PROPOSED

COVERED SOURCE PERMIT NO. 0220-01-C MODIFICATION

Permit Application No. 0220-09

Increase Throughput to 383,250,000 gallons per 12-months and Installation of a Vapor Combustion Unit

Aloha Petroleum, Ltd. - 10 AST storage tanks and tank truck load rack

Facility: Aloha Petroleum, Ltd.
Barbers Point Sales Terminal, Campbell Industrial Park, Kapolei, Hawaii

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SICC: 5171

Background:
Aloha Petroleum, Ltd. (Aloha) owns a bulk liquid storage and transfer facility located at Campbell Industrial Park, Kapolei, Oahu. This facility, known as the Barber's Point Sales Terminal, was upgraded in 1996 to provide operational flexibility and improve the efficiency of the terminal. Ten above ground storage tanks were built and a bottom-loading tank truck load rack with vapor recovery was installed. All but one of the ten storage tanks has an internal floating roof with primary seals. The nine internal floating roof tanks store unleaded gasoline. Fuel additive is stored in a 238 barrel fixed roof tank. The fuel additive tank is not subject to HAR 11-60.1-39 or NSPS 40 CFR 60 Subpart Kb.

The tank truck load rack has four stations, each with five load arms. The design throughput for the loading rack was based on the maximum number of load arms that can be used for a given period of time. The maximum number of load arms that can be used simultaneously is ten (10). With each arm capable of dispensing 900 gallons of fuel per minute, the load rack has a maximum throughput of 9,000 gallons per minute. At 24 hours a day, 365 days a year, the potential throughput is 112,628,571 barrels per year.

The limiting factor of the load rack is not the rack pump, but the vapor recovery unit. The vapor recovery unit can process 500,000 gallons per day, or 4,345,238 barrels per year. The carbon adsorption system is guaranteed to have maximum emission rate of 10 mg/l of loaded product. Source performance tests have verified the manufacturers' guarantee. Aloha also has a self-imposed throughput limit of 4,309,524 barrels per rolling 12-month period.

Aloha also maintains pipelines from their facility to the marine terminals located at Barbers' Point Deep Draft Harbor and barge harbor. Currently there are 4 each, 8-inch product pipelines extending to the Barbers' Point Deep Draft Harbor and two each, 8-inch lines to the barge harbor. The marine loading operations are permitted under Noncovered Source Permit no. 0334-01-N.

Proposed Modification:

Aloha is proposing to increase the facility throughput from the currently permitted limit of 4,309,524 barrels per rolling 12-month period to 9,125,000 barrels per rolling 12-month period. To accommodate the increase in product flow, the current vapor recovery unit (VRU) will be replaced with a vapor combustion unit (VCU). The VCU is designed to handle the higher flow rate.

The existing tanks are not being physically modified. The increase in throughput at the tank truck load rack will result in higher turnovers for the tanks. As a result, a slight increase in VOC emissions from the tanks is expected.

Equipment:

For this modification, only the bottom loading tank truck load rack and the John Zink VCU are affected.

Air Pollution Controls:

Emissions from the storage tanks are controlled by the design characteristics of the tanks; internal floating roofs with primary seals.

The currently permitted John Zink VRU will be replaced with a John Zink VCU. The VCU uses two pilot burners, firing on propane, to ignite the VOC vapors collected during tank truck loading operations. The system, which includes the VCU and the vapor collection system, is guaranteed to emit no more than 10 mg of VOCs per liter of fuel loaded. John Zink also guarantees the emissions out of the VRU will not exceed 10 mg per liter of product loaded for VOCs and CO, and 4 mg per liter of product loaded for NO_x.

The VCU is a natural draft hydrocarbon combustion unit. The unit uses two 0.054 MMBtu/hr pilot burners which fire on propane. The VCU and the tank truck load rack are electronically linked together. When the load rack is ready to begin loading, a three horsepower air-assist blower starts and purges the eight-foot diameter by 45 feet tall stack of any trace VOCs. Soon after the blower is

started, the two propane pilot burners are ignited. Only then can operations at the tank truck load rack commence. Once the load rack begins loading, the vapor block valves are opened and VOCs flow to the first stage burner. Depending on the amount of flow, a secondary valve could open and direct vapors to the secondary burner. The three hp air-assist blower operates throughout the entire process to ensure an efficient combustion process and reduce opacity. The maximum flow rate of the tank truck load rack is 12 arms at 600 gpm per arm, or 7,200 gpm total. The VCU is designed to handle this maximum flow rate.

Operational Limits:

As stated earlier, Aloha is proposing to increase the throughput of the tank truck load rack from 4,309,524 barrels per rolling 12-month period to 9,125,000 barrels per rolling 12-month period. This increase in throughput will also result in higher turnovers for the storage tanks. However, the storage tanks do not have throughput limits, as the emissions from the tanks are minimal. The throughput of the load rack will be monitored by flow meters at each arm and records will be maintained on a daily basis.

The tank truck load rack is subject to NSPS Subpart XX. Under this subpart, only documented, vapor-tight tank trucks with a compatible vapor collection system can be loaded at this facility. The gauge pressure of the tank truck cannot exceed 4,500 pascals during the loading operation. The subpart also specifies that the vapor recovery system cannot emit more than 35 mg/l of gasoline loaded. However, the VCU manufacturer has guaranteed a limit of 10 mg/l of gasoline loaded.

Applicable Requirements:

Hawaii Administrative Rules (HAR):

Chapter 11-59, Ambient Air Quality Standards
Chapter 11-60.1
Subchapter 1, General Requirements
Subchapter 2, General Prohibitions
11-60.1-31 Applicability
11-60.1-32 Visible Emissions
11-60.1-39 Storage of Volatile Organic Compounds
11-60.1-41 Pump and Compressor Requirements
Subchapter 5, Covered Sources
Subchapter 6, Fees for Covered Sources, Noncovered sources, and Agricultural Burning
11-60.1-111 Definitions
11-60.1-112 General Fee Provisions for Covered Sources
11-60.1-113 Application Fees for Covered Sources
11-60.1-114 Annual Fees for Covered Sources
11-60.1-115 Basis of Annual fees for Covered Sources
Subchapter 8, Standards of performance for Stationary Sources
11-60.1-161 New Source Performance Standards

PROPOSED

CDS (Compliance Data System)

CDS is an inventory system for covered sources subject to annual inspections. CDS requirements do apply because the facility is a covered source.

NSPS:

The tank-truck load rack is subject to 40 CFR Part 60, Subpart XX because the date of construction is after the trigger date. Similarly, the petroleum storage tanks are subject to 40 CFR Part 60, Subparts Kb, because the construction date of the tanks is after the trigger dates.

Non-Applicable Requirements:

PSD:

PSD is not applicable to this facility because it is not a major stationary source.

CERR (Consolidated Emission Reporting Rule):

40 CFR part 51, Subpart A – Emission Inventory Reporting Requirements, determines applicability based on the emissions of each pollutant from any individual emission point within the facility that emits at the triggering levels. The emissions from the load rack and storage tanks are less than the 100 and 1,000 ton per year triggers.

NESHAP:

The load rack is not subject to 40 CFR Part 63 Subpart R because it is not a major source, as stated in section 63.420(a)(2).

CAM:

The purpose of Compliance Assurance Monitoring (CAM) is to provide a reasonable assurance that compliance is being achieved with large emissions units that rely on air pollution control device equipment to meet an emissions limit or standard. Pursuant to 40 Code of Federal Regulations, Part 64, for CAM to be applicable, the emissions unit must: (1) be located at a major source; (2) be subject to an emissions limit or standard; (3) use a control device to achieve compliance; (4) have potential pre-control emissions that are 100% of the major source level; and (5) not otherwise be exempt from CAM. CAM is not applicable because the facility is not a major source.

BACT:

A Best Available Control Technology (BACT) analysis was not required because the VOC emissions increase is less than the 40 tons per year trigger. The total VOC emission from the proposed modification was estimated at 16 tons per year. As shown in table 1 below, total emissions for all pollutants were below the BACT trigger levels. As such, any increases are below the trigger levels.

Table 1 - Proposed Emissions Increase

Pollutant	Current Emissions (T/yr)	Proposed Increase (T/yr)	Total (T/yr)
NO_x	0	6.50	6.50
SO_2	0	1.11	1.11
CO	0	16.02	16.02
VOC	61	8.41	69.41
PM_{10}	0	1.41	1.41

Synthetic minor:
A synthetic minor is a facility that without limiting conditions, physical or operational, emits above the major source triggering levels as defined by HAR 11-60.1-1 for either criteria pollutant(s) or hazardous air pollutant(s). This facility is not a synthetic minor, as the throughput limit is the design maximum of the VCU and is not used to prevent the facility from becoming major source.

Calculations:
Emissions from the proposed system occur at the following areas:
- fugitive emissions from the tank truck to the vapor capture system;
- fugitive emissions from the vapor capture system to the VCU;
- emissions from the pilot burners; and
- emissions from combusting the VOCs in the VCU.

John Zink guarantees that there will be no fugitive emissions from the tank truck to the vapor capture system and there will be no fugitive emissions from the vapor capture system to the VCU. Thus, the emissions for the system are only from the pilot burners and combusting the fuel. John Zink guarantees that emissions of VOC and CO will be at or below 10 mg per liter of product loaded and NO_x emissions will be at or below 4 mg per liter of product loaded. PM_{10} emissions were estimated from flaring operations, AP-42 section 13.5., revised 9/91. The SO_2 emission factor for the VCU assumes the sulfur content by weight is the same for both liquid and vapor. This is conservative, as it has been reported that the sulfur in the petroleum products do not vaporize and remain in the liquid phase. Emissions from the two 0.054 MMBtu/hr burners were estimated using AP-42 section 1.5 - LPG Combustion, revised 10/96.

Table 2 - Emission Factors

Polutant	Propane Burner (lb/MMBtu)	VCU (mg/l)	VCU ($lb/10^3$ gal)
NO_x	0.208	4	3.34e-3
SO_2[1]	0.017		1.60
CO	0.035	10	8.35e-2
VOC	0.005	10	8.35e-2
PM_{10}[2]	0.007	0.177	1.11e-5

1 - lb/ton of vapor. Assumes sulfur is in vapor form.
2 - lb/SCF of vapor combusted

Total annual heat input to each propane burner:
0.054 MMBtu/hr * 8,760 hrs = 477.3 MMBtu/yr

Max throughput at the load rack:
9,125,000 barrels * 42 gal/bbl = 383,250,000 gal

Table 3 - Emissions from the Modification

Polutant	Two 0.054 MMBtu/hr Propane Burners (T/yr)	VCU (T/yr)	Total (T/yr)
NO_x	0.10	6.4	6.50
SO_2	0.01	1.1	1.11
CO	0.02	16.0	16.02
VOC	0.01	16.0	16.01
PM_{10}	0.01	1.4	1.41

For the tanks, there was no significant emissions increase from the proposed throughput. Almost all of the VOC losses are due to the tank construction and turnover (withdrawal) losses are less than 50 pounds per year for each tank. The emissions increase from the higher turnover rate amounted to several pounds of VOC per tank per year.

In total, VOC emissions at the facility will increase from 61 tons per year to 70 tons per year.

Alternate Operating Scenarios:
No new alternate operating scenarios were proposed

Air Quality Assessment
The applicant performed an Ambient Air Quality Impact Analysis (AAQIA) using ISCST3. However, the Department performed a simpler modeling analysis using SCREEN3 which demonstrated compliance with the SAAQS. As such, the applicant's AAQIA was not reviewed and should not be relied upon. The following assumptions were used in the Department's analysis.

1. Simple terrain;
2. Rural dispersion;
3. SCREEN3 default met data;
4. SCREEN3 default receptor spacing; and
5. scaling factors of 0.9, 0.7, 0.4, and 0.2 for the 3-hour, 8-hour, 24-hour, and annual concentrations, respectively.

Receptors were placed every 100 meters from the base of the stack. The area surrounding the stack is considered ambient air because, although it is private property, the general public has access to the area.

The only structures within five stack heights of the VCU stack are above-ground storage tanks. The following tanks were looked at as potential downwash inducing structures. Comparing five times the building height or projected width to the tanks distance to the stack indicated that all of the tanks could cause downwash. Since tank no. 101 had the highest Hg, it would cause the greatest downwash. As such, the dimensions for tank no. 101 were used in the SCREEN3 model.

Table 4 - Potential Downwash-Inducing Structures

Tank No.	height	length	width	projected width	5*Hb	5*Pw	lesser of 5*Hb or 5*Pw	dist. to stack	Hg = Hb+1.5L/5
6554	40	35	35	49	200	247	200	106	50.5
13817	48	45	45	64	240	318	240	106	61.5
13020	48	45	45	64	240	318	240	166	61.5
13019	48	45	45	64	240	318	240	200	61.5
13021	48	45	45	64	240	318	240	230	61.5
101	60	79	79	112	300	559	300	290	83.7

The table below lists the emission rates and stack parameters used in the analysis.

Table 5 - Emission Rates and Stack Parameters

VCU w/ two 0.054 MMBtu/hr pilot burners	Emission Rates (g/s)				Stack Parameters			
	NO_x	CO	SO_2	PM_{10}	height (m)	dia. (m)	velocity (m/s)	temp (K)
	1.82	4.54	0.32	0.39	13.72	2.44	18.44	810.93

Background air quality data used in the analysis was obtained from the Department's 2004 Annual Summary of the Hawaii Air Quality Data. The table below summarizes the results of the ambient air quality analysis. As shown, it is predicted that the operation of the VCU will not exceed the state or national ambient air quality standards (SAAQS/NAAQS).

Table 6 - Results of the Ambient Air Quality Analysis

Pollutant	Averaging Period	Concentration (mg/m^3) Max	Background	Total	SAAQ	% of SAAQS
SOx	3-hr	79	17	96	1,300	7%
	24-hr	35	7	42	365	12%
	annual	18	1	19	80	23%
NO_2[1]	annual	10	9	19	70	27%
PM_{10}	24-hr	43	54	96	150	64%
	annual	21	13	34	50	69%
CO	1-hr	1,241	2,394	3,635	10,000	36%
	8-hr	869	983	1,852	5,000	37%

1 - NO_x concentrations were adjusted for the annual throughput limitation.

Conclusion:
The estimated emissions increases are well below the BACT significance levels. The new vapor combustion unit will be designed to adequately handle the increase in throughput at the tank truck load rack. The facility has been operating in compliance with the current CSP and should continue to operate in compliance with the proposed throughput increase and new VCU.

Recommendation:
Issue permit with the proposed throughput limits.

Appendix