STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JOHN ELIAS BALDACCI
GOVERNOR

DAVID P. LITTELL
COMMISSIONER

Portland Pipe Line Corporation
Cumberland County
South Portland, Maine
A-197-77-1-A

Departmental
Findings of Fact and Order
Air Emission License
NSR Amendment #1

After review of the air emissions license amendment application, staff investigation reports and other documents in the applicant's file in the Bureau of Air Quality, pursuant to 38 M.R.S.A., §344 and §590, the Department finds the following facts:

I. REGISTRATION

A. Introduction

1. Portland Pipe Line Corporation (PPLC) was issued Air Emission License A-197-70-C-R on April 16, 2008, permitting the operation of emission sources associated with their oil pipe line and storage facility.

2. The equipment addressed in this license is located at PPLC's Pier 2 facility and the storage tank facilities (30 Hill Street), South Portland, Cumberland County, Maine.

3. PPLC has requested a New Source Review Air License under 06-096 CMR 115 (and an amendment to their Part 70 Air License under 06-096 CMR 140, being processed separately) to reverse the flow in their 18 inch pipeline to bring crude oil south from Montreal for loading onto marine tank vessels. (This pipeline is currently licensed to carry crude oil from South Portland north to Montreal refineries.) Also included is the installation of a Vapor Control System to convey vapors displaced by the marine tank vessel loading operations to Vapor Combustion Units (VCU's). No changes to storage tanks or their operation are requested in this amendment, nor is an increase in throughput capacity of the tank farm sought.

B. Emission Equipment

The following emission equipment is addressed in this air emission license:

Fuel Burning Equipment

Equipment	Maximum Capacity (MMBtu/hr)	Maximum Destruction Rate (ft^3/hr)	Fuel Type, % sulfur	Stack #
#27 - Vapor Combustion Unit	182.7	140,365	Hydrocarbon vapors with natural gas pilot	2
#28 - Vapor Combustion Unit	182.7	140,365	Hydrocarbon vapors with natural gas pilot	3

C. Application Classification

The modification of a major source is considered a major modification based on whether or not expected emission increases of the new units exceed the "Significant Emission Levels" as defined in the Department's regulations. The emission increases are:

Pollutant	Net Change of Project (TPY)	Sig. Level (TPY)
PM	1.98	25
PM_{10}	1.98	15
SO_2	21.0	40
NO_x	18.7	40
CO	19.9	100
VOC	39.0	40

This modification is determined to be a minor modification and has been processed as such.

II. BEST PRACTICAL TREATMENT (BPT)

A. Introduction

In order to receive a license the applicant must control emissions from each unit to a level considered by the Department to represent Best Practical Treatment (BPT), as defined in *Definitions Regulation*, 06-096 CMR 100 (last amended December 24, 2005). Separate control requirement categories exist for new and existing equipment as well as for those sources located in designated non-attainment areas.

BPT for new sources and modifications requires a demonstration that emissions are receiving Best Available Control Technology (BACT), as defined in *Definitions Regulation*, 06-096 CMR 100 (last amended December 24, 2005). BACT is a top-down approach to selecting air emission controls considering economic, environmental and energy impacts.

Project Description

PPLC operates a crude oil marine tank vessel unloading facility and tank farm in South Portland, and a system of pump stations and pipelines from South Portland, Maine to the Canadian Border. (The Canadian segment of the pipeline system is owned and operated by PPLC's affiliate.) The marine tank vessel unloading facility consists of a pier (Pier 2) on Casco Bay capable of accommodating and unloading crude oil from two marine tank vessels at a time. The tank farm in South Portland consists of 23 storage tanks. Two pipelines (18 inch and 24 inch diameter) carry the crude north from the South Portland tank farm to refineries in Montreal.

PPLC plans to modify its 18 inch pipeline to allow crude oil to move south from Montreal to the Portland tank farm where the crude oil will be loaded onto marine tank vessels at the Pier 2 facility. The project will include the installation of a Vapor Control System which will convey the vapors displaced by the marine tank vessel loading operations to Vapor Combustion Units (VCU's) to achieve greater than 98 percent destruction of volatile organic compound emissions. The VCU's are enclosed with no visible flame, and each employs anti-flashback burners and detonation arrestors.

The project does not involve any changes to the storage tanks or their operation, and will not increase the throughput capacity of the tank farm.

B. Vapor Control System

The proposed Vapor Control System (VCS) consists of two primary parts – Vapor Transfer Arms (VTA's) and Vapor Combustion Units (VCU's) – and interconnecting piping. Vapors generated by the loading sequence include those released from the crude oil itself, as well as vapors that constitute the inert gas blanket from the ship's hold, displaced during loading. The inert gas blanket is required to maintain a low oxygen atmosphere in empty ship holds to prevent explosions or fires.

Two VTA's will be installed on Pier 2, one at the north berth and one at the south, approximately 15 feet from the existing loading arms. A dock safety unit skid, which protects the ships from flash back, backflow of air in the vapor line, high or low pressures in the piping and other conditions unsafe for crude oil transfer will also be located on the dock.

Two skid-mounted VCU's will be installed on Pier 2. The combustion stacks each are approximately 12 feet in diameter and 70 feet high. Each VCU has a maximum design heat input capacity of 182.7 MMBtu/hour, with a maximum destruction rate of 140,365 cubic feet per hour of hydrocarbon vapors, with a natural gas pilot.

C. Regulatory Applicability

New Source Performance Standards

Several sections of EPA NSPS have the potential to impact this project; however, the following sections do not apply for the reasons outlined below:

- NSPS for Volatile Organic Liquid Storage Vessels – the project does not reconstruct or modify the existing crude oil storage tanks; therefore Subpart Kb is not triggered.
- NSPS for Small Industrial-Commercial-Institutional Steam Generating Units – Although they do combust fuel, VCU's are not steam generating units as defined in Section 60.41c, therefore 40 CFR 60 Subpart Dc does not apply.
- NSPS for Incinerators – An incinerator is defined in Section 60.51c as a furnace used in the process of burning solid waste to reduce its volume. As the VCU's do not burn solid waste, 40 CFR 60 Subpart E is not applicable.
- NSPS General Provisions – General Control Device Requirements for Flares – The EPA has determined John Zink VCU's do not constitute flares for the purposes of 40 CFR 60 and are therefore not subject to Section 60.18. (See EPA Clean Air Act Applicability Determination Index Nos. M020002 and M020005.)

National Emission Standards for Hazardous Air Pollutants (NESHAPS)

EPA NESHAPS for marine tank vessel loading are contained in 40 CFR 63 Subpart Y, and require the owner/operator of affected marine tank vessel loading facilities to equip each terminal with a vapor collection system designed to collect HAP vapors displaced from marine tank vessel loading operations and to reduce HAP by 98 percent by weight. Subpart Y applies to major HAP sources and sources of HAP emissions of less than 10 tons of each individual HAP calculated annually and less than 25 tons of all HAP combined calculated annually, installed after September 20, 1999. Therefore, although PPLC will remain a minor (area) HAP source, PPLC's marine tank vessel loading operation will be subject to Subpart Y.

D. Facility Throughput and Emissions:

The potential-to-emit of the VCU's depends in part on the throughput capacity of the pipeline and the marine tank vessel load rate, which in turn vary depending upon the type of crude oil being transported and loaded. Throughput capacity is primarily affected by viscosity and specific gravity of the crude; therefore, two representative crude oil products were utilized to determine potential emission rates and throughput: Cold Lake crude as the representative heavy crude and Syncrude as the representative light crude.

The annual throughput capacity of the marine tank vessel loading terminal will be limited by the 18 inch pipeline's capacity to handle 180,000 barrels per day of Syncrude or 140,000 barrels per day of Cold Lake crude. For the purposes of the application, the combination of factors resulting in the highest emission case was used to calculate potential to emit.

Emissions from the VCU's depend upon the vapor stream from the marine tank vessel cargo tanks being loaded, the assist gas combusted in the VCU's and the destruction efficiency of the VCU's. The vapor stream displaced during the marine tank vessel loading of crude oil is derived from two sources: 1. the inert gas blanket pumped into the cargo holds of the marine tank vessel following offloading of the previous product, and 2. vapors from the petroleum being loaded.

1. Inert Gas Blanket

Hydrocarbon vapors present in marine tank vessels cannot burn in an atmosphere containing less than approximately 11 percent oxygen, therefore maintaining oxygen concentrations in marine tank vessel cargo tanks below this level protects against fires and/or explosions. Inert gas systems are used to provide the reduced oxygen environment needed to achieve safe conditions in the vessel cargo tanks.

International regulations require that inert gas blankets contain no more than 5 percent oxygen by volume. The most common sources of inert gas blankets are the cleaned and cooled combustion products of a dedicated inert gas blanket generator and cleaned and cooled exhaust gases from the marine tank vessel boilers.

The displaced inert gases are assumed to pass through the VCU's and out the VCU stacks along with the products of combustion formed by burning the collected hydrocarbon vapors and any assist gas.

2. Crude Oil Vapor

During marine vessel loading operations, it is expected VOC concentrations in vapor exiting the tank vessels will remain at a relatively low and consistent level through most of the loading operation, but will increase sharply near the end of the loading as the vapors become concentrated in the thinning layer of inert gas. The values will also change depending upon the characteristics of the crude product being loaded, the marine tank vessel itself and surrounding conditions, however the shape of the curve of concentration versus time will be comparable for all products loaded.

As the heat release from the VCU's increases depending partly on the VOC concentration in the marine vessel cargo tank, emissions from the VCU's are expected to increase.

The loading rate of the crude varies throughout the loading cycle, with the maximum loading rate being 50,000 barrels per hour estimated to cover over 85 percent of the loading cycle. The loading rate is expected to be 18,000 barrels per hour, or less, for the last 15 percent of the loading cycle, allowing for safe topping off and balancing of the vessel tanks, and to assure the design thermal capacity of the VCU's is not exceeded. The weighted average loading rate of 45,200 barrels per hour is used to determine emission factors in terms of pounds per thousand barrels. To determine annual emissions, these emission factors are multiplied by the maximum annual throughput for the loading terminal.

Cold Lake crude (representative heavy crude) has higher short term (hourly) emissions than Syncrude (representative light crude), therefore emission rates associated with Cold Lake crude oil vapors are used to calculate the maximum potential short term emissions of nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2) and VOC.

Syncrude has higher potential annual throughput than Cold Lake, thus to prevent underestimation of annual potential emissions from the project, the maximum annual throughput for the loading terminal associated with Syncrude (i.e. 180,000 barrels per day) was used in calculations together with the maximum pound per 1000 barrels emission factors for Cold Lake crude for all pollutants except VOC. Due to the design of the vapor control system, annual potential VOC emissions are expected to be the same for all crude products and throughput levels. Particulate matter emissions from Cold Lake and Syncrude are expected to be negligible.

E. Emission Rates

Particulate Matter

Only organic compounds which have volatilized from the crude oil and assist natural gas – both gaseous fuels – are combusted in the VCU's, the design of which ensures virtually complete combustion of the fuel. Particulate emissions are therefore negligible. International Safety Guide for Oil Tankers and Terminals (ISGOTT) data indicate particulate content of the inert gas is negligible. The worst case emission rate was determined from AP-42 to be 1.36 lb PM_{10}/hour per unit, or 0.6 lb PM_{10}/1000 barrels of crude loaded. Based on the maximum annual terminal marine tank vessel loading throughput of 65,700,000 barrels per year, the total annual particulate emissions from both VCU's are estimated to be 1.98 tons per year.

Sulfur Dioxide

Sulfur compounds present in the gases from the crude oil as well as from the scrubbed inert gas will be oxidized to SO_2 in the VCU's. The amount of sulfur present in the vapor depends upon the volatile sulfur content of the crude oil. Heavy crude oils, represented by Cold Lake crude, have higher sulfur contents than lighter crude oils, represented by Syncrude. Emissions estimates commissioned by PPLC determined a peak hourly emission rate of 27.90 pounds SO_2 per hour for each VCU. To allow for possibly higher sulfur contents in other crude oils and to ensure the highest possible emissions scenario is considered, a safety factor of 60 percent was applied to both the annual and short-term SO_2 emissions, resulting in the potential SO_2 emission rates from the crude vapor being increased to a peak hourly rate of 44.64 pounds SO_2 per hour.

Additional SO_2 will be contributed from the inert gas. ISGOTT indicates the typical SO_2 concentration of the inert gas is 50 ppm; this yields an annual potential-to-emit of approximately 1.5 tons per year of SO_2. To conservatively allow for the use of higher sulfur fuels in some ship boilers used to generate the inert gas, a value of 75 ppm was used with the maximum marine tank vessel loading rate of 50,000 barrels per hour to determine a maximum short-term SO_2 emission rate from the inert gas of 3.50 pounds per hour.

The average emission factor over the course of the loading cycle is 0.64 pounds SO_2 per barrel of crude oil loaded. Based on the maximum annual terminal marine tank vessel loading throughput of 65,700,000 barrels per year, total annual potential to emit is 21.0 tons SO_2 per year.

Nitrogen Oxides

PPLC evaluated specifications for both Cold Lake and Syncrude and determined the highest emission case for each VCU to be a peak hourly emission rate of 32.90pounds NO_x, based on Cold Lake crude emission rates.

A typical level of NO_x (200 ppm) in inert gas blankets (as provided by ISGOTT) was used to estimate VCU emissions associated with the displaced inert gas, the volume of which was estimated based on the maximum annual terminal marine tank vessel loading throughput of 180,000 barrels per day, 365 days per year, yielding a potential-to-emit of 4.4 tons per year of NO_x. Similar calculations using the maximum marine tank load vessel rate of 50,000 barrels per hour yields a peak short-term NOx emission rate of 6.70 lb NO_x per hour.

The average emission factor over the course of the loading cycle is 0.57 pounds NO_x per 1000 barrels of crude oil loaded. The potential annual NO_x emissions are calculated as (180,000 bbl/day)x(365 days/yr)x(0.57 lb/1000 bbl)x(1 ton/2000 pounds), equaling approximately 18.7 tons per year.

Carbon Monoxide

PPLC evaluated the specifications for Cold Lake crude and determined for each VCU a peak hourly emission rate of 45.70 pounds CO per hour.

ISGOTT data indicate CO content in inert gases is negligible.

The average emission factor over the course of the loading cycle is 0.61 lb CO per 1000 barrels of crude oil loaded. Based on the maximum annual terminal marine tank vessel loading throughput of 65,700,000 barrels per year, the total annual potential-to-emit is 19.9 tons CO per year.

Volatile Organic Compounds

PPLC determined for each VCU a peak hourly emission rate of 93.9 pounds VOC per hour based on loading Cold Lake crude. The average emission factor over the course of the loading cycle is 1.53 pound VOC per 1000 barrels of crude oil loaded.

Based on Cold Lake crude, the annual potential-to-emit is calculated as (140,000 bbl/d)x(365 days/yr)x(1.53 lb VOC/1000 bbl)x(1 ton/2000 lbs), equaling approximately 39 tons VOC per year.

Due to the design of the vapor control system, annual potential controlled VOC emissions are expected to be the same for all crude products and throughput levels, therefore controlled emissions based on loading Syncrude are also equal to approximately 39 tons VOC per year.

PPLC determined for each VCU a peak hourly emission rate of 66.0 lb VOC per hour based on loading Syncrude. The average emission factor over the course of the loading cycle is 1.19 pound VOC per 1000 barrels of crude oil loaded.

Based on Syncrude, the annual potential-to-emit is calculated as (180,000 bbl/d)x(365 days/yr)x(1.19 lb VOC/1000 bbl)x(1 ton/2000 lbs) equaling approximately 39 tons VOC per year.

Based on the above, PPLC emission limits for each VCU were developed from the following:

Pollutant	Assist Gas lbs/hr	Cold Lake Crude lbs/hr	Inerting Gas lbs/hr	Total lbs/hr (Peak)	lbs/1000 Barrels Loaded (Averaged over loading event)
PM/PM_{10}	1.36	Neg.	Neg.	1.36	0.06
SO_2	Included	44.6	1.75	46.4	0.64
NO_x	Included	32.9	3.35	36.3	0.57
CO	Included	45.7	Neg.	45.7	0.61
VOC	Neg.	93.9	Neg.	93.9	1.53

F. BACT Analysis

BACT for each of the VCU's shall include good combustion practices, the use of natural gas as the pilot and assist fuel, and the following.

PM: Emission rate based on AP-42: 0.00075 lbs/MMBtu, or 0.06 lb/1000 barrels loaded, averaged over the loading event.

SO_2: Short term peak hourly emission rate of 46.4 lb SO_2/hr based on BACT, loading Cold Lake Crude and including vapors from the inert gas blanket; 0.64 lb SO_2/1000 barrels loaded, averaged over the loading event.

NO_x: Emission rate of 0.07 lb NO_x/MMBtu averaged over the loading period based on BACT; or 0.57 lb NO_x/1000 barrels of crude loaded, averaged over the loading event.

CO: Emission rate of 13.7 lb CO/hr averaged over the loading period based on BACT; or 0.61 lb/1000 barrels of crude oil loaded. One hour limit of 45.7 lbs CO/hr to provide reasonable operational flexibility to accommodate variations in loading rates consistent with good combustion practices.

VOC: Emission rate of 5 mg/L averaged over the loading period based on BACT. Short term peak hourly rate of 93.9 lb VOC/hr or 29.8 mg/L.

Opacity: Visible emissions from the VCU stack shall not exceed 10% opacity based on a six (6) minute block average basis, except for no more than one six (6) minute block average in a three (3) hour period.

G. Annual Emissions

PPLC shall be restricted to the following annual emissions, based on a 12 month rolling total:

Total Licensed Annual Emissions for the Facility
Tons/year
(Used to calculate the annual license fee)

	PM	PM_{10}	SO_2	NO_x	CO	VOC
Boilers – Units #3 #4	0.42	0.42	1.8	1.3	0.13	0.01
Storage Tanks – Units #1 & #5-#26	--	--	--	--	--	220.0
Vapor Combustion Units - # 27 & #28	1.98	1.98	21.0	18.7	19.9	39.0
Total TPY	**2.4**	**2.4**	**22.8**	**20.0**	**20.0**	**259.0**

III. AMBIENT AIR QUALITY ANALYSIS

PPLC previously submitted an ambient air quality analysis for air emission license A-197-70-A-I demonstrating that emissions from the facility, in conjunction with all other sources, do not violate ambient air quality standards. An additional ambient air quality analysis is not required for this amendment.

ORDER

Based on the above Findings and subject to conditions listed below, the Department concludes that the emissions from this source:

- will receive Best Practical Treatment,
- will not violate applicable emission standards,
- will not violate applicable ambient air quality standards in conjunction with emissions from other sources.

The Department hereby grants Air Emission License A-197-77-1-A subject to the conditions found in Air Emission License A-197-70-C-R and in the following conditions.

Severability. The invalidity or unenforceability of any provision, or part thereof, of this License shall not affect the remainder of the provision or any other provisions. This License shall be construed and enforced in all respects as if such invalid or unenforceable provision or part thereof had been omitted.

SPECIFIC CONDITIONS

(1) **Vapor Control System**

A. PPLC is licensed to construct and operate a Vapor Control System, including two Vapor Transfer Arms and two Vapor Combustion Units.
B. PPLC shall fire natural gas as pilot and assist fuel in each VCU.
C. PPLC shall meet the following emission limits for each VCU:

Pollutant	Total lbs/hr (Peak)	lbs/1000 Barrels Loaded (Averaged over loading event)
PM/PM_{10}	1.36	0.06
SO_2	46.4	0.64
NO_x	36.3	0.57
CO	45.7	0.61
VOC	93.9	1.53

(2) PPLC will ensure the Vapor Control System complies with the applicable requirements of 40 CFR 63.1 through 63.16, including but not limited to:
A. Providing notification to DEP and EPA of intent to construct.
B. Developing a comprehensive operating plan including a written plan for startup, shutdown and malfunction of the system.
C. Maintaining records of all malfunctions and corrective actions, and reporting to DEP malfunctions which causes an exceedance of any emission standard or license limit.
D. Conducting performance testing for VOC's under normal operating conditions within 180 days of startup in accordance with a test plan submitted to DEP and EPA at least 60 days before the scheduled test.
E. Preparing an operation and maintenance plan for the continuous monitoring systems which assures the systems operate at all times when the vapor combustion unit operates in accordance with 40 CFR 63.8;

(3) PPLC will ensure the entire loading system and loading operation complies with the applicable provisions of 40 CFR 63 Subpart Y (40 CFR 63.560 through 63.568) including but not limited to the following:

A. Complying with the MACT requirement by reducing HAP emissions from marine tank vessel loading operations by 98 percent, by weight (40 CFR 63.562(b)(3)).
B. Verifying ship-to-shore compatibility of the ship's vapor collection equipment with that of the source's vapor collection system (40 CFR 63.562(b)(ii)).
C. Verifying the vapor tightness of the marine tank vessel before loading (40 CFR 63.562(b)(iii)).
D. Assuring the operations and maintenance plan for emission control and monitoring equipment requires continuous operation including periods of startup, shutdown and malfunctions in a manner consistent with safety and good air pollution control practices for minimizing emissions, and describes a program of correction action for both emission control and monitoring equipment, specifies procedures for preventive maintenance, identifies all operating parameters to be monitored and reported, and implements a quality control program for the continuous monitoring system (40 CFR 63.562(e)(1)-(6)).
E. Assuring vapor collection systems are designed and operated to prevent fugitive leaks of vapors by meeting the design standards of a car-seal or lock-and-key configuration or equipping the by-pass line with a flow indicator, and limiting loading to when the vapor collection systems are connected. Additionally, the source is responsible for ensuring the vapor-tightness and pressure/vacuum settings of the marine tank vessel which includes testing if the vessel does not have appropriate documentation (40 CFR 64.563(a)(1)-(4)).
F. Conducting an initial performance test in accordance with procedures delineated in 40 CFR 63.565 within 180 days of startup to determine control efficiency and/or the outlet concentration to demonstrate compliance and to establish a baseline temperature to achieve the required combustion efficiency. The facility shall be subsequently operated with the block average temperature no more than 50°F below the baseline temperature (40 CFR 63.563(b)(1)-(4)).
G. Conducting a monitoring program during loading operations that includes monitoring of flow rate in the vent by-pass or visual inspections of the seal or closure mechanism, and monitoring as appropriate (40 CFR 63.564(b)-(d)).
H. Installing, calibrating, operating and maintaining a temperature monitor, meeting delineated specifications, at the exhaust point of the combustion device which records the temperature every 15 minutes and computes one-hour and three-hour block average temperatures as required by 40 CFR 63.564(e)(3)-(4).

I. Ensuring the continuous monitoring systems for flow rate and temperature shall meet the applicable requirements of the compliance assurance monitoring delineated in 40 CFR 64.
J. Ensuring all recordkeeping and reporting requirements include all required information and timetables required in Section 63.567.

(4) PPLC will ensure accurate calculation of annual emissions by:
A. Maintaining a record of monthly and annual volume of crude oil loaded, categorized by crude oil type or source.
B. Maintaining a record of the quantity of assist gas burned in the VCU's.

(5) PPLC shall notify the Department within 48 hours and submit a report to the Department on a quarterly basis if a malfunction or breakdown in any component causes a violation of any emission standard (38 M.R.S.A. §605).

DONE AND DATED IN AUGUSTA, MAINE THIS 25th DAY OF August, 2009.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: _____
DAVID P. LITTELL, COMMISSIONER

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: February 12, 2009
Date of application acceptance: February 17, 2009

Date filed with the Board of Environmental Protection:

This Order prepared by N. Lynn Cornfield, Bureau of Air Quality.