F.B.D. → 1-0-0-3 B.BERNOTCH N

OMEGA | PARTNERS

Christopher W. Pelligreen

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540 Maryville Centre Drive, Ste 340
Saint Louis, MO 63141
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Partners Hartford LLC

ryville Centre Drive, Suite 340
int Louis, Missouri 63141

119050 AAD
05070020

December 26, 2012

Illinois IPA
Division of Air Pollution Control
Permit Section
1021 North Grand Avenue East
Springfield, IL 62794-9505

(Sent Via FedEx only)

Attention: Illinois EPA

Re: Construction Permit Application for FESOP Source
Omega Partners Hartford LLC
Hartford, Illinois

Enclosed:
- 2 Copies of the Construction Permit Application as required by IEPA
- $10,000 regulatory processing fee as required by IEPA – OPH Check # 1238

Please do not hesitate to contact Chris Pelligreen, Managing Partner; at (314)744-3310 should you have any questions or concerns.

Sincerely,

Omega Partners Hartford LLC

Christopher W. Pelligreen

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DEC 27 2012

Illinois Environmental Protection Agency
BUREAU OF AIR
STATE OF ILLINOIS

Environmental Compliance Services

207 Fair Street
Valparaiso, Indiana 46383

Phone (219) 464-0235
Fax (219) 548-1455
Email RMONROE207@AOL.COM

December 19, 2012

Omega Partners III, LLC
540 Maryville Centre Drive, Suite 340
St. Louis, MO 63141

RE: Construction Permit Application for FESOP Source
Omega Partners Hartford LLC
Hartford, Illinois

Dear Sirs:

Attached is the construction permit application for the expansion at the Hartford, Illinois terminal. The application includes all the proposed changes and equipment additions for the terminal.

Please feel free to contact me with any questions or comments.

Sincerely,

Rick A. Monroe

attachment

Table of Contents

	Page
1.0 - Introduction	1
2.0 - Summary of Facility Operations and Air Emissions	1
3.0 - Potential to Emit (PTE)	3
4.0 - Regulatory Evaluation	3
4.1 - NSPS Subpart Kb (VOL Storage Vessels)	3
4.2 - NESHAP Subpart Y (Marine Tank Vessel Loading Operations)	4
4.3 - NESHAP Part 61 Subpart BB (Benzene Transfer Operations)	5
4.4 - NESHAP Subpart Dc (Steam Generating Units)	5
4.5 - NESHAP Part 63 Subpart JJJJJJ (Area Source Boilers)	5
5.0 - Permit Application and Fee Forms	6

<u>Attachments</u>

Illinois EPA Construction Permit Application and Fee Forms
Emission Worksheet and Documents
Manufacture Literature – Truck/Railcar Rack VCU
Manufacture Literature – Marine Rack VCU
Manufacture Literature – Boilers

Air Construction Permit Application
Omega Partners Hartford LLC – Terminal Expansion
ID Number 119050AAD

1.0 - Introduction

Omega Partners Hartford LLC (OPH) is planning to modify its operations. A change in the emission activities of the facility will result. OPH has prepared the attached Construction Application to modify its existing air permit to account for the change in operation and emissions.

2.0 - Summary of Facility Operations and Air Emissions

OPH manages its air emissions under a Federally Enforceable State Operating Permit (FESOP). The FESOP limits the emission of air pollutants to less than major source thresholds (i.e., 100 tons/year for volatile organic material (VOM) and 10 tons/year for any single hazardous air pollutant (HAP) and 25 tons/year for any combination of HAPs). Emissions of air pollutants from the proposed modification of facility operations will remain below the major source thresholds and the facility will retain its minor source status.

The following table describes the emission units and air pollution control equipment currently listed in the FESOP along with any proposed changes to the emission units and control equipment. New emission units and control equipment are also being included in the table.

Table A - Summary of Emission Units and Control Equipment

Status of Emission Unit/Control Equipment	Description of Emission Unit/Control Equipment	Comments
Existing	Truck Loading Rack and Vapor Combustion Unit	A reduction in the permitted material throughputs and emission limits. The Emission Worksheet details the proposed reduction pertaining to the material throughputs and emission limits.
Existing	3,000 barrel storage tank (Tank 0-3-2) equipped with an internal floating roof (IFR) permitted to store gasoline/ethanol/distillate/transmix.	A change to the material throughput limit pertaining to the storage tanks is being requested. The Emission Worksheet details the proposed change in the material throughput and resulting emissions.
Existing	20,000 barrel storage tank (Tank 20-4) equipped with an internal floating roof (IFR) permitted to store gasoline/ethanol/distillate/transmix.	A change to the material throughput limit pertaining to the storage tanks is being requested. This tank also has the potential to store crude oil. The Emission Worksheet details the proposed change in the material throughput and resulting emissions.
Existing	42,000 barrel storage tank (Tank 42-3) equipped with an internal floating roof (IFR) permitted to store gasoline/ethanol/distillate/transmix.	A change to the material throughput limit pertaining to the storage tanks is being requested. This tank also has the potential to store crude oil. The Emission Worksheet details the proposed change in the material throughput and resulting emissions.

Status of Emission Unit/Control Equipment	Description of Emission Unit/Control Equipment	Comments
Existing	Two 42,000 barrel storage tanks (Tanks 42-5 and 42-7) equipped with an internal floating roof (IFR) permitted to store gasoline/ethanol/distillate/transmix.	A change in the type of material stored is being requested. The tanks are to be utilized for crude oil storage. The Emission Worksheet details the proposed material throughputs and resulting emissions. The floating roofs are to be replaced and the tanks will be equipped with a mechanical shoe seal and secondary wiper seal.
Existing	120,000 barrel storage tank (Tank 120-1) equipped with an internal floating roof (IFR) permitted to store gasoline/ethanol/distillate/transmix.	A change in the type of material stored is being requested. The tank is to be utilized for crude oil storage. The Emission Worksheet details the proposed material throughput and resulting emissions. The floating roof is to be replaced and the tank will be equipped with a mechanical shoe seal and secondary wiper seal.
Existing	Support Tanks (See Table 4 in the Emission Worksheet)	The Emission Worksheet details the proposed material throughputs and resulting emissions for the support tanks.
Proposed	Two 254,000 barrel storage tanks (Tanks 254-1 and 254-2), Two 154,000 barrel storage tanks (Tanks 154-1 and 154-2), one 122,000 barrel storage tank (Tank 122-1) and one 218,000 barrel storage tank (Tank 218-1). All proposed tanks to be equipped with external floating roofs (EFR), and secondary wiper seal. All proposed tanks to store crude oil.	The Emission Worksheet details the proposed material throughputs and resulting emissions.
Proposed	Marine load-out operation equipped with a new vapor combustion unit for crude oil.	The Emission Worksheet details the proposed material throughput and resulting emissions.
Proposed	Railcar load-out station with crude oil emissions being controlled through the existing VCU operated at the truck rack.	The Emission Worksheet details the proposed material throughput and resulting emissions.
Proposed	Two natural gas-fired boilers each with a maximum heat input of 20 MMBtu/hr.	The Emission Worksheet details the proposed natural gas throughput and resulting emissions.

A railcar unloading station with up to 60 spots for material unloading is to be constructed. Unloading operations utilized bottom off-loading procedures and the unloaded product is pumped directly to the storage tanks. No emission potential results at the railcar unloading station. The terminal may also transfer material via a pipeline. Material transfer activities involving the pipeline do not results with any emission potential.

Two steam generators together with a 3,000 gallon hot oil expansion tank and 2,000 gallon condensation tank are to be constructed. No regulated air pollutants are generated and the steam generators are exempt from Illinois EPA air permitting requirements.

A storage tank, with a volume of up to 420,000 gallons, for holding water for fire fighting requirements is to be installed. No regulated air pollutants are generated and the tank is exempt from Illinois EPA air permitting requirements.

3.0 – Potential to Emit (PTE)

The attached Emission Worksheet details the potential to emit (PTE) from the emission units and control equipment listed in Table A. Table 10 in the Emission Worksheet shows the PTE for each of the criteria pollutants (NO_x, CO, VOM, SO_2, and PM10) is below the major threshold limits. Table 11 in the Emission Worksheet shows the PTE for individual and total HAP is below the major threshold limits.

4.0 – Regulatory Evaluation

The FESOP references the regulatory requirements applicable to the existing emission units and those regulatory requirements remain applicable. The National Emission Standards for Hazardous Air Pollutants (NESHAP) Subpart BBBBBB (Gasoline Distribution Bulk Terminals, Bulk Plants, and Pipeline Facilities) became effective on January 11, 2011. OPH meets the definition of a bulk gasoline terminal and all equipment in gasoline service is subject to NESHAP Subpart BBBBBB.

4.1 – NSPS Subpart Kb (VOL Storage Vessels)

The air permit states that Tank 120-1 is subject to New Source Performance Standards (NSPS) Subpart Ka for storage vessels for petroleum liquids for which construction, reconstruction, or modification commenced after May 18, 1978, and prior to July 23, 1984. The internal floating roof of Tank 120-1 is to be replaced and a mechanical shoe seal and secondary wiper seal installed. The internal floating roofs of Tanks 42-5 and 42-7 are to be replaced and mechanical shoe seals and secondary wiper seals installed. The replacement of the floating roofs will result with Tanks 42-5, 42-7, and 120-1 being subject to NSPS Subpart Kb which is applicable to volatile organic liquid storage vessels (including petroleum liquid storage vessels for which construction, reconstruction, or modification commenced after July 23, 1984.

The air permit also states that Tanks 0-32-, 20-4, and 42-3 are subject to NSPS Subpart Kb. All proposed new tanks (Tanks 254-1, 254-2, 154-1, 154-2, 122-1, and 218-1) are to be constructed with external floating roofs (EFR) with mechanical shoe seals and secondary wiper seals. Based on the storage capacity and vapor pressure of stored product (crude oil), the new tanks will be subject to NSPS Subparts A and Kb.

4.2 – NESHAP Subpart Y (Marine Tank Vessel Loading Operations)

NESHAP Subpart Y includes MACT and RACT standards along with general provisions. Applicability to the standards and provisions of NESHAP Subpart Y is being reviewed.

Maximum Achievable Control Technology (MACT) Standards Applicability

The MACT standards in 40 CFR 63.562 (b) and (d) are applicable to existing and new sources with emissions of 10 or 25 tons, and applicable to new sources with emissions of 10 or 25 tons. 10 and 25 tons are defined as individual HAP emissions of 10 tons/year or more and total HAP emissions or 25 tons/year or more.

OPH is considered as an existing source and has emissions of less than10 or 25 tons; and is subject to the following requirements of 40 CFR 63.560(a):

- 40 CFR 63.560(a)(2) which indicate that existing sources with emissions less than 10 tons and 25 tons are not subject to the emission standards in 63.562 (b) and (d);
- 40 CFR 63.560(a)(3) which require existing sources with emissions less than 10 tons and 25 tons to comply with the recordkeeping requirements of 43.567(j)(4) and the emission estimation requirements of 63.565(l); and
- 40 CFR 63.560(a)(4) which indicate that existing sources with emissions less than 10 tons and 25 tons to meet the submerged fill standards of 46 CFR 153.282.

Reasonably Available Control Technology (RACT) Standards Applicability

Applicability pertaining to the RACT standards in 63.562 (c) and (d) apply to sources with throughput of 10 M barrels or 200 M barrels. A source with throughput of 10 M barrels or 200 M barrels means a source having an aggregated loading from marine vessel loading operations at all loading berths as follows:

- Prior to the compliance date, of 1.6 billon liters (10 M barrels) or more of gasoline on a 24-month annual average basis or of 32 billion liters (200 M barrels) or more of crude oil on a 24-month annual average after September 19, 1996; or
- After the compliance date, of 1.6 billon liters (10 M barrels) or more of gasoline annually or of 32 billion liters (200 M barrels) or more of crude oil annually after September 21, 1998.

Potential crude oil throughput at OPH is less than 200 M barrels annually, and is not subject to the RACT standards of 40 CFR 63.562.

General Provisions Applicability

Facilities defined as affected sources are required to comply with the requirements in Table 1 of 40 CFR 63.560. Affected source means a sources with emissions of 10 or 25 tons, a new source with emissions less than 10 and 25 tons, a new major source offshore loading terminal, a source with throughput of 10 M barrels or 200 M barrels, that is subject to the emission standards of 40 CFR 63.562.

OPH is not classified as an affected source, and is not subject to the General Provisions requirements of NESHAP Subpart Y.

4.3 – NESHAP Part 61 Subpart BB (Benzene Transfer Operations)

NESHAP Subpart BB applies to loading racks that includes the loading of benzene into marine vessels. However, specifically exempted are loading racks at which only the following are loaded: benzene-laden waste, gasoline, crude oil, natural gas liquids, petroleum distillates, or benzene-laden liquid from coke by-product recovery plants. OPH has the potential to load only exempted liquids, and is not subject to the requirements of NESHAP Part 61 Subpart BB.

4.4 – NSPS Subpart Dc (Steam Generating Units)

Applicability depends on the date of construction and heat input capacity of the steam generating unit. Steam generating units constructed, modified, or reconstructed after June 9, 1989 and that has a maximum heat input capacity of 100 MMBtu/hr or less, but greater than or equal to 10 MMBtu/hr. The maximum heat input capacity of each boiler is greater than 10 MMBtu/hr and the boilers are subject to NSPS Subpart Dc.

4.5 – NESHAP Part 63 Subpart JJJJJJ (Area Source Boilers)

NESHAP Subpart JJJJJJ is applicable to boilers located at area sources that burn coal, oil, or biomass (e.g., wood), or non-waste materials. Natural gas-fired boilers are not subject to the rule. An area source is defined as a facility that emits or has a potential to emit less than 10 tons per year (tpy) of any single HAP or less than 25 tpy of total HAP. OPH is considered an area source. However, the two natural gas-fired boilers are not subject to the rule.

5.0 - Permit Application Forms and Fee

The following permit application forms are attached:

- Construction Permit Application for a FESOP Source (Form APC628);
- Fee Determination for Construction Permit Application (Form 197-FEE);
- Data and Information Process Emission Source (Railcar Load-Out Station) (Form APC220);
- Data and Information Process Emission Source (Marine Rack Load-Out) (Form APC220);
- Data and Information Air Pollution Control Equipment (Marine Rack VCU) (Form APC260);
- Process Emission Source Addendum Tank (Tanks 254-1, 254-2, 154-1, 154-2, 122-2, and 218-1) (Form APC232); and
- Fuel Combustion Emission Source (Boilers 1 and 2) (Form APC-240)

A permit fee of $10,000 is required to be submitted with the application.

Construction Permit Application
Table of Contents

1) Construction Permit Application for a FESOP Source (Form APC628)

2) Fee Determination for Construction Permit Application (Form 197-FEE)

3) Data and Information Process Emission Source (Railcar Load-Out Station) (Form APC220)

4) Data and Information Process Emission Source (Marine Rack Load-Out) (Form APC220)

5) Data and Information Air Pollution Control Equipment (Marine Rack VCU) (Form APC260)

6) Process Emission Source Addendum Tank (Tanks 254-1, 254-2, 154-1, 154-2, 122-2, and 218-1) (Form APC232)

7) Fuel Combustion Emission Source (Boilers 1 and 2) (Form APC-240)

8) Process Flow Diagram

Illinois Environmental Protection Agency
Division Of Air Pollution Control -- Permit Section
P.O. Box 19506
Springfield, Illinois 62794-9506 1700-0012-3863

Construction Permit Application For a FESOP Source (FORM APC628)	For Illinois EPA use only
	BOA ID No.: 119050AAD
	Application No.: 05070020
	Date Received: 12-27-12

This form is to be used to supply information to obtain a construction permit for a proposed project involving a Federally Enforceable State Operating Permit (FESOP) or Synthetic Minor source, including construction of a new FESOP source. Other necessary information must accompany this form as discussed in the "General Instructions For Permit Applications," Form APC-201.

Proposed Project

1. Working Name of Proposed Project:
   OP Hartford - Terminal Expansion
2. Is the project occurring at a source that already has a permit from the Bureau of Air (BOA)?
   ☐ No ☒ Yes If Yes, provide BOA ID Number: 119050AAD
3. Does this application request a revision to an existing construction permit issued by the BOA?
   ☒ No ☐ Yes If Yes, provide Permit Number: ___
4. Does this application request that the new/modified emission units be incorporated into an existing FESOP issued by the BOA?
   ☐ No ☒ Yes If Yes, provide Permit Number: 119050AAD

Source Information

5. Source name:*
   Omega Partners Hartford LLC
6. Source street address:*
   1402 South Delmar

7. City: Hartford	8. County: Madison	9. Zip code: 62048

ONLY COMPLETE THE FOLLOWING FOR A SOURCE WITHOUT AN ID NUMBER.

10. Is the source located within city limits? ☐ Yes ☐ No
    If no, provide Township Name:

11. Description of source and product(s) produced:	12. Primary Classification Code of source: SIC: ____ or NAICS: ______
13. Latitude (DD:MM:SS.SSSS):	14. Longitude (DD:MM:SS.SSSS):

* If this information different than previous information, then complete a new Form 200-CAAPP to change the source name in initial FESOP application for the source or Form APC-620 for Air Permit Name and/or Ownership Change if the FESOP has been previously issued.

Applicant Information

15. Who is the applicant? ☒ Owner ☐ Operator	16. All correspondence to: (check one) ☒ Owner ☐ Operator ☐ Source
17. Applicant's FEIN: 71-1031531	18. Attention name and/or title for written correspondence: John Niemi

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Illinois Environmental Protection Agency
BUREAU OF AIR
STATE OF ILLINOIS

This Agency is authorized to require and you must disclose this information under 415 ILCS 5/39. Failure to do so could result in the application being denied and penalties under 415 ILCS 5 et seq. It is not necessary to use this form in providing this information. This form has been approved by the forms management center.

Owner Information*

19. Name: Omega Partners Hartford LLC		
20. Address: 540 Maryville Centre Drive, Suite 340		
21. City: St. Louis	22. State: MO	23. Zip code: 63141

* If this information different than previous information, then complete Form 272-CAAPP for a Request for Ownership Change for CAAPP Permit for an initial FESOP application for the source or Form APC-620 for Air Permit Name and/or Ownership Change if the FESOP has been previously issued.

Operator Information (If Different from Owner)*

24. Name		
25. Address:		
26. City:	27. State:	28. Zip code:

* If this information different than previous information, then complete a new Form 200-CAAPP to change the source name in initial FESOP application for the source or Form APC-620 for Air Permit Name and/or Ownership Change if the FESOP has been previously issued.

Technical Contacts for Application

29. Preferred technical contact: (check one) ☐ Applicant's contact ☒ Consultant	
30. Applicant's technical contact person for application:	
31. Contact person's telephone number	32. Contact person's email address:
33. Applicant's consultant for application: Environmental Compliance Services	
34. Consultant's telephone number: 219-464-0235	35. Consultant's email address: rmonroe207@aol.com

Review Of Contents of the Application

36. Is the emission unit covered by this application already constructed? If "yes", provide the date construction was completed: Note: The Illinois EPA is unable to issue a construction permit for a emission unit that has already been constructed.	☐ Yes ☒ No
37. Does the application include a narrative description of the proposed project?	☒ Yes ☐ No
38. Does the application contain a list or summary that clearly identifies the emission units and air pollution control equipment that are part of the project?	☒ Yes ☐ No
39. Does the application include process flow diagram(s) for the project showing new and modified emission units and control equipment and related existing equipment and their relationships?	☐ Yes ☒ No
40. If the project is at a source that has not previously received a permit from the BOA, does the application include a source description, plot plan and site map?	☐ Yes ☒ No

Review Of Contents of the Application (continued)	
41. Does the application include relevant information for the proposed project as requested on Illinois EPA, BOA application forms (or otherwise contain all the relevant information)?	☒ Yes ☐ No
42. Does the application identify and address all applicable or potentially applicable emissions standards, including: a. State emission standards (35 IAC Chapter I, Subtitle B); b. Federal New Source Performance Standards (40 CFR Part 60); c. Federal standards for HAPs (40 CFR Parts 61 and 63)?	☒ Yes ☐ No
43. Does the application address whether the proposed project or the source could be a major project for Prevention of Significant Deterioration (PSD), 40 CFR 52.21?	☐ Yes ☐ No ☒ N/A
44. Does the application address for which pollutant(s) the proposed project or the source could be a major project for PSD, 40 CFR 52.21?	☐ Yes ☐ No ☒ N/A
45. Does the application address whether the proposed project or the source could be a major project for "Nonattainment New Source Review," (NA NSR), 35 IAC Part 203?	☐ Yes ☐ No ☒ N/A
46. Does the application address for which pollutant(s) the proposed project or the source could be a major project for NA NSR, 35 IAC Part 203?	☐ Yes ☐ No ☒ N/A
47. Does the application address whether the proposed project or the source could potentially be subject to federal Maximum Achievable Control Technology (MACT) standard under 40 CFR Part 63 for Hazardous Air Pollutants (HAP) and identify the standard that could be applicable?	☐ Yes ☐ No ☒ N/A* * Source not major ☒ Project not major ☐
48. Does the application identify the HAP(s) from the proposed project or the source that would trigger the applicability of a MACT standard under 40 CFR Part 63?	☐ Yes ☐ No ☒ N/A
49. Does the application include a summary of the current and the future potential emissions of the source after the proposed project has been completed for each criteria air pollutant and/or HAP (tons/year)?	☐ Yes ☐ No ☒ N/A* * Applicability of PSD, NA NSR or 40 CFR 63 not applicable to the source's emissions.
50. Does the application include a summary of the requested permitted annual emissions of the proposed project for the new and modified emission units (tons/year)?	☒ Yes ☐ No ☐ N/A* * Project does not involve an increase in emissions from new or modified emission units.
51. Does the application include a summary of the requested permitted production, throughput, fuel, or raw material usage limits that correspond to the annual emissions limits of the proposed project for the new and modified emission units?	☒ Yes ☐ No ☐ N/A* * Project does not involve an increase in emissions from new or modified emission units.
52. Does the application include sample calculations or methodology for the emission estimations and the requested emission limits?	☒ Yes ☐ No
53. Does the application address the relationships with and implications of the proposed project for the source's FESOP?	☒ Yes ☐ No ☐ N/A* *FESOP not yet issued.
54. If the application contains information that is considered a TRADE SECRET, has such information been properly marked and claimed and other requirements to perfect such a claim been satisfied in accordance with 35 IAC Part 130? Note: "Claimed information will not be legally protected from disclosure to the public if it is not properly claimed or does not qualify as trade secret information.	☐ Yes ☐ No ☒ N/A* * No information in the application is claimed to be a TRADE SECRET

Review Of Contents of the Application (continued)		
55. If the source is located in a county other than Cook County, are two separate copies of this application being submitted?	☒ Yes	☐ No
56. If the source is located in Cook County, are three separate copies of this application being submitted?	☐ Yes	☒ No
57. Does the application include a completed "FEE DETERMINATION FOR CONSTRUCTION PERMIT APPLICATION," Form 197-FEE, for the emission units and control equipment for which a permit for construction or modification is being sought?	☒ Yes	☐ No
58. Does the application include a check in the proper amount for payment of the Construction permit fee?	☒ Yes	☐ No

Note: Answering "No" to Items 36 through 58 may result in the application being deemed incomplete.

Signature Block

Pursuant to 35 IAC 201.159, all applications and supplements thereto shall be signed by the owner and operator of the source, or their authorized agent, and shall be accompanied by evidence of authority to sign the application. Applications without a signed certification will be deemed incomplete.

59. Authorized Signature:

I certify under penalty of law that, based on information and belief formed after reasonable inquiry, the statements and information contained in this application are true, accurate and complete and that I am a responsible official for the source, as defined by Section 39.5(1) of the Environmental Protection Act. In addition, the technical contact person identified above is authorized to submit (by hard copy and/or by electronic copy) any supplemental information related to this application that may be requested by the Illinois EPA.

BY: [signature] — AUTHORIZED SIGNATURE | Authorized Signatory — TITLE OF SIGNATORY

Christopher W. Pelligreen — TYPED OR PRINTED NAME OF SIGNATORY | December 24 2012 — DATE

Illinois Environmental Protection Agency

Bureau of Air • 1021 North Grand Avenue East • P.O. Box 19506 • Springfield • Illinois • 62794-9506

FEE DETERMINATION FOR CONSTRUCTION PERMIT APPLICATION

FOR AGENCY USE ONLY

ID Number: 119050AAD Permit #: 12120038
[X] Complete [ ] Incomplete Date Complete: 12-27-12
Check Number: 1238 Account Name: OMEGA PARTNERS HARTFORD LLC

Rec'd. $10,000.

This form is to be used to supply fee information that must accompany all construction permit applications. This application must include payment in full to be deemed complete. Make check or money order payable to the Illinois Environmental Protection Agency, Division of Air Pollution Control - Permit Section at the above address. Do NOT send cash. Refer to instructions (197-INST) for assistance.

Source Information

1. Source Name: Omega Partners Hartford LLC
2. Project Name: OP Hartford - Terminal Expansion
3. Source ID #: (if applicable) 119050AAD
4. Contact Name: John Niemi
5. Contact Phone #: 314-744-3310

Fee Determination

6. The boxes below are automatically calculated.

Section 1 Subtotal $0.00 + Section 2, 3 or 4 Subtotal $10,000.00 = $10,000.00 Grand Total

Section 1: Status of Source/Purpose of Submittal

7. Your application will fall under only one of the following five categories described below. Check the box that applies. Proceed to applicable sections. For purposes of this form:
   - **Major Source** is a source that is required to obtain a CAAPP permit.
   - **Synthetic Minor Source** is a source that has taken limits on potential to emit in a permit to avoid CAAPP permit requirements (e.g.,FESOP).
   - **Non-Major Source** is a source that is not a major or synthetic minor source.

[X] Existing source without status change or with status change from synthetic minor to major source or vice versa. Proceed to Section 2.

[ ] Existing non-major source that will become synthetic minor to major source. Proceed to Section 4.

[ ] New major or synthetic minor source. Proceed to Section 4.

[ ] New non-major source. Proceed to Section 3.

$0.00 Section 1 Subtotal

[ ] AGENCY ERROR. If this is a timely request to correct an issued permit that involves only an agency error and if the request is received within the deadline for a permit appeal to the Pollution Control Board. Skip Sections 2, 3 and 4. Proceed directly to Section 5.

Section 2: Special Case Filing Fee

8. **Filing Fee**. If the application only addresses one or more of the following, check the appropriate boxes, skip Sections 3 and 4 and proceed directly to Section 5. Otherwise, proceed to Section 3 or 4 as appropriate.

Addition or replacement of control devices on permitted units.
Pilot projects/trial burns by a permitted unit
Land remediation projects
Revisions related to methodology or timing for emission testing
Minor administrative-type change to a permit

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Section 3: Fees for Current or Projected Non-Major Sources

9.	This application consists of a single new emission unit or no more than two modified emission units. ($500 fee)	9.	
10.	This application consists of more than one new emission unit or more than two modified units. ($1,000 fee)	10.	
11.	This application consists of a new source or emission unit subject to Section 39.2 of the Act (i.e., Local Siting Review); a commercial incinerator or a municipal waste, hazardous waste, or waste tire incinerator; a commercial power generator; or an emission unit designated as a complex source by agency rulemaking. ($15,000 fee)	11.	$0.00
12.	A public hearing is held (see instructions). ($10,000 fee)	12.	
13.	Section 3 subtotal. (lines 9 through 12 - entered on page 1)	13.	$0.00

Section 4: Fees for Current or Projected Major or Synthetic Minor Sources

Application contains modified emission units only	14. For the first modified emission unit, enter $2,000.	
	15. Number of additional modified emission units = ______ x $1,000.	15. $0.00
	16. Line 14 plus line 15, or $5,000, whichever is less.	16. $0.00
Application contains new and/or modified emission units	17. For the first new emission unit, enter $4,000.	17. $4,000.00
	18. Number of additional new and/or modified emission units = 9 x $1,000.	18. $9,000.00
	19. Line 17 plus line 18, or $10,000, whichever is less.	19. $10,000.00
Application contains netting exercise	20. Number of individual pollutants that rely on a netting exercise or contemporaneous emissions decrease to avoid application of PSD or nonattainment area NSR = ______ x $3,000.	20. $0.00
Additional Supplemental Fees	21. If the new source or emission unit is subject to Section 39.2 of the Act (i.e. siting); a commercial incinerator or other municipal waste, hazardous waste, or waste tire incinerator; a commercial power generator; or one or more other emission units designated as a complex source by Agency rulemaking, enter $25,000.	21.
	22. If the source is a new major source subject to PSD, enter $12,000.	22.
	23. If the project is a major modification subject to PSD, enter $6,000.	23.
	24. If this is a new major source subject to nonattainment area (NAA) NSR, enter $20,000.	24.
	25. If this is a major modification subject to NAA NSR, enter $25,000.	25.
	26. If the application involves a determination of MACT for a pollutant and the project is not subject to BACT or LAER for the related pollutant under PSD or NSR (e.g., VOM for organic HAP), enter $5,000 per unit for which a determination is requested or otherwise required. ______ x $5,000.	26. $0.00
	27. If a public hearing is held (see instructions), enter $10,000.	27.
28. Section 4 subtotal (line 16 and lines 19 through 28) to be entered on page1		28. $10,000.00

Section 5: Certification

NOTE: Applications without a signed certification will be deemed incomplete.

29. I certify under penalty of law that, based on information and belief formed after reasonable inquiry, the information contained in this fee application form is true, accurate and complete.

by: [signature]
Signature

Authorized Signatory
Title of Signatory

Christopher W. Pellegreen
Typed or Printed Name of Signatory

December 24, 2012
Date

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF AIR POLLUTION CONTROL
1021 NORTH GRAND AVENUE, EAST
SPRINGFIELD, ILLINOIS 62702

* DATA AND INFORMATION PROCESS EMISSION SOURCE	

* THIS INFORMATION FORM IS TO BE COMPLETED FOR AN EMISSION SOURCE OTHER THAN A FUEL COMBUSTION EMISSION SOURCE OR AN INCINERATOR. A FUEL COMBUSTION EMISSION SOURCE IS A FURNACE, BOILER, OR SIMILAR EQUIPMENT USED PRIMARILY FOR PRODUCING HEAT OR POWER BY INDIRECT HEAT TRANSFER. AN INCINERATOR IS AN APPARATUS IN WHICH REFUSE IS BURNED.

1. NAME OF PLANT OWNER: Omega Partners Hartford LLC	2. NAME OF CORPORATE DIVISION OR PLANT (IF DIFFERENT FROM OWNER):
3. STREET ADDRESS OF EMISSION SOURCE: 1402 South Delmar	4. CITY OF EMISSION SOURCE: Hartford

GENERAL INFORMATION		
5. NAME OF PROCESS: Marine Rack Load-Out	6. NAME OF EMISSION SOURCE EQUIPMENT: Marine Rack	
7. EMISSION SOURCE EQUIPMENT MANUFACTURER: N/A	8. MODEL NUMBER: N/A	9. SERIAL NUMBER: N/A
10. FLOW DIAGRAM DESIGNATION(S) OF EMISSION SOURCE: Marine Rack		
11. IDENTITY(S) OF ANY SIMILAR SOURCE(S) AT THE PLANT OR PREMISES NOT COVERED BY THE FORM (IF THE SOURCE IS COVERED BY ANOTHER APPLICATION, IDENTIFY THE APPLICATION): N/A		
12. AVERAGE OPERATING TIME OF EMISSION SOURCE: 16 HRS/DAY 7 DAYS/WK 52 WKS/YR	13. MAXIMUM OPERATING TIME OF EMISSION SOURCE: 24 HRS/DAY 7 DAYS/WK 52 WKS/YR	
14. PERCENT OF ANNUAL THROUGHPUT: DEC-FEB 25 % MAR-MAY 25 % JUN-AUG 25 % SEPT-NOV 25 %		

INSTRUCTIONS

1. COMPLETE THE ABOVE IDENTIFICATION AND GENERAL INFORMATION SECTION.
2. COMPLETE THE RAW MATERIAL, PRODUCT, WASTE MATERIAL, AND FUEL USAGE SECTIONS FOR THE PARTICULAR SOURCE EQUIPMENT. COMPOSITIONS OF MATERIALS MUST BE SUFFICIENTLY DETAILED TO ALLOW DETERMINATION OF THE NATURE AND QUANTITY OF POTENTIAL EMISSIONS. IN PARTICULAR, THE COMPOSITION OF PAINTS, INKS, ETC., AND ANY SOLVENTS MUST BE FULLY DETAILED.
3. EMISSION AND EXHAUST POINT INFORMATION MUST BE COMPLETED, UNLESS EMISSIONS ARE EXHAUSTED THROUGH AIR POLLUTION CONTROL EQUIPMENT.
4. OPERATION TIME AND CERTAIN OTHER ITEMS REQUIRE BOTH AVERAGE AND MAXIMUM VALUES
5. FOR GENERAL INFORMATION REFER TO "GENERAL INSTRUCTIONS FOR PERMIT APPLICATIONS," APC-201.

DEFINITIONS

AVERAGE - THE VALUE THAT SUMMARIZES OR REPRESENTS THE GENERAL CONDITION OF THE EMISSION SOURCE, OR THE GENERAL STATE OF PRODUCTION OF THE EMISSION SOURCE. SPECIFICALLY:
AVERAGE OPERATING TIME - ACTUAL TOTAL HOURS OF OPERATION FOR THE PRECEDING TWELVE MONTH PERIOD.
AVERAGE RATE - ACTUAL TOTAL QUANTITY OF "MATERIAL" FOR THE PRECEDING TWELVE MONTH PERIOD, DIVIDED BY THE AVERAGE OPERATING TIME.
AVERAGE OPERATION - OPERATION TYPICAL OF THE PRECEDING TWELVE MONTH PERIOD, AS REPRESENTED BY AVERAGE OPERATING TIME AND AVERAGE RATES.

MAXIMUM - THE GREATEST VALUE ATTAINABLE OR ATTAINED FOR THE EMISSION SOURCE, OR THE PERIOD OF GREATEST OR UTMOST PRODUCTION OF THE EMISSION SOURCE. SPECIFICALLY:
MAXIMUM OPERATING TIME - GREATEST EXPECTED TOTAL HOURS OF OPERATIONS FOR ANY TWELVE MONTH PERIOD.
MAXIMUM RATE - GREATEST QUANTITY OF "MATERIAL" EXPECTED PER ANY ONE HOUR OF OPERATION.
MAXIMUM OPERATION - GREATEST EXPECTED OPERATION, AS REPRESENTED BY MAXIMUM OPERATING TIME AND MAXIMUM RATES.

RAW MATERIAL INFORMATION		
NAME OF RAW MATERIAL	AVERAGE RATE PER IDENTICAL SOURCE	MAXIMUM RATE PER IDENTICAL SOURCE
20a.	b. LB/HR	c. LB/HR
21a.	b. LB/HR	c. LB/HR
22a.	b. LB/HR	c. LB/HR
23a.	b. LB/HR	c. LB/HR
24a.	b. LB/HR	c. LB/HR

PRODUCT INFORMATION		
NAME OF PRODUCT	AVERAGE RATE PER IDENTICAL SOURCE	MAXIMUM RATE PER IDENTICAL SOURCE
30a. Load-Out of Crude Oil	b. LB/HR	c. LB/HR
31a.	b. LB/HR	c. LB/HR
32a.	b. LB/HR	c. LB/HR
33a.	b. LB/HR	c. LB/HR
34a.	b. LB/HR	c. LB/HR

WASTE MATERIAL INFORMATION		
NAME OF WASTE MATERIAL	AVERAGE RATE PER IDENTICAL SOURCE	MAXIMUM RATE PER IDENTICAL SOURCE
40a.	b. LB/HR	c. LB/HR
41a.	b. LB/HR	c. LB/HR
42a.	b. LB/HR	c. LB/HR
43a.	b. LB/HR	c. LB/HR
44a.	b. LB/HR	c. LB/HR

*FUEL USAGE INFORMATION		
FUEL USED	TYPE	HEAT CONTENT
50a. NATURAL GAS ☐	b. ----------------------------	c. 1000 BTU/SCF
OTHER GAS ☐		BTU/SCF
OIL ☐		BTU/GAL
COAL ☐		BTU/LB
OTHER ☐		BTU/LB
d. AVERAGE FIRING RATE PER IDENTICAL SOURCE: BTU/HR	e. MAXIMUM FIRING RATE PER IDENTICAL SOURCE: BTU/HR	

*THIS SECTION IS TO BE COMPLETED FOR ANY FUEL USED DIRECTLY IN THE PROCESS EMISSION SOURCE, E. G. GAS IN A DRYER, OR COAL IN A MELT FURNACE.

*EMISSION INFORMATION			
51. NUMBER OF IDENTICAL SOURCES (DESCRIBE AS REQUIRED): N/A			
AVERAGE OPERATION			
CONTAMINANT	CONCENTRATION OR EMISSION RATE PER IDENTICAL SOURCE		METHOD USED TO DETERMINE CONCENTRATION OR EMISSION RATE
PARTICULATE MATTER	52a. GR/SCF	b. LB/HR	c.
CARBON MONOXIDE	53a. PPM (VOL)	b. LB/HR	c.
NITROGEN OXIDES	54a. PPM (VOL)	b. LB/HR	c.
ORGANIC MATERIAL	55a. PPM (VOL)	b. LB/HR	c.
SULFUR DIOXIDE	56a. PPM (VOL)	b. LB/HR	c.
**OTHER (SPECIFY)	57a. PPM (VOL)	b. LB/HR	c.
MAXIMUM OPERATION			
CONTAMINANT	CONCENTRATION OR EMISSION RATE PER IDENTICAL SOURCE		METHOD USED TO DETERMINE CONCENTRATION OR EMISSION RATE
PARTICULATE MATTER	58a. GR/SCF	b. LB/HR	c.
CARBON MONOXIDE	59a. PPM (VOL)	b. LB/HR	c.
NITROGEN OXIDES	60a. PPM (VOL)	b. LB/HR	c.
ORGANIC MATERIAL	61a. PPM (VOL)	b. LB/HR	c.
SULFUR DIOXIDE	62a. PPM (VOL)	b. LB/HR	c.
**OTHER (SPECIFY)	63a. PPM (VOL)	b. LB/HR	c.

*ITEMS 52 THROUGH 63 NEED NOT BE COMPLETED IF EMISSIONS ARE EXHAUSTED THROUGH AIR POLLUTION CONTROL EQUIPMENT.
**"OTHER" CONTAMINANT SHOULD BE USED FOR AN AIR CONTAMINANT NOT SPECIFICALLY NAMED ABOVE. POSSIBLE OTHER CONTAMINANTS ARE ASBESTOS, BERYLLIUM, MERCURY, VINYL CHLORIDE, LEAD, ETC.

***EXHAUST POINT INFORMATION	
64. FLOW DIAGRAM DESIGNATION(S) OF EXHAUST POINT:	
65. DESCRIPTION OF EXHAUST POINT (LOCATION IN RELATION TO BUILDINGS, DIRECTION, HOODING, ETC.):	
66. EXIT HEIGHT ABOVE GRADE:	67. EXIT DIAMETER:
68. GREATEST HEIGHT OF NEARBY BUILDINGS:	69. EXIT DISTANCE FROM NEAREST PLANT BOUNDARY:
AVERAGE OPERATION	MAXIMUM OPERATION
70. EXIT GAS TEMPERATURE: °F	72. EXIT GAS TEMPERATURE: °F
71. GAS FLOW RATE THROUGH EACH EXIT: ACFM	73. GAS FLOW RATE THROUGH EACH EXIT: ACFM

***THIS SECTION SHOULD NOT BE COMPLETED IF EMISSIONS ARE EXHAUSTED THROUGH AIR POLLUTION CONTROL EQUIPMENT.

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF AIR POLLUTION CONTROL
1021 NORTH GRAND AVENUE, EAST
SPRINGFIELD, ILLINOIS 62702

* DATA AND INFORMATION AIR POLLUTION CONTROL EQUIPMENT	

* THIS INFORMATION FORM IS TO BE COMPLETED FOR AN EMISSION SOURCE OTHER THAN A FUEL COMBUSTION EMISSION SOURCE OR AN INCINERATOR. A FUEL COMBUSTION EMISSION SOURCE IS A FURNACE, BOILER, OR SIMILAR EQUIPMENT USED PRIMARILY FOR PRODUCING HEAT OR POWER BY INDIRECT HEAT TRANSFER. AN INCINERATOR IS AN APPARATUS IN WHICH REFUSE IS BURNED.

1. NAME OF OWNER: Omega Partners Hartford LLC	2. NAME OF CORPORATE DIVISION OR PLANT (IF DIFFERENT FROM OWNER):
3. STREET ADDRESS OF CONTROL EQUIPMENT: 1402 South Delmar	4. CITY OF CONTROL EQUIPMENT Hartford
5. NAME OF CONTROL EQUIPMENT OR CONTROL SYSTEM: Marine Rack Vapor Combustion Unit (VCU)	

INSTRUCTIONS
1. COMPLETE THE ABOVE IDENTIFICATION SECTION. 2. COMPLETE THE APPROPRIATE SECTION FOR THE UNIT OF CONTROL EQUIPMENT, OR THE APPROPRIATE SECTIONS FOR THE CONTROL SYSTEM. BE CERTAIN THAT THE ARRANGEMENT OF VARIOUS UNITS IN A CONTROL SYSTEM IS MADE CLEAR IN THE PROCESS FLOW DIAGRAM. 3. COMPLETE PAGE 6 OF THIS FORM, EMISSION INFORMATION AND EXHAUST POINT INFORMATION. 4. EFFICIENCY VALUES SHOULD BE SUPPORTED WITH A DETAILED EXPLANATION OF THE METHOD OF CALCULATION, THE MANNER OF ESTIMATION, OR THE SOURCE OF INFORMATION. REFERENCE TO THIS FORM ANY RELEVANT INFORMATION OR EXPLANATION INCLUDED IN THIS PERMIT APPLICATION. 5. EFFICIENCY VALUES AND CERTAIN OTHER ITEMS OF INFORMATION ARE TO BE GIVEN FOR AVERAGE AND MAXIMUM OPERATION OR THE SOURCE EQUIPMENT. FOR EXAMPLE, "MAXIMUM EFFICIENCY" IS THE EFFICIENCY OF THE CONTROL EQUIPMENT WHEN THE SOURCE IS AT MAXIMUM OPERATION, AND "AVERAGE FLOW RATE" IS THE FLOW RATE INTO HE CONTROL EQUIPMENT WHEN THE SOURCE IS AT AVERAGE OPERATION. 6. FOR GENERAL INFORMATION REFER TO "GENERAL INSTRUCTIONS FOR PERMIT APPLICATIONS," APC-201.

DEFINITIONS
AVERAGE - THE VALUE THAT <u>SUMMARIZES</u> OR <u>REPRESENTS</u> THE <u>GENERAL CONDITION</u> OF THE <u>EMISSION SOURCE</u>, OR THE GENERAL STATE OF PRODUCTION OF THE EMISSION SOURCE. SPECIFICALLY: AVERAGE OPERATION - OPERATION TYPICAL OF THE PRECEDING TWELVE MONTH PERIOD, AS REPRESENTED BY AVERAGE OPERATING TIME AND AVERAGE RATES. MAXIMUM - THE GREATEST VALUE <u>ATTAINABLE</u> OR <u>ATTAINED</u> FOR THE <u>EMISSION SOURCE</u>, OR THE PERIOD OF GREATEST OR UTMOST PRODUCTION OF THE EMISSION SOURCE. SPECIFICALLY: MAXIMUM OPERATION - GREATEST EXPECTED OPERATION, AS REPRESENTED BY MAXIMUM OPERATING TIME AND MAXIMUM RATES.

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter 111 1/2, Section 1039. Disclosure of this information is required under that Section. Failure to do so may prevent this form from being processed and could result in your application being denied. This form has been approved by the Forms Management Center.

ADSORPTION UNIT

1. FLOW DIAGRAM DESIGNATION(S) OF ADSORPTION UNIT:

2. MANUFACTURER:

3. MODEL NAME AND NUMBER:

4. ADSORBENT:
☐ ACTIVATED CHARCOAL: TYPE ____________ ☐ OTHER: SPECIFY ____________

5. ADSORBATE(S):

6. NUMBER OF BEDS PER UNIT:

7. WEIGHT OF ABSORBENT PER BED: LB

8. DIMENSIONS OF BED:
THICKNESS ________ IN, SURFACE AREA ________ SQUARE IN

9. INLET GAS TEMPERATURE: °F

9. PRESSURE DROP ACROSS UNIT: INCH H_2O GAUGE

11. TYPE OF REGENERATION:
☐ REPLACEMENT ☐ STEAM ☐ OTHER: SPECIFY ____________

12. METHOD OF REGENERATION:
☐ ALTERNATE USE OF ________ ENTIRE UNITS ☐ ALTERNATE USE OF ________ BEDS IN A SINGLE UNIT
☐ SOURCE SHUT DOWN ☐ OTHER: DESCRIBE

AVERAGE OPERATION OF SOURCE	MAXIMUM OPERATION OF SOURCE
13. TIME ON LINE BEFORE REGENERATION: MIN/BED	15. TIME ON LINE BEFORE REGENERATION: MIN/BED
14. EFFICIENCY OF ABSORBER (SEE INSTRUCTION 4): %	16. EFFICIENCY OF ABSORBER (SEE INSTRUCTION 4): %

AFTERBURNER

1. FLOW DIAGRAM DESIGNATION(S) OF AFTERBURNER:

2. MANUFACTURER:

3. MODEL NAME AND NUMBER:

4. COMBUSTION CHAMBER DIMENSIONS:
LENGTH ________ IN, CROSS-SECTIONAL AREA ________ SQUARE IN

5. INLET GAS TEMPERATURE: °F

7. FUEL:
☐ GAS ☐ OIL: SULFUR ________ WT%

6. OPERATING TEMPERATURE OF COMBUSTION CHAMBER: °F

8. BURNERS PER AFTERBURNER:
________ @ ________ BTU/HR EACH

9. CATALYST USED:
☐ NO ☐ YES: DESCRIBE CATALYST ____________

10. HEAT EXCHANGER USED:
☐ NO ☐ YES: DESCRIBE HEAT EXCHANGER ____________

AVERAGE OPERATION OF SOURCE	MAXIMUM OPERATION OF SOURCE
11. GAS FLOW RATE: SCFM	13. GAS FLOW RATE: SCFM
12. EFFICIENCY OF AFTERBURNER (SEE INSTRUCTION 4): %	14. EFFICIENCY OF AFTERBURNER (SEE INSTRUCTION 4): %

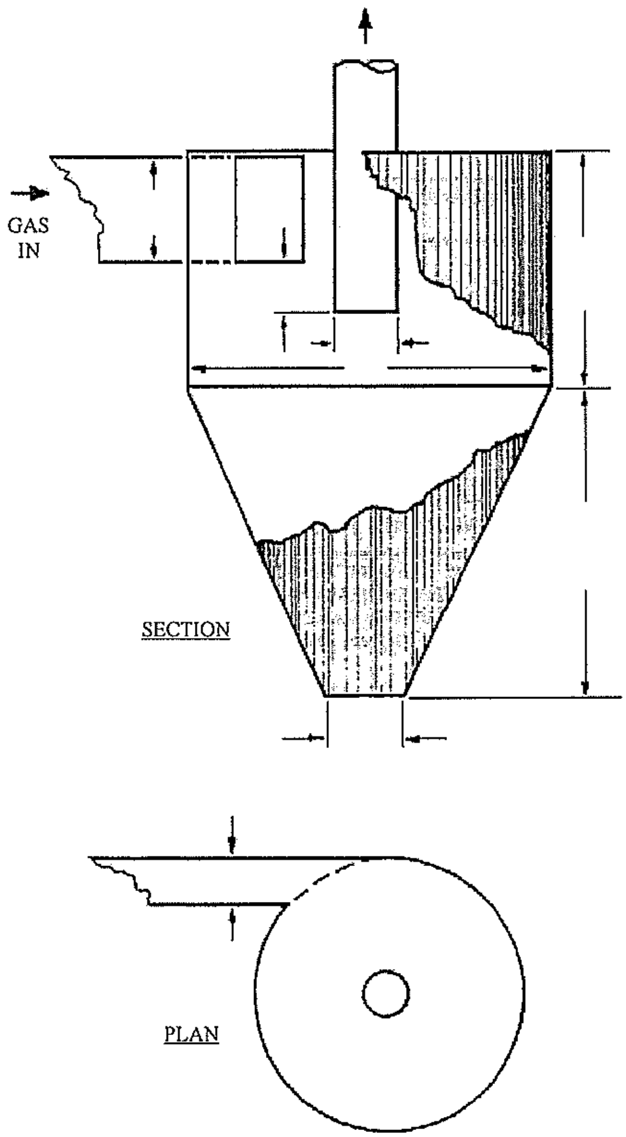
CYCLONE

1. FLOW DIAGRAM DESIGNATION(S) OF CYCLONE:

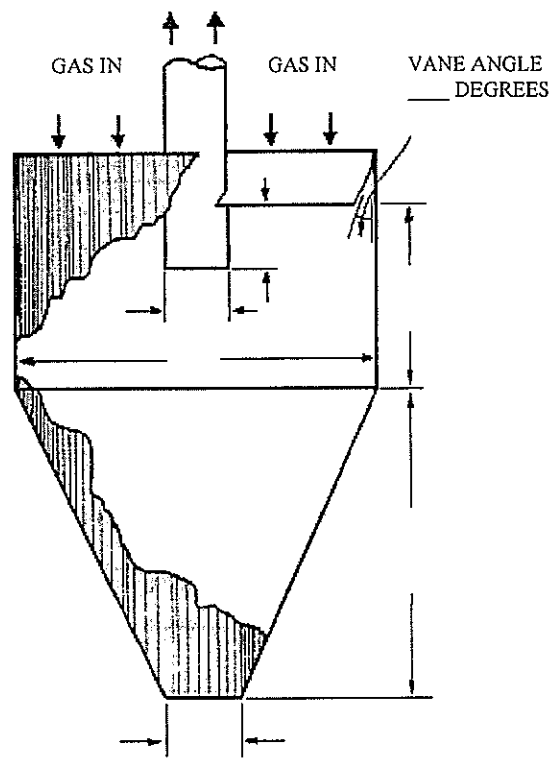
2. MANUFACTURER:	3. MODEL:
4. TYPE OF CYCLONE: ☐ SIMPLE ☐ MULTIPLE	5. NUMBER OF CYCLONES IN EACH MULTIPLE CYCLONE:

6. DIMENSION THE APPROPRIATE SKETCH (IN INCHES) OR PROVIDE A DRAWING WITH EQUIVALENT INFORMATION:

TANGENTIAL INLET CYCLONE



AXIAL INLET CYCLONE
(INDIVIDUAL CYCLONE OF MULTIPLE CYCLONE)



NOT TO SCALE

AVERAGE OPERATION OF SOURCE	MAXIMUM OPERATION OF SOURCE
7. GAS FLOW RATE: SCFM	9. GAS FLOW RATE: SCFM
8. EFFICIENCY OF CYCLONE (SEE INSTRUCTION 4): %	10. EFFICIENCY OF CYCLONE (SEE INSTRUCTION 4): %

CONDENSER

1. FLOW DIAGRAM DESIGNATION(S) OF CONDENSER:		
2. MANUFACTURER:	3. MODEL NAME AND NUMBER:	4. HEAT EXCHANGE AREA: FT^2

AVERAGE OPERATION OF SOURCE		MAXIMUM OPERATION OF SOURCE	
5. COOLANT FLOW RATE PER CONDENSER: WATER ______ GPM AIR ______ SCFM OTHER: TYPE ______, FLOW RATE ______		10. COOLANT FLOW RATE PER CONDENSER: WATER ______ GPM AIR ______ SCFM OTHER: TYPE ______, FLOW RATE ______	
6. GAS FLOW RATE: SCFM		11. GAS FLOW RATE: SCFM	
7. COOLANT TEMPERATURE: INLET____°F OUTLET____°F	8. GAS TEMPERATURE: INLET____°F OUTLET____°F	12. COOLANT TEMPERATURE: INLET____°F OUTLET____°F	13. GAS TEMPERATURE: INLET____°F OUTLET____°F
9. EFFICIENCY OF CONDENSER (SEE INSTRUCTION 4): %		14. EFFICIENCY OF CONDENSER (SEE INSTRUCTION 4): %	

*ELECTRICAL PRECIPITATOR

1. FLOW DIAGRAM DESIGNATION(S) OF ELECTRICAL PRECIPITATOR:	
2. MANUFACTURER:	3. MODEL NAME AND NUMBER:
4. COLLECTING ELECTRODE AREA PER CONTROL DEVICE: FT^2	
AVERAGE OPERATION OF SOURCE	MAXIMUM OPERATION OF SOURCE
5. GAS FLOW RATE: SCFM	7. GAS FLOW RATE: SCFM
6. EFFICIENCY OF ELECTRICAL PRECIPITATOR(SEE INSTRUCTION 4): %	8. EFFICIENCY OF ELECTRICAL PRECIPITATOR(SEE INSTRUCTION 4): %
SUBMIT THE MANUFACTURER'S SPECIFICATIONS FOR THE ELECTRICAL PRECIPITATOR. REFERENCE THE INFORMATION TO THIS FORM.	

*ELECTRICAL PRECIPITATORS VARY GREATLY IN THEIR DESIGN AND IN THEIR COMPLEXITY. THE ITEMS IN THIS SECTION PROVIDE A MINIMUM AMOUNT OF INFORMATION. THE APPLICANT MUST, HOWEVER, SUBMIT WITH THIS APPLICATION THE MANUFACTURER'S SPECIFICATIONS, INCLUDING ANY DRAWINGS, TECHNICAL DOCUMENTS, ETC. IF THE INFORMATION PROVIDED BY THE MANUFACTURER'S SPECIFICATIONS IS INSUFFICIENT FOR FULL AND ACCURATE ANALYSIS, THE AGENCY WILL REQUEST SPECIFIC ADDITIONAL INFORMATION.

FILTER UNIT

1. FLOW DIAGRAM DESIGNATION(S) OF FILTER UNIT:	
2. MANUFACTURER:	3. MODEL NAME AND NUMBER:
4. FILTERING MATERIAL:	5. FILTERING AREA: FT^2
6. CLEANING METHOD: ☐ SHAKER ☐ REVERSE AIR ☐ PULSE AIR ☐ PULSE JET ☐ OTHER: SPECIFY ______	
7. GAS COOLING METHOD: ☐ DUCT WORK: LENGTH ______ FT., DIAM ______ IN. ☐ BLEED-IN AIR ☐ WATER SPRAY ☐ OTHER: SPECIFY ______	
AVERAGE OPERATION OF SOURCE	MAXIMUM OPERATION OF SOURCE
8. GAS FLOW RATE (FROM SOURCE): SCFM	12. GAS FLOW RATE (FROM SOURCE): SCFM
9. GAS COOLING FLOW RATE: BLEED-IN AIR ______ SCFM, WATER SPRAY ______ GPM	13. GAS COOLING FLOW RATE: BLEED-IN AIR ______ SCFM, WATER SPRAY ______ GPM
10. INLET GAS CONDITION: TEMPERATURE ______ °F DEWPOINT ______ °F	14. INLET GAS CONDITION: TEMPERATURE ______ °F DEWPOINT ______ °F
11. EFFICIENCY OF FILTER UNIT (SEE INSTRUCTION 4): %	15. EFFICIENCY OF FILTER UNIT (SEE INSTRUCTION 4): %

SCRUBBER	
1. FLOW DIAGRAM DESIGNATION(S) OF SCRUBBER:	
2. MANUFACTURER:	3. MODEL NAME AND NUMBER:

4. TYPE OF SCRUBBER:
- ☐ HIGH ENERGY: GAS STEAM PRESSURE DROP ____________ INCH H_2O
- ☐ PACKED: PACKING TYPE ____________, PACKING SIZE ____________, PACKING HEIGHT ____________ IN.
- ☐ SPRAY: NUMBER OF NOZZLES ____________, NOZZLE PRESSURE ____________ PSIG
- ☐ OTHER: SPECIFY ____________ ATTACH DESCRIPTION AND SKETCH WITH DIMENSIONS

5. TYPE OF FLOW:
☐ COCURRENT ☐ COUNTERCURRENT ☐ CROSSFLOW

6. SCRUBBER GEOMETRY:
LENGTH IN DIRECTION OF GAS FLOW ____________ IN., CROSS-SECTIONAL AREA ____________ SQUARE IN.

7. CHEMICAL COMPOSITION OF SCRUBBANT:

AVERAGE OPERATION OF SOURCE	MAXIMUM OPERATION OF SOURCE
8. SCRUBBANT FLOW RATE: GPM	12. SCRUBBANT FLOW RATE: GPM
9. GAS FLOW RATE: SCFM	13. GAS FLOW RATE: SCFM
10. INLET GAS TEMPERATURE: °F	14. INLET GAS TEMPERATURE: °F
11. EFFICIENCY OF SCRUBBER (SEE INSTRUCTION 4): ______ % PARTICULATE ______ % GASEOUS	15. EFFICIENCY OF SCRUBBER (SEE INSTRUCTION 4): ______ % PARTICULATE ______ % GASEOUS

OTHER TYPE OF CONTROL EQUIPMENT		
1. FLOW DIAGRAM DESIGNATION(S) OF "OTHER TYPE" OF CONTROL EQUIPMENT: Marine Rack VCU		
2. GENERIC NAME OF "OTHER" EQUIPMENT: Flare	3. MANUFACTURER: John Zink	4. MODEL NAME AND NUMBER:

5. DESCRIPTION AND SKETCH, WITH DIMENSIONS AND FLOW RATES, OF "OTHER" EQUIPMENT:

See attached manufacture literature

AVERAGE OPERATION OF SOURCE	MAXIMUM OPERATION OF SOURCE
6. FLOW RATES: ____________ GPM ____________ SCFM	8. FLOW RATES: 9,800 GPM ____________ SCFM
7. EFFICIENCY OF "OTHER" EQUIPMENT (SEE INSTRUCTION 4): 99 %	9. EFFICIENCY OF "OTHER" EQUIPMENT (SEE INSTRUCTION 4): 99 %

EMISSION INFORMATION

1. NUMBER OF IDENTICAL CONTROL UNITS OR CONTROL SYSTEMS (DESCRIBE AS REQUIRED):

AVERAGE OPERATION

CONTAMINANT	CONCENTRATION OR EMISSION RATE PER IDENTICAL CONTROL UNITS OR CONTROL SYSTEM		METHOD USED TO DETERMINE CONCENTRATION OR EMISSION RATE
PARTICULATE MATTER	2a. GR/SCF	b. LB/HR	c.
CARBON MONOXIDE	3a. PPM (VOL)	b. LB/HR	c.
NITROGEN OXIDES	4a. PPM (VOL)	b. LB/HR	c.
ORGANIC MATERIAL	5a. PPM (VOL)	b. LB/HR	c.
SULFUR DIOXIDE	6a. PPM (VOL)	b. LB/HR	c.
**OTHER (SPECIFY)	7a. PPM (VOL)	b. LB/HR	c.

MAXIMUM OPERATION

CONTAMINANT	CONCENTRATION OR EMISSION RATE PER IDENTICAL CONTROL UNITS OR CONTROL SYSTEM		METHOD USED TO DETERMINE CONCENTRATION OR EMISSION RATE
PARTICULATE MATTER	8a. GR/SCF	b. LB/HR	c. See Emission Worksheet
CARBON MONOXIDE	9a. PPM (VOL)	b. LB/HR	c.
NITROGEN OXIDES	10a. PPM (VOL)	b. LB/HR	c.
ORGANIC MATERIAL	11a. PPM (VOL)	b. LB/HR	c.
SULFUR DIOXIDE	12a. PPM (VOL)	b. LB/HR	c.
**OTHER (SPECIFY)	13a. PPM (VOL)	b. LB/HR	c.

**"OTHER" CONTAMINANT SHOULD BE USED FOR AN AIR CONTAMINANT NOT SPECIFICALLY NAMED ABOVE. POSSIBLE OTHER CONTAMINANTS ARE ASBESTOS, BERYLLIUM, MERCURY, VINYL CHLORIDE, LEAD, ETC.

EXHAUST POINT INFORMATION

1. FLOW DIAGRAM DESIGNATION(S) OF EXHAUST POINT: Marine VCU

2. DESCRIPTION OF EXHAUST POINT (LOCATION IN RELATION TO BUILDINGS, DIRECTION, HOODING, ETC.):

3. EXIT HEIGHT ABOVE GRADE: 40 ft	4. EXIT DIAMETER: 8 ft
5. GREATEST HEIGHT OF NEARBY BUILDINGS: 20	6. EXIT DISTANCE FROM NEAREST PLANT BOUNDARY: 100
AVERAGE OPERATION	**MAXIMUM OPERATION**
7. EXIT GAS TEMPERATURE: 40-100 °F	9. EXIT GAS TEMPERATURE: 40-100 °F
8. GAS FLOW RATE THROUGH EACH EXIT: ACFM	10. GAS FLOW RATE THROUGH EACH EXIT: ACFM

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF AIR POLLUTION CONTROL
1021 NORTH GRAND AVENUE, EAST
SPRINGFIELD, ILLINOIS 62702

* DATA AND INFORMATION PROCESS EMISSION SOURCE	

* THIS INFORMATION FORM IS TO BE COMPLETED FOR AN EMISSION SOURCE OTHER THAN A FUEL COMBUSTION EMISSION SOURCE OR AN INCINERATOR. A FUEL COMBUSTION EMISSION SOURCE IS A FURNACE, BOILER, OR SIMILAR EQUIPMENT USED PRIMARILY FOR PRODUCING HEAT OR POWER BY INDIRECT HEAT TRANSFER. AN INCINERATOR IS AN APPARATUS IN WHICH REFUSE IS BURNED.

1. NAME OF PLANT OWNER: Omega Partners Hartford LLC	2. NAME OF CORPORATE DIVISION OR PLANT (IF DIFFERENT FROM OWNER):
3. STREET ADDRESS OF EMISSION SOURCE: 1402 South Delmar	4. CITY OF EMISSION SOURCE: Hartford

GENERAL INFORMATION

5. NAME OF PROCESS: Railcar Load-Out	6. NAME OF EMISSION SOURCE EQUIPMENT: Railcar Load-Out	
7. EMISSION SOURCE EQUIPMENT MANUFACTURER: N/A	8. MODEL NUMBER: N/A	9. SERIAL NUMBER: N/A
10. FLOW DIAGRAM DESIGNATION(S) OF EMISSION SOURCE: Railcar Load-Out		
11. IDENTITY(S) OF ANY SIMILAR SOURCE(S) AT THE PLANT OR PREMISES NOT COVERED BY THE FORM (IF THE SOURCE IS COVERED BY ANOTHER APPLICATION, IDENTIFY THE APPLICATION): N/A		
12. AVERAGE OPERATING TIME OF EMISSION SOURCE: 16 HRS/DAY 7 DAYS/WK 52 WKS/YR	13. MAXIMUM OPERATING TIME OF EMISSION SOURCE: 24 HRS/DAY 7 DAYS/WK 52 WKS/YR	
14. PERCENT OF ANNUAL THROUGHPUT: DEC-FEB 25 % MAR-MAY 25 % JUN-AUG 25 % SEPT-NOV 25 %		

INSTRUCTIONS

1. COMPLETE THE ABOVE IDENTIFICATION AND GENERAL INFORMATION SECTION.
2. COMPLETE THE RAW MATERIAL, PRODUCT, WASTE MATERIAL, AND FUEL USAGE SECTIONS FOR THE PARTICULAR SOURCE EQUIPMENT. COMPOSITIONS OF MATERIALS MUST BE SUFFICIENTLY DETAILED TO ALLOW DETERMINATION OF THE NATURE AND QUANTITY OF POTENTIAL EMISSIONS. IN PARTICULAR, THE COMPOSITION OF PAINTS, INKS, ETC., AND ANY SOLVENTS MUST BE FULLY DETAILED.
3. EMISSION AND EXHAUST POINT INFORMATION MUST BE COMPLETED, UNLESS EMISSIONS ARE EXHAUSTED THROUGH AIR POLLUTION CONTROL EQUIPMENT.
4. OPERATION TIME AND CERTAIN OTHER ITEMS <u>REQUIRE</u> BOTH <u>AVERAGE</u> AND <u>MAXIMUM</u> VALUES
5. FOR GENERAL INFORMATION REFER TO "GENERAL INSTRUCTIONS FOR PERMIT APPLICATIONS," APC-201.

DEFINITIONS

AVERAGE - THE VALUE THAT SUMMARIZES OR REPRESENTS THE GENERAL CONDITION OF THE EMISSION SOURCE, OR THE GENERAL STATE OF PRODUCTION OF THE EMISSION SOURCE. SPECIFICALLY:
- AVERAGE OPERATING TIME - ACTUAL TOTAL HOURS OF OPERATION FOR THE PRECEDING TWELVE MONTH PERIOD.
- AVERAGE RATE - ACTUAL TOTAL QUANTITY OF "MATERIAL" FOR THE PRECEDING TWELVE MONTH PERIOD, DIVIDED BY THE AVERAGE OPERATING TIME.
- AVERAGE OPERATION - OPERATION TYPICAL OF THE PRECEDING TWELVE MONTH PERIOD, AS REPRESENTED BY AVERAGE OPERATING TIME AND AVERAGE RATES.

MAXIMUM - THE GREATEST VALUE ATTAINABLE OR ATTAINED FOR THE EMISSION SOURCE, OR THE PERIOD OF GREATEST OR UTMOST PRODUCTION OF THE EMISSION SOURCE. SPECIFICALLY:
- MAXIMUM OPERATING TIME - GREATEST EXPECTED TOTAL HOURS OF OPERATIONS FOR ANY TWELVE MONTH PERIOD.
- MAXIMUM RATE - GREATEST QUANTITY OF "MATERIAL" EXPECTED PER ANY ONE HOUR OF OPERATION.
- MAXIMUM OPERATION - GREATEST EXPECTED OPERATION, AS REPRESENTED BY MAXIMUM OPERATING TIME AND MAXIMUM RATES.

RAW MATERIAL INFORMATION		
NAME OF RAW MATERIAL	AVERAGE RATE PER IDENTICAL SOURCE	MAXIMUM RATE PER IDENTICAL SOURCE
20a.	b. LB/HR	c. LB/HR
21a.	b. LB/HR	c. LB/HR
22a.	b. LB/HR	c. LB/HR
23a.	b. LB/HR	c. LB/HR
24a.	b. LB/HR	c. LB/HR

PRODUCT INFORMATION		
NAME OF PRODUCT	AVERAGE RATE PER IDENTICAL SOURCE	MAXIMUM RATE PER IDENTICAL SOURCE
30a. Load-Out of Crude Oil	b. LB/HR	c. LB/HR
31a.	b. LB/HR	c. LB/HR
32a.	b. LB/HR	c. LB/HR
33a.	b. LB/HR	c. LB/HR
34a.	b. LB/HR	c. LB/HR

WASTE MATERIAL INFORMATION		
NAME OF WASTE MATERIAL	AVERAGE RATE PER IDENTICAL SOURCE	MAXIMUM RATE PER IDENTICAL SOURCE
40a.	b. LB/HR	c. LB/HR
41a.	b. LB/HR	c. LB/HR
42a.	b. LB/HR	c. LB/HR
43a.	b. LB/HR	c. LB/HR
44a.	b. LB/HR	c. LB/HR

*FUEL USAGE INFORMATION		
FUEL USED	TYPE	HEAT CONTENT
50a. NATURAL GAS ☐	b. ------------------------------	c. 1000 BTU/SCF
OTHER GAS ☐		BTU/SCF
OIL ☐		BTU/GAL
COAL ☐		BTU/LB
OTHER ☐		BTU/LB
d. AVERAGE FIRING RATE PER IDENTICAL SOURCE: BTU/HR	e. MAXIMUM FIRING RATE PER IDENTICAL SOURCE: BTU/HR	

*THIS SECTION IS TO BE COMPLETED FOR ANY FUEL USED DIRECTLY IN THE PROCESS EMISSION SOURCE, E. G. GAS IN A DRYER, OR COAL IN A MELT FURNACE.

*EMISSION INFORMATION			
51. NUMBER OF IDENTICAL SOURCES (DESCRIBE AS REQUIRED): N/A			
AVERAGE OPERATION			
CONTAMINANT	CONCENTRATION OR EMISSION RATE PER IDENTICAL SOURCE		METHOD USED TO DETERMINE CONCENTRATION OR EMISSION RATE
PARTICULATE MATTER	52a. GR/SCF	b. LB/HR	c.
CARBON MONOXIDE	53a. PPM (VOL)	b. LB/HR	c.
NITROGEN OXIDES	54a. PPM (VOL)	b. LB/HR	c.
ORGANIC MATERIAL	55a. PPM (VOL)	b. LB/HR	c.
SULFUR DIOXIDE	56a. PPM (VOL)	b. LB/HR	c.
**OTHER (SPECIFY)	57a. PPM (VOL)	b. LB/HR	c.
MAXIMUM OPERATION			
CONTAMINANT	CONCENTRATION OR EMISSION RATE PER IDENTICAL SOURCE		METHOD USED TO DETERMINE CONCENTRATION OR EMISSION RATE
PARTICULATE MATTER	58a. GR/SCF	b. LB/HR	c.
CARBON MONOXIDE	59a. PPM (VOL)	b. LB/HR	c.
NITROGEN OXIDES	60a. PPM (VOL)	b. LB/HR	c.
ORGANIC MATERIAL	61a. PPM (VOL)	b. LB/HR	c.
SULFUR DIOXIDE	62a. PPM (VOL)	b. LB/HR	c.
**OTHER (SPECIFY)	63a. PPM (VOL)	b. LB/HR	c.

*ITEMS 52 THROUGH 63 NEED NOT BE COMPLETED IF EMISSIONS ARE EXHAUSTED THROUGH AIR POLLUTION CONTROL EQUIPMENT.

**"OTHER" CONTAMINANT SHOULD BE USED FOR AN AIR CONTAMINANT NOT SPECIFICALLY NAMED ABOVE. POSSIBLE OTHER CONTAMINANTS ARE ASBESTOS, BERYLLIUM, MERCURY, VINYL CHLORIDE, LEAD, ETC.

***EXHAUST POINT INFORMATION	
64. FLOW DIAGRAM DESIGNATION(S) OF EXHAUST POINT:	
65. DESCRIPTION OF EXHAUST POINT (LOCATION IN RELATION TO BUILDINGS, DIRECTION, HOODING, ETC.):	
66. EXIT HEIGHT ABOVE GRADE:	67. EXIT DIAMETER:
68. GREATEST HEIGHT OF NEARBY BUILDINGS:	69. EXIT DISTANCE FROM NEAREST PLANT BOUNDARY:
AVERAGE OPERATION	MAXIMUM OPERATION
70. EXIT GAS TEMPERATURE: °F	72. EXIT GAS TEMPERATURE: °F
71. GAS FLOW RATE THROUGH EACH EXIT: ACFM	73. GAS FLOW RATE THROUGH EACH EXIT: ACFM

***THIS SECTION SHOULD NOT BE COMPLETED IF EMISSIONS ARE EXHAUSTED THROUGH AIR POLLUTION CONTROL EQUIPMENT.

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter 111 1/2, Section 1039. Disclosure of this information is required under that Section. Failure to do so may prevent this form from being processed and could result in your application being denied. This form has been approved by the Forms Management Center

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF AIR POLLUTION CONTROL
P. O. Box 19506
SPRINGFIELD, ILLINOIS 62794-9506

PROCESS EMISSION SOURCE ADDENDUM TANK	FOR AGENCY USE ONLY

1. NAME OF OWNER: Omega Partners Hartford LLC	2. NAME OF CORPORATE DIVISION OR PLANT (IF DIFFERENT FROM OWNER):
3. STREET ADDRESS OF EMISSION SOURCE: 1402 South Delmar	4. CITY OF EMISSION SOURCE: Hartford

TANK INFORMATION

5. NAME OF TANK MANUFACTURER:	6. DESIGNATION OF TANK: Tanks 254-1 and 254-2
7. SERIAL NUMBER:	8. CAPACITY: 254,000 barrels
9. TANK USE:	10. NUMBER OF SAME CAPACITY TANKS STORING THE SAME MATERIAL: 2

11. TANK SHAPE: ☐ HORIZONTAL ☒ CYLINDRICAL ☐ SPHERICAL ☐ OTHER (SPECIFY)____

12. TANK DIAMETER: 180 FT	13. TANK HEIGHT: 56 FT	14. TANK LENGTH: FT

15. STATUS: ☐ EXISTING ☐ ALTERATION	16. TANK TYPE: ☐ FIXED ROOF ☒ FLOATING ROOF ☐ PRESSURE ☐ OTHER (SPECIFY)____
17. SEAL: ☐ SINGLE ☐ DOUBLE ☒ OTHER (SPECIFY) Mech. shoe w/secondary wiper	18. AVERAGE DISTANCE FROM TOP OF TANK SHELL TO LIQUID: FT
19. SHELL TYPE: ☐ RIVETED ☒ WELDED ☐ OTHER (SPECIFY)____	20. PAINT COLOR: white

VENT VALVE DATA

TYPE OF VENT	NUMBER OF VENTS	PRESSURE SETTING	DISCHARGE VENTED TO (ATMOSPHERE, FLARE, ETC.)
21. COMBINATION	a. ____	b. ____	c. See attached Tanks Report for Vent Data
22. PRESSURE	a. ____	b. ____	c. ____
23. VACUM	a. ____	b. ____	c. ____
24. OPEN	a. ____	b. ____	c. ____

MATERIAL TO BE STORED		
25. MATERIAL: Crude Oil	26. DENSITY: LB/FT³	27. VAPOR PRESSURE AT 70 °F: 3.4 PSIA

STORAGE CONFITIONS	
28. STORAGE TEMPERATURE: MINIMUM _____ °F MAXIMUM _____ °F	29. TANK TURN OVER PER YEAR: ☐ BBLS/ ☐ GALS/
30. MAXIMUM FILLING RATE: ☐ BBLS/DAY ☐ GALS/DAY	31. AVERAGE THROUGHPUT: ☐ BBLS/DAY ☐ GALS/DAY
32. PRESSURE EQUALIZERS USED? ☐ YES ☒ NO	33. PERMANENT SUBMERGED LOADING PIPE USED? ☒ YES ☐ NO
34. VAPOR LOSS CONTROL DEVICE? ☐ YES ☒ NO	IF VAPOR LOSS CONTROL DEVICE IS USED, COMPLETE "DATA & INFORMATION –AIR POLLUTION CONTROL EQUIPMENT," (FORM APC-260, AS PART OF THIS APPLICATION

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter 111 1/2, Section 1039. Disclosure of this information is required under that Section. Failure to do so may prevent this form from being processed and could result in your application being denied. This form has been approved by the Forms Management Center

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF AIR POLLUTION CONTROL
P. O. Box 19506
SPRINGFIELD, ILLINOIS 62794-9506

PROCESS EMISSION SOURCE ADDENDUM TANK	FOR AGENCY USE ONLY

1. NAME OF OWNER: Omega Partners Hartford LLC	2. NAME OF CORPORATE DIVISION OR PLANT (IF DIFFERENT FROM OWNER):
3. STREET ADDRESS OF EMISSION SOURCE: 1402 South Delmar	4. CITY OF EMISSION SOURCE: Hartford

TANK INFORMATION

5. NAME OF TANK MANUFACTURER:	6. DESIGNATION OF TANK: Tanks 154-1 and 154-2
7. SERIAL NUMBER:	8. CAPACITY: 154,000 barrels
9. TANK USE:	10. NUMBER OF SAME CAPACITY TANKS STORING THE SAME MATERIAL: 2

11. TANK SHAPE: ☐ HORIZONTAL ☒ CYLINDRICAL ☐ SPHERICAL ☐ OTHER (SPECIFY)_____

12. TANK DIAMETER:	13. TANK HEIGHT:	14. TANK LENGTH:
140 FT	56 FT	FT

15. STATUS: ☐ EXISTING ☐ ALTERATION	16. TANK TYPE: ☐ PRESSURE ☐ FIXED ROOF ☐ OTHER (SPECIFY)_____ ☒ FLOATING ROOF
17. SEAL: ☐ SINGLE ☐ DOUBLE ☒ OTHER (SPECIFY) Mech. shoe w/secondary wiper	18. AVERAGE DISTANCE FROM TOP OF TANK SHELL TO LIQUID: FT
19. SHELL TYPE: ☐ RIVETED ☒ WELDED ☐ OTHER (SPECIFY)_____	20. PAINT COLOR: white

VENT VALVE DATA

TYPE OF VENT	NUMBER OF VENTS	PRESSURE SETTING	DISCHARGE VENTED TO (ATMOSPHERE, FLARE, ETC.)
21. COMBINATION	a. _____	b. _____	c. See attached Tanks Report for Vent Data
22. PRESSURE	a. _____	b. _____	c. _____
23. VACUM	a. _____	b. _____	c. _____
24. OPEN	a. _____	b. _____	c. _____

MATERIAL TO BE STORED		
25. MATERIAL: Crude Oil	26. DENSITY: LB/FT³	27. VAPOR PRESSURE AT 70 °F: 3.4 PSIA

STORAGE CONFITIONS	
28. STORAGE TEMPERATURE: MINIMUM _____ °F MAXIMUM _____ °F	29. TANK TURN OVER PER YEAR: ☐ BBLS/ ☐ GALS/
30. MAXIMUM FILLING RATE: ☐ BBLS/DAY ☐ GALS/DAY	31. AVERAGE THROUGHPUT: ☐ BBLS/DAY ☐ GALS/DAY
32. PRESSURE EQUALIZERS USED? ☐ YES ☒ NO	33. PERMANENT SUBMERGED LOADING PIPE USED? ☒ YES ☐ NO
34. VAPOR LOSS CONTROL DEVICE? ☐ YES ☒ NO	IF VAPOR LOSS CONTROL DEVICE IS USED, COMPLETE "DATA & INFORMATION –AIR POLLUTION CONTROL EQUIPMENT," (FORM APC-260, AS PART OF THIS APPLICATION

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STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF AIR POLLUTION CONTROL
P. O. Box 19506
SPRINGFIELD, ILLINOIS 62794-9506

Page ______ of ______

PROCESS EMISSION SOURCE ADDENDUM TANK	FOR AGENCY USE ONLY

1. NAME OF OWNER: Omega Partners Hartford LLC	2. NAME OF CORPORATE DIVISION OR PLANT (IF DIFFERENT FROM OWNER):
3. STREET ADDRESS OF EMISSION SOURCE: 1402 South Delmar	4. CITY OF EMISSION SOURCE: Hartford

TANK INFORMATION

5. NAME OF TANK MANUFACTURER:	6. DESIGNATION OF TANK: Tanks 122-1
7. SERIAL NUMBER:	8. CAPACITY: 122,000 barrels
9. TANK USE:	10. NUMBER OF SAME CAPACITY TANKS STORING THE SAME MATERIAL: 1
11. TANK SHAPE: ☐ HORIZONTAL ☒ CYLINDRICAL ☐ SPHERICAL ☐ OTHER (SPECIFY)____	
12. TANK DIAMETER: 125 FT — 13. TANK HEIGHT: 56 FT	14. TANK LENGTH: FT
15. STATUS: ☐ EXISTING ☐ ALTERATION	16. TANK TYPE: ☐ FIXED ROOF ☒ FLOATING ROOF ☐ PRESSURE ☐ OTHER (SPECIFY)____
17. SEAL: ☐ SINGLE ☐ DOUBLE ☒ OTHER (SPECIFY) Mech. shoe w/secondary wiper	18. AVERAGE DISTANCE FROM TOP OF TANK SHELL TO LIQUID: FT
19. SHELL TYPE: ☐ RIVETED ☒ WELDED ☐ OTHER (SPECIFY)____	20. PAINT COLOR: white

VENT VALVE DATA

TYPE OF VENT	NUMBER OF VENTS	PRESSURE SETTING	DISCHARGE VENTED TO (ATMOSPHERE, FLARE, ETC.)
21. COMBINATION	a. ____	b. ____	c. See attached Tanks Report for Vent Data
22. PRESSURE	a. ____	b. ____	c. ____
23. VACUM	a. ____	b. ____	c. ____
24. OPEN	a. ____	b. ____	c. ____

MATERIAL TO BE STORED		
25. MATERIAL: Crude Oil	26. DENSITY: LB/FT³	27. VAPOR PRESSURE AT 70 °F: 3.4 PSIA

STORAGE CONFITIONS	
28. STORAGE TEMPERATURE: MINIMUM _____ °F MAXIMUM _____ °F	29. TANK TURN OVER PER YEAR: ☐ BBLS/ ☐ GALS/
30. MAXIMUM FILLING RATE: ☐ BBLS/DAY ☐ GALS/DAY	31. AVERAGE THROUGHPUT: ☐ BBLS/DAY ☐ GALS/DAY
32. PRESSURE EQUALIZERS USED? ☐ YES ☒ NO	33. PERMANENT SUBMERGED LOADING PIPE USED? ☒ YES ☐ NO
34. VAPOR LOSS CONTROL DEVICE? ☐ YES ☒ NO	IF VAPOR LOSS CONTROL DEVICE IS USED, COMPLETE "DATA & INFORMATION –AIR POLLUTION CONTROL EQUIPMENT," (FORM APC-260, AS PART OF THIS APPLICATION

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter 111 1/2, Section 1039. Disclosure of this information is required under that Section. Failure to do so may prevent this form from being processed and could result in your application being denied. This form has been approved by the Forms Management Center

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF AIR POLLUTION CONTROL
P. O. Box 19506
SPRINGFIELD, ILLINOIS 62794-9506

Page ______ of ______

PROCESS EMISSION SOURCE ADDENDUM TANK	FOR AGENCY USE ONLY

1. NAME OF OWNER: Omega Partners Hartford LLC	2. NAME OF CORPORATE DIVISION OR PLANT (IF DIFFERENT FROM OWNER):
3. STREET ADDRESS OF EMISSION SOURCE: 1402 South Delmar	4. CITY OF EMISSION SOURCE: Hartford

TANK INFORMATION

5. NAME OF TANK MANUFACTURER:		6. DESIGNATION OF TANK: Tanks 218-1	
7. SERIAL NUMBER:		8. CAPACITY: 218,000 barrels	
9. TANK USE:		10. NUMBER OF SAME CAPACITY TANKS STORING THE SAME MATERIAL: 1	
11. TANK SHAPE: ☐ HORIZONTAL	☒ CYLINDRICAL	☐ SPHERICAL	☐ OTHER (SPECIFY)_____
12. TANK DIAMETER: 180 FT	13. TANK HEIGHT: 48 FT	14. TANK LENGTH: FT	
15. STATUS: ☐ EXISTING ☐ ALTERATION		16. TANK TYPE: ☐ FIXED ROOF ☒ FLOATING ROOF ☐ PRESSURE ☐ OTHER (SPECIFY)_____	
17. SEAL: ☐ SINGLE ☐ DOUBLE ☒ OTHER (SPECIFY) Mech. shoe w/secondary wiper		18. AVERAGE DISTANCE FROM TOP OF TANK SHELL TO LIQUID: FT	
19. SHELL TYPE: ☐ RIVETED ☒ WELDED ☐ OTHER (SPECIFY)_____		20. PAINT COLOR: white	

VENT VALVE DATA

TYPE OF VENT	NUMBER OF VENTS	PRESSURE SETTING	DISCHARGE VENTED TO (ATMOSPHERE, FLARE, ETC.)
21. COMBINATION	a. _____	b. _____	c. See attached Tanks Report for Vent Data
22. PRESSURE	a. _____	b. _____	c. _____
23. VACUM	a. _____	b. _____	c. _____
24. OPEN	a. _____	b. _____	c. _____

MATERIAL TO BE STORED		
25. MATERIAL: Crude Oil	26. DENSITY: LB/FT³	27. VAPOR PRESSURE AT 70 °F: 3.4 PSIA

STORAGE CONFITIONS	
28. STORAGE TEMPERATURE: MINIMUM _____ °F MAXIMUM _____ °F	29. TANK TURN OVER PER YEAR: ☐ BBLS/ ☐ GALS/
30. MAXIMUM FILLING RATE: ☐ BBLS/DAY ☐ GALS/DAY	31. AVERAGE THROUGHPUT: ☐ BBLS/DAY ☐ GALS/DAY
32. PRESSURE EQUALIZERS USED? ☐ YES ☒ NO	33. PERMANENT SUBMERGED LOADING PIPE USED? ☒ YES ☐ NO
34. VAPOR LOSS CONTROL DEVICE? ☐ YES ☒ NO	IF VAPOR LOSS CONTROL DEVICE IS USED, COMPLETE "DATA & INFORMATION –AIR POLLUTION CONTROL EQUIPMENT," (FORM APC-260, AS PART OF THIS APPLICATION

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF AIR POLLUTION CONTROL
1021 NORTH GRAND AVENUE, EAST
SPRINGFIELD, ILLINOIS 62702

* DATA AND INFORMATION FUEL COMBUSTION EMISSION SOURCE	

* THIS INFORMATION FORM IS TO BE COMPLETED FOR A FURNACE, BOILER, OR SIMILAR EQUIPMENT USED FOR THE PRIMARY PURPOSE OF PRODUCING HEAT OR POWER BY INDIRECT HEAT TRANSFER. AN EMISSION SOURCE THAT DOES NOT FIT THIS DESCRIPTION, INCLUDING AND EMISSION SOURCE USING DIRECT HEATING, IS EITHER A PROCESS EMISSION SOURCE OR AN INCINERATOR.

1. NAME OF PLANT OWNER: Omega Partners Hartford LLC	2. NAME OF CORPORATE DIVISION OR PLANT (IF DIFFERENT FROM OWNER):
3. STREET ADDRESS OF EMISSION SOURCE: 1402 South Delmar	4. CITY OF EMISSION SOURCE: Hartford

GENERAL INFORMATION		
5. FLOW DIAGRAM DESIGNATION(S) OF EMISSION SOURCE: Boilers 1 and 2		
6. MANUFACTURER: American Heating Company	7. MODEL NUMBER: AHE-2000	8. SERIAL NUMBER:
9. AVERAGE OPERATING TIME OF EMISSION SOURCE: ______ HRS/DAY ______ DAYS/WK ______ WKS/YR	10. MAXIMUM OPERATING TIME OF EMISSION SOURCE: 24 HRS/DAY 7 DAYS/WK 52 WKS/YR	
11. PERCENT OF ANNUAL HEAT INPUT: DEC-FEB 25 % MAR-MAY 25 % JUN-AUG 25 % SEPT-NOV 25 %		

INSTRUCTIONS
1. COMPLETE THE ABOVE IDENTIFICATION AND GENERAL INFORMATION SECTION. 2. COMPLETE THE APPROPRIATE FUEL SECTION OR SECTIONS. IF MORE THAN ONE FUEL IS FIRED OR IF THE CAPABILITY EXISTS TO FIRE MORE THAN ONE FUEL, THE ACTUAL USAGE OF FUELS AND THE RELATIONSHIP BETWEEN FUELS, SIMULTANEOUS FIRING, ALTERNATE FIRING, RESERVE FUEL, ETC., MUST BE MADE CLEAR. 3. EMISSION AND EXHAUST POINT INFORMATION MUST BE COMPLETED, UNLESS EMISSIONS ARE EXHAUSTED THROUGH AIR POLLUTION CONTROL EQUIPMENT. 4. FIRING RATES AND CERTAIN OTHER ITEMS REQUIRE BOTH AVERAGE AND MAXIMUM VALUES 5. FOR GENERAL INFORMATION REFER TO "GENERAL INSTRUCTIONS FOR PERMIT APPLICATIONS," APC-201.

DEFINITIONS
AVERAGE - THE VALUE THAT SUMMARIZES OR REPRESENTS THE GENERAL CONDITION OF THE EMISSION SOURCE, OR THE GENERAL STATE OF HEAT PRODUCTION OF THE EMISSION SOURCE. SPECIFICALLY: AVERAGE OPERATING TIME - ACTUAL TOTAL HOURS OF OPERATION FOR THE PRECEDING TWELVE MONTH PERIOD. AVERAGE RATE - ACTUAL TOTAL QUANTITY OF "MATERIAL" FOR THE PRECEDING TWELVE MONTH PERIOD, DIVIDED BY THE AVERAGE OPERATING TIME. AVERAGE OPERATION - OPERATION TYPICAL OF THE PRECEDING TWELVE MONTH PERIOD, AS REPRESENTED BY AVERAGE OPERATING TIME AND AVERAGE RATES. MAXIMUM - THE GREATEST VALUE ATTAINABLE OR ATTAINED FOR THE EMISSION SOURCE, OR THE PERIOD OF GREATEST OR UTMOST HEAT PRODUCTION OF THE EMISSION SOURCE. SPECIFICALLY: MAXIMUM OPERATING TIME - GREATEST EXPECTED TOTAL HOURS OF OPERATIONS FOR ANY TWELVE MONTH PERIOD. MAXIMUM RATE - GREATEST QUANTITY OF "MATERIAL" EXPECTED PER ANY ONE HOUR OF OPERATION. MAXIMUM OPERATION - GREATEST EXPECTED OPERATION, AS REPRESENTED BY MAXIMUM OPERATING TIME AND MAXIMUM RATES.

GAS FIRING

*11. ORIGIN OF GAS: ☐ DISTILLATE FUEL OIL GASIFICATION ☐ OTHER LIQUID FUEL GASIFICATION ☐ SOLID FUEL GASIFICATION ☐ BYPRODUCT SPECIFY SOURCE ☐ PIPELINE			
12. ARE YOU ON AN INTERRUPTABLE GAS SUPPLY: ☐ YES ☒ NO IF "YES", SPECIFY ALTERNATE FUEL:			
13. ANNUAL CONSUMPTION: SCF	*14. HEAT CONTENT: BTU/SCF	*15. SULFUR CONTENT: % BY WT.	
16. AVERAGE FIRING RATE: BTU/HR	17. MAXIMUM FIRING RATE: 22,700,000 BTU/HR		

* IF THE GAS FIRED IS NATURAL GAS, THESE ITEMS NEED NOT BE COMPLETED.

OIL FIRING

18. TYPE OF OIL: GRADE NUMBER: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 OTHER: SPECIFY	
19. ANNUAL CONSUMPTION: GALLONS	20. HEAT CONTENT: ☐ BTU/LB ☐ BTU/GAL
21. SULFUR CONTENT: % BY WT	22. ASH CONTENT: % BY WT
23. DIRECTION OF FIRING: ☐ HORIZONTAL ☐ TANGENTIAL ☐ OTHER: SPECIFY	
24. AVERAGE FIRING RATE: BTU/HR	25. MAXIMUM FIRING RATE: BTU/HR

SOLID FUEL FIRING

26. TYPE OF SOLID FUEL ☐ SUB-BITUMINOUS COAL ☐ BITUMINOUS COAL ☐ ANTHRACITE COAL ☐ OTHER: SPECIFY		
27. ANNUAL CONSUMPTION: TONS	28. HEAT CONTENT AS FIRED: BTU/LB	
29. MOISTURE CONTENT AS FIRED: % BY WT.	30. ASH CONTENT AS FIRED: % BY WT.	31. SULFUR CONTENT AS FIRED: % BY WT.
32. TYPE OF FIRING: ☐ CYCLONE ☐ PULVERIZED { ☐ WET BOTTOM OR ☐ DRY BOTTOM, ☐ HORIZONTALLY OPPOSED OR ☐ OTHER: SPECIFY ______		
☐ SPREADER STOKER: % REINJECTION ______ ☐ OTHER: SPECIFY ______		
33. AVERAGE FIRING RATE: BTU/HR	34. MAXIMUM FIRING RATE: BTU/HR	

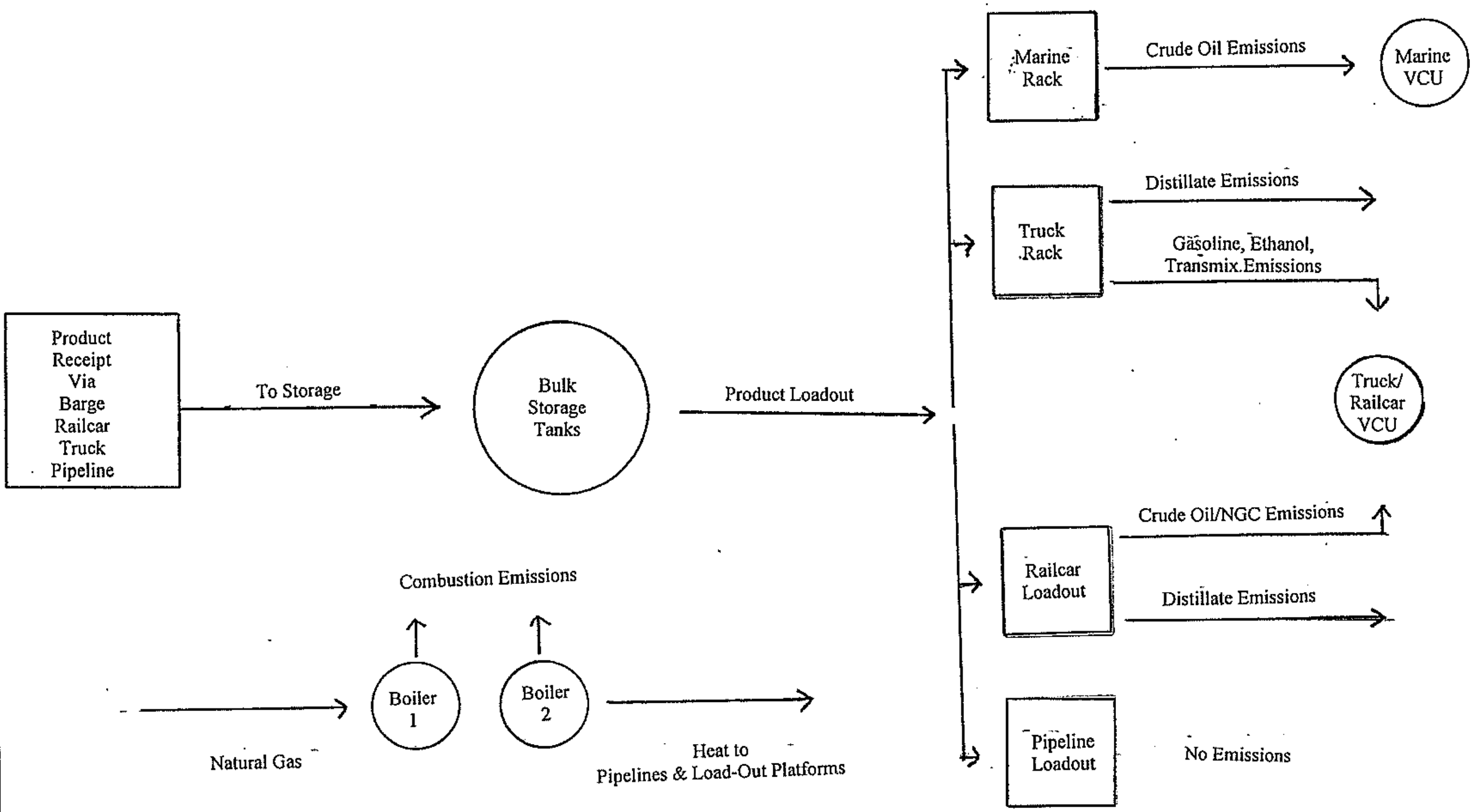
SUBMIT COPIES OF THOSE PORTIONS OF COAL OR OTHER SOLID FUEL CONTRACTS WHICH SET FORTH THE SPECIFICATIONS OF THE FUEL AND THE DURATION OF THE CONTRACT. IF THE ACTUAL FUEL FIRED IS A BLEND OF SOLID FUELS, SUBMIT APPROPRIATE PORTIONS OF ALL FUEL CONTRACTS AND SET FORTH THE MANNER IN WHICH THE FUELS ARE BLENDED AND ACTUALLY FRIED. REFERENCE THIS INFORMATION TO THIS FORM.

*EMISSION INFORMATION			
35. NUMBER OF IDENTICAL SOURCES (DESCRIBE AS REQUIRED): 2			
AVERAGE OPERATION			
CONTAMINANT	CONCENTRATION OR EMISSION RATE PER IDENTICAL SOURCE		METHOD USED TO DETERMINE CONCENTRATION OR EMISSION RATE
PARTICULATE MATTER	36a. GR/SCF	b. ☐ LB/10^6 BTU ☐ LB/HR	c.
CARBON MONOXIDE	37a. PPM (VOL)	b. ☐ LB/10^6 BTU ☐ LB/HR	c.
NITROGEN OXIDES	38a. PPM (VOL)	b. ☐ LB/10^6 BTU ☐ LB/HR	c.
ORGANIC MATERIAL	39a. PPM (VOL)	b. ☐ LB/10^6 BTU ☐ LB/HR	c.
SULFUR DIOXIDE	40a. PPM (VOL)	b. ☐ LB/10^6 BTU ☐ LB/HR	c.
MAXIMUM OPERATION			
CONTAMINANT	CONCENTRATION OR EMISSION RATE PER IDENTICAL SOURCE		METHOD USED TO DETERMINE CONCENTRATION OR EMISSION RATE
PARTICULATE MATTER	41a. GR/SCF	b. ☐ LB/10^6 BTU ☐ LB/HR	c.
CARBON MONOXIDE	42a. PPM (VOL)	b. ☐ LB/10^6 BTU ☐ LB/HR	c.
NITROGEN OXIDES	43a. PPM (VOL)	b. ☐ LB/10^6 BTU ☐ LB/HR	c.
ORGANIC MATERIAL	44a. PPM (VOL)	b. ☐ LB/10^6 BTU ☐ LB/HR	c.
SULFUR DIOXIDE	45a. PPM (VOL)	b. ☐ LB/10^6 BTU ☐ LB/HR	c.

* IF EMISSIONS ARE EXHAUSTED THROUGH AIR POLLUTION CONTROL EQUIPMENT, OR IF NATURAL GAS IS THE FUEL FIRED, ITEMS 36 THROUGH 47 NEED NOT BE COMPLETED.

**EXHAUST POINT INFORMATION	
46. FLOW DIAGRAM DESIGNATION(S) OF EXHAUST POINT: Boiler 1 and 2	
47. DESCRIPTION OF EXHAUST POINT (LOCATION IN RELATION TO BUILDINGS, DIRECTION, HOODING, ETC.):	
48. EXIT HEIGHT ABOVE GRADE: 9 ft 8 inches	50. EXIT DIAMETER:
49. GREATEST HEIGHT OF NEARBY BUILDINGS:	51. EXIT DISTANCE FROM NEAREST PLANT BOUNDARY: FT
AVERAGE OPERATION	MAXIMUM OPERATION
52. EXIT GAS TEMPERATURE: °F	54. EXIT GAS TEMPERATURE: °F
53. GAS FLOW RATE THROUGH EACH EXIT: ACFM	55. GAS FLOW RATE THROUGH EACH EXIT: ACFM

** IF EMISSIONS ARE EXHAUSTED THROUGH AIR POLLUTION CONTROL EQUIPMENT THIS SECTION SHOULD NOT BE COMPLETED.



Process Flow Diagram – Omega Partners Hartford

Emission Worksheet and Documents
Table of Contents

1) Emission Worksheet

2) Tanks Reports

3) Roof Landing Losses Worksheets

4) Natural Gas Fired Boiler Emissions Calculator Printout from Illinois EPA

Emission Worksheet
Omega Partners Hartford

1. Truck Rack Load-Out Operation

The existing air permit includes emission factors to calculate emissions from the truck rack. The change at the truck rack involves the reduction in the material throughput and emissions. Table 1 details the material throughputs for the truck rack and Table 2 details the resulting emissions.

Table 1
Truck Rack – Material Throughput Potentials

Material	Monthly Throughput Potentials (gallons/month)	Annual Throughput Potentials (gallons/year)
Distillates, Transmix, Ethanol, & Gasoline	2,520,000	30,240,000

The air permit lists emission factors to calculate VOM emissions and is included in the following table. The permit states emissions are based on standards emission factors (Table 5.2-5, AP-42, Fifth Edition, Volume 1, July 2008), a vendor (John Zink) guaranteed emissions for the vapor combustion unit (VCU) of 35 mg/l of gasoline loaded, and a control efficiency of 95% for the VCU. The following table lists the emission factors along with VOM emissions based on the maximum material throughputs listed in Table 1.

Table 2
Truck Rack – VOM Emission Potentials

Emission Type	Material	Emission Factor (lb/1,000 gallons)	VOM Emissions (ton/month)	VOM Emissions (ton/year)
Point Source	Transmix, Ethanol, & Gasoline	0.292	0.38	4.42
Fugitive	Transmix, Ethanol, & Gasoline	0.1085	0.14	1.64
Fugitive	Distillates (uncontrolled)	0.014	0.02	0.22
Total				**6.26**

2. Railcar Load-Out Operation

The proposed railcar load-out operation is to consist of a load-out station with up to 16 spots for loading. Products subject to loading into railcars include: crude oil, natural gas condensate (NGC), and distillates. The following table lists potential material throughputs.

Table 3
Railcar Load-Out Station – Material Throughput Potentials

Material	Monthly Throughput Potentials (gallons/month)	Annual Throughput Potentials (gallons/year)
Crude Oil, NGC, and Distillates	6,300,000	75,600,000

The attached correspondence from John Zink confirms the operating and performance parameters of the existing flare pertaining to loading of crude oil and NGC as described in the owner's manual. The parameters include an emission guarantee of 35 mg/l of hydrocarbons with a maximum vapor flow rate to the VCU of 856 SCFM (6,400 gal/min). A copy of the owner's manual is attached.

Emission Worksheet
Omega Partners Hartford

The existing air permit includes emission factors to calculate emissions from the truck rack. The permit states emissions are based on standards emission factors (Table 5.2-5, AP-42, Fifth Edition, Volume 1, July 2008), a vendor guaranteed emissions for the vapor combustion unit (VCU) of 35 mg/l of gasoline loaded, and a control efficiency of 95% for the VCU.

The emission determination process listed in AP-42 uses the same calculation procedures pertaining to tank trucks and rail tank cars. With no change in the operating and performance parameters of the existing flare pertaining to loading of crude oil and NGC, and identical calculation procedures pertaining to tank trucks and rail tank cars, the emission factors to calculate VOM emissions as presented in the existing air permit for the tuck rack are being used to calculate VOM emissions as from the loading of railcars.

The following table lists the emission factors along with VOM emissions based on the maximum material throughputs listed in Table 3.

Table 4
Railcar Load-Out Station – VOM Emission Potentials

Emission Type	Material	Emission Factor (lb/1,000 gallons)	VOM Emissions (ton/month)	VOM Emissions (ton/year)
Point Source	Crude Oil and NGC	0.292	0.92	11.04
Fugitive	Crude Oil and NGC	0.1085	0.34	4.10
Fugitive	Distillates (uncontrolled)	0.014	0.05	0.53
Total				**15.67**

3. Marine Rack Load-Out Operation

Calculations of the marine load-out operation are based on AP-42 emission equations for the marine loading of crude oil using equations 2 and 3 in Chapter 5.2. Note that no ballasting operations are to be conducted at the facility and no emission losses result. PTE is based on a throughput value of 113,400,000 gal/month (2,700,000 barrels/month) and 1,360,800,000 gal/year (32,400,000 barrels/year) of uncontrolled emissions.

Equation 2: $CL = CA + CG$

Where: CL = total loading losses (lb/1,000 gal of crude oil loaded)
CA = arrival emission factor (lb/1,000 gal of crude oil loaded)
CG = generated emission factor (lb/1,000 gal of crude oil loaded)

CA emission factor from AP-42 Table 5.2-3 for unclean barge = 0.86 lb/1,000 gal

Equation 3: $CG = 1.84\,(0.44P - 0.42)\,MG/T$

Where:
P = true vapor pressure (3.4 psi @ 70°F from AP-42 Table 7.1-2)
M = molecular weight of vapors (50 from AP-42 Table 7.1-2)
G = vapor growth factor (1.02)
T = temperature of vapors, °R (62.6°F + 460) = 522.6°R

$$CG = 1.84\,(0.44 \times 3.4 - 0.42)\,50 \times 1.02/522.6$$
$$= 1.84(1.076) \times 0.098$$
$$= 0.19 \text{ lb}/1{,}000 \text{ gal}$$

$$CL = (0.86 \text{ lb}/1{,}000 \text{ gal} + 0.19 \text{ lb}/1{,}000 \text{ gal}) \times 1{,}360{,}800 \times 10^3 \text{ gal/year} \times 1 \text{ ton}/2{,}000 \text{ lb}$$
$$= 714.4 \text{ tons/yr}$$

Emission Worksheet
Omega Partners Hartford

The marine loading rack is to be equipped with a vapor control unit. The vapor control unit is a vapor combustion unit (VCU). The VCU comes with a manufactures emission reduction guarantee of 99%. Documentation from the flare manufacture (John Zink) is attached.

VOC (ton/yr) = 714.4 tons/yr x (1-0.99)
= 7.2 tons/yr

The flare manufacture indicates a destruction efficiency of 99%. Fugitive emissions from the flare using a fugitive emission rate of 1.3% are being calculated as follows:

Fugitive Emissions (tons/yr) = uncontrolled emissions x fugitive emission rate
= 714.4 tons/yr x 0.013
= 9.3 tons/yr

VOM Emission Potential from Marine Load-Out Operation = 7.2 tons/yr + 9.3 tons/yr
= 16.5 tons/yr

4. Bulk Storage Tanks

VOC emissions from the bulk storage tanks are being calculated using EPA TANKS Program. Potential storage tank emissions are based on 24 tank turnovers per year. The following table summarizes the emission total from the Tank Reports. Tank Reports are attached.

Table 5
Potential to Emit from Bulk Storage Tanks (Working and Breathing Losses)

Tank ID	Product Storage for Emission Calculations	Throughput (gallons/yr)	VOM (tons/yr)
0-3-2	Gasoline (RVP 15)	2,221,632	1.20
20-4	Gasoline (RVP 15)	18,214,560	2.75
42-3	Gasoline (RVP 15)	38,388,672	3.60
42-5	Crude Oil	50,400,000	0.53
42-7	Crude Oil	50,400,000	0.48
120-1	Crude Oil	201,600,000	1.05
254-1	Crude Oil	255,838,536	2.47
254-2	Crude Oil	255,838,536	2.47
154-1	Crude Oil	154,766,304	2.00
154-2	Crude Oil	154,766,304	2.00
122-1	Crude Oil	123,379,200	1.86
218-1	Crude Oil	219,290,400	2.35
Total			**22.76**

In addition to breathing and working losses involving the storage tanks, Chapter 7.1.3.2.2 of AP-42 includes roof landing losses involving floating roof storage tanks. Roof landing losses are being estimated for the floating roof storage tanks listed in Table 5. Emission Worksheets are attached and the following table summarizes the emissions.

Table 5A Summary of VOM Emissions from Roof Landing Events		
Tank ID	**Estimated Number of Roof Landing Events/Year**	**VOM (tons/yr)**
0-3-2	2	0.96
20-4	2	0.46
42-3	2	1.08
42-5	1	0.94
42-7	1	0.86
120-1	1	2.39
254-1	1	4.14
254-2	1	4.14
154-1	1	2.56
154-2	1	2.56
122-1	1	2.05
218-1	1	4.14
Total		**26.28**

5. Support Tanks

VOC emissions from the support tanks are being calculated using EPA TANKS Program. The following table summarizes the emission total from the Tank Reports. Tank Reports are attached.

Table 6 Potential to Emit from Support Tanks			
Tank ID	**Product Storage**	**Throughput (gallons/yr)**	**VOM (tons/yr)**
AA-1-1	Fuel Additive	6,317	0.02
HA-1-1	Fuel Additive	5,640	0.01
AA-8-1	Fuel Additive	54,145	0.01
AA-8-2	Fuel Additive	67,682	0.03
T-2	Transmix (Slop)	36,273	0.51
WB-10-1	Petroleum Contact Water (PCW)	13,536	0.03
WB-10-2	Petroleum Contact Water (PCW)	42,865	0.14
Total			**0.75**

Emission Worksheet
Omega Partners Hartford

6. Fugitive Emissions from Equipment Components

Fugitive VOC emissions from equipment components are being estimated following API Publication # 4588 (Development of Fugitive Emission Factors and Emission Profiles for Petroleum Marketing). Fugitive emissions for the following equipment components are being provided: loading arms, meters, pump seals, and valves.

Table 7
Fugitive VOC Emissions

Fugitive VOC Emissions	= Number of Components x Emission Factor x Operating Hours
Fugitive VOC Emissions (Loading Arms)	= 18 x 0.00087 lb/hr x 8,760 hr/yr x ton/2,000 lb = 0.06 ton/yr
Fugitive VOC Emissions (Meters)	= 32 x 0.00025 lb/hr x 8,760 hr/yr x ton/2,000 lb = 0.04 ton/yr
Fugitive VOC Emissions (Pump Seals)	= 32 x 0.00093 lb/hr x 8,760 hr/yr x ton/2,000 lb = 0.12 ton/yr
Fugitive VOC Emissions (Valves)	= 160 x 0.00015 lb/hr x 8,760 hr/yr x ton/2,000 = 0.10 ton/yr
Total VOC Emissions	**= 0.32 tons/yr**

Note: The number of equipment components is being estimated.

7. Potential to Emit – Fuel Combustion Units

Emissions from the operation of two natural gas-fired boilers are being calculated. Heat input information from attached manufacture (American Heating Company) documentation.

Table 8
Fuel Combustion Units

Combustion Unit Type	Maximum Heat Input (MMBtu/hr)	Terminal Designation	Fuel Input
Boiler	22.7	Boiler 1	Natural Gas
Boiler	22.7	Boiler 2	Natural Gas

The maximum fuel input (MMCF/yr) for the boilers are estimated as follows:

Potential Throughput (MMCF/yr) = Heat Input Capacity (MMBtu/hr) * 8,760 hrs/yr * 1 MMCF/1,000 MMBtu
= 22.7 MMBtu/hr * 8,760 hrs/yr * 1 MMCF/1,000 MMBtu
= 199 MMCF/yr

Using Illinois EPA calculator to calculate emissions (see attachment) and summarized in the following table:

Emission Worksheet
Omega Partners Hartford

Table 8A Summary of Potential to Emit from Boilers						
Combustion Unit	**VOM**	**CO**	**NOx**	**SO_2**	**PM**	**PM_{10}**
Boiler 1	0.55	8.36	9.95	0.06	0.76	0.76
Boiler 1	0.55	8.36	9.95	0.06	0.76	0.76
Total (tons/yr)	**1.10**	**16.72**	**19.90**	**0.12**	**1.52**	**1.52**

8. CO and NOx Emissions from VCUs

Emissions of combustion related pollutants from the VCUs are being calculated using emission factors provided by the flare manufacture (John Zink)

Table 9 CO and NOx Emissions from Load-Out Operations					
Loading Platform	**Throughput (gal/yr)**	**CO Factor (lb/1,000 gal)**	**CO Emissions (tons/yr)**	**NOx Factor (lb/1,000 gal)**	**NOx Emissions (tons/yr)**
Truck Rack	30,240,000	0.0835	1.27	0.0334	0.51
Railcar Rack	75,600,000	0.0835	3.16	0.0334	1.26
Marine Rack	1,360,800,000	0.0835	56.81	0.0334	22.72
Total			**61.24**		**24.49**

9. Potential to Emit Criteria Pollutants – Source-Wide

The following table summarizes the source-wide PTE.

Table 10 Summary of Source-Wide Potential to Emit from Emission Units						
Emission Unit	**VOM**	**CO**	**NOx**	**SO_2**	**PM**	**PM_{10}**
Truck Rack Load-Out	6.26	1.27	0.51	--	--	--
Railcar Load-Out	15.67	3.16	1.26			
Marine Rack Load-Out	16.50	56.81	22.72	--	--	--
Bulk Storage Tanks	49.04	--	--	--	--	--
Support Tanks	0.75	--	--	--	--	--
Equipment Components	0.32	--	--	--	--	--
Boilers	1.10	16.72	19.90	0.12	1.52	1.52
Total (tons/yr)	**89.64**	**77.96**	**44.39**	**0.12**	**1.52**	**1.52**

10. Potential to Emit – Hazardous Air Pollutants (HAP)

Using HAP composition of crude oil from EPA Document (EPA-453/R-94-079a), National Emission Standards for Hazardous Air Pollutants for Source Categories: Oil and Natural Gas Production and Natural Gas Transmission and Storage – Background Information for Proposed Standards, Table 2-1 (Average HAP Composition of Extracted Streams and Recovered Products).

Using EPA document # EPA-453/R-94-002a, January 1994, Gasoline Distribution Industry (Stage 1) - Background Information for Proposed Standards, Appendix C, Calculation of HAP Vapor Profiles for Gasoline. Using weight by percentage for "normal gasoline" as listed in Table C-5.

The following table details the HAP composition of crude oil and gasoline along with the potential to emit estimates.

Table 11
Potential to Emit HAP from Crude Oil and Gasoline

HAP	Crude Oil (Weight %)	PTE Crude Oil (tons/yr) (1)	Gasoline (Weight %)	PTE Gasoline (tons/yr)(2)	Emission Totals (tons/yr)
Benzene	0.25	0.19	0.90	0.15	0.34
Toluene	0.48	0.36	1.30	0.21	0.57
Ethylbenzene	0.12	0.09	0.10	0.02	0.11
Mixed Xylenes	0.55	0.41	0.50	0.08	0.49
n-Hexane	1.50	1.12	1.60	0.26	1.37
2,2-4-Trimethylpentane	NA	--	0.8	0.13	0.13
Total	**2.90**	**2.17**	**5.20**	**0.85**	**3.02**

(1) – PTE calculated by multiplying VOC emissions from crude oil (73.34 tons/yr) by the weight percent of HAP.
(2) – PTE calculated by multiplying VOC emissions from gasoline (16.3 tons/yr) by the weight percent of HAP.

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	OP Hartford Tank 0-3-2
City:	
State:	
Company:	
Type of Tank:	Internal Floating Roof Tank
Description:	

Tank Dimensions

Diameter (ft):	25.00
Volume (gallons):	92,568.00
Turnovers:	24.00
Self Supp. Roof? (y/n):	Y
No. of Columns:	0.00
Eff. Col. Diam. (ft):	0.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Vapor-mounted
Secondary Seal	Rim-mounted

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Gask.	1
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1
Roof Leg or Hanger Well/Adjustable	5
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: St. Louis, Missouri (Avg Atmospheric Pressure = 14.46 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

OP Hartford Tank 0-3-2 - Internal Floating Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp	Vapor Pressure (psia)			Vapor Mol.	Liquid Mass	Vapor Mass	Mol.	Basis for Vapor Pressure
		Avg.	Min.	Max.	(deg F)	Avg.	Min.	Max.	Weight.	Fract.	Fract.	Weight	Calculations
Gasoline (RVP 15.0)	All	57.84	52.89	62.80	56.05	7.8317	N/A	N/A	60.0000			92.00	Option 4: RVP=15, ASTM Slope=3

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

OP Hartford Tank 0-3-2 - Internal Floating Roof Tank

Annual Emission Calcaulations	
Rim Seal Losses (lb):	635.7287
Seal Factor A (lb-mole/ft-yr):	2.2000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.0030
Value of Vapor Pressure Function:	0.1926
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	7.8317
Tank Diameter (ft):	25.0000
Vapor Molecular Weight (lb/lb-mole):	60.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	16.7600
Number of Columns:	0.0000
Effective Column Diameter (ft):	0.0000
Annual Net Throughput (gal/yr.):	2,221,632.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	5.6000
Tank Diameter (ft):	25.0000
Deck Fitting Losses (lb):	1,746.5201
Value of Vapor Pressure Function:	0.1926
Vapor Molecular Weight (lb/lb-mole):	60.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	151.1000
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	25.0000
Vapor Molecular Weight (lb/lb-mole):	60.0000
Product Factor:	1.0000
Total Losses (lb):	2,399.0088

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	18.4939
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	32.3644
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Gask.	1	33.00	0.00	0.00	381.4372
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	647.2874
Roof Leg or Hanger Well/Adjustable	5	7.90	0.00	0.00	456.5688
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1	12.00	0.00	0.00	138.7044
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	71.6640

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

OP Hartford Tank 0-3-2 - Internal Floating Roof Tank

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Gasoline (RVP 15.0)	635.73	16.76	1,746.52	0.00	2,399.01

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	OP Hartford Tank 20-4
City:	
State:	
Company:	
Type of Tank:	Internal Floating Roof Tank
Description:	

Tank Dimensions

Diameter (ft):	55.00
Volume (gallons):	758,940.00
Turnovers:	24.00
Self Supp. Roof? (y/n):	Y
No. of Columns:	0.00
Eff. Col. Diam. (ft):	0.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal	None

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Gask.	1
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1
Roof Leg or Hanger Well/Adjustable	5
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: St. Louis, Missouri (Avg Atmospheric Pressure = 14.46 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

OP Hartford Tank 20-4 - Internal Floating Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 15.0)	All	57.84	52.89	62.80	56.05	7.8317	N/A	N/A	60.0000			92.00	Option 4: RVP=15, ASTM Slope=3

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

OP Hartford Tank 20-4 - Internal Floating Roof Tank

Annual Emission Calcaulations	
Rim Seal Losses (lb):	3,687.2264
Seal Factor A (lb-mole/ft-yr):	5.8000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000
Value of Vapor Pressure Function:	0.1926
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	7.8317
Tank Diameter (ft):	55.0000
Vapor Molecular Weight (lb/lb-mole):	60.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	62.4594
Number of Columns:	0.0000
Effective Column Diameter (ft):	0.0000
Annual Net Throughput (gal/yr.):	18,214,560.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	5.6000
Tank Diameter (ft):	55.0000
Deck Fitting Losses (lb):	1,746.5201
Value of Vapor Pressure Function:	0.1926
Vapor Molecular Weight (lb/lb-mole):	60.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	151.1000
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	55.0000
Vapor Molecular Weight (lb/lb-mole):	60.0000
Product Factor:	1.0000
Total Losses (lb):	5,496.2059

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	18.4939
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	32.3644
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Gask.	1	33.00	0.00	0.00	381.4372
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	647.2874
Roof Leg or Hanger Well/Adjustable	5	7.90	0.00	0.00	456.5688
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1	12.00	0.00	0.00	138.7044
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	71.6640

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

OP Hartford Tank 20-4 - Internal Floating Roof Tank

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Gasoline (RVP 15.0)	3,687.23	62.46	1,746.52	0.00	5,496.21

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification	
User Identification:	OP Hartford Tank 42-3
City:	
State:	
Company:	
Type of Tank:	Internal Floating Roof Tank
Description:	
Tank Dimensions	
Diameter (ft):	80.00
Volume (gallons):	1,599,528.00
Turnovers:	24.00
Self Supp. Roof? (y/n):	Y
No. of Columns:	0.00
Eff. Col. Diam. (ft):	0.00
Paint Characteristics	
Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good
Rim-Seal System	
Primary Seal:	Mechanical Shoe
Secondary Seal	None
Deck Characteristics	
Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Gask.	1
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1
Roof Leg or Hanger Well/Adjustable	5
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: St. Louis, Missouri (Avg Atmospheric Pressure = 14.46 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

OP Hartford Tank 42-3 - Internal Floating Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 15.0)	All	57.84	52.89	62.80	56.05	7.8317	N/A	N/A	60.0000			92.00	Option 4: RVP=15, ASTM Slope=3

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

OP Hartford Tank 42-3 - Internal Floating Roof Tank

Annual Emission Calcaulations	
Rim Seal Losses (lb):	5,363.2384
Seal Factor A (lb-mole/ft-yr):	5.8000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000
Value of Vapor Pressure Function:	0.1926
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	7.8317
Tank Diameter (ft):	80.0000
Vapor Molecular Weight (lb/lb-mole):	60.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	90.5013
Number of Columns:	0.0000
Effective Column Diameter (ft):	0.0000
Annual Net Throughput (gal/yr.):	38,388,672.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	5.6000
Tank Diameter (ft):	80.0000
Deck Fitting Losses (lb):	1,746.5201
Value of Vapor Pressure Function:	0.1926
Vapor Molecular Weight (lb/lb-mole):	60.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	151.1000
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	80.0000
Vapor Molecular Weight (lb/lb-mole):	60.0000
Product Factor:	1.0000
Total Losses (lb):	7,200.2598

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	18.4939
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	32.3644
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Gask.	1	33.00	0.00	0.00	381.4372
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	647.2874
Roof Leg or Hanger Well/Adjustable	5	7.90	0.00	0.00	456.5688
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1	12.00	0.00	0.00	138.7044
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	71.6640

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

OP Hartford Tank 42-3 - Internal Floating Roof Tank

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Gasoline (RVP 15.0)	5,363.24	90.50	1,746.52	0.00	7,200.26

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	OP Hartford Tank 42-5
City:	
State:	
Company:	
Type of Tank:	Internal Floating Roof Tank
Description:	

Tank Dimensions

Diameter (ft):	80.00
Volume (gallons):	1,609,272.00
Turnovers:	31.32
Self Supp. Roof? (y/n):	Y
No. of Columns:	0.00
Eff. Col. Diam. (ft):	0.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal	Shoe-mounted

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Gask.	1
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1
Roof Leg or Hanger Well/Adjustable	24
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: St. Louis, Missouri (Avg Atmospheric Pressure = 14.46 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

OP Hartford Tank 42-5 - Internal Floating Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Crude oil (RVP 5)	All	57.84	52.89	62.80	56.05	2.7578	N/A	N/A	50.0000			207.00	Option 4: RVP=5

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

OP Hartford Tank 42-5 - Internal Floating Roof Tank

Annual Emission Calcaulations	
Rim Seal Losses (lb):	135.3415
Seal Factor A (lb-mole/ft-yr):	1.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000
Value of Vapor Pressure Function:	0.0529
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.7578
Tank Diameter (ft):	80.0000
Vapor Molecular Weight (lb/lb-mole):	50.0000
Product Factor:	0.4000
Withdrawal Losses (lb):	602.5770
Number of Columns:	0.0000
Effective Column Diameter (ft):	0.0000
Annual Net Throughput (gal/yr.):	50,400,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0060
Average Organic Liquid Density (lb/gal):	7.1000
Tank Diameter (ft):	80.0000
Deck Fitting Losses (lb):	318.4754
Value of Vapor Pressure Function:	0.0529
Vapor Molecular Weight (lb/lb-mole):	50.0000
Product Factor:	0.4000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	301.2000
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	80.0000
Vapor Molecular Weight (lb/lb-mole):	50.0000
Product Factor:	0.4000
Total Losses (lb):	1,056.3938

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	1.6918
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	2.9606
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Gask.	1	33.00	0.00	0.00	34.8927
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	59.2119
Roof Leg or Hanger Well/Adjustable	24	7.90	0.00	0.00	200.4745
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1	12.00	0.00	0.00	12.6883
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	6.5556

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

OP Hartford Tank 42-5 - Internal Floating Roof Tank

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Crude oil (RVP 5)	135.34	602.58	318.48	0.00	1,056.39

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	OP Hart ford Tank 42-7
City:	
State:	
Company:	
Type of Tank:	Internal Floating Roof Tank
Description:	

Tank Dimensions

Diameter (ft):		80.00
Volume (gallons):		1,619,310.00
Turnovers:		31.12
Self Supp. Roof? (y/n):	Y	
No. of Columns:		0.00
Eff. Col. Diam. (ft):		0.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal	Shoe-mounted

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Roof Leg or Hanger Well/Adjustable	24
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: St. Louis, Missouri (Avg Atmospheric Pressure = 14.46 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

OP Hart ford Tank 42-7 - Internal Floating Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Crude oil (RVP 5)	All	57.84	52.89	62.80	56.05	2.7578	N/A	N/A	50.0000			207.00	Option 4: RVP=5

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

OP Hart ford Tank 42-7 - Internal Floating Roof Tank

Annual Emission Calcaulations	
Rim Seal Losses (lb):	135.3415
Seal Factor A (lb-mole/ft-yr):	1.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000
Value of Vapor Pressure Function:	0.0529
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.7578
Tank Diameter (ft):	80.0000
Vapor Molecular Weight (lb/lb-mole):	50.0000
Product Factor:	0.4000
Withdrawal Losses (lb):	602.5770
Number of Columns:	0.0000
Effective Column Diameter (ft):	0.0000
Annual Net Throughput (gal/yr.):	50,400,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0060
Average Organic Liquid Density (lb/gal):	7.1000
Tank Diameter (ft):	80.0000
Deck Fitting Losses (lb):	224.3708
Value of Vapor Pressure Function:	0.0529
Vapor Molecular Weight (lb/lb-mole):	50.0000
Product Factor:	0.4000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	212.2000
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	80.0000
Vapor Molecular Weight (lb/lb-mole):	50.0000
Product Factor:	0.4000
Total Losses (lb):	962.2892

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	1.6918
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	2.9606
Roof Leg or Hanger Well/Adjustable	24	7.90	0.00	0.00	200.4745
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1	12.00	0.00	0.00	12.6883
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	6.5556

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

OP Hart ford Tank 42-7 - Internal Floating Roof Tank

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Crude oil (RVP 5)	135.34	602.58	224.37	0.00	962.29

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification	
User Identification:	OP Hartford Tank 120-1
City:	
State:	
Company:	
Type of Tank:	Internal Floating Roof Tank
Description:	
Tank Dimensions	
Diameter (ft):	134.00
Volume (gallons):	4,670,317.00
Turnovers:	43.17
Self Supp. Roof? (y/n):	Y
No. of Columns:	0.00
Eff. Col. Diam. (ft):	0.00
Paint Characteristics	
Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good
Rim-Seal System	
Primary Seal:	Mechanical Shoe
Secondary Seal	Shoe-mounted
Deck Characteristics	
Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Roof Leg or Hanger Well/Adjustable	49
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: St. Louis, Missouri (Avg Atmospheric Pressure = 14.46 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

OP Hartford Tank 120-1 - Internal Floating Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Crude oil (RVP 5)	All	57.84	52.89	62.80	56.05	2.7578	N/A	N/A	50.0000			207.00	Option 4: RVP=5

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

OP Hartford Tank 120-1 - Internal Floating Roof Tank

Annual Emission Calcaulations	
Rim Seal Losses (lb):	226.6969
Seal Factor A (lb-mole/ft-yr):	1.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000
Value of Vapor Pressure Function:	0.0529
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.7578
Tank Diameter (ft):	134.0000
Vapor Molecular Weight (lb/lb-mole):	50.0000
Product Factor:	0.4000
Withdrawal Losses (lb):	1,438.9899
Number of Columns:	0.0000
Effective Column Diameter (ft):	0.0000
Annual Net Throughput (gal/yr.):	201,600,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0050
Average Organic Liquid Density (lb/gal):	7.1000
Tank Diameter (ft):	134.0000
Deck Fitting Losses (lb):	433.1984
Value of Vapor Pressure Function:	0.0529
Vapor Molecular Weight (lb/lb-mole):	50.0000
Product Factor:	0.4000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	409.7000
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	134.0000
Vapor Molecular Weight (lb/lb-mole):	50.0000
Product Factor:	0.4000
Total Losses (lb):	2,098.8852

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	1.6918
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	2.9606
Roof Leg or Hanger Well/Adjustable	49	7.90	0.00	0.00	409.3022
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1	12.00	0.00	0.00	12.6883
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	6.5556

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

OP Hartford Tank 120-1 - Internal Floating Roof Tank

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Crude oil (RVP 5)	226.70	1,438.99	433.20	0.00	2,098.89

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	OP Hartford Tank 254 (1 and 2)
City:	
State:	
Company:	
Type of Tank:	External Floating Roof Tank
Description:	

Tank Dimensions

Diameter (ft):	180.00
Volume (gallons):	10,659,939.00
Turnovers:	24.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good

Roof Characteristics

Type:	Pontoon
Fitting Category	Detail

Tank Construction and Rim-Seal System

Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Shoe-mounted

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	4
Unslotted Guide-Pole Well/Gasketed Sliding Cover	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	33
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	92
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: St. Louis, Missouri (Avg Atmospheric Pressure = 14.46 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

OP Hartford Tank 254 (1 and 2) - External Floating Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Crude oil (RVP 5)	All	57.84	52.89	62.80	56.05	2.7578	N/A	N/A	50.0000			207.00	Option 4: RVP=5

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

OP Hartford Tank 254 (1 and 2) - External Floating Roof Tank

Annual Emission Calcaulations	
Rim Seal Losses (lb):	2,454.6157
Seal Factor A (lb-mole/ft-yr):	1.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000
Average Wind Speed (mph):	9.6583
Seal-related Wind Speed Exponent:	1.6000
Value of Vapor Pressure Function:	0.0529
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.7578
Tank Diameter (ft):	180.0000
Vapor Molecular Weight (lb/lb-mole):	50.0000
Product Factor:	0.4000
Withdrawal Losses (lb):	1,359.4569
Annual Net Throughput (gal/yr.):	255,838,536.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0060
Average Organic Liquid Density (lb/gal):	7.1000
Tank Diameter (ft):	180.0000
Roof Fitting Losses (lb):	1,131.1040
Value of Vapor Pressure Function:	0.0529
Vapor Molecular Weight (lb/lb-mole):	50.0000
Product Factor:	0.4000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	1,069.7485
Average Wind Speed (mph):	9.6583
Total Losses (lb):	4,945.1766

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	1.6918
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	2.9606
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	4	6.20	1.20	0.94	56.8182
Unslotted Guide-Pole Well/Gasketed Sliding Cover	1	25.00	13.00	2.20	947.2326
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	0.6320
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	33	1.30	0.08	0.65	55.0283
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	92	0.53	0.11	0.13	65.2750
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	1.4656

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

OP Hartford Tank 254 (1 and 2) - External Floating Roof Tank

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Crude oil (RVP 5)	2,454.62	1,359.46	1,131.10	0.00	4,945.18

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	OP Hartford Tank 154 (1 and 2)
City:	
State:	
Company:	
Type of Tank:	External Floating Roof Tank
Description:	

Tank Dimensions

Diameter (ft):	140.00
Volume (gallons):	6,448,596.00
Turnovers:	24.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good

Roof Characteristics

Type:	Pontoon
Fitting Category	Detail

Tank Construction and Rim-Seal System

Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Shoe-mounted

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	2
Unslotted Guide-Pole Well/Gasketed Sliding Cover	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	21
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: St. Louis, Missouri (Avg Atmospheric Pressure = 14.46 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

OP Hartford Tank 154 (1 and 2) - External Floating Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Crude oil (RVP 5)	All	57.84	52.89	62.80	56.05	2.7578	N/A	N/A	50.0000			207.00	Option 4: RVP=5

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

OP Hartford Tank 154 (1 and 2) - External Floating Roof Tank

Annual Emission Calcaulations	
Rim Seal Losses (lb):	1,909.1455
Seal Factor A (lb-mole/ft-yr):	1.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000
Average Wind Speed (mph):	9.6583
Seal-related Wind Speed Exponent:	1.6000
Value of Vapor Pressure Function:	0.0529
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.7578
Tank Diameter (ft):	140.0000
Vapor Molecular Weight (lb/lb-mole):	50.0000
Product Factor:	0.4000
Withdrawal Losses (lb):	1,057.3539
Annual Net Throughput (gal/yr.):	154,766,304.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0060
Average Organic Liquid Density (lb/gal):	7.1000
Tank Diameter (ft):	140.0000
Roof Fitting Losses (lb):	1,017.4097
Value of Vapor Pressure Function:	0.0529
Vapor Molecular Weight (lb/lb-mole):	50.0000
Product Factor:	0.4000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	962.2213
Average Wind Speed (mph):	9.6583
Total Losses (lb):	3,983.9091

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	1.6918
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	2.9606
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	2	6.20	1.20	0.94	28.4091
Unslotted Guide-Pole Well/Gasketed Sliding Cover	1	25.00	13.00	2.20	947.2326
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	0.6320
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	21	1.30	0.08	0.65	35.0180
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	1.4656

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

OP Hartford Tank 154 (1 and 2) - External Floating Roof Tank

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Crude oil (RVP 5)	1,909.15	1,057.35	1,017.41	0.00	3,983.91

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	OP Hartford Tank 122-1
City:	
State:	
Company:	
Type of Tank:	External Floating Roof Tank
Description:	

Tank Dimensions

Diameter (ft):	125.00
Volume (gallons):	5,140,800.00
Turnovers:	24.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good

Roof Characteristics

Type:	Pontoon
Fitting Category	Detail

Tank Construction and Rim-Seal System

Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Shoe-mounted

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	2
Unslotted Guide-Pole Well/Gasketed Sliding Cover	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	20
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	28
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: St. Louis, Missouri (Avg Atmospheric Pressure = 14.46 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

OP Hartford Tank 122-1 - External Floating Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Crude oil (RVP 5)	All	57.84	52.89	62.80	56.05	2.7578	N/A	N/A	50.0000			207.00	Option 4: RVP=5

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

OP Hartford Tank 122-1 - External Floating Roof Tank

Annual Emission Calcaulations	
Rim Seal Losses (lb):	1,704.5942
Seal Factor A (lb-mole/ft-yr):	1.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000
Average Wind Speed (mph):	9.6583
Seal-related Wind Speed Exponent:	1.6000
Value of Vapor Pressure Function:	0.0529
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.7578
Tank Diameter (ft):	125.0000
Vapor Molecular Weight (lb/lb-mole):	50.0000
Product Factor:	0.4000
Withdrawal Losses (lb):	944.0694
Annual Net Throughput (gal/yr.):	123,379,200.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0060
Average Organic Liquid Density (lb/gal):	7.1000
Tank Diameter (ft):	125.0000
Roof Fitting Losses (lb):	1,062.4328
Value of Vapor Pressure Function:	0.0529
Vapor Molecular Weight (lb/lb-mole):	50.0000
Product Factor:	0.4000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	1,004.8022
Average Wind Speed (mph):	9.6583
Total Losses (lb):	3,711.0964

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	1.6918
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	2.9606
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	2	6.20	1.20	0.94	28.4091
Unslotted Guide-Pole Well/Gasketed Sliding Cover	1	25.00	13.00	2.20	947.2326
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	0.6320
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	20	1.30	0.08	0.65	33.3505
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	28	1.30	0.08	0.65	46.6907
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	1.4656

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

OP Hartford Tank 122-1 - External Floating Roof Tank

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Crude oil (RVP 5)	1,704.59	944.07	1,062.43	0.00	3,711.10

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification		
User Identification:	OP Hartford Tank AA-1-1	
City:		
State:		
Company:		
Type of Tank:	Vertical Fixed Roof Tank	
Description:		
Tank Dimensions		
Shell Height (ft):		6.00
Diameter (ft):		4.00
Liquid Height (ft) :		5.60
Avg. Liquid Height (ft):		4.00
Volume (gallons):		526.42
Turnovers:		12.00
Net Throughput(gal/yr):		6,317.02
Is Tank Heated (y/n):	N	
Paint Characteristics		
Shell Color/Shade:	White/White	
Shell Condition	Good	
Roof Color/Shade:	White/White	
Roof Condition:	Good	
Roof Characteristics		
Type:	Cone	
Height (ft)		1.00
Slope (ft/ft) (Cone Roof)		0.50
Breather Vent Settings		
Vacuum Settings (psig):		-0.03
Pressure Settings (psig)		0.03

Meterological Data used in Emissions Calculations: St. Louis, Missouri (Avg Atmospheric Pressure = 14.46 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

OP Hartford Tank AA-1-1 - Vertical Fixed Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Fuel Additive - Red Dye	All	57.84	52.89	62.80	56.05	0.9860	0.9860	0.9860	130.0000			130.00	
1,2-Diethylbenzene						0.0086	0.0069	0.0107	134.2200	0.1300	0.0011	134.22	Option 2: A=6.9878, B=1576.94, C=200.51
Ethylbenzene						0.1006	0.0844	0.1195	106.1700	0.0300	0.0031	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Unidentified Components						1.1718	1.1670	1.1707	130.0851	0.8400	0.9958	130.41	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

OP Hartford Tank AA-1-1 - Vertical Fixed Roof Tank

Annual Emission Calcaulations	
Standing Losses (lb):	7.4514
Vapor Space Volume (cu ft):	29.3215
Vapor Density (lb/cu ft):	0.0231
Vapor Space Expansion Factor:	0.0338
Vented Vapor Saturation Factor:	0.8913
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	29.3215
Tank Diameter (ft):	4.0000
Vapor Space Outage (ft):	2.3333
Tank Shell Height (ft):	6.0000
Average Liquid Height (ft):	4.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.5000
Shell Radius (ft):	2.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0231
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.9860
Daily Avg. Liquid Surface Temp. (deg. R):	517.5110
Daily Average Ambient Temp. (deg. F):	56.0333
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	515.7233
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,337.6368
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0338
Daily Vapor Temperature Range (deg. R):	19.8192
Daily Vapor Pressure Range (psia):	0.0000
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.9860
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.9860
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.9860
Daily Avg. Liquid Surface Temp. (deg R):	517.5110
Daily Min. Liquid Surface Temp. (deg R):	512.5562
Daily Max. Liquid Surface Temp. (deg R):	522.4658
Daily Ambient Temp. Range (deg. R):	18.6833
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.8913
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.9860
Vapor Space Outage (ft):	2.3333
Working Losses (lb):	19.2789
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.9860
Annual Net Throughput (gal/yr.):	6,317.0212
Annual Turnovers:	12.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	526.4184
Maximum Liquid Height (ft):	5.6000
Tank Diameter (ft):	4.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	26.7304

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

OP Hartford Tank AA-1-1 - Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Fuel Additive - Red Dye	19.28	7.45	26.73
1,2-Diethylbenzene	0.02	0.01	0.03
Ethylbenzene	0.06	0.02	0.08
Unidentified Components	19.20	7.42	26.62

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	OP Hartford Tank HA-1-1	
City:		
State:		
Company:		
Type of Tank:	Vertical Fixed Roof Tank	
Description:		

Tank Dimensions

Shell Height (ft):		11.00
Diameter (ft):		4.00
Liquid Height (ft) :		10.00
Avg. Liquid Height (ft):		8.00
Volume (gallons):		940.03
Turnovers:		6.00
Net Throughput(gal/yr):		5,640.20
Is Tank Heated (y/n):	N	

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone	
Height (ft)		1.00
Slope (ft/ft) (Cone Roof)		0.50

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: St. Louis, Missouri (Avg Atmospheric Pressure = 14.46 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

OP Hartford Tank HA-1-1 - Vertical Fixed Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Fuel Additive - Gasoline	All	57.64	52.69	62.80	58.05	0.2000	0.2000	0.2000	130.0000			130.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

OP Hartford Tank HA-1-1 - Vertical Fixed Roof Tank

Annual Emission Calcaulations	
Standing Losses (lb):	2.3568
Vapor Space Volume (cu ft):	41.8879
Vapor Density (lb/cu ft):	0.0047
Vapor Space Expansion Factor:	0.0341
Vented Vapor Saturation Factor:	0.9659
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	41.8879
Tank Diameter (ft):	4.0000
Vapor Space Outage (ft):	3.3333
Tank Shell Height (ft):	11.0000
Average Liquid Height (ft):	8.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.5000
Shell Radius (ft):	2.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0047
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2000
Daily Avg. Liquid Surface Temp. (deg. R):	517.5110
Daily Average Ambient Temp. (deg. F):	56.0333
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	515.7233
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,337.6368
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0341
Daily Vapor Temperature Range (deg. R):	19.8192
Daily Vapor Pressure Range (psia):	0.0000
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2000
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.2000
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.2000
Daily Avg. Liquid Surface Temp. (deg R):	517.5110
Daily Min. Liquid Surface Temp. (deg R):	512.5562
Daily Max. Liquid Surface Temp. (deg R):	522.4658
Daily Ambient Temp. Range (deg. R):	18.6833
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9659
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.2000
Vapor Space Outage (ft):	3.3333
Working Losses (lb):	3.4916
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2000
Annual Net Throughput (gal/yr.):	5,640.1975
Annual Turnovers:	6.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	940.0329
Maximum Liquid Height (ft):	10.0000
Tank Diameter (ft):	4.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	5.8483

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

OP Hartford Tank HA-1-1 - Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Fuel Additive - Gasoline	3.49	2.36	5.85

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification	
User Identification:	OP Hartford Tank AA-8-1
City:	
State:	
Company:	
Type of Tank:	Vertical Fixed Roof Tank
Description:	
Tank Dimensions	
Shell Height (ft):	13.25
Diameter (ft):	8.00
Liquid Height (ft) :	12.00
Avg. Liquid Height (ft):	12.00
Volume (gallons):	4,512.16
Turnovers:	12.00
Net Throughput(gal/yr):	54,145.90
Is Tank Heated (y/n):	N
Paint Characteristics	
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good
Roof Characteristics	
Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.25
Breather Vent Settings	
Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: St. Louis, Missouri (Avg Atmospheric Pressure = 14.46 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

OP Hartford Tank AA-8-1 - Vertical Fixed Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Fuel Additive - Lubricity	All	57.84	52.89	62.80	56.05	0.0265	0.0265	0.0265	130.0000			130.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

OP Hartford Tank AA-8-1 - Vertical Fixed Roof Tank

Annual Emission Calcaulations	
Standing Losses (lb):	0.6138
Vapor Space Volume (cu ft):	79.5870
Vapor Density (lb/cu ft):	0.0006
Vapor Space Expansion Factor:	0.0341
Vented Vapor Saturation Factor:	0.9978
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	79.5870
Tank Diameter (ft):	8.0000
Vapor Space Outage (ft):	1.5833
Tank Shell Height (ft):	13.2500
Average Liquid Height (ft):	12.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.2500
Shell Radius (ft):	4.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0006
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0265
Daily Avg. Liquid Surface Temp. (deg. R):	517.5110
Daily Average Ambient Temp. (deg. F):	56.0333
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	515.7233
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,337.6368
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0341
Daily Vapor Temperature Range (deg. R):	19.8192
Daily Vapor Pressure Range (psia):	0.0000
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0265
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0265
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0265
Daily Avg. Liquid Surface Temp. (deg R):	517.5110
Daily Min. Liquid Surface Temp. (deg R):	512.5562
Daily Max. Liquid Surface Temp. (deg R):	522.4658
Daily Ambient Temp. Range (deg. R):	18.6833
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9978
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0265
Vapor Space Outage (ft):	1.5833
Working Losses (lb):	4.4413
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0265
Annual Net Throughput (gal/yr.):	54,145.8959
Annual Turnovers:	12.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	4,512.1580
Maximum Liquid Height (ft):	12.0000
Tank Diameter (ft):	8.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	5.0551

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

OP Hartford Tank AA-8-1 - Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Fuel Additive - Lubricity	4.44	0.61	5.06

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification	
User Identification:	OP Hartford Tank AA-8-2
City:	
State:	
Company:	
Type of Tank:	Vertical Fixed Roof Tank
Description:	
Tank Dimensions	
Shell Height (ft):	16.00
Diameter (ft):	8.00
Liquid Height (ft) :	15.00
Avg. Liquid Height (ft):	15.00
Volume (gallons):	5,640.20
Turnovers:	12.00
Net Throughput(gal/yr):	67,682.37
Is Tank Heated (y/n):	N
Paint Characteristics	
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good
Roof Characteristics	
Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.25
Breather Vent Settings	
Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: St. Louis, Missouri (Avg Atmospheric Pressure = 14.46 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

OP Hartford Tank AA-8-2 - Vertical Fixed Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Fuel Additive - Gasoline	All	57.84	52.89	62.80	56.05	0.2000	0.2000	0.2000	130.0000			130.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

OP Hartford Tank AA-8-2 - Vertical Fixed Roof Tank

Annual Emission Calcaulations	
Standing Losses (lb):	3.8497
Vapor Space Volume (cu ft):	67.0206
Vapor Density (lb/cu ft):	0.0047
Vapor Space Expansion Factor:	0.0341
Vented Vapor Saturation Factor:	0.9861
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	67.0206
Tank Diameter (ft):	8.0000
Vapor Space Outage (ft):	1.3333
Tank Shell Height (ft):	16.0000
Average Liquid Height (ft):	15.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.2500
Shell Radius (ft):	4.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0047
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2000
Daily Avg. Liquid Surface Temp. (deg. R):	517.5110
Daily Average Ambient Temp. (deg. F):	56.0333
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	515.7233
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,337.6368
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0341
Daily Vapor Temperature Range (deg. R):	19.8192
Daily Vapor Pressure Range (psia):	0.0000
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2000
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.2000
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.2000
Daily Avg. Liquid Surface Temp. (deg R):	517.5110
Daily Min. Liquid Surface Temp. (deg R):	512.5562
Daily Max. Liquid Surface Temp. (deg R):	522.4658
Daily Ambient Temp. Range (deg. R):	18.6833
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9861
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.2000
Vapor Space Outage (ft):	1.3333
Working Losses (lb):	41.8986
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2000
Annual Net Throughput (gal/yr.):	67,682.3698
Annual Turnovers:	12.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	5,640.1975
Maximum Liquid Height (ft):	15.0000
Tank Diameter (ft):	8.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	45.7483

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

OP Hartford Tank AA-8-2 - Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Fuel Additive - Gasoline	41.90	3.85	45.75

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification		
User Identification:	OP Hartford Tank T-2	
City:		
State:		
Company:		
Type of Tank:	Vertical Fixed Roof Tank	
Description:		
Tank Dimensions		
Shell Height (ft):		31.00
Diameter (ft):		10.50
Liquid Height (ft) :		28.00
Avg. Liquid Height (ft):		26.00
Volume (gallons):		18,136.76
Turnovers:		2.00
Net Throughput(gal/yr):		36,273.52
Is Tank Heated (y/n):	N	
Paint Characteristics		
Shell Color/Shade:	White/White	
Shell Condition	Good	
Roof Color/Shade:	White/White	
Roof Condition:	Good	
Roof Characteristics		
Type:	Cone	
Height (ft)		1.00
Slope (ft/ft) (Cone Roof)		0.19
Breather Vent Settings		
Vacuum Settings (psig):		-0.03
Pressure Settings (psig)		0.03

Meterological Data used in Emissions Calculations: St. Louis, Missouri (Avg Atmospheric Pressure = 14.46 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

OP Hartford Tank T-2 - Vertical Fixed Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Transmix	All	57.84	52.89	62.80	56.05	2.5000	1.0000	2.0000	140.0000			140.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

OP Hartford Tank T-2 - Vertical Fixed Roof Tank

Annual Emission Calcaulations	
Standing Losses (lb):	727.7653
Vapor Space Volume (cu ft):	461.8141
Vapor Density (lb/cu ft):	0.0630
Vapor Space Expansion Factor:	0.1169
Vented Vapor Saturation Factor:	0.5859
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	461.8141
Tank Diameter (ft):	10.5000
Vapor Space Outage (ft):	5.3333
Tank Shell Height (ft):	31.0000
Average Liquid Height (ft):	26.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.1900
Shell Radius (ft):	5.2500
Vapor Density	
Vapor Density (lb/cu ft):	0.0630
Vapor Molecular Weight (lb/lb-mole):	140.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.5000
Daily Avg. Liquid Surface Temp. (deg. R):	517.5110
Daily Average Ambient Temp. (deg. F):	56.0333
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg R):	515.7233
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,337.6368
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1169
Daily Vapor Temperature Range (deg. R):	19.8192
Daily Vapor Pressure Range (psia):	1.0000
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.5000
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	1.0000
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	2.0000
Daily Avg. Liquid Surface Temp. (deg R):	517.5110
Daily Min. Liquid Surface Temp. (deg R):	512.5562
Daily Max. Liquid Surface Temp. (deg R):	522.4658
Daily Ambient Temp. Range (deg. R):	18.6833
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.5859
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	2.5000
Vapor Space Outage (ft):	5.3333
Working Losses (lb):	302.2793
Vapor Molecular Weight (lb/lb-mole):	140.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.5000
Annual Net Throughput (gal/yr.):	36,273.5201
Annual Turnovers:	2.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	18,136.7600
Maximum Liquid Height (ft):	28.0000
Tank Diameter (ft):	10.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	1,030.0446

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

OP Hartford Tank T-2 - Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Transmix	302.28	727.77	1,030.04

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification		
User Identification:	OP Hartford Tank WB-10-1	
City:		
State:		
Company:		
Type of Tank:	Vertical Fixed Roof Tank	
Description:		
Tank Dimensions		
Shell Height (ft):		6.50
Diameter (ft):		8.00
Liquid Height (ft) :		6.00
Avg. Liquid Height (ft):		6.00
Volume (gallons):		2,256.08
Turnovers:		6.00
Net Throughput(gal/yr):		13,536.47
Is Tank Heated (y/n):	N	
Paint Characteristics		
Shell Color/Shade:	White/White	
Shell Condition	Good	
Roof Color/Shade:	White/White	
Roof Condition:	Good	
Roof Characteristics		
Type:	Cone	
Height (ft)		0.50
Slope (ft/ft) (Cone Roof)		0.12
Breather Vent Settings		
Vacuum Settings (psig):		-0.03
Pressure Settings (psig)		0.03

Meterological Data used in Emissions Calculations: St. Louis, Missouri (Avg Atmospheric Pressure = 14.46 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

OP Hartford Tank WB-10-1 - Vertical Fixed Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
PCW	All	57.84	52.89	62.80	56.05	1.0000	0.5000	1.0000	140.0000			140.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

OP Hartford Tank WB-10-1 - Vertical Fixed Roof Tank

Annual Emission Calcaulations	
Standing Losses (lb):	21.1440
Vapor Space Volume (cu ft):	33.5103
Vapor Density (lb/cu ft):	0.0252
Vapor Space Expansion Factor:	0.0710
Vented Vapor Saturation Factor:	0.9659
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	33.5103
Tank Diameter (ft):	8.0000
Vapor Space Outage (ft):	0.6667
Tank Shell Height (ft):	6.5000
Average Liquid Height (ft):	6.0000
Roof Outage (ft):	0.1667
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.1667
Roof Height (ft):	0.5000
Roof Slope (ft/ft):	0.1200
Shell Radius (ft):	4.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0252
Vapor Molecular Weight (lb/lb-mole):	140.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.0000
Daily Avg. Liquid Surface Temp. (deg. R):	517.5110
Daily Average Ambient Temp. (deg. F):	56.0333
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	515.7233
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,337.6368
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0710
Daily Vapor Temperature Range (deg. R):	19.8192
Daily Vapor Pressure Range (psia):	0.5000
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.0000
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.5000
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	1.0000
Daily Avg. Liquid Surface Temp. (deg R):	517.5110
Daily Min. Liquid Surface Temp. (deg R):	512.5562
Daily Max. Liquid Surface Temp. (deg R):	522.4658
Daily Ambient Temp. Range (deg. R):	18.6833
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9659
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	1.0000
Vapor Space Outage (ft):	0.6667
Working Losses (lb):	45.1216
Vapor Molecular Weight (lb/lb-mole):	140.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.0000
Annual Net Throughput (gal/yr.):	13,536.4740
Annual Turnovers:	6.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	2,256.0790
Maximum Liquid Height (ft):	6.0000
Tank Diameter (ft):	8.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	66.2656

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

OP Hartford Tank WB-10-1 - Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
PCW	45.12	21.14	66.27

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification	
User Identification:	OP Harford Tank WB-10-2
City:	
State:	
Company:	
Type of Tank:	Vertical Fixed Roof Tank
Description:	
Tank Dimensions	
Shell Height (ft):	21.25
Diameter (ft):	8.00
Liquid Height (ft) :	19.00
Avg. Liquid Height (ft):	16.00
Volume (gallons):	7,144.25
Turnovers:	6.00
Net Throughput(gal/yr):	42,865.50
Is Tank Heated (y/n):	N
Paint Characteristics	
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good
Roof Characteristics	
Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.25
Breather Vent Settings	
Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: St. Louis, Missouri (Avg Atmospheric Pressure = 14.46 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

OP Hartford Tank WB-10-2 - Vertical Fixed Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
PCW	All	57.84	52.89	62.80	56.05	1.0000	0.5000	1.0000	140.0000			140.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

OP Hartford Tank WB-10-2 - Vertical Fixed Roof Tank

Annual Emission Calcaulations	
Standing Losses (lb):	141.4736
Vapor Space Volume (cu ft):	280.6489
Vapor Density (lb/cu ft):	0.0252
Vapor Space Expansion Factor:	0.0710
Vented Vapor Saturation Factor:	0.7717
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	280.6489
Tank Diameter (ft):	8.0000
Vapor Space Outage (ft):	5.5833
Tank Shell Height (ft):	21.2500
Average Liquid Height (ft):	16.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.2500
Shell Radius (ft):	4.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0252
Vapor Molecular Weight (lb/lb-mole):	140.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.0000
Daily Avg. Liquid Surface Temp. (deg. R):	517.5110
Daily Average Ambient Temp. (deg. F):	56.0333
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	515.7233
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,337.6368
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0710
Daily Vapor Temperature Range (deg. R):	19.8192
Daily Vapor Pressure Range (psia):	0.5000
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.0000
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.5000
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	1.0000
Daily Avg. Liquid Surface Temp. (deg R):	517.5110
Daily Min. Liquid Surface Temp. (deg R):	512.5562
Daily Max. Liquid Surface Temp. (deg R):	522.4658
Daily Ambient Temp. Range (deg. R):	18.6833
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.7717
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.0000
Vapor Space Outage (ft):	5.5833
Working Losses (lb):	142.8850
Vapor Molecular Weight (lb/lb-mole):	140.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.0000
Annual Net Throughput (gal/yr.):	42,865.5009
Annual Turnovers:	6.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	7,144.2502
Maximum Liquid Height (ft):	19.0000
Tank Diameter (ft):	8.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	284.3586

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

OP Hartford Tank WB-10-2 - Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
PCW	142.89	141.47	284.35

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 0-3-2

Input Factors
Tank Type: IFR with full liquid heel
Tank Diameter = 25 ft
Days on Legs: 2
Product Stored in Tank: Gasoline (RVP 13)
Product Filled into Tank: Gasoline (RVP 13)
Product height = 1.0 inches (0.08 ft)
Product density = 6.84 lb/gal

Emission Calculations

Using EPA AP-42, Chapter 7.1.3.2.2.

Calculation of Landing Losses

$L_{TL} = L_{SL} + L_{FL}$

Calculation of Standing Idle Losses (L_{SL})

$$L_{SL} = n_d \, K_E \, \left\{\frac{P \, V_V}{R \, T}\right\} \, M_V \, K_S$$

L_{SL} = Standing loss during roof landing, lb
n_d = 2.0
K_E = 0.85
P = 8.3
V_V = Volume of vapor space (ft^3) = 1,594
R = Ideal gas constant (10.731)
T = Average temperature of liquid and vapor below IFR (°R) = 58 °F (518°R)
M_V = Vapor molecular weight = 62
K_S = 0.41

$$L_{SL} = n_d \, K_E \, \left\{\frac{P \, V_V}{R \, T}\right\} \, M_V \, K_S$$

$$= 2.0*0.85 \quad \frac{8.3*1{,}594}{10.731*518} \quad 62*0.41$$

$$= 1.7*2.38*25.42$$

$$= 103 \text{ pounds}$$

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 0-3-2

Calculation of Filling Losses (L_{FL})

$$L_{FL} = \frac{\{P\ V_V\}}{\{R\ T\}}\ M_V\ S$$

L_{FL} = Filling loss from roof landing, lb
P = 8.3
V_V = Volume of vapor space (ft^3) = 1,594
R = Ideal gas constant (10.731)
T = Average temperature of liquid and vapor below IFR (°R)
= Average temperature for Baltimore area from Tanks program = 58 °F (518°R)
M_V = Vapor molecular weight = 62
S = Filling saturation factor (0.60 for a full liquid heel)

$$L_{FL} = \frac{8.3 \times 1{,}594}{10.731 \times 518}\ 62*0.6$$

$$= 2.38*\ 37.2$$

= 88.5 pounds

Total Landing Losses

L_{TL} = $L_{SL} + L_{FL}$
= 103 lb + 88.5 lb
= 191.5 lb **(0.096 ton)**

Tank Vapor Space Volume (V_V)

V_V = Is the area formed between the floating roof and the liquid

Input factors: Distance from the bottom of the roof to the tank floor when roof is landed on leg supports = 3 ft 4 inches (low legs)
Product depth = 1.0 inches
h_V = 3 feet 4 inches – 1.0 inches = 3 feet 3 inches = 3.25 ft

V_V = pi x r^2 x h_V = 3.14 x 12.5^2 x 3.25 ft
= 1,594 ft^3

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 20-4

Calculation of Filling Losses (L_{FL})

$$L_{FL} = \frac{\{P\, V_V\}}{\{R\, T\}} \quad M_V\ S$$

L_{FL} = Filling loss from roof landing, lb
P = 8.3
V_V = Volume of vapor space (ft^3) = 7,717
R = Ideal gas constant (10.731)
T = Average temperature of liquid and vapor below IFR (°R)
= Average temperature for Baltimore area from Tanks program = 58 °F (518°R)
M_V = Vapor molecular weight = 62
S = Filling saturation factor (0.60 for a full liquid heel)

$$L_{FL} = \frac{8.3 \times 7{,}717}{10.731 \times 518} \quad 62*0.6$$

$$= 11.5 * 37.2$$

$$= 428 \text{ pounds}$$

Total Landing Losses

L_{TL} = $L_{SL} + L_{FL}$
= 497 lb + 428 lb
= 925 lb **(0.462 ton)**

Tank Vapor Space Volume (V_V)

V_V = Is the area formed between the floating roof and the liquid

Input factors: Distance from the bottom of the roof to the tank floor when roof is landed on leg supports = 3 ft 4 inches (low legs)
Product depth = 1.0 inches
h_V = 3 feet 4 inches – 1.0 inches = 3 feet 3 inches = 3.25 ft

V_V = pi x r^2 x h_V = 3.14 x 27.5^2 x 3.25 ft
= 7,717 ft^3

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 20-4

Input Factors
Tank Type: IFR with full liquid heel
Tank Diameter = 55 ft
Days on Legs: 2
Product Stored in Tank: Gasoline (RVP 13)
Product Filled into Tank: Gasoline (RVP 13)
Product height = 1.0 inches (0.08 ft)
Product density = 6.84 lb/gal

Emission Calculations

Using EPA AP-42, Chapter 7.1.3.2.2.

Calculation of Landing Losses

$L_{TL} = L_{SL} + L_{FL}$

Calculation of Standing Idle Losses (L_{SL})

$L_{SL} = n_d\ K_E\ \{\frac{P\ V_V}{R\ T}\}\ M_V\ K_S$

L_{SL}	= Standing loss during roof landing, lb
n_d	= 2.0
K_E	= 0.85
P	= 8.3
V_V	= Volume of vapor space (ft ^{3}) = 7,717
R	= Ideal gas constant (10.731)
T	= Average temperature of liquid and vapor below IFR (°R) = 58 °F (518°R)
M_V	= Vapor molecular weight = 62
K_S	= 0.41

$L_{SL} = n_d\ K_E\ \{\frac{P\ V_V}{R\ T}\}\ M_V\ K_S$

$= 2.0*0.85\ \frac{8.3*7{,}717}{10.731*518}\ 62*0.03$

$= 1.7*11.5*25.42$

$= 497$ pounds

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 42-3

Input Factors

Tank Type: IFR with full liquid heel
Tank Diameter = 80 ft
Days on Legs: 2
Product Stored in Tank: Gasoline (RVP 13)
Product Filled into Tank: Gasoline (RVP 13)
Product height = 1.0 inches (0.08 ft)
Product density = 6.84 lb/gal

Emission Calculations

Using EPA AP-42, Chapter 7.1.3.2.2.

Calculation of Landing Losses

$L_{TL} = L_{SL} + L_{FL}$

Calculation of Standing Idle Losses (L_{SL})

$$L_{SL} = n_d \; K_E \; \left\{\frac{P \; V_V}{R \; T}\right\} \; M_V \; K_S$$

L_{SL} = Standing loss during roof landing, lb
n_d = 2.0
K_E = 0.85
P = 8.3
V_V = Volume of vapor space (ft^3) = 18,840
R = Ideal gas constant (10.731)
T = Average temperature of liquid and vapor below IFR (°R) = 58 °F (518°R)
M_V = Vapor molecular weight = 62
K_S = 0.38

$$L_{SL} = n_d \; K_E \; \left\{\frac{P \; V_V}{R \; T}\right\} \; M_V \; K_S$$

$$= 2.0*0.85 \quad \frac{8.3*18,840}{10.731*518} \quad 62*0.38$$

$$= 1.7*28.1*23.56$$

$$= 1,125 \text{ pounds}$$

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 42-3

Calculation of Filling Losses (L_{FL})

$$L_{FL} = \frac{\{P\ V_V\}}{\{R\ T\}}\ M_V\ S$$

L_{FL} = Filling loss from roof landing, lb
P = 8.3
V_V = Volume of vapor space (ft^3) = 18,840
R = Ideal gas constant (10.731)
T = Average temperature of liquid and vapor below IFR (°R)
= Average temperature for Baltimore area from Tanks program = 58 °F (518°R)
M_V = Vapor molecular weight = 62
S = Filling saturation factor (0.60 for a full liquid heel)

$$L_{FL} = \frac{8.3 \times 18{,}840}{10.731 \times 518}\ 62{*}0.6$$

$$= 28.1{*}\ 37.2$$

$$= 1{,}045 \text{ pounds}$$

Total Landing Losses

$$L_{TL} = L_{SL} + L_{FL}$$
$$= 1{,}125 \text{ lb} + 1{,}045 \text{ lb}$$
$$= 2{,}170 \text{ lb } \mathbf{(1.085\ ton)}$$

Tank Vapor Space Volume (V_V)

V_V = Is the area formed between the floating roof and the liquid

Input factors: Distance from the bottom of the roof to the tank floor when roof is landed on leg supports = 3 ft 10 inches (low legs)
Product depth = 1.0 inches
h_v = 3 feet 10 inches – 1.0 inches = 3 feet 9 inches = 3.75 ft

V_V = pi x r^2 x h_v = 3.14 x 40^2 x 3.75 ft

= 18,840 ft^3

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 42-5

Input Factors

Tank Type: IFR with full liquid heel
Tank Diameter = 80 ft
Days on Legs: 1
Product Stored in Tank: Crude Oil (RVP 5)
Product Filled into Tank: Crude Oil (RVP 5)
Product height = 1.0 inches (0.08 ft)
Product density = 6.84 lb/gal

Emission Calculations

Using EPA AP-42, Chapter 7.1.3.2.2.

Calculation of Landing Losses

$L_{TL} = L_{SL} + L_{FL}$

Calculation of Standing Idle Losses (L_{SL})

$$L_{SL} = n_d\ K_E\ \left\{\frac{P\ V_V}{R\ T}\right\}\ M_V\ K_S$$

L_{SL} = Standing loss during roof landing, lb
n_d = 1
K_E = 0.77
P = 2.76
V_V = Volume of vapor space (ft^3) = 16,328
R = Ideal gas constant (10.731)
T = Average temperature of liquid and vapor below IFR (°R) = 58 °F (518°R)
M_V = Vapor molecular weight = 207
K_S = 0.68

$$L_{SL} = n_d\ K_E\ \left\{\frac{P\ V_V}{R\ T}\right\}\ M_V\ K_S$$

$$= 1*0.77 \quad \frac{2.76*16{,}328}{10.731*518} \quad 207*0.68$$

$$= 0.77*8.11*140.76$$

= 879 pounds

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 42-5

Calculation of Filling Losses (L_{FL})

$$L_{FL} = \frac{\{P\ V_V\}}{\{R\ T\}}\ M_V\ S$$

L_{FL} = Filling loss from roof landing, lb
P = 2.76
V_V = Volume of vapor space (ft^3) = 16,328
R = Ideal gas constant (10.731)
T = Average temperature of liquid and vapor below IFR (°R)
= Average temperature for Baltimore area from Tanks program = 58 °F (518°R)
M_V = Vapor molecular weight = 207
S = Filling saturation factor (0.60 for a full liquid heel)

$$L_{FL} = \frac{2.76 \times 16{,}328}{10.731 \times 518} \quad 207*0.6$$

$$= 8.11 * 124.2$$

$$= 1{,}007 \text{ pounds}$$

Total Landing Losses

L_{TL} = $L_{SL} + L_{FL}$
= 879 lb + 1,007 lb
= 1,186 lb **(0.943 ton)**

Tank Vapor Space Volume (V_V)

V_V = Is the area formed between the floating roof and the liquid

Input factors: Distance from the bottom of the roof to the tank floor when roof is landed on leg supports = 3 ft 4 inches (low legs)
Product depth = 1.0 inches
h_V = 3 feet 4 inches – 1.0 inches = 3 feet 3 inches = 3.25 ft

V_V = pi x r^2 x h_V = 3.14 x 40^2 x 3.25 ft
= 16,328 ft^3

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 42-7

Input Factors
Tank Type: IFR with full liquid heel
Tank Diameter = 80 ft
Days on Legs: 1
Product Stored in Tank: Crude Oil (RVP 5)
Product Filled into Tank: Crude Oil (RVP 5)
Product height = 1.0 inches (0.08 ft)
Product density = 6.84 lb/gal

Emission Calculations

Using EPA AP-42, Chapter 7.1.3.2.2.

Calculation of Landing Losses

$L_{TL} = L_{SL} + L_{FL}$

Calculation of Standing Idle Losses (L_{SL})

$$L_{SL} = n_d \, K_E \, \left\{\frac{P \, V_V}{R \, T}\right\} \, M_V \, K_S$$

L_{SL} = Standing loss during roof landing, lb
n_d = 1
K_E = 0.77
P = 2.76
V_V = Volume of vapor space (ft^3) = 14,670
R = Ideal gas constant (10.731)
T = Average temperature of liquid and vapor below IFR (°R) = 58 °F (518°R)
M_V = Vapor molecular weight = 207
K_S = 0.70

$$L_{SL} = n_d \, K_E \, \left\{\frac{P \, V_V}{R \, T}\right\} \, M_V \, K_S$$

$$= 1*0.77 \quad \frac{2.76*14{,}670}{10.731*518} \quad 207*0.70$$

$$= 0.77*7.28*144.9$$

= 812 pounds

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 42-7

Calculation of Filling Losses (L_{FL})

$$L_{FL} = \frac{\{P\ V_V\}}{\{R\ T\}}\ M_V\ S$$

L_{FL} = Filling loss from roof landing, lb
P = 2.76
V_V = Volume of vapor space (ft^3) = 14,670
R = Ideal gas constant (10.731)
T = Average temperature of liquid and vapor below IFR (°R)
= Average temperature for Baltimore area from Tanks program = 58 °F (518°R)
M_V = Vapor molecular weight = 207
S = Filling saturation factor (0.60 for a full liquid heel)

$$L_{FL} = \frac{2.76 \times 14{,}670}{10.731 \times 518} \quad 207*0.6$$

$$= 7.28 * 124.2$$

$$= 904 \text{ pounds}$$

Total Landing Losses

$\mathbf{L_{TL}}$ = $\mathbf{L_{SL} + L_{FL}}$
= 812 lb + 904 lb
= 1,716 lb **(0.858 ton)**

Tank Vapor Space Volume (V_V)

V_V = Is the area formed between the floating roof and the liquid

Input factors: Distance from the bottom of the roof to the tank floor when roof is landed on leg supports = 3 ft 0 inches (low legs)
Product depth = 1.0 inches
h_V = 3 feet 0 inches – 1.0 inches = 2 feet 11 inches = 2.92 ft

V_V = pi x r^2x h_V = 3.14 x 40^2 x 2.92 ft
= 14,670 ft^3

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 120-1

Input Factors
Tank Type: IFR with full liquid heel
Tank Diameter = 120 ft
Days on Legs: 1
Product Stored in Tank: Crude Oil (RVP 5)
Product Filled into Tank: Crude Oil (RVP 5)
Product height = 1.0 inches (0.08 ft)
Product density = 6.84 lb/gal

Emission Calculations

Using EPA AP-42, Chapter 7.1.3.2.2.

Calculation of Landing Losses

$L_{TL} = L_{SL} + L_{FL}$

Calculation of Standing Idle Losses (L_{SL})

$$L_{SL} = n_d\ K_E\ \left\{\frac{P\ V_V}{R\ T}\right\}\ M_V\ K_S$$

L_{SL} = Standing loss during roof landing, lb
n_d = 1
K_E = 0.77
P = 2.76
V_V = Volume of vapor space (ft ^{3}) = 42,390
R = Ideal gas constant (10.731)
T = Average temperature of liquid and vapor below IFR (°R) = 58 °F (518°R)
M_V = Vapor molecular weight = 207
K_S = 0.65

$$L_{SL} = n_d\ K_E\ \left\{\frac{P\ V_V}{R\ T}\right\}\ M_V\ K_S$$

$$= 1*0.77\ \frac{2.76*42{,}390}{10.731*518}\ 207*0.65$$

$$= 0.77*21.0*134.5$$

= 2,175 pounds

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 120-1

Calculation of Filling Losses (L_{FL})

$$L_{FL} = \frac{\{P\ V_V\}}{\{R\ T\}}\ M_V\ S$$

L_{FL}	= Filling loss from roof landing, lb
P	= 2.76
V_V	= Volume of vapor space (ft^3) = 42,390
R	= Ideal gas constant (10.731)
T	= Average temperature of liquid and vapor below IFR (°R)
	= Average temperature for Baltimore area from Tanks program = 58 °F (518°R)
M_V	= Vapor molecular weight = 207
S	= Filling saturation factor (0.60 for a full liquid heel)

$$L_{FL} = \frac{2.76 \times 42{,}390}{10.731 \times 518}\quad 207{*}0.6$$

$$= 21.0{*}\ 124.2$$

$$= 2{,}608 \text{ pounds}$$

Total Landing Losses

$\mathbf{L_{TL}}$ = $\mathbf{L_{SL} + L_{FL}}$
= 2,175 lb + 2,608 lb
= 4,783 lb **(2.391 ton)**

Tank Vapor Space Volume (V_V)

V_V = Is the area formed between the floating roof and the liquid

Input factors: Distance from the bottom of the roof to the tank floor when roof is landed on leg supports = 3 ft 10 inches (low legs)
Product depth = 1.0 inches
h_V = 3 feet 10 inches – 1.0 inches = 3 feet 9 inches = 3.75 ft

V_V = pi x r^2x h_V = 3.14 x 60^2 x 3.75 ft
= 42,390 ft^3

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 254-1 and 2

Input Factors

Tank Type: External Floating Roof (EFR) with liquid heel
Tank Diameter = 180 ft
Days on Legs: 1
Product Stored in Tank: Crude Oil (RVP 5)
Product Filled into Tank: Crude Oil (RVP 5)

Emission Calculations Using EPA AP-42, Chapter 7.1.3.2.2.2

$L_{TL} = L_{SL} + L_{FL}$

$L_{SL} = 0.57\ n_d\ D\ P^*\ M_V$ (Equation 2-19)

L_{SL} = Standing loss during roof landing, lb
n_d = 1
D = 180
P^* = 0.049
M_V = 207

L_{SL}	$= 0.57\ n_d\ D\ P^*\ M_V$
	$= 0.57\ (1)\ (180)\ (0.049)\ (207)$
	= 1,041 pounds

$$L_{FL} = \left\{\frac{P\ V_V}{R\ T}\right\}\ M_V\ (C_{sf}\ S)$$ (Equation 2-27)

P = 2.76
V_V = Volume of vapor space (ft^3) = 86,984
R = Ideal gas constant (10.731)
T = Average temperature of liquid and vapor below EFR (°R) = 58 °F (518°R)
M_V = Vapor molecular weight = 207
S = Filling saturation factor (0.60 for a full liquid heel)
K_S = 0.67
K_E = 0.77
C_{sf} = 1.35

L_{FL}	=	$\frac{2.76 \times 86{,}984}{10.731 \times 518}$ 207 (1.35 x 0.6)
	=	43.2 x 167.7
	=	7,243 pounds

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 254-1 and 2

L_{TL} = $L_{SL} + L_{FL}$
= 1,041 lb + 7,243 lb
= **8,284 lb (4.14 tons)**

Tank Vapor Space Volume (Vv)	
Vv =	Is the area formed between the floating roof and the liquid
Input factors:	Distance from the bottom of the roof to the tank floor when roof is landed on leg supports = 3 ft 6 inches (low legs) Product depth = 1.0 inches h_v = 3 feet 6 inches – 1.0 inches = 3 feet 5 inches = 3.42 ft
Vv =	pi x r^2 x h_v = 3.14 x 90^2 x 3.42 ft
=	86,984 ft^3

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 154-1 and 2

Input Factors
Tank Type: External Floating Roof (EFR) with liquid heel
Tank Diameter = 140 ft
Days on Legs: 1
Product Stored in Tank: Crude Oil (RVP 5)
Product Filled into Tank: Crude Oil (RVP 5)

Emission Calculations Using EPA AP-42, Chapter 7.1.3.2.2.2

$L_{TL} = L_{SL} + L_{FL}$

$L_{SL} = 0.57\ n_d\ D\ P^*\ M_V$ (Equation 2-19)

L_{SL} = Standing loss during roof landing, lb
n_d = 1
D = 140
P* = 0.049
M_V = 207

$L_{SL} = 0.57\ n_d\ D\ P^*\ M_V$
= 0.57 (1) (140) (0.049) (207)
= 809 pounds

$L_{FL} = \left\{\frac{P\ V_V}{R\ T}\right\} M_V\ (C_{sf}\ S)$ (Equation 2-27)

P = 2.76
V_V = Volume of vapor space (ft^3) = 52,620
R = Ideal gas constant (10.731)
T = Average temperature of liquid and vapor below EFR (°R) = 58 °F (518°R)
M_V = Vapor molecular weight = 207
S = Filling saturation factor (0.60 for a full liquid heel)
K_S = 0.67
K_E = 0.77
Csf = 1.33

$L_{FL} = \frac{2.76 \times 52{,}620}{10.731 \times 518}\ 207\ (1.33 \times 0.6)$
= 26.1 x 165.2
= 4,311 pounds

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 154-1 and 2

L_{TL}	=	$L_{SL} + L_{FL}$
	=	809 lb + 4,311 lb
	=	**5,120 lb (2.56 tons)**

Tank Vapor Space Volume (Vv)

Vv	=	Is the area formed between the floating roof and the liquid
Input factors:		Distance from the bottom of the roof to the tank floor when roof is landed on leg supports = 3 ft 6 inches (low legs) Product depth = 1.0 inches h_v = 3 feet 6 inches – 1.0 inches = 3 feet 5 inches = 3.42 ft
Vv	=	pi x r^2 x h_v = 3.14 x 70^2 x 3.42 ft
	=	52,620 ft^3

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 122-1

Input Factors
Tank Type: External Floating Roof (EFR) with liquid heel
Tank Diameter = 125 ft
Days on Legs: 1
Product Stored in Tank: Crude Oil (RVP 5)
Product Filled into Tank: Crude Oil (RVP 5)

Emission Calculations Using EPA AP-42, Chapter 7.1.3.2.2.2

$L_{TL} = L_{SL} + L_{FL}$

$L_{SL} = 0.57\ n_d\ D\ P^*\ M_V$ (Equation 2-19)

L_{SL} = Standing loss during roof landing, lb
n_d = 1
D = 125
P* = 0.049
M_V = 207

$L_{SL} = 0.57\ n_d\ D\ P^*\ M_V$
= 0.57 (1) (125) (0.049) (207)
= 723 pounds

$L_{FL} = \left\{\frac{P\ V_V}{R\ T}\right\} M_V\ (C_{sf}\ S)$ (Equation 2-27)

P = 2.76
V_V = Volume of vapor space (ft ^{3}) = 41,984
R = Ideal gas constant (10.731)
T = Average temperature of liquid and vapor below EFR (°R) = 58 °F (518°R)
M_V = Vapor molecular weight = 207
S = Filling saturation factor (0.60 for a full liquid heel)
K_S = 0.67
K_E = 0.77
Csf = 1.31

$L_{FL} = \frac{2.76 \times 41{,}984}{10.731 \times 518}\ 207\ (1.31 \times 0.6)$

= 20.8x 162.7
= 3,384 pounds

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 122-1

L_{TL}	=	$L_{SL} + L_{FL}$
	=	723 lb + 3,384 lb
	=	**4,107 lb (2.05 tons)**

Tank Vapor Space Volume (Vv)		
Vv	=	Is the area formed between the floating roof and the liquid
Input factors:		Distance from the bottom of the roof to the tank floor when roof is landed on leg supports = 3 ft 6 inches (low legs) Product depth = 1.0 inches h_v = 3 feet 6 inches – 1.0 inches = 3 feet 5 inches = 3.42 ft
Vv	=	pi x r^2 x h_v = 3.14 x 62.5^2 x 3.42 ft
	=	41,948 ft^3

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 218-1

Input Factors
Tank Type: External Floating Roof (EFR) with liquid heel
Tank Diameter = 180 ft
Days on Legs: 1
Product Stored in Tank: Crude Oil (RVP 5)
Product Filled into Tank: Crude Oil (RVP 5)

Emission Calculations Using EPA AP-42, Chapter 7.1.3.2.2.2

$L_{TL} = L_{SL} + L_{FL}$

$L_{SL} = 0.57\ n_d\ D\ P^*\ M_V$ (Equation 2-19)

L_{SL} = Standing loss during roof landing, lb
n_d = 1
D = 180
P^* = 0.049
M_V = 207

$L_{SL} = 0.57\ n_d\ D\ P^*\ M_V$
$= 0.57\ (1)\ (180)\ (0.049)\ (207)$
= 1,041 pounds

$L_{FL} = \left\{\frac{P\ V_V}{R\ T}\right\}\ M_V\ (C_{sf}\ S)$ (Equation 2-27)

P = 2.76
V_V = Volume of vapor space (ft^3) = 86,984
R = Ideal gas constant (10.731)
T = Average temperature of liquid and vapor below EFR (°R) = 58 °F (518°R)
M_V = Vapor molecular weight = 207
S = Filling saturation factor (0.60 for a full liquid heel)
K_S = 0.67
K_E = 0.77
C_{sf} = 1.35

$L_{FL} = \frac{2.76 \times 86{,}984}{10.731 \times 518}\ 207\ (1.35 \times 0.6)$

$= 43.2 \times 167.7$
= 7,243 pounds

Emission Worksheet
Calculation Roof Landing Losses

OP Hartford – Tank 218-1

L_{TL}	=	$L_{SL} + L_{FL}$
	=	1,041 lb + 7,243 lb
	=	**8,284 lb (4.14 tons)**

Tank Vapor Space Volume (Vv)	
V_V =	Is the area formed between the floating roof and the liquid
Input factors:	Distance from the bottom of the roof to the tank floor when roof is landed on leg supports = 3 ft 6 inches (low legs) Product depth = 1.0 inches h_V = 3 feet 6 inches – 1.0 inches = 3 feet 5 inches = 3.42 ft
V_V =	pi x r^2 x h_V = 3.14 x 90^2 x 3.42 ft
=	86,984 ft^3

Illinois Environmental Protection Agency

www.epa.state.il.us

Pat Quinn, Governor

Calculate Emissions

Natural Gas Fired Boiler

Production Information

Heat input: < 100 million BTU/hr

Amount of fuel burned: 199 million cubic feet

Calculate Emissions

Emissions (tons/year)

CO	CO2	METHANE	N2O
8.3580	11940.0000	0.2289	0.2189
NH3	NOX	PART	PM10
0.3184	9.9500	0.7562	0.7562
PM2.5	SO2	VOM	
0.7562	0.0597	0.5473	

Return to Calculate Emissions page

From: Larry Wright <lwright@omegapartnersllc.com>
To: Rick Monroe <rmonroe207@aol.com>
Subject: Fwd: Hartford - Existing Zink Flare
Date: Mon, Nov 12, 2012 12:22 pm
Attachments: Omega_Truck_Hartford.pdf (51K)

Thanks,
Larry Wright
Sent from my iPhone

Begin forwarded message:

From: "Matthes, Bill" <bill.matthes@johnzink.com>
Date: November 12, 2012, 12:14:51 PM EST
To: "Larry Wright" <lwright@omegapartnersllc.com>
Subject: RE: Hartford - Existing Zink Flare

Larry,

Attached is the design information from the operating manual. John Zink Company will stand behind this guarantee as long as the unit is correctly operated. We will guarantee a 35 mg/liter emission guarantee (0.292 lbs/1,000 gallons loaded), when loading gasoline, diesel and crude oil at the rates shown in the attachment.

If you should have any questions, please let me know.

Bill Matthes

Sr. Application Engineer

918-234-2918

From: Larry Wright [mailto:lwright@omegapartnersllc.com]
Sent: Friday, November 09, 2012 3:15 PM
To: Matthes, Bill
Subject: Fwd: Hartford - Existing Zink Flare

Bill,

See below. Let me know if you have any issues with what we need for the existing VCU at OPH.

Thanks,

Larry Wright

Sent from my iPhone

Begin forwarded message:

From: Rick Monroe <rmonroe207@aol.com>
Date: November 9, 2012, 3:25:27 PM EST
To: lwright@omegapartnersllc.com
Subject: Hartford - Existing Zink Flare

Larry,

Please follow up with John Zink and have them provide an email or other documentation confirming the operating and performance parameters remaining as described in the owner manual pertaining to the load-out of crude oil. This documentation will need to be included in the application.

Thanks,

Rick Monroe

I. INTRODUCTION

The John Zink Temperature Controlled Hydrocarbon Combustor is a fully automatic system that is designed to incinerate a mixture of hydrocarbon vapors and operate remotely in either a automatic or manual mode. The system starts and stops in response to external electrical control signals received by the control logic system.

The combustion system is controlled by a programmable logic controller (PLC) which has an internal pre-designed operating logic sequence. The PLC receives and transmits control signals in response to operating pressures and temperatures. In the event that a component fails or if the process conditions vary beyond the prescribed operating parameters, the control system will respond by stopping the flow of hydrocarbon vapor and shutting down the combustor-liquid seal system in a safe and sequenced order.

As part of the safety system design to prevent a flame flashback from the burner assembly, several important equipment components have been provided, i.e., anti-flashback burners, flame arresters, and a water seal vessel. Each item is designed to stop the propagation of a flashback to the source of the hydrocarbon vapor flow.

In addition to the anti-flashback equipment, various pressure switches, liquid level switches, thermocouples, and u/v flame detectors are also used to monitor and protect personnel and equipment from a mis-operation or system malfunction. The vapor combustor system consists of the following equipment and safety devices:

1. Combustor chamber
2. Liquid seal vessel
3. Master control panel Nema 4
4. Ignition transformers and enclosure Nema 4
5. Assist air blower and air damper
6. Electric hydrocarbon vapor block valves
7. Anti-flashback burners and pilots
8. Flame arresters
9. Ultraviolet (u/v) flame safeguard detectors
10. Associated pressure, temperature, and level switches
11. Solenoid valves, pressure gauges, and assorted hand valves
12. Motor starter

IV. DESIGN BASIS AND PERFORMANCE SUMMARY

1. Gas Composition: Hydrocarbon Vapors and Air

2. Maximum Vapor Flow to Combustor: 856 SCFM
   Minimum Vapor Flow to Combustor: 80 SCFM

3. Ambient Temperatures: 0°F to 100°F

4. Maximum Hydrocarbon (measured as Propane) Concentration: 60 Vol%
   Minimum Hydrocarbon (measured as Propane) Concentration: 6 Vol%

5. Available Pressure at Inlet of Vapor Combustion Unit is: 12" W.C. max.

6. Emission Guarantee: 35 mg hydrocarbon per liter of product loaded.

7. John Zink Company guarantees the hydrocarbon emissions from the proposed Vapor Combustion Unit to meet or exceed the standards and conditions listed in the Code of Federal Regulations, which are listed in CFR 60.18 paragraphs 9c) through (f) as they apply to combustors, based on the following:

   (a) Combustion unit being operated per recommended manufacturer's instructions at conditions specified in the "Design Basis" of the proposal.
   (b) Hydrocarbons are considered to be those hydrocarbons normally found in gasoline vapors displaced when transports are loaded (excluding ethane and methane). A typical analysis taken from the U.S. E.P.A. publication EPA-450/2-77-026 is as follows:

Component	Vol.%
Air	58.1
Propane	0.6
Iso-butane	2.9
Butene	3.2
N-Butane	17.4
Iso-Pentane	7.7
Pentene	5.1
N-Pentane	2.0
Hexane	3.0

   (c) Calculation of hydrocarbon emissions from the vapor combustion system will be determined by appropriate and generally accepted sampling and analyzing techniques per requirements of the U.S. Environmental Protection Agency for bulk gasoline loading terminals (40 CFR 60, Subpart XX). Emissions are to be averaged over a 6 hour test period.
   (d) John Zink Company is responsible only for those hydrocarbon emissions that pass through the combustion system and is not responsible for those emissions that may occur from the loading rack or from the vapor collection system due to improper truck or pipe sealing techniques.

V. COMBUSTOR OPERATION

A. Before Start-up:

1. Close valve:

   a. BV-201
   b. BV-202
   c. BV-203

2. Open valves:

   a. BV-204
   b. BV-300
   c. BV-303

3. Verify that main power disconnect (supplied by customer) is turned off.

4. Open main control panel CE-1, verify that circuit breaker CB-1 is turned off.

5. Verify that receptacle R-1 circuit breaker CB-2 is turned off.

6. Turn system power switch to the off position.

7. Turn system selector switch to the off position.

8. Verify space heater EH-1 is set for 70°F, adjust if necessary.

9. Verify that all relays located inside the control panel are pressed in tightly.

10. Verify fuel pressure at PI-303 is approximately 7 psig. Adjust PCV-302 if necessary.

11. Verify liquid level inside liquid seal. Check level gauge LG-201.

12. The following safety PLC limit inputs must be made in order for the system to start. If any limit is not made, then panel shutdown lamp will illuminate once the system is turned on. The fault must be cleared first.

    a. Remote emergency shutdown
    b. Liquid seal level
    c. High flame arrester temperature
    d. Spare fault

B. Ready for Start-up:

1. Turn on customer supplied main power disconnect switch to control panel CE-1.

2. Turn on circuit breaker CB-4.

    a. Space heater EH-1 will start to warm up if the ambient temperature is below the set point of thermostat (70°F).

3. Turn on circuit breaker CB-2.

4. Turn on power switch.

    a. Power on light illuminates white.
    b. PLC-1 energizes, CPU run and power LED lights illuminate red.
    c. 120 Vac signal to PLC input slot No. 1-2.
    d. 120 Vac signal to PLC input slot No. 1-5.
    e. 120 Vac signal to PLC input slot No. 2-0.
    f. 120 Vac signal to PLC input slot No. 2-2.
    g. 120 Vac signal to PLC input slot No. 2-4.
    h. 120 Vac signal to PLC input slot No. 2-5.
    i. 120 Vac signal to PLC input slot No. 2-6.
    j. Depress lamp test push button to verify that all red pilot lamps illuminate. Replace any if necessary.

6. Depress fault PB-28 reset push button.

    a. General alarm relay CR-27 will energize if a fault condition exists.
    b. The fault condition will be represented by an illuminated red light on the front of panel CE-1.
    c. Should a fault condition exist, check for the cause and correct it.

7. Once the fault reset push button is depressed and no fault conditions exist, then the system is ready to start.

C. Start-up:

1. Turn system selector switch to auto position.

   a. 120 Vac input signal to PLC input slot No. 1-0 (unit on).
   b. 120 Vac input signal to PLC input slot No. 1-1 (unit run).

   Note: Customer remote start signal must be turned on prior to start-up in order for remote operation to occur.

2.

   a. Assist air blower motor starter coil MS-301 energizes and assist air blower BL-301 starts.
   b. Assist air blower will purge the combustion stack for 60 seconds.

   Note: This is a preset time period within the PLC program and is not adjustable.

   c. Purge cycle is completed and the assist air blower BL-301 continues to operate.

3. Pilot gas solenoid valve XSV-305 energizes.

   a. Natural gas enters the pilot assemblies and mixes with ambient air.

4. Each pilot will try to ignite for 10 seconds after the 60 second air purge. If any pilot is not proven, the system will again purge for 60 seconds and try to light for 10 seconds. If, after the third try, any pilot doesn't light, you will receive a flame failure fault, and the blower will shut off.

5. Flame relays BSL-301 & 302 will energize ignition transformers IT-79 & 2 causing a spark at the tip of each pilot igniting the pilots.

6. Flame scanners BSL-301 & 302 will detect the pilot flames.

7. If the pilot flame is not detected, the PLC pilot ignition sequence has a special feature that will automatically re-ignite the pilot flame.

   a. Pilot gas solenoid valve XSV-305 is opened.
   b. Ignition transformers IT-1 & 2 are energized and will spark for 9 seconds.
   c. After 9 seconds, if BSL-301 & 302 have not detected a flame, the ignition transformers IT-1 & 2 and pilot gas solenoid XSV-305 will shut off. The PLC program will count seconds.
   d. After 3 seconds, the PLC will repeat steps 1, 2, and 3.

   If a pilot flame is not detected on each pilot after the fifth ignition trial, the PLC will shutdown the combustion system due to pilot failure.

8. After BSL-301 & 302 have detected a pilot flame, pilot gas solenoid valve XSV-305 will remain energized and the pilot gas will continue to flow.

9. Permissive start relay CR-1 energizes.

   a. One (1) set of contacts on CR-62 (C37 & C38) are used as a remote auxiliary signal for system operation, verifying the combustion system is ready to accept waste gas flow.

10. To start the combustor in the <u>hand</u> position:

   a. Review start-up instructions section B and C.
   b. Turn system selector switch to hand position.
   c. Operational sequence of the combustion system will be identical to section B and C start-up instructions.

D. Hydrocarbon Vapor Gas Flow To The Combustor:

1. As the hydrocarbon vapor starts to flow to the combustor, the pressure within the liquid seal starts to increase.

   a. Low waste gas pressure switch PSL-201 closes and provides a 120 Vac input signal to the PLC at slot No. 1-6.
   b. High waste gas pressure switch PSH-201 closes when the pressure increases above 5" W.C., and provides a 120 Vac input signal to the PLC at slot No. 1-7.

   Note: Once the pressure remains above 5" W.C., the PLC program will permit the combustor to accept and burn hydrocarbon vapors.

2. Relay CR-84 is energized and hydrocarbon vapor block valve MOV-201 opens.

3. Hydrocarbon vapors flow through the vapor block valve MOV-201 and flame arrester FA-201 to the burner located inside the combustion stack where they are burned.

4. Liquid seal pressure will decrease below 5" W.C. on PI-201 when block valve MOV-201 opens.

5. With increased loading, the pressure inside the liquid seal could again increase to 5" W.C. If the pressure inside the liquid seal again reaches 5" W.C. relay CR-94 will energize and MOV-202 will open.

6. Hydrocarbon vapors flow through vapor block valves MOV-201 & 202 and flame arresters FA-201 & 202 to the burners located inside of the combustion stack where they are burned.

E. Normal Combustor Shutdown

1. With the decrease in hydrocarbon vapor flow to the liquid seal and combustion stack, the pressure inside the liquid seal will decrease, activating the staging valve pressure switch PSL-201.

2. If the pressure in the liquid seal decreases below 0.5" W.C. and remains low for 10 seconds, then relay CR-94 de-energizes, and hydrocarbon vapor block valve MOV-202 closes.

3. Liquid seal pressure will increase when MOV-202 closes. With decreased loading, liquid seal pressure will begin to fall again. If liquid seal pressure again falls below .5" W.C., relay CR-84 will de-energize and MOV-201 will close.

4. Assist air blower BL-301 and pilots remain on.

5. Once the remote customer start signal is lost, the 120 Vac is turned off the PLC input slot No. 1-1.

   a. 15 minute PLC post loading internal timer starts.
   b. Pilots and assist air blower BL-301 continue to operate.

   Note: If hydrocarbon liquid loading is restarted and the customer remote start signal is turned on before the 15 minute timer completes the time cycle, the combustion system will restart, see section D, Hydrocarbon Vapor Flow to the Combustor.

5. Once the 15 minute timer has completed the time cycle, the combustor is shutdown in a sequence order.

   a. Permissive start relay CR-62 is de-energized.

      1. Remote auxiliary signal to indicate the combustor is ready to accept waste flow is turned off.

   b. Pilot on light is turned off.
   c. Assist air blower MS-301 motor starter coil is de-energized and the assist air blower BL-301 is turned off.
   d. Pilot gas solenoid valve XSV-305 is closed.
   e. Power on lamp remains illuminated white.
   f. PLC-1 remains energized.

   Note: At this point, all hydrocarbon vapor, pilot gas, and assist gas flows are blocked to the combustion pilot and burner.

F. Emergency Shutdown

Emergency shutdown of the combustion system is similar to a normal shutdown sequence outlined in section E, except for the following:

1. Emergency shutdown occurs when the remote push button is depressed.

2. System power switch can also be used as emergency shutdown switch, but the shutdown indication is omitted.

3. Once the emergency stop switch is depressed:

   a. Electrical output control signals from the PLC are turned off.
   b. PLC remains energized.
   c. General alarm relay CR-27 is de-energized.
   d. Pilot gas solenoid valve XSV-305 is closed.
   e. Pilot on green light is turned off.
   f. Pilot flames are turned off.
   g. MOV-201 & 202 go to closed position.
   h. Assist air blower motor starter MS-301 is de-energized, assist air blower BL-301 stops.
   i. Permissive start control relay CR-62 de-energizes.

4. Restart the combustion system after an emergency shutdown.

   a. Turn system selector switch to the off position.
   b. Determine the cause of the shutdown and alleviate the problem.
   c. Depress fault reset push button.

      1. General alarm relay CR-27 is de-energized.

   d. Turn system selector switch to the auto or man. position.
   e. System start-up will occur as outlined in Section C, Start-up.

G. Power Failure

The following will occur during an electrical power failure to the unit:

1. Solenoid valve XSV-305 will de-energize, shutting off the pilot gas supply.
2. Permissive to load relay CR-62 will de-energize.
3. Motor operated valve MOV-201 & 202 will stop in their current positions.
4. When electrical power is regained, MOV-201 & 202 will go to a closed position.
5. Follow Section F Emergency Shutdown to restart unit.

VI. TROUBLESHOOTING

WARNING

This equipment has 480 Vac and 120 Vac electricity that can shock or kill personnel. Extreme caution must be used when servicing this equipment.

This equipment contains vapors within the explosive mixture range. Extreme caution must be used when servicing this equipment.

Preventative maintenance and repairs should only be performed by qualified service personnel who are familiar with all safety and operations procedures. Read Section II, Cautions and Warnings before proceeding with any maintenance operations.

This troubleshooting section is only intended to be a guide in solving equipment faults. It lists potential problems with possible causes and solutions, and is not a detailed list of all possible problems. Reference should be made to the vendor literature section of the operating manual to troubleshoot problems with specific component items of this system. It is recommended that only **qualified service personnel should perform repairs**. Contact the John Zink Company at (918) 234-2966 if a system fault cannot be corrected.

The John Zink Hydrocarbon Vapor Combustion System is equipped with automatic shutdowns which activate if there are any major malfunctions. The cause of the system shutdown will be indicated as a "first-out" red light on the control panel. The illuminated light will indicate which device caused the shutdown.

Located on the front of the main control panel (CE-1) are various lights to assist in troubleshooting the hydrocarbon vapor system in the event the unit should shutdown or fail to start. They are:

1. System power on - white
2. Remote emergency shutdown - red
3. Liquid seal level - red
4. Combustion air blower failure - red
5. Flame arrester high temperature - red
6. Pilot failure - red
7. Pilot on - green

1. Problem: **Power on light will not illuminate.**

Solutions:
a. Control panel circuit breaker CB-4 is turned off.
b. Power on switch is turned off.
c. Pilot light bulb is defective.
d. 120 Vac electrical power to control panel is turned off. Check terminals L1 and N1 with a Volt-OHM-Meter.
e. Customer supplied main power circuit breaker is turned off or tripped.
f. Loose wire(s).

2. Problem: **Combustion air blower failure.**

Solutions:
a. 480 Vac power supply turned off.
b. Motor starter auxiliary contacts did not close. Check PLC input slot 2-1 for illuminated red 120 Vac signal.
c. Blower motor starter MS-301 has not engaged.
d. Motor starter holding coil defective.
e. Motor starter overload relay is tripped. Depress reset push button.
f. Motor starter heater elements may be open.
g. Loose wire(s).

3. Problem: **Pilot failure.**

Solutions:
a. Flame relay BSL-301 or 302 is defective.
b. Flame detector BE-301 or 302 is defective.
c. Pilot did not ignite during the pilot ignition sequence.

4. Problem: **Remote emergency shutdown.**

Solutions:
a. Remote customer emergency shutdown switch was depressed.
b. Sump tank has a high level.
c. Check PLC input slot 1-2 for illuminated red 120 Vac signal.

5. Problem: **Liquid seal level.**

Solutions:
a. Liquid level in liquid seal vessel V-201 is either too high or too low. Check PLC input slot 2-0 for illuminated red 120 Vac signal.
b. Liquid level switch LSLL-201 or LSHH-201 is defective.
c. Sudden surge of vapor flow and pressure inside the liquid seal vessel.
d. Loose wire(s).

6. Problem: **Flame arrester high temperature.**

Solutions:
a. High temperature at the face of the flame arrester FA-201 or FA-202.
b. Temperature switch TSH-201 or 202 set point is not correct. Check PLC inputs slot 2-2 & 2-4 for illuminated red 120 Vac signal.
c. Burner may be defective.
d. Loose wire(s).

7. Problem: **Pilot on light will not illuminate green.**

Solutions:
- a. Flame relay BSL-301 or 302 is defective.
- b. Check PLC input slots 2-3 for illuminated red 120 Vac signal.
- c. Check control relay CR-71 and contacts.
- d. Check light bulb.
- e. Loose wire(s).

8. Problem: **Pilot gas pressure.**

Solutions:
- a. Supply gas pressure at BV-300 is not correct, 30 psig required.
- b. Block valve BV-300 is closed.
- c. Strainer STR-301 is plugged.
- d. Regulator PCV-302 is set too low or too high.

<u>Additional problems that are not annunciated on the main control panel:</u>

9. Problem: **Hydrocarbon block valve MOV-201 or 202 will not open.**

Solutions:
- a. Check PLC output slot 1-0 & 1-1 for illuminated red 120 Vac signal.
- b. Liquid seal pressure switches PSL-201 and PSH-201 are defective or out of adjustment. Check PLC input slots 1-6 and 1-7 for illuminated red 120 Vac signal(s).
- c. MOV-201 or 202 internal drive motor may be defective.

10. Problem: **Combustor will not start remotely.**

Solutions:
- a. System selector switch set in the man. position. Check PLC input slot 1-0 for illuminated red 120 Vac signal.
- b. No remote start signal at terminals C6 and C7. Check PLC input slot 1-1 for illuminated red 120 Vac signal.
- c. Fault reset push button was not depressed.
- d. General alarm reset control relay CR-27 did not reset. Check PLC output slot 4-7 for illuminated red 120 Vac signal.

11. Problem: **Combustor will not start in the man. position.**

Solutions:
- a. System selector switch not in the man. position. Check PLC input slots 1-0 and 1-1 for illuminated red 120 Vac signals.

12. Problem: **Combustion system will not shutdown in automatic operation.**

Solutions:

Note: During normal operation, the system selector switch is in the automatic position, and the assist air blower and pilots will shut off 5 minutes after the remote start signal is lost.

- a. System selector switch was not turned to the auto position.

b. Remote customer start signal was not turned off.
c. PLC input and/or output module may be defective or inoperative.

13. Problem: **Hydrocarbon vapor system pressure too high.**

Solutions:
a. Instantaneous hydrocarbon product loading rate is exceeding the system design conditions.
b. Liquid seal level may be too high.
c. Flame arrester FA-201 or 202 may be plugged.
d. Burner assemblies may be plugged.
e. Hydrocarbon vapor block valves MOV-201 or 202 may be partially open.

14. Problem: **Pilot will not ignite.**

Solutions:
a. Supply gas pressure to pilot mixer is too low.
b. Air inspirated pilot orifice may need adjustment or cleaning.
c. Pilot mixer may need to be cleaned.
d. Ignition rod is grounded or broken.
e. Ignition rod insulators are cracked.
f. Ignition rod wire is broken or grounded.
g. Spark plug is cracked or grounding out.
h. Flame scanner may be broken, loose, grounded, or dirty.
i. Pilot gas block valve XSV-305 did not open. See Problem No. 3, pilot gas pressure.
j. Ignition transformer IT-79 or IT-80 is inoperative or defective.
k. If the pilot gas piping was opened for maintenance, the line may contain air, therefore, allow the system to cycle several times to purge the air out.

15. Problem: **Main burner smokes.**

Solutions:
a. Assist air blower damper HCV-301 is closed too far, restricting air flow to the burner.
b. Burner mixing plates may be damaged or fallen off the burner assembly.
c. Vapor flow rate to the combustor is above the design conditions.

Note: Review Section VII, System Testing, to assist in troubleshooting the combustion control system.

VII. SYSTEM TESTING

WARNING

This equipment has 480 Vac and 120 Vac electricity that can shock or kill personnel. Extreme caution must be used when servicing this equipment.

This equipment contains hydrocarbon vapors within the explosive mixture range. Extreme caution must be used when servicing this equipment.

Preventative maintenance and repairs should only be performed by qualified service personnel who are familiar with all safety and operations procedures. Read Section II, Cautions and Warnings before proceeding with any maintenance operations.

Periodic testing of the combustion-liquid seal safety control devices is of the utmost importance to insure proper operation and safety protection for personnel and equipment. It is recommended that all system safety testing be performed only by qualified service personnel who are familiar with the operation and equipment components. Service personnel must read Section I, Cautions and Warnings, Section V, Combustor Operation, and Section VI, Troubleshooting to understand the equipment and operation in order to maintain the equipment.

Note: System testing will require that certain control instruments be removed from the liquid seal and combustor to verify correct calibration set points and operation. Controls shall be reinstalled and a complete system check should be performed to verify the proper operation of the control wiring. When performing a complete system check, **do not** simulate operation by installing jumper wires.

1. High Flame Arrester High Temperature TSH-201 or TSH-202

   a. Turn system power switch to off position.
   b. Turn system selector switch to off position.
   c. Remove switch TSH-201 from the flame arrester FA-201.
   d. Switch operation must be tested using a hot oil or water immersion bath (150°F). Do not use an open flame or torch. Damage to the liquid filled probe will occur.
   e. Reinstall switch TSH-201. Connect electrical wiring to the switch and turn on system power switch.
   f. Depress light test acknowledge push button.
   g. Depress fault reset push button to clear additional red lights.
   h. Carefully remove either of the electrical wires from the switch TSH-201.
   i. Flame arrester high temperature will illuminate red.
   j. Depress light test acknowledge push button.
   k. Reconnect the wire to switch TSH-201.
   l. Depress fault reset push button. Flame arrester high temperature light will turn off.
   m. Turn off system power switch.

2. Liquid Seal Low Pressure Switch PSL-201

a. Disconnect pressure sensing line from the liquid seal at BV-204.
b. Connect a pneumatic tester to the 1/4" tubing. The tester must not exceed 25" W.C. pressure. Damage to PI-201 may occur.
c. Turn system selector switch to off.
d. Turn on system power switch.
e. Depress light test acknowledge push button.
f. Depress fault reset push button to clear additional red lights.
g. Slowly increase pressure on the 1/4" line. Observe the red pointer on PI-201 as the pressure reads 0.5" W.C. pressure. At 0.5" W.C., pressure switch PSL-201 will close and a 120 Vac signal will input to PLC slot No. 1-6.
h. Verify the red LED light on the PLC is illuminated.
i. Turn system power switch off.
j. Disconnect tester and reconnect 1/4" tubing.

3. Liquid Seal High Pressure Switch PSH-201

a. Repeat steps a, b, c, d, and e as outlined in Item 2, liquid seal low pressure switch testing.
b. Slowly increase pressure on the 1/4" line.
c. Observe the red pointer on PI-201 as the pressure reaches 5.0" W.C. At 5.0" W.C., pressure switch PSH-201 will close and a 120 Vac signal will input to PLC slot No. 1-7.
d. Duplicate steps h, i, and j as outlined in Item 2, low pressure switch testing.

4. Liquid Seal Low Level Switch LSLL-201

a. Observe and mark the liquid level on level gauge LG-201.
b. Turn system power switch off.
c. Turn system selector switch to off.
d. Remove 8" hand hole cover on liquid seal. This will be necessary to observe and mark the liquid level above the perforated cone inside the vessel.
e. Turn system power switch on.
f. Depress light test acknowledge push button.
g. Depress fault reset push button to clear additional red lights.
h. Open drain valve BV-202 and slowly drain out approximately 4 to 5 inches of liquid until level switch LSLL-201 trips. Observe and mark the level on level gauge LG-201. The level should be above the perforated cone. If the level is not above the perforated cone, stop the checkout, and call John Zink Company.
i. Liquid seal level light will illuminate red.
j. Close drain valve BV-202.
k. Refill the liquid seal and verify the perforated cone is covered with water to the original mark.
l. Replace the hand hole cover.
m. Depress fault reset push button.
n. Turn off system power switch.

5. Assist Air Blower BL-301

a. Turn system power switch to off.
b. Turn system selector switch to off.
c. Disconnect 480 Vac electrical power to blower motor starter.
d. Open motor starter panel MS-301 to observe starter operation.
e. Remove wire from terminal C46 to motor starter coil MS-301, inside panel CE-1.
f. Turn on system power switch.
g. Depress light test acknowledge push button.
h. Depress fault reset push button to clear additional red lights.
i. Turn system selector switch to MAN.
j. Blower failure light will illuminate red.
k. Turn off system power switch.
l. Turn system selector switch to off.
m. Reconnect wire to terminal C46 for the motor starter coil.
n. Turn power on.
o. Depress fault reset push button. Blower failure light will turn off.
p. Close motor starter panel MS-301 and reconnect 480 Vac power to motor starter.

6. Flame Failure BSL-301 or BSL-302

Note: Flame safeguard system test can only be performed when the combustion system is in operation.

a. Start combustion system in hand as outlined in Section V.
b. Once the pilot gas valve opens and the pilot has ignited, check the flame relay.

    1. Open panel CE-1. Observe Honeywell flame relay. The pilot light on BSL-301 should be lit.
    2. Insert the Honeywell tester W136A-1045 in flame signal ports. Note and record the meter reading.

c. Once the flame relay has been checked, the flame safeguard system must be checked for pilot flame failure.

    1. Disconnect electrical wire from terminal X1 to u/v detector BE-301.
    2. Pilot gas solenoid valve XSV-305 will close, shutting off the pilot gas flow to the pilot.

d. The combustion control system <u>will</u> shutdown immediately on pilot failure.

    1. Pilot on light will be turned off.
    2. Pilot failure light will be illuminated red.
    3. Pilot gas solenoid valve will close.
    4. Turn system selector switch off and reconnect the electrical wire to terminal X1.
    5. Depress fault reset push button on front of panel CE-1. Pilot failure light will turn off.
    6. Turn system selector switch off.

e. Follow same procedure for BSL-302 except remove wire from terminal X3.

7. Emergency Shutdown

a. Turn system power switch off.
b. Turn system selector switch off.
c. Turn system power switch to on.
d. Depress lamp test acknowledge push button.
e. Depress fault reset push button to clear red lights.
f. Turn system selector switch to man. position.

    1. Depress remote emergency shutdown push button or remove electrical wire from terminal C10.
    2. Emergency shutdown light will illuminate red.

g. Reconnect wire to terminal C10 if previously removed.
h. Depress fault reset push button.
i. Emergency shutdown alarm light will turn off.
j. Turn system power switch off.

8. Hydrocarbon Vapor Valve MOV-201 or MOV-202

Note: Verify that liquid seal pressure PI-201 is at 0" W.C. and **no vapor flow** will be started during this test.

a. Turn system power switch off.
b. Turn system selector switch off. Open panel CE-1.
c. Remove relay CR-84 from its base.
d. Install a jumper from L1 to terminal C51.
e. Remove cover from valve MOV-201.
f. Turn on system power switch.
g. Observe MOV-201 opening.
h. Turn off system power switch when the valve is fully open.
i. Take jumper from L1 to C51 off. Install CR-84.
j. Turn on system power switch. Observe the valve closing.
k. Turn off system power switch when the valve is fully closed.
l. Re-install the cover on valve MOV-201.
m. Use same procedure for MOV-202 except remove wire from terminal C94.

JOHN ZINK® MARINE VAPOR COMBUSTION SYSTEM

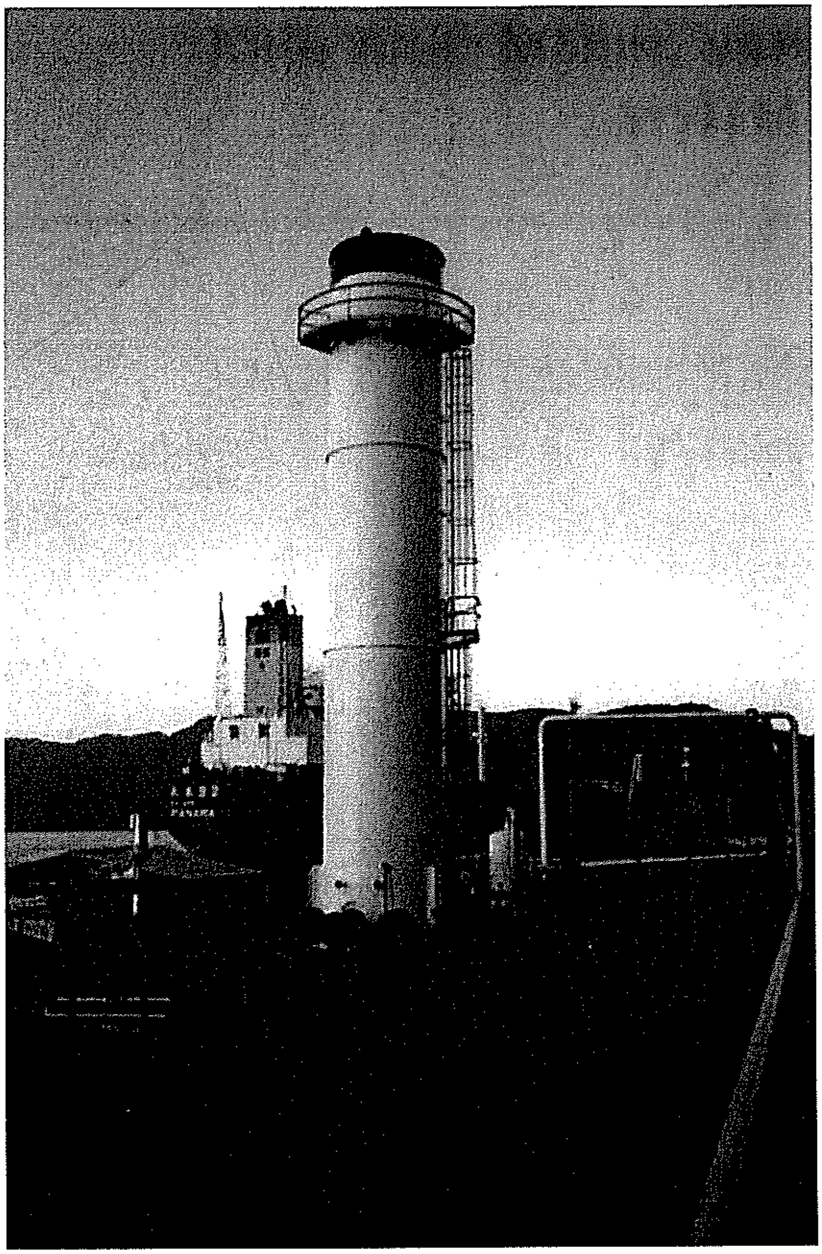


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Table of Contents

Page No.

I. INTRODUCTION 3

II. SCOPE OF SUPPLY 4

III. DESIGN BASIS 6

IV. PROCESS DESCRIPTION 9

V. EQUIPMENT SPECIFICATIONS 10

VI. PERFORMANCE GUARANTEE 18

VII. COMMERCIAL 20

VIII. CLARIFICATIONS AND EXCEPTIONS 22

IX. OWNER REQUIREMENTS AND RESPONSIBILITIES 24

X. ATTACHMENTS 26

- A. JOHN ZINK COMPANY TERMS AND CONDITIONS OF SALE 27
- B. TECHNICAL ASSISTANCE AGREEMENT 28
- C. PRELIMINARY P&IDS 29
- D. QUALITY CONTROL STANDARDS 30
- E. MARINE BROCHURE 31

I. Introduction

John Zink Company, LLC is pleased to provide this firm proposal for a JOHN ZINK® Marine Vapor Combustion System (MVCS) to be located at Omega Partners petroleum products terminal in Wood River, Illinois.

The system is designed in accordance with the appropriate sections of 33 CFR Part 154 to condition, transfer and combust the hydrocarbon vapors displaced during the loading of marine vessels. Loading will occur at two loading berths at a maximum rate of 14,000 BPH. The destruction efficiency will be a minimum of 99 percent as described in the Performance Guarantee section.

Through the execution of hundreds of vapor control projects, John Zink has developed a thorough understanding that our customers value safety, efficiency, and ease of installation, operation and maintenance in their equipment. The design of the proposed VCU incorporates several features which enhance safety, performance and reliability. John Zink also understands that, in addition to high-quality equipment, our customers value excellence in project execution and service. Purchasing a system from John Zink provides many advantages not limited to the following:

- Experienced design and project management staff dedicated to providing excellent customer service during the execution and installation phases of a project.
- In-house fabrication ability. Because John Zink owns its own 250,000 square foot manufacturing facility, we are able to assemble most systems in our own shop which allows us to better control quality and schedule. We also assemble our control panels in-house and perform a functional test of the control panel and MVCS skids prior to shipment.
- Large service organization. Our factory trained technicians provide both preventative maintenance and emergency call-out assistance 24/7.
- Spare parts inventory for quick turn arounds.
- Portable Emission Control Systems (PECS®) for temporary compliance needs.
- Installation assistance.
- John Zink proprietary anti-flashback burners. John Zink is the only VCU supplier to design and manufacture our own anti-flashback burners.
- Elimination of liquid seal. John Zink's anti-flashback burners allow for an additional level of safety so that liquid seal can be removed, reducing equipment maintenance.

II. Scope of Supply

Engineering

The following items are included as "Engineering Deliverables"

1. Process Flow Diagram
2. Piping and Instrument Diagrams
3. System pressure drop calculations
4. Natural gas enrichment requirements
5. Combustor emission data
6. Utility requirements
7. Design and specification for:
    Dock Safety Units (DSUs)
    Staging Unit (VSU)
    Vapor Combustion Unit (VCU)
8. General arrangement drawings with complete tagging and assembly information.
9. Control panel(s) and junction box schematics.
10. Electrical one line diagrams.
11. Structural design of combustor with foundation information for design by others.
12. Structural design of skids with foundation information for design by others.
13. Written operational procedure.
14. Documentation package for the John Zink design that will be used as part of the documentation package to obtain an exemption from compliance with the requirement for a liquid seal found in 33CFR 154.828(b)(1).

Equipment

The proposed Marine Vapor Combustion System (MVCS) is designed to control hydrocarbon emissions from vapors displaced during the loading of marine vessels safely and effectively. The MVCS consists of three main process units, 02 Dock Safety Units (DSUs), Staging Unit (VSU) and Vapor Combustion Unit (VCU).

DSU equipment is located on the dock. The DSU serves as protection for the marine vessels from excessive pressure, excessive vacuum, flashback, and other shore-based hazards. Vapors displaced from the marine vessel will be conditioned with natural gas to a safe composition above the upper flammable limit. The DSUs will be provided on a skid, and dual oxygen analyzers will be used to monitor the process conditions.

Vapors are transferred to the VCU via the VSU where they are thermally destroyed in a controlled manner. The control system is integrated between the three process units. Each unit includes numerous components that must interact with each other, automatically adjusting to changes in flow and composition. The MVCS uses an Allen Bradley Compact Logix programmable logic controller (PLC) to coordinate these interactions in an orderly manner. There is a PLC at the DSUs and the VCU.

The design and operation of the MVCS are strictly regulated by the U.S. Coast Guard as defined in Title 33 Code of Federal Regulations Part 154 (33 CFR 154). These regulations were promulgated on June 21, 1990 in response to the requirements in the Clean Air Act for vapor control during marine loading. The regulations did not require vapor control, but established safety requirements to prevent the marine vessel from excessive pressure or vacuum, overfilling, and fire or explosion when vapor control is used. The regulations originally addressed only the marine loading of crude oil, gasoline and benzene but have been extended to the loading of many other materials including distillates and chemicals. The regulations have not been revised to address the numerous technical complexities and new environmental regulations since they were promulgated. They have, however, been significantly supplemented by a large number of U.S. Coast Guard letters, guidelines and waivers. John Zink has been integrally involved in the evolution of these regulations and supplements and assures our customers that our MVCS will meet all U.S. Coast Guard requirements.

III. Design Basis

This design basis was developed from customer specifications and from reasonable assumptions. This basis is critical to the performance of the MVCS, and both the site-specific information and the assumptions should be thoroughly reviewed to ensure that they are accurate and acceptable.

Number of Docks .... Two (2)
Vessels Loaded .... Barges
Vessels Atmospheres .... Non-inerted
Number of Vessels Loaded Simultaneously 2
Inerted and Non-Inerted Atmospheres Loaded Simultaneously .... No

Loading Rates
Position # 1 .... 7,000 BPH
Position # 2 .... 7,000 BPH

Piping Layout (to be confirmed by customer)
DSU to VSU .... 100 feet (Pipe Size to be determined)
Vapor Line Control Pressure at the DSU Inlet .... 1.5 "WC

Products Loaded: .... Gasoline/Crude Oil/Eagle Ford Crude
Vapor Hydrocarbon Concentration (1) .... 42 mol% maximum
True Vapor Pressure (1) .... 9 psia maximum
Estimated Heat Release(2) .... 109 MMBtu/hr
Estimated Pilot Gas (3) .... 1.0 scfm natural gas for each of the 2 pilots
Vapors with Growth .... 1,638 scfm
Estimated Enrichment Gas (4) .... 702 scfm
Enriched Vapors (5) .... 2,340 scfm maximum
Estimated Assist Gas .... 100 scfm
Destruction Efficiency (6) .... 99 % minimum

Area Electrical Classification
DSU skid .... Class I, Division 2, Group D
VSU skid .... Non-Classified
Enclosure Type .... NEMA 4 X with Z Purge
Detonation Arrester Classification .... Type 1 , Group D Vapors
Earthquake Zone .... zone 4
Wind Velocity .... 120 mph
Ambient Temperature .... 40-100 ^{0}F
Electrical Power .... 480 V, 3 Ph, 60 Hz and 120 V, 1 Ph, 60 Hz
Enrichment Gas .... Natural Gas @ 30 psig minimum
Instrument Air/Nitrogen .... 120 psig(8)

rick monroe

Notes to Design Basis

1. The maximum theorretical hydrocarbon concentration corresponds to approximately 61% saturation of a liquid with a true vapor pressure of 9 psia. We use a saturation level of approximately 70% based on our barge loading experience. True vapor pressure needs to be verified by the customer. Note this is the gasoline case. Eagel Ford Crude case results in the RVP of 13.5 and concentration of 100% and the MVCU is derated to 5,600 bbl/hr.

2. The maximum heating value of the vapors displaced from vessel loading including enrichment and assist gas is assumed to be 1,389 BTU/scf in the gasoline case for design. The heating value is much higher for the Eagle Ford Crude and the MVCU cannot handle the same flow rate as the gasoline loading rate and must be derated.

3. Pilot gas is required continuously at a rate of approximately 1.0 scfm per pilot.

4. Enrichment gas is required when the oxygen concentration of non- inerted vapors is too high to be considered "safe" in accordance with 33 CFR 154.824. The amount of enrichment gas required will vary considerably based on the vapor flow rate and the oxygen and hydrocarbon concentrations. The maximum enrichment gas flow rate occurs at the beginning of the loading of a non-inert vessel.

5. The enriched vapor flow rate will vary considerably based on the loading rate and the vapor oxygen and hydrocarbon concentrations. The maximum enriched vapor flow rate occurs at the beginning of the loading of non-inerted vessels. The USCG 25 percent growth factor is included. The flow rate is calculated for vapors at 60°F and 14.7 psia at the Dock Safety Unit and will be somewhat different at other temperatures and pressures. The MVCS, however, is designed for the entire vapor temperature and pressure ranges defined in this basis.

6. Refer to the Performance Guarantee in Section V.

7. The design basis assumes that there is negligible H2S and mercaptan. Higher concentrations may require additional precautions to protect against corrosion in the stack and vapor piping.

8. Due to the cost of electic operated actuators on this application, John Zink Company hs elected to use pneumatic actuators. Electro-Hydraulic actuators can be quoted upon request.

IV. Process Description

The P&IDs attached show a typical arrangement of the control equipment required to meet Coast Guard requirements. The three major components required by the regulations are the 02 Dock Safety Units (DSUs), Staging Unit (VSU), and the Vapor Combustion Unit (VCU).

All marine transport vessels (ships/barges) used for the transportation of organic liquids, are outfitted with a vapor collection header for the containment of the organic vapors generated during the loading process. The collected vapors are routed through a vapor hose and into the Dock Safety Unit (John Zink Supply).

The Dock Safety Units are located at the dock and serves the purposes of protecting the marine vessel from fire/explosion, over and under pressure, and of conditioning the captured vapors to a nonflammable condition. At each DSU the vapors are conditioned by adding enough natural gas to the captured vapors to "enrich" the mixture to at least 170% of the upper flammability limit (UFL).

On each DSU, the vapors pass through an automatic quick closing block valve. The vapors are then routed through a Detonation Arrestor to the enriching gas mixer for addition of the natural gas. The amount of enrichment gas added is controlled throughout loading by using a Dual Oxygen Analyzer System. The mixed vapors are analyzed with the Dual Oxygen Analyzer System to verify the mixture is at least 170% of the UFL. For a non-inerted vessel, the system alarms at a concentration of 15.5% oxygen (170% of the UFL for methane in air) and shuts the loading process down at an oxygen concentration of 16.5% (150% of the UFL for methane in air).

The vapors leaving the Dock Safety Unit travel through piping (provided by others) to the VSU (John Zink Supply). The vapors first pass through the inlet safety valve. The vapors next pass through a detonation arrestor one of two staging valves and into the combustion chamber of the Vapor Combustion Unit. The combustion process is aided in the combustion chamber by an assist air blower which provides part of the stoichiometric air necessary for combustion as well as providing mixing energy for efficient, smokeless operation. The remaining air required for combustion and for quenching is controlled via temperature by the natural draft dampers located at the bottom of the stack. The combusted vapors exit the VCU to the atmosphere.

V. Equipment Specifications

The proposed Marine Vapor Combustion System (MVCS) is provided in modular packages to allow for convenient field installation and to provide adequate equipment spacing for ease of operation and maintenance.

The Dock Safety Units (DSUs) and the Staging Unit (VSU) will be furnished as separate skid mounted assemblies. The dock is required to have a "control station" and therefore an operator control panel is mounted on the dock safety skid. The "main" control panel is included and mounted on the VSU. The equipment is described in detail below. All sizes, dimensions and specifications are preliminary and may be changed in final engineering.

Marine Dock Safety Units (DSUs) Components

Each DSU is designed to handle the vapors from loading up to 7,000 BPH. The DSUs are expected to be installed in a hazardous area. The main DSU components are described below.

Pressure / Vacuum Relief Valve
One pressure / vacuum relief valve in accordance with 33 CFR 154.814 will be provided to help protect the marine vessel from excessive pressure from a faulty enrichment system. The valve is equipped with flame screens.

We do not know how long the piping is from the dock to the vapor combustor. Thus we have sized the dock safety skids very conservatively. We would be happy to revise our proposal to reflect the next smaller size dock safety skid, if the distance is short between the dock safety skid and the combustor.

Detonation Arrester
A 10" detonation arrester in accordance with 33 CFR 154.822 is required for each loading spot to help protect the marine vessel from fire and explosion. It is a passive device that uses the element to extinguish a flame by absorbing its heat and is designed to withstand the velocities and high pressures that occur in a detonation. The arrester is designed for group D vapors and is constructed with a carbon steel body and a stainless steel element. A high temperature shutdown device is provided on the element face to detect the presence of a flame on the face of the element. The element is removable for cleaning and inspection.

Cartridge Filter
A cartridge filter with 10" 150 # flanged connections designed to remove rust and scale that may be accumulated in the vessel's vapor piping system is included to reduce the maintenance chore of cleaning the detonation arresters. The filter is designed to remove

98% of particulates that are greater than 10 microns. The cartridge filter is designed as an ASME Sec VIII Div 1 vessel and fabricated from carbon.

Vapor Piping System

A carbon steel vapor piping system in accordance with 33 CFR 154.810 will be provided for the introduction of vapors into the DSU. It consists of a facility vapor connection, a vertical vent pipe for the pressure relief valve effluent, an automatic isolation valve and a manual isolation valve.

Instrumentation

Pressure instruments in accordance with 33 CFR 154.814 are provided for the measurement of the vapor pressure. The instruments include a dual pressure transmitter for pressure control as well as high/low pressure warning and shutdown, a differential pressure transmitter for backflow detection, temperature element for high temperature alarm and shutdown, and pressure/temperature gauges for local indication.

Instrument Air Header

A galvanized instrument air header with local pressure indication and individual manual shut off valves to each individual instrument air user is furnished.

Oxygen Analyzer System

One paramagnetic oxygen analyzer system in accordance with 33 CFR 154.824 will be provided to sample and analyze the oxygen content of the vapors and send a signal to the enrichment gas controller. The system consists of two oxygen analyzers, a common pumped sampling system with sample low-flow shutdown and a local indicator. The analyzer electronics are suitable for a hazardous area however the complete oxygen analyzer system will be provided in a NEMA 4X enclosure for weather protection.

Enrichment Gas System

One carbon steel enrichment gas system in accordance with 33 CFR 154.824 will be provided for the DSU to add the fuel gas necessary to ensure the vapors are not in the flammable range. The system consists of the piping and components needed to control the flow including a regulator, strainer, pressure gauge, control valve, shutdown valve, and manual valves. The system also includes a proprietary mixer to ensure the enrichment gas is thoroughly distributed in the vapor piping.

Vessel Overfill Panel

A vessel overfill panel in accordance with 33 CFR 154.812 will be provided to alarm and shut down the MVCS if the marine vessel is overfilled at each facility connection. They are intrinsically safe and will be supplied with a 100 foot long cable for connection to the vessel.

Pressure Test Panel

A test panel will be provided to help perform the testing of the pressure alarms and shutdowns required by 33 CFR 154.880. The panel is permanently installed and consists of the components and instruments needed apply pressure and vacuum to the appropriate instruments in order to verify proper calibration and operation as required by USCG.

DSU Skid

The structural steel skid will be fabricated in accordance with AWS D1.1 and will be constructed of A36 carbon steel.

Vapor Staging Unit (VSU) Components

The Staging Unit (VSU) contains all the auxiliary and safety equipment required for the Vapor Combustion Unit (VCU). The main components are described below.

Vapor Piping System

A carbon steel vapor piping system in accordance with 33 CFR 154.828 will be provided for the introduction of the vapors into the VSU.

Liquid Seal

Note:

A liquid seal in accordance with 33 CFR 154.828 is not provided as part of the package. Documentation will be provided to assist with the Coast Guard exemption process to operate without a liquid seal vessel. Requirements of the liquid seal vessel exemption will be supplied. The exemption with an appropriate "equivalent of safety added to the system has become standard operating procedure for the USCG when utilizing John Zink proprietary anti-flashback burners and should only be a formality.

Vapor Isolation Valves

A 12" 150 # wafer style high performance butterfly valve is located upstream of combustor detonation arrester is provided with a pneumatic actuator to serve as a portion of the double combustor isolation valves required by the USCG. The second portion of the required double isolation is achieved with two similar valves that are downstream of the combustor detonation arrester located in parallel lines directing the vapors to different burner stages in the combustor.

During operation each of the two parallel valves leading to the burners is opened and closed based on the vapor flow rate. These valves are 8" 150 # wafer style fire safe butterfly valves and are provided with a pneumatic actuator.

Detonation Arrester

A 12" detonation arrester in accordance with 33 CFR 154.822 is required to help protect the marine vessel from fire and explosion. It is a passive device that uses the element to extinguish a flame by absorbing its heat and is designed to withstand the velocities and high pressures that occur in a detonation. The arrester is designed for group D vapors constructed with a carbon steel body and a stainless steel element. A high temperature shutdown switch is provided on the element face to detect the presence of a flame on the face of the element. The element is removable for cleaning and inspection.

Pilot System

A carbon steel pilot gas system will be provided to control the pilot gas flow including a strainer, regulator, pressure gauge, shutdown valve, high- and low-pressure shutdown switches, and manual valves.

Assist Gas System

Assist gas will be added to the waste vapor stream to control temperature. For non-inert vessels, it is not anticipated that assist gas will be required as the enrichment gas added at the DSU will provide the heat release necessary to maintain the VCU at a sufficient temperature. However, assist gas is provided for low flow conditions or for any pre-heat requirements if applicable. A carbon steel assist gas system will be provided to control the assist gas flow including a regulator, pressure gauge, shutdown valve and manual valve.

VSU Instrumentation

Instrumentation provided on the VSU includes:

- Temperature elements for each combustion stage
- Temperature element for detonation arrestor
- Differential pressure transmitter for backflow detection across detonation arrestor
- Pressure switch on vapor manifold for staging burners on/off and maintaining burner exit velocities at levels conducive for safe and stable combustion

VSU Skid

The structural steel skid will be fabricated in accordance with AWS D1.1 and will be constructed of A36 carbon steel.

Control System

The Marine Vapor Control System will be controlled by a programmable logic controller (PLC) and analog controllers. The main PLC unit will be located in the VCU control panel located on the VSU. A remote PLC will be located at the DSU. The use of the remote PLC units allows nearly all of the extensive wiring between the DSU and VCU to be replaced with communication cables. The primary operator interface for the operation of the Vapor Control Combustion System will be at the DSU control panels. An auxiliary operator interface for the operation of the VCU will be provided at the VCU control panel. Analog controllers will be used for the oxygen content, vapor pressure and combustor temperature control functions. Independent controllers will be provided for the fuel gas and quench air, which will allow a lower temperature set point to be used for the fuel gas. Motor starters for the assist air blower and an ignition transformer enclosure will also be located on the VSU. All enclosures will be NEMA 4X except as noted and will be purged as necessary to meet the area classification. The electrical design and construction is in accordance with NFPA-70 of the NEC, except for Article 515, Table 515-2.

Vapor Combustion Unit (VCU)

The VCU consists of an enclosed vapor combustor sized to handle the vapors from the loading of a barge at a rate of 20,000 BPH to be installed in a non-hazardous area. It is a self-supported vertical stack that uses natural draft to provide combustion and quench air.

Mechanical Design

The combustor has a diameter of 11 feet and an overall height of 50 feet. Two, 2" sample ports, one sight glass per stage, various instrument and component connections, lifting lugs, and ladder and platform clips are provided.

The design conditions used are a shell temperature of 500 °F, MDMT of –20 °F and no corrosion allowance. Material of construction is A-36 carbon steel welded in accordance with AWS D1.1.

The structural design is as follows

Earthquake .... Zone 4
Wind Velocity..ASCE 7-02 120 mph

Other Combustor Features

Refractory:

Ceramic fiber refractory with Inconel pins and keepers will be provided in the enclosed combustor to protect it from the radiation and high temperature of combustion. This refractory does not require curing and does not limit the combustor heat-up or cool-down rates. A rain shield is installed on the top edge of the refractory to help protect it from the weather. The hot face temperature rating of the ceramic fiber is 2400 °F.

Anti-flashback Vapor Burners:

Two (2) combustion stages each equipped with three (3) 8" stainless steel anti-flashback burners will be provided for the introduction of the marine vapors into the combustion chamber. These proprietary burners help prevent flashbacks into the vapor piping by using technology similar to that used in flame and detonation arrestors.

Assist Air Blower:

A tube-axial assist air blower will be provided for each stage to ensure the vapors are combusted quickly and efficiently. The assist air helps ensure smokeless operation by using a part of the combustion air to enhance mixing. It also cools the burners and extends their operating life. A 3 HP 480 V TEFC motor drive each blower. The assist air blowers has a manual inlet damper that can be used to fine tuning of assist air flow.

Quench Air Damper(s):
Two Quench air damper(s) with an automatic actuator will be provided to introduce combustion and quench air into the combustor. The damper blades operate in an opposed manner to maximize the control with the low available differential pressure. The damper frame is galvanized carbon steel, and the blades and bearings are stainless steel. The damper is hinged for easy entry to the inside of the combustor.

Pilot Gas System
One high-efficiency pilot will be provided for each section of vapor burners to ensure that a stable, continuous ignition source is available for each stream. The pilots inspirate air from outside the combustor and mix it with fuel gas to provide a pre-mix stream to the tips. Fuel gas use is approximately one scfm per pilot due to the high efficiency design. An automatic ignition assembly will be provided.

Instrumentation

- One ultraviolet flame detector for each pilot. The detectors are used to ensure that the pilots have stable flames.

- The combustor will have two thermocouples near the exit of the exhaust. One is used to control the assist gas / quench air dampers and the other is used as a safety shutdown.

John Zink Fabrication Standards

Piping
Vapor piping is carbon steel and is built to ANSI B31.3 150# class. All piping 1.5" and smaller to be SCH 80, piping greater than 1.5" to be schedule 40. All piping connections greater than 2" will utilize 150# flanges; small-bore piping will have NPT connections with appropriately positioned unions to facilitate maintenance.

Paint
Piping, stack, vessels will have a commercial blast surface preparation (SSPC-SP-6) and three coat system as required in customer specification

Structural skids will be galvanized.

Components with a manufacturer's finish coat will not be painted. Components that could be damaged by blasting such as valves will be hand-tool cleaned (SSPC-SP-2) instead of blasted. Sherwin-Williams products are used.

Estimated Equipment Dimensions and Weights

Dock Safety Units (DSUs) Qty 02:	10'-6" wide X 15'-6"long 11,000 Lbs each

Vapor Staging Unit (VSU):	12' wide X 26' long 22,000 Lbs
Vapor Combustion Unit:	11' OD X 50' OAH 34,250 Lbs

VI. Performance Guarantee

John Zink Company guarantees the performance of the proposed vapor combustion unit to produce a maximum 99% reduction in the total hydrocarbon vapor emissions routed through it based on the following:

1. The equipment is transported, stored, installed, operated, and maintained in compliance with manufactures' operating and maintenance guidelines (including operation records), accepted good industry practices, and within conditions as defined in "Design Basis" of this proposal.

2. Total hydrocarbons include evaporative hydrocarbon emissions naturally occurring during the marine loading of products listed in the Design Basis, plus natural gas added for enrichment or assist gas.

3. The use of natural gas for pilot, enrichment, and warm-up gas.

4. Determination of hydrocarbon emissions shall be measured according to the EPA Reference Methods 2A, 2B, 25A & 25B or any other equivalent test method acceptable by John Zink.

5. Emissions measurements shall be averaged over at least the last 50% of the total liquid cargo loaded. In addition, the hydrocarbon concentration of the inert vapor shall be within the minimum and maximum limits stated in the Design Basis.

6. John Zink Company is responsible only for those emissions that pass through the vapor control device supplied by John Zink.

7. The process guarantees apply only to the time period when loading is occurring. System purge, stack heat up, etc. are not included as part of the process performance test.

8. The performance guarantee as stated above is the only performance guarantee offered. Values stated for other parameters are good faith estimates and not to be construed as performance guarantees.

9. Any defects are reported immediately to John Zink.

10. Performance testing shall be conducted by customer within sixty (60) days after the equipment has been placed in operation. John Zink Company shall be notified in writing prior to the test so that their representative may be present. It shall be the customer's responsibility to maintain equipment in good working order prior to and during the testing. Performance testing is the Customer's responsibility. However, if due to no fault of John Zink Company the equipment cannot be put into operation or

for other reasons not tested within 12 months after equipped is ready to ship, then the Performance Guarantee shall be deemed to have been met for any and all purposes.

11. Should the equipment not meet the Performance Guarantee, John Zink and the Customer shall jointly determine, in accordance with recognized engineering procedures and practices, whether the failure is a result of a design deficiency. If it is established that the equipment failed to meet the Performance Guarantee and such failure is due to design deficiency, John Zink will take such action as it may determine necessary to correct the equipment to meet such guarantees. Customer agrees to give John Zink free and necessary access to the equipment when requested for the purpose of making correction.

12. The Performance Guarantees shall terminate 18 months after the date that the equipment is available for shipment or one year after start-up, whichever occurs first (the "Guarantee Period").

AMERICAN HEATING COMPANY

1200 Route 46 ♦ Clifton, New Jersey 07013
Phone (973) 777-0100 ♦ Fax (973) 777-4693
www.americanheatingco.com

November 13th, 2012

To: Chris Pelligreen	Company / Location	Ship To
(P) 314-744-3310	Omega Partners Hartford LLC	Omega Partners Hartford LLC
(F)	540 Maryville Centre Drive, Suite 340	1402 S. Delmar Avenue
chris@omegapartnersllc.com	St. Louis, MO 63141	Hartford, IL 62048
	Attn: Chris Pelligreen 314-744-3310	Attn: Joe Evans 618-254-0603

Proposal:	**MI-092412Mrev2**
Type:	**Firm**
Purchase Order:	**OPH/Heating System11-13-12**

Dear Chris,

Thank you for your inquiry and request for quotation. Based on the information provided, we are quoting our unique **20 MM Btu/hr** high efficiency serpentine coil design heater with convection section.

For your specific application, our serpentine coil design has an 88% L.H.V. efficiency versus a 78% L.H.V. efficiency from a helical coil design. The fuel savings alone will pay for the heater in approximately 1 year. The more robust serpentine coil design also provides longer tube and insulation life, longer fluid life, and many other benefits that will be enumerated on the following pages.

We at American Heating Company pride ourselves in providing a superior designed product at a highly competitive price.

Please let us know how we may continue to be of service to you on this or any other project. Please refer to the attached documentation concerning the specifics of our design.

Yours Truly,

Matt Corry
American Heating Company
518-275-7805
mcorry@americanheatingco.com

AMERICAN HEATING COMPANY

BENEFITS OF AHE-2000

A. Higher Efficiency - The serpentine coil design has an efficiency of 88% L.H.V., based on a hot oil temperature of 450F, while the helical coil will have an efficiency of 78% L.H.V. The 24 MM Btu/hr Serpentine Heater operating at 8,000 hours per year will pay for itself in approximately one year.

B. Lower Film Temperature - It is known per API Standard Practice 530 and proven by thousands of serpentine coil designed heaters in the field, that the serpentine coil will have lower film temperatures by as much as 50°F over a helical coil. With the space between the tubes of the serpentine coil, the radiant heat will be transferred to the front, sides and back of the tube as opposed to the tightly-wound helical coil where the heat is transferred only to the front part of the tube.

C. Longer Fluid Life – The majority of heat transfer fluid degradation takes place within the film layer in the tubes of the heater combustion chamber. The lower film temperatures reduce the degradation rate thus increasing fluid life. A general rule of thumb in the Heat Transfer Fluid industry, is that every 40°F lower in film temperature, decreases the degradation rate by half.

D. Higher Fluid Outlet Temperatures – The lower film temperature also provides the flexibility to achieve higher fluid outlet temperatures without risking damaging the fluid.

E. Lower Firebox Temperature / Longer life - The serpentine coil design allows for a larger combustion volume in the radiant section. This will give lower radiant chamber temperatures than the helical coil, allowing the coils and insulation longer life.

F. Coil Replacement – The lower combustion chamber temperature, along with the serpentine design configuration, helps avoid the need to replace the heater coil. We have hundreds of hot oil heaters that have been running for years without any issues with the tubes. This is unlike helical coil designs, where it is typical to have issues with the coil after several years of service.

Though unlikely, if a section of the coil needs to be repaired, you can simply repair the section of pipe with common sch.40 tube, which should take less than a day. There should never be a need to replace the entire coil. In contrast, a helical coil heater has to have its entire coil replaced if there is a tube problem. The helical coil has to be special ordered and may take weeks if not months to deliver The serpentine design has saved customers thousands of dollars in avoided downtime waiting for a new helical coil to arrive.

G. Field Workability - The serpentine heater is designed with removable front heads that allow easy access to the heater coil and skids to help slide the coil out of the firebox. The horizontal configuration makes this a simple task.

H. Thermal Expansion Due To Heating - Due to the use of return bends in the serpentine design, the coil is designed to take all the internal thermal expansion within the confines of the radiant section. The thermal expansion in the serpentine coil will be in one direction in contrast to the helical coil which will experience thermal expansion in all directions. This will cause the helical coil to fatigue over time causing possible tube failure and loss of efficiency.

I. Tube Wall Thickness - Although the helical coil and serpentine coil both use Schedule 40 tubes, the actual tube wall thickness in a helical coil is considerably less than Schedule 40 in parts of the coil due to the bending process used in manufacturing the helical coil. The coil is susceptible to tube failure in parts of the wall that have been thinned. Since the Serpentine design does not have bent tubes this is not a concern.

J. Avoids Fluid Overheating – Our design, as should all heater designs, has the full flow of hot oil going through the heater coil. Some vertical helical coil designs have part of the hot oil flow diverted around the heater with only some of the hot oil going through the heater. The hot fluid is then combined with the cold fluid to achieve the desired outlet hot oil temperature. This scenario can cause the actual temperature of the oil in the heater to be at least 40°F higher than the desired outlet temperature.

AMERICAN HEATING COMPANY

SYSTEM PARAMETERS: AHE-2000

HIGH EFFICIENCY-THERMAL FLUID HEATER

Capacity:	20,000,000 Btu/hr
Circulation Rate:	900GPM
Inlet Temp:	420°F
Outlet Temp:	520°F
Thermal Fluid:	Therminol 55
Coil Connection:	6"
Number of Circuits:	2 flow pass
Input (LHV):	22,700,000 Btu/hr
Calculated Efficiency	88%
Plant Elevation	Sea Level
Heater Orientation	Horizontal
Location:	Outdoors
Panel:	NEMA 4
Controls:	NEMA 4
Nitrogen:	None
Electric:	460V/3PH/60Hz

BURNER

Manufacturer	IC Burner or equivalent
Model:	----
Turndown:	4:1
Modulation:	Yes
Low Nox:	No
Fuel:	Natural Gas

EXPANSION TANK (Highest Point)

Type	CS
Volume:	3,000 ~~2000~~ gal

Customer to confirm size requirement

PUMP

Model:	Dean – RA3000
Number:	---
Cooling:	Ambient Air
Head Design:	30psig

FUEL TRAIN

UL Standard

PHYSICAL DATA

Equipment	Dimensions (Approx.)	Mounting
Heater	35"L x 9'-3"W x 9'-8"H	Skid
Panel	TBD	Back of Heater
Pump & Motor	TBD	Separate Skid
Burner	Outdoor	Front of Heater
Tank	TBD	Mount in Field

EFFICIENCY COMPARISON

Type of Heater	Required Input	To Process
Helical Coil Efficiency 75%	26,667,000 Btu/hr	20,000,000 Btu/hr
Serpentine Efficiency 88%	22,727,000 Btu/hr	20,000,000 Btu/hr
Savings =	3,940,000 Btu/hr	

1 YEAR SAVINGS = 3.94 MM Btu/hr * 8000 = **31.5 Billion BTU/year**
5 YEAR SAVINGS = **157.5 Billion BTU's**
10 YEAR SAVINGS = **315 Billion BTU's**

AMERICAN HEATING COMPANY

DETAIL DESCRIPTON: AHE-2000

HEATER

Our recommended heater for your application is our High Efficiency Serpentine coil design with finned tube convection section.

- Carbon steel shell and heads ¼" thick
- Serpentine coil design
- Two flow pass of 4" tubes Sch. 40 A-106 GrB tubes
- Seamless pipe designed to API-530
- Heater coil hydro-tested per ASME code and code stamped to ASME Section VIII and National Board Registered.
- Tube seals at terminal connections
- Finned convection section
- 6" flanged inlet and outlets
- Stainless steel tube supports and runner
- Internal ceramic fiber insulation 4" thick
- Attached stub stack
- Lifting lugs
- Designed for outdoors
- Control panel with annunciator lights – NEMA 4 components
  - High stack temperature shut off switch
  - Expansion tank low level safety switch
  - Low flow shut off switch
  - High fluid temperature shut off switch

BURNER

An Industrial Combustion or equal, Natural Gas with automatic temperature control and flame safeguard. The burner will conform to UL standards. Fuel train will be pre-piped and prewired and will ship loose for field installation by others. We require 5 psig to our gas train. Turn down will be 4:1.

- Blower is integral with burner
- Propane pilot
- UV Flame detection scanner for proving flame
- Combustion air blower designed for outdoor service
- Combustion air duct with damper and modulation motor containing low/high fire proof switches
- Locally mounted low combustion air pressure switch.

PILOT GAS FUEL TRAIN

Pilot gas fuel train supplied to typical UL requirements. Fuel train controls will meet NEMA 4 requirements and will consist of NPT connections.

- Pressure regulator
- Solenoid safety shutdown valve
- Manual ball valve (UL listed)

ELECTRIC CONTROLS

The heater is provided with a NEMA 4 electric enclosure in addition to the panel on the burner. The enclosure utilizes the Honeywell UDC-3200 digital temperature controller with modulating burner that includes touch safe design and solid state components. The high fluid and stack limit switches are discrete units separate from the temperature controller. The enclosure includes the following:

- Panel door fuse disconnect
- Starter with protection for blower
- Step-down transformer for 120 volt control circuit
- Control relays
- Honeywell UDC digital temperature controller. Controller has low fire hold capabilities through manual adjustment

- High fluid temperature limit switch (digital) with manual reset
- High stack temperature limit switch (digital) with manual reset
- Indicating light for alarm off - on
- Switches for burner off - on, pump off - on and alarm off - on.
- Fireye E-110 burner management system or equivalent burner management system

Locally mounted instruments:

- Low / high thermal fluid differential pressure switch for low flow shutdown
- Inlet / outlet pressure gauge with isolation valve
- Thermal fluid outlet thermocouple

<u>HOT OIL PUMP AND MOTOR</u>

One 900gpm centrifugal pump and motor designed to pump through the heater and system. It will ship loose on a common base plate with the motor for field installation by others. All interconnecting piping and valves between the heater and pump is by others.

<u>EXPANSION TANK</u>

At this time we have quoted a ~~2000~~ 3,000 expansion tank designed for atmospheric conditions. Customer is to provide the system hot oil volume so we can correctly size the tank. Tank should be installed at the highest point in the system by others

<u>NOTES</u>

- An expansion tank and hot oil pumps are included.
- Honeywell UDC-3200 Controller with full modulation capabilities is included. This will ensure proper operations at all conditions.
- Heater is supplied as a flange to flange unit. All interconnecting valves and piping will be by others.
- Unit is designed for outdoors.
- Blower and pump motor starter is included.
- A stub stack is included.
- This unit is designed to AHC standards only.

Steam Generator

The unit is built to ASME Code, Section VIII Division 1, inspected and certified. The **600HP** steam generator will produce **20,000lb/hr** of **150PSIG** steam using **900gpm** of **520°F** heat transfer fluid (hot oil). We designed this unit with Stainless Steel tubes and have included all the necessary trim to operate the unit

Trim Package Includes:

1. 2-way pneumatic hot oil control valve with panel.
2. Water column with primary low water cut out and feed water pump on/off control.
3. Pressure limit control.
4. Two (2) pressure relief valves.
5. Auxiliary low water probe and relay.
6. Feed-water stop and check valves.
7. Bottom blow down valves.
8. Surface blow down valve.
9. Insulation and aluminum sheathing.
10. Control Panel (110V).

Note:

1. 30-40 PSIG Plant air is required for the pneumatic 2-way hot oil control valve.

AMERICAN HEATING COMPANY

High Pressure Condensate Return System

I am pleased to offer this quotation for a High Pressure Condensate Return System. This system utilizes a higher pressure design to save energy, feed water and overall equipment costs. The key to the system is that it holds the return condensate above its flashpoint.

By avoiding flashing the system avoids losing valuables BTU's as well as the treated water itself. This saves energy, make up water and water treatment chemicals. It also saves electric cost since smaller motors and pumps are utilized in this system. Additionally a Deaerator system and feed water preheater is not necessary with a High Pressure Condensate System.

Note: Condensate system is designed to support three (3) 600HP Steam Generators.

High Pressure Condensate Return System Includes the following:

1. 2,000 Gallon AMSE Section VIII high pressure condensate tank with all internals.
2. 2 inches of insulation and aluminum sheathing.
3. Control Panel (460V) including the following:
    - Two (6) Motor Starters.
    - Control Transformer
    - ON/OFF Switches
    - Indicator Lights – pump on/off
    - 460V stepdown to 110V for pumps
    - Disconnect in Panel
4. Level Control.
5. Shut Off Control.
6. Make Up Water Pump (Booster Pump).
7. Steam Regulator.
8. Sight Glass with Float Chamber.
9. Two (6) Feedwater Pumps. (2 pumps per steam generator)
10. Suction discharge strainer and valves.
11. Two (2) pressure relief valves (Kunkle).
12. Two (2) chemical feed pumps.
13. Dual operating water conditioning system.
14. Blow down separator including an automatic after cooler.

The High Pressure Condensate Return Tank and above describe components will be installed on the tank and entire package will be installed on a skid.

Tank Coil Heating System

80D Tank

We are quoting Six (6) coils Model Number ATC-2-6-20 Sch.80 (ECF Design). This is a special custom design for ECF and their customer only. The coils are design with heavy duty Schedule 80 piping elongated legs and an increased pad for the coils. Each aspect of the design reduces installation cost and reduces the overall project cost.

Each coil will consist of six (6) 2.0" IPS Sch. 80 tubes designed with 3 fins/inch. The fins are helically wound and will be ¾" high and .05" thick. This will give you a total of 3,000ft^2 of heating surface for your tank. .

NOTES

1. Price is based on FOB Beggs, OK.
2. All piping is Sch 80.
3. All coils are made with helical wound carbon steel fins. The tubes will be constructed out of seamless A-106-GrB material
4. Mechanical design of the coils will be 550°F with 150psig and hydro tested to 225psig.
5. Coils will be supplied per this proposal only. Coils are of the manufacturer's standard design.
6. Sales tax is not included in our price.
7. **Coils will fit through a 30" manway.**