EOG Resources, Inc.
600 Seventeenth Street
Suite 1000N
Denver, CO 80202
Main: 303-572-9000
Fax: 303-824-5400

May 7, 2015

Attn: O&G Production Facilities
Wyoming Department of Environmental Quality
Air Quality Division
Herschler Building, 2-E
122 West 25th Street
Cheyenne, Wyoming 82002

RE: EOG Resources, Inc.
Air Permit Application – Jubilee 17 NWNE PAD (formerly Jubilee 584-1705H PAD)
Laramie, Wyoming

Dear WDEQ:

EOG Resources, Inc. (EOG) is submitting the enclosed Chapter 6 Section 2 (C6 S2) air permit application using the IMPACT Data System Forms. This air permit application is being submitted to modify the Jubilee 584-1705H PAD facility which is currently authorized under Air Quality Permit CT-16718, issued November 12, 2014, with the addition of production and equipment associated with one (1) new well, the Jubilee 579-1705H. The facility will be known as the Jubilee 17 NWNE PAD. There are three wells producing to one set of surface equipment on location.

Well Name	API Number	First Date of Production	Natural Gas Rate (MMSCFD)	Crude Oil Rate (BPD)
Jubilee 579-1705H	49-021-21064	1/30/2015	0.260[1]	409.6[1]
Jubilee 584-1705H	49-021-21061	4/23/2014	0.013[2]	34.3[2]
Jubilee 586-1705H	49-021-21060	4/23/2014	0.025[2]	59.9[2]

1 Based on first 30 days production, after 0.6 decline factor.
2 Based on most recent production rates (no decline)

Each well produces both crude oil and natural gas. The Jubilee 17 NWNE PAD consists of the following sources of emissions:

- Six (6) Crude Oil Storage Tanks (500 bbl capacity each);
- One (1) Produced Water Storage Tank (500 bbl capacity);
- Three (3) Heater Treaters (1.0 MMBtu/hr heater capacity each);
- One (1) Recycle Treater (0.5 MMBtu/hr heater capacity);
- One (1) Trace Line Heater (0.50 MMBtu/hr heater capacity);
- One (1) Vapor Recovery Tower (VRT)
- Four (4) Electric Pumps (chemical, recycle, trace, and water transfer);
- Various Gas Scrubbers/Liquids Knockouts (tank vapor combustor, sales line, fuel gas, etc)
- One (1) 48" x 12' Cimarron Smokeless Enclosed Combustion Device (ECD) (Controls VRT, Oil Storage Tanks, Produced Water Storage Tanks, and Truck Loadout);

- One (1) 60" x 13' Cimarron Smokeless Enclosed Combustion Device (ECD) (Controls VRT, Oil Storage Tanks, Produced Water Storage Tanks, and Truck Loadout);
- Truck Loading Operation (LACT);
- Six (6) intermittent bleed level controllers (three (3) Kimray Model 2200 and three (3) Model 1400)
- Various non-bleed controllers;
- Fugitive Components;
- One (1) 8' Smokeless Steffes Emergency Flare (used to control produced gas during upsets);
- One (1) 1000-gallon propane tank;
- Two (2) 135-gallon chemical tanks;
- Two (2) electric motor driven pumping units.

The Jubilee 579-1705H well head is located on the same well pad as the Jubilee 580-1720H which is being permitted under a separate application.

Attachments A and B contain a flow diagram/plot plan of the emissions unit and facility process description, while Attachment C contains the current production rates for the wells. Gas/oil analyses are contained in Attachment D, and detailed emission calculations and supporting documentation are provided in Attachment E.

The application for this facility was due on April 30, 2015 but due to technical difficulties with the submittal through the IMPACT system, an extension to submit the application was allowed. Please see the attached email authorizing the delayed submission of the application.

We trust the attached permit application package will meet your expectations and that you will not hesitate to call me at (303) 262-9946 or Mark Smith at (307) 823-6208 if you have any questions or need additional information. We appreciate your prompt attention to this most important project.

Sincerely,

for
Curtis Rice
EOG Environmental – Denver Division

cc: File – Well
Attachments: As stated

Mark Smith

From: Brian Hall <brian.hall@wyo.gov>
Sent: Thursday, April 30, 2015 3:38 PM
To: Mark Smith
Cc: Curtis Rice; Fred Dilella; Glenn Spangler; Cole Anderson
Subject: Permit Application for Facility F026417

Follow Up Flag: Follow up
Flag Status: Flagged

Mark,

The IMPACT team continues to investigate the problem preventing you from electronically submitting your NSR application for Jubilee 584-1705H PAD . As the 90 day deadline approaches, I would like to provide assurance that you do not have to submit a hard copy application just to meet the deadline. I have spoken with both Cole Anderson and Fred Di Lella about this scenario and they recognize that it is a technical problem with our system that is preventing an on time submittal. They both agree that allowing us a few more days to fix the problem so you can submit electronically is in the best interest of AQD and EOG. I will include this email as correspondence in the facility record.

Thank you for your continued patience as we resolve this issue.

--

Brian R Hall
Air Quality Planning Section Supervisor
Wyoming Department of Environmental Quality
Phone (307) 777-6088
Cell (307) 274-6985
FAX (307) 777-5616

brian.hall@wyo.gov

122 West 25th Street
Herschler Building, 2-East
Cheyenne, WY 82002

E-Mail to and from me, in connection with the transaction of public business, is subject to the Wyoming Public Records Act and may be disclosed to third parties.

May 7, 2015

Attachment A – Flow Diagram and Plot Plan of Emission Units and/or Facility

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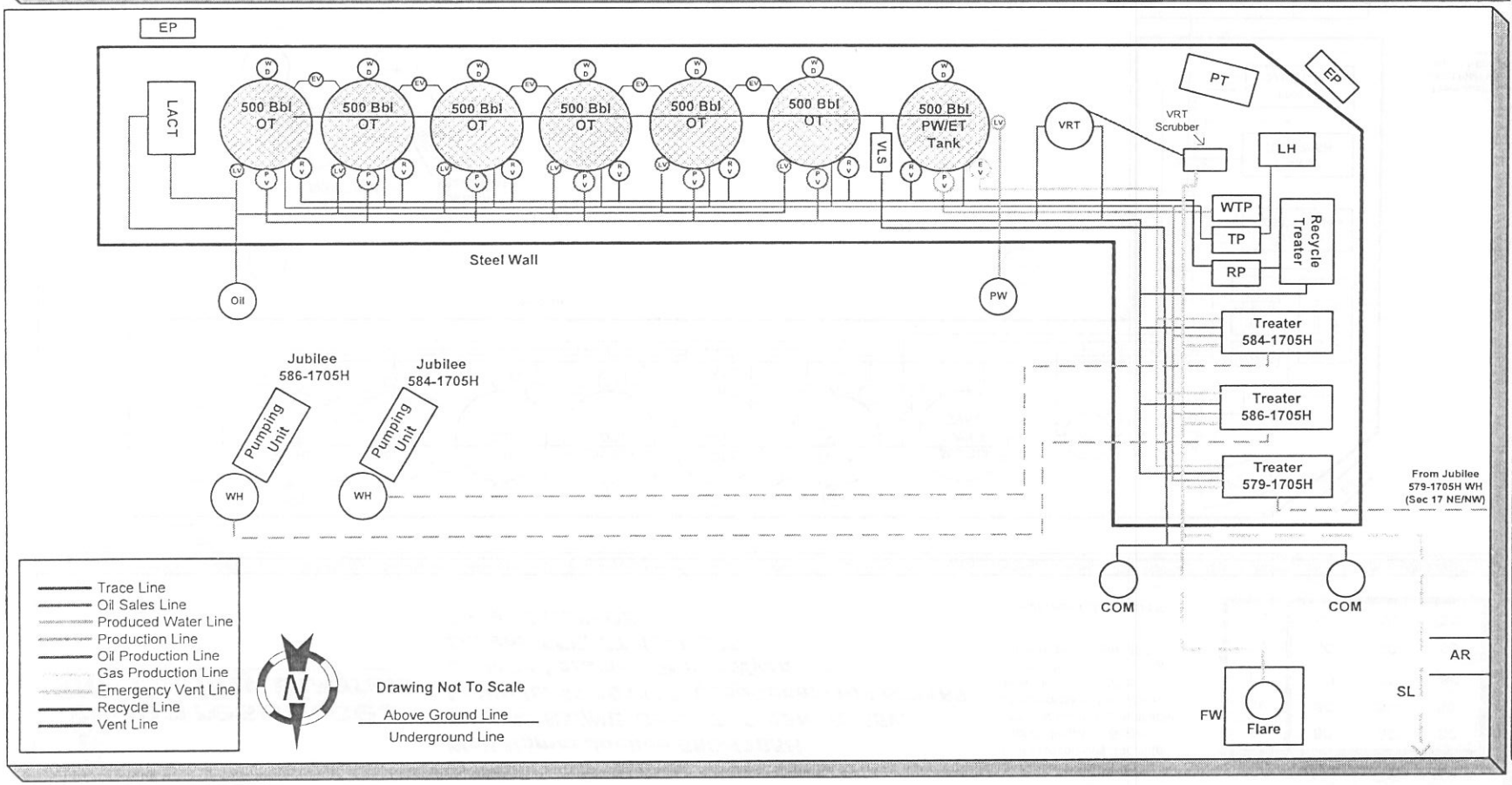
Site Facility Diagram

Well Name: Jubilee 584-1705H
1/4 1/4: NW/NE Sec: 17 T: 13N R: 65W
Latitude: 41.101119 Longitude: -104.683553
County: Laramie State: Wyoming
Lease: FEE, ST 13-00036
Type of well: Oil

EOG Resources, Inc. site facility diagrams & site security plans are available electronically at all EOG Resources, Inc. offices. Normal business hours are 7:00am to 4:30pm MST.

Revised: 03/17/2015

Valve	Production Phase	Sales Phase	Water Drain
PV	SO	SC	SC
SV	SC	SO	SC
EV	SO	SC	SC
LV	SC	SO	SC
RV	SC	SC	SC



Abbreviations

AM= Allocation Meter
AR = Access Road
CHP = Chemical Pump
CHT = Chemical Tank
COM = Combustor
COMP = Compressor
COMT – Composite Treater
CONT = Containment Tub
CP = Charge Pump
CT = Condensate Tank
DH = Dehydrator
DL = Dump Line
EP = Electrical Panel
ET = Emergency Tank
EV = Equalizer Valve
FE = Fire Extinguisher
FGS = Fuel Gas Scrubber
FT = Fiberglass Tub
FW = Firewall (dimensions feet)
FWKO = Free Water Knockout
GB = Gas Buster
GEN = Generator
HP = High Pressure
LACT = LACT Unit
LH = Line Heater
LP = Low Pressure
LV = Load Valve
MAN = Manifold
MB = Methanol Bath
MBT = Methanol Bulk Tank
MP = Methanol Pump
OT = Oil Tank
PIGL = Pig Launcher
PIGR = Pig Receiver
PL = Production Line
POC = Pump Off Controller
PP = Power Pole
PRT = Product Tank
PT = Propane Tank
PU = Pumping Unit
PV = Production Valve
PW = Produced Water
RL = Recycle Line
RP = Recycle Pump
RV = Recycle Valve
SC = Sealed Closed
SGS = Sales Gas Scrubber
SL = Sales Line
SM = Sales Meter
SO = Sealed Open
SP = Separator
SUMP = Sump Pump
SV = Sales Valve
T = Treater
TM = Test Meter
TP = Trace Pump
TRFP = Transfer Pump
TT = Test Treater
VM = Vent Meter
VRT = Vapor Recovery Tower
UNP = Unload Pump
WDP = Water Disposal Pump
WD = Water Drain
WFP = Water Flood Pump
WH = Wellhead

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Site Facility Diagram

Well Name: Jubilee 586-1705H
1/4 1/4: NW/NE Sec: 17 T: 13N R: 65W
Latitude: 41.101117 Longitude: -104.683189
County: Laramie State: Wyoming
Lease: FEE, ST 13-00036
Type of well: Oil

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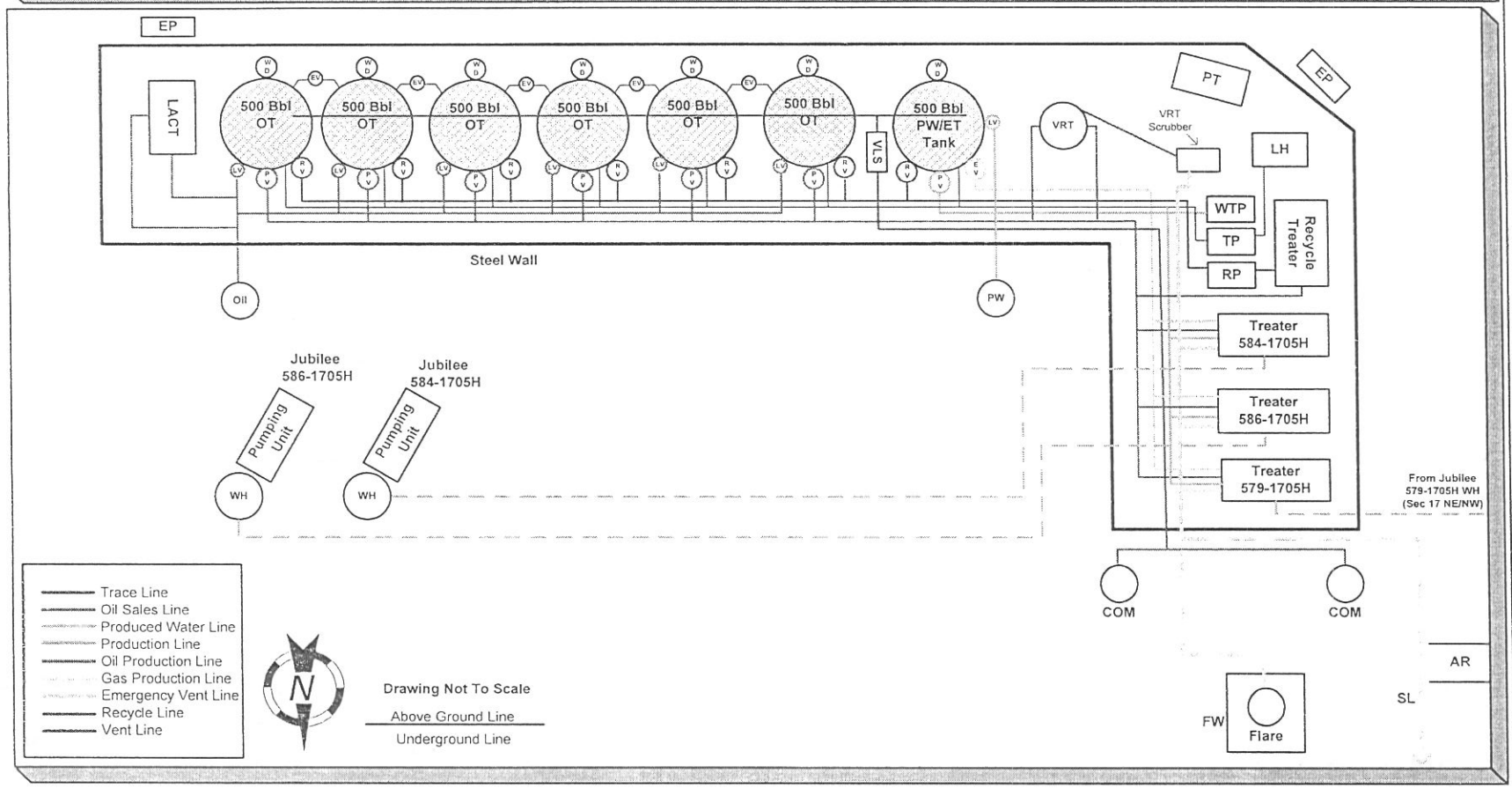
Revised: 03/17/2015

Valve	Production Phase	Sales Phase	Water Drain
PV	SO	SC	SC
SV	SC	SO	SC
EV	SO	SC	SC
LV	SC	SO	SC
RV	SC	SC	SC



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EV = Equalizer Valve
FE = Fire Extinguisher
FGS = Fuel Gas Scrubber
FT = Fiberglass Tub
FW = Firewall (dimensions feet)
FWKO = Free Water Knockout
GB = Gas Buster
GEN = Generator
HP = High Pressure
LACT = LACT Unit
LH = Line Heater
LP = Low Pressure
LV = Load Valve
MAN = Manifold
MB = Methanol Bath
MBT = Methanol Bulk Tank
MP = Methanol Pump
OT = Oil Tank
PIGL = Pig Launcher
PIGR = Pig Receiver
PL = Production Line
POC = Pump Off Controller
PP = Power Pole
PRT = Product Tank
PT = Propane Tank
PU = Pumping Unit
PV = Production Valve
PW = Produced Water
RL = Recycle Line
RP = Recycle Pump
RV = Recycle Valve
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SGS = Sales Gas Scrubber
SL = Sales Line
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UNP = Unload Pump
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WD = Water Drain
WFP = Water Flood Pump
WH = Wellhead

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Site Facility Diagram

Well Name: Jubilee 579-1705H
1/4 1/4: NE/NW Sec: 17 T: 13N R: 65W
Latitude: 41.101156 Longitude: -104.687047
County: Laramie State: Wyoming
Lease: FEE, ST 13-00036
Type of well: Oil

EOG Resources, Inc. site facility diagrams & site security plans are available electronically at all EOG Resources, Inc. offices. Normal business hours are 7:00am to 4:30pm MST.

Revised: 03/17/2015

Valve	Production Phase	Sales Phase	Water Drain
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EV	SO	SC	SC
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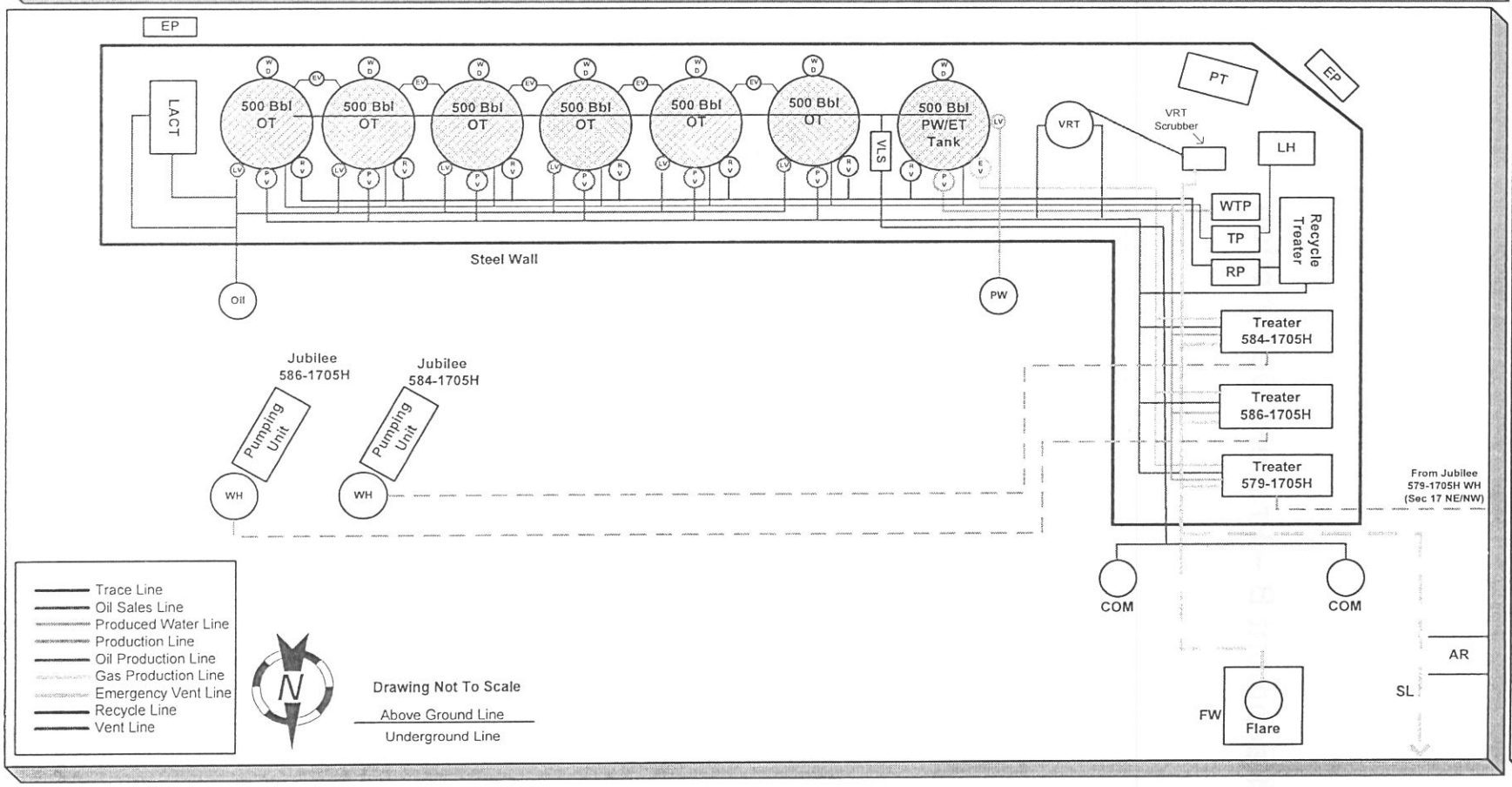
RV	SC	SC	SC



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May 7, 2015

Attachment B – Process Description

May 7, 2015

Process Description

Jubilee 17 NWNE PAD multiple well oil & gas production facility

Jubilee 17 NWNE PAD is an oil and gas production facility located in Laramie County, Wyoming that receives production from three wells. The wells produce both crude oil and natural gas.

- Six (6) Crude Oil Storage Tanks (500 bbl capacity each);
- One (1) Produced Water Storage Tank (500 bbl capacity);
- Three (3) Heater Treaters (1.0 MMBtu/hr heater capacity each);
- One (1) Recycle Treater (0.5 MMBtu/hr heater capacity);
- One (1) Trace Line Heater (0.50 MMBtu/hr heater capacity);
- One (1) Vapor Recovery Tower (VRT)
- Four (4) Electric Pumps (chemical, recycle, trace, and water transfer);
- Various Gas Scrubbers/Liquids Knockouts (tank vapor combustor, sales line, fuel gas, etc)
- One (1) 48" x 12' Cimarron Smokeless Enclosed Combustion Device (ECD) (Controls VRT, Oil Storage Tanks, Produced Water Storage Tanks, and Truck Loadout);
- One (1) 60" x 13' Cimarron Smokeless Enclosed Combustion Device (ECD) (Controls VRT, Oil Storage Tanks, Produced Water Storage Tanks, and Truck Loadout);
- Truck Loading Operation (LACT);
- Six (6) intermittent bleed level controllers (three (3) Kimray Model 2200 and three (3) Model 1400)
- Various non-bleed controllers;
- Fugitive Components;
- One (1) 8' Smokeless Steffes Emergency Flare (used to control produced gas during upsets);
- One (1) 1000-gallon propane tank;
- Two (2) 135-gallon chemical tanks;
- Two (2) electric motor driven pumping units.

Gas and liquids rise to the surface through the well head. The gas/liquid mixture enters the heater treaters to separate the natural gas, crude oil, and produced water. The natural gas stream is tied into a pipeline. In the event of pipeline shut-in, the gas from the heater treater can be flared. Crude oil is sent to the oil storage tanks and water is sent to the produced water tanks. The crude oil is produced in six storage tanks and hauled away by truck. The water is produced in one storage tank and also hauled away by truck as necessary. The tank vapors from the wells' crude and produced water tanks are controlled and routed to the Cimarron ECDs that have a destruction efficiency of 98%. The truck loading vapor emissions are controlled and routed to the ECDs with a capture efficiency of 70%.

As standard protocol for handling fugitive VOC emissions from multiple well facilities EOG, is implementing a leak detection and repair (LDAR) program at this facility. The plan is attached below.

The Jubilee 17 NWNE PAD is located in the NW¼ NE¼ of Section 17, T13N, R65W approximately eight (8) miles east-southeast of Cheyenne, in Laramie County, Wyoming. The latitude and longitude coordinates from the existing Jubilee 584-1705H facility were used for the location of the facility. (Lat: 41.10111, Long: -104.68355). The Jubilee 579-1705H well head is located on the same well pad as the Jubilee 580-1720H which is being permitted under a separate application.

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Fugitive Equipment Leak Inspection and Maintenance Plan

Statement of Dedication and Basis

In order to demonstrate and formally document the effectiveness of the efforts made to minimize emissions from fugitive component leaks, EOG Resources, Inc. (EOG) has committed to monitoring and fixing leaks at exploration and production facilities in the Green River Basin (UGRB), DJ, and Powder River Basin (PRB) which are located in the State of Wyoming. The effort is executed as demonstrated by the select implementation of a formal Leak Detection and Repair (LDAR) program. EOG is dedicated to complying with all applicable air quality standards, rules and regulations promulgated by the Wyoming Department of Environmental Quality (WDEQ); including, but not limited, to Chapter 6, Section 2 of the WDEQ air quality standards and regulations (WAQSR). The components and schedule of this program are described in the plan that follows.

EOG applies good operating practices audio, visual and olfactory detection (AVO) and the use of leak detection solutions to identify and repair fugitive emissions from equipment leaks on an on-going basis at all of its facilities in the UGRB, DJ, and PRB operational area. EOG has implemented a formal LDAR program above and beyond current operating practices. This LDAR program uses an additional monitoring methodology- infrared (IR) camera technology -to identify fugitive volatile organic compound (VOC) emissions from equipment leaks. While the magnitude of the leak cannot be measured using the infrared camera methodology (see 'Technology' section of this Plan), the protocol being followed will allow greater opportunity to reduce overall fugitive emissions even though the value may not be quantified. The IR protocol serves to identify leaks which may only be visible in the infrared spectrum and will ensure proper documentation of the repair of any leak detected using the infrared technology. Use of this monitoring approach allows EOG to demonstrate that its operating practices effectively control fugitive emissions from equipment leaks to insignificant levels.

Technology and Limitations

LDAR inspections will be conducted using IR cameras. IR cameras detect the band of light in the electromagnetic spectrum that extends beyond visible light. Using an IR camera one can identify hydrocarbon vapors which indicate possible sources of fugitive leaks. It should be noted that the intent of this device is solely qualitative; specifically, the IR camera is unable to quantify the magnitude of a leak or the leak rate). However, the objective of this program is to identify and repair any observed leak regardless of its magnitude. As such, the IR camera is the ideal tool to identify these leaks. It should also be noted that all images seen through the infrared camera are not necessarily VOC emissions. It can be difficult to determine whether recordings indicate hydrocarbon vapors or whether the vapors are heat or water vapors. Though, hydrocarbon vapors should typically dissipate slower and "trail-off" longer than heat or water vapors. The design of the camera only allows for detection of vapors and heat emissions and as such the nature of the emissions is not definitive.

Facility Identification

EOG is dedicated to good operating and industry practices at all of its facilities in the UGRB, DJ, and PRB operational areas; however, the application of the EOG LDAR program will be at facilities which have been identified as being subject per condition of the associated air quality permit. A subject facility is defined as exceeding the Air Quality Division (AQD) Best Available Control Technology (BACT) threshold for potential fugitive emissions. The BACT threshold definitions are respective to the effective regulation as follows:

- 15 TPY per AQD Oil and Gas Production Facilities Chapter 6, Section 2 Permitting Guidance, dated OB/W07; or,
- 8 TPY for new and modified facilities after August 1, 2010 per AQD Guidance dated 03/2010.

On a quarterly basis, production equipment at subject facilities will be monitored following the procedure identified in the 'Inspection Protocol' section of this Plan. Wellhead monitoring will be conducted annually during the 3rd quarter inspection.

Inspection Protocol

Modified and newly constructed facilities that are identified in a permit condition as requiring participation in the LDAR program will be inspected; any leaks will be documented; and applicable repair procedures will be followed. These facilities will be incorporated into the LDAR program no later than the next quarterly inspection period. The following scenarios are provided as examples to clarify,

<u>Scenario 1:</u>
Should the quarterly LDAR monitoring occur in May (2nd quarter of the year) and a new facility begins producing the following June (3rd quarter of the year), the fugitive emissions for all sources at this facility will be reviewed as per the AQD's Chapter 6 Section 2 Permitting Guidance. As appropriate and applicable, an application will be submitted prior to the 60 day deadline and the facility monitored under the EOG LDAR program during the next scheduled quarterly inspection.

<u>Scenario 2:</u>
For an existing facililty that began operating in June the fugitive emissions would be reviewed in August. If at that time the fugitive emissions are projected to exceed the 8 TPY VOC threshold this facility will be added to the list of facilities to monitor during the next scheduled quarterly inspection.

Facilities subject to compliance with this Plan and respective permit condition will do so by following the below inspection and maintenance proceedure. The AVO inspection and maintenance procedure follows that which has been approved by Region 8 of the Environmental Protection Agency respective to the Tribal New Source Review program.

1. Conduct AVOs, including IR camera inspection, on a quarterly basis of all pumps, valves, connectors, and pressure relief devices at the facility.

2. For each leak found in the AVO inspection, the leak shall be managed in accordance with the 'Repair Schedule' section of this Plan.

3. Re-screen repaired components to determine if the leak is repaired. If the rescreening shows that the leak was not repaired then another attempt to repair the leak will be made as soon as possible, but no later than 15 days after the rescreening.

4. Steps 2 and 3 will be repeated until the rescreening shows no leak.

5. Leaking components will be documented along with the date the leak is detected, date the leak is repaired, and date that the leak is rescreened; see 'Repair Schedule' section of this Plan.

Monitoring and Recordkeeping

Quarterly records and documentation associated with the infrared monitoring inspections performed as part of this LDAR program will be maintained in accordance with the following procedure and consist of the specified informaion. Each quarterly inspection will include a brief discussion of the inspections that were performed, any anomalies in the procedure, and incorporate the following lists:

- List of components screened and associated dates;
- List of currently leaking components;
- List of repaired components along with the repair method and associated repair dates (see 'Repair Schedule' section of this Plan); and
- List of successful repairs, repair delays, and post-repair screenings and associated dates.

The above information will be recorded, maintained and kept for five years electronically and in hardcopy at the nearest EOG field office.

Repair Schedule

Leaks identified through the quarterly inspections will be tagged using a numbered weather resistant tag, documented on a 'IR Camera Inspection' form. Additionally, still photographs of the location of the leak may be taken to assist field personnel in identifying leaking components. All findings (leaks) identified during an inspection with the Infrared camera will be communicated to field personnel so that they may be repaired.

The most common leak types identified during IR inspections are associated with loose fittings, connections and bad seals. These are relatively simple to repair and typically do not require the facility to be shut down. While EOG will be diligent about trying to repair every leak in a timely fashion, a delayed repair schedule will be required in instances where the facility must be shut down or additional time is required to procure parts or equipment in order to repair a leak. For every leak the following schedule should be followed to repair leaks identified with the infrared camera.

Repair Attempt	Timing
1st Attempt	A 1st attempt to repair a leak will be made within 7 days. This will consist of typical basic repairs (i.e., tightening packing, tightening tubing ferrules). After a repair attempt has been made, verification that the leak has been repaired shall consist of observing the component using an IR camera or similar leak detection solutions. Otherwise, visual and/or olfactory inspections shall be conducted to ensure the leak has been repaired. The leak tag may only be removed once repair of the leak has been verified using an Infrared Camera and documented on the respective facility IR Camera Inspection form.
2nd Attempt	If a 1st attempt is not successful, a 2nd attempt will be made within 7 days of the 1st attempt. If the facility must be shut down to repair a leak or if additional time is needed to procure parts or equipment, the leak will be tracked on a delayed repair list. After a repair attempt has been made, verification that the leak has been repaired shall consist of observing the component using an IR camera or similar leak detection solutions. Otherwise, visual and/or olfactory inspections shall be conducted to ensure the leak has been repaired. The leak tag may only be removed once repair of the leak has been verified using an Infrared Camera and documented on the respective facility IR Camera Inspection form. EOG will make a "Best Attempt" at repairing every leak. However, if repairs made during the 2nd attempt are not successful, the leak will be added to the delayed repair list.
Delay Repair	If the facility must be shutdown to attempt the repair of a leak, additional time is needed to procure parts or equipment, or the 2nd repair attempt is not successful, it may be put on a delayed repair list. Repairs will be conducted during the next scheduled shutdown or prior to the next LDAR inspection.

Reporting

EOG will follow reporting protocol specified in the respective air permit for subject facilities. The following will be reported to the WDEQ Stationary Source Permitting Manager and District Engineer for the respective district office upon request to include the following information:

- List of facilities included during the inspection period;
- List of findings and leaks for each inspection; and
- MS Excel Spreadsheet that details leaks, repairs, delay repairs, and LDAR applicable facilities

May 7, 2015

Attachment D – Production Rate Information

Selected Item	Date	Gas Prod	Oil Prod	Water Prod
JUBILEE 579-1705H	1/27/2015	0	0	0
JUBILEE 579-1705H	1/28/2015	0	0	0
JUBILEE 579-1705H	1/29/2015	0	0	0
JUBILEE 579-1705H	1/30/2015	115	290	843
JUBILEE 579-1705H	1/31/2015	469	1,164	1,515
JUBILEE 579-1705H	2/1/2015	506	670	1,573
JUBILEE 579-1705H	2/2/2015	518	676	1,446
JUBILEE 579-1705H	2/3/2015	536	683	1,434
JUBILEE 579-1705H	2/4/2015	538	680	1,353
JUBILEE 579-1705H	2/5/2015	548	673	1,287
JUBILEE 579-1705H	2/6/2015	549	741	1,005
JUBILEE 579-1705H	2/7/2015	572	674	1,223
JUBILEE 579-1705H	2/8/2015	565	684	1,170
JUBILEE 579-1705H	2/9/2015	452	662	1,115
JUBILEE 579-1705H	2/10/2015	434	717	1,050
JUBILEE 579-1705H	2/11/2015	443	725	1,018
JUBILEE 579-1705H	2/12/2015	409	766	914
JUBILEE 579-1705H	2/13/2015	440	681	965
JUBILEE 579-1705H	2/14/2015	448	724	959
JUBILEE 579-1705H	2/15/2015	429	668	862
JUBILEE 579-1705H	2/16/2015	442	711	902
JUBILEE 579-1705H	2/17/2015	431	676	847
JUBILEE 579-1705H	2/18/2015	403	674	816
JUBILEE 579-1705H	2/19/2015	411	679	786
JUBILEE 579-1705H	2/20/2015	395	697	815
JUBILEE 579-1705H	2/21/2015	398	694	808
JUBILEE 579-1705H	2/22/2015	377	632	745
JUBILEE 579-1705H	2/23/2015	341	649	748
JUBILEE 579-1705H	2/24/2015	365	617	736
JUBILEE 579-1705H	2/25/2015	369	640	725
JUBILEE 579-1705H	2/26/2015	341	733	785
JUBILEE 579-1705H	2/27/2015	311	689	713
JUBILEE 579-1705H	2/28/2015	335	648	692
JUBILEE 579-1705H	3/1/2015	392	557	709
JUBILEE 579-1705H	3/2/2015	380	681	712
JUBILEE 579-1705H	3/3/2015	382	672	655
JUBILEE 579-1705H	3/4/2015	402	632	635
JUBILEE 579-1705H	3/5/2015	416	665	658
JUBILEE 579-1705H	3/6/2015	391	623	609
JUBILEE 579-1705H	3/7/2015	413	615	581
JUBILEE 579-1705H	3/8/2015	410	619	564
JUBILEE 579-1705H	3/9/2015	401	608	539
JUBILEE 579-1705H	3/10/2015	479	636	557
JUBILEE 579-1705H	3/11/2015	487	669	551
JUBILEE 579-1705H	3/12/2015	489	608	504
JUBILEE 579-1705H	3/13/2015	414	608	478
JUBILEE 579-1705H	3/14/2015	512	615	476
JUBILEE 579-1705H	3/15/2015	498	615	486
JUBILEE 579-1705H	3/16/2015	479	608	462
JUBILEE 579-1705H	3/17/2015	473	551	415
JUBILEE 579-1705H	3/18/2015	379	525	365
JUBILEE 579-1705H	3/19/2015	431	535	378
JUBILEE 579-1705H	3/20/2015	501	549	390
JUBILEE 579-1705H	3/21/2015	484	537	396
JUBILEE 579-1705H	3/22/2015	472	544	382
JUBILEE 579-1705H	3/23/2015	474	543	377
JUBILEE 579-1705H	3/24/2015	463	502	342
JUBILEE 579-1705H	3/25/2015	431	492	325
JUBILEE 579-1705H	3/26/2015	426	436	283
JUBILEE 579-1705H	3/27/2015	261	412	243
JUBILEE 579-1705H	3/28/2015	393	513	284
JUBILEE 579-1705H	3/29/2015	415	482	350
JUBILEE 579-1705H	3/30/2015	442	465	299
JUBILEE 579-1705H	3/31/2015	438	489	310
JUBILEE 579-1705H	4/1/2015	454	491	309
JUBILEE 579-1705H	4/2/2015	438	416	270
JUBILEE 579-1705H	4/3/2015	426	452	286
JUBILEE 579-1705H	4/4/2015	414	427	270
JUBILEE 579-1705H	4/5/2015	455	449	254
JUBILEE 579-1705H	4/6/2015	425	431	267
JUBILEE 579-1705H	4/7/2015	419	418	256
JUBILEE 579-1705H	4/8/2015	421	405	245
JUBILEE 579-1705H	4/9/2015	413	426	251
JUBILEE 579-1705H	4/10/2015	418	406	238
JUBILEE 579-1705H	4/11/2015	422	414	238
JUBILEE 579-1705H	4/12/2015	422	416	239
JUBILEE 579-1705H	4/13/2015	399	416	239
JUBILEE 579-1705H	4/14/2015	391	390	219
JUBILEE 579-1705H	4/15/2015	295	132	76
JUBILEE 579-1705H	4/16/2015	153	408	173
JUBILEE 579-1705H	4/17/2015	286	373	179
JUBILEE 579-1705H	4/18/2015	108	9	17
JUBILEE 579-1705H	4/19/2015	228	569	252
JUBILEE 579-1705H	4/20/2015	418	479	287
JUBILEE 579-1705H	4/21/2015	471	439	262
JUBILEE 579-1705H	4/22/2015	518	435	256
JUBILEE 579-1705H	4/23/2015	536	448	266
JUBILEE 579-1705H	4/24/2015	561	407	247
JUBILEE 579-1705H	4/25/2015	509	406	240

First 30 days Production Rates (Used 1/31/2015- 3/11/2015)

Gas	Oil	Water
433.2	682.6	894.4

Using 0.6 decline factor

259.9	409.6	536.7

Selected Item	Date	Gas Prod	Oil Prod	Water Prod
JUBILEE 584-1705H	1/27/2015	0	0	0
JUBILEE 584-1705H	1/28/2015	0	0	0
JUBILEE 584-1705H	1/29/2015	0	0	0
JUBILEE 584-1705H	1/30/2015	0	0	0
JUBILEE 584-1705H	1/31/2015	0	0	0
JUBILEE 584-1705H	2/1/2015	0	0	0
JUBILEE 584-1705H	2/2/2015	0	0	0
JUBILEE 584-1705H	2/3/2015	0	0	0
JUBILEE 584-1705H	2/4/2015	0	0	0
JUBILEE 584-1705H	2/5/2015	0	0	0
JUBILEE 584-1705H	2/6/2015	0	0	0
JUBILEE 584-1705H	2/7/2015	0	0	0
JUBILEE 584-1705H	2/8/2015	0	0	0
JUBILEE 584-1705H	2/9/2015	0	0	0
JUBILEE 584-1705H	2/10/2015	0	0	0
JUBILEE 584-1705H	2/11/2015	0	0	0
JUBILEE 584-1705H	2/12/2015	0	0	0
JUBILEE 584-1705H	2/13/2015	0	0	0
JUBILEE 584-1705H	2/14/2015	0	0	0
JUBILEE 584-1705H	2/15/2015	0	0	0
JUBILEE 584-1705H	2/16/2015	0	0	0
JUBILEE 584-1705H	2/17/2015	0	0	0
JUBILEE 584-1705H	2/18/2015	0	0	0
JUBILEE 584-1705H	2/19/2015	0	0	0
JUBILEE 584-1705H	2/20/2015	0	0	0
JUBILEE 584-1705H	2/21/2015	0	0	0
JUBILEE 584-1705H	2/22/2015	0	0	0
JUBILEE 584-1705H	2/23/2015	0	0	0
JUBILEE 584-1705H	2/24/2015	0	0	0
JUBILEE 584-1705H	2/25/2015	0	0	0
JUBILEE 584-1705H	2/26/2015	0	0	0
JUBILEE 584-1705H	2/27/2015	0	0	0
JUBILEE 584-1705H	2/28/2015	0	0	0
JUBILEE 584-1705H	3/1/2015	0	0	0
JUBILEE 584-1705H	3/2/2015	0	0	0
JUBILEE 584-1705H	3/3/2015	0	0	0
JUBILEE 584-1705H	3/4/2015	0	0	0
JUBILEE 584-1705H	3/5/2015	0	0	0
JUBILEE 584-1705H	3/6/2015	3	0	13
JUBILEE 584-1705H	3/7/2015	10	0	172
JUBILEE 584-1705H	3/8/2015	10	0	196
JUBILEE 584-1705H	3/9/2015	10	0	269
JUBILEE 584-1705H	3/10/2015	10	4	270
JUBILEE 584-1705H	3/11/2015	10	3	273
JUBILEE 584-1705H	3/12/2015	10	0	255
JUBILEE 584-1705H	3/13/2015	10	0	258
JUBILEE 584-1705H	3/14/2015	10	10	239
JUBILEE 584-1705H	3/15/2015	10	25	247
JUBILEE 584-1705H	3/16/2015	12	22	230
JUBILEE 584-1705H	3/17/2015	13	24	228
JUBILEE 584-1705H	3/18/2015	13	25	235
JUBILEE 584-1705H	3/19/2015	13	25	225
JUBILEE 584-1705H	3/20/2015	13	25	228
JUBILEE 584-1705H	3/21/2015	12	27	234
JUBILEE 584-1705H	3/22/2015	13	26	231
JUBILEE 584-1705H	3/23/2015	13	28	232
JUBILEE 584-1705H	3/24/2015	12	30	223
JUBILEE 584-1705H	3/25/2015	12	29	226
JUBILEE 584-1705H	3/26/2015	12	25	189
JUBILEE 584-1705H	3/27/2015	13	29	155
JUBILEE 584-1705H	3/28/2015	14	33	227
JUBILEE 584-1705H	3/29/2015	13	30	180
JUBILEE 584-1705H	3/30/2015	15	31	220
JUBILEE 584-1705H	3/31/2015	15	37	160
JUBILEE 584-1705H	4/1/2015	14	33	197
JUBILEE 584-1705H	4/2/2015	13	31	171
JUBILEE 584-1705H	4/3/2015	13	38	184
JUBILEE 584-1705H	4/4/2015	11	35	188
JUBILEE 584-1705H	4/5/2015	11	34	178
JUBILEE 584-1705H	4/6/2015	12	35	187
JUBILEE 584-1705H	4/7/2015	12	35	177
JUBILEE 584-1705H	4/8/2015	11	36	176
JUBILEE 584-1705H	4/9/2015	12	37	182
JUBILEE 584-1705H	4/10/2015	10	36	178
JUBILEE 584-1705H	4/11/2015	11	40	179
JUBILEE 584-1705H	4/12/2015	12	40	184
JUBILEE 584-1705H	4/13/2015	16	41	185
JUBILEE 584-1705H	4/14/2015	15	39	173
JUBILEE 584-1705H	4/15/2015	11	40	177
JUBILEE 584-1705H	4/16/2015	16	41	172
JUBILEE 584-1705H	4/17/2015	19	45	176
JUBILEE 584-1705H	4/18/2015	16	39	162
JUBILEE 584-1705H	4/19/2015	16	44	166
JUBILEE 584-1705H	4/20/2015	12	45	159
JUBILEE 584-1705H	4/21/2015	15	43	160
JUBILEE 584-1705H	4/22/2015	13	45	162
JUBILEE 584-1705H	4/23/2015	14	49	172
JUBILEE 584-1705H	4/24/2015	14	46	149
JUBILEE 584-1705H	4/25/2015	16	49	164

Most Recent Production Rates (Used 3/14/2015 - 4/25/2015)

Gas	Oil	Water
13.1	34.3	192.3

Existing Production (no decline)

13.1	34.3	192.3

Selected Item	Date	Gas Prod	Oil Prod	Water Prod
JUBILEE 586-1705H	1/27/2015	0	0	0
JUBILEE 586-1705H	1/28/2015	0	0	0
JUBILEE 586-1705H	1/29/2015	0	0	0
JUBILEE 586-1705H	1/30/2015	0	0	0
JUBILEE 586-1705H	1/31/2015	0	0	0
JUBILEE 586-1705H	2/1/2015	0	0	0
JUBILEE 586-1705H	2/2/2015	0	0	0
JUBILEE 586-1705H	2/3/2015	0	0	0
JUBILEE 586-1705H	2/4/2015	0	0	0
JUBILEE 586-1705H	2/5/2015	0	0	0
JUBILEE 586-1705H	2/6/2015	0	0	0
JUBILEE 586-1705H	2/7/2015	0	0	0
JUBILEE 586-1705H	2/8/2015	0	0	0
JUBILEE 586-1705H	2/9/2015	0	0	0
JUBILEE 586-1705H	2/10/2015	0	0	0
JUBILEE 586-1705H	2/11/2015	0	0	0
JUBILEE 586-1705H	2/12/2015	0	0	0
JUBILEE 586-1705H	2/13/2015	0	0	0
JUBILEE 586-1705H	2/14/2015	0	0	0
JUBILEE 586-1705H	2/15/2015	0	0	0
JUBILEE 586-1705H	2/16/2015	0	0	0
JUBILEE 586-1705H	2/17/2015	0	0	0
JUBILEE 586-1705H	2/18/2015	0	0	0
JUBILEE 586-1705H	2/19/2015	0	0	0
JUBILEE 586-1705H	2/20/2015	0	0	0
JUBILEE 586-1705H	2/21/2015	0	0	0
JUBILEE 586-1705H	2/22/2015	0	0	0
JUBILEE 586-1705H	2/23/2015	0	0	0
JUBILEE 586-1705H	2/24/2015	0	0	0
JUBILEE 586-1705H	2/25/2015	0	0	0
JUBILEE 586-1705H	2/26/2015	0	0	0
JUBILEE 586-1705H	2/27/2015	0	0	230
JUBILEE 586-1705H	2/28/2015	0	0	200
JUBILEE 586-1705H	3/1/2015	10	0	291
JUBILEE 586-1705H	3/2/2015	26	12	350
JUBILEE 586-1705H	3/3/2015	11	16	346
JUBILEE 586-1705H	3/4/2015	14	52	315
JUBILEE 586-1705H	3/5/2015	44	64	327
JUBILEE 586-1705H	3/6/2015	13	29	233
JUBILEE 586-1705H	3/7/2015	20	49	303
JUBILEE 586-1705H	3/8/2015	21	49	314
JUBILEE 586-1705H	3/9/2015	23	48	307
JUBILEE 586-1705H	3/10/2015	23	57	301
JUBILEE 586-1705H	3/11/2015	24	58	309
JUBILEE 586-1705H	3/12/2015	25	50	292
JUBILEE 586-1705H	3/13/2015	30	53	310
JUBILEE 586-1705H	3/14/2015	25	52	282
JUBILEE 586-1705H	3/15/2015	26	54	301
JUBILEE 586-1705H	3/16/2015	29	55	304
JUBILEE 586-1705H	3/17/2015	25	52	272
JUBILEE 586-1705H	3/18/2015	32	56	287
JUBILEE 586-1705H	3/19/2015	31	55	279
JUBILEE 586-1705H	3/20/2015	28	56	272
JUBILEE 586-1705H	3/21/2015	26	57	276
JUBILEE 586-1705H	3/22/2015	27	57	272
JUBILEE 586-1705H	3/23/2015	25	59	277
JUBILEE 586-1705H	3/24/2015	26	64	264
JUBILEE 586-1705H	3/25/2015	29	61	267
JUBILEE 586-1705H	3/26/2015	30	54	231
JUBILEE 586-1705H	3/27/2015	27	60	222
JUBILEE 586-1705H	3/28/2015	33	63	265
JUBILEE 586-1705H	3/29/2015	29	61	241
JUBILEE 586-1705H	3/30/2015	31	62	255
JUBILEE 586-1705H	3/31/2015	33	76	253
JUBILEE 586-1705H	4/1/2015	34	68	259
JUBILEE 586-1705H	4/2/2015	26	60	229
JUBILEE 586-1705H	4/3/2015	17	73	244
JUBILEE 586-1705H	4/4/2015	24	68	243
JUBILEE 586-1705H	4/5/2015	17	68	233
JUBILEE 586-1705H	4/6/2015	18	70	243
JUBILEE 586-1705H	4/7/2015	20	69	231
JUBILEE 586-1705H	4/8/2015	19	70	227
JUBILEE 586-1705H	4/9/2015	24	74	232
JUBILEE 586-1705H	4/10/2015	16	72	223
JUBILEE 586-1705H	4/11/2015	19	76	227
JUBILEE 586-1705H	4/12/2015	19	77	229
JUBILEE 586-1705H	4/13/2015	30	82	232
JUBILEE 586-1705H	4/14/2015	26	74	215
JUBILEE 586-1705H	4/15/2015	15	72	229
JUBILEE 586-1705H	4/16/2015	29	72	221
JUBILEE 586-1705H	4/17/2015	31	77	221
JUBILEE 586-1705H	4/18/2015	32	68	212
JUBILEE 586-1705H	4/19/2015	31	75	212
JUBILEE 586-1705H	4/20/2015	21	73	212
JUBILEE 586-1705H	4/21/2015	12	72	205
JUBILEE 586-1705H	4/22/2015	23	75	216
JUBILEE 586-1705H	4/23/2015	25	78	219
JUBILEE 586-1705H	4/24/2015	23	73	203
JUBILEE 586-1705H	4/25/2015	28	76	212

Most Recent Production Rates (Used 3/2/2015 - 4/25/2015)

Gas	Oil	Water
24.9	59.9	265.2

Existing Production (no decline)

24.9	59.9	265.2

May 7, 2015

Attachment E – Oil and Gas Analyses

PRECISION ANALYSIS

GAS MEASUREMENT EMISSIONS TESTING LABORATORY

307.856.0866
www.precision-labs.com

Client:	EOG-DJ Basin	**Analysis Date:**	4/29/2014
Sample ID:	Jubilee 586-1705H	**Date Sampled:**	04/25/2014
Unique #:	0	**Purpose:**	NI
Sample Temperature:	150 DEG F	**Sample Pressure:**	70 PSI
Sampled By:	Erik Hollaway	**Type Sample:**	SPOT
County:	NI		

Components	Mole %	Weight %	Liq. Vol. %
Carbon Dioxide	2.3436	3.802	1.885
Nitrogen	0.8291	0.856	0.430
Methane	60.8495	35.987	48.609
Ethane	12.7979	14.186	16.128
Propane	13.4845	21.920	17.505
iso-Butane	1.4076	3.016	2.170
n-Butane	5.1150	10.960	7.599
iso-Pentane	0.9369	2.492	1.614
n-Pentane	1.0168	2.704	1.737
Cyclopentane	0.0543	0.141	0.076
n-Hexane	0.1919	0.610	0.372
Cyclohexane	0.1214	0.377	0.195
Other Hexanes	0.2671	0.849	0.518
Heptanes	0.3433	1.268	0.746
Methylcyclohexane	0.0988	0.358	0.187
2,2,4-Trimethylpentane	0.0002	0.001	0.000
Benzene	0.0700	0.202	0.092
Toluene	0.0394	0.134	0.062
Ethylbenzene	0.0022	0.009	0.004
Xylenes	0.0049	0.019	0.009
Octanes	0.0210	0.088	0.051
Nonanes	0.0043	0.020	0.011
Decanes+	0.0003	0.002	0.001
Totals	100.000	100.000	100.000

ADDITIONAL BTEX DATA

Components	Mole %	Weight %	Liq. Vol. %
Cyclopentane	0.054	0.141	0.076
Cyclohexane	0.121	0.377	0.195
2-Methylpentane	0.168	0.534	0.326
3-Methylpentane	0.099	0.314	0.192
n-Hexane	0.192	0.610	0.372
Methylcyclohexane	0.099	0.358	0.187
2,2,4-Trimethylpentane	0.000	0.001	0.000
Benzene	0.070	0.202	0.092
Toluene	0.039	0.134	0.062
Ethylbenzene	0.002	0.009	0.004
m-Xylene	0.001	0.003	0.001
p-Xylene	0.003	0.013	0.006
o-Xylene	0.001	0.003	0.001

SPECIFIC GRAVITY @ 60/60 F, calculated	0.9366
TOTAL GPM (Ethane Inclusive)	10.385
CALCULATED BTU / REAL CF @ 14.73 PSIA, dry basis	1542.073
CALCULATED BTU / REAL CF @ 14.73 PSIA, wet basis	1515.967
AVERAGE MOLECULAR WEIGHT	27.126
MOLAR MASS RATIO	0.9364
RELATIVE DENSITY (G x Z (Air) / Z), calculated	0.9424
IDEAL GROSS HEATING VALUE, BTU / IDEAL CF @ 14.696 PSIA	1528.973
COMPRESSIBILITY FACTOR (Z)	0.99379

PROPANE GPM	3.7054
BUTANE GPM	2.0679
GASOLINE GPM (PENTANE AND HEAVIER)	1.1978
VOC WEIGHT FRACTION	0.451

NOTATION: ALL CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-09, THE TABLES OF PHYSICAL CONSTANTS FOR HYDROCARBONS AND OTHER COMPOUNDS OF INTEREST TO THE NATURAL GAS INDUSTRY

PRECISION ANALYSIS

GAS MEASUREMENT EMISSIONS TESTING LABORATORY

307 856 0866
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Client:	EOG-DJ Basin	**Analysis Date:**	4/29/2014
Sample ID:	Jubilee 584-1705H	**Date Sampled:**	04/25/2014
Unique #:	0	**Purpose:**	NI
Sample Temperature:	150 DEG F	**Sample Pressure:**	75 PSI
Sampled By:	Erik Hollaway	**Type Sample:**	SPOT
County:	Laramie		

Components	Mole %	Weight %	Liq. Vol. %
Carbon Dioxide	2.4300	3.835	1.929
Nitrogen	0.8135	0.817	0.416
Methane	58.7429	33.791	46.320
Ethane	12.9473	13.960	16.105
Propane	14.2997	22.610	18.324
iso-Butane	1.5224	3.173	2.317
n-Butane	5.6374	11.749	8.266
iso-Pentane	1.1451	2.962	1.948
n-Pentane	1.3003	3.364	2.192
Cyclopentane	0.0703	0.177	0.097
n-Hexane	0.2055	0.635	0.393
Cyclohexane	0.0855	0.258	0.135
Other Hexanes	0.3389	1.047	0.648
Heptanes	0.2605	0.936	0.559
Methylcyclohexane	0.0611	0.215	0.114
2,2,4-Trimethylpentane	0.0002	0.001	0.000
Benzene	0.0546	0.153	0.071
Toluene	0.0358	0.118	0.056
Ethylbenzene	0.0031	0.012	0.006
Xylenes	0.0124	0.047	0.022
Octanes	0.0270	0.110	0.064
Nonanes	0.0065	0.030	0.017
Decanes+	0.0000	0.000	0.000
Totals	100.000	100.000	100.000

ADDITIONAL BTEX DATA

Components	Mole %	Weight %	Liq. Vol. %
Cyclopentane	0.070	0.177	0.097
Cyclohexane	0.086	0.258	0.135
2-Methylpentane	0.213	0.659	0.408
3-Methylpentane	0.126	0.388	0.240
n-Hexane	0.206	0.635	0.393
Methylcyclohexane	0.061	0.215	0.114
2,2,4-Trimethylpentane	0.000	0.001	0.000
Benzene	0.055	0.153	0.071
Toluene	0.036	0.118	0.056
Ethylbenzene	0.003	0.012	0.006
m-Xylene	0.002	0.007	0.004
p-Xylene	0.008	0.032	0.015
o-Xylene	0.002	0.008	0.004

SPECIFIC GRAVITY @ 60/60 F, calculated	0.9629
TOTAL GPM (Ethane Inclusive)	11.004
CALCULATED BTU / REAL CF @ 14.73 PSIA, dry basis	1582.043
CALCULATED BTU / REAL CF @ 14.73 PSIA, wet basis	1555.237
AVERAGE MOLECULAR WEIGHT	27.889
MOLAR MASS RATIO	0.9626
RELATIVE DENSITY (G x Z (Air) / Z), calculated	0.9693
IDEAL GROSS HEATING VALUE, BTU / IDEAL CF @ 14.696 PSIA	1568.015
COMPRESSIBILITY FACTOR (Z)	0.99341

PROPANE GPM	3.9295
BUTANE GPM	2.2696
GASOLINE GPM (PENTANE AND HEAVIER)	1.3512
VOC WEIGHT FRACTION	0.476

NOTATION: ALL CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-09, THE TABLES OF PHYSICAL CONSTANTS FOR HYDROCARBONS AND OTHER COMPOUNDS OF INTEREST TO THE NATURAL GAS INDUSTRY.

PRECISION ANALYSIS
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EXTENDED HYDROCARBON LIQUID STUDY
CERTIFICATE OF ANALYSIS

Company: **EOG Resources-DJ Basin**

Sample Name: **JUBILEE 579-1705H**

Date Sampled: 02/27/2015
Sample Location: Weld
Sample Pressure: 55 PSI
Sample Temperature: 110 DEG F
County: Colorado
Sample Source: Separator
Sampling Method: GPA 2174
Type Sample: SPOT

Sample Number: 15030403-02
Date Tested: 03/05/2015
Test Method: GPA 2186M

Date Reported: 03/20/2015
Note: Due to the nature of H2S, the values of H2S reported may be lower than actual.

Components	Mole %	Weight %	Liq. Vol. %
Hydrogen Sulfide	0.0000	0.000	0.000
Oxygen	0.0000	0.000	0.000
Carbon Dioxide	0.0483	0.011	0.010
Nitrogen	0.0143	0.002	0.002
Methane	0.3498	0.029	0.071
Ethane	0.9915	0.152	0.319
Propane	4.1813	0.939	1.385
iso-Butane	0.9939	0.294	0.391
n-Butane	5.2958	1.568	2.007
iso-Pentane	2.5110	0.923	1.104
n-Pentane	3.1235	1.148	1.361
Hexanes	2.4508	1.076	1.211
Heptanes	5.2779	2.694	2.927
Octanes	1.8814	1.095	1.158
Nonanes	0.2089	0.137	0.141
Decanes+	68.4954	87.976	85.953
Benzene	0.2952	0.117	0.099
Toluene	0.9441	0.443	0.380
Ethylbenzene	0.0274	0.015	0.013
Xylenes	0.5411	0.293	0.253
n-Hexane	2.0162	0.885	0.997
2,2,4-Trimethylpentane	0.3522	0.205	0.220
Totals	100.000	100.000	100.000

EXTENDED ANALYSIS DATA

Components	Mole %	Weight %	Liq. Vol. %
Hydrogen Sulfide	0.0000	0.000	0.000
Carbon Dioxide	0.0483	0.011	0.010
Nitrogen	0.0143	0.002	0.002
Methane	0.3498	0.029	0.073
Ethane	0.9915	0.152	0.325
Propane	4.1813	0.940	1.411
iso-Butane	0.9939	0.294	0.398
n-Butane	5.2958	1.569	2.045
iso-Pentane	2.5110	0.923	1.125
n-Pentane	3.1235	1.149	1.387
Hexanes	2.4508	1.077	1.234
Heptanes	5.2779	2.696	2.982
Octanes	1.8814	1.095	1.180
Nonanes	0.2089	0.137	0.144
Decanes	5.1668	3.747	3.884
Benzene	0.2952	0.118	0.101
Toluene	0.9441	0.443	0.387
Ethylbenzene	0.0274	0.015	0.013
Xylenes	0.5411	0.293	0.257
n-Hexane	2.0162	0.886	1.015
2,2,4-Trimethylpentane	0.3522	0.205	0.224
Undecanes(C11)	3.9698	3.163	3.234
Dodecanes(C12)	4.2340	3.676	3.714
Tridecanes(C13)	5.1735	4.862	4.866
Tetradecanes(C14)	5.2243	5.283	5.240
Pentadecanes(C15)	4.7959	5.193	5.118
Hexadecanes(C16)	5.4752	6.320	6.141
Heptadecanes(C17)	3.8057	4.665	4.492
Octadecanes(C18)	3.9609	5.139	4.914
Nonadecanes(C19)	3.0366	4.157	3.909
Eicosanes (C20)	3.1624	4.555	4.397
Heneicosanes (C21)	2.9684	4.488	4.314
Docosanes (C22)	2.4131	3.821	3.739
Tricosanes (C23)	2.0828	3.447	3.292
Tetracosanes (C24)	1.9526	3.371	3.220
Pentacosanes (C25)	2.0492	3.684	3.502
Hexacosanes (C26)	1.8892	3.531	3.456
Heptacosanes (C27)	1.6334	3.170	3.094
Octacosanes (C28)	1.5549	3.129	2.952
Nonacosanes (C29)	1.0880	2.267	2.136
Triacosanes (C30)	0.9254	1.995	1.875
Hentriacontane Plus (C31+)	1.9331	4.305	4.196
Totals	100.000	100.000	100.000

ADDITIONAL BTEX DATA

Components	Mole %	Weight %	Liq. Vol. %
2-Methylpentane	1.752	0.769	0.866
3-Methylpentane	0.698	0.307	0.345
n-Hexane	2.016	0.885	0.997
2,2,4-Trimethylpentane	0.352	0.205	0.220
Benzene	0.295	0.117	0.099
Toluene	0.944	0.443	0.380
Ethylbenzene	0.027	0.015	0.013
m-Xylene	0.062	0.034	0.029
p-Xylene	0.387	0.209	0.181
o-Xylene	0.092	0.050	0.043

RELATIVE SPECIFIC GRAVITY OF DECANES+ (C10+) FRACTION, calculated	0.76532
AVERAGE MOLECULAR WEIGHT	196.177
AVERAGE MOLECULAR WEIGHT OF DECANES+ (C10+) FRACTION, calculated	252.155
TRUE VAPOR PRESSURE AT 100 F, PSIA, calculated	38.150
AVERAGE BOILING POINT, F, calculated	548.187
CUBIC FEET OF GAS / GALLON OF LIQUID, as Ideal Gas, calculated	17.836
BTU / GALLON OF LIQUID AT 14.73 PSIA, calculated	124,570.74
LBS / GALLON OF LIQUID, calculated	6.234

NOTATION: ALL CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-09, THE TABLES OF PHYSICAL CONSTANTS FOR HYDROCARBONS AND OTHER COMPOUNDS OF INTEREST TO THE NATURAL GAS INDUSTRY.

FLASHED CRUDE OIL LIQUID STUDIES
CERTIFICATE OF ANALYSIS

Sample Name: **JUBILEE 579-1705H**
Sample Number: 15030403-01

TEST PERFORMED	RESULTS	DATE TESTED
API GRAVITY AT 60/60 F, (ASTM D-7777), calculated from SG	35.8	03/12/2015
REID VAPOR PRESSURE (ASTM D6377), PSI AT 100 F, measured	6.30	03/12/2015
CLOUD POINT (ASTM D-97), deg F, measured	5.0	03/12/2015
POUR POINT (ASTM D-97), deg F, measured	-14.8	03/12/2015
PARAFFIN CONTENT (UOP-46), weight %, measured	60.070	03/13/2015
EOG GRINDOUT (EOG METHOD), volume %, measured	81.250	03/12/2015
KINEMATIC VISCOSITY AT 100 F (ASTM D-445),	66.400	03/18/2015
KINEMATIC VISCOSITY AT 120 F (ASTM D-445),	64.665	03/18/2015
ASPHALTENES (ASTM D-3279), weight %, CL	1.00	03/16/2015

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ASTM D86 Distillation
Certificate of Analysis

Date Tested:	03/16/2015	Qualifiers:
	% Recovery	DEG C @ 300mm Hg
	Intial Boiling Point	40
	5	65
	10	96
	20	140
	30	186
	40	250
	42	300
	Final Boiling Point	N/A
	Volume % Recovery	42
	Volume % Residue	50
	Volume % Loss	8

Comments: Residue and loss observed
Temperatures are uncorrected for barometric pressure

PRECISION ANALYSIS

GAS MEASUREMENT EMISSIONS TESTING LABORATORY

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Client:	EOG	**Analysis Date:**	2/6/2015
Sample ID:	Jubilee 579-1705H	**Date Sampled:**	2/4/2015
Unique #:	0	**Purpose:**	NI
Sample Temperature:	134 DEG F	**Sample Pressure:**	65 PSI
Sampled By:	Jacob Stephens	**Type Sample:**	SPOT
County:	Laramie		

Components	Mole %	Weight %	Liq. Vol. %
Carbon Dioxide.....	2.7905	4.484	2.234
Nitrogen.....	0.8838	0.904	0.456
Methane.....	59.7220	34.982	47.486
Ethane.....	13.5516	14.878	16.998
Propane.....	15.8418	25.506	20.470
iso-Butane.....	1.8055	3.832	2.771
n-Butane.....	0.0000	0.000	0.000
iso-Pentane.....	1.5874	4.182	2.723
n-Pentane.....	1.8795	4.951	3.195
Cyclopentane.....	0.1200	0.307	0.167
n-Hexane.....	0.4141	1.303	0.799
Cyclohexane.....	0.1522	0.468	0.243
Other Hexanes	0.5941	1.869	1.146
Heptanes.....	0.4423	1.618	0.957
Methylcyclohexane.....	0.0579	0.208	0.109
2,2,4-Trimethylpentane...	0.0001	0.000	0.000
Benzene.....	0.0993	0.283	0.130
Toluene.....	0.0248	0.084	0.039
Ethylbenzene.....	0.0021	0.008	0.004
Xylenes.....	0.0048	0.019	0.009
Octanes.....	0.0177	0.074	0.043
Nonanes.....	0.0058	0.027	0.015
Decanes+.....	0.0025	0.013	0.007
Totals	100.000	100.000	100.000

ADDITIONAL BTEX DATA

Components	Mole %	Weight %	Liq. Vol. %
Cyclopentane	0.120	0.307	0.167
Cyclohexane	0.152	0.468	0.243
2-Methylpentane	0.374	1.177	0.721
3-Methylpentane	0.220	0.693	0.425
n-Hexane	0.414	1.303	0.799
Methylcyclohexane	0.058	0.208	0.109
2,2,4-Trimethylpentane	0.000	0.000	0.000
Benzene	0.099	0.283	0.130
Toluene	0.025	0.084	0.039
Ethylbenzene	0.002	0.008	0.004
m-Xylene	0.001	0.003	0.001
p-Xylene	0.003	0.013	0.006
o-Xylene	0.001	0.003	0.001

SPECIFIC GRAVITY @ 60/60 F, calculated	0.9456
TOTAL GPM (Ethane Inclusive)	10.589
CALCULATED BTU / REAL CF @ 14.73 PSIA, dry basis	1542.684
CALCULATED BTU / REAL CF @ 14.73 PSIA, wet basis	1516.567
AVERAGE MOLECULAR WEIGHT	27.388
MOLAR MASS RATIO	0.9452
RELATIVE DENSITY (G x Z (Air) / Z), calculated	0.9517
IDEAL GROSS HEATING VALUE, BTU / IDEAL CF @ 14.696 PSIA	1529.397
COMPRESSIBILITY FACTOR (Z)	0.99367

PROPANE GPM	4.3532
BUTANE GPM	0.5893
GASOLINE GPM (PENTANE AND HEAVIER)	2.0317
VOC WEIGHT FRACTION	0.447

NOTATION: ALL CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-09, THE TABLES OF PHYSICAL CONSTANTS FOR HYDROCARBONS AND OTHER COMPOUNDS OF INTEREST TO THE NATURAL GAS INDUSTRY.

May 7, 2015

Attachment F – Emissions Calculations and Supporting Documentation

Well Name:	Jubilee 584-1705H	Jubilee 586-1705H	Composite Gas Analysis			
Date Sampled:	4/25/2014	4/25/2014				
Component:	mol%	mol%	mol%	M.W.	(mol% X MW)/100	WT%
Hydrogen Sulfide (H2S)	0.0000	0.0000	0.0000	34.08	0.0000	0.00000
Oxygen (O2)	0.0000	0.0000	0.0000	32.00	0.0000	0.00000
Carbon Dioxide (CO2)	2.4300	2.3436	2.3868	44.01	1.0504	0.03819
Nitrogen (N2)	0.8135	0.8291	0.8213	28.02	0.2301	0.00837
Methane (C1)	58.7429	60.8495	59.7962	16.04	9.5913	0.34874
Ethane (C2)	12.9473	12.7979	12.8726	30.07	3.8708	0.14074
Propane (C3)	14.2997	13.4845	13.8921	44.09	6.1250	0.22271
iso-Butane (i-C4)	1.5224	1.4076	1.4650	58.12	0.8515	0.03096
n-Butane (nC-4)	5.6374	5.1150	5.3762	58.12	3.1246	0.11361
iso-Pentane (i-C5)	1.1451	0.9369	1.0410	72.15	0.7511	0.02731
n-Pentane (n-C5)	1.3003	1.0168	1.1586	72.15	0.8359	0.03039
Cyclopentane	0.0703	0.0543	0.0623	70.1	0.0437	0.00159
n-Hexane (n-C6)	0.2055	0.1919	0.1987	86.17	0.1712	0.00623
Cyclohexane	0.0855	0.1214	0.1035	84.16	0.0871	0.00317
Other Hexanes	0.3389	0.2671	0.3030	85.00	0.2576	0.00936
Heptanes	0.2605	0.3433	0.3019	100.20	0.3025	0.01100
Methylcyclohexane	0.0611	0.0988	0.0800	98.18	0.0785	0.00285
2,2,4-Trimethylpentane	0.0002	0.0002	0.0002	114.22	0.0002	0.00001
Benzene	0.0546	0.0700	0.0623	78.11	0.0487	0.00177
Toluene	0.0358	0.0394	0.0376	92.14	0.0346	0.00126
Ethylbenzene	0.0031	0.0022	0.0027	106.17	0.0028	0.00010
Xylene	0.0124	0.0049	0.0087	106.17	0.0092	0.00033
Octanes	0.0270	0.0210	0.0240	120.00	0.0288	0.00105
Nonanes	0.0065	0.0043	0.0054	128.26	0.0069	0.00025
Decanes+	0.0000	0.0003	0.0002	142.29	0.0002	0.00001
Total	100.000	100.000	100.000	M.W.=	27.50	
Temperature (F)	150.0	150.0	150.00			
Pressure (psig)	75.0	70.0	72.50			
Molecular WT	27.889	27.126	27.51			
Higher Heating Value (Btu/scf)	1582.043	1542.073	1562.06			
Total VOC Weight Percent	46.40 %					
Total HAP Weight Percent	0.97 %					

Well Name:	Jubilee 579-1705H	Composite
Date Sampled:	3/5/2015	
Component:	mole%	mole %
Hydrogen Sulfide (H2S)	0.0000	0.0000
Oxygen (O2)	0.0000	0.0000
Carbon Dioxide (CO2)	0.0483	0.0483
Nitrogen (N2)	0.0143	0.0143
Methane (C1)	0.3498	0.3498
Ethane (C2)	0.9915	0.9915
Propane (C3)	4.1813	4.1813
iso-Butane (i-C4)	0.9939	0.9939
n-Butane (nC-4)	5.2958	5.2958
iso-Pentane (i-C5)	2.5110	2.5110
n-Pentane (n-C5)	3.1235	3.1235
2-Methylpentane (C6)	1.7520	1.7520
3-Methylpentane (C6)	0.6980	0.6980
Heptanes (C7)	5.2779	5.2779
Octanes (C8)	1.8814	1.8814
Nonanes (C9)	0.2089	0.2089
Benzene	0.2952	0.2952
Toluene	0.9441	0.9441
Ethylbenzene	0.0274	0.0274
m-Xylene	0.0620	0.0620
p-Xylene	0.3870	0.3870
o-Xylene	0.0920	0.0920
n-Hexane	2.0162	2.0162
2,2,4-Trimethylpentane	0.3522	0.3522
Decanes+ (C10+)	68.4954	68.4954
Total	99.999	99.999
MW C10+	252.1550	252.1550
Specific Gravity C10+	0.7653	0.7653
API Gravity (sales oil)	35.8	35.8000
RVP (sales oil)	6.30	6.3000
Temperature (F)	110	110.0
Pressure (psig)	55	55.0

Heater Emission Calculations

AP-42 Emission Factors for Natural Gas Combustion, Table 1.4-1

Process Unit:	Heat Input Rating	
Heater Treater 1: (584)	1.000	MMBtu/hr
Heater Treater 2: (586)	1.000	MMBtu/hr
Heater Treater 3: (579)	1.000	MMBtu/hr
Line Heater:	0.500	MMBtu/hr
Recycle Treater:	0.500	MMBtu/hr
NA	0.000	MMBtu/hr
NA	0.000	MMBtu/hr
NA	0.000	MMBtu/hr
NA	0.000	MMBtu/hr
NA	0.000	MMBtu/hr
Fuel Heat Value:	1562.1	Btu/scf
Annual Operating Hours:	8760	hrs
NO_x Emissions =	**2.6**	TPY
CO Emissions =	**2.2**	TPY
VOC Emissions=	**0.1**	TPY

	Fuel Consumed (Comb. Size, MMBtu/hr Heat Input)
	Natural Gas
NO_x	100
CO	84
VOC	5.5

Estimated Heater NOx Emissions							
Heater Number	Heater Rating	Emissions Factor	Emissions Factor	Fuel Heat Value	Corrected Emissions Factor	Operating Hours	Estimated Emissions
()	(MMBtu/hr)	(lb/MMCF)	(lb/hr)	(Btu/scf)	(lb/hr)	(hrs)	(TPY)
1	1.000	100	0.098	1562	0.150	8760	0.658
2	1.000	100	0.098	1562	0.150	8760	0.658
3	1.000	100	0.098	1562	0.150	8760	0.658
4	0.500	100	0.049	1562	0.075	8760	0.329
5	0.500	100	0.049	1562	0.075	8760	0.329
6	0.000	100	0.000	1562	0.000	8760	0.000
7	0.000	100	0.000	1562	0.000	8760	0.000
8	0.000	100	0.000	1562	0.000	8760	0.000
9	0.000	100	0.000	1562	0.000	8760	0.000
10	0.000	100	0.000	1562	0.000	8760	0.000
					Total NO_x Emissions =	**2.6**	TPY
					Total NO_x Emissions =	**0.60**	lb/hr

Estimated Heater CO Emissions							
Heater Number	Heater Rating	Emissions Factor	Emissions Factor	Fuel Heat Value	Corrected Emissions Factor	Operating Hours	Estimated Emissions
()	(MMBtu/hr)	(lb/MMCF)	(lb/hr)	(Btu/scf)	(lb/hr)	(hrs)	(TPY)
1	1.000	84	0.082	1562	0.126	8760	0.552
2	1.000	84	0.082	1562	0.126	8760	0.552
3	1.000	84	0.082	1562	0.126	8760	0.552
4	0.500	84	0.041	1562	0.063	8760	0.276
5	0.500	84	0.041	1562	0.063	8760	0.276
6	0.000	84	0.000	1562	0.000	8760	0.000
7	0.000	84	0.000	1562	0.000	8760	0.000
8	0.000	84	0.000	1562	0.000	8760	0.000
9	0.000	84	0.000	1562	0.000	8760	0.000
10	0.000	84	0.000	1562	0.000	8760	0.000
					Total CO Emissions =	**2.2**	TPY
					Total CO Emissions =	**0.50**	lb/hr

Estimated Heater VOC Emissions							
Heater Number	Heater Rating	Emissions Factor	Emissions Factor	Fuel Heat Value	Corrected Emissions Factor	Annual Operating	Estimated Emissions
()	(MMBtu/hr)	(lb/MMCF)	(lb/hr)	(Btu/scf)	(lb/hr)	(hrs)	(TPY)
1	1.000	5.5	0.005	1562	0.008	8760	0.036
2	1.000	5.5	0.005	1562	0.008	8760	0.036
3	1.000	5.5	0.005	1562	0.008	8760	0.036
4	0.500	5.5	0.003	1562	0.004	8760	0.018
5	0.500	5.5	0.003	1562	0.004	8760	0.018
6	0.000	5.5	0.000	1562	0.000	8760	0.000
7	0.000	5.5	0.000	1562	0.000	8760	0.000
8	0.000	5.5	0.000	1562	0.000	8760	0.000
9	0.000	5.5	0.000	1562	0.000	8760	0.000
10	0.000	5.5	0.000	1562	0.000	8760	0.000
					Total VOC Emissions =	**0.1**	TPY
					Total VOC Emissions =	**0.03**	lb/hr

Combustor Emission Calculations

Emission Source:			
VRT & Tank Vent Gas Flowrate:	12.8	Mcf/day	(from Promax)
Tank Vent Gas Flowrate:	531.3	scf/hr	
Estimated Heating Value:	2583.3	Btu/scf	(Btu content of VRT & tank flash from Promax)
Truck Loadout Flowrate:	593.5	scf/day	
Truck Loadout Flowrate:	24.7	scf/hr	
Estimated Heating Value:	2583.3	Btu/scf	(assumed same heat content as tank & VRT vapors)
Pilot Gas Flowrate:	0.56	scf/min	(two combustors @ 0.28 CFM)
Pilot Gas Flowrate:	33.6	scf/hr	
Estimated Heating Value:	1562.1	Btu/scf	
Total Flow to Flare:	14149.9	scf/day	
	7074.9478	scf/day	(two combustors)

Pollutant	lb/hr	ton/yr
NO_x	0.21	0.9
CO	0.05	0.2

Emission Factors (From Ch. 6, Sec. 2 Guidance)

NO_x	0.14	lb/MMBtu
CO	0.035	lb/MMBtu

Controller/Motor Valve Emission Calculations

Molecular WT (from gas sample) 27.51

Total VOC Weight Percent 46.4

Total HAP Weight Percent 1.0

1 cubic inch= 0.000578704 cubic feet

Kimray Model Number	Number of Devices	Area of Diaphragm (in^2)	Stem Travel (in)	Volume (in^3)	Volume (ft^3)/actuation	Number of Actuations per day	
Model 2200	3	65	0.75	48.75	0.02821182	**480**	(assume every 3 mins)
Model 1400	3	30	0.5	15	0.00868056	**480**	
Gen II	0	NA	NA	NA	**0.6** scfd		(bleed rate per Kimray)

Example Calculation - # of valves * volume of diaphragm (ft^3) * number of actuations per day * MW gas * 1lb-mol/379scf * 365 days/yr * ton/2000lb * VOC wt% = TPY VOC

	VOC TPY	HAP TPY
Emissions for Model 2200	0.2	0.01
Emissions for Model 1400	0.1	0.00
Emissions for Gen II	0.0	0.00
Total	0.3	0.01

Truck Loading Emission Calculations

VOC Emissions from Truck Loading - AP-42 Chapter 5.2

AP-42 Chapter 5.2, Table 5.2-1	
Tank trucks and rail cars submerged loading of a clean cargo tank	0.5
Submerged loading; dedicated normal service	0.6
Submerged loading; dedicated vapor balance service	1
Splash loading of a clean cargo tank	1.45
Splash loading; dedicated normal service	1.45
Splash loading; dedicated vapor balance service	1
Marine vessels, submerged loading; ships	0.2
Submerged loading; barges	0.5

Equation 1 for loading losses: (12.46) * (SPM / T) = L_L

Where:

L_L = loading losses, lbs/1000 gal of liquid loaded

S = saturation factor

P = true vapor pressure of liquid loaded (psia). Source: 6.3 RVP of crude oil (from Precision Analysis) converted to TVP @50°F using Figure 7.1-13a of AP-42 Chapter 7 (11/06).

M = Molecular wt of vapors, lb/lb-mol (from Promax)

T = temperature of bulk liquids loaded °R (°F = 460)

503.8	barrels/day	(production rates)
183872.4	bbls/yr	
7722639	gallons/yr	

S=	1	
P=	3.0	psia
M=	48.89	lb/lb-mol (taken from Promax)
T=	510	°R
L_L=	**3.58**	**lb/1000 gallons**

Total Loss= 13.8 TPY TOC

593.5 scf/day	**24.7 scf/hr**

Using MW tank vapor and predicted volume of total gas, convert to SCF/day for controlled emission calculations

Uncontrolled VOC Emissions:	12.5	TPY
Uncontrolled HAP Emissions:	0.3	TPY
Controlled VOC Emissions:	3.9	TPY
Controlled HAP Emissions:	0.1	TPY

{controlled emissions based on 70% capture efficiency of system}

COMPONENT	(Taken from Promax) mol %	M.W.	(mol % X MW)/100	WT% of i
H2S	0.0000	34.08	0	0
O2	0.0000	32.00	0	0.0000
CO2	0.4362	44.01	0.1920	0.0040
N2	0.0443	28.02	0.0124	0.0003
Methane C1	2.3318	16.04	0.3740	0.0077
Ethane C2	13.4356	30.07	4.0401	0.0834
Propane C3	41.4775	44.09	18.2874	0.3777
i-Butane i-C4	5.3537	58.12	3.1116	0.0643
n-Butane n-C4	21.8259	58.12	12.6852	0.2620
i-Pentane iC5	4.5239	72.15	3.2640	0.0674
n-Pentane nC5	4.3992	72.15	3.1740	0.0655
n-Hexane n-C6	0.9252	86.17	0.7973	0.0165
Cyclohexane	0.0000	84.16	0.0000	0.0000
other Hexanes	1.4707	85.00	1.2501	0.0258
Heptanes	0.8141	100.20	0.8158	0.0168
Methylcyclohexane	0.0000	98.18	0.0000	0.0000
2,2,4 Trimethylpentane	0.0571	114.22	0.0652	0.0013
Benzene	0.1252	78.11	0.0978	0.0020
Toluene	0.1187	92.14	0.1094	0.0023
Ethylbenzene	0.0013	106.17	0.0013	0.0000
Xylenes	0.0211	106.17	0.0224	0.0005
C8+ Heavies	0.0973	120.00	0.1167	0.0024
nonanes	0.0039	128.26	0.0050	0.0001
C_{10}+	0.0001	142.29	0.0002	0.0000
Water	2.5371			
	100.000			1.0000

MOLECULAR WEIGHT (lb/lb-mol)= 48.4219

TOTAL VOCs WEIGHT PERCENT = 0.9046

TOTAL HAPs WEIGHT PERCENT = 0.0226

Fugitive Emissions Calculations

EPA Average Emission Factors for Total Hydrocarbon (THC)Emissions from O&G Production Operations
(lb/component-day)

Equipment Service Category

Equipment Type	Gas	Heavy Oil (<20° API)	Light Oil (>20° API)	Water/Light Oil
connector	0.011	0.0004	0.011	0.0058
flange	0.021	0.000021	0.0058	0.00015
open ended line	0.11	0.0074	0.074	0.013
other	0.47	0.0017	0.4	0.74
pump	0.13	0	0.69	0.0013
valve	0.24	0.00044	0.13	0.0052

Speciated Fugitive Emission Factors
(Estimated weight fractions of THC emissions in each category)

	Methane	NMHC	VOC	C6+	Benzene	Toluene	Ethyl-Benzene	Xylenes
Light Crude	0.613	0.387	0.292	0.0243	0.00037	0.00075	0.00017	0.00036
Heavy Crude	0.942	0.058	0.030	0.0752	0.00935	0.00344	0.00051	0.00372
Gas Production	0.92	0.080	0.035	0.00338	0.00023	0.00039	0.00002	0.0001

Service

Type	Gas	Heavy Oil	Light Oil	Water/Light Oil
connector	362	0	290	116
flange	10	0	24	7
open ended line	0	0	0	0
other	14	0	5	3
pump	0	0	2	1
valve	40	0	38	14
Emissions (lb/day)	20.372	0	11.6492	2.96795

365	days
2000	lbs
0.905	VOC concentration - light crude from Promax
0.464	VOC concentration - gas sample

Using Site Specific Data

	TOC	VOC	C6+	Benzene	Toluene	Ethyl-Benzene	Xylene	Total HAP
lb/day	35.0	21.367	0.362	0.010	0.018	0.002	0.007	0.398
ton/yr	6.4	3.9	0.066	0.0018	0.003	0.000	0.001	0.1

STATE OF WYOMING

Department of Environmental Quality - Air Quality Division
Oil and Gas Production Facilities C6 S2 Permit Application

EMISSION SUMMARY

Company Name: EOG Resources, Inc.

Facility Name: Jubilee 17 NWNE PAD

This form must be completed for each emission source at the facility. A list of the emission sources which must be considered is found in Appendix B of the C6 S2 O&G Production Facilities Permitting Guidance.

UNCONTROLLED EMISSIONS (Tons Per Year)

These are the total uncontrolled, potential emissions from each source.

EMISSION SOURCE (i.e., tank, natural gas-fired heater, reboiler still vent, glycol flash separator, pneumatic pump, separator gas vent, water knockout vent, etc.)	VOCs	total HAPs	NO_X	CO	SO_2	H_2S
six (6) 500-bbl oil storage tanks	241.8	5.8				
1.0 MMBtu/hr heater treater heater (584)	0.04	insig	0.66	0.55		
1.0 MMBtu/hr heater treater heater (586)	0.04	insig	0.66	0.55		
1.0 MMBtu/hr heater treater heater (579)	0.04	insig	0.66	0.55		
0.50 MMBtu/hr line heater	0.02	insig	0.33	0.28		
0.50 MMBtu/hr recycle treater heater	0.02	insig	0.33	0.28		
truck loading	12.5	0.3				
fugitives	3.9	0.1				
pneumatic controllers	0.3	insig				
Total	258.7	6.2	2.6	2.2		

CONTROLLED EMISSIONS (Tons Per Year)

These are the total emissions from each source. Include controlled emissions from each controlled source and uncontrolled emissions from each source which does not require control, such as process equipment burners.

EMISSION SOURCE	VOCs	total HAPs	NO_X	CO	SO_2	H_2S
six (6) 500-bbl oil storage tanks	See Cimarron Combustors					
1.0 MMBtu/hr heater treater heater (584)	0.04	insig	0.66	0.55		
1.0 MMBtu/hr heater treater heater (586)	0.04	insig	0.66	0.55		
1.0 MMBtu/hr heater treater heater (579)	0.04	insig	0.66	0.55		
0.50 MMBtu/hr line heater	0.02	insig	0.33	0.28		
0.50 MMBtu/hr recycle treater heater	0.02	insig	0.33	0.28		
truck loading	3.9	0.1				
two (2) Cimarron Combustors	4.8	0.1	0.9	0.2		
fugitives (LDAR)	insig	insig				
pneumatic controllers	0.3	insig				
Total	9.2	0.2	3.5	2.4		

HAZARDOUS AIR POLLUTANT SUMMARY (Tons Per Year)

Complete this section for each emissions source if TOTAL HAPs from that source are 9 TPY or greater.

SOURCE	Benzene	Toluene	Ethyl-Benzene	Xylenes	Other

STATE OF WYOMING
Department of Environmental Quality - Air Quality Division
Oil and Gas Production Facilities C6 S2 Permit Application

Equipment List

Company Name	EOG Resources, Inc.
Facility Name	Jubilee 17 NWNE PAD

List all production equipment at the site including all pressurized vessels with the potential for flash emissions, all hydrocarbon liquids and produced water storage tanks, all dehydration units, all pneumatic pumps, all natural gas-fired burners and heaters and all emission control equipment and devices. Pressurized vessels with the potential for flash emissions are all vessels that vent vapors to the atmosphere during times other than upset or emergency conditions (water knockouts, 2-phase and 3-phase separators, heater treaters, gun barrels, scrubber pots, etc). Provide design ratings for dehys (MMCFD), process heaters, burners and pilots (MMBtu/hr, SCFH). Provide size of production & water storage tanks (BPD). For dehydration units indicate if the unit includes a glycol flash separator and/or reboiler still vent condenser. For emission control combustors/flares indicate design rating (MMBtu/hr, SCFD) and combustor/flare height (ft). Provide pneumatic pump motive gas useage (SCFH).

If more space is required, continue on page 2 of this sheet.

PROVIDE INSTALLATION DATES OF ALL EMISSION CONTROL EQUIPMENT & MONITORING DEVICES/SYSTEMS !!!

six (6) 500-barrel (bbl) oil storage tanks (routed to Cimarron ECDs)
one (1) 500-bbl produced water storage tank (routed to Cimarron ECDs)
three (3) 6'x20' horizontal heater treaters w/ 1.0 MMBtu/hr heaters
one (1) 0.50 MMBtu/hr line heater
one (1) 48"x12' Cimmaron LV enclosed combustion device (ECD) with continuous pilot and thermocouple monitored through Cygnet (controls VRT, produced water, oil storage tank, and truck loading emissons) installed prior to first date of production
one (1) 60"x13' Cimmaron LV enclosed combustion device (ECD) with continuous pilot and thermocouple monitored through Cygnet (controls VRT, produced water, oil storage tank, and truck loading emissons) installed prior to first date of production
six (6) intermittent bleed level controllers (three (3) Kimray Model 2200, and three (3) Model 1400)
four (4) electric pumps (chemical, recycle, trace, and water transfer)
various gas scrubbers/liquids knockouts (tank vapor combustor, sales gas line, fuel gas, etc)
one (1) 1000-gallon propane tank and two (2) 135-gallon chemical tanks
various non-bleed controllers
truck loading (LACT)
fugitives
one (1) 8' Steffes emergency flare (controls produced gas during upsets)
one (1) recycle treater w/ 0.50 MMBtu/hr heater
one (1) Vapor Recovery Tower (VRT) (routed to Cimarron ECDs)
two (2) electric motor driven pumping units

Example:

1 2-phase high pressure separator (unheated)

1 3-phase low pressure separator w/ 0.5 MMBtu/hr heater

2 0.5 MMBtu/hr line heaters

1 5 MMCFD TEG dehydration unit w/ 0.5 MMBtu/hr reboiler heater, glycol flash separator(0.5 MMBtu/hr heater) and overheads condenser

2 400-bbl condensate tanks

1 400-bbl produced water tank

1 30-ft enclosed combustor (3.0 MMBtu/hr, 5 MCFD) for flashing & reboiler vent/glycol flash separator emissions control installed 1/1/2007

Bryan Research & Engineering, Inc.

ProMax® 3.2

with

TSWEET® & PROSIM®

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Simulation Report

Project: Jubilee 17 NWNE PAD.pmx

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Client Name: EOG
Location: Jubilee 17 NWNE PAD
Job:

ProMax Filename: M:\ProMax\Jubilee 17 NWNE PAD.pmx
ProMax Version: 3.2.12198.0
Simulation Initiated: 4/28/2015 12:52:08 PM

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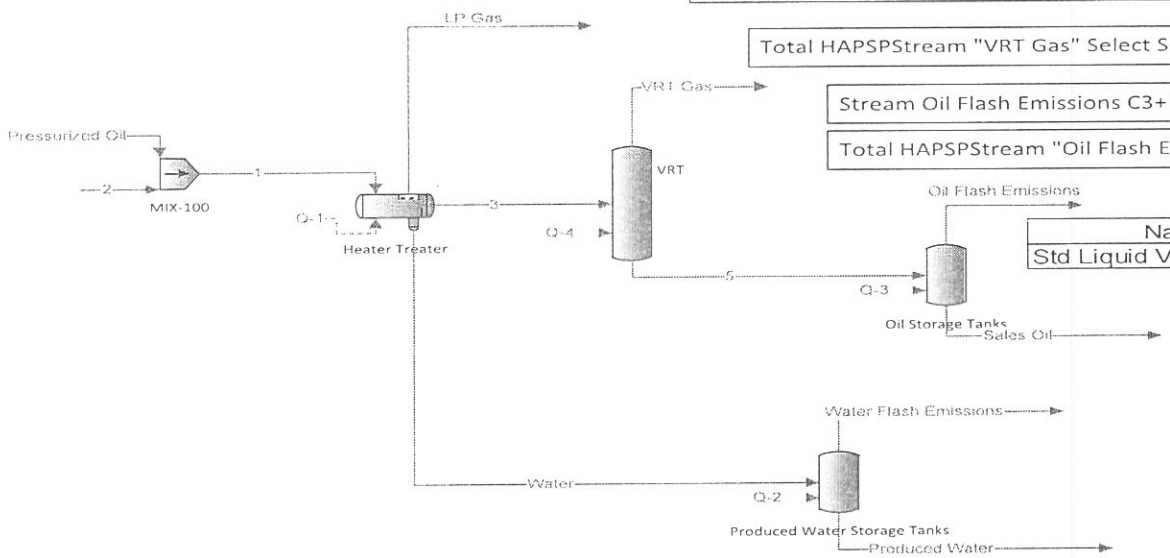
Report Navigator can be activated via the ProMax Navigator Toolbar.
An asterisk (*), throughout the report, denotes a user specified value.
tion mark (?) after a value, throughout the report, denotes an extrapolated or approximate



Stream VRT Gas C3+ Mass Flow =125.6 ton/yr

Total HAPSPStream "VRT Gas" Select Sum = 2.921 ton/yr

Stream Oil Flash Emissions C3+ Mass Flow =114.2 ton/yr

Total HAPSPStream "Oil Flash Emissions" Select Sum = 2.851 ton/yr

Names	Units	Sales Oil	Water
Std Liquid Volumetric Flow	bbl/d	503.8	994.2

Stream Water Flash Emissions C3+ Mass Flow =2.351 ton/yr

Total HAPSPStream "Water Flash Emissions" Select Sum = 0.05344 ton/yr

Process Streams		Oil Flash Emissions	Sales Oil	VRT Gas	Water Flash Emissions
Composition	Status:	Solved	Solved	Solved	Solved
Phase Total	From Block:	Oil Storage Tanks	Oil Storage Tanks	VRT	Produced Water Storage Tanks
	To Block:	--	--	--	--
Mass Flow		lb/h	lb/h	lb/h	lb/h
Hydrogen Sulfide		0	0	0	0
Oxygen		0	0	0	0
Carbon Dioxide		0.114256	0.0870720	0.231220	0.0290918
Nitrogen		0.00739393	0.000480272	0.0980271	0.0144097
Methane		0.222664	0.0376692	1.28052	0.141500
Ethane		2.40468	2.10587	4.48275	0.175912
Propane		10.8885	32.7563	13.1061	0.313379
Isobutane		1.85215	14.0948	1.94724	0.0180339
n-Butane		7.55086	79.9606	7.75787	0.139019
Isopentane		1.94280	52.2673	1.94570	0.0224504
n-Pentane		1.88921	66.0752	1.89437	0.0232224
2-Methylpentane		0.554477	45.7017	0.561189	0.00365898
3-Methylpentane		0.199904	18.2476	0.202571	0.00286161
Heptane		0.485581	163.010	0.510074	0.00187121
Octane		0.0661241	66.5091	0.0718242	0.000241471
Nonane		0.00296495	8.30253	0.00332238	1.56254E-05
Benzene		0.0582261	6.90660	0.0589835	0.00405365
Toluene		0.0651130	26.7228	0.0680875	0.00457225
Ethylbenzene		0.000791427	0.899316	0.000853448	5.84577E-05
m-Xylene		0.00152631	2.03566	0.00166714	0.000112397
p-Xylene		0.00979570	12.7066	0.0106216	0.000716192
o-Xylene		0.00203463	3.02025	0.00221133	0.000151223
n-Hexane		0.474589	52.9208	0.483935	0.00249779
2,2,4-Trimethylpentane		0.0388268	12.3971	0.0404724	3.87772E-05
Water		0.272059	0.254417	0.493179	0.0786924
C10+		0.000180178	5356.19	0.000273214	1.09578E-07
Mole Fraction		%	%	%	%
Hydrogen Sulfide		0	0	0	0
Oxygen		0	0	0	0
Carbon Dioxide		0.436166	0.00667859	0.652896	2.13965
Nitrogen		0.0443433	5.78728E-05	0.438847	1.67537
Methane		2.33183	0.00792627	9.91926	28.5499
Ethane		13.4356	0.236409	18.5263	18.9363
Propane		41.4775	2.50756	36.9354	23.0035
Isobutane		5.35367	0.818596	4.16333	1.00431
n-Butane		21.8259	4.64394	16.5869	7.74194
Isopentane		4.52395	2.44542	3.35128	1.00720
n-Pentane		4.39915	3.09145	3.26287	1.04183
2-Methylpentane		1.08058	1.79020	0.809264	0.137434
3-Methylpentane		0.389723	0.714785	0.292118	0.107485
Heptane		0.814149	5.49151	0.632586	0.0539851
Octane		0.0972531	1.96544	0.0781376	0.00684241
Nonane		0.00388384	0.218519	0.00321914	0.000394369
Benzene		0.125233	0.298470	0.0938378	0.167977
Toluene		0.118726	0.979027	0.0918313	0.160623
Ethylbenzene		0.00125241	0.0285948	0.00099867	0.00176229
m-Xylene		0.00241535	0.0647255	0.00193973	0.00342683
p-Xylene		0.0155015	0.404017	0.0124329	0.0218357
o-Xylene		0.00321975	0.0960314	0.00258842	0.00461057
n-Hexane		0.925237	2.07208	0.697859	0.0938184
2,2,4-Trimethylpentane		0.0571052	0.366352	0.0440299	0.00109881
Water		2.53712	0.0476713	3.40195	14.1388
C10+		0.000120047	71.7036	0.000134648	1.40662E-06
Mass Fraction		%	%	%	%
Hydrogen Sulfide		0	0	0	0
Oxygen		0	0	0	0
Carbon Dioxide		0.392596	0.00144561	0.655871	2.97934
Nitrogen		0.0254063	7.97309E-06	0.280613	1.48494
Methane		0.765096	0.000625401	3.63227	14.4913
Ethane		8.26272	0.0349625	12.7156	18.0154
Propane		37.4072	0.543834	37.1763	32.0937
Isobutane		6.36417	0.234008	5.52346	1.84689
n-Butane		25.9455	1.32754	22.0057	14.2372
Isopentane		6.67566	0.867764	5.51909	2.29919
n-Pentane		6.49151	1.09701	5.37350	2.37825
2-Methylpentane		1.90524	0.758759	1.59185	0.374723
3-Methylpentane		0.686890	0.302955	0.574604	0.293063
Heptane		1.66851	2.70637	1.44685	0.171152
Octane		0.227209	1.10421	0.203734	0.0247295
Nonane		0.0101879	0.137842	0.00942414	0.00160032
Benzene		0.200071	0.114666	0.167310	0.415142
Toluene		0.223735	0.443664	0.193134	0.468252
Ethylbenzene		0.00271943	0.0148308	0.00242086	0.00598676
m-Xylene		0.00524456	0.0337969	0.00470057	0.0115108
p-Xylene		0.0336590	0.210960	0.0301288	0.0733465
o-Xylene		0.00699119	0.0501434	0.00627266	0.0154870
n-Hexane		1.63074	0.878614	1.37271	0.255804
2,2,4-Trimethylpentane		0.133413	0.205822	0.114802	0.00397124
Water		0.934824	0.00422394	1.39893	8.05904
C10+		0.000619110	88.9258	0.000774988	1.12221E-05

SWB VOC TPY from Tanks 4.0	SWB HAP TPY (assume 2.7% HAP based on oil flash output stream HAP concentration)
2.0	0.04
Oil Flash VOC TPY	**Oil Flash HAP TPY**
114.2	2.9
VRT Flash VOC TPY	**VRT Flash HAP TPY**
125.6	2.9

Total VOC TPY	Total HAP TPY
241.8	5.8

Process Streams		Oil Flash Emissions	Sales Oil	VRT Gas	Water Flash Emissions
Properties	Status:	Solved	Solved	Solved	Solved
Phase: Total	From Block:	Oil Storage Tanks	Oil Storage Tanks	VRT	Produced Water Storage Tanks
	To Block:	--	--	--	--
Property	Units				
Temperature	°F	100*	100	110*	120*
Pressure	psia	12*	12	19.6959*	12*
Mole Fraction Vapor	%	100	0	100	100
Mole Fraction Light Liquid	%	0	100	0	0
Mole Fraction Heavy Liquid	%	0	0	0	0
Molecular Weight	lb/lbmol	48.8936	203.320	43.8099	31.6060
Mass Density	lb/ft^3	0.0991159	50.2644	0.143756	0.0613042
Molar Flow	lbmol/h	0.595226	29.6243	0.804704	0.0308945
Mass Flow	lb/h	29.1027	6023.21	35.2540	0.976449
Vapor Volumetric Flow	ft^3/h	293.623	119.831	245.236	15.9279
Liquid Volumetric Flow	gpm	36.6076	14.9399	30.5748	1.98582
Std Vapor Volumetric Flow	MMSCFD	0.00542109	0.269807	0.00732854	0.000281375
Std Liquid Volumetric Flow	sgpm	0.109087	14.6942	0.138735	0.00417001
Compressibility		0.985585	0.00808175	0.981831	0.984523
Specific Gravity		1.68816	0.805919	1.51264	1.09127
API Gravity			40.5213		
Enthalpy	Btu/h	-29986.9	-4.87043E+06	-38734.6	-1557.04
Mass Enthalpy	Btu/lb	-1030.38	-808.609	-1098.73	-1594.60
Mass Cp	Btu/(lb*°F)	0.416852	0.476742	0.427224	0.438820
Ideal Gas Cp/Cv Ratio		1.10854	1.02620	1.11978	1.16779
Dynamic Viscosity	cP	0.00842414	2.02514	0.00898599	0.0105022
Kinematic Viscosity	cSt	5.30593	2.51521	3.90190	10.6948
Thermal Conductivity	Btu/(h*ft*°F)	0.0107620	0.0702428	0.0119834	0.0145270
Surface Tension	lbf/ft		0.00186007		
Net Ideal Gas Heating Value	Btu/ft^3	2513.94	9975.10	2241.35	1470.46
Net Liquid Heating Value	Btu/lb	19345.3	18463.9	19249.7	17451.9
Gross Ideal Gas Heating Value	Btu/ft^3	2729.41	10939.0	2437.19	1611.37
Gross Liquid Heating Value	Btu/lb	21017.6	19703.0	20946.1	19143.7

Process Streams		Oil Flash Emissions	Sales Oil	VRT Gas	Water Flash Emissions
Composition	Status:	Solved	Solved	Solved	Solved
Phase: Vapor	From Block:	Oil Storage Tanks	Oil Storage Tanks	VRT	Produced Water Storage Tanks
	To Block:	--	--	--	--
Mass Flow		lb/h		lb/h	lb/h
Hydrogen Sulfide		0		0	0
Oxygen		0		0	0
Carbon Dioxide		0.114256		0.231220	0.0290918
Nitrogen		0.00739393		0.0989271	0.0144997
Methane		0.222664		1.28052	0.141500
Ethane		2.40468		4.48275	0.175912
Propane		10.8865		13.1061	0.313375
Isobutane		1.85215		1.94724	0.0180339
n-Butane		7.55086		7.75787	0.139019
Isopentane		1.94280		1.94570	0.0224504
n-Pentane		1.88921		1.89437	0.0232224
2-Methylpentane		0.554477		0.561189	0.00365898
3-Methylpentane		0.199904		0.202571	0.00286161
Heptane		0.485581		0.510074	0.00167121
Octane		0.0661241		0.0718242	0.000241471
Nonane		0.00296495		0.00332238	1.56264E-05
Benzene		0.0582281		0.0589835	0.00405365
Toluene		0.0651130		0.0680875	0.00457225
Ethylbenzene		0.000791427		0.000853448	5.84577E-05
m-Xylene		0.00152631		0.00165714	0.000112397
p-Xylene		0.00979570		0.0106216	0.000716192
o-Xylene		0.00203403		0.00221133	0.000151223
n-Hexane		0.474589		0.483935	0.00249779
2,2,4-Trimethylpentane		0.0388268		0.0404724	3.87772E-05
Water		0.272059		0.493179	0.0786924
C10+		0.000180178		0.000273214	1.09578E-07
Mole Fraction		%		%	%
Hydrogen Sulfide		0		0	0
Oxygen		0		0	0
Carbon Dioxide		0.436166		0.652896	2.13966
Nitrogen		0.0443433		0.438847	1.67537
Methane		2.33183		9.91926	28.5499
Ethane		13.4356		18.5263	18.9363
Propane		41.4775		36.9354	23.0036
Isobutane		5.35367		4.16333	1.00431
n-Butane		21.8259		16.5869	7.74194
Isopentane		4.52395		3.35128	1.00720
n-Pentane		4.39915		3.26287	1.04183
2-Methylpentane		1.08098		0.805264	0.137434
3-Methylpentane		0.389723		0.292116	0.107485
Heptane		0.814149		0.632588	0.0539851
Octane		0.0972531		0.0781376	0.0068424[1]
Nonane		0.00388384		0.00321814	0.000394369
Benzene		0.125233		0.0938378	0.167977
Toluene		0.118726		0.0918313	0.160623
Ethylbenzene		0.00125241		0.000998987	0.00178229
m-Xylene		0.00241535		0.00193873	0.00342683
p-Xylene		0.0155015		0.0124329	0.0218357
o-Xylene		0.00321975		0.00258842	0.00461057
n-Hexane		0.925237		0.657859	0.0938194
2,2,4-Trimethylpentane		0.0571052		0.0440296	0.00109881
Water		2.53712		3.40195	14.1388
C10+		0.000129047		0.000134648	1.40662E-06
Mass Fraction		%		%	%
Hydrogen Sulfide		0		0	0
Oxygen		0		0	0
Carbon Dioxide		0.392596		0.655871	2.97934
Nitrogen		0.0254063		0.280613	1.48494
Methane		0.765096		3.63227	14.4913
Ethane		8.26272		12.7156	18.0154
Propane		37.4072		37.1763	32.0937
Isobutane		6.36417		5.52346	1.84689
n-Butane		25.9455		22.0057	14.2372
Isopentane		6.67596		5.51909	2.29919
n-Pentane		6.49151		5.37350	2.37825
2-Methylpentane		1.90524		1.59165	0.374723
3-Methylpentane		0.686890		0.574604	0.293063
Heptane		1.66851		1.44685	0.171152
Octane		0.227209		0.203734	0.0247295
Nonane		0.0101879		0.00942414	0.00160032
Benzene		0.200071		0.167310	0.415142
Toluene		0.223735		0.193134	0.468252
Ethylbenzene		0.00271943		0.00242086	0.00598676
m-Xylene		0.00524456		0.00470057	0.0115108
p-Xylene		0.0336590		0.0301268	0.0733465
o-Xylene		0.00699119		0.00627256	0.0154870
n-Hexane		1.63074		1.37271	0.255804
2,2,4-Trimethylpentane		0.133413		0.114802	0.00397124
Water		0.934824		1.39893	8.05904
C10+		0.000619110		0.000774988	1.12221E-05

Process Streams		Oil Flash Emissions	Sales Oil	VRT Gas	Water Flash Emissions
Properties	Status:	Solved	Solved	Solved	Solved
Phase Vapor	From Block:	Oil Storage Tanks	Oil Storage Tanks	VRT	Produced Water Storage Tanks
	To Block:	--	--	--	--
Property	Units				
Temperature	°F	100		110	120
Pressure	psia	12		19.6959	12
Mole Fraction Vapor	%	100		100	100
Mole Fraction Light Liquid	%	0		0	0
Mole Fraction Heavy Liquid	%	0		0	0
Molecular Weight	lb/lbmol	48.8936		43.8099	31.6060
Mass Density	lb/ft^3	0.0991159		0.143756	0.0613042
Molar Flow	lbmol/h	0.595226		0.804704	0.0308945
Mass Flow	lb/h	29.1027		35.2540	0.976449
Vapor Volumetric Flow	ft^3/h	293.623		245.235	15.9279
Liquid Volumetric Flow	gpm	36.6076		30.5748	1.98582
Std Vapor Volumetric Flow	MMSCFD	0.00542109		0.00732894	0.000281375
Std Liquid Volumetric Flow	sgpm	0.109087		0.138735	0.00417001
Compressibility		0.985585		0.981831	0.994523
Specific Gravity		1.68816		1.51264	1.09127
API Gravity					
Enthalpy	Btu/h	-29986.9		-38734.5	-1557.04
Mass Enthalpy	Btu/lb	-1030.38		-1098.73	-1594.60
Mass Cp	Btu/(lb*°F)	0.416852		0.427224	0.438820
Ideal Gas CpCv Ratio		1.10864		1.11978	1.16779
Dynamic Viscosity	cP	0.00842414		0.00898509	0.0105022
Kinematic Viscosity	cSt	5.30593		3.90190	10.6948
Thermal Conductivity	Btu/(h*ft*°F)	0.0107620		0.0119834	0.0145270
Surface Tension	lbf/ft				
Net Ideal Gas Heating Value	Btu/ft^3	2513.94		2241.35	1470.46
Net Liquid Heating Value	Btu/lb	19345.3		19249.7	17451.9
Gross Ideal Gas Heating Value	Btu/ft^3	2729.41		2437.19	1611.37
Gross Liquid Heating Value	Btu/lb	21017.6		20946.1	19143.7

Process Streams		Oil Flash Emissions	Sales Oil	VRT Gas	Water Flash Emissions
Composition	Status:	Solved	Solved	Solved	Solved
Phase Light Liquid	From Block:	Oil Storage Tanks	Oil Storage Tanks	VRT	Produced Water Storage Tanks
	To Block:	--	--	--	--
Mass Flow			lb/h		
Hydrogen Sulfide			0		
Oxygen			0		
Carbon Dioxide			0.0870720		
Nitrogen			0.000480272		
Methane			0.0376692		
Ethane			2.10587		
Propane			32.7563		
Isobutane			14.0948		
n-Butane			79.9606		
Isopentane			52.2673		
n-Pentane			66.0752		
2-Methylpentane			45.7017		
3-Methylpentane			18.2476		
Heptane			163.010		
Octane			66.5091		
Nonane			8.30253		
Benzene			6.90660		
Toluene			26.7228		
Ethylbenzene			0.899316		
m-Xylene			2.03566		
p-Xylene			12.7066		
o-Xylene			3.02025		
n-Hexane			52.9208		
2,2,4-Trimethylpentane			12.3971		
Water			0.254417		
C10+			5356.13		
Mole Fraction			%		
Hydrogen Sulfide			0		
Oxygen			0		
Carbon Dioxide			0.00067869		
Nitrogen			5.78728E-05		
Methane			0.00792027		
Ethane			0.236409		
Propane			2.50758		
Isobutane			0.818596		
n-Butane			4.64394		
Isopentane			2.44542		
n-Pentane			3.09145		
2-Methylpentane			1.79020		
3-Methylpentane			0.714785		
Heptane			5.49151		
Octane			1.90544		
Nonane			0.218519		
Benzene			0.298470		
Toluene			0.979027		
Ethylbenzene			0.0285946		
m-Xylene			0.0647255		
p-Xylene			0.404017		
o-Xylene			0.0960314		
n-Hexane			2.07298		
2,2,4-Trimethylpentane			0.366352		
Water			0.0476713		
C10+			71.7036		
Mass Fraction			%		
Hydrogen Sulfide			0		
Oxygen			0		
Carbon Dioxide			0.00144561		
Nitrogen			7.97369E-06		
Methane			0.000625401		
Ethane			0.0349625		
Propane			0.543834		
Isobutane			0.234008		
n-Butane			1.32754		
Isopentane			0.867764		
n-Pentane			1.09701		
2-Methylpentane			0.758759		
3-Methylpentane			0.302955		
Heptane			2.70637		
Octane			1.10421		
Nonane			0.137842		
Benzene			0.114666		
Toluene			0.443964		
Ethylbenzene			0.0149308		
m-Xylene			0.0337969		
p-Xylene			0.210960		
o-Xylene			0.0501424		
n-Hexane			0.878614		
2,2,4-Trimethylpentane			0.205822		
Water			0.00422384		
C10+			88.9258		

Process Streams		Oil Flash Emissions	Sales Oil	VRT Gas	Water Flash Emissions
Properties	Status:	Solved	Solved	Solved	Solved
Phase: Light Liquid	From Block:	Oil Storage Tanks	Oil Storage Tanks	VRT	Produced Water Storage Tanks
	To Block:	--	--	--	--
Property	Units				
Temperature	°F		100		
Pressure	psia		12		
Mole Fraction Vapor	%		0		
Mole Fraction Light Liquid	%		100		
Mole Fraction Heavy Liquid	%		0		
Molecular Weight	lb/lbmol		203.320		
Mass Density	lb/ft^3		50.2644		
Molar Flow	lbmol/h		29.6243		
Mass Flow	lb/h		6023.21		
Vapor Volumetric Flow	ft^3/h		119.831		
Liquid Volumetric Flow	gpm		14.9399		
Std Vapor Volumetric Flow	MMSCFD		0.269807		
Std Liquid Volumetric Flow	sgpm		14.6947		
Compressibility			0.00808175		
Specific Gravity			0.805919		
API Gravity			40.5213		
Enthalpy	Btu/h		-4.87043E+06		
Mass Enthalpy	Btu/lb		-808.609		
Mass Cp	Btu/(lb*°F)		0.476742		
Ideal Gas CpCv Ratio			1.02620		
Dynamic Viscosity	cP		2.02514		
Kinematic Viscosity	cSt		2.51521		
Thermal Conductivity	Btu/(h*ft*°F)		0.0702428		
Surface Tension	lb/ft		0.00186007		
Net Ideal Gas Heating Value	Btu/ft^3		9975.10		
Net Liquid Heating Value	Btu/lb		18453.9		
Gross Ideal Gas Heating Value	Btu/ft^3		10639.0		
Gross Liquid Heating Value	Btu/lb		19703.0		

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

Identification		
User Identification:	Jubilee 17 NWNE PAD	
City:		
State:		
Company:		
Type of Tank:	Vertical Fixed Roof Tank	
Description:		
Tank Dimensions		
Shell Height (ft):		24.00
Diameter (ft):		12.00
Liquid Height (ft) :		20.00
Avg. Liquid Height (ft):		16.00
Volume (gallons):		16,920.59
Turnovers:		456.44
Net Throughput(gal/yr):		7,723,254.00
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)		0.05
Slope (ft/ft) (Cone Roof)		0.01
Breather Vent Settings		
Vacuum Settings (psig):		-0.03
Pressure Settings (psig)		0.03

Meterological Data used in Emissions Calculations: Cheyenne, Wyoming (Avg Atmospheric Pressure = 11.76 psia)

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

Jubilee 17 NWNE PAD - Vertical Fixed Roof Tank

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
Crude oil (RVP 5)	All	47.49	41.37	53.62	45.62	2.2374	1.9688	2.5348	50.0000			207.00	Option 4: RVP=5

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

Emissions Report for: Annual

Jubilee 17 NWNE PAD - Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Crude oil (RVP 5)	3,585.42	353.81	3,939.23