Equistar Chemicals, L.P. (Equistar) owns and operates Olefins Unit (OP2) in Channelview, Harris County, Texas. The unit's emissions are authorized by New Source Review (NSR) Permit No. 2933 and various Permits by Rule (PBR) authorizations. The facility operates under the Federal Operating Permit number O1426, and is associated with the Texas Commission on Environmental Quality (TCEQ) account number HG-0033-B, Customer Number CN600124705 and Regulated Entity RN100542281.

1.1 Process Description

The OP2 Unit consists of cracking furnaces, where pyrolysis (cracking by heat) occurs, fractionation equipment to separate and purify the raw products, catalytic reactors to convert some by-products, heat exchangers to control process temperatures and provide energy efficiency, liquid pumps and gaseous compressors. Additionally, there is utility equipment to support utilities to the olefins process operations.

Cracking & Quench (C&Q) is the front-end of the unit where feedstock is cracked into smaller chain molecules, and initial fractions are produced. The cracking furnaces (EPNs: 44HTHRTRS, EF4419) accommodate a variety of feed stocks. Liquid feeds to the cracking furnaces are generally pumped into tankage (EPNs: 49E01 – 49E07) and then routed to the cracking furnaces. Natural gas liquids can be fed directly to the furnaces from pipelines. The effluent from the cracking furnaces is directed through heat exchangers to halt the reactions and recovery energy. The stream, generally referred to as cracked gas, is then directed to the compression and fractionation step.

The cracked gas then goes through a series of compression and fractionation steps where the primary products, ethylene and propylene are separated from the by-products. The by-products are also fractionated into several different by-product streams, such as ethane, propane, C4 products, C5 products, pyrolysis fuel oil, pyrolysis gasoline and other higher carbon hydrocarbons. Methane and hydrogen removed from the cracked gas is used as fuel gas for the fired sources within the unit. Acetylene in the cracked gas is converted to ethylene and ethane in the Acetylene converters and methyl acetylene/propadiene (MAPD) in the cracked gas is converted to propylene and propane in the MAPD converters.

The DPG equipment processes pyrolysis gasoline feed. In the DPG equipment, the di-olefins are converted to mono-olefins. The effluent from these reactors is sent to other units at the site for further fractionated into light and heavy gasoline fractions.

The Acetylene, MAPD and DPG converters are regenerated through a common stack (The converters (EPN: 44E10) are regenerated using the Regen Heater (EPN: 47E03).

Process water is used as steam within the unit (EPNs: 44PVD4420 and 44FUGSTM). Purchased steam is also used within the unit and superheated using the Superheaters (F480001 A/B). Cooling water is supplied by a closed loop system between the Cooling Tower (EPN: 48E11) and heat exchangers.

1.2 Project Description

The facility will make several piping modifications to install additional isolation valves, upgrade metallurgy, improve safety systems, improving back-up equipment availability and modify existing piping configurations. The facility will add product gasoline into the existing heavy py-gas tank, TK-4921 (EPN 49E12). There are no upstream or downstream impacts to equipment or process related to these piping and fugitive component changes and tank change of service. Summary of the Criterial Pollutants (Table 1a) is identified on the Emissions Summary Tab in the included 30 TAC 106.261 & 106.262 PBR Workbook.

The facility is located in the Houston/Galveston/Beaumont Area, which is classified as severe non-attainment for ozone. Increase in actual emissions will be less than 5 tpy of volatile organic compounds (VOC). The project does not trigger a review of federal permitting requirements.

1.3 Project Emission Summary

The following table summarizes the cumulative change in emissions as a result of the projects.

Table 1-1: Emissions Summary

EPN	Pollutants	Potential to Emit	
		(lb/hr)	(tpy)
F44E00	VOC	0.90	3.95
49E12	VOC	0.78	0.97

Emissions are also summarized on the Table 1(a) equivalent Emission Summary tab in the attached PBR Workbook. Emissions calculations for the criteria pollutant fugitive emissions are included in this PBR application.

Texas Commission on Environmental Quality
Permit by Rule Applicability Checklist
Title 30 Texas Administrative Code § 106.4

The following checklist was developed by the Texas Commission on Environmental Quality (TCEQ), **Air Permits Division**, to assist applicants in determining whether or not a facility meets all of the applicable requirements. Before claiming a specific Permit by Rule (PBR), a facility must first meet all of the requirements of **Title 30 Texas Administrative Code § 106.4** (30 TAC § 106.4), "Requirements for Permitting by Rule." Only then can the applicant proceed with addressing requirements of the specific Permit by Rule being claimed.

The use of this checklist is not mandatory; however, it is the responsibility of each applicant to show how a facility being claimed under a PBR meets the general requirements of 30 TAC § 106.4 and also the specific requirements of the PBR being claimed. If all PBR requirements cannot be met, a facility will not be allowed to operate under the PBR and an application for a construction permit may be required under 30 TAC § 116.110(a).

Registration of a facility under a PBR can be performed by completing **Form PI-7** (Registration for Permits by Rule) or **Form PI-7-CERT** (Certification and Registration for Permits by Rule). The appropriate checklist should accompany the registration form. Check the most appropriate answer and include any additional information in the spaces provided. If additional space is needed, please include an extra page and reference the question number. The PBR forms, tables, checklists, and guidance documents are available from the TCEQ, Air Permits Division website at: www.tceq.texas.gov/permitting/air/nav/air_pbr.html.

1. 30 TAC § 106.4(a)(1) and (4): Emission Limits	**Answer**
List emissions in tpy for **each** facility (add additional pages or table if needed):	
Are the SO_2, PM_{10}, VOC, or other air contaminant emissions claimed for **each** facility in this PBR submittal less than 25 tpy?	☒ YES ☐ NO
Are the NO_x and CO emissions claimed for each facility in this PBR submittal less than 250 tpy?	☒ YES ☐ NO
If the answer to both is "Yes," continue to the question below. If the answer to either question is "No," a ***PBR cannot be claimed****.*	
Has any facility at the property had public notice and opportunity for comment under 30 TAC Section 116 for a regular permit or permit renewal? (This does not include public notice for voluntary emission reduction permits, grandfathered existing facility permits, or federal operating permits.)	☒ YES ☐ NO
If "Yes," skip to Section 2. If "No," continue to the questions below.	
If the site has had no public notice, please answer the following:	
Are the SO_2, PM_{10}, VOC, or other emissions claimed for **all** facilities in this PBR submittal less than 25 tpy?	☐ YES ☐ NO
Are the NO_x and CO emissions claimed for all facilities in this PBR submittal less than 250 tpy?	☐ YES ☐ NO
If the answer to both questions is "Yes," continue to Section 2.	
If the answer to either question is "No," ***a PBR cannot be claimed****. A permit will be required under Chapter 116.*	

Texas Commission on Environmental Quality
Permit by Rule Applicability Checklist
Title 30 Texas Administrative Code § 106.4

2. 30 TAC § 106.4(a)(2): Nonattainment Check	Answer
Are the facilities to be claimed under this PBR located in a designated ozone nonattainment county?	☒ YES ☐ NO
If "Yes," please indicate which county by checking the appropriate box to the right.	
(Moderate) - Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller counties:	☒ HGB
(Moderate) - Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant, and Wise counties:	☐ DFW
If "Yes," to any of the above, continue to the next question. If "No," continue to Section 3.	
Does this project trigger a nonattainment review?	☐ YES ☒ NO
Is the project's potential to emit (PTE) for emissions of VOC or NO_x increasing by 100 tpy or more?	☐ YES ☒ NO
PTE is the maximum capacity of a stationary source to emit any air pollutant under its worst-case physical and operational design unless limited by a permit, rules, or made federally enforceable by a certification.	
Is the site an existing major nonattainment site and are the emissions of VOC or NO_x increasing by 40 tpy or more?	☐ YES ☒ NO
If needed, attach contemporaneous netting calculations per nonattainment guidance.	
Additional information can be found at: www.tceq.texas.gov/permitting/air/forms/newsourcereview/tables/nsr_table8.html and www.tceq.texas.gov/permitting/air/nav/air_docs_newsource.html	
*If "Yes," to any of the above, the project is a major source or a major modification and **a PBR may not be used**. A Nonattainment Permit review must be completed to authorize this project. If "No," continue to Section 3.*	
3. 30 TAC § 106.4(a)(3): Prevention of Significant Deterioration (PSD) check	
Does this project trigger a review under PSD rules?	
To determine the answer, review the information below:	
Are emissions of any regulated criteria pollutant increasing by 100 tpy of any criteria pollutant at a named source?	☐ YES ☒ NO
Are emissions of any criteria pollutant increasing by 250 tpy of any criteria pollutant at an unnamed source?	☐ YES ☒ NO
Are emissions increasing above significance levels at an existing major site?	☐ YES ☒ NO
PSD information can be found at: www.tceq.texas.gov/assets/public/permitting/air/Forms/NewSourceReview/Tables/10173tbl.pdf and www.tceq.texas.gov/permitting/air/nav/air_docs_newsource.html	
*If "Yes," to any of the above, **a PBR may not be used**. A PSD Permit review must be completed to authorize the project.*	
If "No," continue to Section 4.	

Texas Commission on Environmental Quality
Permit by Rule Applicability Checklist
Title 30 Texas Administrative Code § 106.4

4. 30 TAC § 106.4(a)(6): Federal Requirements	Answer
Will all facilities under this PBR meet applicable requirements of Title 40 Code of Federal Regulations (40 CFR) Part 60, New Source Performance Standards (NSPS)?	☒ YES ☐ NO ☐ NA
If "Yes," which Subparts are applicable? *(answer below.)*	
VV	
Will all facilities under this PBR meet applicable requirements of 40 CFR Part 63, Hazardous Air Pollutants Maximum Achievable Control Technology (MACT) standards?	☒ YES ☐ NO ☐ NA
If "Yes," which Subparts are applicable? *(answer below.)*	
G, YY	
Will all facilities under this PBR meet applicable requirements of 40 CFR Part 61, National Emissions Standards for Hazardous Air Pollutants (NESHAPs)?	☒ YES ☐ NO ☐ NA
If "Yes," which Subparts are applicable? *(answer below.)*	
FF, V	
If "Yes" to any of the above, please attach a discussion of how the facilities will meet any applicable standards.	
5. 30 TAC § 106.4(a)(7): PBR prohibition check	
Are there any air permits at the site containing conditions which prohibit or restrict the use of PBRs?	☐ YES ☒ NO
If "Yes," PBRs may not be used or their use must meet the restrictions of the permit. A new permit or permit amendment may be required.	
List permit number(s):	
6. 30 TAC § 106.4(a)(8): NO_x Cap and Trade	
Is the facility located in Harris, Brazoria, Chambers, Fort Bend, Galveston, Liberty, Montgomery, or Waller County?	☒ YES ☐ NO
If "Yes," answer the question below.	
If "No," continue to Section 7.	
Will the proposed facility or group of facilities obtain required allowances for NO_x if they are subject to 30 TAC Chapter 101, Subchapter H, Division 3 (relating to the Mass Emissions Cap and Trade Program)?	☐ YES ☒ NO

Texas Commission on Environmental Quality
Permit by Rule Applicability Checklist
Title 30 Texas Administrative Code § 106.4

7. Highly Reactive Volatile Organic Compounds (HRVOC) check		
Is the facility located in Harris County?		☒ YES ☐ NO
If "Yes," answer the next question. If "No," skip to the box below.		
Will the project be constructed after June 1, 2006?		☒ YES ☐ NO
If "Yes," answer the next question.		
If "No," skip to the box below.		
Will one or more of the following HRVOC be emitted as a part of this project?		☒ YES ☐ NO
If "Yes," complete the information below:		
Information	**lb/hr**	**tpy**
► 1,3-butadiene		
► all isomers of butene (e.g., isobutene [2-methylpropene or isobutylene])	0.15	0.63
► alpha-butylene (ethylethylene)		
► beta-butylene (dimethylethylene, including both cis- and trans-isomers)		
► ethylene	0.40	1.75
► propylene	0.13	0.56
Is the facility located in Brazoria, Chambers, Fort Bend, Galveston, Liberty, Montgomery, or Waller County?		☐ YES ☒ NO
If "Yes," answer the next question. If "No," the checklist is complete.		
Will the project be constructed after June 1, 2006?		☐ YES ☐ NO
If "Yes," answer the next question. If "No," the checklist is complete.		
Will one or more of the following HRVOC be emitted as a part of this project?		☐ YES ☐ NO
If "Yes," complete the information below:		
Information	**lb//hr**	**tpy**
► ethylene		
► propylene		

Save Form Reset Form Print Form

Texas Commission on Enviromental Quality
Storage Tank and Change of Service
Air Permits by Rule (PBR) Checklist
Title 30 Texas Administrative Code § 106.478

Check the most appropriate answer and include any additional information in the spaces provided. If additional space is needed, please include an extra page and reference the rule number. The permit by rule (PBR) forms, tables, checklists, and guidance documents are available from the Texas Commission on Environmental Quality (TCEQ), Air Permits Division website at: www.tceq.texas.gov/permitting/air/nav/air_pbr.html.

This PBR (§ 106.478) requires registration for storage tanks with a capacity of 25,000 gallons or greater and located in a designated ozone non-attainment area with the commission's Office of Air in Austin before construction begins. The registration shall include a list of all tanks, calculated emissions for each compound in tons per year for each tank, and a Table 7 for each different tank design. The facility may be registered by completing Form PI-7, "Registration for Permits by Rule," or Form PI-7-CERT, "Registration and Certification for Permits by Rule." This checklist should accompany the registration form.

For additional assistance with your application, including resources to help calculate your emissions, please visit the Small Business and Local Government Assistance (SBLGA) webpage at the following link: www.TexasEnviroHelp.org

Questions/Description and Response	
Rule	**Applicability**
(7)	What is the capacity of the tank? 2,284,273 gallons
(1)	Is the tank located at least 500 feet from the nearest recreational area, residence, or other structure not occupied or used solely by the owner of the facility or the owner of the property? ☒ YES ☐ NO
Indicate the tank location from the nearest recreational area, residence, or other structure not occupied or used solely by the owner of the facility or the owner of the property: >500 feet	
(2)	Is the true vapor pressure of the compound being stored less than 11.0 psia? ☐ YES ☐ NO
Indicate the true vapor pressure: 9.34 psia	
(3)(A)	Will any storage tank with a capacity of 40,000 gallons or more used to store compounds with a true vapor pressure greater than 0.5 psia and less than 11.0 psia be equipped with an internal floating cover or equivalent control? ☒ YES ☐ NO ☐ N/A
Check the type of tank and control method used: ☐ Internal floating roof tank. ☒ External floating roof tank using double seal technology with a primary mechanical shoe seal. ☐ External floating roof tank using double seal technology with a primary liquid-mounted seal. ☐ An existing open top floating roof tank having a vapor-mounted primary seal, which is undergoing a change of service.	

Texas Commission on Enviromental Quality
Storage Tank and Change of Service
Air Permits by Rule (PBR) Checklist
Title 30 Texas Administrative Code § 106.478

Questions/Description and Response		
Rule	**Applicability**	
(3)(B)	Does the floating roof or floating cover design of the tank incorporate sufficient flotation to conform to the requirements of American Petroleum Institute (API) Code 650, Appendix C or an equivalent degree of flotation?	☒ YES ☐ NO
Note: *If using an equivalent degree of flotation, please describe how the method used is equivalent to API Code 650, Appendix C.*		
(4)	If the compounds have a true vapor pressure of 0.5 psia or less at the maximum storage temperature, will each fixed or cone roof be equipped with a submerged fill pipe or use bottom loading?	☐ YES ☐ NO ☐ N/A
Indicate the loading method: ☐ submerged fill pipe ☐ bottom loading		
(5)	Is each fixed or cone roof tank not equipped with an internal floating roof painted chalk white, except where a dark color is necessary to help the tank absorb or retain heat in order to maintain the material in the tank in a liquid state?	☐ YES ☒ NO
(6)	Have the tank emissions been calculated using the methods specified in Section 4.3 of the United States Protection Agency Publication AP-42	☐ YES ☒ NO
(7)	If the capacity of the tank is 25,000 gallons or more, have you provided Form PI-7 or Form PI-7-CERT as part of this registration request?	☐ YES ☒ NO
☐ Form PI-7 ☐ Form PI-7-CERT		
(8)	Are the chemicals or mixtures of chemicals to be stored limited to those shown in Table 478?	☐ YES ☒ NO
If "NO," answer the next question.		
(8)	Do mixtures of chemicals listed in Table 478 contain more than a total of 1.0% percent by volume of all other chemicals not listed in Table 478?	☐ YES ☒ NO
If "YES," the facility does not qualify for this PBR.		
Indicate the actual percentage by volume of all unlisted chemicals:		

Chemical Name:	Percent Composition (percent):
gasoline & heavy py-gas - refinery petroleum fraction	100%
containing less than 10% benzene	

Texas Commission on Enviromental Quality
Storage Tank and Change of Service
Air Permits by Rule (PBR) Checklist
Title 30 Texas Administrative Code § 106.478

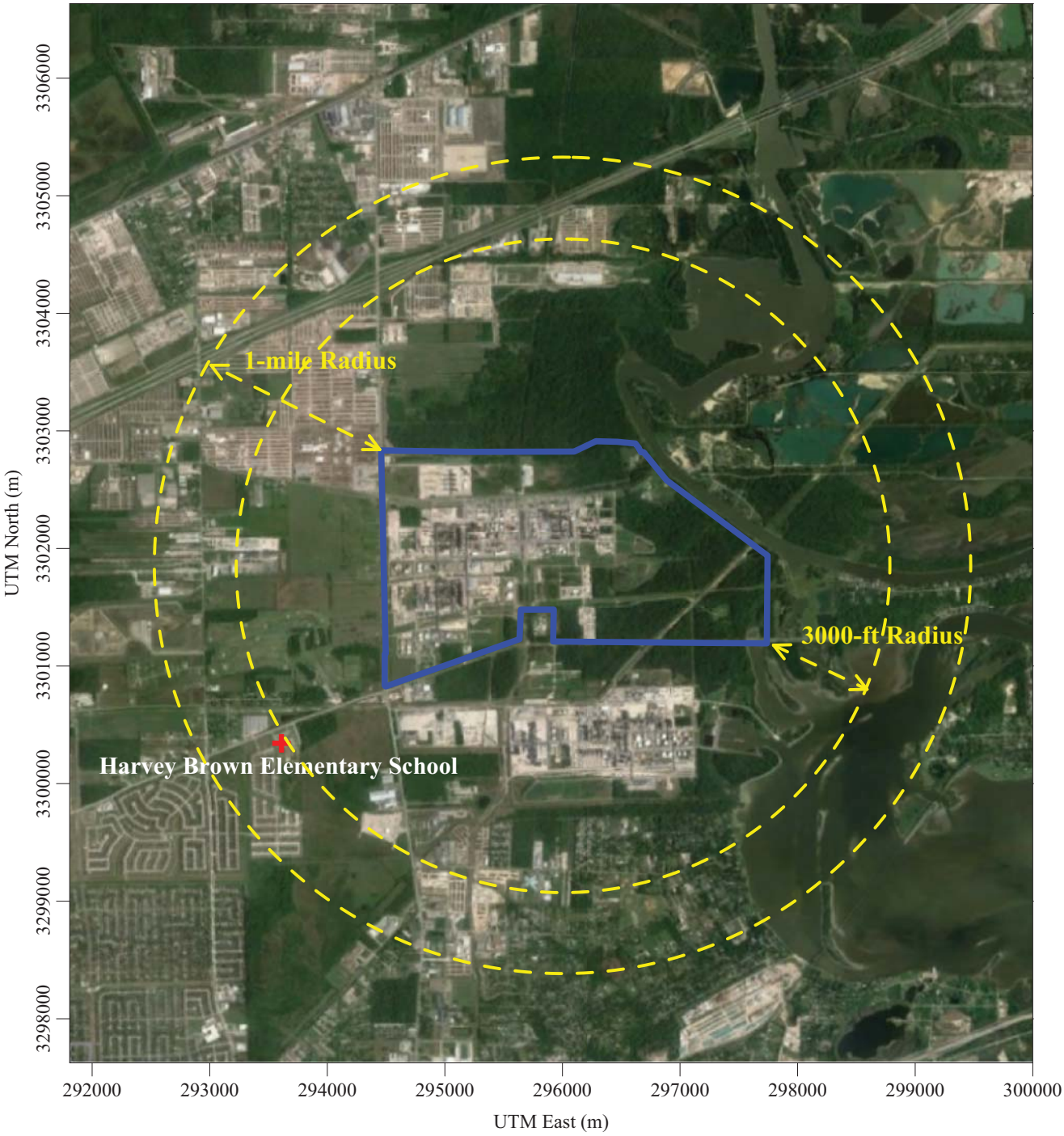
Questions/Description and Response	
Other Applicable Rules and Regulations	
Is this facility subject to 30 TAC §§ 115.112-119?	☒ YES ☐ NO
Why or Why Not: Tanks store material with VP > 1.5 psia	
Is this facility subject to 30 TAC §§ 115.120-129?	☒ YES ☐ NO
Why or Why Not:	
Is this facility subject to 40 CFR Part 60, NSPS Subpart K?	☒ YES ☐ NO
Why or Why Not: Tank complies with MACT	
Is this facility subject to 40 CFR Part 60, NSPS Subpart Kb?	☐ YES ☒ NO
Why or Why Not: Tank complies with MACT	
Is this facility subject to 40 CFR Part 60, NSPS Subpart NNN?	☒ YES ☐ NO
Why or Why Not: Tank is not distillation vent	

Record Keeping: There are no additional record keeping requirements other than the general requirements specified in 30 TAC § 106.8. The records must be made available immediately upon request to the commission or any air pollution control program having jurisdiction. If you have any question about the type of records that should be maintained, contact the Air Program in the TCEQ Regional Office for the region in which the site is located.

Recommended Calculation Methods: In order to demonstrate compliance with this PBR, the registrant may use the emission factors for each air contaminant from the EPA Compilation of Air Pollutant Emission Factors (AP-42), Fifth Edition, Volume I, Chapter 7: "Liquid Storage Tanks" at: www.epa.gov/ttn/chief/ap42/index.html. The registrant may also use the calculation method for storage tanks that store chemical compounds as described in the TCEQ guidance for "Storage Tanks" at: www.tceq.texas.gov/permitting/air/guidance/newsourcereview/tanks/nsr_fac_tanks.html.

Reset Form Print Form

Figure 1-1 Area Map
Equistar Chemicals, L.P. - Channelview



F44E00

49E12

SHELDON ROAD

MAIN ENTRANCE GATE

PLANT EXIT ROAD

PLANT ENTRANCE ROAD

GUARD HOUSE

PARKING AREA

EMPLOYEE'S

PERSONNEL

LAB

ADMINISTRATION BLDG.

EAST PLANT CONTROL BLDG.

SAFETY

TO EMPLOYEE'S RECREATION AREA

PIPE SHOP

ELEC. SHOP

MAINTENANCE

A-2 WAREHOUSE

INST.

AUTO.

ELEC.

TANK TRUCK LOADING

RAIL CAR LOADING

EAST PLANT

GREENWADE SERVICES

ECU

OP-I

OP-I CONTROL ROOM

METH

BT DRIVE

BT

MEK

MEK TANK FARM

POLY 80

MIB PLANT FLARE

IPDH

SMA

SMA WAREHOUSE

ACCESS ROAD

UTILITY AVE.

ALKY. FLARE

RECOVERY FLARE

CLASS II LAND FARM

UNITED GAS METER STATION

BENCH MARK
N. 3301.705
E. 296.068

MAIN PLANT DRAINAGE DITCH

DITCH

PROPOSED THERMO OXIDIZER SITE

STORM WATER OUT FALL 002

SLUDGE LAGOONS

WALLISVILLE GULLY

100' PIPELINE EASEMENT

623¢ WARREN PIPELINE CO. EASEMENT

0 NORTH

0 SOUTH

N.2000'

N

P

N. 1000'

W. 5000

W. 4000

W. 3000

W. 2000

W. 1000

W. 0.0 E. 0.0

E. 1000'

E.2000'

E.3000'

E.4000'

EAST METER STATION

138 KV. SUB-STA.

H.L. & P. CO. LEASE

40' FLOOD CONTROL EASEMENT - MAIN PLANT DRAINAGE DITCH

MAINTENANCE WAREHOUSE

OP-I FLARE

OP-II

OP-II CONTROL ROOM

OP-II FLARE

36" PIPELINE EASEMENT

ARCO 50' PIPE ALLEY

SHELL PIPELINE CO. PIPELINE EASEMENT

HOUSTON LIGHTING & POWER CO. 100' FEE STRIP

MISSOURI-PACIFIC R.R. 400' FEE STRIP

WARREN PIPELINE CO. 60' EASEMENT

AIR PRODUCTS 11.2489 AC. LEASE

PROJECT ENGINEERING OFFSITE FACILITY

PARKING

100' ARCO PIPE ALLEY

120' PIPELINE EASEMENT

5' ARCO EASEMENT

150' HOUSTON LIGHTING & POWER EASEMENT

100' ARCO CHEM. PIPELINE EASEMENT

FENCE LINE

S.1000'

S.2000'

S.3000'

WALLISVILLE ROAD

BARGE LOADING DOCK FACILITIES

TO ARCO CHEM.

ARCO CHEM.

AREA 138

AREA 139

AREA 140

AREA 141

AREA 142

AREA 143

AREA 148

AREA 149

AREA 150

AREA 101

AREA 102

AREA 103

AREA 104

AREA 105

AREA 106

AREA 107

AREA 108

AREA 109

AREA 110

AREA 112

AREA 117

AREA 122

AREA 123

AREA 124

AREA 125

AREA 126

AREA 127

AREA 128

AREA 129

AREA 130

AREA 131

AREA 132

AREA 133

AREA 170

INTAKE WATER STORAGE IMPOUNDMENT

WEST METER STATION

ARCO PIPELINE MAINT.

ARCO SEC. IX

H.L. & P. CO. LYONDELL SUB-STATION

LEGEND:

PROPERTY BOUNDARY LINES

EASEMENT & PIPE ALLEY BOUNDARY LINES

BUILDINGS

METERS 10 50 100

DWG. NO.	REFERENCE DRAWINGS	NO.	DATE	REVISIONS	DRN	APP
X		7		W.O. No.		
X		6		W.O. No.	DSC	
X		5	4/21/94	ADDED UTM COORDINATES TO BENCH MARK W.O. No.	DSC	AS
X		4	5/04/93	ADDED MISC. EQUIPMENT W.O. No.	DSC	AS
X		3	1/19/93	ADDED MISC. EQUIPMENT W.O. No.	DSC	AS
X		2	9/17/92	ADJUSTED GRID SYSTEM & AS-BUILT PMII W.O. No. AFC 2-003	AS	AS
X		1	8-24-92	ADDED MISC. EQUIPMENT W.O. No. AFC 2-003	AS	AS

Lyondell Petrochemical Company

LOCATION: CHANNELVIEW ENGINEERING DEPARTMENT

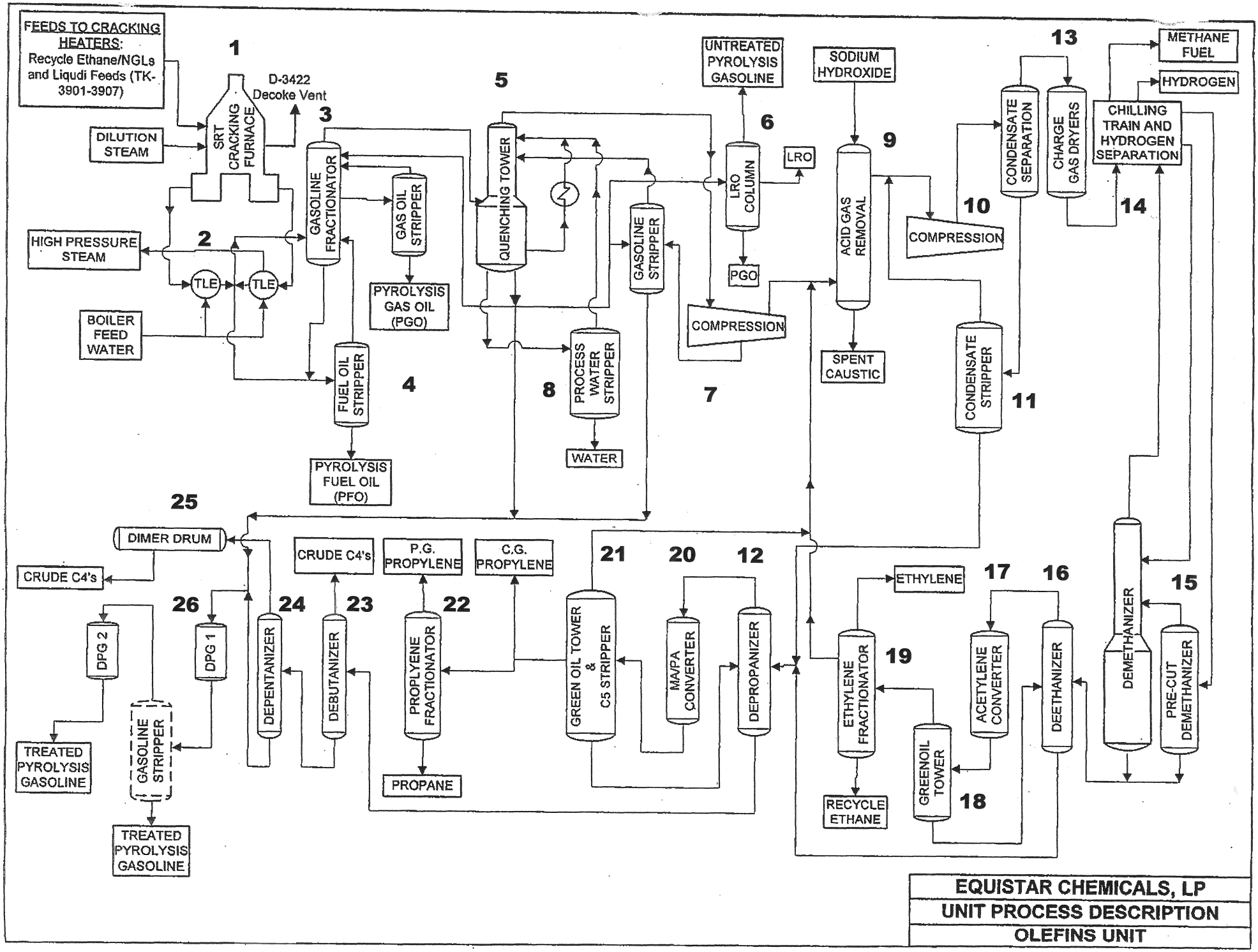
PLOT PLAN

CHANNELVIEW PLANT

DRN. CMP	DATE 2/11/94	SCALE	DRAWING NUMBER				REV.
CHK.	DATE	1"=300'	E	99	L	3183	5
APP.	DATE						

CAD FILE: E99L3183

3-4-92


FEEDS TO CRACKING HEATERS: Recycle Ethane/NGLs and Liqudi Feeds (TK-3901-3907)
1
DILUTION STEAM
SRT CRACKING FURNACE
D-3422 Decoke Vent
3
GASOLINE FRACTIONATOR
GAS OIL STRIPPER
PYROLYSIS GAS OIL (PGO)
HIGH PRESSURE STEAM
2
TLE
TLE
BOILER FEED WATER
FUEL OIL STRIPPER
4
PYROLYSIS FUEL OIL (PFO)
5
QUENCHING TOWER
GASOLINE STRIPPER
8
PROCESS WATER STRIPPER
WATER
UNTREATED PYROLYSIS GASOLINE
6
LRO COLUMN
LRO
PGO
COMPRESSION
7
SODIUM HYDROXIDE
9
ACID GAS REMOVAL
SPENT CAUSTIC
10
COMPRESSION
13
CONDENSATE SEPARATION
CHARGE GAS DRYERS
14
METHANE FUEL
HYDROGEN
CHILLING TRAIN AND HYDROGEN SEPARATION
CONDENSATE STRIPPER
11
25
DIMER DRUM
CRUDE C4's
26
DPG 2
DPG 1
TREATED PYROLYSIS GASOLINE
GASOLINE STRIPPER
TREATED PYROLYSIS GASOLINE
24
DEPENTANIZER
CRUDE C4's
23
DEBUTANIZER
P.G. PROPYLENE
C.G. PROPYLENE
22
PROPLYENE FRACTIONATOR
PROPANE
21
GREEN OIL TOWER & C5 STRIPPER
20
MA/PA CONVERTER
12
DEPROPANIZER
ETHYLENE
17
ACETYLENE CONVERTER
16
DEETHANIZER
15
DEMETHANIZER
PRE-CUT DEMETHANIZER
ETHYLENE FRACTIONATOR
19
RECYCLE ETHANE
GREENOIL TOWER
18
EQUISTAR CHEMICALS, LP
UNIT PROCESS DESCRIPTION
OLEFINS UNIT

Tank	TK-4921
Material Stored	PyGas Mix

Tank Physical Characteristics

Shell height (ft)	48.00
Diameter (ft)	90.00
Net throughput (gallons/yr)	57,816,000
Maximum pumping rate (gallons/hour)	6,600
Shell Condition	light rust
Shell Color/Shade	White
Shell Condition	Average
Roof Color/Shade	White
Roof Condition	Average
Primary seal	Mechanical-shoe seal
Secondary seal	Rim-mounted secondary
Deck type	Welded

Fitting type		Quantity	No. x Kf	
Access Hatch (24-in. Diam.)	Hatch Unbolted Cover, Ungaske	n.),Hatch Unbolted Cover, Unga		0.00	0.00
Access Hatch (24-in. Diam.)	Hatch Bolted Cover, Gasketed	am.),Hatch Bolted Cover, Gask	1	1.60	0.00
Access Hatch (24-in. Diam.)	Hatch Unbolted Cover, Gasketem	.),Hatch Unbolted Cover, Gas		0.00	0.00
Automatic Gauge Float Well	float Unbolted Cover, Ungasket	ell,float Unbolted Cover, Ungas		0.00	0.00
Automatic Gauge Float Well	float Bolted Cover, Gasketed	Well,float Bolted Cover, Gaske	1	2.80	0.00
Automatic Gauge Float Well	float Unbolted Cover, Gasketed	Well,float Unbolted Cover, Gask		0.00	0.00
Column Well (24-in. Diam.)	Round Pipe, Ungasketed Sliding	Round Pipe, Ungasketed Slidin		0.00	0.00
Column Well (24-in. Diam.)	Round Pipe, Gasketed Sliding C	.),Round Pipe, Gasketed Sliding		0.00	0.00
Column Well (24-in. Diam.)	Round Pipe, Flexible Fabric Slee	Round Pipe, Flexible Fabric Sle		0.00	0.00
Column Well (24-in. Diam.)	Built-Up Column, Sliding Cover,	uilt-Up Column, Sliding Cover,		0.00	0.00
Column Well (24-in. Diam.)	Built-Up Column, Sliding Cover,	uilt-Up Column, Sliding Cover,		0.00	0.00
Ladder Well (36-in. Diam.)	Sliding Cover, Ungasketed	Diam.),Sliding Cover, Ungasketed		0.00	0.00
Ladder Well (36-in. Diam.)	Sliding Cover, Gasketed	Diam.),Sliding Cover, Gasketed		0.00	0.00
Gauge-Hatch/Sample Well	Weighted Mech. Actuation, Gas	ell,Weighted Mech. Actuation, G	1	0.57	0.12
Gauge-Hatch/Sample Well	Weighted Mech. Actuation, Unl	l,Weighted Mech. Actuation, Un		0.00	0.00
Gauge-Hatch/Sample Well	(G-Hatch Only) Slit Fabric Seal,	atch Only) Slit Fabric Seal, 10%		0.00	0.00
Rim Vent (6-in. Diameter)	Rim Weighted Mech. Actuation	Rim Weighted Mech. Actuation,		0.00	0.00
Rim Vent (6-in. Diameter)	Rim Weighted Mech. Actuation	Rim Weighted Mech. Actuation	1	1.23	0.63
Vacuum Breaker (10-in. Diam.)	VB Weighted Mech. Actuation,	.),VB Weighted Mech. Actuatio		0.00	0.00
Vacuum Breaker (10-in. Diam.)	VB Weighted Mech. Actuation,	n.),VB Weighted Mech. Actuati	1	11.83	6.77
Roof Leg (3-in. Diameter)	Center area - sock	Diameter),Center area - sock		0.00	0.00
Roof Leg (3-in. Diameter)	Adjustable, Internal Floating Dec	r),Adjustable, Internal Floating I		0.00	0.00
Roof Leg (3-in. Diameter)	Adjustable, Double-Deck Roofs	er),Adjustable, Double-Deck Ro		0.00	0.00
Roof Leg (3-in. Diameter)	Adjustable, Pontoon Area, Gask	),Adjustable, Pontoon Area, Gas	16	24.53	4.23
Roof Leg (3-in. Diameter)	Adjustable, Pontoon Area, Socke	r),Adjustable, Pontoon Area, S		0.00	0.00
Roof Leg (3-in. Diameter)	Adjustable, Pontoon Area, Ungas	Adjustable, Pontoon Area, Unga		0.00	0.00
Roof Leg (3-in. Diameter)	Adjustable, Center Area, Gasket	),Adjustable, Center Area, Gasl	12	7.99	1.68
Roof Leg (3-in. Diameter)	Adjustable, Center Area, Ungasl	,Adjustable, Center Area, Unga		0.00	0.00
Roof Leg (3-in. Diameter)	Fixed	(3-in. Diameter),Fixed		0.00	0.00
Deck Drain	Stub Drain	Drain,Stub Drain		0.00	0.00
Deck Drain	Open	ck Drain,Open		0.00	0.00
Deck Drain	90% Closed	Drain,90% Closed		0.00	0.00
Slotted Guide-Pole/Sample Well	Gask. Sliding Cover, w. Float, W	Well,Gask. Sliding Cover, w. Flo		0.00	0.00
Slotted Guide-Pole/Sample Well	Gask. Sliding Cover, w. Pole Slee	Well,Gask. Sliding Cover, w. Pol		0.00	0.00
Slotted Guide-Pole/Sample Well	Gask. Sliding Cover, w. Pole Wip	Well,Gask. Sliding Cover, w. Po		0.00	0.00
Slotted Guide-Pole/Sample Well	UnGask or Gask. Sliding Cover	e Well,UnGask or Gask. Sliding		0.00	0.00
Slotted Guide-Pole/Sample Well	UnGask or Gask. Sliding Cover,	ll,UnGask or Gask. Sliding Cov		0.00	0.00
Slotted Guide-Pole/Sample Well	Gask. Sliding Cover, w. Pole Slee	k. Sliding Cover, w. Pole Sleeve		0.00	0.00
Slotted Guide-Pole/Sample Well	Gask. Sliding Cover, w. Float, Po	Sliding Cover, w. Float, Pole Sle		0.00	0.00
Unslotted Guide-Pole Well	Ungasketed Sliding Cover	e Well,Ungasketed Sliding Cove		0.00	0.00
Unslotted Guide-Pole Well	Ungasketed sliding cover, w. po	Ungasketed sliding cover, w. pol		0.00	0.00
Unslotted Guide-Pole Well	Gasketed sliding cover, w. pole sleeve			0.00	0.00
Unslotted Guide-Pole Well	Gasketed sliding cover		1	94.58	104.96
Unslotted Guide-Pole Well	Gasketed sliding Cover, w. Wiper			0.00	0.00

Chemical components information

Chemical name - Avg Weight Percent	Chemical	Liq wt%	VP wt%
Material 1	n-DECANE	4.06%	0.04%
Material 2	TOLUENE	3.68%	0.70%
Material 3	n-Nonane	3.30%	0.10%
Material 4	m-xylene	2.26%	0.13%
Material 5	n-Hexane	2.45%	2.41%
Material 6	ETHYLBENZENE	1.85%	0.12%
Material 7	o-xylene	0.80%	0.04%
Material 8	INDANE	0.47%	0.01%
Material 9	STYRENE	0.38%	0.02%
Material 10	trans-2-PENTENE	0.76%	2.43%
Material 11	n-PENTANE	0.33%	1.08%
Material 12	Indene	0.30%	0.00%
Material 13	DICYCLOPENTADIENE	0.22%	0.00%
Material 14	2-METHYL-1-BUTENE	0.11%	0.43%
Material 15	CIS-2-BUTENE	0.72%	7.14%
Material 16	TRANS-2-BUTENE	0.72%	7.79%
Material 17	1-PENTENE	0.08%	0.32%
Material 18	CIS-2-PENTENE	0.24%	0.75%
Material 19	2-METHYL-2-BUTENE	0.16%	0.47%
Material 20	1-HEXENE	3.21%	3.82%
Material 21	TRANS-2-HEXENE	12.66%	12.72%
Material 22	2-METHYL-1-PENTENE	11.06%	13.90%
Material 23	2-METHYL-2-PENTENE	11.14%	11.37%
Material 24	3-METHYL-TRANS-2-PENTENE	37.59%	34.03%
Material 25	1-OCTENE	1.44%	0.17%

Tank		TK-4921		
Material Stored		PyGas Mix		
Chemical name - Max Weight Percent		Chemical	Liq wt%	VP wt%
Material 1		n-DECANE	4.06%	0.10%
Material 2		TOLUENE	3.68%	1.30%
Material 3		n-Nonane	3.30%	0.23%
Material 4		m-xylene	2.26%	0.27%
Material 5		n-Hexane	2.45%	3.85%
Material 6		ETHYLBENZENE	1.85%	0.25%
Material 7		o-xylene	0.80%	0.08%
Material 8		INDANE	0.47%	0.01%
Material 9		STYRENE	0.38%	0.03%
Material 10		trans-2-PENTENE	0.76%	3.52%
Material 11		n-PENTANE	0.33%	1.55%
Material 12		Indene	0.30%	0.01%
Material 13		DICYCLOPENTADIENE	0.22%	0.01%
Material 14		2-METHYL-1-BUTENE	0.11%	0.61%
Material 15		CIS-2-BUTENE	0.72%	9.42%
Material 16		TRANS-2-BUTENE	0.72%	10.18%
Material 17		1-PENTENE	0.08%	0.45%
Material 18		CIS-2-PENTENE	0.24%	1.09%
Material 19		2-METHYL-2-BUTENE	0.16%	0.69%
Material 20		1-HEXENE	3.21%	6.01%
Material 21		TRANS-2-HEXENE	12.66%	20.38%
Material 22		2-METHYL-1-PENTENE	11.06%	21.73%
Material 23		2-METHYL-2-PENTENE	11.14%	18.23%
Material 24		3-METHYL-TRANS-2-PENTENE		
Material 25		1-OCTENE		

		Avg	Max
Bulk Temperature	F	110.00	120.00
True vapor pressure at Tla	psia	4.06	9.34
Vapor molecular weight	lb/lbmol	77.75	75.9095
Material Density	lb/gal	26.92	26.92

Floating Roof Tank

Withdraw Losses	lb/yr	582.52
Rim Seal Loss	lb/yr	2016.20

Tank			TK-4921
Material Stored			PyGas Mix
Deck Fitting Loss		lb/yr	913.31
Deck Seam Loss		lb/yr	0.00
FR Total		tpy	1.76
Working Loss			
Lwd Floating Roof	=(0.943)*Q*Cs*Wl/D * (1+ Nc*Fc/D)	lb/yr	582.5212
Cs			0.0015
Nc Fc			0.0000
Standing Loss			
Rim Seal Loss			
Lr	=(Kra+Krb*v^n) D P* Mv Kc	lb/yr	2016.20
Kra		lbmol/ft/yr	0.60
Krb		lbmol/(mph)^n/ft/yr	0.40
v		mph	7.40
n			1.00
Pa	atm pressure	psia	14.65
P *			0.0809
Kc			1.00
Tla	=0.7*Taa+0.3Tb+0.008arI	R	544.55
Taa		F	69.6273
I			1406.21
Roof solar			0.25
Shell solar			0.25
Deck Fitting Loss			
Lf	=Ff P* Mv Kc	lb/yr	913.3085
Ff		lbmol/yr	145.1365
Deck Seam Loss			
Ld	=Kd Sd D^2 P* Mv Kc	lb/yr	0.00
Kd		lbmol/ ft-yr	0.00
Bolted Deck Seam			7.00
Sd			0.00
Max Hourly			
P*			0.2486
v		mph	9.00
Ff		lbmol/yr	118.39
Lwd Floating Roof	=(0.943)*Q*Cs*Wl/D * (1+ Nc*Fc/D)	lb/hr	0.0665
Lr	=(Kra+Krb*v^n) D P* Mv Kc	lb/hr	0.8143
Lf	=Ff P* Mv Kc	lb/hr	0.2550
Ld	=Kd Sd D^2 P* Mv Kc	lb/hr	0.0000
Total Hrly		lb/hr	1.14

Speciated Emissions

			lb/hr	tpy
Material 1	lb/hr	n-DECANE	0.00	0.00
Material 2	lb/hr	TOLUENE	0.01	0.01
Material 3	lb/hr	n-Nonane	0.00	0.00
Material 4	lb/hr	m-xylene	0.00	0.00
Material 5	lb/hr	n-Hexane	0.04	0.04
Material 6	lb/hr	ETHYLBENZENE	0.00	0.00
Material 7	lb/hr	o-xylene	0.00	0.00
Material 8	lb/hr	INDANE	0.00	0.00
Material 9	lb/hr	STYRENE	0.00	0.00
Material 10	lb/hr	trans-2-PENTENE	0.04	0.04
Material 11	lb/hr	n-PENTANE	0.02	0.02
Material 12	lb/hr	Indene	0.00	0.00
Material 13	lb/hr	DICYCLOPENTADIENE	0.00	0.00
Material 14	lb/hr	2-METHYL-1-BUTENE	0.01	0.01
Material 15	lb/hr	CIS-2-BUTENE	0.11	0.13
Material 16	lb/hr	TRANS-2-BUTENE	0.12	0.14
Material 17	lb/hr	1-PENTENE	0.01	0.01
Material 18	lb/hr	CIS-2-PENTENE	0.01	0.01
Material 19	lb/hr	2-METHYL-2-BUTENE	0.01	0.01
Material 20	lb/hr	1-HEXENE	0.07	0.07
Material 21	lb/hr	TRANS-2-HEXENE	0.23	0.22
Material 22	lb/hr	2-METHYL-1-PENTENE	0.25	0.24
Material 23	lb/hr	2-METHYL-2-PENTENE	0.21	0.20
Material 24	lb/hr	3-METHYL-TRANS-2-PENTENE	0.00	0.60
Material 25	lb/hr	1-OCTENE	0.00	0.00
Total VOC			1.14	1.76

Tank	TK-4921	12.00	
Material Stored	TK-4916 - heavy py gas	20.00	
		2.75	
Tank Physical Characteristics		32.00	

Shell height (ft)	48.00
Diameter (ft)	90.00
Net throughput (gallons/yr)	340,200,000
Maximum pumping rate (gallons/hour)	70,350
Shell Condition	light rust
Shell Color/Shade	White
Shell Condition	Average
Roof Color/Shade	White
Roof Condition	Average
Primary seal	Mechanical-shoe seal
Secondary seal	Rim-mounted secondary
Deck type	Welded

Fitting type		Quantity	No. x Kf	
Access Hatch (24-in. Diam.)	Hatch Unbolted Cover, Ungaske	n.),Hatch Unbolted Cover, Unga	0.00	0.00
Access Hatch (24-in. Diam.)	Hatch Bolted Cover, Gasketed	am.),Hatch Bolted Cover, Gask	1	1.60	0.00
Access Hatch (24-in. Diam.)	Hatch Unbolted Cover, Gasketem	.),Hatch Unbolted Cover, Gas	0.00	0.00
Automatic Gauge Float Well	float Unbolted Cover, Ungasket	ell,float Unbolted Cover, Unga	0.00	0.00
Automatic Gauge Float Well	float Bolted Cover, Gasketed	Well,float Bolted Cover, Gaske	1	2.80	0.00
Automatic Gauge Float Well	float Unbolted Cover, Gasketed	Well,float Unbolted Cover, Gask	0.00	0.00
Column Well (24-in. Diam.)	Round Pipe, Ungasketed Sliding	Round Pipe, Ungasketed Slidin	0.00	0.00
Column Well (24-in. Diam.)	Round Pipe, Gasketed Sliding C	.),Round Pipe, Gasketed Sliding	0.00	0.00
Column Well (24-in. Diam.)	Round Pipe, Flexible Fabric Slee	Round Pipe, Flexible Fabric Sle	0.00	0.00
Column Well (24-in. Diam.)	Built-Up Column, Sliding Cover,	uilt-Up Column, Sliding Cover,	0.00	0.00
Column Well (24-in. Diam.)	Built-Up Column, Sliding Cover,	uilt-Up Column, Sliding Cover,	0.00	0.00
Ladder Well (36-in. Diam.)	Sliding Cover, Ungasketed	Diam.),Sliding Cover, Ungasketed	0.00	0.00
Ladder Well (36-in. Diam.)	Sliding Cover, Gasketed	Diam.),Sliding Cover, Gasketed	0.00	0.00
Gauge-Hatch/Sample Well	Weighted Mech. Actuation, Gas	ell,Weighted Mech. Actuation, G	1	0.47	0.00
Gauge-Hatch/Sample Well	Weighted Mech. Actuation, Un	l,Weighted Mech. Actuation, U	0.00	0.00
Gauge-Hatch/Sample Well	(G-Hatch Only) Slit Fabric Seal,	atch Only) Slit Fabric Seal, 10%	0.00	0.00
Rim Vent (6-in. Diameter)	Rim Weighted Mech. Actuation	Rim Weighted Mech. Actuation,	0.00	0.00
Rim Vent (6-in. Diameter)	Rim Weighted Mech. Actuation	Rim Weighted Mech. Actuation	1	0.71	0.00
Vacuum Breaker (10-in. Diam.)	VB Weighted Mech. Actuation,	.),VB Weighted Mech. Actuatio	0.00	0.00
Vacuum Breaker (10-in. Diam.)	VB Weighted Mech. Actuation,	n.),VB Weighted Mech. Actuati	1	6.20	0.00
Roof Leg (3-in. Diameter)	Center area - sock	Diameter),Center area - sock	0.00	0.00
Roof Leg (3-in. Diameter)	Adjustable, Internal Floating Dec	r),Adjustable, Internal Floating D	0.00	0.00
Roof Leg (3-in. Diameter)	Adjustable, Double-Deck Roofs	er),Adjustable, Double-Deck Ro	0.00	0.00
Roof Leg (3-in. Diameter)	Adjustable, Pontoon Area, Gask	),Adjustable, Pontoon Area, Gas	16	20.80	0.00
Roof Leg (3-in. Diameter)	Adjustable, Pontoon Area, Socke	r),Adjustable, Pontoon Area, S	0.00	0.00
Roof Leg (3-in. Diameter)	Adjustable, Pontoon Area, Unga	Adjustable, Pontoon Area, Unga	0.00	0.00
Roof Leg (3-in. Diameter)	Adjustable, Center Area, Gasket	),Adjustable, Center Area, Gasl	12	6.36	0.00
Roof Leg (3-in. Diameter)	Adjustable, Center Area, Ungasl	,Adjustable, Center Area, Unga	0.00	0.00
Roof Leg (3-in. Diameter)	Fixed	(3-in. Diameter),Fixed	0.00	0.00
Deck Drain	Stub Drain	Drain,Stub Drain	0.00	0.00
Deck Drain	Open	ck Drain,Open	0.00	0.00
Deck Drain	90% Closed	Drain,90% Closed	0.00	0.00
Slotted Guide-Pole/Sample Well	Gask. Sliding Cover, w. Float, W	Well,Gask. Sliding Cover, w. Flo	0.00	0.00
Slotted Guide-Pole/Sample Well	Gask. Sliding Cover, w. Pole Slee	Well,Gask. Sliding Cover, w. Pol	0.00	0.00
Slotted Guide-Pole/Sample Well	Gask. Sliding Cover, w. Pole Wip	Well,Gask. Sliding Cover, w. Po	0.00	0.00
Slotted Guide-Pole/Sample Well	UnGask or Gask. Sliding Cover	e Well,UnGask or Gask. Sliding	0.00	0.00
Slotted Guide-Pole/Sample Well	UnGask or Gask. Sliding Cover,	ll,UnGask or Gask. Sliding Cov	0.00	0.00
Slotted Guide-Pole/Sample Well	Gask. Sliding Cover, w. Pole Slee	k. Sliding Cover, w. Pole Sleeve	0.00	0.00
Slotted Guide-Pole/Sample Well	Gask. Sliding Cover, w. Float, Po	Sliding Cover, w. Float, Pole Sle	0.00	0.00
Unslotted Guide-Pole Well	Ungasketed Sliding Cover	e Well,Ungasketed Sliding Cove	0.00	0.00
Unslotted Guide-Pole Well	Ungasketed sliding cover, w. po	Ungasketed sliding cover, w. pol	0.00	0.00
Unslotted Guide-Pole Well	Gasketed sliding cover, w. pole sleeve		0.00	0.00
Unslotted Guide-Pole Well	Gasketed sliding cover		1	25.00	0.00
Unslotted Guide-Pole Well	Gasketed sliding Cover, w. Wiper		0.00	0.00

Chemical components information

Chemical name - Avg Weight Percent	Chemical	Liq wt%	VP wt%
Material 1	n-DECANE	20.28%	0.73%
Material 2	TOLUENE	18.37%	12.86%
Material 3	n-Nonane	16.49%	1.85%
Material 4	m-xylene	11.26%	2.39%
Material 5	n-Hexane	9.83%	35.44%
Material 6	ETHYLBENZENE	9.25%	2.23%
Material 7	o-xylene	4.00%	0.67%
Material 8	INDANE	2.33%	0.09%
Material 9	STYRENE	1.89%	0.30%
Material 10	trans-2-PENTENE	1.81%	21.16%
Material 11	n-PENTANE	1.67%	19.77%
Material 12	Indene	1.50%	0.04%
Material 13	DICYCLOPENTADIENE	1.08%	0.08%
Material 14	2-METHYL-1-BUTENE	0.16%	2.22%
Material 15	benzene	0.07%	0.16%
Material 16	m-METHYLSTYRENE		
Material 17			
Material 18			
Material 19			
Material 20			
Material 21			
Material 22			
Material 23			
Material 24			
Material 25			

Tank	TK-4921	12.00	
Material Stored	TK-4916 - heavy py gas	20.00	
Chemical name - Max Weight Percent	Chemical	Liq wt%	VP wt%
Material 1	n-DECANE	20.28%	1.15%
Material 2	TOLUENE	18.37%	14.77%
Material 3	n-Nonane	16.49%	2.60%
Material 4	m-xylene	11.26%	3.06%
Material 5	n-Hexane	9.83%	35.21%
Material 6	ETHYLBENZENE	9.25%	2.84%
Material 7	o-xylene	4.00%	0.89%
Material 8	INDANE	2.33%	0.14%
Material 9	STYRENE	1.89%	0.40%
Material 10	trans-2-PENTENE	1.81%	19.01%
Material 11	n-PENTANE	1.67%	17.64%
Material 12	Indene	1.50%	0.07%
Material 13	DICYCLOPENTADIENE	1.08%	0.10%
Material 14	2-METHYL-1-BUTENE	0.16%	1.96%
Material 15	benzene	0.07%	0.17%
Material 16	m-METHYLSTYRENE		
Material 17			
Material 18			
Material 19			
Material 20			
Material 21			
Material 22			
Material 23			
Material 24			
Material 25			

		Avg	Max
Bulk Temperature	F	110.00	120.00
True vapor pressure at Tla	psia	1.31	2.78
Vapor molecular weight	lb/lbmol	81.02	82.4278
Material Density	lb/gal	6.56	6.56

Floating Roof Tank

Withdraw Losses	lb/yr	834.87
Rim Seal Loss	lb/yr	607.61

Tank			TK-4921	12.00
Material Stored			TK-4916 - heavy py gas	20.00
Deck Fitting Loss		lb/yr	121.26	
Deck Seam Loss		lb/yr	0.00	
FR Total		tpy	0.78	
Working Loss				
Lwd Floating Roof	=(0.943)*Q*Cs*Wl/D * (1+ Nc*Fc/D)	lb/yr	834.8729	
Cs			0.0015	
Nc Fc			0.0000	
Standing Loss				
Rim Seal Loss				
Lr	=(Kra+Krb*v^n) D P* Mv Kc	lb/yr	607.61	
Kra		lbmol/ft/yr	0.60	
Krb		lbmol/(mph)^n/ft/yr	0.40	
v		mph	7.40	
n			1.00	
Pa	atm pressure	psia	14.65	
P *			0.0234	
Kc			1.00	
Tla	=0.7*Taa+0.3Tb+0.008arI	R	544.55	
Taa		F	69.6273	
I			1406.21	
Roof solar			0.25	
Shell solar			0.25	
Deck Fitting Loss				
Lf	=Ff P* Mv Kc	lb/yr	121.2570	
Ff		lbmol/yr	63.9400	
Deck Seam Loss				
Ld	=Kd Sd D^2 P* Mv Kc	lb/yr	0.00	
Kd		lbmol/ ft-yr	0.00	
Bolted Deck Seam			7.00	
Sd			0.00	
Max Hourly				
P*			0.0526	
v		mph	9.00	
Ff		lbmol/yr	0.00	
Lwd Floating Roof	=(0.943)*Q*Cs*Wl/D * (1+ Nc*Fc/D)	lb/hr	0.1726	
Lr	=(Kra+Krb*v^n) D P* Mv Kc	lb/hr	0.1871	
Lf	=Ff P* Mv Kc	lb/hr	0.0000	
Ld	=Kd Sd D^2 P* Mv Kc	lb/hr	0.0000	
Total Hrly		lb/hr	0.36	

Speciated Emissions

			lb/hr	tpy
Material 1	lb/hr	n-DECANE	0.00	0.01
Material 2	lb/hr	TOLUENE	0.05	0.10
Material 3	lb/hr	n-Nonane	0.01	0.01
Material 4	lb/hr	m-xylene	0.01	0.02
Material 5	lb/hr	n-Hexane	0.13	0.28
Material 6	lb/hr	ETHYLBENZENE	0.01	0.02
Material 7	lb/hr	o-xylene	0.00	0.01
Material 8	lb/hr	INDANE	0.00	0.00
Material 9	lb/hr	STYRENE	0.00	0.00
Material 10	lb/hr	trans-2-PENTENE	0.07	0.17
Material 11	lb/hr	n-PENTANE	0.06	0.15
Material 12	lb/hr	Indene	0.00	0.00
Material 13	lb/hr	DICYCLOPENTADIENE	0.00	0.00
Material 14	lb/hr	2-METHYL-1-BUTENE	0.01	0.02
Material 15	lb/hr	benzene	0.00	0.00
Material 16	lb/hr	m-METHYLSTYRENE	0.00	0.00
Material 17	lb/hr	0.00	0.00	0.00
Material 18	lb/hr	0.00	0.00	0.00
Material 19	lb/hr	0.00	0.00	0.00
Material 20	lb/hr	0.00	0.00	0.00
Material 21	lb/hr	0.00	0.00	0.00
Material 22	lb/hr	0.00	0.00	0.00
Material 23	lb/hr	0.00	0.00	0.00
Material 24	lb/hr	0.00	0.00	0.00
Material 25	lb/hr	0.00	0.00	0.00
Total VOC			0.36	0.78

Table 7 (c) External Floating Roof Storage Tank Summary

I. Tank Identification	TK-4921
1. Applicant's name:	
2. Location:	see plot plan
3. Tank No.	TK-4921
4. Emission Point No.	49E12
5. FIN	
6. Status	
II. Tank Physical Characteristics	
1. Dimensions	
Shell height (ft)	48.00
Diameter (ft)	90.00
Maximum Liquid Height	
Nominal capacity or tank volume (gallons)	2,284,273
Turnovers per year	25
Net throughput (gallons/yr)	57,816,000
Maximum pumping rate (gallons/hour)	6,600
h. Self supporting roof ?	No
Number of columns	0
Column diameter (ft)	0.00
2. Shell/Roof and Paint Characteristics	
Shell Condition	light rust
Shell Color/Shade	White
Shell Condition	Average
Roof Color/Shade	White
Roof Condition	Average
Tank Construction	
Primary seal	Mechanical-shoe seal
Secondary seal	Yes
Deck type	Welded
Deck Construction (Bolted Tanks Only):	
Deck Seam Length (ft) (Bolted Tank Only):	
5. Roof fitting loss factor (lbmol/year)	638.42
Based upon	Actual Fittings
III. Liquid Properties of Stored Material	
1. Chemical category	Organic Liquids
2. Single or multi-component liquid	Multiple
3. Single component information	
Chemical name	
CAS Number	
Average liquid surface temperature (F)	
True vapor pressure at avg.lst (psia)	
Liquid molecular weight	
4. Multiple component information	
Mixture name	PyGas Mix
Average liquid surface temperature (F)	84.55
Minimum liquid surface temperature (F)	140.84
Maximum liquid surface temperature (F)	149.19
True vapor pressure at avg.l.s.t. (psia)	4.06
True vapor pressure at min.l.s.t. (psia)	4.65
True vapor pressure at max.l.s.t. (psia)	5.54
Liquid molecular weight	87.55
Vapor molecular weight	77.75

Table 7 (c) External Floating Roof Storage Tank Summary

I. Tank Identification	TK-4921
1. Applicant's name:	
2. Location:	see plot plan
3. Tank No.	TK-4921
4. Emission Point No.	49E12

Chemical components information

Chemical name - Liquid Weight Percent	Chemical	Liq wt
Material 1	n-DECANE	4.06%
Material 2	TOLUENE	3.68%
Material 3	n-Nonane	3.30%
Material 4	m-xylene	2.26%
Material 5	n-Hexane	2.45%
Material 6	ETHYLBENZENE	1.85%
Material 7	o-xylene	0.80%
Material 8	INDANE	0.47%
Material 9	STYRENE	0.38%
Material 10	trans-2-PENTENE	0.76%
Material 11	n-PENTANE	0.33%
Material 12	Indene	0.30%
Material 13	DICYCLOPENTADIENE	0.22%
Material 14	2-METHYL-1-BUTENE	0.11%
Material 15	CIS-2-BUTENE	0.72%

IV. Fittings Information

Fitting type	Quantity	No. x Kf
Access Hatch (24-in. Diam.),Hatch Unbolted Cover, Ungasketed		
Access Hatch (24-in. Diam.),Hatch Bolted Cover, Gasketed	1	1.6
Access Hatch (24-in. Diam.),Hatch Unbolted Cover, Gasketed		
Automatic Gauge Float Well,float Unbolted Cover, Ungasketed		
Automatic Gauge Float Well,float Bolted Cover, Gasketed	1	2.8
Automatic Gauge Float Well,float Unbolted Cover, Gasketed		
Column Well (24-in. Diam.),Round Pipe, Ungasketed Sliding Cover		
Column Well (24-in. Diam.),Round Pipe, Gasketed Sliding Cover		
Column Well (24-in. Diam.),Round Pipe, Flexible Fabric Sleeve Seal		
Column Well (24-in. Diam.),Built-Up Column, Sliding Cover, Ungasketed		
Column Well (24-in. Diam.),Built-Up Column, Sliding Cover, Gasketed		
Ladder Well (36-in. Diam.),Sliding Cover, Ungasketed		
Ladder Well (36-in. Diam.),Sliding Cover, Gasketed		
Gauge-Hatch/Sample Well,Weighted Mech. Actuation, Gask.	1	0.5752837
Gauge-Hatch/Sample Well,Weighted Mech. Actuation, Ungask.		
Gauge-Hatch/Sample Well,(G-Hatch Only) Slit Fabric Seal, 10% Open Area		
Rim Vent (6-in. Diameter),Rim Weighted Mech. Actuation, Ungask.		
Rim Vent (6-in. Diameter),Rim Weighted Mech. Actuation, Gask.	1	1.2641667
Vacuum Breaker (10-in. Diam.),VB Weighted Mech. Actuation, Ungask.		
Vacuum Breaker (10-in. Diam.),VB Weighted Mech. Actuation, Gask.	1	12.200718
Roof Leg (3-in. Diameter),Center area - sock		
Roof Leg (3-in. Diameter),Adjustable, Internal Floating Deck		
Roof Leg (3-in. Diameter),Adjustable, Double-Deck Roofs		
Roof Leg (3-in. Diameter),Adjustable, Pontoon Area, Gasketed	16	24.695617
Roof Leg (3-in. Diameter),Adjustable, Pontoon Area, Sock		
Roof Leg (3-in. Diameter),Adjustable, Pontoon Area, Ungasketed		
Roof Leg (3-in. Diameter),Adjustable, Center Area, Gasketed	12	8.0091007
Roof Leg (3-in. Diameter),Adjustable, Center Area, Ungasketed		
Roof Leg (3-in. Diameter),Fixed		
Deck Drain,Stub Drain		

Table 7 (c) External Floating Roof Storage Tank Summary

I. Tank Identification	TK-4921	
1. Applicant's name:		
2. Location:	see plot plan	
3. Tank No.	TK-4921	
4. Emission Point No.	49E12	
Deck Drain,Open		
Deck Drain,90% Closed		
Slotted Guide-Pole/Sample Well,Gask. Sliding Cover, w. Float, Wiper		
Slotted Guide-Pole/Sample Well,Gask. Sliding Cover, w. Pole Sleeve		
Slotted Guide-Pole/Sample Well,Gask. Sliding Cover, w. Pole Wiper		
Slotted Guide-Pole/Sample Well,UnGask or Gask. Sliding Cover		
Slotted Guide-Pole/Sample Well,UnGask or Gask. Sliding Cover, w. Float		
Slotted Guide-Pole/Sample Well,Gask. Sliding Cover, w. Pole Sleeve and Pole Wiper		
Slotted Guide-Pole/Sample Well,Gask. Sliding Cover, w. Float, Pole Sleeve, and Pole Wi		
Unslotted Guide-Pole Well,Ungasketed Sliding Cover		
Unslotted Guide-Pole Well,Ungasketed sliding cover, w. pole sleeve		
Unslotted Guide-Pole Well,Gasketed sliding cover, w. pole sleeve		
Unslotted Guide-Pole Well,Gasketed sliding cover	1	587.27948
Unslotted Guide-Pole Well,Gasketed sliding Cover, w. Wiper		
Total deck fitting loss factor, lb mole/year :		638.42

TK-4921
see plot plan
TK-4921
49E12
48.00
90.00
2,284,273
149
340,200,000
70,350
No
0
0.00
light rust
White
Average
White
Average
Mechanical-shoe seal
Yes
Welded
638.42
Actual Fittings
Organic Liquids
Multiple
TK-4916 - heavy py gas
84.55
140.84
149.19
1.31
1.51
1.81
107.92
81.02

TK-4921	
see plot plan	
TK-4921	
49E12	
Chemical	Liq wt
n-DECANE	20.28%
TOLUENE	18.37%
n-Nonane	16.49%
m-xylene	11.26%
n-Hexane	9.83%
ETHYLBENZENE	9.25%
o-xylene	4.00%
INDANE	2.33%
STYRENE	1.89%
trans-2-PENTENE	1.81%
n-PENTANE	1.67%
Indene	1.50%
DICYCLOPENTADIENE	1.08%
2-METHYL-1-BUTENE	0.16%
benzene	0.07%
Quantity	No. x Kf
1	1.6
1	2.8
1	0.5752837
1	1.2641667
1	12.200718
16	24.695617
12	8.0091007

TK-4921	
see plot plan	
TK-4921	
49E12	
1	587.27948
	638.42