

ANNEXURE 15.0

INCITEC PIVOT AGRICULTURAL SOIL SAMPLE ANALYSES

ANNEXURE 15.0a

PROJECT SITE SOIL ANALYSES



Because the land is your life.



Standard Interpretation Status Report

Trading Name	BOOTH ASSOCIATES	Field Name	SITE 1
Location	Griffith	Section of Field	
Contact Name:		GPS Latitude	Longitude:
Work Phone:		Sample Type	Soil
Adviser:	Thane Pringle	Lab Report No:	233382
Phone:	02 6968 1011	Crop:	
Interpretation:	22-Jan-2007	Growth Stage:	
Chart:	727M	Planting:	
IRRIGATED LUCERNE MAINTENANCE Northern Victoria and Southern Riverina; Red Brown Earths, Sandy Loams & Clay Loams			
		Target Yield (t/ha)	0

The following information and recommendations are suggested for your consideration and are the opinion of the interpreter.

Analyte	Value	Def Plant Tests only	Low	< Opt/Norm or Mod	Generally Satisfactory	> Opt/ Norm	High	Excess or Toxic
pH (1:5 Water)	5.10							
pH (1:5 CaCl2)	4.30							
Organic Carbon %C	1.20							
Nitrate Nitrogen mg/kg	1.00							
Sulfate Sulfur (KCl40) mg/kg	20.00							
Phosphorus (Colwell) mg/kg	18.00							
Phosphorus Buffer Index (PBI)	130.0							
Potassium (Amm-acet.) meq/100g	0.78							
Calcium (Amm-acet.) meq/100g	4.80							
Magnesium(Amm-acet.) meq/100g	3.10							
Aluminium (KCl) meq/100g	0.63							
Sodium (Amm-acet.) meq/100g	0.34							
Chloride mg/kg	36.00							
Elect. Conductivity dS/m	0.09							
Copper (DTPA) mg/kg	2.50							
Zinc (DTPA) mg/kg	0.60							
Manganese (DTPA) mg/kg	29.00							
Iron (DTPA) mg/kg	240.0							
Molybdenum								
Cation Exch. Cap. meq/100g	9.65							
Calcium/Magnesium ratio	1.50							
Aluminium Saturation %	6.50							
Sodium % of cations (ESP)	3.50							
Elec. Cond. (Sat. Ext.) dS/m	0.70							
Selenium								
Colour(Munsell)	Brown							
Texture	Light Clay							

Notes: Interpretations and recommendations given here are a guide only, and depend on representative samples being analysed, additionally environmental and managerial factors influence production, therefore Incitec Pivot Limited and Dealers do not accept any liability whatsoever arising out of these interpretations and recommendations for any damage, loss or injury of any nature and the user takes these interpretations and recommendations on these terms. This recommendation is made in good faith, based on the best technical information available.

Chart Use: Occasionally Interpretations/Recommendations will be compiled using, as a basis only, a Chart referenced to a different crop or situation. This is necessary only if there is no Chart defined in the system for your crop or situation.



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Nutrient
Advantage

Standard Interpretation Status Report

Trading Name	BOOTH ASSOCIATES	Field Name	SITE 2
Location	Griffith	Section of Field	
Contact Name:		GPS Latitude	Longitude:
Work Phone:		Sample Type	Soil
Adviser:	Thane Pringle	Lab Report No:	233383
Phone:	02 6968 1011	Crop:	
Interpretation:	22-Jan-2007	Growth Stage:	
Chart:	727M	Planting:	
IRRIGATED LUCERNE MAINTENANCE Northern Victoria and Southern Riverina; Red Brown Earths, Sandy Loams & Clay Loams			
		Target Yield (t/ha)	0

The following information and recommendations are suggested for your consideration and are the opinion of the interpreter.

Analyte	Value	Def Plant Tests only	Low	< Opt/Norm or Mod	Generally Satisfactory	> Opt/ Norm	High	Excess or Toxic
pH (1:5 Water)	6.30							
pH (1:5 CaCl2)	5.60							
Organic Carbon %C	1.30							
Nitrate Nitrogen mg/kg	1.00							
Sulfate Sulfur (KCl40) mg/kg	7.30							
Phosphorus (Colwell) mg/kg	16.00							
Phosphorus Buffer Index (PBI)	130.0							
Potassium (Amm-acet.) meq/100g	1.60							
Calcium (Amm-acet.) meq/100g	12.00							
Magnesium(Amm-acet.) meq/100g	6.30							
Sodium (Amm-acet.) meq/100g	0.22							
Chloride mg/kg	31.00							
Elect. Conductivity dS/m	0.09							
Copper (DTPA) mg/kg	2.70							
Zinc (DTPA) mg/kg	0.85							
Manganese (DTPA) mg/kg	32.00							
Iron (DTPA) mg/kg	100.0							
Molybdenum								
Cation Exch. Cap. meq/100g	20.10							
Calcium/Magnesium ratio	1.90							
Sodium % of cations (ESP)	1.10							
Elec. Cond. (Sat. Ext.) dS/m	0.60							
Selenium								

Colour(Munsell) Brown
Texture Medium Clay

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Standard Interpretation Status Report

Trading Name	BOOTH ASSOCIATES	Field Name	SITE 3
Location	Griffith	Section of Field	
Contact Name:		GPS Latitude	
Work Phone:		Sample Type	Soil
Adviser:	Thane Pringle	Lab Report No:	233384
Phone:	02 6968 1011	Crop:	
Interpretation:	22-Jan-2007	Growth Stage:	
Chart:	727M	Planting:	
IRRIGATED LUCERNE MAINTENANCE Northern Victoria and Southern Riverina; Red Brown Earths, Sandy Loams & Clay Loams		Target Yield (t/ha)	0

The following information and recommendations are suggested for your consideration and are the opinion of the interpreter.

Analyte	Value	Def Plant Tests only	Low	< Opt/Norm or Mod	Generally Satisfactory	> Opt/ Norm	High	Excess or Toxic
pH (1:5 Water)	5.40							
pH (1:5 CaCl2)	4.60							
Organic Carbon %C	1.40							
Nitrate Nitrogen mg/kg	1.40							
Sulfate Sulfur (KCl40) mg/kg	18.00							
Phosphorus (Colwell) mg/kg	31.00							
Phosphorus Buffer Index (PBI)	120.0							
Potassium (Amm-acet.) meq/100g	0.94							
Calcium (Amm-acet.) meq/100g	6.50							
Magnesium(Amm-acet.) meq/100g	4.40							
Aluminium (KCl) meq/100g	0.18							
Sodium (Amm-acet.) meq/100g	0.44							
Chloride mg/kg	85.00							
Elect. Conductivity dS/m	0.13							
Copper (DTPA) mg/kg	2.40							
Zinc (DTPA) mg/kg	0.88							
Manganese (DTPA) mg/kg	43.00							
Iron (DTPA) mg/kg	170.0							
Molybdenum								
Cation Exch. Cap. meq/100g	12.50							
Calcium/Magnesium ratio	1.50							
Aluminium Saturation %	1.40							
Sodium % of cations (ESP)	3.50							
Elec. Cond. (Sat. Ext.) dS/m	0.80							
Selenium								

Colour(Munsell) Brown
Texture Medium Clay

Notes: Interpretations and recommendations given here are a guide only, and depend on representative samples being analysed, additionally environmental and managerial factors influence production, therefore Incitec Pivot Limited and Dealers do not accept any liability whatsoever arising out of these interpretations and recommendations for any damage, loss or injury of any nature and the user takes these interpretations and recommendations on these terms. This recommendation is made in good faith, based on the best technical information available.

Chart Use: Occasionally Interpretations/Recommendations will be compiled using, as a basis only, a Chart referenced to a different crop or situation. This is necessary only if there is no Chart defined in the system for your crop or situation.

ANNEXURE 15.0b

“TUBBO” IRRIGATION SOIL ANALYSES

FOUR ARROWS ETHANOL PTY LTD : Soil sample analyses at "Tubbo" irrigation



		Field Name								
		Flanagans 1	Jones J11	Taprells 8	Mangna Clump	Ten Mile	Nulla Sample 19	Nulla Sample 21	Nulla Poor	Nulla Good
Sampling Depth	cm	0-10	0-10	0-10	0-10					
Soil Colour	Munsell	Strong Brown	Greyish Brown	Brown	Strong Brown	BR	BRGR	BRGE	GRBR	BRGR
Soil Texture		Clay Loam	Light Clay	Light/Med Clay	Light Clay	3.50	3.50	2.50	3.50	3.50
Gravel								5.00		
pH - water	1:5 Water	7.30	7.20	6.80	5.90	7.90	7.60	8.50	7.20	7.30
pH - CaCl ₂	1:5 CaCl ₂	6.50	6.30	5.80	4.60	7.10	6.60	7.80	6.50	6.40
Organic Carbon	%C	0.80	1.10	0.80	0.90	0.82	0.83	0.77	0.86	1.26
Reactive Iron	mg/kg					837.00	734.00	656.00	978.00	937.00
Nitrate Nitrogen	mg/kg	16.30	11.80	22.50	7.70	10.00	10.00	10.00	60.00	16.00
Ammonium Nitrogen	mg/kg					2.00	3.00	3.00	54.00	5.00
Sulfate Sulfur	mg/kg		7.00	14.00	14.00					
Phosphorus	mg/kg	5.00	14.00	22.00	8.00	8.00	8.00	8.00	23.00	29.00
Phosphorus Olsen	mg/kg					4.50	4.30	4.10	9.90	13.60
Potassium	meq/100g	0.83	2.10	102.00	0.95	334.00	324.00	313.00	511.00	498.00
Calcium	meq/100g	8.61	13.67	8.79	3.03	10.54	12.82	20.58	16.18	14.02
Magnesium	meq/100g	4.54	10.46	7.88	2.61	8.25	7.79	10.29	9.95	9.01
Sodium	meq/100g	0.96	0.55	1.43	0.46	2.10	0.86	2.51	1.49	1.31
Exc. Potassium	meq/100g					0.83	0.79	0.79	1.29	1.25
Chloride	mg/kg	25.00	20.00	40.00	15.00	34.00	16.00	35.00	25.00	18.00
Electrical Conduct	dS/m	0.12	0.08	0.10	0.04	0.17	0.08	0.23	0.18	0.11
Copper	mg/kg	1.30	1.70	1.30	1.70	1.43	1.16	1.31	1.65	1.53
Zinc	mg/kg	0.40	1.00	0.40	0.50	0.16	0.19	0.19	0.82	0.90
Manganese	mg/kg	18.00	17.00	26.00	39.00	10.66	15.46	9.86	14.16	15.56
Iron	mg/kg	39.00	26.00	26.00	101.00	24.75	27.57	18.85	44.89	35.06
Boron	mg/kg	1.20	1.60	23.00	0.90	1.50	1.50	3.20	1.40	1.50
Aluminium	meq/100g				0.29					
Sulfur	mg/kg	9.00				45.10	6.80	5.50	7.10	7.80
Cation Exch.Cap	meq/100g		26.78	19.13	7.34					
Calcium.Magnesium	ratio		1.31	1.12	1.16					
Aluminium Saturaton	%				3.90					
Sodium % of cations (ESP)			2.04	7.47	6.30					
Elec. Cond.	dS/m		0.60	1.00	0.30					
Disp.Index, Loveday/Pyle			7.00	12.00	6.00					

ANNEXURE 16.0

INDIVIDUAL EMISSION SOURCE PARAMETERS AND IDENTIFIED POINTS OF EMISSIONS

"Potential to Emit" Emission Estimate:

0% DDGS Capability

4/12/07

Coleambally, New South Wales

110MM gallons/year Denatured Ethanol

1,100,000 tons/yr grain

39,285,716 bu/yr

0 tons/yr DDGS (no drying capability)

914,349 tons/yr wet cake

Emission Source(s)	PM (tpy)	PM10 (tpy)	SO2 (tpy)	NOx (tpy)	CO (tpy)	VOC (tpy)	HAP (tpy)
Unload/Milling Baghouses (2 each)	14.27	14.27					
Grain Handling Fugitives	3.66	1.66					
Cooling Tower	16.44	16.44					
2 Boilers (120 MMBtuh each)	7.99	7.99	0.63	94.61	88.30	5.78	1.97
1 RTO (process vents)	0.81	0.81	0.02	3.50	7.01	5.43	1.11
Fermentation (CO2) Scrubber	0.58	0.58				49.50	5.92
Purge Scrubber	0.10	0.10				14.85	1.80
Fugitive Components (LDAR)						8.84	1.54
Methanator Flare				0.15	0.63	0.09	
Plant Haul Roads (wheel dust)	15.23	2.97					
Etoh Loadout w/Flare (truck/rail)				0.69	3.57	5.17	2.07
Liquid Storage Tanks						2.70	0.09
Emergency Fire water pump	0.002	0.002	0.010	0.090	0.005	0.002	
Wet Cake Pad	0.024	0.005				3.79	0.66
Uncontrolled Process Vents						0.65	
Totals, Plantwide	59.07	44.81	0.66	99.05	99.51	96.80	15.16

Notes:

Emissions are considered worst case for environmental approvals

Emergency fire water pump will be a lean burn diesel IC engine

PM/PM10 emissions based on minimum efficiency of collection system, includes uncaptured fugitives

Fugitive Components (LDAR) do not include distillation components operating under negative pressure

Trucks assumed carrying gasoline (worst case) prior to taking on load of denatured etoh

The 2 package boilers to be equipped with standard burners (see calculations)

Etoh Loadout VOCs controlled by a shared 98% efficient flare (meeting 40CFR60.18 design criteria)

RTO Operating Temperature to be established at startup testing to achieve target CO emission rate

Process vents will exhaust to the Regenerative TO (RTO)

A process scrubber is not proposed as specified process vents will be ducted to the RTO

Cooling Tower biocide will not contain VOCs. Emissions based on 3000 ppm TDS (worst case)

Methanator flare emissions occur only when the boiler(s) is down

Truck/Rail loadout limit 110,000,000 gpy (100% by truck or 100% by rail or any combination)

Haul road basis: 0.25 miles in, 0.25 miles out

CO2 produced will be recovered by CO2 plant (17.0 lb CO2/bushel):

333,929 tons CO2/year

Equipment Basis:

2-120 MMBTUh Package Boilers with standard burners

1-RTO 8 MMBTUh (will operate at 4.3 MMBtuh)

1-CO2 scrubber

1-Purge scrubber

1-Shared Truck/Rail Loadout Flare

1-Biomethanator w/flare

2-Baghouses (unloading, milling)

1-Cooling Tower

1-Emergency Diesel Fired Water Pump

1-Wet Cake Pad

1-Anhydrous Ammonia Storage Tank (pressure vessel)

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Storage Tanks (2 Denatured Ethanol, 1-190 Proof, 1-200 Proof, 1- Denaturant, 1-Corrosion Inhibitor)

Grain Handling Emissions:

Basis: 110 MM gallons/year Denatured Ethanol

** Grain Handling/Storage is closed system - except bin vents

Baghouse grain loading concentration includes safety factor

Emissions based on US AP-42 Particulate Emission Factors for Grain Elevators

Fugitive Emissions are accounted for below

PM/PM-10 Emissions:

ID	Emission Source	Baghouse	Emission	Hours of	Controlled	Controlled
S20	Unloading Baghouse	48,000	0.005	8,760	2.06	9.01
S30	Hammermill Baghouse	28,000	0.005	8,760	1.20	5.26

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Grain Handling Fugitive Emissions:**PM Emissions:**

ID	Emission Source	Throughput (tpy)	Emission Factor (lb/ton)	Potential uncontrolled PM (tpy)	Controlled PM Emissions (tons/yr)
	Fugitives Receiving	1,100,000	0.035	19.25	0.963
	Fugitives Handling/Stor.	1,100,000	0.061	33.55	1.678
	Fugitives Grain Scalping	1,100,000	0.012	6.60	0.330
	Fugitives Bin Vents	1,100,000	0.025	13.75	0.688
					3.658 Total

PM-10 Emissions:

ID	Emission Source	Throughput (tpy)	Emission Factor (lb/ton)	Potential uncontrolled PM-10 (tpy)	Controlled PM-10 Emissions (tons/yr)
	Fugitives Receiving	1,100,000	0.0078	4.29	0.215
	Fugitives Handling/Stor.	1,100,000	0.034	18.70	0.935
	Fugitives Grain Scalping	1,100,000	0.006	3.30	0.165
	Fugitives Bin Vents	1,100,000	0.0125	6.88	0.344
					1.658 Total

Notes:

1. Fugitives are a result of uncaptured PM/PM10
2. Assumes ethanol plant will receive and store grain in their grain storage silos
3. Assumes storage bin vents not are included with the headhouse/internal handling emissions
4. Assumes additional control of fugitives from choked flow system (~95%)

PM10 Emissions from Cooling Tower:

Basis: Mass balance based on circulation rates, TDS, Drift Loss

Water density 8.34 lb/gal

Based on manufacturer's guarantee of 0.005% drift loss

All PM is assumed to be PM10, therefore PM = PM10

Non VOC biocide proposed, therefore no VOCs calculated

ID	Emission Source	Circulation rate (gal/hr)	TDS content (avg ppm)	Drift Loss (percent)	Operating hours (hrs/yr)	PM10 PTE (tons/yr)	PM PTE (tons/yr)	VOC PTE (tons/yr)
	Cooling Tower	3,000,000	3000	0.005	8760	16.44	16.44	0.00

Note: any increase in average TDS beyond 3000 ppm will result in increased PM/PM10 emissions.

Cooling tower to have 4 cells

VOC PTE basis:	VOC emiss. factor (lb/million gph)	0
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Emissions from combustion of natural gas at Boilers and RTO

Criteria emissions from combustion of natural gas at Boilers

Basis: Unit assumed to operate maximum fuel input capacity
 Assumed operation time: 8760 hr/yr
 PTE based on 100% natural gas
 BTU content of natural gas: 1000 Btu/scf

Unit	Fuel	Size MMBtu/hr	Pollutant	E Factors lb/MMBtu		PTE lb/hr	PTE tpy
2-120 MMBTUH Package Boilers	N Gas	240	NOx	0.090	Manufacturer	21.60	94.61
			SO2	0.0006	AP-42	0.14	0.63
			CO	0.084	Manufacturer	20.16	88.30
			VOC	0.0055	AP-42	1.32	5.78
			PM/PM-10	0.0076	AP-42	1.82	7.99

Criteria emissions from combustion of natural gas at RTO

Basis: Emission factors are from AP-42 for natural gas combustion, except NOx Mfg guarantee
 Unit assumed to operate maximum fuel input capacity
 Assumed operation time: 8760 to dry proposed amount of DDGS
 PTE based on 100% Natural Gas
 BTU content of natural gas: 1000 Btu/scf

Unit	Fuel	Size MMBtu/hr	Pollutant	E Factors lb/MMBtu	Source	Comment	PTE lb/hr	PTE tpy
1 - 8 MMBtu/hr RTO	N Gas	8	NOx	0.1	Manufacturer	guarantee	0.80	3.50
			SO2	0.0006	AP-42	nat gas	0.005	0.02
			CO	0.2	Manufacturer	guarantee	1.60	7.01
			VOC **	0.155	3 x AP-42	ind flare	1.24	5.43
			PM/PM-10	0.023	3 x AP-42	nat gas	0.18	0.81

** VOC, PM/PM10 estimated at 3 times AP-42 (0.0518 & .0076 lb/MMbtu) to be conservative

HAP emissions from RTO (process)

Unit	Fuel	Production Mmgpy	Pollutant	E Factors lb/Mmgpy	Source	Comment	PTE lb/hr	PTE tpy
1 - 8 MMBtu/hr RTO	N Gas	110	Acetaldehyde	12.5	see below		0.16	0.69
			Acrolein	1.36	see below		0.02	0.07
			Methanol	0.53	see below		0.01	0.03
			Formaldehyde	5.84	see below		0.07	0.32
						total		1.11

Acetaldehyde emission factor 794 lb/MMGPY. Estimate a 98% reduction by RTO

Methanol emission factor 26.28 lb/MMGPY. Estimate a 98% reduction by RTO

Acrolein and Formaldehyde emission factor from Russell Process Scrubber test data.

Emissions are considered to be conservative based on available process scrubber testing data at Russell Plant.

Firewater Pump - Emergency Equipment

Basis: Manufacturer's emission factors: 300 hp, 6 cylinders, four stroke, lean burn, turbocharged, diesel

Emission Factor for PM10 assumed to be all PM emissions

Equipment for Emergency Purposes, maximum of non-emergency

52 hours/year assumed as maximum operation of emergency equipment.

Unit Description	Unit Size		Operation hr/yr	Pollutant	E Factors lb/hp-hr	PTE lb/yr	PTE tpy
Fire Water Pump	300	hp	52	NOx	0.0115	179.40	0.09
	300		52	SO2	0.0013	20.28	0.01
	300		52	CO	0.0006	9.36	0.00
	300		52	VOC*	0.0003	4.68	0.00
	300		52	PM/PM-10	0.0002	3.12	0.00

*Note: VOC factor considered conservative as it is for total organic carbon, which includes some non-VOC emissions (i.e.: Methane). HAPs assumed to be negligible.

Fermentation (CO2) Scrubber Outlet (controlled):

Basis:	Estimate and emission factors based on ICM Emission Guide	
Denatured Ethanol Production:	110.00 MM gal/yr	
Assumed operation time:	8760 hr/yr	
Emissions include control resulting from sodium bisulfite injection		

VOC/HAP Emissions: assumes that all ethanol production is scrubbed

ID	Emission Source	Pollutant	Production (MMgpy)	Emission factor (lb/MMgpy)	Controlled Emissions (tons/yr)
	Fermentation Scrubber	VOC	110.00	900	49.50
		PM	110.00	4.96	0.27
		PM10	110.00	5.55	0.31
		PM+PM10			0.58
	HAPs:	Acetylaldehyde	110.00	105	5.78
		Acrolein	110.00	0.9	0.05
		Methanol	110.00	0.9	0.05
		Formaldehyde	110.00	0.9	0.05
	Total HAPs:				5.92
	Other Compounds:	Acetic Acid	110.00	18.4	1.01
	(non HAPs of interest)	Butyric Acid	110.00	43.8	2.41
		Lactic Acid	110.00	9.6	0.53
		Furfural	110.00	0.53	0.03
		Glycerol	110.00	186.6	10.26
		2-Furaldehyde	110.00	0.9	0.05
		Formic Acid	110.00	19.2	1.06

Emission factors are based on testing at similar ethanol production facilities (actual test data) plus includes a moderate margin of safety and are therefore considered to be conservative.

Purge Scrubber Outlet (controlled):

Basis:	Estimated emissions based on one purge every fermentation cycle.	
Denatured Ethanol Production:	110.00 MM gal/yr	
Assumed total purge time:	1500 hr/yr	

VOC/HAP emission basis: all fermentation purging production is scrubbed

ID	Emission Source	Pollutant	Production (MMgpy)	Emission factor (lb/MMgpy)	Controlled Emissions (tons/yr)
	Purge Scrubber	VOC	110.00	270	14.85
		PM	110.00	0.89	0.05
		PM10	110.00	1.00	0.06
		PM+PM10			0.10
	HAPs:	Acetaldehyde	110.00	28	1.54
		Acrolein	110.00	1.06	0.06
		Methanol	110.00	3.57	0.20
		Formaldehyde	110.00	0.04	0.002
	Total HAPs:				1.80
	Other Compounds:	Acetic Acid	110.00	4.20	0.23
	(non HAPs of interest)	Butyric Acid	110.00	7.88	0.43
		Lactic Acid	110.00	5.78	0.32
		Furfural	110.00	0.10	0.006
		Glycerol	110.00	1.37	0.08
		Ethyl Acetate	110.00	19.6	1.08

Basis: 1500 hrs of purging per year

Emission factors are conservative estimates, emission testing not done on a purge scrubber.

Fugitive Emissions		Basis: Leak Rate (SOCMI average) multiplied by no. of components Component counts based on a similar sized facility Leak Rates and VOC control from: <i>Protocol for Leak Emission Rates EPA-453/R-95-017, November 1995</i>				
Equipment	#	Leak Rate (kg/hr/source)	VOC lb/hr	VOC tpy	LDAR Control percent	VOC tpy
Light Liquid Valves	545	0.00403	4.84	21.19	84.00	3.39
Light Liquid Pumps	45	0.0199	1.97	8.64	69.00	2.68
Gas Valves	91	0.00597	1.20	5.24	87.00	0.68
Flanges (connectors)	910	0.00183	3.67	16.07	87.00	2.09
Total Fugitive Components	1591		VOC Uncontrolled	51.14	Controlled	8.84

Notes:

Components in vacuum service are not inventoried and not to be inspected due to leak free nature

Components with >20% VOC by volume or >10% by weight will be part of the LDAR program

Except for valves and pumps, non-welded components and fittings treated as "flanges" for LDAR

Above are based on actual counts at a 40 MMgpy (nameplate) plant + 15% and then adjusted accordingly

HAP portion of VOCs:

	Mass Fraction	VOC (tpy)	HAP (tpy)
Formaldehyde	0.000169	8.84	0.001494
Acetaldehyde	0.155	8.84	1.369965
Methanol	0.015	8.84	0.132577
Acrolein	0.0045	8.84	0.039773
			1.543809

ICM HAP fraction derived from stack testing of Fermentation Scrubber

Emissions from Biomethanator Flare

Basis: Flare operates only when dryer is down, based on 500 hours per year (worst-case)
 Otherwise, biomethanator off-gasses go to dryer for combustion
 VOC based on total HC minus methane minus ethane (37% of total HC is VOC)
 SO₂ is negligible based on minimal H₂S levels
 PM/PM-10 is negligible based on smokeless design

Rate	6.4 MMBtu/hr
Heating Value	850 Btu/scf
Operating time	500 hr/yr
Pilot	0.1 MMBtu/hr 8760 hrs/yr
Pilot Operating Time	8760 hr/yr

Emission	NO _x	0.068 lb/MMBtu	(AP-42, Table 13.5-1)
Factors	CO	0.37 lb/MMBtu	(AP-42, Table 13.5-1)
(waste gas only)	VOC	0.052 lb/MMBtu	(AP-42, Table 13.5-1&2, less methane & ethane)
	PM/PM10	negligible	smokeless design
	SO ₂	negligible	negligible sulfur presence
	HAP	negligible	due to negligible presence

Flaring Emissions	NO _x	0.44 lb/hr	0.11 ton/yr
	CO	2.37 lb/hr	0.59 ton/yr
	VOC	0.33 lb/hr	0.08 ton/yr

Pilot Emissions	NO _x	0.1 lb/MMBtu	(AP-42, Table 1.4-1)	0.04 tpy
	CO	0.084 lb/MMBtu	(AP-42, Table 1.4-1)	0.04 tpy
	VOC	0.0055 lb/MMBtu	(AP-42, Table 1.4-2)	0.00 tpy
	PM/PM10	0.0076 lb/MMBtu	(AP-42, Table 1.4-2)	0.00 tpy
	SO ₂	0.0006 lb/MMBtu	(AP-42, Table 1.4-2)	0.00 tpy
	HAP	negligible		negligible tpy

Flaring + Pilot	NO _x	0.15
	CO	0.63
	VOC	0.09
	PM/PM10	negligible
	SO ₂	negligible
	HAP	negligible

Equation based on AP-42 Section 13.2.1 Paved Roads

$$\text{lbs/VMT Equation: } E = k (sL/2)^{0.85} (W/3)^{1.5}$$

Road Basis: 0.25 miles in, 0.25 miles out (preliminary estimate)

k_{PM} 0.082 dimensionless

particle size multiplier k_{PM-10} 0.016 dimensionless

road surface silt loading sL 0.4 g/m² (assumed)

Emission Unit	Truck Full (tons)	Truck Empty (tons)	Average Truck (tons)	PM Emission Factor (lb/VMT)	PM 10 Emission Factor (lb/VMT)	Total VMT	PM Emissions (tons/yr)	PM10 Emissions (tons/yr)
In plant paved roads	40.00	15.00	27.50	0.80	0.16	47,620	15.23	2.97

VMT Calculations	Load Size	Amount/yr	% by truck	# of Trips	VMT (miles)	Full	Empty
Denaturant **	7500 gal	5,500,000 gal	100%	733	367	183	183
Denatured Ethanol	7500 gal	104,500,000 gal	9%	13,933	6,967	3,483	3,483
Grain	25 tons	1,100,000 tons	100%	44,000	22,000	11,000	11,000
Wet DGS	25 tons	914,349 tons		36,574	18,287	9,143	9,143
					47,620	23,810	23,810
						50.0%	50.0%

Weighted Vehicle Average	((Empty %)*(15)) + ((Full %)*(40))
Empty Vehicle	15 Tons
Full Vehicle	40 tons
	27.5 tons

** Assumes every truck delivering denaturant takes on a load of denatured ethanol, thus 110,000,000 gal/yr may be loaded out by truck

Wet DGS Store/Handling/Loadout

Basis: 100% of Wet DGS is moved to truck by front end loader
Front end loader average weight = 2 tons

1 Front end loader trip = 10 feet
See ICM Emission Guide for Emission Factor Equation

Emission Unit	Front end loader (tons)	Front end loader empty (tons)	Average Truck (tons)	PM Emission Factor (lb/VMT)	PM 10 Emission Factor (lb/VMT)	Total VMT	PM Emissions (tons/yr)	PM10 Emissions (tons/yr)
In plant paved roads	3.00	1.00	2.00	0.055	0.011	866	0.024	0.005

VMT Calculations	Load Size	Amount/yr	# of Trips	VMT (miles)
Wet DGS	2	914,349 tons	457,174	866

Based on Handheld VOC monitor results of 0.1 to 7.0 ppm VOC, assume VOC emissions as insignificant
Emission factor increased by factor of 10 in order to be conservative

VOC emission factor (lb/ton)	VOC emissions (tons/year)
0.0083	3.79

HAP portion of VOCs:			
	Mass Fraction	VOC (tpy)	HAP (tpy)
Formaldehyde	0.000169	3.79	0.0006
Acetaldehyde	0.155	3.79	0.5882
Methanol	0.015	3.79	0.0569
Acrolein	0.0045	3.79	0.0171
			0.66 total

ICM Process

VOC Emission Estimates - From Insignificant Sources

Uncontrolled Vents	VOC Concentration (ppm, carbon)	Molecular weight (from test data)	Flow (cfm)	Conversion Constant (1.557E-7)	Midwest Scaling factor (from test data)	VOCs (lb/hr)	VOCs (tons/yr)
Thin Stillage Tank Vent	44.0	59.2	8.0	0.0000001557	2.3	0.007462	0.033
Syrup Tank Vent	62.2	59.2	5.4	0.0000001557	2.3	0.007121	0.031
Cook Water Tank Vent	31.0	59.2	13.4	0.0000001557	2.3	0.008807	0.039
Liquifaction Tank #1 (no vent on other Liq. tanks).	64.7	59.2	80.0	0.0000001557	2.3	0.109732	0.481
Whole Stillage Tank Vent (based on VOC measurement of wet cake).	7.0	59.2	100.0	0.0000001557	2.3	0.01484	0.065
Total VOCs (insignificant sources), tpy							0.65

Notes:

1. As a point of reference, LDAR defines an equipment leak as > 10,000 ppm

Conclusion: Above vents at < 1.0 tpy may be classified as insignificant.

Storage VOCs and HAPs:

Basis: Tanks 4.09 software (VOC), see attached tank calculations.

Stored Liquid	VOC		Acetaldehyde (tpy)	Methanol (tpy)	Benzene (tpy)	Hexane (tpy)	Toluene (tpy)	Xylene (tpy)	Cumene (tpy)	Ethylbenzene (tpy)	Carbon disulfide (tpy)
	lbs/yr	(tpy)									
190 proof	921.62	0.461	0.000092162	0.000092162							
190 proof			0	0							
200 proof	921.62	0.461	0.000092162	0.000092162							
200 proof			0	0							
denat. etoh	572.4	0.286	0.00005724	0.00005724	0.0001431	0.0025758	0.001431	0.000143	2.862E-05	0.00001431	0.000005724
denat. etoh	572.4	0.286	0.00005724	0.00005724	0.0001431	0.0025758	0.001431	0.000143	2.862E-05	0.00001431	0.000005724
denaturant (ng)	2,395.03	1.198			0.0029938	0.05987575	0.0059876	0.000599	0.0001198	5.98758E-05	2.39503E-05
corr. Inhib.	11.06	0.006	negligible HAPs								
Total VOCs		2.697									
Total HAPs		0.07894	0.000298804	0.000298804	0.00328	0.06502735	0.0088496	0.000885	0.000177	8.84958E-05	3.53983E-05
			subtotals:	den etoh			0.002862	0.000286	5.724E-05	0.00002862	0.000011448

HAP:	Mass Fractions (VOL specific) (% / 100)
Acetaldehyde	0.0002 etoh (190/200/denatured etoh)
Methanol	0.0002 etoh (190/200/denatured etoh)
Benzene (den)	0.0005 denatured etoh
Hexane (den)	0.009 denatured etoh
Hexane (ng)	0.05 denaturant, natural gasoline
Toluene	0.005 denaturant, natural gasoline
Benzene (ng)	0.0025 denaturant, natural gasoline
Xylenes	0.0005 denaturant, natural gasoline
Cumene	0.0001 denaturant, natural gasoline
Ethylbenzene	0.00005 denaturant, natural gasoline
Carbon disulfide	0.00002 denaturant, natural gasoline

HAP calculations (tpy) based on VOL (tpy) x HAP Mass Fraction

Natural Gas Combustion HAPS:

Basis: AP-42

Units	Organic Compound	Emission Factor (lb/million ft3)	Amount Per Year (MM scf)	PTE	
				Emissions (lb/yr)	Emissions (tpy)
See Below	Hexane	1.8	2,172	3910.46	1.9552
	Formaldehyde	7.50E-02		162.94	0.0815
	Toluene	3.40E-03		7.39	0.0037
	Benzene	2.10E-03		4.56	0.0023
	Nickel	2.10E-03		4.56	0.0023
	Chromium	1.40E-03		3.04	0.0015
	Dichlorobenzene	1.20E-03		2.61	0.0013
	Cadmium	1.10E-03		2.39	0.0012
	Naphthalene	6.10E-04		1.33	0.0007
	Manganese	3.80E-04		0.83	0.0004
	Mercury	2.60E-04		0.56	0.0003
	Arsenic	2.00E-04		0.43	0.0002
	Cobalt	8.40E-05		0.18	0.0001
	2-Methylnaphthalene	2.40E-05		0.05	0.0000
	Phenanthrene	1.70E-05		0.04	0.0000
	Pyrene	5.00E-06		0.01	0.0000
	Fluoranthene	3.00E-06		0.01	0.0000
	Fluorene	2.80E-06		0.01	0.0000
			Totals:	4101.39	2.05

Thermal Oxidizer Unit/Dryer Natural Gas Combustion:

Boiler 1	120 MMBtu/hr	8760 hr/yr
Boiler 2	120 MMBtu/hr	8760 hr/yr
RTO 1	8 MMBtu/hr	8760 hr/yr
	0 MMBtu/hr	8760 hr/yr
SUM	248 MMBtu/hr, maximum potential	
	1000 BTU/scf	
	248,000 scf/hr, maximum potential	
	2,172 MMscf/yr	

Emission factors taken from AP-42, Table 1.4-3 and 1.4-4 (7/98)

Only factors for pollutants noted as HAPs as defined by Section 112(b) of the Clean Air Act listed

Factors marked as "less than" are omitted as emissions are considered negligible

Butane, ethane, propane and pentane are assumed to be combusted and therefore negligible.

The following metals are not listed as HAPs; barium, copper, molybdenum, vanadium, zinc

TRUCK and RAIL LOADING HAP LOSSES:**RAIL Loading HAPs:**

Rail Loading: 0.47 tpy

Rail Denatured Ethanol HAPs	Fraction (%/100)	VOC (tpy)	HAP (tpy)
Benzene	0.00046	0.47	0.000
Hexane	0.009	0.47	0.004
Acetaldehyde	0.0002	0.47	0.000
Methanol	0.0002	0.47	0.000
All other HAPS insignificant			
Total HAPs			0.005

Truck Loading HAPS:

Composition based on typical MSDS for unleaded gasoline (mid points used)

Most gasoline is similar in composition

Only listed HAPs are given below

Calculations assume that trucks carrying ethanol were carrying gasoline and these vapors are vented to flare during loading

Total estimated VOC from product loading 5.17 tpy

Compound	Percent in Product	HAP Emissions (lb/yr)	HAP Emissions (tpy)	
Benzene	2.45%	253.39	0.13	
Ethylbenzene	2.00%	206.85	0.10	
Cumene	1.00%	103.42	0.05	
Xylenes	12.00%	1241.08	0.62	
Toluene	15.00%	1551.35	0.78	
MTBE	7.50%	775.68	0.39	(worst case as MTBE is often replaced w/etoh)
Total HAPs		4131.76 lb/yr 2.07 ton/yr		

Worst Case Truck HAP loss totals: 2.07 tpy

Hazardous Air Pollutant Emissions Summary

See Workbook for details of emission calculations

Compound	CO ₂	Purge	Fuel	Fugitive	Product	Denaturant	Truck	Wet	
	Scrubber	Scrubber	Boilers & RTO	Losses	Storage	Storage	Loading	Cake	TOTAL
	(tpy)		(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
Acrolein	0.0495	0.0583	0.0748	0.0398				0.02	0.24
Formaldehyde	0.0495	0.0022	0.3212	0.0015				0.0006	0.38
Acetaldehyde	5.7750	1.5400	0.6875	1.3700	0.0003			0.5882	9.96
Methanol	0.0495	0.1964	0.0292	0.1326	0.0003			0.0569	0.46
Hexane			1.9552		0.0052	0.0650			2.03
Toluene			0.0037		0.0029	0.0088	0.7757		0.79
Benzene			0.0023		0.0003	0.0033	0.1267		0.13
Nickel			0.0023						0.0023
Chromium			0.0015						0.0015
Dichlorobenzene			0.0013						0.0013
Cadmium			0.0012						0.0012
Naphthalene			0.0007						0.0007
Manganese			0.0004						0.0004
Mercury			0.0003						0.0003
Arsenic			0.0002						0.0002
Cobalt			0.0001						0.0001
2-Methylnaphthalene			0.000026						0.000026
Phenanthrene			0.000018						0.000018
Pyrene			0.000005						0.000005
Fluoranthene			0.000003						0.000003
Fluorene			0.000003						0.000003
Xylenes					0.0003	0.0009	0.6205		0.6217
Cumene					0.0001	0.000177	0.0517		0.0519
Ethylbenzene					0.00003	0.000088	0.1034		0.1035
Carbon disulfide					0.00001	0.000035			0.00005
MTBE (from trucks)							0.3878		0.3878
	5.9235	1.79685	3.0819	1.543809	0.01	0.08	2.0659	0.6628	
			stor. totals	0.09	Total Potential to Emit				15.16
Sub totals									
RTO HAPs:	1.11								
Boiler HAPs	1.97								

VOC emissions from Product Loading (Truck/Rail)

Natural Gasoline Delivery Truck -- Flared (controlled):

Loading Operations	Basis:	Calculated from AP-42, Section 5.2.2 - Loading Losses	
	Equation:	12.46*S*P*M/T	
	where:	S	0.6 Saturation factor (submerged)
From Tanks 4.09		P	4.3895 Vapor pressure (psia)
		M	66 Molar Mass (lb/lb-mole)
From Tanks 4.09, average temp		T	509.91 Product Temp (deg R)
AP-42 Factor:		4.25 lb/1000 gal	
Losses calculated using this factor multiplied by loading rates:			
Gasoline vapor emission rate (based on denaturant delivery):		110,000,000 gal/yr	
VOC Loading losses		467,226 lb/yr,uncontrolled	
Controlled by flare		4.67 tpy, @ 98% red.	
Assumes that every tanker taking a load of denatured etoh carried gasoline before loading denatured ethanol.			

Truck and Rail loading (combustion portion of emissions):

		PM/PM-10 is negligible based on smokeless design	
		Pilot operated 8760 hrs/yr	
Rate		12.4 MMBtu/hr	
Heating Value		850 Btu/scf	
Operating time		1540 hr/yr at 600 gpm loading rate	
Pilot		0.1 MMBtu/hr	
Pilot Operating Time		8760 hr/yr	
Emission Factors (waste gas only)	NOx	0.068 lb/MMBtu	(AP-42, Table 13.5-1)
	CO	0.37 lb/MMBtu	(AP-42, Table 13.5-1)
	VOC	0.052 lb/MMBtu	(AP-42, Table 13.5-1&2, less methane and ethane)
	PM/PM10	negligible	smokeless design
	SO2	negligible	negligible sulfur presence
	HAP	negligible	due to negligible presence
Flaring Emissions (1540hr/yr)	NOx	1299 lb/yr	0.65 ton/yr
(truck and rail time)	CO	7066 lb/yr	3.53 ton/yr
	VOC	993 lb/yr	0.50 ton/yr
Pilot Emissions (8760hr/yr)	NOx	0.1 lb/MMBtu	(AP-42, Table 1.4) 0.0438 tpy
	CO	0.084 lb/MMBtu	(AP-42, Table 1.4) 0.0368 tpy
	VOC	0.0055 lb/MMBtu	(AP-42, Table 1.4) 0.0024 tpy
	PM/PM10	0.0076 lb/MMBtu	(AP-42, Table 1.4) 0.0033 tpy
	SO2	0.0006 lb/MMBtu	(AP-42, Table 1.4) 0.0003 tpy
	HAP	negligible	negligible

Highest Totals	NOx	0.69
see above	CO	3.57
	VOC	5.17 Total
	PM/PM10	negligible
	SO2	negligible
	HAP	negligible

Rail Loading Losses (controlled):

Denatured Ethanol

Loading Operations	Basis:	Calculated from AP-42, Section 5.2.2 - Loading Losses
	Equation:	$12.46 \cdot S \cdot P \cdot M / T$
	where:	S 0.6 Saturation factor
		P 0.5896 Vapor pressure (psia)
		M 49.7552 Molar Mass (lb/lb-mole)
		T 509.91 Product Temp (deg R)
From Tanks 4.09		
	AP-42 Factor:	0.43 lb/1000 gal
<i>Losses calculated using this factor multiplied by loading rates:</i>		
Gasoline vapor emission rate (based on 100% denaturant delivery):		110,000,000 gal/yr
VOC Loading losses		47,311 lb/yr
Uncontrolled VOCs		23.66 tpy
Vapor recovery with flaring (98% destruction)		0.47 tpy

TANKS 4.0.9d
Emissions Report - Detail Format
Total Emissions Summaries - All Tanks in Report

Emissions Report for: Annual

Tank Identification	Losses (lbs)
Four Arrows 190 Proof (110) Four Arrows	Internal Floating Roof Tank Coleambally, Australia 921.62
Four Arrows 200 Proof (110) Four Arrows	Internal Floating Roof Tank Coleambally, Australia 921.62
Four Arrows Corrosion Inhibitor (110) Four Arrows	Vertical Fixed Roof Tank Coleambally, Australia 11.06
Four Arrows Denaturant (110) Four Arrows	Internal Floating Roof Tank Coleambally, Australia 2,395.03
Four Arrows Denatured Ethanol #1 (110) Four Arrows	Internal Floating Roof Tank Coleambally, Australia 572.40
Four Arrows Denatured Ethanol #2 (110) Four Arrows	Internal Floating Roof Tank Coleambally, Australia 572.40
Total Emissions for all Tanks:	5,394.14

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

Identification		
User Identification:	Four Arrows 190 Proof (110)	
City:	Coleambally	
State:	Australia	
Company:	Four Arrows	
Type of Tank:	Internal Floating Roof Tank	
Description:	190 proof	
Tank Dimensions		
Diameter (ft):	33.00	
Volume (gallons):	200,000.00	
Turnovers:	550.00	
Self Supp. Roof? (y/n):	N	
No. of Columns:	1.00	
Eff. Col. Diam. (ft):	1.00	
Paint Characteristics		
Internal Shell Condition:	Light Rust	
Shell Color/Shade:	White/White	
Shell Condition:	Good	
Roof Color/Shade:	White/White	
Roof Condition:	Good	
Rim-Seal System		
Primary Seal:	Vapor-mounted	
Secondary Seal:	Rim-mounted	
Deck Characteristics		
Deck Fitting Category:	Typical	
Deck Type:	Bolted	
Construction:	Sheet	
Deck Seam:	Sheet: 5 Ft Wide	
Deck Seam Len. (ft):	171.06	
Deck Fitting/Status		Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed		1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed		1
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Ungask.		1
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed		1
Roof Leg or Hanger Well/Adjustable		11
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open		1
Stub Drain (1-in. Diameter)/Slit Fabric Seal 10% Open		9
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.		1

Meteorological Data used in Emissions Calculations: Fort Wayne, Indiana (Avg Atmospheric Pressure = 14.31 psia)

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

Four Arrows 190 Proof (110) - Internal Floating Roof Tank
Coleambally, Australia

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.	Max.					
Ethyl alcohol	All	51.54	46.67	56.42	49.91	0.4894	N/A	N/A	46.0700		46.07	Option 2: A=8.321, B=1718.21, C=237.52

TANKS 4.0.9d

Emissions Report - Detail Format

Detail Calculations (AP-42)

Four Arrows 190 Proof (110) - Internal Floating Roof Tank

Coleambally, Australia

Annual Emission Calculations					
Rim Seal Losses (lb):	29.0936				
Seal Factor A (lb-mole/ft-yr):	2.2000				
Seal Factor B (lb-mole/ft-yr (mph) ^{1/2}):	0.0030				
Value of Vapor Pressure Function:	0.0087				
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.4894				
Tank Diameter (ft):	33.0000				
Vapor Molecular Weight (lb/lb-mole):	46.0700				
Product Factor:	1.0000				
Withdrawal Losses (lb):	764.5376				
Number of Columns:	1.0000				
Effective Column Diameter (ft):	1.0000				
Annual Net Throughput (gal/yr.):	110,000,000.0000				
Shell Clingage Factor (tbl/1000 sqft):	0.0015				
Average Organic Liquid Density (lb/gal):	6.8100				
Tank Diameter (ft):	33.0000				
Deck Filling Losses (lb):	115.7734				
Value of Vapor Pressure Function:	0.0087				
Vapor Molecular Weight (lb/lb-mole):	46.0700				
Product Factor:	1.0000				
Tot. Roof Filling Loss Fact.(lb-mole/yr):	288.9000				
Deck Seam Losses (lb):	12.2193				
Deck Seem Length (ft):	171.0596				
Deck Seem Loss per Unit Length Factor (lb-mole/ft-yr):	0.1400				
Deck Seem Length Factor(ft/sqft):	0.2000				
Tank Diameter (ft):	33.0000				
Vapor Molecular Weight (lb/lb-mole):	46.0700				
Product Factor:	1.0000				
Total Losses (lb):	921.6239				
Roof Fitting/Status	Quantity	KF _a (lb-mole/yr)	Roof Filling Loss Factors KF _b (lb-mole/(yr mph ^{1/2} n))	m	Losses(lb)
Access Hatch (24-in. Diam.)Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	14.4266
Automatic Gauge Float WellUnbolted Cover, Ungasketed	1	14.00	5.40	1.10	5.6103
Column Well (24-in. Diam.)Built-Up Col.-Sliding Cover, Ungask.	1	47.00	0.00	0.00	18.8347
Ladder Well (36-in. Diam.)Sliding Cover, Ungasketed	1	76.00	0.00	0.00	30.4561
Roof Leg or Hanger WellAdjustable	11	7.90	0.00	0.00	34.8242
Sample Pipe or Well (24-in. Diam.)Silt Fabric Seal 10% Open	1	12.00	0.00	0.00	4.8089
Stub Drain (1-in. Diameter)	9	1.20	0.00	0.00	4.3280
Vacuum Breaker (10-in. Diam.)Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	2.4846

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

Emissions Report for: Annual

Four Arrows 190 Proof (110) - Internal Floating Roof Tank
Coleambally, Australia

		Losses/(lbs)			
Components	Rim Seal Loss	Withdrawal Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Ethyl alcohol	29.09	764.54	115.77	12.22	921.62

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

Identification	
User Identification:	Four Arrows 200 Proof (110)
City:	Coleambally
State:	Australia
Company:	Four Arrows
Type of Tank:	Internal Floating Roof Tank
Description:	200 proof
Tank Dimensions	
Diameter (ft):	33.00
Volume (gallons):	200,000.00
Turnovers:	550.00
Self Supp. Roof? (y/n):	N
No. of Columns:	1.00
Eff. Col. Diam. (ft):	1.00
Paint Characteristics	
Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good
Rim-Seal System	
Primary Seal:	Vapor-mounted
Secondary Seal:	Rim-mounted
Deck Characteristics	
Deck Fitting Category:	Typical
Deck Type:	Bolted
Construction:	Sheet
Deck Seam:	Sheet: 5 Ft Wide
Deck Seam Len. (ft):	171.06
Deck Fitting/Status	
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Ungask.	1
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1
Roof Leg or Hanger Well/Adjustable	11
Sample Pipe or Well (24-in. Diam.)/Silt Fabric Seal 10% Open	1
Stub Drain (1-in. Diameter)/Silt Fabric Seal 10% Open	9
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meteorological Data used in Emissions Calculations: Fort Wayne, Indiana (Avg Atmospheric Pressure = 14.31 psia)

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

Four Arrows 200 Proof (110) - Internal Floating Roof Tank
Coleambally, Australia

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.	Max.					
Ethyl alcohol	All	51.54	46.67	56.42	49.91	0.4894	N/A	N/A	46.0700			46.07	Option 2: A=8.321, B=1718.21, C=237.52

TANKS 4.0.9d

Emissions Report - Detail Format

Detail Calculations (AP-42)

Four Arrows 200 Proof (110) - Internal Floating Roof Tank

Coleambally, Australia

Annual Emission Calculations			
Rim Seal Losses (lb):	29,0936		
Seal Factor A (lb-mole/ft-yr):	2.2000		
Seal Factor B (lb-mole/ft-yr (mph) ^{1/2}):	0.0030		
Value of Vapor Pressure Function:	0.0087		
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.4894		
Tank Diameter (ft):	33.0000		
Vapor Molecular Weight (lb/lb-mole):	46.0700		
Product Factor:	1.0000		
Withdrawal Losses (lb):	764.5376		
Number of Columns:	1.0000		
Effective Column Diameter (ft):	1.0000		
Annual Net Throughput (gal/yr.):	110,000,000.0000		
Shell Clingage Factor (tbl/1000 sqft):	0.0015		
Average Organic Liquid Density (lb/gal):	6.6100		
Tank Diameter (ft):	33.0000		
Deck Filling Losses (lb):	115.7734		
Value of Vapor Pressure Function:	0.0087		
Vapor Molecular Weight (lb/lb-mole):	46.0700		
Product Factor:	1.0000		
Tot. Roof Filling Loss Fact. (lb-mole/yr):	288.9000		
Deck Seam Losses (lb):	12.2193		
Deck Seam Length (ft):	171.0596		
Factor (lb-mole/ft-yr):	0.1400		
Deck Seam Length Factor (tbl/sqft):	0.2000		
Tank Diameter (ft):	33.0000		
Vapor Molecular Weight (lb/lb-mole):	46.0700		
Product Factor:	1.0000		
Total Losses (lb):	921.6239		
Roof Filling/Status			
	Quantity	KFa (lb-mole/yr)	Roof Filling Loss Factors KFb (lb-mole/yr mph ^{1/2})
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1	14.00	5.40
Column Well (24-in. Diam.)/Built-Up Coll.-Sliding Cover, Ungask.	1	47.00	0.00
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1	76.00	0.00
Roof Leg or Hanger Well/Adjustable	11	7.90	0.00
Sample Pipe or Well (24-in. Diam.)/Still Fabric Seal 10% Open	9	12.00	0.00
Stub Drain (1-in. Diameter)/	9	1.20	0.00
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20
			Losses (lb)
			1.20
			1.10
			0.00
			0.00
			30.4561
			34.8242
			4.8089
			4.3280
			2.4846

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

Emissions Report for: Annual

Four Arrows 200 Proof (110) - Internal Floating Roof Tank
Coleambally, Australia

Components	Losses(lbs)				Total Emissions
	Rim Seal Loss	Withdrawal Loss	Deck Fitting Loss	Deck Seam Loss	
Ethyl alcohol	29.09	764.54	115.77	12.22	921.62

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

Identification

User Identification: Four Arrows Corrosion Inhibitor (110)
City: Coleambally
State: Australia
Company: Four Arrows
Type of Tank: Vertical Fixed Roof Tank
Description: Corrosion Inhibitor

Tank Dimensions

Shell Height (ft): 8.00
Diameter (ft): 8.00
Liquid Height (ft): 8.00
Avg. Liquid Height (ft): 7.00
Volume (gallons): 3,008.11
Turnovers: 20.00
Net Throughput(gal/yr): 60,162.11
Is Tank Heated (y/n): N

Paint Characteristics

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

Roof Characteristics

Type: Cone
Height (ft): 0.00
Slope (ft/ft) (Cone Roof): 0.06

Breather Vent Settings

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

Meteorological Data used in Emissions Calculations: Fort Wayne, Indiana (Avg Atmospheric Pressure = 14.31 psia)

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

Four Arrows Corrosion Inhibitor (110) - Vertical Fixed Roof Tank
Coleambally, Australia

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.	Max.					
Xylene (m)	All	51.54	46.67	56.42	49.91	0.0667	0.0557	0.0796	106.1700		106.17	Option 2: A=7.009, B=1482.266, C=215.11

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

Four Arrows Corrosion Inhibitor (110) - Vertical Fixed Roof Tank Coleambally, Australia

Annual Emission Calculations	
Standing Losses (lb):	0.9104
Vapor Space Volume (cu ft):	54.4543
Vapor Density (lb/cu ft):	0.0013
Vapor Space Expansion Factor:	0.0356
Vented Vapor Saturation Factor:	0.9962
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	54.4543
Tank Diameter (ft):	8.0000
Vapor Space Outage (ft):	1.0833
Tank Shell Height (ft):	8.0000
Average Liquid Height (ft):	7.0000
Roof Outage (ft):	0.0833
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.0833
Roof Height (ft):	0.0000
Roof Slope (ft/ft):	0.0625
Shell Radius (ft):	4.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0013
Vapor Molecular Weight (lb/lb-mole):	106.1700
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0667
Daily Avg. Liquid Surface Temp. (deg. R):	511.2145
Daily Average Ambient Temp. (deg. F):	49.8917
Ideal Gas Constant R (psia cu ft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	509.5817
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insolation Factor (Btu/sq ft day):	1,222.3894
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0356
Daily Vapor Temperature Range (deg. R):	19.4986
Daily Vapor Pressure Range (psia):	0.0239
Breather Vent Press. Settling Range (psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0667
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0557
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0796
Daily Avg. Liquid Surface Temp. (deg R):	511.2145
Daily Min. Liquid Surface Temp. (deg R):	506.3399
Daily Max. Liquid Surface Temp. (deg R):	516.0892
Daily Ambient Temp. Range (deg. R):	19.0000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9962
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0667

1.0833	
10.1471	
106.1700	
0.0667	
60.162.1065	
20.0000	
1.0000	
3.008.1053	
8.0000	
8.0000	
1.0000	
11.0575	

Total Losses (lb):

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

Emissions Report for: Annual

Four Arrows Corrosion Inhibitor (110) - Vertical Fixed Roof Tank
Coleambally, Australia

		Losses(lbs)	
Components	Working Loss	Breathing Loss	Total Emissions
Xylene (-m)	10.15	0.91	11.06

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

Four Arrows Denaturant (110) - Internal Floating Roof Tank
Coleambally, Australia

Mixture/Component	Month	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
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Gasoline (RVP 10)	All	51.54	46.67	56.42	49.91	4.3895	N/A	N/A	66.0000			92.00	Option 4: RVP=10, ASTM Slope=3

TANKS 4.0.9d

Four Arrows Denaturant (110) - Internal Floating Roof Tank
Coleambally, Australia

Annual Emission Calculations		Roof Filling Loss Factors				Losses (lb)
		Quantity	KFa (lb-mole/yr)	KFb (lb-mole/yr mph ² n))	m	
Rim Seal Losses (lb):	437.5811					
Seal Factor A (lb-mole/ft-yr):	2.2000					
Seal Factor B (lb-mole/ft-yr (mph ² n)):	0.0030					
Value of Vapor Pressure Function:	0.0913					
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.3895					
Tank Diameter (ft):	33.0000					
Vapor Molecular Weight (lb/lb-mole):	66.0000					
Product Factor:	1.0000					
Withdrawal Losses (lb):	32.3859					
Number of Columns:	1.0000					
Effective Column Diameter (ft):	1.0000					
Annual Net Throughput (gall/yr.):	5,500.000.0000					
Shell Clingage Factor (bbbl/1000 sqft):	0.0015					
Average Organic Liquid Density (lb/gal):	5.6000					
Tank Diameter (ft):	33.0000					
Deck Filling Losses (lb):	1,741.2833					
Value of Vapor Pressure Function:	0.0913					
Vapor Molecular Weight (lb/lb-mole):	66.0000					
Product Factor:	1.0000					
Tot. Roof Filling Loss Fact. (lb-mole/yr):	288.9000					
Deck Seam Losses (lb):	183.7640					
Deck Seam Length (ft):	171.0596					
Factor (lb-mole/ft-yr):	0.1400					
Deck Seam Length Factor (ft/sqft):	0.2000					
Tank Diameter (ft):	33.0000					
Vapor Molecular Weight (lb/lb-mole):	66.0000					
Product Factor:	1.0000					
Total Losses (lb):	2,395.0343					
Roof Filling/Status	Quantity	KFa (lb-mole/yr)	KFb (lb-mole/yr mph ² n))	m	Losses (lb)	
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	216.9823	
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1	14.00	5.40	1.10	84.3820	
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Ungask.	1	47.00	0.00	0.00	283.2825	
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1	76.00	0.00	0.00	458.0738	
Roof Leg or Hanger Well/Adjustable	11	7.90	0.00	0.00	523.7713	
Sample Pipe or Well (24-in. Diam.)/Silt Fabric Seal 10% Open	1	12.00	0.00	0.00	72.3274	
Stub Drain (1-in. Diameter)	1	1.20	0.00	0.00	65.0947	
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	9	6.20	1.20	0.94	37.3692	

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

Emissions Report for: Annual

Four Arrows Denaturant (110) - Internal Floating Roof Tank
Coleambally, Australia

Components	Losses(lbs)			Total Emissions
	Rim Seal Loss	Withdrawal Loss	Deck Fitting Loss	
Gasoline (RVP 10)	437.58	32.39	1,741.28	2,395.03
			183.78	

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

Identification

User Identification: Four Arrows Denatured Ethanol #1 (110)
 City: Coleambally
 State: Australia
 Company: Four Arrows
 Type of Tank: Internal Floating Roof Tank
 Description: Denatured Ethanol

Tank Dimensions

Diameter (ft): 80.00
 Volume (gallons): 1,500,000.00
 Turnovers: 36.67
 Self Supp. Roof? (y/n): N
 No. of Columns: 1.00
 Eff. Col. Diam. (ft): 1.00

Paint Characteristics

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

Rim-Seal System

Primary Seal: Vapor-mounted
 Secondary Seal: Rim-mounted

Deck Characteristics

Deck Fitting Category: Typical
 Deck Type: Bolted
 Construction: Sheet
 Deck Seam: Sheet: 5 Ft Wide
 Deck Seam Len. (ft): 1,005.31

Deck Fitting/Status

	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Ungask.	1
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1
Roof Leg or Hanger Well/Adjustable	24
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Stub Drain (1-in. Diameter)/Slit Fabric Seal 10% Open	52
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meteorological Data used in Emissions Calculations: Fort Wayne, Indiana (Avg Atmospheric Pressure = 14.31 psia)

TANKS 4.0.9d

Four Arrows Denatured Ethanol #1 (110) - Internal Floating Roof Tank
Coleambally, Australia

Mixture/Component	Month	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
		Avg.	Min.		Max.	Avg.	Min.					
Ethyl alcohol	All	51.54	48.67	56.42	49.91			49.8905			47.25	Option 2: A=8.321, B=1718.21, C=237.52
Ethyl alcohol								46.0700	0.9500	0.7470	48.07	Option 2: A=8.321, B=1718.21, C=237.52
Gasoline (RVP 10)								66.0000	0.0500	0.2530	92.00	Option 4: RVP10, ASTM Slope=3

TANKS 4.0.9d

Emissions Report - Detail Format

Detail Calculations (AP-42)

Four Arrows Denatured Ethanol #1 (110) - Internal Floating Roof Tank

Coleambally, Australia

Annual Emission Calculations

Rim Seal Losses (lb): 92.3225
 Seal Factor A (lb-mole/ft-yr): 2.2000
 Seal Factor B (lb-mole/ft-yr (mph)^{0.75}): 0.0030
 Value of Vapor Pressure Function: 0.0105
 Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.5896
 Tank Diameter (ft): 80.0000
 Vapor Molecular Weight (lb/lb-mole): 49.8805
 Product Factor: 1.0000

Withdrawal Losses (lb): 153.5902
 Number of Columns: 1.0000
 Effective Column Diameter (ft): 1.0000
 Annual Net Throughput (gal/yr): 55,005,000.0000
 Shell Clingage Factor (bbl/1000 sqft): 0.0015
 Average Organic Liquid Density (lb/gal): 6.5509
 Tank Diameter (ft): 80.0000

Deck Filling Losses (lb): 232.4849
 Value of Vapor Pressure Function: 0.0105
 Vapor Molecular Weight (lb/lb-mole): 49.8805
 Product Factor: 1.0000
 Tot. Roof Filling Loss Fact. (lb-mole/yr): 443.2000

Deck Seam Losses (lb): 94.0011
 Deck Seam Length (ft): 1,005.3088
 Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr): 0.1400
 Deck Seam Length Factor (ft/sqft): 0.2000
 Tank Diameter (ft): 80.0000
 Vapor Molecular Weight (lb/lb-mole): 49.8805
 Product Factor: 1.0000

Total Losses (lb): 572.3987

Roof Filling/Status	Quantity	KF _A (lb-mole/yr)	Roof Filling Loss Factors KF _B (lb-mole/(yr mph ^{0.75} n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	18.8842
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1	14.00	5.40	1.10	7.3436
Column Well (24-in. Diam.)/Built-Up Coll-Sliding Cover, Ungask.	1	47.00	0.00	0.00	24.6543
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1	76.00	0.00	0.00	39.8665
Roof Leg or Hanger Well/Adjustable	24	7.90	0.00	0.00	99.4565
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1	12.00	0.00	0.00	6.2947
Stub Drain (1-in. Diameter)/	52	1.20	0.00	0.00	32.7325
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	3.2523

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

Emissions Report for: Annual

Four Arrows Denatured Ethanol #1 (110) - Internal Floating Roof Tank
Coleambally, Australia

Components	Losses(lbs)				Total Emissions
	Rim Seal Loss	Withdrawal Loss	Deck Fitting Loss	Deck Seam Loss	
Ethyl alcohol	92.32	153.59	232.48	94.00	572.40
Ethyl alcohol	68.97	145.91	173.67	70.22	458.77
Gasoline (RVP 10)	23.36	7.68	58.81	23.78	113.63

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

Identification		
User Identification:	Four Arrows Denatured Ethanol #2 (110)	
City:	Coleambally	
State:	Australia	
Company:	Four Arrows	
Type of Tank:	Internal Floating Roof Tank	
Description:	Denatured Ethanol	
Tank Dimensions		
Diameter (ft):	80.00	
Volume (gallons):	1,500,000.00	
Turnovers:	36.67	
Self Supp. Roof? (y/n):	N	
No. of Columns:	1.00	
Eff. Col. Diam. (ft):	1.00	
Paint Characteristics		
Internal Shell Condition:	Light Rust	
Shell Color/Shade:	White/White	
Shell Condition:	Good	
Roof Color/Shade:	White/White	
Roof Condition:	Good	
Rim-Seal System		
Primary Seal:	Vapor-mounted	
Secondary Seal:	Rim-mounted	
Deck Characteristics		
Deck Fitting Category:	Typical	
Deck Type:	Bolted	
Construction:	Sheet	
Deck Seam:	Sheet: 5 Ft Wide	1,005.31
Deck Seam Len. (ft):		
Deck Fitting/Status		Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed		1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed		1
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Ungask.		1
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed		1
Roof Leg or Hanger Well/Adjustable		24
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open		1
Stub Drain (1-in. Diameter)/Slit Fabric Seal 10% Open		52
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.		1

Meteorological Data used in Emissions Calculations: Fort Wayne, Indiana (Avg Atmospheric Pressure = 14.31 psia)

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

Four Arrows Denatured Ethanol #2 (110) - Internal Floating Roof Tank Coleambally, Australia

Mixture/Component	Month	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
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Ethyl alcohol	All	51.54	48.67	56.42	49.91	0.5896	N/A	N/A	49.8905	0.9500	0.7470	47.25	Option 2: A=8.321, B=1718.21, C=237.52
Ethyl alcohol						0.4894	N/A	N/A	46.0700	0.0500	0.2530	46.07	Option 2: A=8.321, B=1718.21, C=237.52
Gasoline (RVP 10)						4.3595	N/A	N/A	66.0000			92.00	Option 4: RVP=10, ASTM Slope=3

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

Four Arrows Denatured Ethanol #2 (110) - Internal Floating Roof Tank Coleambally, Australia

Annual Emission Calculations

Rim Seal Losses (lb): 92.3225
Seal Factor A (lb-mole/ft-yr): 2.2000
Seal Factor B (lb-mole/ft-yr (mph)^{0.75}): 0.0030
Value of Vapor Pressure Function: 0.0105
Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.5896
Tank Diameter (ft): 80.0000
Vapor Molecular Weight (lb/lb-mole): 49.8805
Product Factor: 1.0000

Withdrawal Losses (lb): 153.5902
Number of Columns: 1.0000
Effective Column Diameter (ft): 1.0000
Annual Net Throughput (gal/yr): 55,005,000.0000
Shell Clingage Factor (bbl/1000 sqft): 0.0015
Average Organic Liquid Density (lb/gal): 6.5509
Tank Diameter (ft): 80.0000

Deck Filling Losses (lb): 232.4849
Value of Vapor Pressure Function: 0.0105
Vapor Molecular Weight (lb/lb-mole): 49.8805
Product Factor: 1.0000
Tot. Roof Filling Loss Fact. (lb-mole/yr): 443.2000

Deck Seam Losses (lb): 94.0011
Deck Seam Length (ft): 1,065.3088
Factor (lb-mole/ft-yr): 0.1400
Deck Seam Length Factor (ft/sqft): 0.2000
Tank Diameter (ft): 80.0000
Vapor Molecular Weight (lb/lb-mole): 49.8805
Product Factor: 1.0000

Total Losses (lb): 572.3587

Roof Filling/Status

Access Hatch (24-in. Diam./Unbolted Cover, Ungasketed Automatic Gauge Float Well/Unbolted Cover, Ungasketed Column Well (24-in. Diam./Built-Up Coil-Sliding Cover, Ungasketed Ladder Well (36-in. Diam./Sliding Cover, Ungasketed Roof Leg or Hanger Well/Adjustable Sample Pipe or Well (24-in. Diam./Still Fabric Seal 10% Open Stub Drain (1-in. Diameter) Vacuum Breaker (10-in. Diam./Weighted Mech. Actuation, Gask.

Roof Filling Loss Factors KFa (lb-mole/yr)	Quantity	KFb (lb-mole/yr mph ^{0.75})	m	Losses (lb)
36.00	1	5.90	1.20	18.8842
14.00	1	5.40	1.10	7.3438
47.00	1	0.00	0.00	24.6543
76.00	1	0.00	0.00	39.8665
7.90	24	0.00	0.00	99.4565
12.00	1	0.00	0.00	6.2947
1.20	52	0.00	0.00	32.7325
6.20	1	1.20	0.94	3.2523

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

Emissions Report for: Annual

Four Arrows Denatured Ethanol #2 (110) - Internal Floating Roof Tank
Coleambally, Australia

Components	Losses(lbs)				Total Emissions
	Rim Seal Loss	Withdrawal Loss	Deck Fitting Loss	Deck Seam Loss	
Ethyl alcohol	92.32	153.59	232.48	94.00	572.40
Ethyl alcohol	68.97	145.91	173.67	70.22	458.77
Gasoline (RVP 10)	23.36	7.68	58.81	23.78	113.63