ANNEXE 4

Calculs pour taux d'émission et pages références pour seuil d'odeur de thiophène et de jet fuel

Tableau sommaire des émissions de gaz de diesel de janvier à décembre (1 seul remplissage par mois)

Émissions du diesel sur une base mensuelle (TANKS 4.0.9d)

Substance	Couleur / ombre	Hauteur du réservoir (pi.)	Diamètre du réservoir (pi.)	Nombre de renouv.	Mois	Perte de stockage (Lbs)	Perte de remplissage et vidage (Lbs)	Total des pertes (Lbs)
Diesel	gris / clair	48	166.5	1	Janvier	70.33	39.28	109.61
Diesel	gris / clair	48	166.5	1	Février	70.33	44.83	115.16
Diesel	gris / clair	48	166.5	1	Mars	70.33	58.22	128.55
Diesel	gris / clair	48	166.5	1	Avril	94.96	89.52	184.48
Diesel	gris / clair	48	166.5	1	Mai	125.77	145.87	271.64
Diesel	gris / clair	48	166.5	1	Juin	146.13	168.1	314.23
Diesel	gris / clair	48	166.5	1	Juillet	159.09	188.04	347.13
Diesel	gris / clair	48	166.5	1	Août	146.33	153.26	299.59
Diesel	gris / clair	48	166.5	1	Septembre	120.48	100.64	221.12
Diesel	gris / clair	48	166.5	1	Octobre	92.69	57.88	150.57
Diesel	gris / clair	48	166.5	1	Novembre	71.27	26.66	97.93
Diesel	gris / clair	48	166.5	1	Décembre	70.33	30.21	100.54

Analyse des résultats:

C'est dans le mois de juillet que les émissions sont les plus importantes. Il est donc conservateur de faire nos calculs en prenant les valeurs du mois de juillet.

Rapport détaillé des émissions de gaz de diesel pour le mois de janvier (1 seul remplissage)

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

Identification

User Identification:	T-07395_Diesel_166.5_grey
City:	Becancour
State:	Quebec
Company:	Servitank
Type of Tank:	Vertical Fixed Roof Tank
Description:	Reservoir futur Diesel_ferme

Tank Dimensions

Shell Height (ft):	48.00
Diameter (ft):	166.50
Liquid Height (ft) :	45.00
Avg. Liquid Height (ft):	26.50
Volume (gallons):	7,329,326.47
Turnovers:	1.00
Net Throughput(gal/yr):	7,329,326.47
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	5.20
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

Vacuum Settings (psig):	-0.06
Pressure Settings (psig)	0.09

Meterological Data used in Emissions Calculations: Becancour, Quebec (Avg Atmospheric Pressure = 14.59 psia)

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

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

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
Distillate fuel oil no. 2	Jan	30.63	25.29	35.97	42.99	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031

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

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Standing Losses (lb):	39.2791											
Vapor Space Volume (cu ft):	505,882.1447											
Vapor Density (lb/cu ft):	0.0001											
Vapor Space Expansion Factor:	0.0328											
Vented Vapor Saturation Factor:	0.9962											
Tank Vapor Space Volume:												
Vapor Space Volume (cu ft):	505,882.1447											
Tank Diameter (ft):	166.5000											
Vapor Space Outage (ft):	23.2344											
Tank Shell Height (ft):	48.0000											
Average Liquid Height (ft):	26.5000											
Roof Outage (ft):	1.7344											
Roof Outage (Cone Roof)												
Roof Outage (ft):	1.7344											
Roof Height (ft):	5.2031											
Roof Slope (ft/ft):	0.0625											
Shell Radius (ft):	83.2500											
Vapor Density												
Vapor Density (lb/cu ft):	0.0001											
Vapor Molecular Weight (lb/lb-mole):	130.0000											
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0031											
Daily Avg. Liquid Surface Temp. (deg. R):	490.3014											
Daily Average Ambient Temp. (deg. F):	9.8600											
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731											
Liquid Bulk Temperature (deg. R):	502.6580											
Tank Paint Solar Absorptance (Shell):	0.5400											
Tank Paint Solar Absorptance (Roof):	0.5400											
Daily Total Solar Insulation Factor (Btu/sqft day):	520.3328											
Vapor Space Expansion Factor												
Vapor Space Expansion Factor:	0.0328											
Daily Vapor Temperature Range (deg. R):	21.3458											
Daily Vapor Pressure Range (psia):	0.0000											
Breather Vent Press. Setting Range(psia):	0.1563											
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0031											
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0031											
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0031											
Daily Avg. Liquid Surface Temp. (deg R):	490.3014											
Daily Min. Liquid Surface Temp. (deg R):	484.9650											
Daily Max. Liquid Surface Temp. (deg R):	495.6379											
Daily Ambient Temp. Range (deg. R):	18.7200											
Vented Vapor Saturation Factor												
Vented Vapor Saturation Factor:	0.9962											

Vapor Pressure at Daily Average Liquid:	
Surface Temperature (psia):	0.0031
Vapor Space Outage (ft):	23.2344
Working Losses (lb):	70.3266
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid	
Surface Temperature (psia):	0.0031
Net Throughput (gal/mo.):	7,329,326.4730
Annual Turnovers:	1.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	7,329,326.4736
Maximum Liquid Height (ft):	45.0000
Tank Diameter (ft):	166.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	109.6057

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

Emissions Report for: January

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	70.33	39.28	109.61

Résultats sommaires du rapport des émissions de gaz de diesel de février à décembre (1 seul remplissage par mois)

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

Emissions Report for: February

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	70.33	44.83	115.16

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

Emissions Report for: March

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	70.33	58.22	128.55

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

Emissions Report for: April

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	94.96	89.52	184.48

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

Emissions Report for: May

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	125.77	145.87	271.64

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

Emissions Report for: June

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	146.13	168.10	314.23

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

Emissions Report for: July

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	159.09	188.04	347.13

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

Emissions Report for: August

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	146.33	153.26	299.59

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

Emissions Report for: September

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	120.48	100.64	221.12

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

Emissions Report for: October

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	92.69	57.88	150.56

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

Emissions Report for: November

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	71.27	26.66	97.93

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

Emissions Report for: December

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	70.33	30.21	100.54

Rapport détaillé des émissions de gaz de diesel pour le mois de juillet

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

Identification

User Identification:	T-07395_Diesel_166.5_grey
City:	Becancour
State:	Quebec
Company:	Servitank
Type of Tank:	Vertical Fixed Roof Tank
Description:	Reservoir futur Diesel_ferme

Tank Dimensions

Shell Height (ft):	48.00
Diameter (ft):	166.50
Liquid Height (ft) :	45.00
Avg. Liquid Height (ft):	26.50
Volume (gallons):	7,329,326.47
Turnovers:	1.00
Net Throughput(gal/yr):	7,329,326.47
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	5.20
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

Vacuum Settings (psig):	-0.06
Pressure Settings (psig)	0.09

Meterological Data used in Emissions Calculations: Becancour, Quebec (Avg Atmospheric Pressure = 14.59 psia)

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

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

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
Distillate fuel oil no. 2	Jul	62.05	51.01	73.09	42.99	0.0070	0.0047	0.0099	130.0000			188.00	Option 1: VP60 = .0065 VP70 = .009

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

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Standing Losses (lb):							188.0389					
Vapor Space Volume (cu ft):							505,882.1447					
Vapor Density (lb/cu ft):							0.0002					
Vapor Space Expansion Factor:							0.0743					
Vented Vapor Saturation Factor:							0.9914					
Tank Vapor Space Volume:												
Vapor Space Volume (cu ft):							505,882.1447					
Tank Diameter (ft):							166.5000					
Vapor Space Outage (ft):							23.2344					
Tank Shell Height (ft):							48.0000					
Average Liquid Height (ft):							26.5000					
Roof Outage (ft):							1.7344					
Roof Outage (Cone Roof)												
Roof Outage (ft):							1.7344					
Roof Height (ft):							5.2031					
Roof Slope (ft/ft):							0.0625					
Shell Radius (ft):							83.2500					
Vapor Density												
Vapor Density (lb/cu ft):							0.0002					
Vapor Molecular Weight (lb/lb-mole):							130.0000					
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.0070					
Daily Avg. Liquid Surface Temp. (deg. R):							521.7205					
Daily Average Ambient Temp. (deg. F):							67.6400					
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):							10.731					
Liquid Bulk Temperature (deg. R):							502.6580					
Tank Paint Solar Absorptance (Shell):							0.5400					
Tank Paint Solar Absorptance (Roof):							0.5400					
Daily Total Solar Insulation Factor (Btu/sqft day):							1,925.8289					
Vapor Space Expansion Factor												
Vapor Space Expansion Factor:							0.0743					
Daily Vapor Temperature Range (deg. R):							44.1521					
Daily Vapor Pressure Range (psia):							0.0052					
Breather Vent Press. Setting Range(psia):							0.1563					
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.0070					
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):							0.0047					
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):							0.0099					
Daily Avg. Liquid Surface Temp. (deg R):							521.7205					
Daily Min. Liquid Surface Temp. (deg R):							510.6824					
Daily Max. Liquid Surface Temp. (deg R):							532.7585					
Daily Ambient Temp. Range (deg. R):							20.8800					
Vented Vapor Saturation Factor												
Vented Vapor Saturation Factor:							0.9914					

Vapor Pressure at Daily Average Liquid:	
Surface Temperature (psia):	0.0070
Vapor Space Outage (ft):	23.2344
Working Losses (lb):	159.0883
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid	
Surface Temperature (psia):	0.0070
Net Throughput (gal/mo.):	7,329,326.4730
Annual Turnovers:	1.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	7,329,326.4736
Maximum Liquid Height (ft):	45.0000
Tank Diameter (ft):	166.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	347.1272

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

Emissions Report for: July

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	159.09	188.04	347.13

Résultats sommaires du rapport des émissions de gaz des produits modélisés potentiellement entreposés pour le mois de juillet

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

Emissions Report for: July

T-07395_Jetfuel_166.5_gris - Vertical Fixed Roof Tank
Becancour, Quebec

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Jet kerosene	204.46	238.68	443.14

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

Emissions Report for: July

T-07395_Benzene_76.5 - Internal Floating Roof Tank
Becancour, Quebec

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Benzene	17.49	4.52	61.34	23.41	106.76

Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: July

T-07395_Methanol_150 - Internal Floating Roof Tank
Becancour, Quebec

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Methyl alcohol	64.66	8.34	76.21	0.00	149.22

Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: July

T-07395_Methanol_115 - Internal Floating Roof Tank
Becancour, Quebec

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Methyl alcohol	49.58	6.40	58.07	0.00	114.05

Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: July

T-07395_Methanol_100 - Internal Floating Roof Tank
Becancour, Quebec

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Methyl alcohol	43.11	5.56	50.47	0.00	99.14

Tableau sommaire des émissions de gaz des différents produits modélisés potentiellement entreposés pour le mois de juillet

Émissions pour le mois de juillet en fonction des différents liquides (TANKS 4.0.9d)

Construction avec toit fixe

Substance	Couleur / ombre	Hauteur du réservoir (pi.)	Diamètre du réservoir (pi.)	Nombre de renouv.	Mois	Perte de stockage (Lbs)	Perte de remplissage et vidage (Lbs)	Pertes par réservoir (Lbs)	Nombre de réservoirs	Total des pertes (Lbs)
Diesel	gris / clair	48	166.5	1	Juillet	159.09	188.04	347.13	3	1041.39
Jetfuel	gris / clair	48	166.5	1	Juillet	204.46	238.68	443.14	3	1329.42

Construction avec toit flottant

Substance	Couleur / ombre	Joint d'étanchéité circonférentiel primaire	Joint d'étanchéité circonférentiel secondaire	Mode de fixation du deck	Hauteur du réservoir (pi.)	Diamètre du réservoir (pi.)	Nombre de renouv.	Mois	Perte par le joint d'étanchéité circonférentiel (Lbs)	Perte de vidage (Lbs)	Perte à travers les différents accessoires sur le toit flottant (Lbs)	Perte à travers le deck (Lbs)	Pertes par réservoir (Lbs)	Nombre de réservoirs	Total des pertes (Lbs)
Benzène	gris / clair	Mechanical shoe	Shoe-mounted	Boulonné	48	76.5	1	Juillet	17.49	4.52	61.34	23.41	106.76	1	106.76
Méthanol	gris / clair	Mechanical shoe	Aucun	Soudé	48	150	1	Juillet	64.66	8.34	76.21	0	149.21	2	298.42
Méthanol	gris / clair	Mechanical shoe	Aucun	Soudé	48	115	1	Juillet	49.58	6.4	58.07	0	114.05	3	342.15
Méthanol	gris / clair	Mechanical shoe	Aucun	Soudé	48	100	1	Juillet	43.11	5.56	50.47	0	99.14	1	99.14

Détail des calculs des taux d'émission de gaz des différents produits modélisés potentiellement entreposés pour le mois de juillet

Benzène

Données	Valeurs	Unités de mesure
Volume de déchargement bateau	4550	m3
Débit de remplissage	**400**	**m3/hre**
Diamètre de sortie	0.3048	m
Aire de sortie	0.07296588	m2
Volume maximal	1375316	gallons
Volume maximal	5206.13778	m3
Émissions totales en juillet	106.76	Lbs
Émissions totales en juillet	48.4260183	Kg
Temps de déchargement bateau	11.375	heure
Taux d'émission	4.25723238	kg/hre
Taux d'émission	4257.23238	g/hre
Taux d'émission	1.18256455	g/s
Taux d'émission par évent	**0.59128228**	**g/s**
Vitesse du gaz (total)	5482.01456	m/hre
Vitesse du gaz (total)	1.52278182	m/s
Vitesse du gaz par évent	**0.76139091**	**m/s**

Méthanol (Diamètre: 100 pieds)

Données	Valeurs	Unités de mesure
Volume de déchargement bateau	25300	m3
Débit de remplissage	**500**	**m3/hre**
Diamètre de sortie	0.3048	m
Aire de sortie	0.07296588	m2
Volume maximal	2350073	gallons
Volume maximal	8895.99469	m3
Émissions totales en juillet	99.14	Lbs
Émissions totales en juillet	44.969609	Kg
Temps de chargement	17.7919894	heure
Taux d'émission	2.52752	kg/hre
Taux d'émission	2527.52	g/hre
Taux d'émission	0.70208889	g/s
Taux d'émission par évent	**0.35104444**	**g/s**
Vitesse du gaz (total)	6852.5182	m/hre
Vitesse du gaz (total)	1.90347728	m/s
Vitesse du gaz par évent	**0.95173864**	**m/s**

Méthanol (Diamètre: 150 pieds)

Données	Valeurs	Unités de mesure
Volume de déchargement bateau	25300	m3
Débit de remplissage	**500**	**m3/hre**
Diamètre de sortie	0.3048	m
Aire de sortie	0.07296588	m2
Volume maximal	5287665	gallons
Volume maximal	20015.9909	m3
Émissions totales en juillet	149.22	Lbs
Émissions totales en juillet	67.685748	Kg
Temps de chargement	40.0319818	heure
Taux d'émission	1.69079184	kg/hre
Taux d'émission	1690.79184	g/hre
Taux d'émission	0.4696644	g/s
Taux d'émission par évent	**0.2348322**	**g/s**
Vitesse du gaz (total)	6852.5182	m/hre
Vitesse du gaz (total)	1.90347728	m/s
Vitesse du gaz par évent	**0.95173864**	**m/s**

Jetfuel - réservoir #8 - par remplissage

Données	Valeurs	Unités de mesure
Volume de déchargement bateau	32250	m3
Débit de remplissage	**600**	**m3/hre**
Diamètre de sortie	0.3048	m
Aire de sortie	0.07296588	m2
Volume maximal	7,329,326	gallons
Volume maximal	27744.5191	m3
Émissions en juillet (working loss)	204.46	Lbs
Émissions en juillet (working loss)	92.7424476	Kg
Temps de chargement	46.2408651	heure
Taux d'émission	2.00563825	kg/hre
Taux d'émission	2005.63825	g/hre
Taux d'émission	**0.55712173**	**g/s**
Vitesse du gaz	**8223.02184**	**m/hre**
Vitesse du gaz	**2.28417273**	**m/s**
Densité	0.00334273	kg/m3
Densité	3.34273041	g/m3

Diesel - réservoir #8 - par remplissage

Données	Valeurs	Unités de mesure
Volume de déchargement bateau	32250	m3
Débit de remplissage	**600**	**m3/hre**
Diamètre de sortie	0.3048	m
Aire de sortie	0.07296588	m2
Volume maximal	7,329,326	gallons
Volume maximal	27744.5191	m3
Émissions en juillet (working loss)	159.09	Lbs
Émissions en juillet (working loss)	72.1627506	Kg
Temps de chargement	46.2408651	heure
Taux d'émission	1.56058392	kg/hre
Taux d'émission	1560.58392	g/hre
Taux d'émission	**0.43349553**	**g/s**
Vitesse du gaz	8223.02184	m/hre
Vitesse du gaz	**2.28417273**	**m/s**
Densité	0.00260097	kg/m3
Densité	2.6009732	g/m3

Pertes par respiration

GENIVAR | PROJET : T-07395-212 N° : | Feuille n° 1 de 2
Débit emission Diesel/Jet Fuel | Date Dec 2007
OBJET : Calculs pour modélisation | Par JPD

Pour les mois de Juillet le logiciel Tanks 4.0 de EPA fournit les pertes par respiration au cours du mois comme suit :

Diesel : 188.04 lbs → 85294.94g.

Jet fuel : 238.68 lbs → 108 265.25g.

Nous avons relevés pour la region de Becancour, le nombre d'heures pendant lesquelles la pression $^{atm.}$ chutait durant le mois de Juillet -

Juillet 2006 : 327 hres
Juillet 2007 : 338 hres

Les emissions gazeuses vers l'atmosphère se produisent quand la pression atmosphérique baisse relativement à celle à l'intérieur du reservoir. Il y a dans ces conditions une expiration du réservoir pour équilibrer les pressions.

Afin d'être conservateur, nous prenons la plus petite valeur soit 327 heures.

DISTRIBUTION :

Alors l'émission ~~horaire~~ massique devient en g/s:

Diesel = 85294.94/(327*3600) = 0,0725

Jet Fuel = 108265.25/(327*3600) = 0,0919

La concentration volumique ou densité du produit dans le volume de gaz évacué reste le même que celui évalué dans "Tanks 4.0" pour le mois de juillet soit :

Diesel : 2,60 g/m³

Jet Fuel : 3,3427 g/m³

Et finalement le débit d'évacuation correspondant des gaz est de :

Diesel : 0,0725 g/s ÷ 2,60 g/m³ * 3600 s/h = 100 m³/h

Jet fuel : 0,0919 g/s ÷ 3,3427 g/m³ * 3600 s/h = 99 m³/h

DISTRIBUTION :

Rapport détaillé des émissions annuelles de gaz de diesel en fonction du nombre de renouvellement calculé

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

Identification

User Identification:	T-07395_Diesel_166.5_grey
City:	Becancour
State:	Quebec
Company:	Servitank
Type of Tank:	Vertical Fixed Roof Tank
Description:	Reservoir futur Diesel_ferme

Tank Dimensions

Shell Height (ft):		48.00
Diameter (ft):		166.50
Liquid Height (ft) :		45.00
Avg. Liquid Height (ft):		26.50
Volume (gallons):		7,329,326.47
Turnovers:		5.00
Net Throughput(gal/yr):		36,646,632.37
Is Tank Heated (y/n):	N	

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone	
Height (ft)		5.20
Slope (ft/ft) (Cone Roof)		0.06

Breather Vent Settings

Vacuum Settings (psig):	-0.06
Pressure Settings (psig)	0.09

Meterological Data used in Emissions Calculations: Becancour, Quebec (Avg Atmospheric Pressure = 14.7 psia)

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

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

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
Distillate fuel oil no. 2	All	47.04	39.23	54.84	42.99	0.0041	0.0031	0.0055	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045

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

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

Annual Emission Calcaulations

Standing Losses (lb):	917.8217
Vapor Space Volume (cu ft):	505,882.1447
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.0511
Vented Vapor Saturation Factor:	0.9950
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	505,882.1447
Tank Diameter (ft):	166.5000
Vapor Space Outage (ft):	23.2344
Tank Shell Height (ft):	48.0000
Average Liquid Height (ft):	26.5000
Roof Outage (ft):	1.7344
Roof Outage (Cone Roof)	
Roof Outage (ft):	1.7344
Roof Height (ft):	5.2031
Roof Slope (ft/ft):	0.0625
Shell Radius (ft):	83.2500
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0041
Daily Avg. Liquid Surface Temp. (deg. R):	506.7065
Daily Average Ambient Temp. (deg. F):	40.7480
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	502.6580
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,180.0602
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0511
Daily Vapor Temperature Range (deg. R):	31.2237
Daily Vapor Pressure Range (psia):	0.0024
Breather Vent Press. Setting Range(psia):	0.1563
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0041
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0031
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0055
Daily Avg. Liquid Surface Temp. (deg R):	506.7065
Daily Min. Liquid Surface Temp. (deg R):	498.9006
Daily Max. Liquid Surface Temp. (deg R):	514.5125
Daily Ambient Temp. Range (deg. R):	18.5850
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9950

Vapor Pressure at Daily Average Liquid:	
Surface Temperature (psia):	0.0041
Vapor Space Outage (ft):	23.2344
Working Losses (lb):	463.3748
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid	
Surface Temperature (psia):	0.0041
Annual Net Throughput (gal/yr.):	36,646,632.3682
Annual Turnovers:	5.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	7,329,326.4736
Maximum Liquid Height (ft):	45.0000
Tank Diameter (ft):	166.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	1,381.1965

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

Emissions Report for: Annual

T-07395_Diesel_166.5_grey - Vertical Fixed Roof Tank
Becancour, Quebec

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	463.37	917.82	1,381.20

Résultats sommaires du rapport des émission annuelles de gaz des produits modélisés potentiellement entreposés en fonction du nombre de renouvellement calculé

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

Emissions Report for: Annual

T-07395_Jetfuel_166.5_gris - Vertical Fixed Roof Tank
Becancour, Quebec

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Jet kerosene	616.71	1,220.70	1,837.42

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

Emissions Report for: Annual

T-07395_Benzene_76.5 - Internal Floating Roof Tank
Becancour, Quebec

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Benzene	134.78	49.69	472.71	180.43	837.62

Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-07395_Methanol_150 - Internal Floating Roof Tank
Becancour, Quebec

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Methyl alcohol	463.96	66.75	546.83	0.00	1,077.53

Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-07395_Methanol_115 - Internal Floating Roof Tank
Becancour, Quebec

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Methyl alcohol	355.70	51.22	416.65	0.00	823.57

Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-07395_Methanol_100 - Internal Floating Roof Tank
Becancour, Quebec

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Methyl alcohol	309.30	44.50	362.10	0.00	715.90

Tableau sommaire des émissions annuelles de gaz des produits modélisés potentiellement entreposés en fonction du nombre de renouvellement calculé

Émissions annuelles en fonction des différents liquides (TANKS 4.0.9d)

Construction avec toit fixe

Substance	Couleur / ombre	Hauteur du réservoir (pi.)	Diamètre du réservoir (pi.)	Nombre de renouv.	Calcul	Perte de stockage (Lbs)	Perte de remplissage et vidage (Lbs)	Pertes par réservoir (Lbs)	Nombre de réservoirs	Total des pertes (Lbs)
Diesel	gris / clair	48	166.5	5	12 mois	463.37	917.82	1381.19	3	4143.57
Jetfuel	gris / clair	48	166.5	5	12 mois	616.71	1220.7	1837.41	3	5512.23

Construction avec toit flottant

Substance	Couleur / ombre	Joint d'étanchéité circonférentiel primaire	Joint d'étanchéité circonférentiel secondaire	Mode de fixation du deck	Hauteur du réservoir (pi.)	Diamètre du réservoir (pi.)	Nombre de renouv.	Calculs	Perte par le joint d'étanchéité circonférentiel (Lbs)	Perte de vidage (Lbs)	Perte à travers les différents accessoires sur le toit flottant (Lbs)	Perte à travers le deck (Lbs)	Pertes par réservoir (Lbs)	Nombre de réservoirs	Total des pertes (Lbs)
Benzène	gris / clair	Mechanical shoe	Shoe-mounted	Boulonné	48	76.5	11	12 mois	134.78	49.69	472.71	180.43	837.61	1	837.61
Méthanol	gris / clair	Mechanical shoe	Aucun	Soudé	48	150	8	12 mois	463.96	66.75	546.83	0	1077.54	2	2155.08
Méthanol	gris / clair	Mechanical shoe	Aucun	Soudé	48	115	8	12 mois	355.7	51.22	416.65	0	823.57	3	2470.71
Méthanol	gris / clair	Mechanical shoe	Aucun	Soudé	48	100	8	12 mois	309.3	44.5	362.1	0	715.9	1	715.9

Calculs pour l'évaluation d'émission de thiophène

T-07395 - Servitank / phase 2 - Calculs pour l'évaluation d'émission de thiophène

Puisque aucune valeur précise n'a été trouvée sur le seuil d'odeur du diesel, un composé chimique analogue a été utilisé comme traceur pour la modélisation, soit le thiophène. Ce dernier est un composé proche de la famille du benzothiophène, dont fait parti le diesel.

Selon le « Handbook of Environmental Data on Organic Chemicals », il a été défini que le seuil d'odeur du thiophène correspond à ce qui suit:

- 33% de la population est en mesure de percevoir le thiophène lorsque sa concentration est à environ 1.5 mg/m^3,
- 100% de la population est en mesure de percevoir le thiophène lorsque sa concentration est à environ 11 mg/m^3,

À partir de ces données, nous devons déterminer si le thiophène va être ressenti.

Voici les étapes de calculs :

1. Évaluer la concentration de thiophène dans le toit du réservoir
2. Confirmer les débits de remplissage
3. Calculer les taux d'émission
4. Modèle ISCST avec vents synthétique
5. Comparaison des résultats

Propriétés du thiophène

Masse moléculaire $M = 84.14$ g/mol Formule C_4H_4S

Pression de vapeur : Les données de pression de vapeur pour le thiophène varient significativement entre le Perry's Handbook 7th edition et le site Korea thermophysical properties data base. Cependant, divers MSDN et pages d'information tendent à montrer que les données du KTP sont les bonnes.

$V_p = 22.2$ kPa à 40 °C → Okay

Propriétés du diesel

Masse moléculaire $M = 130$ g/mol

$P_{\text{Total diesel}} = 0,022$ psi à 40 °C $= 0,152$ kPa à 40 °C

Concentration dans le tait

$P_{total} = \sum X_i P_i$ pour les i composantes

Concentration du thiophène dans le diesel : 15 ppm

↳ Ici, nous faisons l'assomption conservatrice que tout le soufre dans le diesel est sous forme de thiophène

DISTRIBUTION :

Concentration massique de thiophène dans le diesel = 15 µg/g

= 0,000015 g/g

Et par utilisation de la règle de Raoult pour un mélange de produit en équilibre pour des phases gazeuses et liquides, nous obtenons pour le mélange thiophène - diesel:

$X_{\text{thiophène liquide}} = 0,000\ 023$

$P_{\text{vp thiophène}} = 0,000\ 511\ kPa$

Titre du thiophène $Y_{\text{thiophène}} = 0,003362$

$C_{\text{Vap thiophène dans diesel}} = 0,002191\ g/g$

Pour le mélange de diesel dans la phase gazeuse air-diesel au-dessus du liquide, nous avons comme densité$_{\text{diesel}} = \frac{P_{\text{diesel}} \times M_{\text{diesel}}}{R \cdot T} = 7,59\ g/m^3$

Ainsi, la densité de thiophène dans le mélange gazeux égale $0,0166\ g/m^3$

Alors, avec un taux de remplissage de $600\ m^3/h$, le débit massique de sortie du thiophène $m_{\text{thiophène}} = 0,0028\ g/s$

DISTRIBUTION :

Modélisation de la dispersion

- Modèle utilisé : 15CST3,
- Modèle de niveau 1 du MDDEP,
- Option UIR : URBAN,
- Les données synthétiques générales ont été utilisées : METSYN.ASC,
- L'effet du bâtiment pour un seul réservoir a été considéré (down wash).

Note : Les données synthétiques de Dorval ont été essayées, qui sont autorisées pour Bécancour, mais les concentrations obtenues étaient inférieures. Nous avons donc gardé les données synthétiques générales.

D'après le tableau des résultats des modélisations présenté au chapitre 3 du présent document, la concentration de thiophène directement à la sortie de la zone industrielle est de 0.45 µg / m^3.

Tel que décrit dans le guide de modélisation, les odeurs sont regardées sur des moyennes de 4 minutes :

$$C_{4\ minutes} = 1.9\ C_{1\ heure} = 0.855\ \mu g / m^3$$

Pour fin de comparaison, le seuil de perception utilisé pour le thiophène correspond à environ 1 500 µg/m^3 pour 30% des sujets à environ 11 000 µg/m^3 pour 100% des sujets. Ces valeurs sont tirées du « Handbook of Environmental Data on Organic Chemicals », de John Wiley & Sons, Inc., Fourth Edition, p 1994, 1995.

La conclusion est donc que les odeurs réelles après 4 minutes sont inférieures au seuil minimal de perception.

Référence du « Handbook of Environmental Data on Organic Chemical » utilisé pour fins de comparaison avec l'émission de thiophène calculée

Handbook of Environmental Data on Organic Chemicals

Fourth Edition

VOLUME 1

Karel Verschueren
President
Verschueren Environmental Consultancy

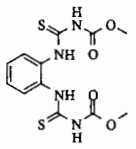
Series in Conjunction with Environmental Protection Magazine
Dallas, Texas

www.eponline.com
Environmental PROTECTION

A WILEY-INTERSCIENCE PUBLICATION

JOHN WILEY & SONS, INC.
New York • Chichester • Weinheim • Brisbane • Singapore • Toronto

1994 thiophene



$C_{12}H_{14}N_4O_4S_2$

CAS 23564-05-8

USE: systemic fungicide.

A. PROPERTIES: colorless crystals; molecular weight 342.4; melting point 178°C; vapor pressure $<10^{-7}$ mbar at 20°C; solubility 3.5 mg/L at 20°C, 27 mg/L at 20°C; log P_{oct} 1.4.

C. WATER AND SOIL POLLUTION FACTORS:

Hydrolysis: Unstable in alkaline solution. (9662)
Degradation: in soil, plants, and animals, conversion to 2-(methoxycarbonylamino) benzimidazole. (2962)
Degraded in soil, aqueous solution and under UV light by cyclization to form carbendazim. This is then degraded to 2-aminobenzimidazole and 5-hydroxy-2-aminobenzimidazole.

D. BIOLOGICAL EFFECTS:

ALGAE:			
Chlorella pyrenoidosa	48h LC_{50}	8.5mg/L	(6117)
CRUSTACEANS:			
Daphnia magna	48h LC_{50}	16 mg/L	(6117)
AMPHIBIANS:			
Ranoa brevipoda porosa tadpoles	LC_{50}	>100 mg/L	(6118)
FISHES:			
Cyprinus carpio	LC_{50}	>75 mg/L	
Salmo iridens	LC_{50}	8.8 mg/L	(1873)
cytotoxicity to goldfish GF-Scale cells	NR_{50}	>400 mg/L	(2680)
carp	72h LC_{50}	>75 mg/L	(2962)
rainbow trout, carp	48h LC_{50}	7.8; 11 mg/L	(9600)
BIRDS: Japanese quail	oral LD_{50}	>5.0 g/kg	(1873)
MAMMALS:			
rabbit, mouse, guinea pig, rat	oral LD_{50}	2,270, 3,400, 3,640, 6,640 mg/kg bw resp.	(6119)

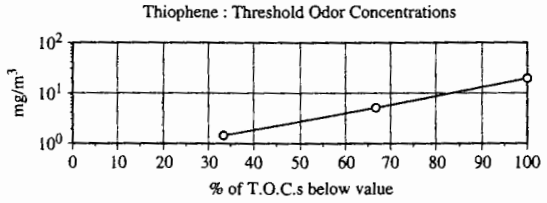
thiophene (thiofuran)

C_4H_4S

CAS 110-02-1

A. PROPERTIES: molecular weight 84.13; melting point –30/–38°C; boiling point 84°C; vapor pressure 60 mm at 20°C, 100 mm at 30°C; d 1.06 at 20/4°C; saturation concentration in air 275 g/m^3 at 20°C, 433 g/m^3 at 30°C; solubility 3,600 mg/L at 18°C; log P_{oct} 1.81.

B. AIR POLLUTION FACTORS: 1 mg/m^3 = 0.29 ppm, 1 ppm = 3.50 mg/m^3.



(610, 637, 716)

Control methods:
wet scrubber: water at pH 8.5: outlet: 4,000 odor units/scf
$KMnO_4$ at pH 8.5: outlet: 13 odor units/scf (115)
catalytic combustion: platinized ceramic honeycomb catalyst: ignition temp. 335°C, inlet temp. for 90% conversion: 400–450°C (91)

D. BIOLOGICAL EFFECTS:

Inhibition of photosynthesis of a freshwater, nonaxenic, unialgal culture of Selenastrum capricornutum:
at 10 mg/L: 95% carbon-14 fixation (vs. controls)
100 mg/L: 97% carbon-14 fixation (vs. controls)
1,000 mg/L: 68% carbon-14 fixation (vs. controls) (1690)

thiophenol (phenylmercaptan; benzenethiol)

C_6H_5SH

C_6H_6S

CAS 108-98-5

USES: In the manufacture of pharmaceuticals. Chemical intermediate. Mosquito larvicide.

A. PROPERTIES: colorless liquid; molecular weight 110.17; melting point –15°C; boiling point 169.5°C; vapor pressure 1 mm at 18.6°C, 10 mm at 56°C, 100 mm at 106.6°C; d 1.1 at 20/4°C; solubility 470 mg/L at 15°C; log P_{oct} 2.52.

B. AIR POLLUTION FACTORS:

Odor: characteristic quality: putrid, nauseating:
T.O.C.: 0.0002 ppm (306)
0.00026 ppm
14 ppm (279)
O.I. at 20°C: 94 (316)

Control methods:
wet scrubber: water at pH 8.5: outlet: 1,300 odor units/scf
$KMnO_4$ at pH 8.5: outlet: 13 odor units/scf (115)

Incinerability:
Temperature for 99% destruction at 2.0-sec residence time under oxygen-starved reaction conditions: 725°C.
Thermal stability ranking of hazardous organic compounds: rank 110 on a scale of 1 (highest stability) to 320 (lowest stability). (2390)

Odor removal: median odor threshold level increases from 13 ppm to >125 ppm in 50% aqueous ethylene glycol after reaction with chloramine-T. (1821)

Fiche signalétique du Jet fuel déterminant la concentration minimale pouvant être perçue par l'odorat

— Cette fiche est permise mais la valeur du point 3 Odour Threshold est retenue: —

Esso Imperial Oil

MATERIAL SAFETY DATA SHEET

Date Prepared: November 25, 2003
Supersedes: November 21, 2003
MSDS Number: 08525

1. PRODUCT INFORMATION

Product Identifier: KEROSENE TYPE AVIATION TURBINE FUEL
ESSO TURBO FUEL A
ESSO TURBO FUEL A-1
ESSO JET A
ESSO JET A-1
JET A
JET A-1
TURBO FUEL A
TURBO FUEL A-1
TURBO FUEL A-1 F34
TURBO FUEL A-1 JP8
JET A-1 (FSII)
CAN/CGSB-3.23 GRADE F34

Application and Use:
Aviation turbine fuel

Product Description:

A mixture of aliphatic and aromatic hydrocarbons and additives.

REGULATORY CLASSIFICATION

WHMIS:
Class B, Division 3: Combustible Liquids.
Class D, Division 2, Subdivision A: Very Toxic Material.
Class D, Division 2, Subdivision B: Toxic Material

CEPA: CANADIAN ENVIRONMENTAL PROTECTION ACT
All components of this product are either on the Domestic Substances List (DSL), exempt, or have been notified under CEPA.

TDG INFORMATION (RAIL/ROAD):

Shipping Name: FUEL, AVIATION, TURBINE ENGINES
Class: 3

Packing Group: III
PIN Number: UN1863
Marine Pollutant: Not applicable

In containers of 454 litres capacity or less this product is exempt from TDG regulations.

Please be aware that other regulations may apply.

TELEPHONE NUMBERS		MANUFACTURER/SUPPLIER:
Emergency 24 hr.	(519) 339-2145	IMPERIAL OIL
Technical Info.	(800) 268-3183	Products Division
		111 St Clair Avenue West
		Toronto, Ontario
		M5W 1K3
		(416) 968-4441

---

2. REGULATED COMPONENTS

The following components are defined in accordance with sub-paragraph 13(a) (i) to (iv) or paragraph 14(a) of the Hazardous Products Act:

NAME	%	CAS #	
Kerosene, straight run	0-100 V/V	8008-20-6	LD50:>5g/kg,oral,rat
Diethylene glycol monomethyl ether	0-0.15 V/V	111-77-3	LD50:7g/kg,orl,rat LD50:>2.0/kg,skn.rbt

---

3. TYPICAL PHYSICAL & CHEMICAL PROPERTIES

Physical State: Liquid
Specific gravity: not available
Viscosity: 8.00 cSt at -20 deg C
Vapour Density: 4
Boiling Point: 205 to 300 deg C
Evaporation rate: not available (1= n-butylacetate)
Solubility in water: NEGLIGIBLE
Freezing/Pour Point: -47 deg C ASTM D238[redacted]
Odour Threshold: 0.552mg/m3
Vapour Pressure: 4 kPa at 38 deg C
Density: 0.81 g/cc at 15 deg C
Appearance/odour: White or pale yellow liquid, petroleum odour

---

4. HEALTH HAZARD INFORMATION

NATURE OF HAZARD

INHALATION:

Negligible hazard at normal temperatures (up to 38 deg C).
High vapour concentrations are irritating to the eyes, nose, throat and lungs; may cause headaches and dizziness; may be anesthetic and may cause other central nervous system effects.
Avoid breathing vapours or mists.

EYE CONTACT:

Slightly irritating, but will not injure eye tissue.

SKIN CONTACT:

Irritating.
Frequent or prolonged contact may irritate the skin and cause a skin rash (dermatitis).
Low toxicity.

INGESTION:

Low toxicity.
Small amounts of this liquid drawn into the lungs from swallowing or vomiting may cause severe health effects (e.g. bronchopneumonia or pulmonary edema).

CHRONIC:

Lifetime skin painting tests indicate that materials of similar composition have produced skin cancer in experimental animals. The relationship of these results to humans has not been fully established.
Contains diethylene glycol monomethyl ether (DIEGME). Prolonged and repeated exposure through inhalation or extensive skin contact with DIEGME may result in toxic effects on the kidneys, the reproductive system and/or the embryo/fetus.

ACUTE TOXICITY DATA:

Based on animal testing data from similar materials and products, the acute toxicity of this product is expected to be:

Oral	:	LD50 > 5000 mg/kg	(Rat)
Dermal	:	LD50 > 2000 mg/kg	(Rabbit)
Inhalation	:	LC50 > 2500 mg/m3	(Rat)

OCCUPATIONAL EXPOSURE LIMIT:

Manufacturer Recommends:
For kerosene and other middle distillate fuels, 500 mg/m3 for total vapour/aerosol exposure and 5 mg/m3 for stable aerosols.

ACGIH recommends:
For Kerosene (skin), ACGIH recommends a TWA of 200 mg/m3 and categorizes it as an animal carcinogen.

Local regulated limits may vary.

5. FIRST AID MEASURES

INHALATION:

In emergency situations use proper respiratory protection to immediately remove the affected victim from exposure. Administer artificial respiration if breathing has stopped. Keep at rest. Call for prompt medical attention.

EYE CONTACT:

Flush eyes with large amounts of water until irritation subsides. If irritation persists, get medical attention.

SKIN CONTACT:

Immediately flush with large amounts of water. Use soap if available. Remove contaminated clothing, including shoes, after flushing has begun. If irritation persists, seek medical attention.

INGESTION:

DO NOT induce vomiting since it is important that no amount of the material should enter the lungs (aspiration). Keep at rest. Get prompt medical attention.

6. PREVENTIVE AND CORRECTIVE MEASURES

PERSONAL PROTECTION:

The selection of personal protective equipment varies, depending upon conditions of use.
In open systems where contact is likely, wear safety goggles, chemical-resistant overalls, and chemically impervious gloves.
Where only incidental contact is likely, wear safety goggles, long sleeves, and chemical-resistant gloves.
Where concentrations in air may exceed the occupational exposure limits given in Section 4 and where engineering, work practices or other means of exposure reduction are not adequate, approved respirators may be necessary to prevent overexposure by inhalation.

ENGINEERING CONTROLS:

The use of local exhaust ventilation is recommended to control emissions near the source. Laboratory samples should be handled in a fumehood. Provide mechanical ventilation of confined spaces.
Use explosion-proof ventilation equipment.

HANDLING, STORAGE AND SHIPPING:

Keep containers closed. Handle and open containers with care.

Store in a cool, well ventilated place away from incompatible materials.
In keeping with good personal hygiene practices, wash hands thoroughly after handling the material.
Store and load at normal (up to 38 deg C) temperature and at atmospheric pressure.
Material will accumulate static charges which may cause a spark. Static charge build-up could become an ignition source. Use proper relaxation and grounding procedures.
Empty containers may contain product residue. Do not pressurize cut, heat, or weld empty containers. Do not reuse empty containers without commercial cleaning or reconditioning.

LAND SPILL:

Eliminate source of ignition. Keep public away. Prevent additional discharge of material, if possible to do so without hazard.
Prevent spills from entering sewers, watercourses or low areas. Contain spilled liquid with sand or earth. Do not use combustible materials such as sawdust.
Recover by pumping (use an explosion proof motor or hand pump), or by using a suitable absorbent.
Consult an expert on disposal of recovered material. Ensure disposal in compliance with government requirements and ensure conformity to local disposal regulations. Notify the appropriate authorities immediately.
Take all additional action necessary to prevent and remedy the adverse effects of the spill.

WATER SPILL:

Remove from surface by skimming or with suitable absorbents. If allowed by local authorities and environmental agencies, sinking and/or suitable dispersants may be used in unconfined waters.
Consult an expert on disposal of recovered material. Ensure disposal in compliance with government requirements and ensure conformity to local disposal regulations. Notify the appropriate authorities immediately.
Take all additional action necessary to prevent and remedy the adverse effects of the spill.

7. FIRE AND EXPLOSION HAZARD

Flashpoint and method: 38 deg C TCC ASTM D56

Autoignition: NA Flammable Limits: LEL: NA UEL: NA

GENERAL HAZARDS:

Combustible Liquid; may form combustible mixtures at or above the flash point.
Decomposes; flammable/toxic gases will form at elevated temperatures (thermal decomposition).
Toxic gases will form upon combustion.
Static Discharge; material may accumulate static charges which may cause a fire.

FIRE FIGHTING:

Use water spray to cool fire exposed surfaces and to protect personnel.
Shut off fuel to fire if possible to do so without hazard. If a leak or spill has not ignited use water spray to disperse the vapours.
Use foam or dry chemical to extinguish fire.
Respiratory and eye protection required for fire fighting personnel.
Avoid spraying water directly into storage containers due to danger of boilover.
A self-contained breathing apparatus (SCBA) should be used for all indoor fires and any significant outdoor fires. For small outdoor fires, which may easily be extinguished with a portable fire extinguisher, use of an SCBA may not be required.

HAZARDOUS COMBUSTION PRODUCTS:

Smoke, carbon monoxide, carbon dioxide, oxides of sulphur.
In addition, small amounts of nitrogen oxides will be formed.

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8. REACTIVITY DATA

STABILITY:

This product is stable. Hazardous polymerization will not occur.

INCOMPATIBLE MATERIALS AND CONDITIONS TO AVOID:

Strong oxidizing agents. Use product with caution around heat, sparks, pilo lights, static electricity and open flames.

HAZARDOUS DECOMPOSITION:

See: Hazardous Combustion Products

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9. NOTES

All components of this product are listed on the U.S. TSCA inventory.

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REVISION SUMMARY:
Since 21 November 2003, this MSDS has been revised in Section(s):
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10. PREPARATION

Date Prepared: November 25, 2003
Prepared by: Lubricants & Specialties
IMPERIAL OIL
Products Division

111 St Clair Avenue West
Toronto, Ontario
M5W 1K3
(800) 268-3183

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Calcul des émissions des chaudières

Émission de chaudières CB 80 HP tubes à feu 125 psig
Gaz naturel

à 100% firing rate Eff =	81	%		
SCFH de gaz naturel =	3350			
Excès d'air =	15	%		
Température des gaz =	455	oF	oK	508,333333
SCFH de pc =	40164,49			
ACFH de pc =	68056,4969			
Am3/h de pc =	1927,1272			

Vent Stack: 12 po.

Rated Btu/hr output : 2678000

Input Btu/hr: 3306172,84

Emission:	facteur Lb/MMBtu	lb/hr	kg/hr	g/s
	GAZ NATUREL			
CO	0,15	0,49592593	0,224952	0,06248667
NOx	0,12	0,39674074	0,1799616	0,04998933
SOx	0,001	0,00330617	0,00149968	0,00041658
COV	0,016	0,05289877	0,02399488	0,00666524
PM	0,01	0,03306173	0,0149968	0,00416578
	HUILE No 2			
CO	0,07	0,2314321	0,1049776	
NOx	0,25	0,82654321	0,37492	
SOx	0,52	1,71920988	0,7798336	
COV	0,025	0,08265432	0,037492	
PM	0,025	0,08265432	0,037492	

Pour chaque volume de gaz naturel input nous avons à 15% XSA nous avons 11,9894 volume de produit de combustion

1CH4 + 1,15 x (2 O2 + (2 x 3,773) N2) ==> 1 CO2 + 2 H2O + 8,6894 N2 + 0,3 O2