

**New Jersey Department of Environmental Protection
Reason for Application**

Permit Being Modified

Permit Class: **Number:** 0

Description

of Modifications: The purpose of this application is to obtain an air permit for an organic chemical storage tank and the associated truck loading operation.

**New Jersey Department of Environmental Protection
Facility Profile (General)**

Facility Name (AIMS): Firmenich Incorporated

Facility ID (AIMS): 06242

Street FIRMENICH INCORPORATED
Address: 150 FIRMENICH WAY
NEWARK, NJ 07114

Mailing FIRMENICH INCORPORATED
Address: 150 FIRMENICH WAY
NEWARK, NJ 07114

County: Essex
Location East of Doremus Avenue.
Description: North of Turnpike Extension.

State Plane Coordinates: X-Coordinate: Y-Coordinate: Units: Datum: Source Org.: Source Type:

Industry: Primary SIC: Secondary SIC: NAICS: 325199
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**New Jersey Department of Environmental Protection
Facility Profile (General)**

Contact Type: Air Permit Information Contact

Organization: Firmenich Incorporated

Org. Type: Corporation

Name: Ronald Kurtz

NJ EIN:

Title: Manager, Health Safety and Environmental

Phone: (973) 589-3443 x

Mailing Address: Firmenich Incorporated

Fax: (973) 274-0652 x

150 Firmenich Way

Other: () - x

Newark, NJ 07114

Type:

Email: Ron.Kurtz@Firmenich.com

Contact Type: Fees/Billing Contact

Organization: Firmenich Incorporated

Org. Type: Corporation

Name: Ronald Kurtz

NJ EIN:

Title: Manager, Health Safety and Environmental

Phone: (973) 589-3443 x

Mailing Address: Firmenich Incorporated

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150 Firmenich Way

Other: () - x

Newark, NJ 07114

Type:

Email: Ron.Kurtz@Firmenich.com

Contact Type: Responsible Official

Organization: Firmenich Incorporated

Org. Type: Corporation

Name: Ronald Kurtz

NJ EIN:

Title: Manager, Health Safety and Environmental

Phone: (973) 589-3443 x

Mailing Address: Firmenich Incorporated

Fax: (973) 274-0652 x

150 Firmenich Way

Other: () - x

Newark, NJ 07114

Type:

Email: Ron.Kurtz@Firmenich.com

**New Jersey Department of Environmental Protection
Facility Profile (Permitting)**

1. Is this facility classified as a small business by the USEPA? No
2. Is this facility subject to N.J.A.C. 7:27-22? No
3. Are you voluntarily subjecting this facility to the requirements of Subchapter 22? No
4. Has a copy of this application been sent to the USEPA? No
5. If not, has the EPA waived the requirement? No
6. Are you claiming any portion of this application to be confidential? No
7. Is the facility an existing major facility? No
8. Have you submitted a netting analysis? No
9. Are emissions of any pollutant above the SOTA threshold? No
10. Have you submitted a SOTA analysis? No
11. If you answered "Yes" to Question 9 and "No" to Question 10, explain why a SOTA analysis was not required

12. Have you provided, or are you planning to provide air contaminant modeling? No

**New Jersey Department of Environmental Protection
Equipment Inventory**

Equip. NJID	Facility's Designation	Equipment Description	Equipment Type	Certificate Number	Install Date	Grand- Fathered	Last Mod. (Since 1968)	Equip. Set ID
E13001	T-100R	T-100R	Storage Vessel		2/1/2020	No		
E13002	T-100R Truck	T-100R Truck Loading Station	Manufacturing and Materials Handling Equipment		2/1/2020	No		

**New Jersey Department of Environmental Protection
Control Device Inventory**

CD NJID	Facility's Designation	Description	CD Type	Install Date	Grand-Fathered	Last Mod. (Since 1968)	CD Set ID
CD13001	T-100R TR VR	T-100R Truck Filling Vapor Return	Other	2/1/2020	No		

New Jersey Department of Environmental Protection
Emission Points Inventory

PT NJID	Facility's Designation	Description	Config.	Equiv. Diam. (in.)	Height (ft.)	Dist. to Prop. Line (ft)	Exhaust Temp. (deg. F)			Exhaust Vol. (acfm)			Discharge Direction	PT Set ID
							Avg.	Min.	Max.	Avg.	Min.	Max.		
PT13001	T-100R	T-100 R Vent	Round	8	22	70	130.0	120.0	140.0	0.1	0.0	13.0	Horizontal	

**New Jersey Department of Environmental Protection
Emission Unit/Batch Process Inventory**

U 130 T-100R Tank T-100R and associated truck filling

UOS NJID	Facility's Designation	UOS Description	Operation Type	Signif. Equip.	Control Device(s)	Emission Point(s)	SCC(s)	Annual Oper. Hours		VOC Range	Flow (acfm)		Temp. (deg F)	
								Min.	Max.		Min.	Max.	Min.	Max.
OS1	T-100R	Tank T-100R	Normal - Steady State	E13001		PT13001		8,760.0	8,760.0		0.0	13.0	120.0	140.0
OS2	T-100R Truck	Tank T-100R truck loading	Normal - Steady State	E13002	CD13001 (P)			8,760.0	8,760.0		0.0	20.0	120.0	140.0

**New Jersey Department of Environmental Protection
Potential to Emit**

Subject Item: U130 T-100R
Operating Scenario: OS0 Summary
Step:

Air Contaminant Category (HAPS)	Fugitive Emissions	Emissions Before Controls	Emissions After Controls	Total Emissions	Units	Alt. Em. Limit
VOC (Total)	0.01090000	0.18400000	0.18400000	0.19490000	tons/yr	No

Subject Item: U130 T-100R
Operating Scenario: OS2
Step:

Air Contaminant Category (HAPS)	Fugitive Emissions	Emissions Before Controls	Emissions After Controls	Total Emissions	Units	Alt. Em. Limit
VOC (Total)	0.32600000			0.32600000	lb/hr	No

000000 E13001 (Storage Vessel)
Print Date: 7/20/2020

What type of contents is this storage vessel equipped to contain by design?

Liquids Only

Storage Vessel Type:

Tank

Design Capacity:

11,000

Units:

gallons

Ground Location:

Above Ground

Is the Shell of the Equipment Exposed to Sunlight?

Yes

Shell Color:

Specular Aluminum

Description (if other):

Shell Condition:

Paint Condition:

Good

Shell Construction:

Welded

Is the Shell Insulated?

Yes

Type of Insulation:

fiberglass

Insulation Thickness (in):

2.0

Thermal Conductivity of Insulation [(BTU)(in)(hr)(ft²)(deg F)]:

0.20000

Shape of Storage Vessel:

Cylindrical

Shell Height (From Ground to Roof Bottom) (ft):

Length (ft):

Width (ft):

Diameter (ft):

10.00

Other Dimension

Description:

Length from bottom of tank to top tangent line

Value:

18.50

Units:

feet

Fill Method:

Submerged

Description (if other):

Maximum Design Fill Rate:

100.00

Units:

gal/min

Does the storage vessel have a roof or an open top?

Roof

Roof Type:

Domed vertical fixed roof tank

Roof Height (From Roof Bottom to Roof Top) (ft):

1.70

Roof Construction:

Primary Seal Type:

Secondary Seal Type:

Total Number of Seals:

Roof Support:

Does the storage vessel have a Vapor Return Loop?

No

00000 E13001 (Storage Vessel)
Print Date: 7/20/2020

Does the storage vessel
have a Conservation Vent?

Have you attached a diagram
showing the location and/or the
configuration of this equipment?

Have you attached any manuf.'s
data or specifications to aid the
Dept. in its review of this
application?

Comments:

The design capacity presented above is the total tank volume. The working volume is approximately 10,000 gallons. A selection was not made for "Shell Condition" because the options presented are not appropriate. The shell condition is good.

000000 E13002 (Manufacturing and Materials Handling Equipment)
Print Date: 7/20/2020

Make:	<input type="text" value="Not applicable."/>
Manufacturer:	<input type="text" value="Not applicable."/>
Model:	<input type="text" value="Not applicable."/>
Type of Manufacturing and Materials Handling Equipment:	<input type="text" value="Liquid chemical tank truck filling"/>
Capacity:	<input type="text" value="1.50E+02"/>
Units:	<input type="text" value="other units"/>
Description (if other):	<input type="text" value="gallons per minute"/>
Have you attached a diagram showing the location and/or the configuration of this equipment?	<input type="text" value="Yes"/>
Have you attached any manuf.'s data or specifications to aid the Dept. in its review of this application?	<input type="text" value="No"/>
Comments:	

000000 CD13001 (Other)
Print Date: 7/20/2020

Make:
Manufacturer:
Model:

Maximum Air Flow Rate to Control Device (acfm):

Maximum Temperature of Vapor Stream to Control Device (°F):

Minimum Temperature of Vapor Stream to Control Device (°F):

Minimum Moisture Content of Vapor Stream to Control Device (%):

Minimum Pressure Drop Across Control Device (in. H2O):

Maximum Pressure Drop Across Control Device (in. H2O):

Maximum Number of Sources Using this Apparatus as a Control Device (Include Permitted and Non-Permitted Sources):

Alternative Method to Demonstrate Control Apparatus is Operating Properly:

Have you attached data from recent performance testing? Yes No

Have you attached any manufacturer's data or specifications in support of the feasibility and/or effectiveness of this control apparatus? Yes No

Have you attached a diagram showing the location and/or configuration of this control apparatus? Yes No

Comments:

06242 Firmenich Incorporated PCP000000 U130 OS1 (Storage Vessel Content)
Print Date: 7/20/2020

Content Name:	VOC
CAS Number:	
Is the Content Under Pressure?	No
Pressure (PSIG):	
Physical State:	Liquid
Estimated Average Working Volume:	5,000
Units:	gallons
Density of Contents:	7.500
Units:	lb/gal
Estimated Minimum Storage Temperature (deg F):	120.000
Estimated Maximum Storage Temperature (deg F):	140.000
Estimated Average Storage Temperature (deg F):	130.000
Does the Content Contain VOCs?:	Yes
Organic Density:	7.500
Units:	lb/gal
Molecular Weight (Lbs/Lbs-Mole):	
Vapor Pressure at Average Storage Temperature (PSIA):	0.220
Vapor Pressure at 70 deg F (mmHg):	1.100
Estimated Average Annual Throughput:	300,000.0000
Units:	gallons
Estimated Maximum Annual Throughput:	600,000.0000
Units:	gallons

06242 Firmenich Incorporated PCP000000 U130 OS2 (Gas Flow)
Print Date: 7/20/2020

Volume of Gas Discharged from
this source (acfm):

20.00

06242 Firmenich Incorporated PCP000000 U130 OS2 (Raw Materials)

Print Date: 7/20/2020

Raw Material	CAS Number	Physical State	Molecular Weight (lbs/lbs-mole)	Does the Material Contain VOC?	Weight Fraction (%)	Vapor Pressure @ 70 deg F (mmHg)	Organic Density	Units
VOC (Total)		Liquid		Yes	100.00	1.100	7.500	lb/gal

06242 Firmenich Incorporated PCP000000 U130 OS2 (Efficiency Table - CD13001)
Print Date: 7/20/2020

Pollutant Category	Capture Efficiency (%)	Removal Efficiency (%)	Overall Efficiency (%)
CO			
HAP (Total)			
NOx			
Other (Total)			
Pb			
PM-10			
PM-2.5			
SO2			
TSP			
VOC (Total)	90.00	100.00	90.00

ATTACHMENTS

APPLICATION TO OBTAIN MINOR FACILITY AIR PERMIT

U130 T-100R

**FIRMENICH INCORPORATED
NJDEP FACILITY ID 06242**

CONTENTS

ATTACHMENT 1. DIAGRAMS

ATTACHMENT 2. SUPPLEMENTAL INFORMATION

ATTACHMENT 3. USEPA TANKS PROGRAM CALCULATIONS

ATTACHMENT 1

DIAGRAMS

FIGURE 1. TANK T-100R LOCATION ON BULK STORAGE PAD

PLANT
NORTH
↑

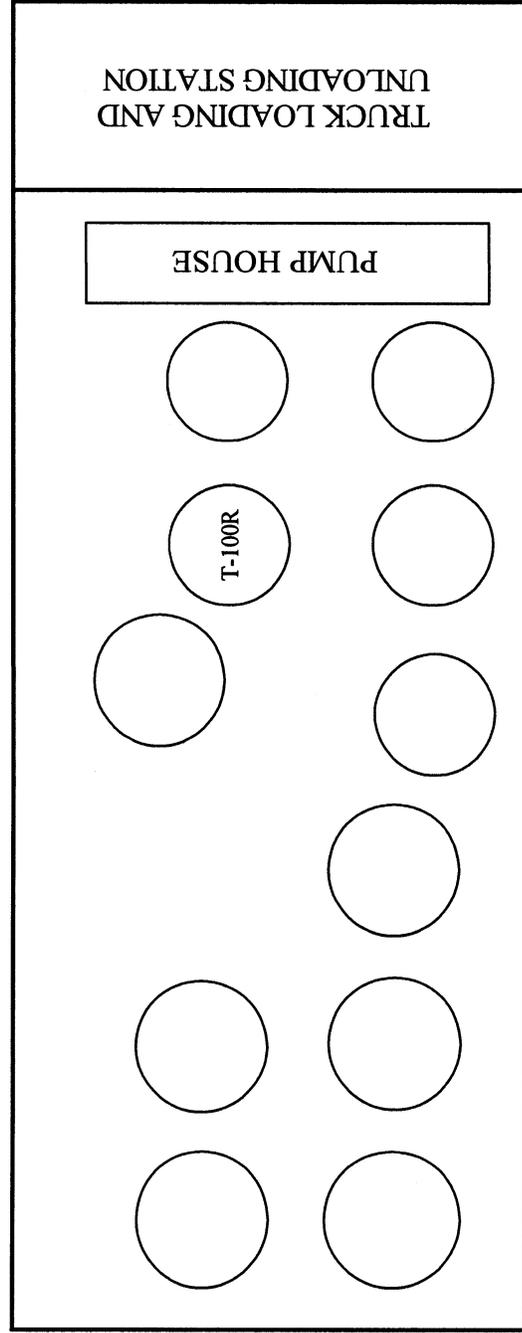
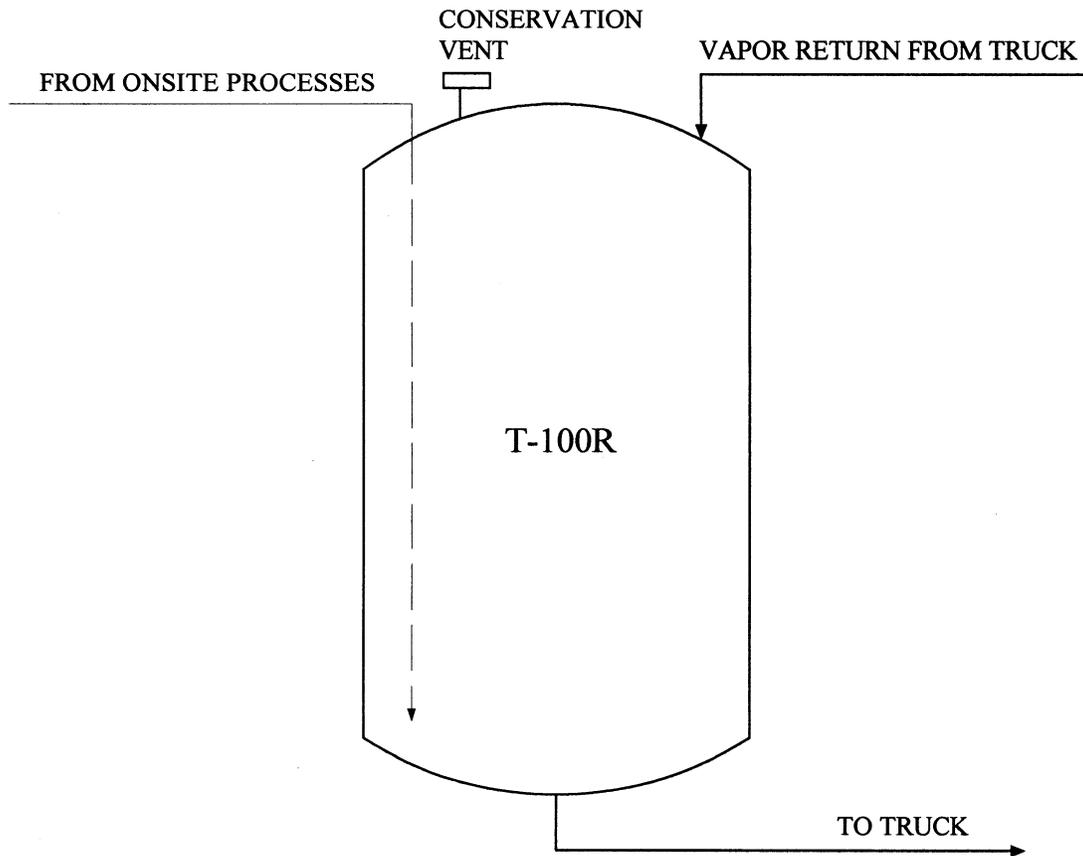


FIGURE 2. T-100R



ATTACHMENT 2
SUPPLEMENTAL INFORMATION

CONTENTS

	PAGE
1.0 PURPOSE AND DESCRIPTION OF PERMIT MODIFICATION	1
2.0 EQUIPMENT AND OPERATING SCENARIOS	1
3.0 AIR POLLUTANT EMISSIONS	2

1.0 PURPOSE AND DESCRIPTION OF PERMIT MODIFICATION

The purpose of this permit application is to obtain an air permit for a storage tank and the associated truck filling operation at the Firmenich facility in Newark, New Jersey. The emission unit number for this permit will be U130. The equipment items will be: E13001 T-100R; and E13002 T-100R Truck Loading Station.

2.0 EQUIPMENT AND OPERATING SCENARIOS

2.1 Tank T-100R (E13001, OS1)

Tank T-100R is a vertical, cylindrical tank, with dished top and bottom heads. Tank T-100R has a total volume of 11,000 gallons and a working volume of approximately 10,000 gallons (Feldmeir Equipment, Drawing E-988-08). The tank is equipped with a submerged fill pipe, and the atmospheric vent on the tank is equipped with a conservation vent.

Tank T-100R is heat-trace, insulated, and covered with aluminum cladding. The heating medium is glycol. The temperature of the glycol supplied to the heat tracing will be 140°F. The temperature of the liquid in the tank will be slightly lower than the temperature of the glycol supplied to the heat tracing due to heat loss from the tracing, through the tank, into the liquid. For conservatism and to provide a margin of safety for the air permit, the maximum liquid storage temperature being specified for the air permit is 140°F. The minimum temperature being specified for the air permit is 120°F.

Tank T-100R will be used to store liquid organic chemicals from onsite processes. The materials stored in T-100R are classified as volatile organic compounds (VOC). Hazardous air pollutant (HAP) materials will not be stored in T-100R.

The vapor pressure of the materials stored in T-100R will be very low. According to Firmenich information, the vapor pressure will be well below 1 mm Hg at 70°F. To provide a margin of safety, the maximum vapor pressure specified for the air permit is 1.1 mm Hg at 70°F.

The annual throughput of tank T-100R is expected to be approximately 250,000 gallons per year. To provide a margin of safety, the maximum throughput specified for the permit is 600,000 gallons per year.

2.2 T-100R Truck Loading Station (E13002, OS2)

Material that is stored in T-100R will be pumped into tank trucks at the T-100R truck loading station. The trucks will be filled through bottom connections. This is

classified as bottom, or submerged, filling. The truck loading station is equipped with a vapor return line to return vapors from the tank trucks to T-100R as tank trucks are filled with material from T-100R.

3.0 AIR POLLUTANT EMISSIONS

3.1 Tank T-100R

The Tank T-100R air pollutant emissions have been calculated using the USEPA TANKS program, with an annual throughput of 600,000 gallons. A copy of the TANKS program output is attached.

The calculations were performed using a surrogate material from the TANKS program chemical data base. The surrogate material has a vapor pressure of 1.1 mm Hg at 70°F, which is greater than the actual vapor pressure of the materials that will be stored in the tank. The vapor pressure of the surrogate material has been specified as the maximum permissible vapor pressure for the air permit.

The calculated emissions are as follows:

Tank T-100R Annual Breathing Emission = 165.2 lb
Tank T-100R Annual Working Emission = 201.9 lb
Tank T-100R Annual Total Emission = 367.1

3.2 T-100R Truck Loading Station

3.2.1 T-100R Truck Loading Station Annual VOC Emission

As noted in section 2.2, the T-100R truck loading station is equipped with a vapor return line to return vapors back to T-100R as the trucks are loaded. A tight, well maintained vapor return system returns essentially all of the vapor from the delivery truck during filling, so emissions during filling are essentially zero. For permitting purposes, a vapor loss of ten percent of the potential filling emissions is specified to occur.

An estimate of the amount of vapor that would be emitted from filling tank trucks with material from T-100R if the system did not have a vapor return line can be calculated using the following expression for truck loading vapor emissions developed by the USEPA (AP-42, Section 5.2, 6/08).

$$L_L = 12.46 \times S \times P \times M / T$$

where:

L_L is the loading vapor emission, in pounds of vapor per 1000 gallons of throughput (lb/10³ gal).

S is a saturation factor, based on the type of loading and the expected vapor status of the truck tank prior to filling (based on the use history). The tank trucks are filled by bottom connections. This is considered bottom or submerged filling. For bottom or submerged filling, with the mode of operation used for the Firmenich process, two optional saturation factors are provided in the AP-42 calculation procedures: 0.5 and 0.6. For conservatism, a saturation factor of 0.6 has been used for the emission calculations.

P is the vapor pressure of the material being loaded, in psia. Based on the data from the USEPA TANKS emission calculations, at the maximum T-100R storage temperature, the vapor pressure of the surrogate material that is being used for emission calculations is approximately 0.3028 psia.

M is the molecular weight of the material being loaded. The molecular weight of the surrogate material that is being used for emission calculations is 96.1.

T is the temperature of the liquid, in degrees R. The specified maximum storage temperature is being used for emission calculations (140°F = 600°R).

Note: For conservatism, the annual average vapor pressure (P) was based on the maximum storage temperature.

Substituting into the expression for the vapor emissions yields the following:

$$\begin{aligned} L_L &= 12.46 \times S \times P \times M / T \\ &= (12.46)(0.6)(0.3028)(96.1) / 600 \\ &= 0.363 \text{ lb vapor/1000 gal throughput.} \end{aligned}$$

Based on a permitted annual throughput of 600,000 gallons, an estimate of the annual vapor emission that would occur from truck loading without a vapor return line can be calculated as follows:

$$\begin{aligned} &\text{Truck Loading Annual VOC Vapor Emission} \\ &\text{That Would Occur Without A Vapor Return Line} \\ &= (0.363 \text{ lb vapor/1000 gal})(600,000 \text{ gal/year}) = 218 \text{ lb/yr} \end{aligned}$$

Assuming that the vapor return system captures at least 90 percent of the vapors from truck loading, an estimate of the fugitive emissions from this operation, after control, can be calculated as follows:

Truck Loading Annual VOC Vapor Fugitive Emissions
(After Control by the Vapor Return)

$$= (1 - 0.9)(218 \text{ lb/yr}) = 21.8 \text{ lb/yr}$$

3.2.2 T-100R Truck Loading Station Maximum Hourly VOC Emission

As explained in Section 3.2.1, based on the maximum potential storage temperature specified for the air permit, the worst-case maximum potential vapor emission factor, without accounting for the vapor return, is as follows:

$$L_L = 12.46 \times S \times P \times M / T$$
$$= 0.363 \text{ lb vapor/1000 gal throughput}$$

The maximum truck filling rate is less than 150 gallons per minute, or less than 9000 gallons per hour. Accordingly, an estimate of the worst-case potential maximum hourly vapor emission rate, without control by the vapor return, can be calculated as follows:

Truck Loading Maximum Potential Hourly Vapor Emission Rate
That Would Occur Without A Vapor Return Line

$$= (0.363 \text{ lb vapor/1000 gal})(9000 \text{ gal/hr}) = 3.27 \text{ lb/hr}$$

Assuming that the vapor return system captures at least 90 percent of the vapors from truck loading, an estimate of the maximum potential hourly fugitive emission rate after control can be calculated as follows:

Truck Loading Maximum Potential Hourly Vapor Fugitive Emission Rate
(After Control by the Vapor Return)

$$= (1 - 0.9)(3.27 \text{ lb/hr}) = 0.327 \text{ lb/hr}$$

Worst-Case Maximum VOC Range (prior to control)

$$VP \text{ at } 70^\circ\text{F} = 0.021 \text{ psia}$$

Worst-Case Maximum Vapor Concentration

$$= (\text{worst-case maximum vapor pressure})/(\text{ambient pressure})$$

$$= (0.3028 \text{ psig})/(14.7 \text{ psia})$$

$$= 2.1\%$$

VOC Range is E

3.2.3 Presenting T-100R Truck Loading Station VOC Emissions in RADIUS Application

The VOC emissions from the truck loading operation occur as fugitive emissions. Therefore, in the RADIUS application, the VOC emissions are presented as fugitive emissions rather than as emissions before and after control.

3.3 Emission Unit U130 Total Annual VOC Emissions

The estimated total annual VOC emissions from the T-100R tank storage and truck filling operations in this permit can be calculated as follows:

Annual Fugitive Emissions from truck filling = 21.8 lb = 0.0109 ton
Annual Emissions from T-100R tank storage = 367.1 lb = 0.184 ton
Total Annual Emissions = 389 lb = 0.195 ton

ATTACHMENT 3

**USEPA TANKS PROGRAM
CALCULATIONS**

TANKS 4.0.9d

Emissions Report - Summary Format

Tank Identification and Physical Characteristics

Identification	
User Identification:	T-100R
City:	Newark
State:	New Jersey
Company:	Firmenich Newark
Type of Tank:	Vertical Fixed Roof Tank
Description:	T-100R
Tank Dimensions	
Shell Height (ft):	18.00
Diameter (ft):	10.00
Liquid Height (ft) :	18.00
Avg. Liquid Height (ft):	9.00
Volume (gallons):	10,000.00
Turnovers:	60.00
Net Throughput(gal/yr):	600,000.00
Is Tank Heated (y/n):	Y
Paint Characteristics	
Shell Color/Shade:	Aluminum/Specular
Shell Condition:	Good
Roof Color/Shade:	Aluminum/Specular
Roof Condition:	Good
Roof Characteristics	
Type:	Dome
Height (ft)	20.00
Radius (ft) (Dome Roof)	10.00
Breather Vent Settings	
Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00
Meteorological Data used in Emissions Calculations: Newark, New Jersey (Avg Atmospheric Pressure = 14.73 psia)	

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

T-100R - Vertical Fixed Roof Tank
Newark, New Jersey

Mixture/Component	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
	Month	Avg.	Min.		Max.	Avg.	Min.					
Furfural	All	130.00	120.00	140.00	130.00	0.2206	0.1581	0.3028	96.0900	96.09	Option 2: A=6.575, B=1198.7, C=162.8	

TANKS 4.0.9d

Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-100R - Vertical Fixed Roof Tank
Newark, New Jersey

Components	Losses (lbs)			Total Emissions
	Working Loss	Breathing Loss		
Furfural	201.90	165.20		367.10