WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY
601 57th Street, SE
Charleston, WV 25304
Phone: (304) 926-0475
www.dep.wv.gov/daq

PERMIT DETERMINATION FORM (PDF)

FOR AGENCY USE ONLY: PLANT I.D. # _____

PDF # _____ PERMIT WRITER: _____

1. NAME OF APPLICANT (AS REGISTERED WITH THE WV SECRETARY OF STATE'S OFFICE):
Noble Energy, Inc.

2. NAME OF FACILITY (IF DIFFERENT FROM ABOVE):
Moundsville 9 (MND 9)

NOV 18 2016

3. NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (NAICS) CODE:
2 1 1 1 1 1

4A. MAILING ADDRESS:
1000 Noble Energy Drive
Canonsburg, PA 15317

4B. PHYSICAL ADDRESS:
2795 Taylors Ridge Rd
Moundsville, WV

5A. DIRECTIONS TO FACILITY (PLEASE PROVIDE **MAP** AS **ATTACHMENT A**):
From WV Route 2 south at traffic signal, make a left turn onto WV Alternate 2 (Round Bottom Hill Road) and travel 1.54 miles to CR 88/5 (Lindsay Lane), make a right onto Lindsay Lane and travel 1.77 miles to CR 21 (Roberts Ridge Road), make a right onto Roberts Ridge Road and travel 3.38 miles to CR 2/1 (Taylors Ridge/McFarland Run), make a right onto Taylors Ridge/McFarland Run Road and travel 1.26 miles to intersection, make a right and follow road until you reach a gate. Travel through the gate to the intersection, make a left and travel for 3000 feet to the location.

5B. NEAREST ROAD:	5C. NEAREST CITY OR TOWN:	5D. COUNTY:
Taylors Ridge Rd	Moundsville, WV	Marshall
5E. UTM NORTHING (KM):	5F. UTM EASTING (KM):	5G. UTM ZONE:
518.2177	4409.077	17N

6A. INDIVIDUAL TO CONTACT IF MORE INFORMATION IS REQUIRED:
Phil Schlagel

6B. TITLE:
Air Quality Manager

6C. TELEPHONE:	6D. FAX:	6E. E-MAIL:
281-872-3202		phil.schlagel@nblenergy.com

7A. DAQ PLANT I.D. NO. (FOR AN EXISTING FACILITY ONLY):
___ ___ ___ – ___ ___ ___ ___ ___

7B. PLEASE LIST ALL CURRENT 45CSR13, 45CSR14, 45CSR19 AND/OR TITLE V (45CSR30) PERMIT NUMBERS ASSOCIATED WITH THIS PROCESS (FOR AN EXISTING FACILITY ONLY):

7C. IS THIS PDF BEING SUBMITTED AS THE RESULT OF AN ENFORCEMENT ACTION? IF YES, PLEASE LIST:

8A. TYPE OF EMISSION SOURCE (CHECK ONE):
☑ NEW SOURCE ☐ ADMINISTRATIVE UPDATE
☐ MODIFICATION ☐ OTHER (PLEASE EXPLAIN IN 11B)

8B. IF ADMINISTRATIVE UPDATE, DOES DAQ HAVE THE APPLICANT'S CONSENT TO UPDATE THE EXISTING PERMIT WITH THE INFORMATION CONTAINED HEREIN?
☐ YES ☐ NO

9. IS *DEMOLITION* OR PHYSICAL *RENOVATION* AT AN EXISTING FACILITY INVOLVED? ☐ YES ☑ NO

10A. DATE OF ANTICIPATED INSTALLATION OR CHANGE:
____/____/20__.

10B. DATE OF ANTICIPATED START-UP:
____/____/20__.

11A. PLEASE PROVIDE A **DETAILED PROCESS FLOW DIAGRAM** SHOWING EACH PROPOSED OR MODIFIED PROCESS EMISSION POINT AS **ATTACHMENT B**.

11B. PLEASE PROVIDE A **DETAILED PROCESS DESCRIPTION** AS **ATTACHMENT C**.

12. PLEASE PROVIDE **MATERIAL SAFETY DATA SHEETS (MSDS)** FOR ALL MATERIALS PROCESSED, USED OR PRODUCED AS **ATTACHMENT D**. FOR CHEMICAL PROCESSE, PLEASE PROVIDE A MSDS FOR EACH COMPOUND EMITTED TO AIR.

Revision 5/2010

13A. **REGULATED AIR POLLUTANT EMISSIONS:**

⇒ **FOR A NEW FACILITY,** PLEASE PROVIDE PLANT WIDE EMISSIONS BASED ON THE POTENTIAL TO EMIT (PTE) FOR THE FOLLOWING AIR POLLUTANTS INCLUDING ALL PROCESSES.

⇒ **FOR AN EXISTING FACILITY,** PLEASE PROVIDE THE PROPOSED CHANGE IN EMISSIONS BASED ON THE PTE OF ALL PROCESS CHANGES FOR THE FOLLOWING AIR POLLUTANTS.

PTE FOR A GIVEN POLLUTANT IS TYPICALLY BEFORE AIR POLLUTION CONTROL DEVICES AND IS COLLECTED BASED ON THE MAXIMUM DESIGN CAPACITY OF PROCESS EQUIPMENT.

POLLUTANT	HOURLY PTE (LB/HR)	YEARLY PTE (TON/YR) (HOURLY PTE MULTIPLIED BY 8760 HR/YR) DIVIDED BY 2000 LB/TON
PM	0.04	0.16
PM_{10}	0.04	0.16
VOCs	3.50	15.31
CO	0.42	1.82
NO_x	0.50	2.17
SO_2	0.00	0.01
Pb		
HAPs (AGGREGATE AMOUNT)	0.28	1.12
TAPs (INDIVIDUALLY)*	0.06	0.28
OTHER (INDIVIDUALLY)*		

* ATTACH ADDITIONAL PAGES AS NEEDED

13B. PLEASE PROVIDE ALL **SUPPORTING CALCULATIONS** AS **ATTACHMENT E.**

CALCULATE AN HOURLY AND YEARLY PTE OF EACH PROCESS EMISSION POINT (SHOWN IN YOUR DETAILED PROCESS FLOW DIAGRAM) FOR ALL AIR POLLUTANTS LISTED ABOVE INCLUDING INDIVIDUAL HAP'S (LISTED IN SECTION 112[b] OF THE 1990 CAAA), TAP'S (LISTED IN 45CSR27), AND OTHER AIR POLLUTANTS (E.G. POLLUTANTS LISTED IN TABLE 45-13A OF 45CSR13, MINERAL ACIDS PER 45CSR7, ETC.).

14. **CERTIFICATION OF DATA**

I, RJ Moses (*TYPE NAME*) ATTEST THAT ALL THE REPRESENTATIONS CONTAINED IN THIS APPLICATION, OR APPENDED HERETO, ARE TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE BASED ON INFORMATION AND BELIEF AFTER REASONABLE INQUIRY, AND THAT I AM A ***RESPONSIBLE OFFICIAL*** ** (*PRESIDENT, VICE PRESIDENT, SECRETARY OR TREASURER, GENERAL PARTNER OR SOLE PROPRIETOR*) OF THE APPLICANT.

SIGNATURE OF RESPONSIBLE OFFICIAL: _____

TITLE: Operations Manager DATE: 10 / 24 / 16

** THE DEFINITION OF THE PHRASE '***RESPONSIBLE OFFICIAL***' CAN BE FOUND AT 45CSR13, SECTION 2.23.

NOTE: PLEASE CHECK ENCLOSED ATTACHMENTS:

☑ **ATTACHMENT A** ☑ **ATTACHMENT B** ☑ **ATTACHMENT C** ☐ **ATTACHMENT D** ☑ **ATTACHMENT E**

RECORDS ON ALL CHANGES ARE REQUIRED TO BE KEPT AND MAINTAINED ON-SITE FOR TWO (2) YEARS.

THE PERMIT DETERMINATION FORM WITH THE INSTRUCTIONS CAN BE FOUND ON DAQ'S PERMITTING SECTION WEB SITE:

www.dep.wv.gov/daq

Noble Energy, Inc.

MND 9 Production Facility
Permit Determination

INTRODUCTION NARRATIVE

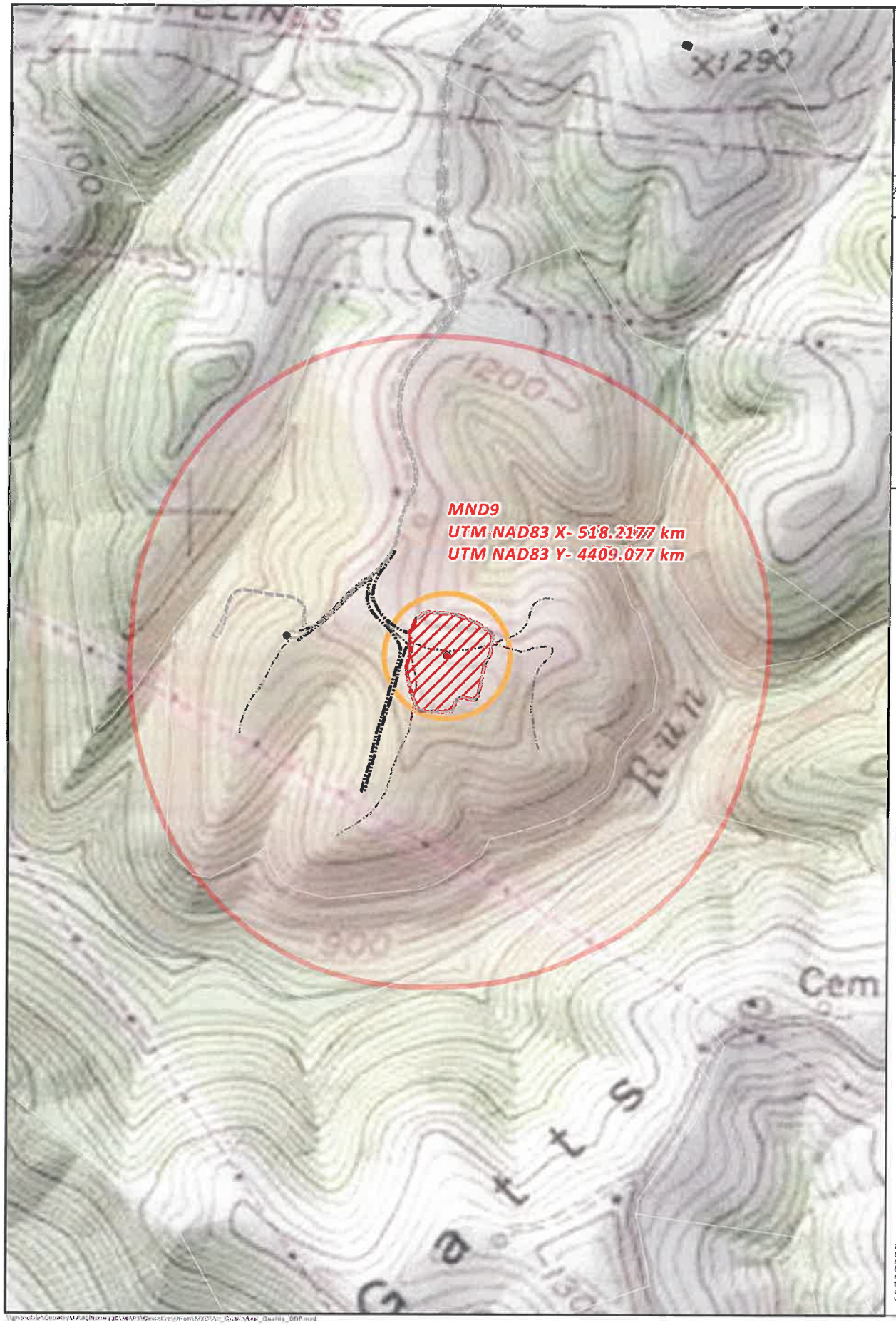
Noble Energy, Inc. (Noble) operates an oil and natural gas production facility at the MND 9 well pad, located in Marshall County, West Virginia. The well pad consists of 6 natural gas wells, 6 gas production units and associated heaters, 4 - 400 bbl Prod Water Storage Tanks and a produced water truck loadout.

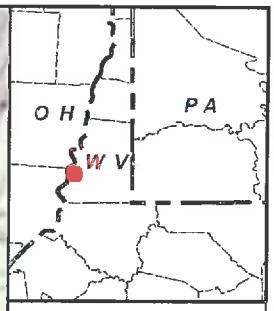
Noble has estimated that potential and actual emissions from the production facility have not and will not exceed the WV 45CSR13 permitting thresholds. The produced water production used in this determination is the maximum actual production rate of any 12 months. Produced water production is expected to decline further through the life of the wells.

ATTACHMENT A

MAP OF MND 9 PRODUCTION FACILITY

MND9 Pad
Marcellus Business Unit





0 300 600
Feet

1 inch = 625 feet

Main Data Frame Projection:
NAD 1983 UTM Zone 17N

Units: Meter

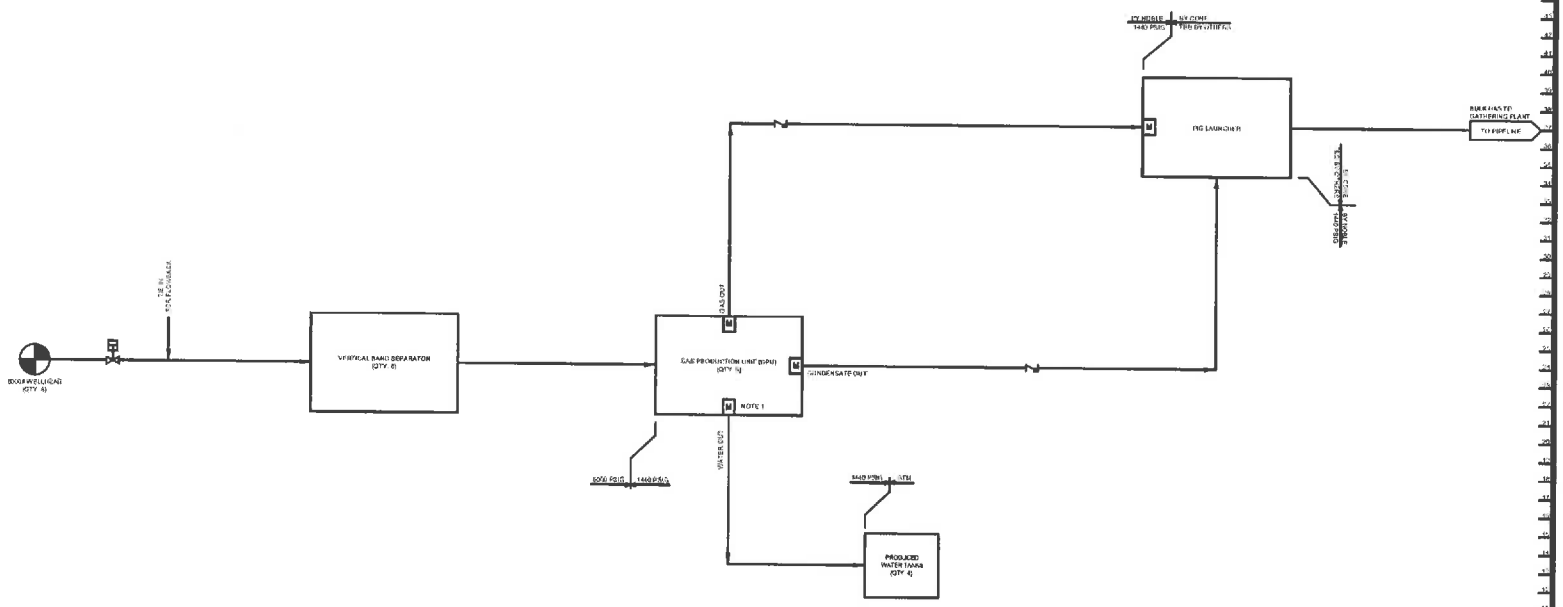
Author: devincreighton
Date Created:10/6/2016

- Approx. Pad Center
- Built Road
- Existing Road
- Trail
- Existing Buildings
- Well Pad Boundary
- 1/4 mi. Pad Extent Buffer
- 300 ft Pad Center Buffer
- Surface Parcels (Resolved)

Disclaimer: All data is licensed for Noble Energy, Inc. use only. Noble Energy, Inc. makes every effort to ensure this map is free of errors, but does not warrant the map or its features are either spatially or temporally accurate or fit for a particular use. Noble Energy, Inc. provides this map without any warranty of any kind

ATTACHMENT B

PROCESS FLOW DIAGRAM



NOTES:
1 ■ DENOTES METER

REV	BY	DATE	DESCRIPTION	CHKD	CONTR APPD	DATE	NBL CHKD	NBL APPD	DATE
A	JH	[illegible]	[illegible]						

noble energy

MARCELLUS SHALE DEVELOPMENT
MOUNDSVILLE 9 WELL PAD
BLOCK FLOW DIAGRAM

DATE DRAWN [illegible]
DRAWN BY JH
DWG. NO. MND9-P03-001

ATTACHMENT C

MND 9 PROCESS DESCRIPTION

The MND 9 is an oil and gas production facility.

Condensate, gas, produced water and sand come from 6 natural gas wells through 6 sand separators.

Sand is routed from the sand separators to a sand storage box for disposal.

Condensate, gas and produced water are routed through 6 Gas Production Units (GPUs) with 6 - 1.0 MMBtu/hr Heaters where separation occurs.

The condensate and gas from the GPUs exit the facility via sales pipeline.

Produced water from the separators flows to 4 - 400 bbl Prod Water Storage Tanks.

Produced water is transported off-site by tanker truck or water pipeline.

ATTACHMENT E

SUPPORTING CALCULATIONS

MND 9
Emission Summary Sheet

Emission Unit ID Number	Source Description	Potential Emissions (tpy)														
		NOx	CO	VOC	SOx	PM	PM10	Formaldehyde	n-Hexane	Benzene	Toluene	Ethylbenzene	Xylene	224-TMP	Single HAP	Total HAPS
PW TK 1-4	400 bbl Prod Water Storage Tanks		---	2.14	---	---	---	---	0.0154	0.0019	0.0038	0.0002	0.0030	0.0000	0.0154	0.0243
GPU 1-6	1.0 MMBtu/hr Heaters	2.15	1.81	0.12	0.01	0.16	0.16	0.0016	0.0388	0.0000	0.0001	0.0000	0.0000	0.0000	0.0388	0.0407
TL	Produced Water Truck Loading Detail	---	---	0.20	---	---	---	---	0.0336	0.0000	0.0012	0.0000	0.0035	0.0000	0.0336	0.0046
FUG	Equipt Component Fugitives Estimate	---	---	5.27	---	---	---	---	0.19	0.01	0.05	0.01	0.09	0.02	0.1949	0.37
TE Gen	Thermo Electric Generator	0.02	0.01	0.00	0.00	0.00	0.00	---	---	---	---	---	---	---	---	---
Pneumatic Controllers	Pneumatic Controllers		---	9.71	---	---	---	---	0.76	0.00	0.01	0.00	0.01	---	---	0.77
Total TPY		**2.17**	**1.82**	**15.31**	**0.01**	**0.16**	**0.16**	**0.00**	**1.04**	**0.01**	**0.06**	**0.01**	**0.10**	**0.02**	**0.28**	**1.21**
Total lb/hr		**0.50**	**0.42**	**3.50**	**0.00**	**0.04**	**0.04**	**0.00**	**0.24**	**0.00**	**0.01**	**0.00**	**0.02**	**0.00**	**0.06**	**0.28**
Total lb/day		**11.90**	**9.97**	**83.88**	**0.07**	**0.90**	**0.90**	**0.01**	**5.70**	**0.07**	**0.32**	**0.07**	**0.56**	**0.08**	**1.55**	**6.63**

MND 9
Heater Detail Sheet

Equipment ID	GPU 1-6	
Equipment Count	6	
Equipment Usage	1.0 MMBtu/hr Heaters	
Fuel Heating Value	1220	Btu/scf
Design Heat Rate*	1.00	MMBtu/hr
Site Heat Rate*	1.00	MMBtu/hr
Potential Operation	8760	hr/yr
Potential Fuel Usage	7.18	MMscf/yr

* These are heat release rates and not the duty for the heater

Potential Emissions

Pollutant	Emission Factor (lb/MMscf)	Nominal Rating (MMBtu/hr)	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor
				(lb/hr)	(tpy)	
NOx	100.00	6.000	8760	0.49	2.15	AP-42[1]
CO	84.00	6.000	8760	0.41	1.81	AP-42[1]
VOC	5.50	6.000	8760	0.03	0.12	AP-42[2]
SO2	0.60	6.000	8760	0.00	0.01	AP-42[2]
PM10	7.60	6.000	8760	0.04	0.16	AP-42[2]
Benzene	0.002	6.000	8760	0.00	0.0000	AP-42[3]
Toluene	0.003	6.000	8760	0.00	0.0001	AP-42[3]
N-Hexane	1.80	6.000	8760	0.01	0.0388	AP-42[3]
Formaldehyde	0.08	6.000	8760	0.00	0.0016	AP-42[3]
Total HAPs	1.89	6.000	8760	0.01	0.04	AP-42[3]
CO_2	120000.00	6.000	8760	590.16	2584.92	AP-42[2]
CH_4	2.30	6.000	8760	0.01	0.05	AP-42[2]
CO_2e					2585.96	

[1] EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-1, Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion

[2] EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-2, Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion

[3] EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-3, Emission Factors for Speciated Organic Compounds from Natural Gas Combustion

MND 9
Tank Detail Sheet

Source ID Number	PW TK 1-4				
Equipment ID	PW TK				
Tank Description	400 bbl Prod Water Storage Tank	Potential operation	8760	hr/yr	
Tank Usage	Produced Water Storage				
Tank Count	4	Maximum water production	231,611	bbl/yr	HYSYS Run, Water Out
Tank Capacity	400 bbl		1.00	% Oil	
Tank Contents	Produced Water		2316.1	bbl/yr Oil	
Emission Controls	NO		0.01846	lb/bbl VOC from FESCO Flash Study	
Tank Orientation	Vertical, above ground		0.00056	lb/bbl BTEX from FESCO Flash Study	
Shell Height / Length	20 ft	Tank Construction	Welded		(Welded, Bolted, Fiberglass)
Shell Diameter	12 ft	Roof color & condition	Gray/Medium, good		(eg. light brown, good)
Roof Slope	0.06	shell color & condition	Gray/Medium, good		(eg. white, fair)
Roof Type (Cone, Dome, IFR, EFR, None)	Cone	FR Primary Seal	N/A		
		FR Seconday Seal	N/A		
		Vent pressure setting	0.03	+/- psig	
		VOC Control Efficiency	0	%	

Potential Emissions

Pollutant	CAS	Hrs of Operation (hrs/yr)	Estimated Uncontrolled Emissions[1] (lb/hr)	(tpy)	(lb/yr)	Source of Emission Factor
VOC		8760	0.49	2.14	4275.54	FESCO Flash Study

	Weight % of VOC	tpy
Benzene	0.09	0.002
Ethybenzene	0.01	0.000
Toluene	0.18	0.004
Xylenes	0.14	0.003
N-Hexane	0.72	0.015
224-TMP	0.00	0.000

MND 9
Produced Water Truck Loading Detail

TL

Select Model Liquid ---> Gasoline RVP 7

or Enter These Factors Directly Below

P=		psia	true vapor pressure
M=		lb/lb-mol	molecular weight of vapors

S=	0.6		saturation factor
P=	4.3	psia	true vapor pressure
M=	68	lb/lb-mol	molecular weight of vapors
T=	70	°F	temperature
L_L=	4.12	lb/1000 gallons	= 12.46*S*P*M/(T+460)
L_L=	0.173	lb/bbl	Loading Losses

Production:	231,611	bbl/year	Produced Water
	2,316	bbl/year	oil based on 1% oil in the Produced Water
	6.34550685	bbl/day	

Potential Emissions

Pollutant	Component Wt%	Component EF lb/bbl	Uncontrolled lb/yr	tpy	Controlled (lb/yr)	(tpy)
VOC	100%	0.173	401	0.2003	401	0.2003
TOTAL HAPS	2.3%	0.004	9	0.0046	9	0.0046
n-hexane	16.67%	0.029	67	0.0336	67	0.0336
224-TMP	0.00%	0.000	0	0.0000	0	0.0000
Benzene	0.04%	0.000	0	0.0000	0	0.0000
Toluene	0.49%	0.001	2	0.0012	2	0.0012
Ethylbenzene	0.19%	0.000	0	0.0000	0	0.0000
Xylene	1.62%	0.003	7	0.0035	7	0.0035

[1] EPA AP-42, Volume I, Fifth Edition - January 1995, Table 5.2-1, Saturation (S) Factors for Calculating Petroleum Liquid Loading Losses

[2] API Compendium of Greenhouse Gas Emissions Methodoligies for the Oil and Natural Gas Industry, Table 5-12

MND 9
Equipt Component Fugitives Estimate

FUG

	Counts	Emission Factor[2] lb/hr/component	% Control Efficiency	% VOC	VOC Emissions		Benzene	Toluene	E-benzene	Xylene	n-Hexane	224-TMP	%CH4	CH4 Emissions		CO_2e
					lb/hr	tpy	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr		lb/hr	tpy	tpy
Valve																
Gas/Vapor	30	0.00992	0	16	0.05	0.21	0.06	0.13	0.01	0.20	4.35	0.00	59.83	0.18	0.78	16.38
Light Liquid[1]	48	0.00551	0	100	0.26	1.16	2.66	14.25	3.48	26.76	176.31	18.53	1.17	0.00	0.01	0.28
Water/Oil	48	0.000216	0	50	0.01	0.02	0.10	0.56	0.14	1.05	0.69	0.00	1.17	0.00	0.00	0.01
Pumps Seals																
Light Liquid	0	0.02866	0	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.17	0.00	0.00	0.00
Water/Oil	0	0.0000529	0	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.17	0.00	0.00	0.00
Flanges																
Gas/Vapor	30	0.00086	0	16	0.00	0.02	0.01	0.01	0.00	0.02	0.38	0.00	59.83	0.02	0.07	1.42
Light Liquid	30	0.000243	0	100	0.01	0.03	0.07	0.39	0.10	0.74	4.86	0.51	100	0.01	0.03	0.67
Water/Oil	36	0.00000617		50	0.00	0.00	0.00	0.01	0.00	0.02	0.01	0.00	100	0.00	0.00	0.02
Open-Ended Lines																
Gas/Vapor	0	0.00441	0	16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.83	0.00	0.00	0.00
Light Liquid	0	0.00309	0	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100	0.00	0.00	0.00
Water/Oil	0	0.0006	0	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100	0.00	0.00	0.00
Other																
Gas/Vapor	12	0.0194	0	16	0.04	0.16	0.05	0.10	0.01	0.16	3.41	0.00	59.83	0.14	0.61	12.81
Light Liquid1	6	0.0165	0	100	0.10	0.43	1.00	5.33	1.30	10.02	66.00	6.94	100	0.10	0.43	9.11
Water/Oil	42	0.0309	0	50	0.65	2.84	13.07	69.92	17.05	131.31	86.52	0.00	100	1.30	5.68	119.37
Connectors																
Gas/Vapor	150	0.000441	0	16	0.01	0.05	0.01	0.03	0.00	0.05	0.97	0.00	59.83	0.04	0.17	3.64
Light Liquid	150	0.000463	0	100	0.07	0.30	0.70	3.74	0.91	7.03	46.30	4.87	100	0.07	0.30	6.39
Water/Oil	84	0.000243	0	50	0.01	0.04	0.21	1.10	0.27	2.07	1.36	0.00	100	0.02	0.09	1.88
Total Emissions					1.19	5.27	17.74	94.47	23.01	177.35	389.79	30.85		1.85	8.10	170.10

Note

1. Heavy liquids are defined as having vapor pressure 0.044 psia or less at 68°F. Light Liquids are defined as having vapor pressure higher than 0.044 psia at 68° F.

2. Factors from EPA Document EPA-453/R-95-017, November 1995.

MND 9
Thermo Electric Generator

Source ID Number	TE Gen	
Equipment ID	TE Gen	
Equipment Usage	Thermo Electric Generator	
Equipment Make	Global Thermoelectric	
Equipment Model	Model 5220	
Emission Controls	None	
Design Heat Rate*	0.03	MMBtu/hr
Potential Operation	8760	hr/yr
Potential Fuel Usage	7.4	gal/day
Fuel	Propane	

Potential Emissions

Pollutant	Emission Factor ($lb/10^3$ gal)	Nominal Rating (MMBtu/hr)	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor
				(lb/hr)	(tpy)	
NOx	13.00	0.028	8760	0.00	0.02	AP-42[1]
CO	7.50	0.028	8760	0.00	0.01	AP-42[1]
TOC	1.00	0.028	8760	0.00	0.00	AP-42[1]
SO2	0.10	0.028	8760	0.00	0.00	AP-42[1]
PM10	0.70	0.028	8760	0.00	0.00	AP-42[1]
CO_2	12500.00	0.028	8760	3.85	16.88	AP-42[1]
CH_4	0.20	0.028	8760	0.00	0.00	AP-42[1]

[1] EPA AP-42, Volume I, Fifth Edition - July 2008, Table 1.5-1, Emission Factors for LPG Combustion

MND 9
Pneumatic Controllers

Equipment ID	CB PC		IB PC	
Equipment Usage	Flow / Back Pressure Control			
Equipment Make	Fischer Control			
Equipment Model	DVS 6200			
Emission Controls	None			
Equipment Count	6		18	
Design Flow*	19.83	SCFH	0.02	SCFH
Potential Operation	8760	hr/yr	8760	
Service	NG			

Potential Emissions

Pollutant	% of VOC	Emission Factor (lb/SCF)	Hrs of Operation (hrs/yr)	Estimated Emissions (lb/hr)	Estimated Emissions (tpy)	Source of Emission Factor
VOC		0.02	8760	2.22	9.71	Gas Analysis
n-Hexane	7.80E-02			0.17	0.76	HYSYS % of VOC
Benzene	1.70E-04			0.00	0.00	HYSYS % of VOC
Toluene	7.23E-04			0.00	0.01	HYSYS % of VOC
Ethylbenzene	9.26E-05			0.00	0.00	HYSYS % of VOC
Xylenes	6.95E-04			0.00	0.01	HYSYS % of VOC
Total HAPs			8760		0.00	HYSYS % of VOC