CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

Interoffice Memo

To: File

From: Maryjoy Ulatowski

Date: Revised April 20, 2020

Subject: 2008 8-Hour RACT Analysis for
Kinder Morgan Liquids Terminals, LLC (KMLT) - Philadelphia Terminal
3300 North Delaware Avenue, Philadelphia, PA 19134
RACT Plan Approval No. IP16-000233

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I. Introduction

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx). Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 2008 8-hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 2008 8-hour ozone standard for this facility.

II. Company Description

Kinder Morgan Liquids Terminals (KMLT), LLC owns and operates as a bulk liquid terminal, located at 3300 North Delaware Avenue, Philadelphia, PA 19134, that warehouses a variety of products/chemicals/materials based on customer's demand. The terminal is called the Philadelphia Terminal. The materials/chemicals are in-bounded via ship/barge, rail car, and tank trucks and then the materials/chemicals are stored in fixed roof and internal floating roof tanks. The material/chemicals in the tanks are shipped out by ship/barge (marine), rail tank car, and tank truck. Sources at the facility include boilers, tank/truck loading, marine loadings, storage tanks, compressors, emergency engine, fugitive emissions and miscellaneous sources.

III. Applicability for NOx and VOC RACT

Kinder Morgan Liquids Terminals, LLC - Philadelphia Terminal is not a major source of NOx having potential a NOx emissions less than 100 tons per year (tpy). The 100 tpy is the major source threshold in Philadelphia County that is applicable to NOx RACT for the 2008 8-hour ozone National Ambient Air Quality Standard (NAAQS).

Kinder Morgan Liquids Terminals, LLC is a major source of VOC having potential VOC emissions greater than 50 tpy. The 50 tpy is the major source threshold in Philadelphia County that is applicable to VOC RACT for the 2008 8-hour ozone NAAQS.

IV. 1990 1-hour VOC RACT Permit

Kinder Morgan Liquids Terminals, LLC was subject to the 1990 1-hour Case-by-Case (CbC) RACT under the facility's previous name "GATX Terminals Corporation". The CbC RACT permit was effective on May 29, 1995 and approved by the United States Environmental Protection Agency (EPA) on October 31, 2001 in 66 FR 54936.

V. 1997 8-hour VOC RACT Permit

Kinder Morgan Liquids Terminals, LLC was subject to the 1997 8-hour RACT since it is considered a major source of VOC. Permit # PA-51-5003 was effective on 2/9/2016 and approved by EPA into the Pennsylvania State Implementation Plan (SIP) on October 7, 2016 (Federal Registrar Vol. 81, No.195).

VI. 2008 8-hour VOC RACT Sources and Analysis

Kinder Morgan Liquids Terminals, LLC is subject to the 2008 8-hour VOC RACT (RACT II) since it is considered a major source of VOC. The table below lists the following sources at the facility were evaluated for the 2008 8-hr VOC RACT.

Table VI-A1: Summary of VOC RACT II Sources at the Facility:

Group	Group Name	Quantity	Group Description	Comments /Summary
A.	Boilers	2	Each Boiler is greater than 10 MMBTU/hr but less than 10 MMBTU/hr. Each boiler fires natural gas as primary fuel and No. 2 during times of natural curtailment.	Each boiler is complying with the presumptive RACT requirements of 25 PA Code §129.97(c) for boilers less than 20 MMBTU/hr [25 PA Code 129.97(c)(3)].
B.	Storage Tanks	113	Various Storage Tanks. See Inventory List below in the Storage Tanks Section.	Each storage tank in the group is complying with a CTG RACT (25 PA Code §129.57 and 25 PA Code §129.56 & AMR V, Section II)
C.	Controlled Tank/Car Loading Operations	---	Tank/Rail Car loading operations of gasoline or organic liquids with a Reid Vapor Pressure (RVP) equal to or greater than 4.0 psi. Controlled loading positions are permanently configured to vent to a NAO Thermal Oxidation Unit to control VOC emissions.	Controlled loading operations at the facility is complying with a CTG RACT. Gasoline or organic liquids with a Reid Vapor Pressure equal to or greater than 4.0 psi are required to be controlled, per the presumptive RACT requirements of 25 PA Code §129.59
	Uncontrolled Tank/Car Loading Operations	----	Uncontrolled Tank/Car Loading Operations	Uncontrolled loading operations at the facility is Case-by-case RACT.
D.	Marine Loading Operations	---	Marine loading operations of materials with a vapor pressure of 4 psi or less. The facility does not marine load material with a vapor of greater than 4.0 psi.	Uncontrolled marine loading operations is Case-by-Case RACT.
E.	Fugitive Emissions			Fugitive emission is complying with the requirements of AMR V, Section XIII., a CTG

				RACT.
F.	Emergency Generator	1		The emergency generator is complying with the Presumptive RACT requirements of 25 PA Code §129.97(c), 25 PA Code §129.97(c)(2), §129.97(c)(5), and§129.97(c)(8).
G	Control Devices	2		Each control device is complying with the Presumptive RACT requirements of 25 PA Code §129.97(c) and 25 PA Code §129.97(c)(2).
H	Tank Cleaning and Degassing Operations			Tank cleaning and degassing operations are complying with the Presumptive RACT requirements of 25 PA Code §129.97(c) and 25 PA Code §129.97(c)(2).
i	Insignificant Sources			PTE is less than 1tpy. Control technology on such small source is both technically and economically unreasonable. Each insignificant source is complying with the Presumptive RACT requirements of 25 PA Code §129.97(c) and 25 PA Code §129.97(c)(2).

A. Boilers (All Presumptive)

1. Boilers - Inventory List

Table VI-A1: Boilers

Source ID	Source Description	Capacity	Fuel/ Material	Permits / Construction Date	1997 8-hr RACT Category	2008 8-hr RACT Category
CU02	Boiler #3, Hurst Boiler with Low NOx burner (Formerly called Boiler # 1)	12.6 MMBTU/hr	Natural Gas No. 2 Fuel Oil (During Gas Curtailment Only)	Oct. 2005	Each boiler was complying with the presumptive RACT requirements of 25 PA Code §129.93(c)(1). The presumptive RACT requirement 25 PA Code §129.93(c)(1) is the of installation, operation, and maintenance of the boiler as per the manufacturer's specifications.	Each boiler is complying with the presumptive RACT requirements of 25 PA Code §129.97(c). The presumptive RACT requirements of 25 PA Code §129.97(c) for a boiler with a heat input of less than 20 MMBTU/hr [25 PA Code 129.97(c)(3)] is the installation, maintenance, and operation of the source in accordance with manufacturer's specification and with good operating practices.
CU01A	Boiler #2, York Boiler with Low NOx burner	13.4 MMBTU/hr	Natural Gas No. 2 Fuel Oil (During Gas Curtailment Only)	Modified 2010		

2. Boilers - RACT II Analysis

The facility has 2 boilers, each rated over 10 MMBTU/h and each firing natural gas as the primary fuel and No. 2 oil during natural gas curtailment. Each boiler is complying with the presumptive RACT requirements of 25 PA Code §129.97(c)(2). The presumptive RACT requirements of 25 PA Code §129.97(c)(2) for a boiler with a heat input of less than 20 MMBTU/hr [25 PA Code 129.97(3)] is the installation, maintenance, and operation of the source in accordance with manufacturer's specification and with good operating practices.

B. Storage Tanks (All CTG)

For the 1997 8-hr and for 2008 8-hr RACT, all storage tanks at the facility are covered by Control Technique Guideline (CTG).

1. Storage Tanks - Descriptions

Table VI-B1: Storage Tank Descriptions

Tank Type	Tank Description
DS IFR	Double Seal, Internal Floating Roof
FR	Fixed Roof
IFR	Internal Floating Roof
HFR	Horizontal Fixed Roof
VFR	Vertical Fixed Roof
VFR DSP	Vertical Fixed Roof, Distilled Spirits

2. Storage Tanks - Inventory List

Table VI-B2: Storage Tanks

Source ID	Facility Tank ID	Tank Vent ID	Tank Type	Capacity (gallons)	1997 8-hr RACT CTG RACT	2008-hr RACT CTG RACT
P051	51	V051	VFR DSP	5,382	25 PA Code §129.57	25 PA Code §129.57
P052	52	V052	VFR DSP	5,363	25 PA Code §129.57	25 PA Code §129.57
P053	53	V053	VFR DSP	5,387	25 PA Code §129.57	25 PA Code §129.57
P054	54	V054	VFR DSP	5,375	25 PA Code §129.57	25 PA Code §129.57
P055	55	V055	VFR DSP	5,341	25 PA Code §129.57	25 PA Code §129.57
P056	56	V056	VFR DSP	5,345	25 PA Code §129.57	25 PA Code §129.57
P057	57	V057	VFR DSP	5,364	25 PA Code §129.57	25 PA Code §129.57
P058	58	V058	VFR DSP	5,367	25 PA Code §129.57	25 PA Code §129.57
P104	104	V104	VFR	419,527	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P105	105	V105	VFR	417,744	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P106	106	V106	VFR	556,755	25 PA Code §129.56 &AMR V, Section II	25 PA Code §129.56 & AMR V, Section II

Source ID	Facility Tank ID	Tank Vent ID	Tank Type	Capacity (gallons)	1997 8-hr RACT CTG RACT	2008-hr RACT CTG RACT
P107	107	V107	DS IFR	127,039	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P108	108	V108	VFR	126,882	25 PA Code §129.56 &AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P121	121	V121	VFR	214,548	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P122	122	V122	VFR	428,569	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P123	123	V123	VFR	738,192	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P124	124	V124	DS IFR	1,584,987	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P125	125	V125	IFR	2,124,954	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P126	126	V126	VFR	214,748	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P127	127	V127	VFR	422,780	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P128	128	V128	VFR	425,518	25 PA Code §129.56 &AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P129	129	V129	VFR	739,384	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P130	130	V130	VFR	126,804	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P131	131	V131	VFR	126,246	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P133	133	V133	VFR	843,751	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P134	134	V134	VFR	427,695	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II

Source ID	Facility Tank ID	Tank Vent ID	Tank Type	Capacity (gallons)	1997 8-hr RACT CTG RACT	2008-hr RACT CTG RACT
P135	135	V135	VFR	636,524	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P137	137	V137	VFR	224,621	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P140	140	V140	VFR	126,854	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P141	141	V141	VFR	425,715	25 PA Code §129.56 &AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P142	142	V142	VFR	210,694	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P143	143	V143	IFR	406,159	25 PA Code §129.56 &AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P144	144	V144	VFR	428,500	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P145	145	V145	VFR	424,621	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P146	146	V146	VFR	423,555	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P147	147	V147	IFR	384,611	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P148	148	V148	IFR	795,557	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P149	149	V149	IFR	401,184	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P150	150	V150	IFR	403,777	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P151	151	V151	IFR	799,391	25 PA Code §129.56 &AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P152	152	V152	IFR	806,968	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II

Source ID	Facility Tank ID	Tank Vent ID	Tank Type	Capacity (gallons)	1997 8-hr RACT CTG RACT	2008-hr RACT CTG RACT
P153	153	V153	IFR	424,961	25 PA Code §129.56 &AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P154	154	V154	VFR	447,628	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P155	155	V155	VFR	844,179	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P156	156	V156	VFR	857,938	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P157	157	V157	IFR	384,611	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P158	158	V158	IFR	384,611	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P159	159	V159	IFR	813,594	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P160	160	V160	IFR	808,142	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P161	161	V161	IFR	819,026	25 PA Code §129.56 &AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P162	162	V162	IFR	840,926	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P163	163	V163	IFR	815,172	25 PA Code §129.56 &AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P164	164	V164	IFR	816,371	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P198	198	V198	VFR	315,436	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P199	199	V199	VFR	314,782	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P200	200	V200	VFR	312,077	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II

Source ID	Facility Tank ID	Tank Vent ID	Tank Type	Capacity (gallons)	1997 8-hr RACT CTG RACT	2008-hr RACT CTG RACT
P201	201	V201	VFR	313,882	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P202	202	V202	VFR	216,331	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P203	203	V203	VFR	216,331	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P204	204	V204	IFR	1,264,372	25 PA Code §129.56 &AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P205	205	V205	VFR	510,742	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P206	206	V206	IFR	509,983	25 PA Code §129.56 &AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P207	207	V207	IFR	511,025	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P208	208	V208	IFR	509,305	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P209	209	V209	IFR	500,614	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P210	210	V210	IFR	510,762	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P211	211	V211	IFR	489,980	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P212	212	V212	VFR	509,189	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P213	213	V213	IFR	266,663	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P214	214	V214	VFR	289,802	25 PA Code §129.56 &AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P215	215	V215	IFR	281,774	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II

Source ID	Facility Tank ID	Tank Vent ID	Tank Type	Capacity (gallons)	1997 8-hr RACT CTG RACT	2008-hr RACT CTG RACT
P216	216	V216	IFR	267,219	25 PA Code §129.56 &AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P217	217	V217	VFR	511,150	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P218	218	V218	IFR	510,164	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P219	219	V219	VFR	509,300	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P220	220	V220	VFR	510,457	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P221	221	V221	IFR	490,637,	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P222	222	V222	IFR	490,516	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P223	223	V223	IFR	479,682	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P224	224	V224	IFR	471,176	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P225	225	V225	IFR	470,665	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P226	226	V226	IFR	473,195	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P227	227	V227	IFR	473,101	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P228	228	V228	IFR	925,384	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P301	301	V301	DS IFR	1,141,483	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P302	302	V302	DS IFR	3,776,119	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II

Source ID	Facility Tank ID	Tank Vent ID	Tank Type	Capacity (gallons)	1997 8-hr RACT CTG RACT	2008-hr RACT CTG RACT
P303	303	V303	DS IFR	981,752	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P304	304	V304	DS IFR	3,989,566	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P305	305	V305	VFR	318,301	25 PA Code §129.56 & AMR V, Section II	25 PA Code §129.56 & AMR V, Section II
P420	420	V420	HFR	20,079	25 PA Code §129.57	25 PA Code §129.57
P421	421	V421	HFR	6,047	25 PA Code §129.57	25 PA Code §129.57
P422	422	V422	HFR	3,138	25 PA Code §129.57	25 PA Code §129.57
P440	440	V440	VFR	35,282	25 PA Code §129.57	25 PA Code §129.57
P450	450	V450	VFR	31,281	25 PA Code §129.57	25 PA Code §129.57
P451	451	V451	VFR	31,264	25 PA Code §129.57	25 PA Code §129.57
P452	452	V452			25 PA Code §129.57	25 PA Code §129.57
P453	453	V453			25 PA Code §129.57	25 PA Code §129.57
P470	470	V470	HFR	10,012	25 PA Code §129.57	25 PA Code §129.57
P471	471	V471	HFR	2,000	25 PA Code §129.57	25 PA Code §129.57
P481	481	V481	HFR	29,996	25 PA Code §129.57	25 PA Code §129.57
P482	482	V482	HFR	29,996	25 PA Code §129.57	25 PA Code §129.57
P483	483	V483	HFR	29,996	25 PA Code §129.57	25 PA Code §129.57
P484	484	V484	HFR	29,996	25 PA Code §129.57	25 PA Code §129.57
P485	485	V485	HFR	29,996	25 PA Code §129.57	25 PA Code §129.57
P486	486	V486	HFR	29,996	25 PA Code §129.57	25 PA Code §129.57
P487	487	V487	HFR	29,996	25 PA Code §129.57	25 PA Code §129.57
P488	488	V488	HFR	29,996	25 PA Code §129.57	25 PA Code §129.57
P489	Ont 1	V489	HFR	20,000	25 PA Code §129.57	25 PA Code §129.57
P490	Ont 2	V490	HFR	20,000	25 PA Code §129.57	25 PA Code §129.57
FT00	Flush Tank 000			2,500	25 PA Code §129.57	25 PA Code §129.57
FT01	Flush Tank 001			2,500	25 PA Code §129.57	25 PA Code §129.57
FT02	Flush Tank 002			2,500	25 PA Code §129.57	25 PA Code §129.57
FT03	Flush Tank 003			2,500	25 PA Code §129.57	25 PA Code §129.57

3. Storage Tanks - RACT II Analysis

For the 1997 8-hr and for 2008 8-hr RACT, the storage tanks at the facility are covered by Control Technique Guideline (CTG) RACT regulations of 25 PA Code §129.57 or 25 PA Code §129.56 as specified in the " 2008 8-hr CTG RACT Regulation" column of the above table.

For storage tanks with capacities greater than 40,000 gallons, since each unit stores petroleum/organic products with a vapor pressure ≥ 1.5 psi and ≤ 11 psi, the RACT requirement is the installation of an external or an internal floating roof, as per the CTG rule 25 PA Code §129.56. Storage tanks containing products with > 11 psi will need to be controlled by a control device meeting the requirements of 25 PA Code §129.56. The installation of an external or internal floating roof for storage tanks with capacities greater than 40,000 gallons storing petroleum/organic products with a vapor pressure ≥ 1.5 psi and ≤ 11 psi also satisfies the requirements of AMR V, Section II which similarly stipulates the implementation of a properly installed and well-maintained organic material vapor control device such as a floating roof.

For storage tanks with capacities greater than or equal to 2,000 gallons but less than or equal to 40,000 gallons, since each unit stores petroleum/organic products with a vapor pressure > 1.5 psi, the RACT requirement is the existence of pressure relief valves which are maintained in good operating condition and which are set to release at various pressures, as per the CTG rule 25 PA Code §129.57.

C. Tank Car/Truck Loading Operations (CTG and Case by Case)

At the Philadelphia Terminal, KMLT operates various tank car/truck loading racks. A loading rack consists of multiple loading positions. Each loading position of a rack connects to a specific storage tank and are used to transfer liquids between a tank car or trucks and the storage tank. Tank car / truck loading racks have various loading positions that can either be "controlled" or "uncontrolled". Controlled loading positions are permanently configured to vent to a NAO Thermal Oxidation Unit to control VOC emissions. Gasoline or organic liquids with a Reid Vapor Pressure (RVP) equal to or greater than 4.0 psi are required to be controlled, per the presumptive RACT requirements of 25 PA Code §129.59. Uncontrolled loading positions are positions that at a loading rack are not vented to the Thermal Oxidizer but are limited to loading liquids with RVP less than 4.0 psi. Therefore, uncontrolled loading is only expected to occur at any uncontrolled loading positions.

1. Tank Car/ Truck Loading Operations - Inventory List

Table VI-C1: Tank Car/Truck Loading Operations and Control Devices

Source ID	Source Description	Manufacturer Model No	Capacity	Fuel/ Material	Construction Date
CD02	Thermal Oxidation Unit (TOU) [Formerly Described as Vapor Incinerator in previous permits]	NAO		Burners: Natural Gas	Burners replaced 2010
CD04	Scrubber				1/2007

2. Tank Car/ Truck Loading Racks and Positions - Permit History

Below is a summary of the various loading racks and number of positions. The table also gives the permitting history of the loading rack and number of controlled or uncontrolled loading positions.

Table VI-C2: Summary Positions and Permit Modifications to Tank Car / Truck Loading Racks

Rack ID	Status During 1997 1-hr RACT	Summary of Modifications (1997-2014)	Status During 1997 8-hr RACT	Summary of Modifications (2015-Sept 2019)	Status 2008 8-hr RACT
A	Controlled		2 controlled and 2 uncontrolled loading positions.		Remains with 2 controlled and 2 uncontrolled loading positions.
B	Controlled	AMS Permit No. 08211 dated 12/11/2008: Removed all controlled positions.	2 uncontrolled loading positions		Remains with 2 uncontrolled positions.
C	Uncontrolled		2 uncontrolled loading positions.		Remains with 2 uncontrolled
D	Uncontrolled		2 controlled and 3 uncontrolled loading positions.		
DSP	N/A	New	1 uncontrolled loading positions.		Remains with 1 uncontrolled

Rack ID	Status During 1997 1-hr RACT	Summary of Modifications (1997-2014)	Status During 1997 8-hr RACT	Summary of Modifications (2015-Sept 2019)	Status 2008 8-hr RACT
					loading positions.
E	Controlled	None	1 controlled and 6 uncontrolled loading positions.		Remains with 1 controlled and 6 uncontrolled loading positions.
F	Controlled	Permit No. 8211 dated 12/10/2008: One controlled position moved to Rack F and other controlled positions moved to Rack M. Rack F increased pump capacity from 450 gpm to 1200 gpm for controlled loading. Additional control position added. 14350 dated 12/10/2014 allowed F and M to control FGE.	2 controlled and 2 uncontrolled loading positions.		Remains with 2 controlled and 2uncontrolled loading positions.
G	Uncontrolled	IP17-000085 dated 3/16/2017: relocate the loading position for Tank 205 from G to Rack R	4 uncontrolled. loading positions		Remains with 4 uncontrolled loading positions.
H	Uncontrolled		2 uncontrolled loading positions		Remains with 2 uncontrolled loading positions.
M	Controlled	8211 dated12/11/2008: One controlled position	2 controlled and 4 uncontrolled		Remains with 2 controlled and 4

Rack ID	Status During 1997 1-hr RACT	Summary of Modifications (1997-2014)	Status During 1997 8-hr RACT	Summary of Modifications (2015-Sept 2019)	Status 2008 8-hr RACT
		moved to Rack F and other controlled positions moved to Rack M. Rack M loading capacity remains at 450 gallons per minute, but the number of loading positions at Rack M increased to two (2) controlled loading position added. No increase in rack pump capacity.	loading positions		uncontrolled positions.
N	Uncontrolled		2 uncontrolled loading positions		Remains with 2 uncontrolled loading position.
O	Uncontrolled		4 uncontrolled loading positions	IP18-000242 dated 6/29/2018: Relocated the loading position for Tank 305 from Rack X uncontrolled to Rack O uncontrolled.	
P	Controlled		3 uncontrolled loading positions	RFD IP18-000316 dated 8/3/2018: Added new uncontrolled loading arm (Position 3) on Loading Rack P	

Rack ID	Status During 1997 1-hr RACT	Summary of Modifications (1997-2014)	Status During 1997 8-hr RACT	Summary of Modifications (2015-Sept 2019)	Status 2008 8-hr RACT
R	Uncontrolled		4 uncontrolled loading positions	IP17-000085 dated 3/16/2017: Relocated the loading position for Tank 205 from G to Rack R	Remains with 4 uncontrolled loading positions.
R-1	Uncontrolled		2 uncontrolled loading positions		Remains with 2 uncontrolled loading positions
Rail Siding 1	N/A	New	All positions are uncontrolled, expect for Rail Siding 1, Spot 1 which is controlled under Rack D. 5 uncontrolled loading positions and 1 controlled loading position)		Currently with 1 controlled loading positions and 4 uncontrolled loading positions
Rail Siding 2	N/A	New	12 uncontrolled loading positions	IP17-000085 dated 3/16/2017: Relocated the loading position for Tank 205 from G to Rack R. Allow Tank 205 to be able to load at Rail Siding 2 Spot 4	
Rail Siding 3	N/A	New	7 uncontrolled loading positions		Remains with 7 uncontrolled loading positions
T	Uncontrolled		4 uncontrolled		Remains with 4

Rack ID	Status During 1997 1-hr RACT	Summary of Modifications (1997-2014)	Status During 1997 8-hr RACT	Summary of Modifications (2015-Sept 2019)	Status 2008 8-hr RACT
			loading positions)		uncontrolled loading positions.
V	Controlled	Controlled positions no longer connected to control.	uncontrolled loading position.		1 uncontrolled loading position
X	Uncontrolled		2 uncontrolled loading positions)	AMS Permit No. 02139 dated 12/10/2017: Added controlled positions. AMS Permit No. 8211 dated 12/11/2008: Removed all controlled positions from Racks X and B. IP18-000242 dated 6/29/2018: Relocation of the loading position for Tank 305 from Rack X uncontrolled to Rack O uncontrolled.	Remains with 2 uncontrolled loading positions

For the NAO Thermal Oxidization Unit and the Marine Vapor Combustion Unit, the presumptive RACT requirement due to combustion is the installation, operation, and maintenance of the unit as per the manufacturer's specifications. These RACT requirements for the NAO Thermal Oxidation Unit are part of the SIP-approved 1-hour RACT Plan Approval for the facility (under its former name "GATX Terminals Corporation"), effective on May 29, 1995, and approved by EPA on October 31, 2001 in 66 FR 54936.

3. RACT Analysis - Controlled Tank Car /Truck Loading Operations (CTG)

Controlled loading is applicable to the GTG RACT requirements of 25 PA Code §129.59. Controlled loading of VOC materials with a RVP greater than or equal to 4.0 psi continues to be subject to the **CTG RACT** regulation 25 PA Code §129.59(a) as specified in the 1990 1-hour RACT and the 1997 8-hr RACT Plan Approvals. Since controlled loading was subject to the a GTG RACT, the requirements should have not been included originally in the 1990 1-hr Case-by-Case RACT permit.

For 2008 8-hr RACT and for controlled loading operations, AMS shall continue to be meet the CTG RACT requirements of 25 PA Code §129.59. Per the facility's 1997 8-hr RACT Permit. KMLT Philadelphia Terminal shall continue to comply with its 1997 8-hr RACT permit requirement which has a short-term VOC emission limit of 57.0 pounds per hour (lb/hr) for all controlled rail tank car/truck loading positions at the facility. The 57.0 lb/hr corresponds to the maximum capacity of the oxidizer at 1421 gallons per minute or 82,600 gallons per hour and the 0.0668 lb/100-gallon limit from 25 PA Code §129.59(a).

Table VI.C3-1 below provides the PTE of controlled loading positions based on a possible actual operating scenario of 1000 hours of operation per controlled rack per year, which is the most a loading position can operate due to the time it takes to move trucks in and out of the position, connecting and disconnecting the loading arm, etc.

Table VI.C3-1: Potential VOC Emissions from Controlled Tank Car/Truck Loading Operations

Location	Position*	Pumping Rate (gpm)	Emission Factor** (lb/100 gal)	Emissions (lb/hr)	Operating Hours*** (Hours/year)	Total Controlled Loading Emissions (tons/year)
A Rack	1 -Truck 2 - Truck	450	0.0668	18.036	1000	9.018
E Rack	1 - Truck	450	0.0668	18.036	1000	9.018
F Rack	1 - Truck 2 - Truck	1200	0.0668	48.096	1000	24.048
M Rack	1 - Truck 2 - Truck	450	0.0668	18.036	1000	9.018
D Rack	1 - Truck	450	0.0668	18.036	1000	9.018
Spot 1-1	2 - Rail	450	0.0668	18.036	1000	9.018
TOTAL	-	3,450	-	138.28	6000	69.14

*A and M racks have two (2) loading positions that cannot load simultaneously due to space issues (a truck can only fit on one side of the rack).

.

**Emission factor from 25 PA Code §129.59(a).

***Operation is physically limited to 1,000 hours per controlled rack per year due to the time it takes to connect and disconnect trucks, move in and out of position, etc.

As seen in the table above, all controlled loading has the potential to emit a total of 69.14 tons of VOC per year. Based on compliance with 25 PA Code §129.59, all controlled positions loading organic liquids greater than or equal to 4.0 RVP are connected to the NAO Thermal Oxidation Unit, which is capable of processing volatile organic vapors and gases so that emissions are no more than 0.0668 pounds of VOC /100 gallons of gasoline. Stack testing of the NAO Thermal Oxidation Unit is necessary in order to ensure compliance the control device emission rate limitation.

During the draft permitting process, the facility is requesting the language to allow an alternative control device in lieu of the NAO Thermal Oxidizer during controlled tank/truck loading operations.

Condition No.	Condition from 1997 8-hr RACT	Proposed Condition for 2008 8-hr RACT
2.A.1	Controlled tank car/truck loading rack positions. Each controlled rack loading position is connected to the NAO Thermal Oxidation Unit.	Controlled tank car/truck loading rack positions. Each controlled rack loading position is connected to the NAO Thermal Oxidation Unit or an alternative control device that demonstrate compliance with Section 2.A (1). A Plan Approval Application shall be submitted and approved by AMS prior to installation and shall include an anti-backsliding analysis.

The proposed modification above is proposed draft for controlled tank car/truck loading rack positions (Condition 2.A.1). AMS has no objection to the request since there is no increase in emission limits or the PTE for VOC. Emissions will be not increase and thus not considered backsliding; however, the Permittee will need to submit a Plan Approval and AMS will need to approve prior to installation/modification of a new or existing control device to control tank/car loading operations.

4. RACT Analysis – Uncontrolled Tank Car/Truck Loading Operations (Case-by-Case)

a. Process Background Information - Uncontrolled Tank Car/Truck Loading Operations (Case-by-Case)

"Uncontrolled loading" or loading of VOC materials with a RVP below 4.0 psi is applicable to C**ase-by-Case RACT.** As specified in the case-by-case SIP-approved 1990 1-hr and 1997 8-hr RACT Plan Approvals, the uncontrolled tank car/truck loading racks can only process organic liquid with a vapor pressure lower than 4.0 RVP and have a combined emission limit of 129 tons of VOC per year. Although not specified in the SIP-approved 1-hour RACT plan approval, AMS considers the loading of materials with a vapor pressure lower than 4.0 RVP at the "controlled racks" (as identified in the SIP-approved 1-hour RACT plan approval) to be subject to the 129 tons of VOC per year limit.

Table VI.C4-2 lists the uncontrolled tank car truck loading positions at the facility. Each uncontrolled loading rack pump has a maximum capacity of 450 gallons per minute. The PTE for each uncontrolled loading position is based on AP-42 Section 5.2 and fuel grade ethanol. Fuel grade ethanol is the facility's highest emitting product that can be loaded without controls. Table VI.C4-1 below provides the fuel grade ethanol properties and loading operations characteristic that were used to calculate the loading loss emission factor (L_L) for tank/truck uncontrolled loading operations at the facility.

Table VI.C4-1: Tank – Truck Loading Loss Emissions Factor for Fuel Grade Ethanol

Chemical Vapor Pressure (psia)	M; Molecular Weight	CE%**	S; Saturation Factor	T; Annual Avg. Temp. (deg. F)	L_L; Emission Factor (lb/1,000 gal)
1.21	46	0	0.5	60	0.67

**CE=0% because there is no control

Table VI.C4-2 in the following page provides a more detailed PTE estimate per uncontrolled loading position, assuming ethanol loading. As shown in Table VI.C4-2, uncontrolled loading positions at the facility are subject to the 129 tpy and that the PTE calculations per position to continue to be the most stringent and enforceable limit of the PTE.

Table VI.C4-2: Potential VOC Emissions from Uncontrolled Tank Car/Truck Loading Operations

Rack Name	No. of Uncontrolled Loading Positions	Pumping Rate (gpm)	L_L; Emission Factor (lb/1,000 gal)	Emissions (lb/hr)	Operating Hours (Hours/year)	Emissions**** (tons)	Simultaneous Loading? ****	Number of Positions Loaded Simultaneously	Total Uncontrolled Loading Emissions (tons/year)	Total Uncontrolled Loading Emissions Limitation (tons/year)
A Rack*	2	450	0.67	18.0	1,000	9.0	No	1	9.05	129
		450	0.67	18.0	1,000	9.0				
E Rack*	6	450	0.67	18.0	1,000	9.0	Yes	2	18.10	
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
F Rack*	1	450	0.67	18.0	1,000	9.0	No	1	9.05	
M Rack*	4	450	0.67	18.0	1,000	9.0	No	1	9.05	
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
D Rack*	3	450	0.67	18.0	1,000	9.0	No	1	9.05	
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
B Rack	2	450	0.67	18.0	1,000	9.0	No	1	9.05	
		450	0.67	18.0	1,000	9.0				
V Rack	1	450	0.67	18.0	1,000	9.0	No	1	9.05	
C Rack	2	450	0.67	18.0	1,000	9.0	Yes	2	18.10	
		450	0.67	18.0	1,000	9.0				
G Rack	4	450	0.67	18.0	1,000	9.0	Yes	2	18.10	
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				

		450	0.67	18.0	1,000	9.0				
H Rack	2	450	0.67	18.0	1,000	9.0	Yes	2	18.10	
		450	0.67	18.0	1,000	9.0				
N Rack	2	450	0.67	18.0	1,000	9.0	No	1	9.05	
		450	0.67	18.0	1,000	9.0				
O Rack	4	450	0.67	18.0	1,000	9.0	No	1	9.05	
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
P Rack	2	450	0.67	18.0	1,000	9.0	No	1	9.05	
		450	0.67	18.0	1,000	9.0				
R Rack	4	450	0.67	18.0	1,000	9.0	Yes	2	18.10	
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
R-1 Rack	2	450	0.67	18.0	1,000	9.0	No	1	9.05	
		450	0.67	18.0	1,000	9.0				
X Rack	2	450	0.67	18.0	1,000	9.0	No	1	9.05	
		450	0.67	18.0	1,000	9.0				
DSP Rack	1	450	0.67	18.0	1,000	9.0	No	1	9.05	
T-Rack	4	450	0.67	18	1000	9.0	No	1	9.05	
Rail Siding 1	5	450	0.67	18.0	1,000	9.0	Yes	5	45.25	
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
Rail Siding 2	12	450	0.67	18.0	1,000	9.0	Yes	12	108.60	
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				

		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
Rail Siding 3	7	450	0.67	18.0	1,000	9.0	Yes	7	63.35	
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
		450	0.67	18.0	1,000	9.0				
TOTAL									424.63	129

* Each rack has additional positions connected to the control, whose PTE has been considered for RACT under controlled loading.

** Operation is limited to 1,000 hours per year due to the time it takes to connect and disconnect trucks, move in and out of position, etc. Emissions based on AP-42, Section 5.2 using fuel grade ethanol. This is not an enforceable emissions limitation but reflects actual and projected operations.

*** Some loading racks can load simultaneously, that is, they can have two trucks loading at the same time, one on each side of the rack. On the other hand most, loading racks cannot load simultaneously, that is, they can only load one truck at a time because one side of the rack is blocked by an obstruction such as a wall or piping; there is not enough space to load more than one truck per side at any given time. Rail sidings at the facility have enough space to simultaneously load a rail car at each loading position.

b. Control Device Rankings - Uncontrolled Tank Car/Truck Loading Operations (Case-by-Case)-

In the 1997 8-hr RACT, the following control devices were evaluated for uncontrolled tank/rail car and truck loading operations (loading VOC liquid materials with an RVP < 4.0 psi). The same control devices were evaluated for the 2008 8-hour ozone RACT.

*Does not include capture efficiency, therefore the actual control efficiencies used in the calculations below **may vary** as they will integrate capture efficiency (i.e. **90%** is included in the analysis for an additional Thermal Oxidation Unit at the tank car/truck loading racks

Rank	Control	Description	*Estimated Effectiveness
1	Thermal Oxidation	Thermal Oxidation is a process in which the hydrocarbons in a gas stream are combusted to form carbon dioxide and water at an elevated temperature. Thermal Oxidation is governed by temperature, time, and turbulence. In order to achieve effective combustion, the organic must be raised 100-degree Fahrenheit or more above its ignition temperature and held at that for good oxidation to occur. An auxiliary fuel is required to ensure the temperature is maintained for proper combustion. There are essentially two (2) types of incinerators: thermal and catalytic.	95-98%
2	Carbon Adsorptio n	Adsorption is where gas molecules are passed through a bed or solid particles, then diffuses from the gas stream to the bed, and held on the media by attractive forces. Adsorptive capacity of the solid for the gas tends to increase with the gas phase concentration, molecular weight, diffusivity, polarity, and boiling point. Typical adsorbents media in use include activated carbon, silica gel, activated alumina, synthetic zeolites, fuller's earth, and other clays	85-95%
3	Bioreactor	There are several different types of bioreactors from soil beds or bio-filters to bio-trickling filters, and bio-scrubbers. Typically used for odor control, bioreactors can be used to oxidize VOCs. For a bioreactor to be effective, one needs a consistent stream and maintain temperature above 60 degrees Fahrenheit. The marine vessel operation at Kinder Morgan is intermittent and the climates average annual temperature is below 60 degrees Fahrenheit. While there are other factors to consider, this control option is considered technically infeasible due to the intermittent nature of the operation and the climate of the area.	60-99%
4	Scrubbers	Scrubbers use a process called absorption to remove pollutants from an air stream to a liquid stream. The absorption processes the organics in the air stream are dissolved in a liquid solvent. The limiting factors as a primary control technique deal with the availability of a	50-98%

		suitable solvent and the solubility of the organic.	
5	Condensation	Refrigeration units are basically “heat pumps,” absorbing heat on the “cold side” of the system and releasing heat on the “hot side” of the system. A refrigerated condenser is a viable option if: The air stream is saturated with the organic compound The organic vapor containment system limits air flow Required air flow does not overload a refrigeration system with heat only when one organic compound is emitted	50-90%

c. Technical Feasibility Evaluation Summary - Uncontrolled Tank Car/Truck Loading Operations (Case-by-Case):

For uncontrolled tank/rail car and truck loading operations (loading VOC liquid materials with an RVP < 4.0 psi), the table below list each possible control devices, scenarios evaluated, and conclusions for the 2008 8-hour ozone RACT and compares each device to the 1997 8-hr RACT evaluation and conclusion.

Control Device	**Evaluation/ Analysis**	**1997 8-hr RACT** **Conclusion Notes/Comments**	**2008 8-hr RACT** **Conclusion/ Notes/ Comments**
Thermal Oxidation	Scenario A: Connection to the Existing Thermal Oxidation Unit	**Was Technically Infeasible.** Kinder Morgan Liquid Terminals, LLC cannot connect any additional loading positions to the NAO Thermal Oxidation Unit following the following reasons: • The existing thermal oxidizer is currently operated at capacity. • The existing control system is not set up to handle such varying streams from very lean to very rich. • It is not technically feasible to connect additional loading positions located at the “Controlled Loading Racks” (as defined in the 1-hor SIP-approved plan approval) since the racks have physical space limitations that would prevent the installation of equipment such as metered loading equipment, top/bottom loading arms, overflow sensors, steel support structures, etc.;	**Still Technically Infeasible.** Same reason as mention in the 1997 8-hr RACT column.

		• Additionally, it is important to note that control of the low vapor pressure chemicals would require the control device to burn excessive quantities of natural gas in order to achieve and maintain the required operating temperature. As a result, the oxidizer would be generating significant nitrogen oxide and carbon monoxide emissions to achieve insignificant VOC reductions from the low vapor pressure products. This would be counterproductive with respect to protecting the environment.	
	Scenario B: Install a new thermal oxidation unit to control uncontrolled loading (materials with psia <4.0).	**<u>Was Technically Feasible, but Economically Unreasonable.</u>** This option was technically feasible, but economically unreasonable. The $ per ton of VOC reduced is greater than $7000. Installation of a new thermal oxidizer or new tank control device was not economically feasible.	**<u>Still Technically Feasible, but Economically Unreasonable.</u>** This option is technically feasible, but economically unreasonable for all tank truck and rail car loading positions and an individual loading position. The cost effectiveness about $15,864 for all uncontrolled loading positions and about $13,169 for an individual uncontrolled loading position. Installation of a new thermal oxidizer or new control device is not economically reasonable for uncontrolled truck tank loading operations.
Carbon Adsorption	Install a Carbon Adsorption System	**<u>Was Technically Infeasible.</u>** The RACT analysis is oriented toward the use of activated carbon, a commonly used adsorbent for VOCs. Carbon adsorption is effective when materials have a molecular weight of 50 or greater. Carbon adsorption is considered technically infeasible for the operation since it would not be effective on all materials handled at the dock. Ethanol is loaded into vessels in addition to other materials. The molecular weight of ethanol is 46, thus making carbon adsorption infeasible.	**<u>Still Technically Infeasible.</u>** Same reason as mention in the 1997 8-hr RACT column

Bioreactor	Install a Bioreactor	**Was Technically Infeasible.** The loading operations at Kinder Morgan is intermittent and the climates average annual temperature is below 60 degrees Fahrenheit. While there are other factors to consider, this control option is considered technically infeasible due to the intermittent nature of the operation and the climate of the area.	**Still Technically Infeasible.** Same reason as mention in the 1997 8-hr RACT column
Scrubbers	Install a Scrubber	**Was Technically Infeasible.** Since the limiting factors for scrubbers as a primary control technique deal with the availability of a suitable solvent and the solubility of the organic. In this case, the terminal would require different solvents to handle the varying material handled. Based on the organics in the air stream requiring different absorption media this control option is considered technically infeasible.	**Still Technically Infeasible.** Same reason as mention in the 1997 8-hr RACT column
Condensation	Install a Condenser	**Was Technically Infeasible.** Since the marine vessel loading operation is only considered to be 50 percent saturated and there are multiple organic compounds, this control option is considered infeasible.	**Still Technically Infeasible.** Same reason as mention in the 1997 8-hr RACT column

d. Cost Analysis for Technically Feasible Options - Uncontrolled Tank Car/Truck Loading Operations (Case-by-Case:

Scenario B: Install a New Thermal Oxidation Unit to Control Uncontrolled loading (materials with psia <4.0).

Option 1: Thermal Oxidizer Technical Feasibility Cost Analysis: "Uncontrolled Loading at All Positions"

The goal of this cost analysis is to determine the feasibility of connecting all uncontrolled loading positions located at either the "Controlled Loading Racks" or at the "Uncontrolled Loading Racks" to a second thermal oxidation unit. (As is explained above, connection to the existing NAO Thermal Oxidation Unit is technically infeasible.)

To determine the cost effectiveness of the technically feasible control options, connection to a thermal oxidation unit, a cost analysis was conducted and is presented below. The capital cost for the thermal oxidizer is based on a vendor quote for another project (see "Attachment A") and is presented in the following tables.

The following is a cost analysis that was submitted by CMI on behalf of KMLT for the control of all uncontrolled loading positions at all tank truck and rail car loading positions. The cost analysis is based on 8760 hours annual of operation of a thermal oxidizer. All uncontrolled positions will need to be vented to the thermal oxidizer and as seen in Table IV-C4-2, the total of uncontrolled operation hours for all uncontrolled position is more than 8760 hours.

Kinder Morgan
RACT Analysis

All Tank Truck and Rail Car Loading Positions
Incinerator Cost
Limited @ 129 tons

4/7/2020

Direct Cost		
Purchased Equipment	$1,706,542.07	Vendor Quote Attached
Instrumentation	-	
Sales Tax		
Freight	$85,327.10	
Purchased Equipment Cost	**$1,791,869.17**	
Direct Installation Cost		
Foundations & supports	$143,349.53	
Handling & erection	$250,861.68	
Electrical	$71,674.77	
Piping	$89,593.46	
Insulation for ductwork	$17,918.69	
Painting	0	
Direct installatoin costs	**$573,398.13**	
Site Preparation	$17,918.69	
Total Direct Cost	$2,383,185.99	
Indirect Cost		
Engineering	$179,186.92	
Construction and field expense	$89,593.46	
Contractor fees	$179,186.92	
Start-up	$35,837.38	
Performance test	$7,500.00	
Total Indirect Cost	$491,304.68	
Total Capital Investment	**$2,874,490.67**	

Kinder Morgan
RACT Analysis

All Tank Truck and Rail Car Loading Positions
Incinerator Cost
Limited @ 129 tons

4/7/2020

Annual Costs

Hours of operation		8,760	
Direct Annual Costs			
Operating Labor	0.5 hrs/shift @ $18/hr	$	9,855.00
Supervisor 15% of operator		$	1,478.25
Operating Materials -			
Maintenance			
Labor 0.5 hr/shift $25/hr		$	6,843.75
Materials 100% of maintenance labor		$	6,843.75
Natural Gas	1.16 per therm	$	1,298,448.62
Electrcity	0.162/kwh	$	7,759.46
Total		**$**	**1,331,228.83**
Indirect Annual Cost			
Overhead 60% of sum of operating supervisor, & maintenance labor & maintenance materials		$	15,012.45
Administrative Charges 2% TCI - 9,650 17,800			$57,489.81
Property Taxes 1% TCI - 4,830 8,900			
Insurance 1% TCI - 4,830 122,700			$28,744.91
Capital recovery (7% over 10 years)			$409,327.47
Total IAC			**$510,574.64**
Total Annual Cost			**$1,841,803.47**
Precontrol Emissions			**129**
Controlled Emissions			**116.1**
Cost Effectiveness			**$15,863.94**

Based on a vendor quote for another project, the total capital investment for the thermal oxidizer is estimated to be $2,874,490.67 and the total annual cost is $ 1,841,803.47 per year. The costs estimates are consistent with the EPA Air Pollution Control Costs Manual, Version 6. The annual costs include operating and maintenance labor, fuel and electrical costs, and a capital depreciation of 7 percent over 10 years. The costs of the technically feasible controls are based on vendor quotes and readily available literature. The cost of this control unit is scaled from the original contractor proposal using the “Sixth-Tenth Factor Rule.” The equation, referenced from Peters and Timmerhaus, Plant Design and Economics for Chemical Engineers, Fourth Edition, 1191 Page 169, is as follows:

Cost of Equipment A = Cost of Equipment B * (Capacity of Equipment A / Capacity of Equipment B)^0.6

As is discussed above, the potential to emit for total uncontrolled loading position is 129 tons of VOC per year. Using the 129 tons of VOC per year as the baseline emissions and given the total capital investment and annual operating costs, the implementation and use of a thermal oxidation unit at each uncontrolled loading position does not prove to be cost effective in nature in that it yields a cost effectiveness of $15,863.94 per ton.

Given that the only technically feasible control option is not cost effective, no requirement to connect all uncontrolled loading positions to a thermal oxidation unit can be made.

All Uncontrolled Loading Positions – Technical/Cost Feasibility

Table VI.C4-3: All Uncontrolled Loading Positions – Cost Feasibility

Rank 1	Control Technology	Baseline VOC Emissions (tpy)	VOC Reduction (%)	VOC Reduction (tpy)	Total Annualized Cost	Cost Effectiveness ($/Ton)
1	Thermal Oxidation	129	90	116.1	$1,841,803.47	$15,863.94

Option 2: Thermal Oxidizer Technical Feasibility Cost Analysis: “Uncontrolled Loading at an Individual Tank Truck Loading Position.

The following cost analysis were submitted by CMI on behalf of Kinder Morgan for individual tank loading position based on the current limit of 9.0 tpy. For tank /rail car loading operations, the key operating parameters are the pumping rate and the hours of operation. The operating hours will vary based on the average pumping rate. For the cost analysis, operating hours per individual truck loading position is 1000 hours. As discussed in section VI.C.a, operation is limited to 1,000 hours per year per loading position due to the time it takes to connect and disconnect trucks, move in and out of position, etc. See Table VI.C4-2 for details.

Kinder Morgan RACT Analysis	Individual Tank Truck or Rail Car Loading Position Limited @ 9.05 tpy		4/7/2020
Direct Cost			
Purchased Equipment	$181,203.85	Vendor Quote Attached	
Instrumentation	-		
Sales Tax			
Freight	$9,060.19		
Purchased Equipment Cost	**$190,264.04**		
Direct Installation Cost			
Foundations & supports	$15,221.12		
Handling & erection	$26,636.97		
Electrical	$7,610.56		
Piping	$3,805.28		
Insulation for ductwork	$1,902.64		
Painting	0		
Direct installatoin costs	**$55,176.57**		
Site Preparation	$1,902.64		
Total Direct Cost	$247,343.25		
Indirect Cost			
Engineering	$19,026.40		
Construction and field expense	$9,513.20		
Contractor fees	$19,026.40		
Start-up	$3,805.28		
Performance test	$7,500.00		
Total Indirect Cost	$58,871.28		
Total Capital Investment	**$306,214.53**		

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Individual Tank Truck or Rail Car Loading Position
Limited @ 9.05 tpy

Annual Costs

Hours of operation 1,000 Based on 1,000 hours per loading position

Direct Annual Costs			
Operating Labor	0.5 hrs/shift @ $18/hr	$	1,125.00
Supervisor 15% of operator		$	168.75
Operating Materials - Maintenance			
Labor 0.5 hr/shift $25/hr		$	6,843.75
Materials 100% of maintenance labor		$	6,843.75
Natural Gas	1.16 per therm	$	29,021.95
Electrcity	0.162/kwh	$	885.78
Total		**$**	**44,888.98**

Indirect Annual Cost		
Overhead 60% of sum of operating supervisor, & maintenance labor & maintenance materials	$	8,988.75
Administrative Charges 2% TCI - 9,650 17,800		$6,124.29
Property Taxes 1% TCI - 4,830 8,900		
Insurance 1% TCI - 4,830 122,700		$3,062.15
Capital recovery (7% over 10 years)		$43,604.95
Total IAC		**$61,780.14**
Total Annual Cost		**$106,669.12**
Precontrol Emissions		**9.05**
Controlled Emissions		**8.1**
Cost Effectiveness		**$13,169.03**

Table VI.C7-2: Individual Uncontrolled Loading Positions – Cost Feasibility

Rank	Control Technology	Baseline NOx Emissions (tpy)	NOx Reduction (%)	NOx Reduction (tpy)	Total Annualized Cost	Cost Effectiveness ($/Ton)
1	Thermal Oxidation	9	90	8.1	$106,669.12	$13,169.03

Technically Feasibility Conclusion:
The above cost analysis shows that based on the current permitted values/PTEs, the only technically feasible control, (the thermal oxidation unit) for all uncontrolled loading positions is not cost effective and thus no control device is determined as RACT. AMS therefore, determined that the new case-by-case conditions presented above for uncontrolled loading positions represents VOC RACT under the 2008 8-hour ozone standard for the tank car/truck uncontrolled loading operations in Kinder Morgan. KMLT will still comply with the 1997 hr RACT requirements of 129 tons of per year and 9.0 tons of VOC per year and 18.1 pounds per hour per uncontrolled position at each tank car/truck loading rack.

e. Uncontrol Tank Car/Truck Loading Operations – Conclusions

For the 2008 8-hr RACT and for uncontrolled tank car/truck loading operations, AMS proposes that the facility shall continue to comply with its 1997 8-hr RACT Permit. The conditions include the following:

Loading operations at any tank car/truck loading position not connected to the NAO Thermal Oxidizer, or "uncontrolled tank car/truck loading position", shall be limited to processing organic liquid with a Reid Vapor Pressure (RVP) less than 4.0 pounds per square inch (psi).
Loading operations at "uncontrolled tank car/truck loading positions" shall comply with the following: 1. Total combined emissions from all "uncontrolled tank car/truck loading positions" at the facility combined shall be limited to 129 tons of VOC per 12-month rolling period. 2. Emissions from each "uncontrolled tank car/truck loading position" shall not exceed 9.0 tons of VOC per 12-month rolling period. 3. Emissions from each "uncontrolled tank car/truck loading position" emission shall not exceed 18.1 pounds of VOC per hour.

D. Marine Vessel Loading Operations:

1. Marine Vessel Loading Operations: 1990 1-Hour RACT (Case-by-Case)

Under the 1990 1-hour RACT permit, marine vessel loading operations of VOCs was case-by-case and is limited to commodities with a RVP of less than 4 psia and limited to 59 tons of VOC per year.

2. Marine Loading Operations: 1997 8 Hr RACT and 2008 Hr RACT (Case-by-Case)

Under the 1997 8-hour RACT Plan Approval, marine vessel loading operations of VOCs still to continue to comply with the requirements of 1990 1-hr hour RACT where marine loading operations were limited to commodities with a RVP of less than 4 psia. In addition, the 1997 RACT permit the annual VOC limit was reduced from 59 to 51 tons per 12 month rolling period. During the 1997 8-hr RACT, the following control devices were evaluated, and the results are summarized in the table below. The same control devices are also evaluated for the 2008 8-hr RACT. Table VI-D2-1 below gives an overview of each control device and Table VI-D2-2 compares and summarizes the 1997 8-hr and 2008 8-hr RACT evaluations and conclusions.

Table VI-D2-1: Marine Loading Control Options

Control	Description	Control Device Estimated Effectiveness	Capture Efficiency from loading operations	Overall Effectiveness with Capture Efficiency
Thermal Oxidation	Thermal Oxidation is a process in which the hydrocarbons in a gas stream are combusted to form carbon dioxide and water at an elevated temperature. Thermal Oxidation is governed by temperature, time, and turbulence. In order to achieve effective combustion, the organic must be raised 100-degree Fahrenheit or more above its ignition temperature and held at that for good oxidation to occur. An auxiliary fuel is required to ensure the temperature is maintained for proper combustion. There are essentially two (2) types of incinerators: thermal and catalytic. Each type is considered technically feasible for the marine loading operation. However, for costs analysis purposes, thermal incineration is being considered since the relative cost of the two are similar.	95-98%	85%	80.75-83.3%

Carbon Adsorption	Adsorption is where gas molecules are passed through a bed or solid particles, then diffuses from the gas stream to the bed, and held on the media by attractive forces. Adsorptive capacity of the solid for the gas tends to increase with the gas phase concentration, molecular weight, diffusivity, polarity, and boiling point. Typical adsorbents media in use include activated carbon, silica gel, activated alumina, synthetic zeolites, fuller's earth, and other clays	85-95%	85%	72.25-80.75%
Bioreactor	There are several different types of bioreactors from soil beds or bio-filters to bio-trickling filters, and bio-scrubbers. Typically used for odor control, bioreactors can be used to oxidize VOCs. For a bioreactor to be effective, one needs a consistent stream and maintain temperature above 60 degrees Fahrenheit. The marine vessel operation at Kinder Morgan is intermittent and the climates average annual temperature is below 60 degrees Fahrenheit. While there are other factors to consider, this control option is considered technically infeasible due to the intermittent nature of the operation and the climate of the area.	60-99%	85%	51-84.15%
Scrubbers	Scrubbers use a process called absorption to remove pollutants from an air stream to a liquid stream. The absorption processes the organics in the air stream are dissolved in a liquid solvent. The limiting factors as a primary control technique deal with the availability of a suitable solvent and the solubility of the organic.	50-98%	85%	42.5-80.75%
Condensation	Refrigeration units are basically "heat pumps," absorbing heat on the "cold side" of the system and releasing heat on the "hot side" of the system. A refrigerated condenser is a viable option if: • The air stream is saturated with the organic compound • The organic vapor containment system limits air flow • Required air flow does not overload a refrigeration system with heat and only one organic compound is emitted	50-98%	85%	42.5-80.75%

Table VI-D2-2: Summary of Control Options and Conclusions

Control Device	Evaluation/ Analysis	1997 8-hr RACT Conclusion Notes/Comments	2008 8-hr RACT Conclusion/ Notes/Comments
Thermal Oxidation	Scenario A: Existing MVCU to control organics with true vapor pressures of 0.4psia or greater.	**Was Technically Infeasible.** The existing Marine Vapor Combustor (MVCU) is owned by a customer and was specifically designed for loading of cumene and the maximum design true vapor pressure is set at 0.4 psia. Due to its design, using the MVCU to control VOC emissions from loading of any organic liquids with true vapor of 0.4 psi or greater, including ethanol, is technically infeasible. The facility could not modify the MVCU because the facility did not own it. The facility voluntary took a reduction from 59 tpy of VOC to 51 tpy for uncontrolled loading.	**Now Technically Feasible, but Still Economically Unreasonable.** At the start of 2018, the customer authorized the modification of the MVCU to handle ethanol loading. It is now possible to upgrade the control device to possible treat organic liquids with a 0.4 psia or greater. The installation has not begun yet at this time. Plan Approval No. Ip17-000185 dated 1/17/2018 allowed for the modification of the MVCU to allow it to control volatile organic materials that have a vapor pressure of 1.57 psi or greater at 60 degrees Fahrenheit. The upgrade will involve adjustment of flow rates and assist gas, product mixture composition, and include additional instrument controls and wiring to the system. The MVCU will continue not to load petroleum distillate with vapor pressures greater than 4 Reid Vapor Pressure (RVP). The facility is voluntary accepting a reduction in the marine loading limit from 51 tons to 29 tons per rolling 12 period. The cost analysis for this scenario is presented below in Section 3.(a). The cost analysis shows that it about $8096 per ton reduced and therefore, not economically reasonable. AMS is approving the facility’s request to reduce emissions from 51 tpy of VOC to 29 tpy. This is a reduction of 22 tpy of VOC from marine loading operations.
	Scenario B: Existing MVCU to control	**Was Technically Infeasible.** The existing MVCU is capable of controlling VOC emissions from commodities with true vapor pressure less than 0.4 psia 2% of	**Still Technically Infeasible** The facility now has permission to use and the modify the MCVU from the customer to control loading of commodities/VOC with that have a vapor pressure of 1.57 psia or greater at 60 degrees Fahrenheit (1.5 psia at 20 degrees Celsius) per Plan Approval

	organics with true vapor pressures of less than 0.4psia	VOC emissions from marine loading corresponded to organics with true vapor less than less than 0.4 psi. Loading of cumene is already being controlled by the existing MVCU. However Kinder Morgan, by agreement, can only use the MVCU to control cumene emissions from marine loading operations conducted on behalf of a single customer. As a result, the use of the MVCU to control emissions from marine loading operations of VOCs with true vapor pressures less than 0.4 psia generally is infeasible.	No. IP17-000185 dated 1/17/2018. The facility does not have permission to load and control organics with low vapor pressures (0.4 psi) except for cumene. Even if the option was technically feasible, controlling low vapor pressures organics will not be economically feasible (see cost analysis below) or an environmental benefit since running the MVCU more often will possibly create more NOX and CO from combustion of natural gas.
	Scenario C: New Thermal Oxidation Unit or MVCU to control all VOC emissions from marine loading.	**Was Technically Feasible, but Economically Unreasonable**. Installing and operating a new thermal oxidation unit is technically feasible, but Economically Unreasonable.	**Still Technically Feasible, but Economically Unreasonable.** The cost analysis for this scenario is presented below in Section 3.c. The analysis shows that the cost effectiveness of installing a new control device is about $13,283 per ton VOC reduced. This is not considered economically feasible and under RACT requirements no controls are required.

Carbon Adsorption	Install a Carbon Adsorption System	**Was Technically Infeasible.** The RACT analysis is oriented toward the use of activated carbon, a commonly used adsorbent for VOCs. Carbon adsorption is effective when materials have a molecular weight of 50 or greater. Carbon adsorption is considered technically infeasible for the operation since it would not be effective on all materials handled at the dock. Ethanol is loaded into vessels in addition to other materials. The molecular weight of ethanol is 46, thus making carbon adsorption infeasible.	**Still Technically Infeasible.** Same reason as mention in the 1997 8-hr RACT column
Bioreactor	Install a Bioreactor	**Was Technically Infeasible.** The marine vessel operation at Kinder Morgan is intermittent and the climates average annual temperature is below 60 degrees Fahrenheit. While there are other factors to consider, this control option is considered technically infeasible due to the intermittent nature of the operation and the climate of the area.	**Still Technically Infeasible.** Same reason as mention in the 1997 8-hr RACT column
Scrubbers	Install a Scrubber	**Was Technically Infeasible.** Since the limiting factors for scrubbers as a primary control technique deal with the availability of a suitable solvent and the solubility of the organic. In this case, the terminal would require	**Still Technically Infeasible.** Same reason as mention in the 1997 8-hr RACT column

		different solvents to handle the varying material handled. Based on the organics in the air stream requiring different absorption media this control option is considered technically infeasible.	
Condensation		**Was Technically Infeasible.** Since the marine vessel loading operation is only considered to be 50 percent saturated and there are multiple organic compounds, this control option is considered infeasible.	**Still Technically Infeasible.** Same reason as mention in the 1997 8-hr RACT column

3. Marine Loading Operations - Cost Analysis of Technically Feasible Options

To determine the cost effectiveness of the technically feasible options, cost analysis for the following option was conducted:

a. Scenario A: Use Existing MVCU to control organics with true vapor pressures of 0.4psia or greater.

The following cost analysis was submitted by Compliance Management International on behalf of KMLT
For the cost analysis, 2000 hours was used based on the average vessel loading rate and the actual gallons loaded in 2018. In the previous RACT analysis, 1076 hours were used per year. The 1076 hour was assumed based on the 51 tpy VOC limit from the previous RACT permit an average pumping rate of 2100 gallons per minute.

Direct Cost		
Purchased Equipment	$62,000	John Zink Quote
Instrumentation	-	
Sales Tax		
Freight	$5,688	From Kinder Morgan
Purchased Equipment Cost	**$67,688.00**	
Direct Installation Cost		
Foundations & supports		
Handling & erection	$3,384.40	
Electrical	$37,000.00	From Kinder Morgan
Piping	$45,000.00	From Kinder Morgan
Insulation for ductwork		
Painting	$676.88	
Direct installation costs	**$86,061.28**	
Site Preparation		
Total Direct Cost	$153,749.28	
Indirect Cost		
Engineering	$35,000.00	
Construction and field expenses		
Contractor fees	$10,000.00	
Start-up	$1,353.76	
Performance test	$25,000.00	
Total Indirect Cost	$71,353.76	
Contingencies	$15,741.50	
Total Capital Investment	**$240,844.54**	

Annual Costs

Hours of operation 2,000 estimated based on actiual operations

Direct Annual Costs

Operating Labor	0.5 hrs/shift @ $18/hr	$	2,250.00
Supervisor 15% of operator		$	337.50
Operating Materials -			
Maintenance	0.5 hrs/shift @ $25/hr	$	3,125.00
Labor 0.5 hr/shift $25/hr		$	6,843.75
Materials 100% of maintenance labor		$	6,843.75
Natural Gas	1.16 per therm	$	144,508.19
Electricity	0.162/kwh	$	1,771.57
Total		**$**	**165,679.76**

Indirect Annual Cost

Overhead	
Administrative Charges 2% TCI	
Property Taxes 1% TCI	
Insurance 1% TCI -	
Capital recovery (7% over 10 years)	$34,296.26
Total IAC	**$34,296.26**

Total Annual Cost	**$199,976.02**
Precontrol Emissions	**29** tons
Controlled Emissions	**24.7** tons
Cost Effectiveness	**$8,096.20** per ton controlled

Control Device	Baseline VOC Emissions (tpy)	VOC Reduction (%) *	VOC Reduction(tpy)	Total Annualized Cost	Cost Effectiveness ($/ton)
New Thermal Oxidation Unit	29	85	24.7	$199,976.02	$8,096.20

* The capture efficiency for a no leak check on a tanker that maintains a minimum positive pressure below +3 to +5 inches of water is 85%.

Based on a proposed VOC emission limit of 29 tons per year, ***modification of the current MVCU to control VOC greater than 0.4 psia from marine loading operation generally*** is not economically reasonable. Accordingly, no control device is required under RACT ***II.*** A new marine loading VOC limit, 29 tpy, is proposed as RACT.

b. Scenario B: Use the existing unit to control VOCs less than 0.4psi other cumene

The facility has permission to control cumene and commodities with have a vapor pressure of 1.57 psi or greater at 60 degrees Fahrenheit. AMS considers this option technically infeasible. If the option was technically feasible, the Cost Analysis to use the existing thermal oxidizer to treat materials with low vapor pressures will be similar to Scenario B but the actual VOC baseline in tpy would be smaller and thus resulting in not an economically feasible option. This option is not recommended because it produces more CO and NOx emissions from the combustion of natural gas to treat low VOC compounds and would not be environmentally friendly.

c. Scenario C- Install a new Thermal Oxidation Unit or MVCU to control all marine loading.

Scenario C involves installation of new equipment. The capital cost for the thermal oxidizer is based on a vendor quote for another project (see Attachment A) and using scaling the size of the equipment is presented in the following cost analysis. The following cost analysis were submitted by Compliance Management International on behalf of KMLT. For the cost analysis, 2000 hours was used based on the average vessel loading rate and the actual gallons loaded in 2018.

Direct Cost		
Purchased Equipment	$522,950.94	Vendor Quote
Instrumentation	-	
Sales Tax		
Freight	$26,147.55	
Purchased Equipment Cost	**$549,098.49**	
Direct Installation Cost		
Foundations & supports	$43,927.88	
Handling & erection	$76,873.79	
Electrical	$21,963.94	
Piping	$45,000.00	
Insulation for ductwork	$5,490.98	
Painting	0	
Direct installatoin costs	**$193,256.59**	
Site Preparation	$5,490.98	
Total Direct Cost	$747,846.06	
Indirect Cost		
Engineering	$54,909.85	
Construction and field expense	$27,454.92	
Contractor fees	$54,909.85	
Start-up	$10,981.97	
Performance test	$7,500.00	
Total Indirect Cost	$155,756.59	
Total Capital Investment	**$903,602.65**	

Annual Costs

Hours of operation		2,000	estimated based on actiual operations

Direct Annual Costs

Operating Labor	0.5 hrs/shift @ $18/hr	$	2,250.00
Supervisor 15% of operator		$	337.50
Operating Materials -			
Maintenance			
Labor 0.5 hr/shift $25/hr		$	6,843.75
Materials 100% of maintenance labor		$	6,843.75
Natural Gas	1.16 per therm	$	144,508.19
Electrcity	0.162/kwh	$	1,771.57
Total		**$**	**162,554.76**

Indirect Annual Cost

Overhead 60% of sum of operating supervisor, & maintenance labor & maintenance materials	$	9,765.00
Administrative Charges 2% TCI		$18,072.05
Property Taxes 1% TCI		
Insurance 1% TCI		$9,036.03
Capital recovery (7% over 10 years)		$128,673.02
Total IAC		**$165,546.10**

Total Annual Cost	**$328,100.86**	
Precontrol Emissions	**29**	tons
Controlled Emissions	**24.7**	tons
Cost Effectiveness	**$13,283.44**	per ton controlled

Control Device	Baseline VOC Emissions (tpy)	VOC Reduction (%)*	VOC Reduction(tpy)	Total Annualized Cost	Cost Effectiveness ($/ton)
New Thermal Oxidation Unit	29	85	24.7	$328,100.86	$13,283.44

* The capture efficiency for a no leak check on a tanker that maintains a minimum positive pressure below +3 to +5 inches of water is 85%.

Based on a vendor quote for another project, the capital cost for the thermal oxidizer is estimated to be $903,602.65 and the total annual operating costs is $324,100.86 per year. The costs estimates are consistent with the EPA Air Pollution Control Costs Manual, Version 6. The annual costs include operating and maintenance labor, fuel and electrical costs, and a capital depreciation of 7 percent over 10 years. The costs of the technically feasible controls are based on vendor quotes and readily available literature. The cost of this control unit is scaled from the original contractor proposal using the “Sixth-Tenth Factor Rule.” The equation, referenced from Peters and Timmerhaus, Plant Design and Economics for Chemical Engineers, Fourth Edition, 1191 Page 169, is as follows:

Cost of Equipment A = Cost of Equipment B * (Capacity of Equipment A / Capacity of Equipment B)^0.6

Based on the proposed permitted value of 29 tpy, the technically feasible control, ***installation of a new Thermal Oxidation Unit to control VOC emissions from marine loading operation,*** is not economically reasonable. Accordingly, no control device is required for RACT II.

4. Marine Vessel Loading Operations - Proposed New Emission Limits

The RACT analysis for marine loading operations concluded that no additional control is required, assuming a baseline VOC emission of 29 tpy. AMS therefore proposes a new limit of 29 tpy for marine loading operations. This is a reduction of 22 tons per year for VOC. Marine loading operations shall still comply with the previous RACT requirement that the Permittee shall not process petroleum distillate with vapor pressures greater than 4 RVP. AMS determines that that the new case-by-case conditions presented above for marine vessel loading represent VOC RACT under the 2008 8-hour ozone standard for the marine vessel loading operations in Kinder Morgan.

E. Fugitive Emissions (CTG)

For fugitive emission sources from the facility, AMS determined that compliance with AMR V, Section XIII and the previous RACT Plan Approval represents VOC RACT under the 2008 8-hour ozone standard. The facility shall continue to comply with the previously issued RACT Plan Approval requirements for the fugitive emissions. As per AMR V Section XIII(1), no person shall cause, suffer, allow or permit volatile organic compounds (VOC) to be emitted from leaking flanges, gaskets, seals, connections, joints, fittings or other process equipment components not involving moving parts, nor shall any person cause, suffer, allow or permit VOC to be emitted from leaking valves, pumps, compressors, safety pressure relief devices or other process equipment components involving moving parts such that:

- The VOC emission from any leaking process equipment component results in a VOC in air concentration of 10,000 parts per million by volume (ppmv), or greater, when measured by test methods approved by the Department.

F. Emergency Generator (Presumptive)

Source ID	Source Description / Location	Manufacturer / Model No Serial Number / Engine Year	Capacity	Fuel/ Material	1997 8-hr RACT	2008 8-hr RACT
EG-01	Emergency Generator, Outside	Engine Manufacturer: Detroit Diesel Engine Model: 83588 Year: Post 2007	490 brake horsepower (bhp)	Diesel	25 PA Code §129.93(c)(5)	25 PA Code §129.97(c), 25 PA Code §129.97(c)(2), §129.97(c)(5), and§129.97(c)(8),

The 490 hp emergency generator is complying with the presumptive RACT requirement of 25 PA Code §129.97(c). The engine has the potential to emit less than 2.7 tpy of VOCs [25 PA Code §129.97(c)(2)], is rated below 500 hp [25 PA Code §129.97(c)(5)], and has a 500 hour per year limit (from AMS Installation Permit No. 09052 dated July 16, 2009) [25 PA Code §129.97(c)(8)]. The Presumptive RACT requirements for the engine are the installation, operation, and maintenance of the unit as per the manufacturer's specifications and with good operating practices.

H. Cleaning & Degassing Operations (All Presumptive)

Source ID	Source Description / Location	1997 8-hr RACT	2008 8-hr RACT
206 Process	Cleaning and Degassing Operations	Insignificant or De Minimis Source	25 PA Code §129.97(c), 25 PA Code §129.97(c)(2)

AMS Installation Permit No. 03047 dated May 21, 2004 limits tank degassing and cleaning operations to 1.8 tons of VOC per 12 months. Since the PTE is less than 2.7 tpy, the unit is complying with the presumptive RACT requirements of 25 PA Code §129.97(c). Presumptive RACT requirements for the source that has the potential to emit less than 2.7 tpy of VOC [25 PA Code §129.97(c)(2)] is installation, operation, and maintenance of the unit as per the manufacturer's specifications and with good operation practices.

G. Control Devices (All Presumptive)

Source ID	Source Description / Location	1997 8-hr RACT	2008 8-hr RACT
	Control Devices	25 PA Code §129.93(c)(4)	25 PA Code §129.97(c), 25 PA Code §129.97(c)(2)

The VOC PTE for each control device at the facility is less than 2.7 tpy. Per 25 PA Code §129.97(c), presumptive RACT requirements for each control device that has the potential to emit less than 2.7 tpy of VOC [25 PA Code §129.97(c)(2)] is installation, operation, and maintenance of the unit as per the manufacturer's specifications and with good operation practices

H. Insignificant Sources (All Presumptive – Small emission Source)

Source ID	Source Description / Location	1997 8-hr RACT	2008 8-hr RACT
	Insignificant Sources	De Minimis Source	Insignificant source, 25 PA Code §129.97(c), 25 PA Code §129.97(c)(2)

VOC emissions from each the following sources is below 1.0 tons per year VOC. Based on AMS permitting and engineering knowledge, AMS determines that installing any control technology on such small source is both technically and economically unreasonable. Since each insignificant source has a VOC PTE of less than 2.7 tpy, each insignificant source is also complying with the Presumptive RACT requirements of 25 PA Code §129.97(c). Presumptive RACT requirements for each insignificant source that has the potential to emit less than 2.7 tpy of VOC [25 PA Code §129.97(c)(2)] is installation, operation, and maintenance of the unit as per the manufacturer's specifications and with good operation practices

- Painting of tanks,
- Sump tank,
- Catch basins,
- Two oil water separators (Receives <200 gallons of organic materials per day,
- Drumming, Steam cleaning of equipment,

- Chemical dryers, pipe cleaning,
- Flushing of tanks with incoming products,
- Fire equipment, Mobile tanks (500 gallons each),
- Tanks 1 (Emergency containment tank),
- Tanks 2 and 3 (Emergency containment tank),
- Tank no. 471 (#2 oil for the vapor incinerator),
- Tank no. 420 (#2 oil for the boilers),
- Two 48 HP Diesel Air Compressors
- Soil Vapor Extraction System

VII. Conclusions and Recommendations:

AMS has determined or recommends the following RACT requirements for 2008 8-hour ozone NAAQS.

- The attached proposed RACT Permit dated April 20, 2020 is submitted for SIP approval and includes case-by-case RACT requirements per 25 PA Code §129.97-100 for tank car-truck loading operations and marine loading operations.
- For controlled tank car loading operations, the facility shall continue to comply with the presumptive RACT requirements of 25 PA Code §129.59.
- For uncontrolled tank car-truck loading operations, AMS has determined that 2008 RACT is to continue to comply with the 1997 8-hr RACT requirements for tank car/truck loading.
- For marine loading operations, AMS has determined that 2008 RACT is to continue to comply with the 1997 8-hr RACT requriement for marine loading that facility shall continue to only process petroleum distillate with vapor pressures of 4 RVP or less.
- In addition to the previous RACT requirements for marine loading operations, AMS is accepting the facility's proposal to reduce the VOC emission limit from marine loading operations from 51 tpy to 29 tpy. This is a reduction of 22 tpy for VOC. The propose attach Plan Approval Draft is submitted for SIP approval. Marine vessel loading operations (including both controlled and uncontrolled loading) shall not exceed 29 tons of VOC per 12-month rolling period.
- The facility is requesting that the RACT Plan Approval be modified to include language that allows for an alternative control device in the future so long as the emission limits are met. AMS has no objections to the request since the emissions and requirements limits will be the same it is not considered back sliding.
- Fugitive emissions will comply with the CTG RACT requirements of AMR V, Section XIII. A RACT determination for the storage tanks is not submitted for SIP approval.
- Each storage tanks will comply with a CTG RACT requirements of 25 PA Code §129.56 or §129.57. A RACT determination for the storage tanks is not submitted for SIP approval.

- Each boiler will comply with the presumptive RACT of 25 PA Code §129.97(c). The presumptive RACT requirements of 25 PA Code §129.97(c) for a boiler with a heat input of less than 20 MMBTU/hr [25 PA Code 1§29.97(3)] is the installation, maintenance, and operation of the source in accordance with manufacturer's specification and with good operating practices. A RACT determination for the storage tanks is not submitted for SIP approval
- The emergency generator will comply with the Presumptive RACT requirements of 25 PA Code §129.97(c). The presumptive RACT requirements of 25 PA Code §129.97(c) is the installation, maintenance, and operation of the source in accordance with manufacturer's specification and with good operating practices. A RACT determination for the emergency generator is not submitted for SIP approval.
- Each control device, the tank cleaning and degreasing operation, and each insignificant source is shall comply with the presumptive RACT requirements of 25 PA Code §129.97(c). Presumptive RACT requirements for each insignificant source that has the potential to emit less than 2.7 tpy of VOC [25 PA Code §129.97(c)(2)] is installation, operation, and maintenance of the unit as per the manufacturer’s specifications and with good operation practices. A RACT determination for each source is not submitted for SIP approval.

4/20/20

Edward Wiener, Chief of Source Registration

Date

Attachment A - Vendor Quote

(The vendor quote is attached in the following pages)