COVERED SOURCE PERMIT NO. 0220-01-C RENEWAL/MODIFICATION

Application Nos. 0220-10 & 0220-11

Installation of a Vapor Recovery Unit

Aloha Petroleum, Ltd. - 9 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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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. Nine above ground internal floating roof storage tanks were built and a bottom-loading tank truck load rack with a vapor recovery system was installed. During the initial construction of the load rack, a vapor recovery unit (VRU) was used to control the emission of VOCs. A vapor combustion unit (VCU) replaced the vapor recovery unit during a modification in 2006. The nine internal floating roof tanks store unleaded gasoline. Fuel additive is stored in a 238 barrel horizontal tank. The fuel additive tank is not subject to HAR 11-60.1-39 or NSPS 40 CFR 60 Subpart Kb.

The two-lane 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 12. With each arm capable of dispensing 600 gallons of fuel per minute, the load rack has a maximum throughput of 7,200 gallons per minute. At 24 hours a day, 365 days a year, the potential throughput is 90,102,857 barrels per year.

The current throughput limit for the load rack is 9,125,000 barrels of petroleum product 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 reinstall the vapor recovery unit to control the VOCs from the loading operations at the tank truck load rack. The proposal would allow Aloha to operate either the vapor combustion unit or the vapor recovery unit. The VRU will be the primary control device used unless the throughput at the load rack is greater than the design limit of the VRU or the VRU is down for maintenance. The maximum design capacity of the VRU is 500,000 gallons per day.

Aloha is also proposing to lower the stack height of the vapor combustion unit from 45 feet to 35 feet.

Equipment:

The equipment for this modification are:

a. Two-lane bottom-loading petroleum tank truck loading rack with of four (4) loading stations, each with five (5) loading arms;
b. John Zink thermal oxidizer vapor combustion unit, model no. ZCT-3-8-45-X-2/8-2/8-X with a thirty-five foot (35') exhaust stack height; and
c. John Zink carbon absorption vapor recovery unit, model no. AAT-609-12-7-12.

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 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 petroleum product loaded. John Zink also guarantees the

emissions out of the VCU 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 35 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.

The previously permitted John Zink VRU unit is guaranteed to emit no more than 10 mg of VOCs per liter of petroleum product loaded. The unit consists of two (2) carbon steel vessels with 23,100 pounds of high efficiency granular activated carbon. The unit is designed to recover vapors displaced from the tank truck during loading. The displaced vapors flow through a condensate tank first, and then pass through only one of the steel vessels. The vapor flow is alternated between the two vessels, which allows for maintenance, repairs, and regeneration without interrupting the operation of the load rack. However, the VRU is capable of handling only 500,000 gallons of product loaded per 24-hour period.

Operational Limits:

Aloha is not proposing to increase the current throughput limit of 383,250,000 gallons of petroleum product per rolling 12-month period. The current throughput limit is greater than the design capacity of the vapor recovery unit. As such, the load rack will have a throughput limit of 500,000 gallons per 24-hour period when the VRU is operating. The 500,000 gallon per 24-hour period throughput limit does not apply to the vapor combustion unit, as it has a maximum throughput rate of 10,368,000 gallons per 24-hour period. Aloha could also operate a combination of the two control units during a 24-hour period as long as the 500,000 gallon throughput limit on the VRU is not exceeded. The throughput of the load rack will be monitored by volumetric flow meters at each load 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, John Zink, the VCU and VRU manufacturer has guaranteed a limit of 10 mg/l of gasoline loaded for each of the units.

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

NSPS:

The internal floating roof storage tanks and the tank truck load rack are subject to the following standards because of the date of construction.

Subpart A - General Provisions;

Subpart Kb - Standards of Performance for Volatile Organic Liquid Storage Vessels (including Petroleum Liquid Storage Vessels) for which Construction, Reconstruction, or Modification Commenced after July 23, 1984; and

Subpart XX - Standards of Performance for Bulk Gasoline Terminals

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 emissions will not increase for this modification. The manufacturers' VOC emission guarantee for the vapor combustion unit and the vapor recovery unit are the same, 10 mg/l of product loaded. Since the VRU will be the primary control device, emissions of NO_X, SO_2, CO, and PM_{10} from the VCU will decrease.

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 a major source.

Facility Emissions:

Emissions from the facility occur at the following areas:

- fugitive emissions from the storage tanks;
- 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 the combustion of VOCs in the VCU; and
- VOC emissions from the VRU.

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 and VRU. Thus, the emissions for the VOC control systems are only from the pilot burners, VOC combustion, and uncaptured VOC vapors.

For the VCU, 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 does not vaporize and remains 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. For the VRU, John Zink guarantees the VOC emissions will not exceed 10 mg/l of product loaded. The VRU does not have any other emissions.

Table 1 - 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 2 - Emissions from the Vapor Combustion Unit

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

Emissions from the vapor recovery unit were estimated using the manufacture's guaranteed emission rate of 10 mg per liter of product loaded. The VRU uses a carbon bed to adsorb the VOCs and as such, only emits VOCs. The design limit of the VRU is 500,000 gallons of throughput per 24-hour period. The potential VOC emission from the VRU is:

500,000 [gal] * 3.7854 [l/gal] * 10 [mg] * 2.2046 E-6 [lb/mg] = 41.7 lb per 24-hour period

41.7 [lb/24-hour period] * 365 [24-hour periods] / 2,000 [lb/ton] = 7.6 tons per year

For the tanks, there are no emissions increase because the throughput did not change. The 9 internal floating roof storage tanks emit approximately 60 tons per year of VOCs. The total emissions for the facility also do not increase because the worst-case scenario for the vapor control system is using the currently permitted vapor combustion unit.

Alternate Operating Scenarios:
No new alternate operating scenarios were proposed. Aloha has the option of using either or both of the vapor control systems. Since both of these units will be permitted, the operation of either one is not considered an alternate operating scenario.

Air Quality Assessment
An ambient air quality impact analysis (AAQIA) was required for this modification because Aloha is proposing to lower the stack height of the vapor combustion unit from 45 feet to 35 feet. The applicant performed an AAQIA using U.S. EPA's ISCST3 model. The model was run using U.S. EPA default options and switches. Rector spacing was 25 meters along Aloha's property boundary. From the property boundary line to 150 meters out, a receptor spacing of 50 meters was used. A receptor spacing of 100 meters was used for the area 200 meters to 500 meters from the property boundary line.

The model used meteorological data from Baber's Point for calendar year 1992. Digital terrain data for the Ewa USGS quadrangle were used in the model. Terrain elevations used for the receptors were the highest value within a 100 meter radius of each receptor.

U.S. EPA's BPIP model was used to determine downwash parameters for the ISCST3 model. Inputs to the BPIP model were the dimensions and distances of the warehouse and 18 above-ground storage tanks. The results of the BPIP model predicted that none of the storage tanks will create downwash conditions on the VCU exhaust stack.

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	10.67	2.44	18.44	1,033

Background air quality data used in the analysis was from the Department's Kapolei Business Park monitoring station. The highest value from the Department's 2003, 2004, and 2005 Annual Summary of the Hawaii Air Quality Data sets were used. 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 ($\mu g/m^3$) Max	Background	Total	SAAQ	% of SAAQS
SOx	3-hr	0.2	64	64	1,300	5%
	24-hr	0.1	21	21	365	6%
	annual	0.1	2	2	80	3%
NO_2	annual	1	9	10	70	14%
PM_{10}	24-hr	3	99	102	150	68%
	annual	0.1	15	15	50	30%
$PM_{2.5}$	24-hr	3	55	58	65 [1]	89% [1]
	annual	0.1	4	4	15 [1]	27% [1]
CO	1-hr	1,353	2,394	3,747	10,000	37%
	8-hr	364	1,055	1,419	5,000	28%

1 - NAAQS

Conclusion:

The proposed modification does not increase the potential emissions from the facility. Actual emissions from the facility should decrease because each time the vapor recovery unit is used instead of the vapor combustion unit, the VOCs are captured instead of burned. NO_X, SO_X, CO, and PM_{10} are not emitted when the VRU is in operation.

The predicted ambient air quality impacts from lowering stack height of the VCU from 45 feet to 35 feet remained in compliance with the state and federal standards.

The facility has been operating in compliance with the current CSP and should continue to operate in compliance with the proposed addition of the VRU.

Recommendation:

Issue permit allowing Aloha to use either the vapor combustion unit or the vapor recovery unit to control the VOC emissions from the tank truck loading operations.