



DEPARTMENT OF NATURAL RESOURCES

MISSOURI AIR CONSERVATION COMMISSION

PERMIT TO CONSTRUCT

Under the authority of RSMo 643 and the Federal Clean Air Act the applicant is authorized to construct the air contaminant source(s) described below, in accordance with the laws, rules and conditions as set forth herein.

Permit Number: 11 2015 - 005

Project Number: 2014-11-061
Installation Number: 047-0126

Parent Company: American Railcar Industries

Parent Company Address: 100 Clark Street, St. Charles, MO 63301

Installation Name: American Railcar Industries

Installation Address: 1101 Bedford Avenue, North Kansas City, MO 64116

Location Information: Clay County, S23, T50N, R33W

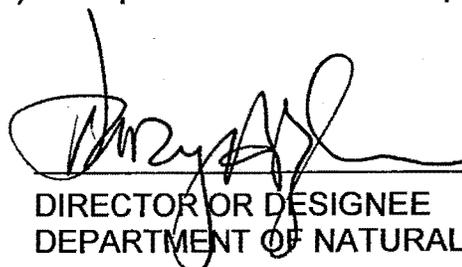
Application for Authority to Construct was made for:
Installation of a new car depressurization system, a steam purge flare, and a steam cleaning operation. This review was conducted in accordance with Section (5), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*.

Standard Conditions (on reverse) are applicable to this permit.

Standard Conditions (on reverse) and Special Conditions are applicable to this permit.

NOV 12 2015
October 16, 2015

EFFECTIVE DATE



DIRECTOR OR DESIGNEE
DEPARTMENT OF NATURAL RESOURCES

STANDARD CONDITIONS:

Permission to construct may be revoked if you fail to begin construction or modification within two years from the effective date of this permit. Permittee should notify the Air Pollution Control Program if construction or modification is not started within two years after the effective date of this permit, or if construction or modification is suspended for one year or more.

You will be in violation of 10 CSR 10-6.060 if you fail to adhere to the specifications and conditions listed in your application, this permit and the project review. In the event that there is a discrepancy between the permit application and this permit, the conditions of this permit shall take precedence. Specifically, all air contaminant control devices shall be operated and maintained as specified in the application, associated plans and specifications.

You must notify the Department's Air Pollution Control Program of the anticipated date of start up of these air contaminant sources. The information must be made available within 30 days of actual startup. Also, you must notify the Department of Natural Resources' regional office responsible for the area within which you are located within 15 days after the actual start up of these air contaminant sources.

A copy of this permit and permit review shall be kept at the installation address and shall be made available to Department of Natural Resources' personnel upon request.

You may appeal this permit or any of the listed special conditions to the Administrative Hearing Commission (AHC), P.O. Box 1557, Jefferson City, MO 65102, as provided in RSMo 643.075.6 and 621.250.3. If you choose to appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed. If it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC.

If you choose not to appeal, this certificate, the project review and your application and associated correspondence constitutes your permit to construct. The permit allows you to construct and operate your air contaminant sources(s), but in no way relieves you of your obligation to comply with all applicable provisions of the Missouri Air Conservation Law, regulations of the Missouri Department of Natural Resources and other applicable federal, state and local laws and ordinances.

The Air Pollution Control Program invites your questions regarding this air pollution permit. Please contact the Construction Permit Unit at (573) 751-4817. If you prefer to write, please address your correspondence to the Missouri Department of Natural Resources, Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102-0176, attention: Construction Permit Unit.

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

The special conditions listed in this permit were included based on the authority granted the Missouri Air Pollution Control Program by the Missouri Air Conservation Law (specifically 643.075) and by the Missouri Rules listed in Title 10, Division 10 of the Code of State Regulations (specifically 10 CSR 10-6.060). For specific details regarding conditions, see 10 CSR 10-6.060 paragraph (12)(A)10. "Conditions required by permitting authority."

American Railcar Industries
Clay County, S23, T50N, R33W

1. **Equipment Dismantle**
American Railcar Industries shall render the original LPG flare (EP-4b) inoperable before the date the new equipment being added under this permit is fully operational. The equipment EP-4b may not be operated after the start up of the new equipment (EP-4d and EP-4e) without review.
2. **Control Device Requirement-Flare**
 - A. American Railcar Industries shall control emissions from the railcar depressurization system and steam purging system (EP-4d) at all times using an open flare.
 - B. The flare shall be operated and maintained in accordance with the manufacturer's specifications and 40 CFR 60.18 as specified in the permit application.
 - C. American Railcar Industries shall maintain a copy of the flare manufacturer's performance warranty on site.
 - D. American Railcar Industries shall maintain an operating and maintenance log for the flare which shall include the following:
 - 1) Incidents of malfunction, with impact on emissions, duration of event, probable cause, and corrective actions; and
 - 2) Maintenance activities, with inspection schedule, repair actions, and replacements, etc.
3. **Purging and Flaring Alternative Commodities**
 - A. When considering purging and flaring alternative commodities in the railcar depressurization system and steam purging system (EP-4d) and the steam cleaning operation (EP-4e) that is different than a SDS supplied with the Application for Authority to Construct as shown in Appendix C, American Railcar Industries shall calculate the potential emissions of

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

VOCs, maximum flare heat input from the commodity (MMBtu/hr) and all individual HAP in the alternative commodity.

- B. American Railcar Industries shall seek approval from the Air Pollution Control Program before use of the alternative commodity in the following cases:
- 1) If the potential VOC emissions from purging, flaring, and cleaning the railcars containing the alternative material is equal to or greater than 23.85 tons per year, or
 - 2) If the potential maximum heat input from the commodity to the flare exceeds 29.4 MMBtu/hr
 - 3) If the potential individual HAP emissions for the alternative material are equal to or greater than the screening model action level (SMAL) for any chemical listed in Appendix B, or the most recent HAP SMAL table located at <http://dnr.mo.gov/env/apcp/docs/cp-hapsmaltbl6.pdf>
 - 4) If potential total HAP emissions exceed 25.0 tons per year
 - 5) The commodity contains, or flaring has the potential to produce, any halogenated HAP or metal HAP
- C. American Railcar Industries shall develop and use forms to demonstrate compliance with Special Condition 3.B. The forms shall contain at a minimum the following information,
- 1) Installation name
 - 2) Installation ID
 - 3) Permit number
 - 4) New commodity name
 - 5) Molecular weight of the commodity
 - 6) Railcar pressure
 - 7) Railcar volume
 - 8) Higher heating value of new commodity (in MMbtu/lb)
 - 9) Individual and total HAP weight % in new commodity
 - 10) Controlled potential VOC emissions from flaring the commodity calculated using Equation 1 from Appendix D
 - 11) Controlled potential emissions of total and individual HAPs using Equation 2 from Appendix D
 - 12) Potential to emit individual and total HAPs from natural gas combustion in the flare assuming the flare operates at MHDR 8,760 hours per year (e.g.: Total HAPs PTE = 0.562 tons per year)

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

- 13) Uncontrolled potential emissions from steam cleaning railcars using Equation 3 from Appendix D assuming that 100% of the commodity is emitted as VOC. If the SDS for the commodity contains the maximum VOC content of the material, American Railcar Industries may multiply Equation 3 from Appendix D by the percent VOC by weight in order to estimate uncontrolled potential emissions from steam cleaning railcars.
 - 14) Total potential emissions of VOC from the new commodity by summing the potential emissions from flaring, steam cleaning, and natural gas combustion.
 - 15) Total potential emissions of individual HAP and total HAP from the new commodity by summing the potential emissions from flaring, steam cleaning, and natural gas combustion.
 - 16) Maximum hourly heat input to the flare calculated by multiplying the higher heating value of the commodity and the maximum pounds of commodity flared per hour. The maximum pounds of commodity flared per hour shall be calculated using Equation 4 from Appendix D.
 - 17) Indication of compliance with Special Condition 3.B.
4. Emission Limitation – Total HAPs
- A. American Railcar Industries shall emit less than 25.0 tons of total HAPs in any consecutive 12-month period from the entire installation as shown in Table 1.
 - B. American Railcar Industries shall develop and use forms to demonstrate compliance with Special Condition 4.A. The forms shall contain at a minimum the following information,
 - 1) Installation name
 - 2) Installation ID
 - 3) Permit number
 - 4) Current month
 - 5) Current 12-month date range
 - 6) All emission units that emit HAPs. If an emission has not been operated, a notation indicating non-use for that month shall be made.
 - 7) HAP emissions from painting (EP-1) and lining (EP-2) calculated using a mass balance approach assuming 100% of volatile HAPs are emitted. If a range is given on the SDS, Air Quality Data Sheet (AQDS), Certified Product Data Sheet (CPDS) or Environmental

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

- 8) Data Sheet (EDS) then use the highest value(s) in the range.
- 9) Controlled HAP emissions in tons from flaring each commodity (EP-4d) calculated using equation 5 from Appendix D
- 10) HAP emissions in tons from steam cleaning (EP-4e) calculated using Equation 6 from Appendix D
- 11) HAP emissions from the emission points shown in Table 1 calculated by multiplying the monthly throughput by the respective emission factors shown in Table 1
- 12) Monthly emissions for each emission unit
- 13) Monthly emissions for total HAPs
- 14) 12-month rolling total for total HAPs
- 15) Indication of compliance with Special Condition 4.A.

Table 1: Installation Wide Emission Points

Emission Point	Description	Total HAP Emission Factor
EP-1	Painting	See Special Condition 4.B.7)
EP-2	Lining	See Special Condition 4.B.7)
EP-3	Blasting	N/A
EP-4d	Steam Purge to Flare	See Special Condition 4.B.8)
EP-4e	Steam Cleaning	See Special Condition 4.B.9)
EP-5	Natural Gas Boilers	1.888 lb/MMCF
EP-6	Natural Gas Space Heaters	1.888 lb/MMCF
EP-7 (non-emission point)	Diesel Engine (nonroad engine used to transport railcars)	N/A
EP-8	Welding	1.048 lb/1000lb of weld wire*
EP-9	Sand Blasting	N/A
EP-10	Glass Bead Blast	N/A

*Based on worst case operation using exclusively E308 weld wire

- 5. Emission Limitation – Hydrogen Chloride
 - A. American Railcar Industries shall emit less than 10.0 tons of Hydrogen Chloride in any consecutive 12-month period from the flare (EP-4d).
 - B. American Railcar Industries shall develop and use forms to demonstrate compliance with Special Condition 5.A. The forms shall contain at a minimum the following information;
 - 1) Installation name
 - 2) Installation ID
 - 3) Permit number
 - 4) Molecular weight of the monochlorobenzene (C₆H₅Cl)

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

- 5) Molecular weight of hydrogen chloride (HCl)
 - 6) Pressure of railcar
 - 7) Railcar volume
 - 8) Hydrogen chloride emissions from flaring calculated using Equation 7 from Appendix D
 - 9) Monthly HCl emissions
 - 10) 12-month rolling total of HCl emissions from flaring activities
 - 11) Indication of compliance with Special Condition 5.A.
6. Emission Limitation – Polycyclic Aromatic Hydrocarbons
- A. American Railcar Industries shall emit less than 0.1 tons of Polycyclic Aromatic Hydrocarbons (PAH) in any consecutive 12-month period from the flare (EP-4d).
 - B. American Railcar Industries shall develop and use forms to demonstrate compliance with Special Condition 6.A. The forms shall contain at a minimum the following information,
 - 1) Installation name
 - 2) Installation ID
 - 3) Permit number
 - 4) Current month
 - 5) Current 12-month date range
 - 6) Controlled PAH emissions in tons from flaring fuel oil (EP-4d) calculated using Equation 8 from Appendix D
 - 7) PAH emissions in tons from steam cleaning (EP-4e) shall be calculated using Equation 9 from Appendix D
 - 8) Monthly PAH emissions
 - 9) 12-month rolling total of PAH emissions
 - 10) Indication of compliance with Special Condition 6.A
7. Railcar Pressure Requirements
- A. American Railcar Industries shall verify and record the internal pressure of each railcar prior to flaring.
 - B. American Railcar Industries shall verify that all railcars that contained liquid commodities have an internal railcar pressure equal to zero pounds per square inch gage (psig) prior to flaring.
 - C. American Railcar Industries shall verify that all railcars that contain butadiene have an internal railcar pressure less than or equal to 35 psig

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

- prior to flaring
 - D. American Railcar Industries shall verify that all railcars that contain gaseous commodities have an internal railcar pressure less than or equal to 120 psig prior to flaring.
8. Railcar Interior Concentration Requirement
- A. American Railcar Industries shall verify and record the internal concentration of each railcar that contains commodities with VOC or HAP prior to steam cleaning directly to the atmosphere.
 - B. American Railcar Industries shall not steam clean railcars directly to the atmosphere that exceed the interior concentrations shown in Table 2.

Table 2: Interior Railcar Concentrations

Commodity	Interior Concentration (ppmv)
Ammonia	50
Beverage Alcohol	1000
Butadiene	1
Butane	1000
Butene-1	1000
Butylamine	5
Butylenes	1000
Crude Oil	500
Denatured Alcohol	1000
Diesel Fuel	12
Ethanol	1000
Ethyl Alcohol	1000
Fuel Oil	1
Fuel Alcohol	1000
Gasoline	3000
Isobutane	1000
Isobutylene	1000
Isopropanol	400
Jet Fuel	29
Liquefied Petroleum Gas	1000
Methanol	200
Methyl Isobutyl Ketone	100
Monochlorobenzene	75
Natural Gas	1000
Petroleum Naptha	1

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

Propane	1000
Propylene	500

9. Railcar Flaring and Steam Cleaning Limitation
 - A. American Railcar Industries shall limit the number of railcars flared and steam cleaned in any consecutive 12-month period to 400 railcars. Railcars that do not contain commodities with VOC or HAPs shall not count toward the 400 railcar limit.
 - B. American Railcar Industries shall keep a record of the total number of railcars flared and steam cleaned in any consecutive 12-month period. A total less than or equal to 400 railcars demonstrates compliance with Special Condition 9.A.

10. Record Keeping and Reporting Requirements
 - A. American Railcar Industries shall maintain all records required by this permit for not less than five years and shall make them available immediately to any Missouri Department of Natural Resources' personnel upon request. These records shall include SDS, Air Quality Data Sheet (AQDS), Certified Product Data Sheet (CPDS) or Environmental Data Sheet (EDS) for all materials used.
 - B. American Railcar Industries shall report to the Air Pollution Control Program's Compliance/Enforcement Section, P.O. Box 176, Jefferson City, MO 65102, no later than 10 days after the end of the month during which any record required by this permit show an exceedance of a limitation imposed by this permit.

REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE
SECTION (5) REVIEW

Project Number: 2014-11-061
Installation ID Number: 047-0126
Permit Number:

American Railcar Industries
1101 Bedford Avenue
North Kansas City, MO 64116

Complete Date
of Application: December 19, 2014

Parent Company:
American Railcar Industries
100 Clark Street
St. Charles, MO 63301

Clay County, S23, T50N, R33W

REVIEW SUMMARY

- American Railcar Industries has applied for authority to install a railcar depressurization system and steam purging system (EP-4d) and a steam cleaning system (EP-4e).
- HAP emissions are expected from the proposed equipment. HAPs of concern from this process are products of combustion of a variety of commodities. American Railcar Industries provided SDS of the proposed commodities with the Application for Authority to Construct (as shown in Appendix C of this permit). American Railcar Industries shall maintain records of all commodities combusted as well as SDS for each commodity. HCl emissions are a byproduct of combustion of C_6H_5Cl .
- None of the New Source Performance Standards (NSPS) apply to the installation.
- None of the NESHAPs apply to this installation. None of the currently promulgated MACT regulations apply to the proposed equipment.
- A flare is being used to control the VOC and volatile HAPs emissions from the equipment in this permit.
- This review was conducted in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential HCl and total HAP emissions are limited below the major source level.
- This installation is located in Clay County, a maintenance area for ozone and an attainment area for all other criteria pollutants.
- This installation is not on the List of Named Installations found in 10 CSR 10-6.020(3)(B), Table 2. The installation's major source level is 250 tons per year and fugitive emissions are not counted toward major source applicability.

- Ambient air quality modeling was not performed since potential emissions of the application are below de minimis levels.
- Emissions testing is not required for the equipment.
- A Basic Operating Permit application is required for this installation within 30 days of equipment startup.
- Approval of this permit is recommended with special conditions.

INSTALLATION DESCRIPTION

American Railcar Industries (ARI) operates a facility that consists of railcar cleaning, blasting, welding, painting, and repair. The installation is located in North Kansas City. ARI receives chemical railcars that are deemed empty but have residual gas or liquid. ARI then purges the railcars and cleans them. The installation is considered a minor source for construction permitting purposes. The installation is currently considered a basic state source for operating permitting purposes.

The following New Source Review permits have been issued to American Railcar Industries from the Air Pollution Control Program.

Table 1: Permit History

Permit Number	Description
1191-016	Section 6 permit (painting and lining)
0692-021	Blasting

PROJECT DESCRIPTION

ARI has proposed the installation of a new industrial supplemental fuel flare. The new flare will allow the facility to accept additional types of chemical railcars that are deemed empty but still contain residual gasses or liquids. Car depressurization and steam purge to flare (EP-4d) and steam clean safe for entry (EP-4e) will be the new emission points as a result of this project. The maximum internal railcar pressures required by Special Condition 7 of this permit were used to estimate potential emissions from this project. ARI is capable of steam purging one railcar every two hours. ARI is capable of steam cleaning one railcar every four hours. ARI will receive railcars that were once filled with various commodities. ARI provided SDS for the expected commodities with the Application for Authority to Construct. Emissions from the purging system will be controlled using a flare that will comply with 40 CFR 60.18 “General control device and work practice requirements”. Therefore a control efficiency equal to 98% is assumed for the calculation of potential to emit VOC and volatile HAPs. The flare has a maximum heat input rating equal to 69.3 MMBtu/hr.

EMISSIONS/CONTROLS EVALUATION

The emission factors for combustion were obtained from the following sections of the EPA document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition:

- Section 1.4 *Natural Gas Combustion*, July 1998.
- Section 13.5 *Industrial Flares*, April 2015

All emissions from steam purging were calculated using the ideal gas law and assuming that 100% of the pollutants were vented through the flare with 98% control efficiency. All emissions from steam cleaning were calculated using the ideal gas law and assuming that 100% of the available pollutants are emitted. All potential emissions are based on a worst case scenario for each pollutant in which 400 railcars that contain commodities with VOC or HAPs are purged to a flare and steam cleaned.

The following table provides an emissions summary for this project. Existing potential emissions were taken from calculations submitted with project number 2006-10-005. Existing potential emissions include potential emissions from equipment that is no longer installed at this installation (EP-4a, EP-4b, and EP-4c). Existing actual emissions were taken from the installation's 2014 EIQ. Potential emissions of the application represent the potential of the new equipment, assuming continuous operation (8760 hours per year). The new installation conditioned potential emissions of VOC accounts for the flare as a control device and omits potential emissions from EP-4a, EP-4b, and EP-4c. New installation conditioned potential emissions adds the potential emissions of the application to the potential emissions of existing equipment as calculated by American Railcar Industries and takes into account limitations taken in the special conditions of this permit.

Table 2: Emissions Summary (tons per year)

Pollutant	Regulatory <i>De Minimis</i> Levels	Existing Potential Emissions	Existing Actual Emissions (2014 EIQ)	Potential Emissions of the Application	New Installation Conditioned Potential
PM	25.0	8.2	N/D	0.64*	10.5
PM ₁₀	15.0	2.3	2.02	0.64*	4.5
PM _{2.5}	10.0	2.3	1.86	0.64*	4.5
SO _x	40.0	0.1	0.0	4.24	4.3
NO _x	40.0	12.0	0.0	30.45	42.5
VOC	40.0	93.4	15.7	23.85	**73.9
CO	100.0	10.1	0.0	28.46	38.6
GHG (CO ₂ e)	100,000	N/D	N/D	36,659	N/D
GHG (mass)	0.0 /250.0	N/D	N/D	36,443	N/D
HAPs	10.0/25.0	18.3	0.0	50.15	<25.0
HCl	10.0	N/D	N/D	49.45	<10.0

N/A = Not Applicable; N/D = Not Determined

*All particulate emissions are assumed to be PM_{2.5}

**The new installation conditioned potential emissions of VOC accounts for the flare as a control device and omits potential emissions from EP-4a, EP-4b, and EP-4c.

PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of all HAPs are limited below the major source level.

APPLICABLE REQUIREMENTS

American Railcar Industries shall comply with the following applicable requirements. The Missouri Air Conservation Laws and Regulations should be consulted for specific record keeping, monitoring, and reporting requirements. Compliance with these emission standards, based on information submitted in the application, has been verified at the time this application was approved. For a complete list of applicable requirements for your installation, please consult your operating permit.

GENERAL REQUIREMENTS

- *Submission of Emission Data, Emission Fees and Process Information*, 10 CSR 10-6.110
- *Operating Permits*, 10 CSR 10-6.065
- *Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin*, 10 CSR 10-6.170
- *Restriction of Emission of Visible Air Contaminants*, 10 CSR 10-6.220
- *Restriction of Emission of Odors*, 10 CSR 10-6.165

SPECIFIC REQUIREMENTS

- *Restriction of Emission of Sulfur Compounds*, 10 CSR 10-6.260

STAFF RECOMMENDATION

On the basis of this review conducted in accordance with Section (5), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, I recommend this permit be granted with special conditions.

J Luebbert
New Source Review Unit

PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated November 19, 2014, received November 24, 2014, designating American Railcar Industries as the owner and operator of the installation.

APPENDIX A

Abbreviations and Acronyms

%	percent	m/s	meters per second
°F	degrees Fahrenheit	Mgal	1,000 gallons
acfm	actual cubic feet per minute	MW	megawatt
BACT	Best Available Control Technology	MHDR	maximum hourly design rate
BMPs	Best Management Practices	MMBtu	Million British thermal units
Btu	British thermal unit	MMCF	million cubic feet
CAM	Compliance Assurance Monitoring	MSDS	Material Safety Data Sheet
CAS	Chemical Abstracts Service	NAAQS ...	National Ambient Air Quality Standards
CEMS	Continuous Emission Monitor System	NESHAPs	National Emissions Standards for Hazardous Air Pollutants
CFR	Code of Federal Regulations	NO_x	nitrogen oxides
CO	carbon monoxide	NSPS	New Source Performance Standards
CO₂	carbon dioxide	NSR	New Source Review
CO_{2e}	carbon dioxide equivalent	PM	particulate matter
COMS	Continuous Opacity Monitoring System	PM_{2.5}	particulate matter less than 2.5 microns in aerodynamic diameter
CSR	Code of State Regulations	PM₁₀	particulate matter less than 10 microns in aerodynamic diameter
dscf	dry standard cubic feet	ppm	parts per million
EQ	Emission Inventory Questionnaire	PSD	Prevention of Significant Deterioration
EP	Emission Point	PTE	potential to emit
EPA	Environmental Protection Agency	RACT	Reasonable Available Control Technology
EU	Emission Unit	RAL	Risk Assessment Level
fps	feet per second	SCC	Source Classification Code
ft	feet	scfm	standard cubic feet per minute
GACT	Generally Available Control Technology	SDS	Safety Data Sheet
GHG	Greenhouse Gas	SIC	Standard Industrial Classification
gpm	gallons per minute	SIP	State Implementation Plan
gr	grains	SMAL	Screening Model Action Levels
GWP	Global Warming Potential	SO_x	sulfur oxides
HAP	Hazardous Air Pollutant	SO₂	sulfur dioxide
hr	hour	tph	tons per hour
hp	horsepower	tpy	tons per year
lb	pound	VMT	vehicle miles traveled
lbs/hr	pounds per hour	VOC	Volatile Organic Compound
MACT	Maximum Achievable Control Technology		
µg/m³	micrograms per cubic meter		

Appendix B: Table of Hazardous Air Pollutants and Screening Model Action Levels (May 3, 2012 Revision 10)

Chemical	CAS #	SMAL (tons/yr)	Group ID	VOC	PM	Chemical	CAS #	SMAL (tons/yr)	Group ID	VOC	PM	Chemical	CAS #	SMAL (tons/yr)	Group ID	VOC	PM
ACETALDEHYDE	75-07-0	9		Y	N	CARBARYL	83-25-2	10	V	Y	Y	DICHLOROPROPANE, [1,2-]	78-87-5	1		Y	N
ACETAMIDE	60-36-5	1		Y	N	CARBON DISULFIDE	75-15-0	1		Y	N	DICHLOROPROPENE, [1,3-]	542-75-6	1		Y	N
ACETONTRILE	75-05-9	4		Y	N	CARBON TETRACHLORIDE	96-23-5	1		Y	N	DICHLORVOS	62-73-7	0.2		Y	N
ACETOPHENONE	98-95-2	1		Y	N	CARBONYL SULFIDE	483-59-1	5		Y	N	DIETHANOLAMINE	111-42-2	5		Y	N
ACETYLAMINOFLUORINE, [2-]	53-95-3	0.005	V	Y	Y	CATECHOL	120-80-9	5		Y	N	DIETHYL SULFATE	64-67-5	1		Y	N
ACROLEIN	107-02-9	0.04		Y	N	CHLORAMBEN	133-90-4	1		Y	Y	DIETHYLENE GLYCOL MONOBUTYL ETHER	112-34-5	5	P	Y	N
ACRYLAMIDE	79-05-1	0.02		Y	N	CHLORDANE	57-74-9	0.01		Y	Y	DIMETHOXYBENZIDINE, [3,3-]	119-90-4	0.1	V	Y	Y
ACRYLIC ACID	79-10-7	0.6		Y	N	CHLORINE	7782-50-5	0.1	N	N	N	DIMETHYL BENZIDINE, [3,3-]	119-93-7	0.008	V	Y	Y
ACRYLONITRILE	107-13-1	0.3		Y	N	CHLOROACETIC ACID	79-11-8	0.1		Y	N	DIMETHYL CARBAMOYL CHLORIDE	79-44-7	0.02		Y	N
ALLYL CHLORIDE	107-05-1	1		Y	N	CHLOROACETOPHENONE, [2-]	532-27-4	0.06		Y	N	DIMETHYL FORMAMIDE	68-12-2	1		Y	N
AMINOBIOPHENYL, [4-]	82-67-1	1	V	Y	N	CHLOROBENZENE	106-90-7	10		Y	N	DIMETHYL HYDRAZINE, [1,1-]	57-14-7	0.008		Y	N
ANILINE	62-53-3	1		Y	N	CHLOROBENZYLATE	510-15-6	0.4	V	Y	Y	DIMETHYL PHTHALATE	131-11-3	10		Y	N
ANISIDINE, [ORTHO-]	90-04-0	1		Y	N	CHLOROFORM	67-66-3	0.9		Y	N	DIMETHYL SULFATE	77-78-1	0.1		Y	N
ANTHRACENE	120-12-7	0.01	V	Y	N	CHLOROMETHYL METHYL ETHER	107-30-2	0.1		Y	N	DIMETHYLAMINOAZOBENZENE, [4-]	60-11-7	1		Y	N
ANTIMONY COMPOUNDS		5	H	N	Y	CHLOROPRENE	126-99-8	1		Y	N	DIMETHYLANILINE, [N-N]	121-69-7	1		Y	N
ANTIMONY PENTAFLUORIDE	7783-70-2	0.1	H	N	Y	CHROMIUM (VI) COMPOUNDS		0.002	L	N	Y	DINITRO-D-CRESOL, [4,6-] (Note 6)	534-52-1	0.1	E	Y	Y
ANTIMONY POTASSIUM TARTRATE	28300-74-5	1	H	N	Y	CHROMIUM COMPOUNDS		5	L	N	Y	DINITROPHENOL, [2,4-]	51-28-5	1		Y	N
ANTIMONY TRIOXIDE	1309-54-4	1	H	N	Y	CHRYSENE	218-01-9	0.01	V	Y	N	DINITROTOLUENE, [2,4-]	121-14-2	0.02		Y	N
ANTIMONY TRISULFIDE	1345-04-8	0.1	H	N	Y	COBALT COMPOUNDS		0.1	M	N	Y	DIOXANE, [1,4-]	123-91-1	6		Y	N
ARSENIC COMPOUNDS		0.005	I	N	Y	COKE OVEN EMISSIONS	8007-45-2	0.03	N	Y	N	DIPHENYLHYDRAZINE, [1,2-]	122-66-7	0.09	V	Y	Y
ASBESTOS	1332-21-4	0	A	N	Y	CRESOL, [META-]	109-39-4	1	B	Y	N	DIPHENYLMETHANE DIISOCYANATE, [4,4-]	101-68-8	0.1	V	Y	N
BENZ(A)ANTHRACENE	56-55-3	0.01	V	Y	N	CRESOL, [ORTHO-]	95-48-7	1	B	Y	N	EPICHLOROHYDRIN	106-89-8	2		Y	N
BENZENE	71-43-2	2		Y	N	CRESOL, [PARA-]	106-44-5	1	B	Y	N	ETHOXYETHANOL, [2-]	110-90-5	10	P	Y	N
BENZIDINE	92-87-5	0.0003	V	Y	N	CRESOLS (MIXED ISOMERS)	1319-77-3	1	B	Y	N	ETHOXYETHYL ACETATE, [2-]	111-15-9	5	P	Y	N
BENZO(A)PYRENE	50-32-8	0.01	V	Y	N	CUMENE	98-82-8	10		Y	N	ETHYL ACRYLATE	140-88-5	1		Y	N
BENZO(B)FLUORANTHENE	205-99-2	0.01	V	Y	N	CYANIDE COMPOUNDS		0.1	O	Y	N	ETHYL BENZENE	100-41-4	10		Y	N
BENZO(K)FLUORANTHENE	207-08-9	0.01	V	Y	N	DDE	72-85-9	0.01	V	Y	Y	ETHYL CHLORIDE	75-00-3	10		Y	N
BENZOTRICHLORIDE	88-07-7	0.006		Y	N	DI(2-ETHYLHEXYL)PHTHALATE, (DEHP)	117-81-7	5		Y	N	ETHYLENE GLYCOL	107-21-1	10		Y	N
BENZYL CHLORIDE	100-44-7	0.1		Y	N	DIAMNITOLUENE, [2,4-]	96-80-7	0.02		Y	N	ETHYLENE GLYCOL MONOBUTYL ETHER (Delisted)	111-76-2				
BERYLLIUM COMPOUNDS		0.008	J	N	Y	DIAZOMETHANE	334-89-3	1		Y	N	ETHYLENE GLYCOL MONOHEXYL ETHER	112-25-4	5	P	Y	N
BERYLLIUM SALTS		2E-05	J	N	Y	DIBENZ(A,H)ANTHRACENE	53-70-3	0.01	V	Y	N	ETHYLENE IMINE [AZRIDINE]	151-56-4	0.003		Y	N
BIPHENYL, [1,1-]	82-52-4	10	V	Y	N	DIOXNSIFURANS		6E-07	D,V	Y	N	ETHYLENE OXIDE	75-21-6	0.1		Y	N
BIS(CHLOROETHYL)ETHER	111-44-4	0.06		Y	N	DIBENZOFURAN	132-64-9	5	V	Y	N	ETHYLENE THIOUREA	96-45-7	0.6		Y	Y
BIS(CHLOROMETHYL)ETHER	542-88-1	0.0003		Y	N	DIBROMO-3-CHLOROPROPANE, [1,2-]	96-12-8	0.01		Y	N	FORMALDEHYDE	50-00-0	2		Y	N
BROMOFORM	75-25-2	10		Y	N	DIBROMOETHANE, [1,2-]	106-93-4	0.1		Y	N	GLYCOL ETHER (ETHYLENE GLYCOL ETHERS)		5	P	Y	N
BROMOMETHANE	74-83-9	10		Y	N	DIBUTYL PHTHALATE	84-74-2	10		Y	Y	GLYCOL ETHER (DIETHYLENE GLYCOL ETHERS)		5	P	Y	N
BUTADIENE, [1,3-]	106-99-0	0.07		Y	N	DICHLOROBENZENE, [1,4-]	106-48-7	3		Y	N	HEPTACHLOR	76-44-8	0.02		Y	N
BUTOXYETHANOL ACETATE, [2-]	112-07-2	5	P	Y	N	DICHLOROBENZIDENE, [3,3-]	91-84-1	0.2	V	Y	Y	HEXACHLOROBENZENE	118-74-1	0.01		Y	N
BUTYLENE OXIDE, [1,2-]	106-88-7	1		Y	N	DICHLOROETHANE, [1,1-]	75-34-3	1		Y	N	HEXACHLOROBUTADIENE	87-69-3	0.9		Y	N
CADMIUM COMPOUNDS		0.01	K	N	Y	DICHLOROETHANE, [1,2-]	107-06-2	0.8		Y	N	HEXACHLOROCYCLOHEXANE, [ALPHA-]	319-84-6	0.01	F	Y	N
CALCIUM CYANAMIDE	156-82-7	10		Y	Y	DICHLOROETHYLENE, [1,1-]	75-35-4	0.4		Y	N	HEXACHLOROCYCLOHEXANE, [BETA-]	319-85-7	0.01	F	Y	N
CAPROLACTAM (Delisted)	105-60-2					DICHLOROMETHANE	75-09-2	10		N	N	HEXACHLOROCYCLOHEXANE, [DELTA-]	319-86-8	0.01	F	Y	N
CAPTAN	133-06-2	10		Y	Y	DICHLOROPHENOXYACETIC ACID, [2,4-]	94-75-7	10	C	Y	Y	HEXACHLOROCYCLOHEXANE, [TECHNICAL]	608-73-1	0.01	F	Y	N

Appendix B: Table of Hazardous Air Pollutants and Screening Model Action Levels (May 3, 2012 Revision 10)

Chemical	CAS #	SMAL (tons/yr)	Group ID	VOC	PM	Chemical	CAS #	SMAL (tons/yr)	Group ID	VOC	PM	Chemical	CAS #	SMAL (tons/yr)	Group ID	VOC	PM
HEXACHLOROCYCLOPENTADIENE	77-47-4	0.1		Y	N	NITROSODIMETHYLAMINE, [N-]	62-75-9	0.001		Y	N	TRIMETHYLPENTANE, [2,2,4-]	540-84-1	5		Y	N
HEXACHLOROETHANE	67-72-1	5		Y	N	NITROSOMORPHOLINE, [N-]	59-89-2	1		Y	N	URETHANE [ETHYL CARBAMATE]	51-79-6	0.8		Y	N
HEXAMETHYLENE,-1,6-DIISOCYANATE	822-06-0	0.02		Y	N	NITROSO-N-METHYLUREA, [N-]	684-93-5	0.0002		Y	N	VINYL ACETATE	108-05-4	1		Y	N
HEXAMETHYLPHOSPHORAMIDE	680-31-9	0.01		Y	N	OCTACHLORONAPHTHALENE	2234-13-1	0.01	V	Y	N	VINYL BROMIDE	593-60-2	0.6		Y	N
HEXANE, [N-]	110-54-3	10		Y	N	PARATHION	56-38-2	0.1		Y	Y	VINYL CHLORIDE	75-01-4	0.2		Y	N
HYDRAZINE	302-01-2	0.004		N	N	PCB [POLYCHLORINATED BIPHENYLS]	1336-36-3	0.009	X	Y	Y	XYLENE, [META-]	108-38-3	10	G	Y	N
HYDROGEN CHLORIDE	7647-01-0	10		N	N	PENTACHLORONITROBENZENE	82-68-8	0.3		Y	N	XYLENE, [ORTHO-]	95-47-6	10	G	Y	N
HYDROGEN FLUORIDE	7664-39-3	0.1		N	N	PENTACHLOROPHENOL	87-86-5	0.7		Y	N	XYLENE, [PARA-]	106-42-3	10	G	Y	N
HYDROQUINONE	123-31-9	1	Y	Y	N	PHENOL	108-95-2	0.1	Y	Y	N	XYLENES (MIXED ISOMERS)	1330-20-7	10	G	Y	N
INDENO(1,2,3CD)PYRENE	193-39-5	0.01	V	Y	N	PHENYLENEDIAMINE, [PARA-]	106-50-3	10		Y	N						
ISOPHORONE	78-59-1	10		Y	N	PHOSGENE	75-44-5	0.1		Y	N						
LEAD COMPOUNDS		0.01	Q	N	Y	PHOSPHINE	7803-51-2	5		N	N						
LINDANE [GAMMA-HEXACHLOROCYCLOHEXANE]	58-89-9	0.01	F	Y	N	PHOSPHOROUS (YELLOW OR WHITE)	7723-14-0	0.1		N	N	Legend					
MALEIC ANHYDRIDE	108-31-6	1		Y	N	PTHALIC ANHYDRIDE	85-44-9	5		Y	N	Group ID	Aggregate Group Name				
MANGANESE COMPOUNDS		0.8	R	N	Y	POLYCYLIC ORGANIC MATTER		0.01	V	Y	N	A	Asbestos				
MERCURY COMPOUNDS		0.01	S	N	N	PROPANE SULTONE, [1,3-]	1120-71-4	0.03		Y	Y	B	Cresols/Cresylic Acid (isomers and mixtures)				
METHANOL	67-56-1	10		Y	N	PROPIOLACTONE, [BETA-]	57-57-8	0.1		Y	N	C	2,4 - D, Salts and Esters				
METHOXYCHLOR	72-43-5	10	V	Y	Y	PROPIONALDEHYDE	123-38-6	5		Y	N	D	Dibenzofurans, Dibenzodioxins				
METHOXYETHANOL, [2-]	109-86-4	10	P	Y	N	PROPOXUR [BAYGON]	114-26-1	10		Y	Y	E	4, 6 Dinitro-o-cresol, and Salts				
METHYL CHLORIDE	74-87-3	10		Y	N	PROPYLENE OXIDE	75-56-9	5		Y	N	F	Lindane (all isomers)				
METHYL ETHYL KETONE (Delisted)	78-93-3					PROPYLENEIMINE, [1,2-]	75-55-8	0.003		Y	N	G	Xylenes (all isomers and mixtures)				
METHYL HYDRAZINE	60-34-4	0.06		Y	N	QUINOLINE	91-22-5	0.006		Y	N	H	Antimony Compounds				
METHYL IODIDE	74-88-4	1		Y	N	QUINONE	106-51-4	5		Y	N	I	Arsenic Compounds				
METHYL ISOBUTYL KETONE	108-10-1	10		Y	N	RADIONUCLIDES		Note 1	Y	N	Y	J	Beryllium Compounds				
METHYL ISOCYANATE	624-83-9	0.1		Y	N	SELENIUM COMPOUNDS		0.1	W	N	Y	K	Cadmium Compounds				
METHYL METHACRYLATE	80-62-6	10		Y	N	STYRENE	100-42-5	1		Y	N	L	Chromium Compounds				
METHYL TERT-BUTYL ETHER	1634-04-4	10		Y	N	STYRENE OXIDE	96-09-3	1		Y	N	M	Cobalt Compounds				
METHYLCYCLOPENTADIENYL MANGANESE	12108-13-3	0.1	R	N	Y	TETRACHLORODIBENZO-P-DIOXIN,[2,3,7,8]	1746-01-6	6E-07	D,V	Y	Y	N	Coke Oven Emissions				
METHYLENE BIS(2-CHLOROANILINE), [4,4-]	101-14-4	0.2	V	Y	Y	TETRACHLOROETHANE, [1,1,2,2-]	79-34-5	0.3		Y	N	O	Cyanide Compounds				
METHYLENEDIANILINE, [4,4-]	101-77-9	1	V	Y	N	TETRACHLOROETHYLENE	127-18-4	10		N	N	P	Glycol Ethers				
METHYLNAPHTHALENE, [2-]	91-57-6	0.01	V	Y	N	TITANIUM TETRACHLORIDE	7550-45-0	0.1		N	N	Q	Lead Compounds (except elemental Lead)				
MINERAL FIBERS		0	T	N	Y	TOLUENE	108-88-3	10		Y	N	R	Manganese Compounds				
NAPHTHALENE	91-20-3	10	V	Y	N	TOLUENE DIISOCYANATE, [2,4-]	584-84-9	0.1		Y	N	S	Mercury Compounds				
NAPHTHYLAMINE, [ALPHA-]	134-32-7	0.01	V	Y	N	TOLUIDINE, [ORTHO-]	95-53-4	4		Y	N	T	Fine Mineral Fibers				
NAPHTHYLAMINE, [BETA-]	91-59-8	0.01	V	Y	N	TOXAPHENE	8001-35-2	0.01		Y	N	U	Nickel Compounds				
NICKEL CARBONYL	13463-39-3	0.1	U	N	Y	TRICHLOROENZENE, [1,2,4-]	120-82-1	10		Y	N	V	Polycyclic Organic Matter				
NICKEL COMPOUNDS		1	U	N	Y	TRICHLOROETHANE, [1,1,1-]	71-55-6	10		N	N	W	Selenium Compounds				
NICKEL REFINERY DUST		0.08	U	N	Y	TRICHLOROETHANE, [1,1,2-]	79-00-5	1		Y	N	X	Polychlorinated Biphenyls (Aroclors)				
NICKEL SUBSULFIDE	12035-72-2	0.04	U	N	Y	TRICHLOROETHYLENE	79-01-6	10		Y	N	Y	Radionuclides				
NITROBENZENE	98-95-3	1		Y	N	TRICHLOROPHENOL, [2,4,5-]	95-95-4	1		Y	N						
NITROBIPHENYL, [4-]	92-93-3	1	V	Y	N	TRICHLOROPHENOL, [2,4,6-]	88-06-2	6		Y	N						
NITROPHENOL, [4-]	100-02-7	5		Y	N	TRIETHYLAMINE	121-44-8	10		Y	N	Notes					
NITROPROPANE, [2-]	79-46-9	1		Y	N	TRIFLURALIN	1582-09-8	9		Y	Y	Note 1	The SMAL for radionuclides is defined as the effective dose equivalent to 0.3 millirems per year for 7 years exposure associated with a cancer risk of 1 in 1 million				

Appendix C: Commodity List

Commodity Name	Commodity Serial Number on SDS	Manufacturer
192 Proof GNS Beverage Alcohol	020000	ADM
Ammonia	N-1	Coffeyville Resources Nitrogen Fertilizers
Butadiene	N/D	TPC Group
Crude C4 UN1010	000000000000004197	Yondell basel
Field Grade Butane	N/D	Keyera
Butane, Fluoridic	88810000803	Tesoro
AlphaPlus® 1-Butene	1036988, 1015419, 1037080, 1037081	AlphaPlus®
Caltran 60-30	3020-00	Calumet Lubricants Company
US Domestic Crude Oil	0000014	Freepoint Commodities, LLC
Crude Oil, Sweet or Sour	N/D	JP Morgan Ventures Energy Corp.
Fuel-Grade Alcohol	92223	Aventine Renewable Energy, Inc.
Diesel Fuel No. 2	11155	BP Products North America Inc.
Denatured Ethanol (Anhydrous)	CDA20-200 proof	POET ethanol products
Ethanol (fuel grade)	N/D	Flint Hills Resources
Pure/USP/ethyl alc/200pf/1200Base	503012	Yondell Basel
Nitric Acid	C1-0801	Innospec
Residual fuel oil or standard fuel #5	N/D	Giant Refining Company
Fuel oil	N/D	Calumet
Isobutane	888100004770	Tesoro
Isobutylene	1028350, 1021752, 1089083, 1021751, 1015420	Chevron Phillips Chemical Company LP
Isopropanol	40769	Halterman
Shell Jet A	X2223	Shell Chemical LP
Liquefied Petroleum Gas (Y Grade)	A0124	Texon LP
Methyl Isobutyl Ketone	SLM3412	ScienceLab.com, Inc.
Monochlorobenzene	837699	Lanxess
Natural Gas	N/D	Williams
Natural Gasoline	N/D	Williams
n-Butylamine	SLB2803	Sciencelab.com, Inc.
Normal Butane	8520	Imperial Oil Products Division
Propane	0148-M7A / N/D	CHS Inc. / Conoco
Propylene LPG	N/D	Irving Oil Refining G.P.

Appendix D: Calculation Sheet

Equation 1: VOC Potential Emissions from Flaring

$$\frac{(\text{Railcar pressure [psig]} + 14.7 \text{ [psi]}) \times \left(\frac{\text{railcar volume [gallons]}}{7.4805 \left[\frac{\text{gallons}}{\text{ft}^3} \right]} \right) \times (\text{molecular weight} \left[\frac{\text{lb}}{\text{lbmol}} \right])}{\left(10.73 \left[\frac{\text{psi} \times \text{ft}^3}{\text{lbmol} \cdot \text{°R}} \right] \times (\text{temperature in } \text{°F} + 459.67) \right)} \times \frac{0.02 \text{ [amount uncontrolled]} \times 8760 \text{ [hours per year]}}{2 \left[\frac{\text{hours}}{\text{railcar}} \right] \times 2000 \text{ [lbs per ton]}}$$

Equation 2: Potential HAP Emissions from Flaring

$$(\text{controlled potential emissions from flaring the commodity [equation 1]}) \times (\text{HAP content [weight \%]})$$

Equation 3: Uncontrolled VOC Potential Emissions from Steam Cleaning Railcars

$$\frac{(\text{interior concentration [ppmv]})}{10^6} \times \left(\text{Volume [gallons]} \times 3.785 \left[\frac{\text{liters}}{\text{gallon}} \right] \right) \times (\text{car pressure [psig]} + 14.7 \text{ [psi]}) \times 0.068 \left[\frac{\text{atmosphere}}{\text{psi}} \right] \times (\text{molecular weight} \left[\frac{\text{lb}}{\text{lbmole}} \right]) / (0.0821 \left[\frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}} \right]) \times \left(\left(\frac{\text{Temperature } [\text{°F}] - 32}{1.8 \left[\frac{\text{°F}}{\text{°C}} \right]} \right) + 273.15 \times 453.59 \left[\frac{\text{grams}}{\text{lb}} \right] \right) \div 4 \left[\frac{\text{hr}}{\text{railcar}} \right] \times \frac{8760 \text{ [hours per year]}}{2000 \text{ [lb per ton]}}$$

Equation 4: Maximum Pounds of Commodity Flared per hour

$$\frac{(\text{Railcar pressure [psig]} + 14.7 \text{ [psi]}) \times \left(\frac{\text{railcar volume [gallons]}}{7.4805 \left[\frac{\text{gallons}}{\text{ft}^3} \right]} \right) \times (\text{molecular weight} \left[\frac{\text{lb}}{\text{lbmol}} \right])}{\left(2 \left[\frac{\text{hours}}{\text{railcar}} \right] \times 10.73 \left[\frac{\text{psia} \cdot \text{ft}^3}{\text{lb} \cdot \text{mol} \cdot \text{°R}} \right] \times (\text{temperature } [\text{°F}] + 459.67) \right)}$$

Appendix D: Calculation Sheet

Equation 5: Controlled HAP Emissions from Flaring Commodity

$$\frac{(rail\ car\ pressure\ [psig] + 14.7[psi]) \times \left(\frac{railcar\ volume\ [gallons]}{7.4805 \frac{gallons}{ft^3}} \right)}{\left(10.73 \left[\frac{psia * ft^3}{lb * mol * ^\circ R} \right] \times (temperature\ in\ ^\circ F + 459.67) \right)} \times (commodity\ molecular\ weight\ \left[\frac{lb}{lbmol} \right])$$

$$\times \frac{0.02[amount\ uncontrolled\ by\ flare]}{2000 \left[\frac{lb}{ton} \right]} \times total\ HAP\ [\% \text{ by weight}] + Natural\ Gas\ usage\ [MMCF]$$

$$\times \frac{1.888 \left[\frac{lb\ total\ HAP}{MMCF\ natural\ gas} \right]}{2000 \frac{lb}{ton}} + HCl\ emissions\ as\ calculated\ in\ Special\ Condition\ 5.B.8)$$

Equation 6: Uncontrolled HAP Emissions from Steam Cleaning Railcar

$$\frac{(interior\ concentration\ [ppmv])}{10^6} \times \left(Volume\ [gallons] \times 3.785 \left[\frac{liters}{gallon} \right] \right) \times (car\ pressure\ [psig] + 14.7\ [psi])$$

$$\times 0.068 \left[\frac{atomsphere}{psi} \right] \times \frac{commodity\ molecular\ weight\ \left[\frac{lb}{lbmole} \right]}{0.0821 \left[\frac{L * atm}{mol * K} \right] \times \left(\left(\frac{Temperature\ in\ ^\circ F - 32}{1.8 \left[\frac{^\circ F}{^\circ C} \right]} \right) + 273.15 * 453.59 \left[\frac{grams}{lb} \right] \right)}$$

$$\times total\ HAP\ [\% \text{ by weight}] \div 2000 \left[\frac{lb}{ton} \right]$$

Appendix D: Calculation Sheet

Equation 7: Hydrogen Chloride Emissions from Flaring Monochlorobenzene

$$\frac{(railcar\ pressure\ [psig + 14.7]) \times \left(\frac{railcar\ volume\ [gallons]}{7.4805 \left[\frac{gallons}{ft^3} \right]} \right) \times (molecular\ weight\ of\ C_6H_5Cl\ [\frac{lb}{lbmol}])}{\left(10.73 \left[\frac{psia * ft^3}{lb * mol * ^\circ R} \right] \times (temperature\ [^\circ F] + 459.67) \right)} \times \frac{0.98\ [amount\ flared]}{2000\ [\frac{lb}{ton}]} \times \frac{molecular\ weight\ of\ HCl\ [\frac{lb}{lbmol}]}{molecular\ weight\ of\ C_6H_5Cl\ [\frac{lb}{lbmol}]}$$

Equation 8: Controlled PAH Emissions from Flaring Fuel Oil

$$\frac{(rail\ car\ pressure\ [psig] + 14.7[psi]) \times \left(\frac{railcar\ volume\ [gallons]}{7.4805 \frac{gallons}{ft^3}} \right) \times (190.0\ [\frac{lb}{lbmol}])}{\left(10.73 \left[\frac{psia * ft^3}{lb * mol * ^\circ R} \right] \times (temperature\ in\ ^\circ F + 459.67) \right)} \times \frac{0.02[amount\ uncontrolled\ by\ flare]}{2000[\frac{lb}{ton}]} \times total\ PAH\ [\% \text{ by weight}]$$

Appendix D: Calculation Sheet

Equation 9: Uncontrolled PAH Emissions from Steam Cleaning Railcars that Contain Fuel Oil

$$\begin{aligned}
 & \frac{(\text{interior concentration [ppmv]})}{10^6} \times \left(\text{Volume [gallons]} \times 3.785 \left[\frac{\text{liters}}{\text{gallon}} \right] \right) \times (\text{car pressure [psig]} + 14.7 \text{ [psi]}) \\
 & \times 0.068 \left[\frac{\text{atmosphere}}{\text{psi}} \right] \times \frac{190.0 \left[\frac{\text{lb}}{\text{lbmole}} \right]}{0.0821 \left[\frac{\text{L} * \text{atm}}{\text{mol} * \text{K}} \right] \times \left(\left(\frac{\text{Temperature in } ^\circ\text{F} - 32}{1.8 \left[\frac{^\circ\text{F}}{^\circ\text{C}} \right]} \right) + 273.15 * 453.59 \left[\frac{\text{grams}}{\text{lb}} \right] \right)} \\
 & \times \text{total PAH [\% by weight]} \div 2000 \left[\frac{\text{lb}}{\text{ton}} \right]
 \end{aligned}$$

Ms. Lynn Taber
Senior Environmental, Health, & Safety Specialist
American Railcar Industries
100 Clark Street
St. Charles, MO 63301

RE: New Source Review Permit - Project Number: 2014-11-061

Dear Ms. Taber:

Enclosed with this letter is your permit to construct. Please study it carefully and refer to Appendix A for a list of common abbreviations and acronyms used in the permit. Also, note the special conditions, if any, on the accompanying pages. The document entitled, "Review of Application for Authority to Construct," is part of the permit and should be kept with this permit in your files. Operation in accordance with these conditions, your new source review permit application and with your amended operating permit is necessary for continued compliance. The reverse side of your permit certificate has important information concerning standard permit conditions and your rights and obligations under the laws and regulations of the State of Missouri.

If you were adversely affected by this permit decision, you may be entitled to pursue an appeal before the administrative hearing commission pursuant to Sections 621.250 and 643.075.6 RSMo. To appeal, you must file a petition with the administrative hearing commission within thirty days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the administrative hearing commission, Truman State Office Building, P.O. Box 1557, Jefferson City, Missouri 65102: www.ao.mo.gov/ahc. If you have questions regarding this permit, contact J Luebbert, at Department of Natural Resources' Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102 or (573) 751-4817.

Sincerely,

AIR POLLUTION CONTROL PROGRAM

Susan Heckenkamp
New Source Review Unit Chief

SH:jll

Enclosures

c: Kansas City Regional Office
PAMS File: 2014-11-061
Permit Number: