	269.59	65.22	571.07	1811.78	25.60	634.12	409.3	
Volumetric Flow													
SCFM													
ACFM													
GPM	25	14	3.4	14	14	0.62	0.15	1.31	3.83	0.06	1.3	0.8	0.05
Stream Information													
Temperature (°F)			-	-	-								
Pressure (PSIG)			-	-	-								

No.	Date	Revision	By	Approved By
A	1/26/2017	Issued for ACDP Submittal to DEQ	CAG	

DOCUMENT CONTROL

Ecolube Recovery
A ClearLube Re-Refining Company, LLC
40 Lake Bellevue Drive
Suite 100
Bellevue, WA 98005
USA

THIS DOCUMENT HAS BEEN CLASSIFIED EAR99 FOR EXPORT CONTROL PURPOSES

Calculated By:	Date:	Title:	Scale: None
Engineer: CAG	Date: 1/26/2017	OVERALL FACILITY Process Flow Diagram (PFD)	Job No.:
Checked By:	Date:	Customer: AMERICAN PETROLEUM ENVIRONMENTAL SERVICES, INC Portland, OR, USA	Capacity:
Approved By:	Date:		Drawing No.: 0-PFD80000-01

PFD Calcs.xls 1/26/2017

DEQ
State of Oregon Department of Environmental Quality

FUME INCINERATOR
CONTROL DEVICE INFORMATION

FORM AQ306
ANSWER SHEET

Facility Name: American Petroleum Environmental Services, Inc. Permit Number: 26-3021-ST-01

1.	Control Device ID	TO-01
2.	Process/Device(s) Controlled	HTR-3, HTR-4, PESCO Oil Recycling System, OPS-1, SULFO-1
3.	Year installed	2017
4.	Manufacturer/Model No.	EPCON Regenerative Thermal Oxidizer
5.	Control Efficiency (%)	> 97% VOCs
6.	Type of incinerator	Regenerative Natural Gas Thermal Oxidizer
7.	Design temperature (°F)	1600°F
8.	Design residence time (sec.)	> 1s
9.	Design inlet gas flow rate (acfm)	9,337 ACFM
10.	Inlet gas pretreatment? (yes/no) If yes, list control device ID and complete a separate control device form	No.
11.	Fuel type	Natural Gas
12	Design maximum hourly amount of fuel (specify units)	1.00 MMBTU/hr
13	Projected maximum annual amount of fuel (specify units)	6,394 MMBTU/year

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DEQ
State of Oregon Department of Environmental Quality

HAZARDOUS AIR POLLUTANT (HAP) **FORM AQ403**
EMISSIONS DETAIL SHEET **ANSWER SHEET**

Facility Name: American Petroleum Environmental Services Permit Number: 26-321-ST-01

Emissions Data

1. Emissions Point	2. Annual Production Rate (specify units)	3. Pollutant	4. Emission Factor	5. EF reference	6. Annual Emissions (tons/yr)
TO-01	406.3 * 10^3	CO	See next page	AP-42	1.44
	Total Gallons Per Year	NOx	See next page	AP-42	6.61
	in HTR-3, HTR-4	PM	See next page	AP-42	6.75
	1576 * 10^6	PM10	See next page	AP-42	2.026
	SCFPY	PM2.5	See next page	AP-42	1.498
	in TO-01	SO2	See next page	Engineered Value	38.05
		VOC	See next page	Engineered Value	0.33

Applications for Standard ACDPs must also include the most recent Toxics Release Inventory report, if applicable (see instructions).

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Facility PTE Calculations
Clear Lube Re-Refining, LLC
1/25/2017
Colin Gregg, EIT
Operations and Technology Director

Comments: EF for OPS-1 assume values from AP-42 for HTR-3/HTR-4 are applicable. Regeneration involves themal desorption of contaminated Bauxite inside each cylinder.
Actual emission points of facility are ONLY TO-01. Other points are included as sources of generation. All effluent will pass through TO-01 prior to atmospheric release.

Pollutant	Plant Source	EF Value	EF Units	EF Source	Operating Factor Value	Operating Factor Units	PTE TPY	PTE Facility Total TPY
CO	HTR-3	5	lbs/10^3 gallons	AP-42	324.94	10^3 Gallons Per Year	0.81	1.44
	HTR-4	5	lbs/10^3 gallons	AP-42	81.36	10^3 Gallons Per Year	0.20	
	TO-01	0	lbs/10^6 SCF	AP-42	1576.8	10^6 SCF Per Year	0.00	
	Refinery	Engineered Value					0.29	
	OPS-1	5	lbs/10^3 gallons	AP-42	52.87	10^3 Gallons Per Year	0.13	
	SULFO-1	0	lbs/SCF	Engineered Value	5.7	10^6 SCF Per Year	0.00	
NO_x	HTR-3	20	lbs/10^3 gallons	AP-42	324.94	10^3 Gallons Per Year	3.25	6.61
	HTR-4	20	lbs/10^3 gallons	AP-42	81.36	10^3 Gallons Per Year	0.81	
	TO-01	2.2	lbs/10^6 SCF	AP-42	1576.8	10^6 SCF Per Year	1.73	
	Refinery	Engineered Value					0.28	
	OPS-1	20	lbs/10^3 gallons	AP-42	52.87	10^3 Gallons Per Year	0.53	
	SULFO-1	0	lbs/SCF	Engineered Value	5.7	10^6 SCF Per Year	0.00	
PM	HTR-3	3.3	lbs/10^3 gallons	AP-42	324.94	10^3 Gallons Per Year	0.54	6.75
	HTR-4	3.3	lbs/10^3 gallons	AP-42	81.36	10^3 Gallons Per Year	0.13	
	TO-01	7.6	lbs/10^6 SCF	AP-42	1576.8	10^6 SCF Per Year	5.99	
	OPS-1	3.3	lbs/10^3 gallons	AP-42	52.87	10^3 Gallons Per Year	0.09	
	SULFO-1	0	lbs/SCF	Engineered Value	5.7	10^6 SCF Per Year	0.00	
PM_{10}	HTR-3	2.3	lbs/10^3 gallons	AP-42	324.94	10^3 Gallons Per Year	0.37	2.026
	HTR-4	2.3	lbs/10^3 gallons	AP-42	81.36	10^3 Gallons Per Year	0.09	
	TO-01	1.9	lbs/10^6 SCF	AP-42	1576.8	10^6 SCF Per Year	1.50	
	OPS-1	2.3	lbs/10^3 gallons	AP-42	52.87	10^3 Gallons Per Year	0.06	
	SULFO-1	0	lbs/SCF	Engineered Value	5.7	10^6 SCF Per Year	0.00	
$PM_{2.5}$	HTR-3	0	lbs/10^3 gallons	AP-42	324.94	10^3 Gallons Per Year	0.00	1.498
	HTR-4	0	lbs/10^3 gallons	AP-42	81.36	10^3 Gallons Per Year	0.00	
	TO-01	1.9	lbs/10^6 SCF	AP-42	1576.8	10^6 SCF Per Year	1.50	
	OPS-1	0	lbs/10^3 gallons	AP-42	52.87	10^3 Gallons Per Year	0.00	
	SULFO-1	0	lbs/SCF	Engineered Value	5.7	10^6 SCF Per Year	0.00	
SO_2	HTR-3	71	lbs/10^3 gallons	AP-42	324.94	10^3 Gallons Per Year	11.54	38.05
	HTR-4	71	lbs/10^3 gallons	AP-42	81.36	10^3 Gallons Per Year	2.89	
	TO-01	0.6	lbs/10^6 SCF	AP-42	1576.8	10^6 SCF Per Year	0.47	
	OPS-1	*See Attached Calculation Sheet*					23.15	
	SULFO-1	0	lbs/SCF	Engineered Value	5.7	10^6 SCF Per Year	0.00	
VOC*	HTR-3	1	lbs/10^3 gallons	AP-42	324.94	10^3 Gallons Per Year	0.162	

MPA
1-29

Facility PTE Calculations
Clear Lube Re-Refining, LLC
1/25/2017
Colin Gregg, EIT
Operations and Technology Director

Comments: EF for OPS-1 assume values from AP-42 for HTR-3/HTR-4 are applicable. Regeneration involves themal desorption of contaminated Bauxite inside each cylinder.
Actual emission points of facility are ONLY TO-01. Other points are included as sources of generation. All effluent will pass through TO-01 prior to atmospheric release.

Pollutant	Plant Source	EF Value	EF Units	EF Source	Operating Factor Value	Operating Factor Units	PTE TPY	PTE Facility Total TPY
	HTR-4	1	lbs/10^3 gallons	AP-42	81.36	10^3 Gallons Per Year	0.041	10.943
	TO-01	5.5	lbs/10^6 SCF	AP-42	1576.8	10^6 SCF Per Year	4.336	
	Refinery	Engineered Value					6.320	
	OPS-1	1	lbs/10^3 gallons	AP-42	52.87	10^3 Gallons Per Year	0.03	
	SULFO-1	20	lbs/10^6 SCF	Engineered Value	5.704	10^6 SCF Per Year	0.057	
VOC After TO-01	TO-01	Engineered Value					0.33	0.33

* Calculation is for total VOCs **UPSTREAM** of TO-01 (before treatment).

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Facility PTE Calculations
Clear Lube Re-Refining, LLC
1/25/2017
Colin Gregg, EIT
Operations and Technology Director

Oil Loss in OPS-1 Regeneration

Column Volume	9	Gallons
Column Recovery	78%	
# of Columns	20	Per Bank
# of Banks Regen	4	Per Day
# of Regenerations	1320	Per Year
Total Oil Loss	52866	Gallons/Year

SO_2 Production in OPS-1

Operating Hours	8000	Per Year	
Starting Sulfur Content	875	ppm	
Ending Sulfur Content	300	ppm	0.06% wt
Oil Flow	833	GPH	
	6666667	GPY	
	20130.8	TPY	
Sulfur Removed	11.6	TPY	2.89
SO_2 Generated	23.2	TPY	

MW Sulfur	32	lb/lbmol
MW SO_2	64	lb/lbmol
Weight Ratio	2	lb SO2/ lb S

W 1-29