Attachment B

EMISSIONS CALCULATIONS, SOURCE PARAMETERS, AND MODELING RESULTS SUMMARY

Air Sciences Inc.	PROJECT TITLE: Pinedale Anticline Project	BY: C. Fraundorfer		FILE: inv_0799.xls
	PROJECT NO: 140-1	PAGE: 1	OF: 4	SHEET: 1
ENGINEERING CALCULATIONS	SUBJECT: Toxins Analysis - Emissions	DATE: September, 1999		

I. Production Emissions

A. Three-Phase Separator Heater

Assumptions:

Size	0.75	MMBtu/hour	Jonah II EIS
Fuel heat content	1,000	Btu/SCF	Jonah II EIS
Time	5,088	hours/year	Jonah II EIS, October - April
	15	minutes/hr	

Pollutant	Emission Factors (lb/MMCF)		Emissions per Well lb/hr - annual average	tons/year	g/s
Benzene	0.0021	1	2.29E-07	1.00E-06	2.88E-08
Formaldehyde	0.0750	1	8.17E-06	3.58E-05	1.03E-06
Hexane	1.8000	1	1.96E-04	8.59E-04	2.47E-05
Toluene	0.0034	1	3.70E-07	1.62E-06	4.67E-08

[1]AP-42, Tables 1.4-1 and 1.4-2.

B. Dehydration Heater

Assumptions:

Size	0.125	MMBtu/hour	Jonah II EIS
Fuel heat content	1,000	Btu/SCF	Jonah II EIS
Time	8,760	hours/year	Jonah II EIS
	15	minutes/hour	

Pollutant	Emission Factors (lb/MMCF)		Emissions per Well lb/hr - annual average	tons/year	g/s
Benzene	0.0021	1	6.56E-08	2.87E-07	8.27E-09
Formaldehyde	0.0750	1	2.34E-06	1.03E-05	2.95E-07
Hexane	1.8000	1	5.63E-05	2.46E-04	7.09E-06
Toluene	0.0034	1	1.06E-07	4.65E-07	1.34E-08

[1]AP-42, Tables 1.4-1 and 1.4-2.

II. Production Emissions (continued)

C. Dehydration VOC Emissions - GLYCALC

Total field gas production rate: 0.5 MMCF/day — BLM, Bill McMahan, 3/99, represents maximum year

	Emission Factor* lb/MMCF	PAP Emissions lb/hr	ton/yr	g/s
VOCs	29.73	0.62	2.71	7.80E-02
Benzene	3.65	0.08	0.33	9.59E-03
Ethylbenzene	0.60	0.01	0.06	1.58E-03
n-Hexane	0.28	0.01	0.03	7.44E-04
Toluene	9.09	0.19	0.83	2.38E-02
Xylenes	7.75	0.16	0.71	2.03E-02

*Emission factors developed from GLYCALC runs from McMurry Oil (3/99).

D. Flashing Emissions - HYSIM

Total field condensate production rate: 4.5 BBL/day — BLM, Bill McMahan, 3/99, represents maximum year

0.11 MMCF gas/bbl condensate — BLM, Bill McMahan, 3/99

Pressure 700 psig — McMurry Oil, Robin Smith, 3/99

	Emission Factor^ lb/bbl	PAP Emissions w/o BACT lb/hr	ton/yr	g/s
VOCs	11.31	2.12	9.29	2.67E-01
Benzene	0.01	0.00	0.01	3.11E-04
Ethylbenzene	0.00	0.00	0.00	6.04E-05
n-Hexane	0.54	0.10	0.44	1.27E-02
Toluene	0.00	0.00	0.00	2.63E-06
Xylenes	0.00	0.00	0.00	2.23E-05

^Emission factors developed from HYSYS runs from McMurry Oil, 3/99.

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II. Production Emissions (continued)

E. Summary

	PAP Emissions		
	lb/hr	ton/yr	g/s
Formaldehyde	1.05E-05	4.60E-05	1.32E-06
Benzene	0.08	0.34	0.010
Toluene	0.19	0.83	0.024
Ethylbenzene	0.01	0.06	0.002
Xylenes	0.16	0.71	0.020
n-Hexane	0.11	0.47	0.013

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II. Toxin Modeling Parameters

A. Microscale Toxins Analysis - Stack Parameters

	H (m)	T (K)*	V (m/s)	D (m)
Sep. Heater	4.5	700	6.1	0.3
Glycol Heater	4.5	700	6.1	0.3
Dehy vent	4.5	289	0.01	0.15
Flashing	3.0	0	0.01	0.08

*A temperature of 0K indicates ambient temperature.

II. Toxin Modeling Results

A. Maximum Predicted Impacts

Pollutant	Chronic Health Effects		
	Chronic Exposure Threshold Concentration (ug/m3)	Predicted Annual Concentration (ug/m3)	Chronic Exposure Threshold Ratio*
Benzene^	71	1.80	0.03
Ethylbenzene**	1000	0.30	3E-04
Formaldehyde^	3.6	5E-05	1E-05
N-Hexane**	200	3.30	0.02
Toluene**	41	4.30	0.10
Xylenes^	300	3.60	0.01

*If this ratio is greater than or equal to one, the chronic exposure threshold concentration is exceeded.

**Accessed from the Integrated Risk Information System website (http://www.epa.gov/ngispgm3/iris/index.html).

^Chronic Exposure Threshold Concentrations taken from the California Air Pollution Control Officers Association Air Toxics "Hot Spots" Program, Revised 1992 Risk Assessment Guidelines.

Pollutant	Cancer Risk		
	Unit Cancer Risk $(ug/m3)^{-1}$	Predicted Annual Concentration (ug/m3)	Increased Cancer Risk** (Maximum Exposure Scenario)
Benzene	8.30E-06	1.80	6.42E-06
Formaldehyde	1.30E-05	5.00E-05	2.80E-10