DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
Permit Application Analysis
A0001156

August 12, 2015

NAME OF FIRM:	Jonah Energy LLC
MAILING ADDRESS:	707 17th Street, Suite 2700 Denver, CO 80202
RESPONSIBLE OFFICIAL:	Chuck Cornell Senior Regulatory Lead
TELEPHONE NUMBER:	(720) 577-1251
TYPE OF OPERATION:	multiple well, gas/condensate central production facility
FACILITY NAME:	**Stud Horse Butte 6-32 Central Facility**
FACILITY LOCATION:	SE¼ NW¼ Section 32, T29N, R108W Latitude: 42.44059° Longitude: -109.74538° Sublette County, Wyoming
DATE FACILITY BECAME OPERATIONAL:	8/17/2005, startup of Stud Horse Butte 6-32 Central Facility 4/10/2015, addition of Stud Horse Butte 111-15 and 112X-15 Pending wells, Stud Horse Butte 215-15A and 215-15B
REVIEWER:	Heather Bleile, Air Quality Engineer

PURPOSE OF APPLICATION: Jonah Energy LLC has filed this application to modify the Stud Horse Butte 6-32 Central Facility with the addition of production and equipment associated with four new wells, the Stud Horse Butte 1-33, 17-33, 31-33 and 32-33.

Production and equipment for the seventy-five wells are co-located and/or shared and all associated air emissions are aggregated for permitting determinations.

PERMIT HISTORY: The Stud Horse Butte 6-32 Central Facility currently operates under Air Quality Permit, MD-16644, issued December 30, 2014. A smokeless combustion device was required to control volatile organic compound (VOC) and hazardous air pollutant (HAP) emissions associated with the condensate tanks, active produced water tanks, dehydration unit and pneumatic pumps. .

The Stud Horse Butte 1-33 Central Facility currently operates under Air Quality Permit, MD-1529, issued on February 27, 2007. A smokeless combustion device was required to control VOC and HAP emissions associated with the dehydration units and condensate tanks.

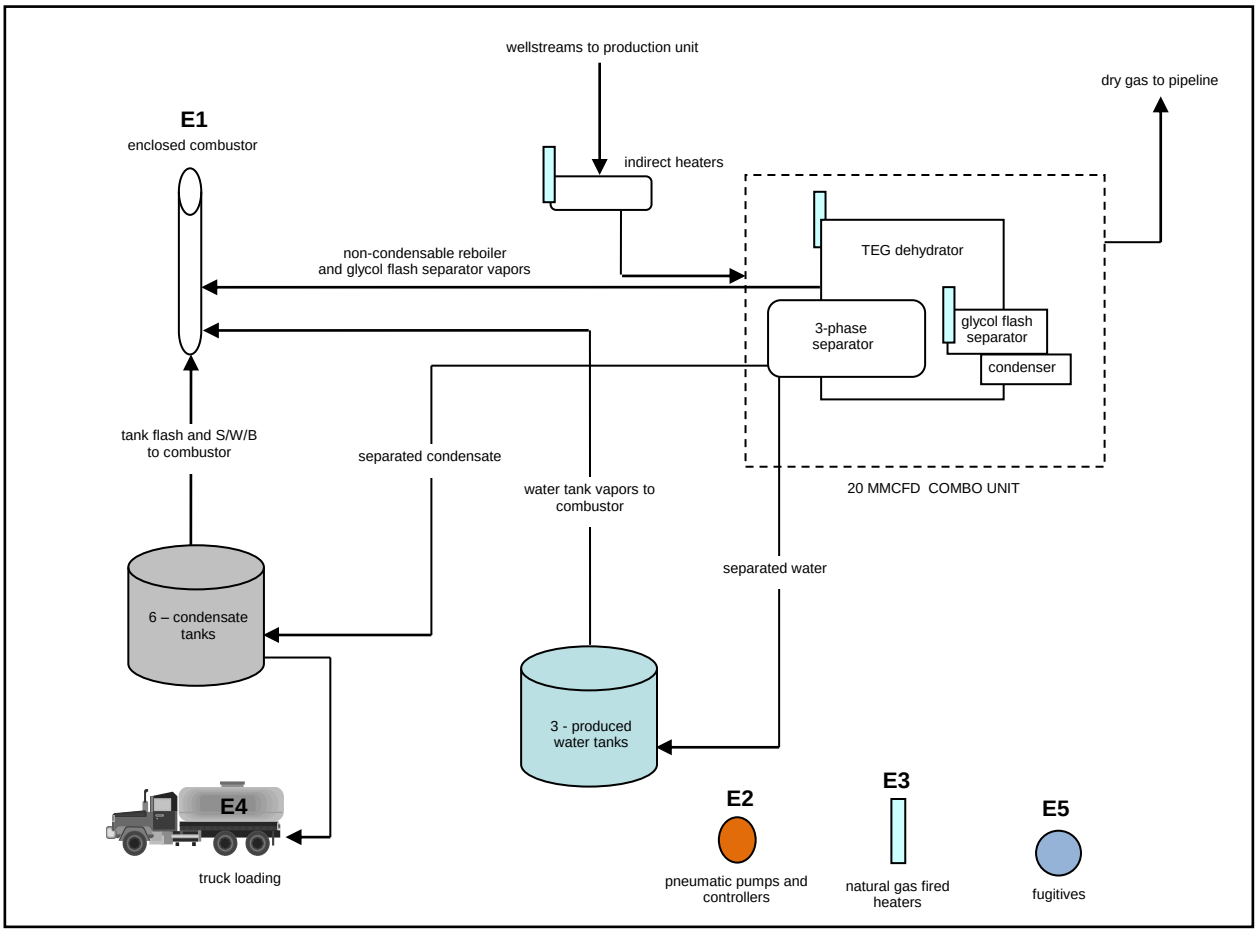
This permit shall supersede MD-16644 for the Stud Horse Butte 6-32 Central Facility and MD-1529 for the Stud Horse Butte 1-33 Central Facility.

The following equipment operates at the Stud Horse Butte 6-32 Central Facility:

- one (1) three-phase high pressure (HP) separator
- one (1) three-phase low pressure (LP) separator
- one (1) 20.0 million cubic feet per day (MMCFD) triethylene glycol (TEG) dehydration unit w/ (3) Kimray Model 20015SC glycol pumps (one spare pump), 0.75 million Btu per hour (MMBtu/hr) reboiler heater, TEG flash tank separator w/ 0.12 MMBtu/hr heater and reboiler overheads condenser
- one (1) 1.5 MMBtu/hr indirect heater
- one (1) 0.5 MMBtu/hr indirect heater
- six (6) 400-barrel (bbl) condensate tanks
- three (3) 400-bbl produced water tanks
- four (4) pneumatic heat trace circulation pumps
- nine (9) low-bleed pneumatic liquid level controllers
- one (1) smokeless combustion device w/ continuous pilot monitoring (controls condensate tank, active produced water tank, TEG flash tank, non-condensable reboiler and pneumatic pump emissions)

For future modifications at the Stud Horse Butte 6-32 Central Facility, involving the installation of equipment associated with a new well or the tying in of production associated with wells at separate locations, the permitting and emission control guidance which is specific to oil and gas production facilities in the Upper Green River Basin, revised September 2013, applies.

PROCESS DESCRIPTION: The following is a schematic representation of the production process at the facility. A complete process description is found in the permit application.



ESTIMATED EMISSIONS: (summarized in the attached tables)

condensate storage tanks:

flashing losses:

Uncontrolled VOC and HAP emissions are estimated using HYSYS process simulation software based on the average extended hydrocarbon composition of condensate from area wells and the daily condensate production rate reported by the applicant.

standing/working/breathing (S/W/B) losses:

Uncontrolled VOC emissions are estimated using EPA Tanks 4.0 software.

Controlled VOC and HAP emissions associated with flashing and S/W/B losses (**Emission Source E1, Process Flow Diagram**) are based on the reported 98% destruction efficiency of the common combustion device. Nitrogen oxide (NO_X) and carbon monoxide (CO) emissions are based on 0.14 lb NO_X/MMBtu and 0.035 lb CO/MMBtu and the volume of vapors calculated with the HYSYS software.

dehydration unit:

reboiler still vent:

Potential uncontrolled VOC and HAP emissions are estimated using GRI-GLYCalc V4.0 software based on the maximum glycol circulation rates of the Kimray Model 20015SC pumps, reported equipment operating parameters, average extended hydrocarbon composition of wet gas from area wells and the daily gas production rate reported by the applicant.

Controlled VOC and HAP emissions (**Emission Source E1, Process Flow Diagram**) were estimated in the same fashion except a condenser was added to the reboiler still vent and a common combustion device was added to the non-condensable reboiler still vent stream. The condenser is proposed to operate at 130ºF and 12 psia. The combustion device is reported to have 98% destruction efficiency. NO_X and CO emissions from the combustion of non-condensable reboiler vapors and glycol flash separator vapors are based on 0.14 lb NO_X/MMBtu and 0.035 lb CO/MMBtu and the estimated volume of vapors.

active produced water tanks: (**Emission Source E1, Process Flow Diagram**)

The Division is currently not requiring emission calculations for active produced water tanks. Vapors from the active produced water tanks are routed to the common combustion device for 98% control.

pneumatic pumps and controllers: (**Emission Source E2, Process Flow Diagram**)

Uncontrolled emissions from the pneumatic pumps are based on estimated gas consumption rates for the pumps, the VOC and HAP content of the instrument gas used and vented by the pumps and 4380 annual operating hours.

Uncontrolled emissions from pneumatic controllers are based on the manufacturer's bleed rate for each controller, the VOC and HAP content of the gas used and 8760 annual operating hours.

Controlled emissions from the pneumatic pumps are based on the reported 98% destruction efficiency of the common combustion device. Emissions from the pneumatic controllers are vented to the atmosphere.

natural gas fired heaters: **(Emission Source E3, Process Flow Diagram)**

NO_X and CO emissions are based on AP-42 EF for fuel boilers and heaters.

truck loading: (**Emission Source E4, Process Flow Diagram**)

VOC and HAP emissions are based on AP-42 EF and the projected condensate production rate.

fugitive sources: (**Emission Source E5, Process Flow Diagram**)

VOC and HAP emissions are based on EPA and API EF, the number of fugitive sources at the well sites and 75% emission reduction. The emission reduction percentage was determined by Jonah Energy LLC during the first year of implementation of their EDI&M program.

When evaluating fugitive emissions, the Division includes emissions for both current and baseline emissions. EnCana performed testing to obtain actual fugitive emissions, performs monthly inspections and receives offset credits for their fugitive emission reductions. Therefore, fugitive emissions are based on EnCana's test results rather than being deemed insignificant.

BEST AVAILABLE CONTROL TECHNOLOGY (BACT): The following table summarizes Presumptive BACT notice and control installation requirements under the 2013 Chapter 6, Section 2 Oil and Gas Production Facilities Permitting Guidance (C6 S2 Guidance).

Application, Emissions Controls, Monitoring	Date Due	Date Filed/Installed
Application	6/10/2015 (within 60-days of modification)	6/11/2015
Tank Emissions Control	4/10/2015 (upon modification)	1/17/2012
Dehy Emissions Control	4/10/2015 (upon modification)	1/17/2012
Pneumatic Heat Trace Pump Emissions Control	4/10/2015 (upon modification)	1/17/2012
Continuous Monitoring	4/10/2015 (upon modification)	1/17/2012
Water Tank Emission Control	4/10/2015 (upon modification)	4/15/2012
Low-Bleed Controllers	4/10/2015 (upon modification)	4/15/2012

The emission control, reporting and monitoring requirements under the 2013 C6 S2 Guidance have been met.

Periodic site evaluations of air pollution control equipment, institution of an annual equipment maintenance program and operator training on the proper operation of pollution control equipment have been incorporated in the conditions of this permit to ensure pollution control equipment operates effectively and meets the BACT requirements of the C6 S2 Guidance.

NEW SOURCE PERFORMANCE STANDARDS (NSPS): The condensate storage tanks at this facility are not subject to Subpart K, K_a or K_b since they are operated prior to custody transfer.

40 CFR part 60, subpart OOOO - *Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution* applies to any new, modified or reconstructed emission source installed after August 23, 2011 at oil and gas production and gas processing facilities. The Stud Horse Butte 6-32 Central Facility is subject to 40 CFR part 60, subpart OOOO as the facility was modified after the effective date.

PREVENTION OF SIGNIFICANT DETERIORATION (PSD): Under the federally enforceable conditions of this permit, emissions from this facility are less than the major source levels defined in WAQSR Chapter 6, Section 4.

CHAPTER 6, SECTION 3 (Operating Permit): Under the federally enforceable conditions of this permit, emissions from this facility are less than the major source levels defined in WAQSR Chapter 6, Section 3.

NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (MACT): Under the federally enforceable conditions of this permit, emissions from this facility are less than the major source levels of 10 TPY of any individual HAP and 25 TPY of any combination of HAPs; therefore this facility is not subject to 40 CFR part 63, subpart HH requirements for oil and gas production facilities which are major sources of HAP emissions.

Jonah Energy LLC operates glycol dehydration unit(s) which are affected area sources under 40 CFR part 63, subpart HH. Based on the information in the application, the glycol dehydration unit(s) are exempt from the control requirements of 40 CFR part 63, subpart HH for glycol dehydration units because the actual annual average flowrate of natural gas to the glycol dehydration unit is less than 85 thousand standard cubic meters (3.0 MMSCFD) or the actual average emissions of benzene from the glycol dehydration unit process vent to the atmosphere are less than 0.90 megagrams per year (1.0 tons per year). Jonah Energy LLC shall maintain records of the actual annual average flowrate of natural gas to the glycol dehydration unit or actual average emissions of benzene from the glycol dehydration unit process vent for each year of operation in accordance with 63.774(d)(1). The procedures in 63.772(b) shall be used to determine the glycol dehydration unit flowrate or benzene emissions. Jonah Energy LLC shall comply with all applicable requirements of 40 CFR part 63, subpart HH.

CHAPTER 6, SECTION 13 – NON-ATTAINMENT PERMIT REQUIREMENTS: The Stud Horse Butte 6-32 Central Facility is located in an area that has been designated as non-attainment for ozone. Since the facility is a minor source (<100 tpy of VOC based on a "Marginal" classification for the area) this permitting action is not subject to the non-attainment permitting requirements of Chapter 6, Section 13 of the WAQSR.

CHAPTER 6, SECTION 2(c)(ii) DEMONSTRATION: Jonah Energy has met the demonstration requirements under Chapter 6, Section 2(c)(ii) for this permitting action since current emissions are less than emissions during the baseline period. VOC emissions have decreased 44.1 TPY from the baseline period and NO_X emissions have decreased 2.2 TPY from the baseline period. These reductions have been added to Jonah Energy LLC's offset bank to use for future permitting actions.

PROPOSED PERMIT CONDITIONS: The Division proposes to issue an Air Quality Permit to Jonah Energy LLC for the Stud Horse Butte 6-32 Central Facility with the following conditions:

1. Authorized representatives of the Division of Air Quality be given permission to enter and inspect any property, premise or place on or at which an air pollution source is located or is being installed for the purpose of investigating actual or potential sources of air pollution and for determining compliance or non-compliance with any rule, regulation, standard, permit or order.

2. All substantive commitments and descriptions set forth in the application for this permit, unless superseded by a specific condition of this permit, are incorporated herein by this reference and are enforceable as a condition of this permit.

3. A permit to operate in accordance with Chapter 6, Section 2(a)(iii) of the WAQSR is required after a 120-day start-up period in order to operate this facility.

4. All notifications, reports and correspondence required by this permit shall be submitted to the Stationary Source Compliance Program Manager, Air Quality Division, 122 West 25th Street, Cheyenne, WY 82002 and a copy shall be submitted to the District Engineer, Air Quality Division, 510 Meadowview Dr., Lander, WY 82520. Submissions may also be done electronically through https://airimpact.wyo.gov to satisfy requirements of this permit.

5. All records required under this permit shall be kept for a period of at least five (5) years and shall be made available to the Division upon request.

6. Effective upon permit issuance, this permit shall supersede Air Quality Permits MD-16644 for the Stud Horse Butte 6-32 Central Facility and MD-1529 for the Stud Horse Butte 1-33 Central Facility.

7. Periodic training on the proper operation of equipment, systems and devices used to contain, control, eliminate or reduce pollution shall be provided to company personnel whose primary job is to regularly ensure that facility production equipment is functional. The training shall provide these personnel with the ability to recognize, correct and report all instances of malfunctioning equipment, systems and devices associated with air pollution control. These equipment, systems and devices include, but are not limited to combustion units, reboiler overheads condensers, hydrocarbons liquids storage tanks, drip tanks, vent lines, connectors, fittings, valves, relief valves, hatches and any other appurtenance employed to, or involved with, eliminating, reducing, containing or collecting vapors and transporting them to a pollution control system or device.

8. Jonah Energy LLC shall implement an Enhanced Directed Inspection and Maintenance (EDI&M) program at the Stud Horse Butte 6-32 Central Facility in accordance with the most recent version of the EDI&M program plan, attached as Appendix A. Compliance with the EDI&M program plan constitutes a demonstration of compliance with permit conditions related to fugitive emissions from leaking equipment.

9. The EDI&M program plan may be revised administratively without reopening the permit. Revised EDI&M program plans shall be approved by the Division prior to implementation.

10. Results of all inspections, evaluations and periodic monitoring shall be documented and maintained for review by the Division upon request.

11. Vapors from all condensate tanks and all active produced water tanks, including flashing and S/W/B losses, shall be routed to the common combustion device to reduce the mass content of total HAP and VOC emissions in the tank vapors by at least ninety-eight percent (98%) by weight.

12. For the TEG dehydration unit with condenser, reboiler still vent vapors shall be routed to the condenser. Condensed reboiler still vent liquids shall be collected and routed to a liquids storage tank. The non-condensable reboiler still vent vapors and glycol flash separator vapors shall be routed to the common combustion device. The condenser and common combustion device shall reduce the mass content of total HAP and VOC emissions in the reboiler still vent and glycol flash separator vapors by at least ninety-eight percent (98%) by weight.

13. The motive gas discharge line on each pneumatic pump shall be routed into a fuel gas supply line or any gas or liquid collection line which is ultimately routed into a closed system or emission control system or each pump shall be replaced with an electric, solar or air-operated pump or other device in order to reduce VOC emissions associated with the pump discharge gas stream by at least ninety-eight percent (98%) by weight.

14. All natural gas-operated pneumatic process controllers (temperature control, pressure control, level control, flow control, etc.) shall be low or no-bleed controllers, with low bleed defined as less than six (6) cubic feet per hour vent or bleed rate, or the controller discharge streams shall be routed into a closed loop system so there are no volatile organic compound or hazardous air pollutants emitted to the atmosphere.

15. The presence of the combustion device pilot flame shall be monitored using a thermocouple and continuous recording device or any other equivalent device to detect and record the presence of the flame. Records shall be maintained noting periods during active well site operation when the pilot flame is not present. The records shall contain a description of the reason(s) for absence of the pilot flame and steps taken to return the pilot flame to proper operation.

16. Emission control equipment, including the VOC and HAP emission control systems or devices, reboiler overheads condensers and all vent lines, connections, fittings, valves, relief valves, hatches or any other appurtenance employed to contain and collect vapors and transport them to the emission control system or device, shall be maintained and operated during any time the wells are producing such that the emissions are controlled at all times. Records shall be maintained noting dates and durations of times during such operation when any VOC or HAP emissions control system or device or the associated containment and collection equipment is not functioning to control emissions as required by this permit.

17. All combustion devices shall be designed, constructed, operated and maintained to be smokeless, per Chapter 3, Section 6(b)(i) of the WAQSR, with no visible emissions except for periods not to exceed a total of five (5) minutes during any two (2) consecutive hours as determined by 40 CFR part 60, appendix A, Method 22.

18. Emissions from this facility shall not exceed the major source threshold as defined in Chapter 6, Section 3 of the WAQSR.

19. Jonah Energy LLC shall comply with all applicable requirements of 40 CFR part 63, subpart HH.

20. Jonah Energy LLC shall comply with all applicable requirements of 40 CFR part 60, subpart OOOO.

EQUIPMENT LIST

- one (1) three-phase HP separator
- one (1) three-phase LP separator
- one (1) 20.0 MMCFD TEG dehydration unit w/ (3) Kimray Model 20015SC glycol pumps (one spare pump), 0.75 MMBtu/hr reboiler heater, TEG flash tank separator w/ 0.12 MMBtu/hr heater and reboiler overheads condenser
- one (1) 1.5 MMBtu/hr indirect heater
- one (1) 0.5 MMBtu/hr indirect heater
- six (6) 400-bb) condensate tanks
- three (3) 400-bbl produced water tanks
- four (4) pneumatic heat trace circulation pumps
- nine (9) low-bleed pneumatic liquid level controllers
- one (1) smokeless combustion device w/ continuous pilot monitoring (controls condensate tank, active produced water tank, TEG flash tank, non-condensable reboiler and pneumatic pump emissions)

Offset Requirements

Emissions / Production	VOC (TPY)	NO_X (TPY)
Current Actual Emissions (105 BPD and 13 MMCFD)	7.9	3.4
Baseline Emissions (169 BPD and 21.8 MMCFD)	52.0	5.6
Difference	-44.1	-2.2
Offset Required	**none**	**none**

EMISSIONS SUMMARY

Stud Horse Butte 6-32 Central Facility

105 BPD total condensate and 13 MMCFD total gas [1]

seventy-five wells: Stud Horse Butte 6-32, 10-32, 11-32, 27-32, 37-32, 38-32, 42-32, 44-32, 51-32, 52-32, 53-32, 54-32, 55-32, 59-32, 60-32, 61-32, 62-32, 90-32, 98-32, 109-32, 110-32, 111-32, 123-32, 124-32, 56-32, 57-32, 9-32, 15-32, 49-32, 50-32, 63-32, 64-32, 66-32, 67-32, 71-32, 13-32, 14-32, 58-32, 69-32, 72-32, 74-32, 75-32, 76-32, 77-32, 78-32, 93-33, 99-33, 41-33, 5-33, 6-33, 7-32, 7-33, 8-33, 33-33, 34-33, 35-32, 35-33, 36-32, 36-33, 37-33, 38-33, 39-33, 42-33, 43-33, 44-33, 45-33, 46-32, 46-33, 47-33, 48-33, 52-33, 1-33, 17-33, 31-33 and 32-33

SOURCE	EMISSIONS (TPY) [2]			
	VOC	HAP	NO_X	CO
Dehydration Unit				
POTENTIAL	160.6	78.5		
CONTROLLED	1.3	0.4	0.5	0.1
Condensate Tanks				
UNCONTROLLED	126.5	4.9		
CONTROLLED	2.5	0.1	0.8	0.2
Pneumatic Pumps				
UNCONTROLLED	26.1	0.9		
CONTROLLED	0.5	insig	0.8	0.2
Process Heaters	insig	insig	1.3	1.1
Truck Loading	1.6	0.1		
Fugitives [3]	0.8	0.1		
Pneumatic Liquid Level Controllers	1.2	insig		
Total Uncontrolled Facility Emissions	**316.8**	**84.5**	**1.3**	**1.1**
Total Controlled Facility Emissions	**7.9**	**0.7**	**3.4**	**1.6**

[1] daily production reported by the applicant
[2] rounded to the nearest 0.1 ton
[3] EnCana is implementing an EDIM program for reducing fugitive emissions. Based on test results, implementation of the EDIM program results in a 75% reduction in fugitive emissions

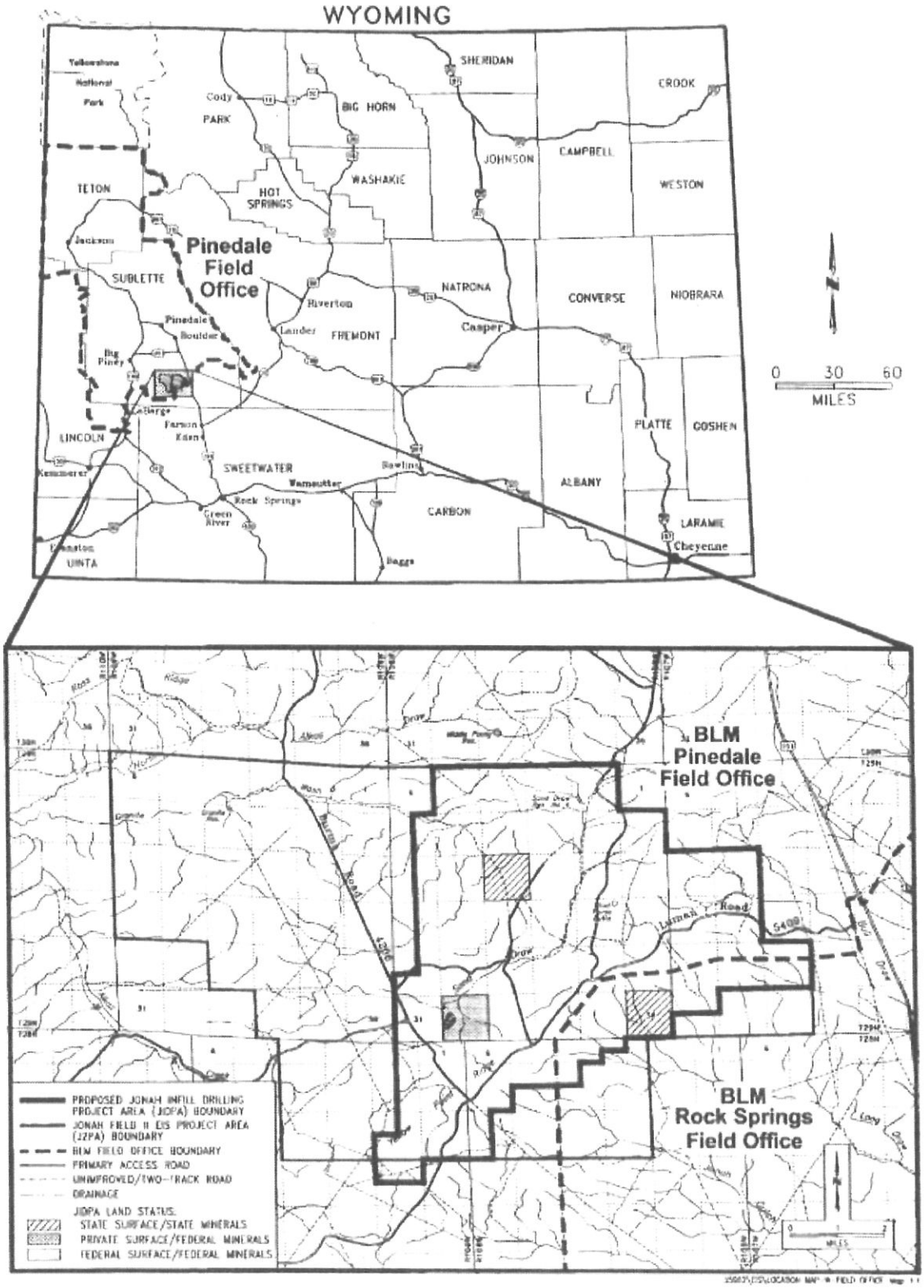
Appendix A

EDI&M Program Plan

encana natural gas	Encana Enhanced Directed Inspection and Maintenance Program Plan for the Jonah Field	Revision#: EDI&M ver. 6 Revised By/Date: M. Cugnetti 01/25/2012 Reviewed By/Date: M. Cugnetti, M. Shaffron 01/25/2012 Approved By/Date: M. Cugnetti, M. Shaffron, 01/25/2012

1.0 SCOPE

This voluntary emission reduction program uses a proven, cost-effective methodology of Directed Inspection and Maintenance (DI&M) to reduce emissions of Volatile Organic Compounds (VOC) from leaking equipment components at Encana Central Delivery Point (CDP) and stand-alone wellhead facility locations in the Jonah Field including the Jonah Infill Development Project Area (JIDPA) and the Normally Pressured Lance (NPL) areas. All existing and new wellhead production facilities located within the boundaries of the JIDPA and NPL are subject to this program. The methodology herein includes a monthly FLIR GF Series camera screening inspection of all Encana CDP and single well facility locations in Jonah to identify leaking equipment, quantification of identified leaks using HI Flow Samplers, and subsequent documented and verified repair of leaking equipment components. The inspections conducted and the data collected in the program database will replace the previously permitted requirement for vapor collection system compliance certifications. Encana's dedicated Enhanced EDI&M Program Team is comprised of a EDI&M Program Coordinator and four full time Inspectors with equipment necessary to effectively implement the program in the Jonah field. When successfully implemented, the Enhanced EDI&M program is targeted to achieve a significant reduction in actual fugitive VOC emissions released from Encana CDP facility and single well facility locations into the air shed within Sublette County. This plan provides Environmental Technicians with a safe and consistent manner to inspect Encana facility locations in the Jonah Field where there are units, combustors and tanks on site. The JIDPA consists of 109W & R110W in T34N, R109W & R110W in T33N, R108W, R109W & R110W in T32N, R108W, R109W & R110W in T31N, R107W, R108W & R109W in T30N, R107W, R108W & R109W in T29, R108W &R109W in T28N, and R107W, R108W & R109 W in T27N. The location of the JIDPA is shown in the map below. The NPL consists of T27N, R107W - (Sec 6-7: ALL, Sec 18-19: ALL, Sec 30-31: ALL), T27N, R108W - (Sec 1-36: ALL), T27N, R109W - (Sec 1-6: ALL, Sec 8-16: ALL, Sec 22-27: ALL, Sec 34-36: ALL), T28N, R107W - (Sec 5-8: ALL, Sec 17-19: ALL, Sec 30-31: ALL), T28N, R108W - (Sec 1-2: ALL, Sec 3: E2, SW, Sec 8: S2, Sec 9: S2, NE, Sec 10-17: ALL, Sec 18: E2, Sec 19-36: ALL), T28N, R109W - (Sec 2: W2, Sec 3-10: ALL, Sec 11: W2, Sec 14: NW, Sec 15-22: ALL, Sec 23: S2, Sec 24-36: ALL), T28N, R110W - (Sec 1-36: ALL), T29N, R107W - (Sec 31: S2, Sec 32-33: ALL), T29N, R108W - (Sec 6: ALL, Sec 7: W2, Sec 18: W2, Sec 19: W2, Sec 30: NW), T29N, R109W - (Sec 1-36: ALL), and T29N, R110W - (Sec 21-29: ALL, Sec 32-36: ALL). The location of the NPL is located directly to the south of the JIDPA on the map below.


WYOMING
Pinedale Field Office
SHERIDAN
CROOK
BIG HORN
Cody
PARK
JOHNSON
CAMPBELL
WESTON
WASHAKIE
HOT SPRINGS
TETON
SUBLETTE
NATRONA
CONVERSE
NIOBRARA
Riverton
Lander
FREMONT
Casper
Pinedale
Boulder
Big Piney
LINCOLN
Kemmerer
SWEETWATER
Rock Springs
Green River
CARBON
ALBANY
PLATTE
GOSHEN
LARAMIE
Cheyenne
UINTA
0 30 60
MILES
BLM Pinedale Field Office
BLM Rock Springs Field Office
PROPOSED JONAH INFILL DRILLING PROJECT AREA (JIDPA) BOUNDARY
JONAH FIELD II EIS PROJECT AREA (JIPA) BOUNDARY
BLM FIELD OFFICE BOUNDARY
PRIMARY ACCESS ROAD
UNIMPROVED/TWO-TRACK ROAD
DRAINAGE
JIDPA LAND STATUS:
STATE SURFACE/STATE MINERALS
PRIVATE SURFACE/FEDERAL MINERALS
FEDERAL SURFACE/FEDERAL MINERALS

2.0 REQUIREMENTS

Inspectors shall be trained and qualified in the operation of a FLIR GF series infrared camera. The inspector shall have a current certification in Infrared Thermography with a FLIR GF series infrared camera. The inspector shall be trained on the Hi Flow Sampler, LEL monitor, and be knowledgeable of the EDI&M database operation. Each EDI&M Inspector shall be capable of reading and interpreting a JSA for required tasks. A proficiency of this SOP must be demonstrated.

3.0 APPLICABLE DOCUMENTS

3.1 JSA Form
3.2 EDI&M electronic inspection Form
3.3 GF Series Camera Sensitivity Check Form
3.4 HI Flow Sampler Calibration Form

4.0 DEDICATED RESOURCES

4.1 PERSONNEL
- **4.1.1** Full time program personnel
  - **4.1.1.1** 1 EDI&M coordinator
  - **4.1.1.2** 4 inspectors
- **4.1.2** Support personnel for repairs
  - **4.1.2.1** Pumpers/lease operators
  - **4.1.2.2** Construction coordinator
  - **4.1.2.3** Contractor crews hired by the construction coordinator
- **4.1.3** Support personnel to assist with the program
  - **4.1.3.1** Database designer and maintenance
  - **4.1.3.2** Data QA manager

4.2 EQUIPMENT
- **4.2.1** Vehicles
  - **4.2.1.1** 4 inspection trucks
- **4.2.2** Calibration/Sensitivity Check
  - **4.2.2.1** 100% Methane
    - **4.2.2.1.1** Regulator and flow meter for camera sensitivity check
    - **4.2.2.1.2** Demand regulator for HI Flow Sampler calibration
  - **4.2.2.2** 2.5% Methane

4.2.2.2.1 Demand regulator for HI Flow Sampler calibration

4.2.3 Inspections/Repair

4.2.3.1 4 FLIR GF infrared cameras

4.2.3.1.1 Charged battery (will last 4 hours)

4.2.3.1.2 Spare charged battery

4.2.3.1.3 Charger

4.2.3.2 4 Bacharach HI Flow Samplers

4.2.3.2.1 Charged battery (will last all day)

4.2.3.2.2 Spare charged battery

4.2.3.3 4 anemometers with humidity sensor

4.2.3.4 4 LEL monitors

4.2.3.5 4 Laptop computers

4.2.3.6 4 cell phones

4.2.3.7 Gas Leak tags and information tags

4.2.3.7.1 Stainless steel wires for tags

4.2.3.8 Hand tools

4.2.3.9 Spare thief hatch gaskets

4.2.3.10 Rags

4.2.3.11 Teflon tape

4.2.4 Safety

4.2.4.1 Minimum required Personal Protective Equipment

4.2.4.1.1 Hard hat

4.2.4.1.2 Safety toe work boots

4.2.4.1.3 Safety glasses

4.2.4.1.4 Fire retardant clothing

4.2.4.1.5 Cotton or FRC gloves

4.2.4.1.6 Respirator

4.2.4.1.7 LEL monitor

4.3 SYSTEMS

4.3.1 IMS system for issuing Hazard ID's

4.3.2 ACCESS Database for program recordkeeping and reporting

4.3.3 FLIR Video Report Software for video formatting

4.3.4 Dedicated server for video storage

5.0 SAFETY AND ENVIRONMENT

5.1 Encana Oil & Gas (USA), Inc. is committed to providing a safe, healthy and environmentally sound workplace. Our culture deems these to be core values around which our business revolves. We accomplish these principles through teamwork, open communications and training. The safety of our employees, contractors, visitors and neighbors is vital to our success. The employees and contractors fully understand and abide by all safety practices, procedures and guidelines. It is through this understanding and commitment that we will accomplish our goal of being injury free. Working

in the Jonah Field has many inherent hazards. The most frequent hazards encountered while performing the EDI&M are mentioned below but there are many more. You have the right and the responsibility stop any job or task when you observe unsafe conditions or unsafe acts.

5.2 Driving

- **5.2.1** Do not use cell phones while driving
- **5.2.2** Do not exceed the posted speed limit
- **5.2.3** Drive defensively and be cautious of larger vehicles that may not be able to see you

5.3 EDI&M inspectors will be working in environmental conditions ranging from sub zero temperatures to high 90's where wet, cold, icy and/or windy conditions may be encountered.

- **5.3.1** Appropriate clothing and precautions should be considered before working at the locations in the Jonah Field.

5.4 Explosive atmosphere can occur in CDP units, in wellhead huts, on tanks, or anywhere in the field if a large gas release occurs.

- **5.4.1** LEL monitors should be worn when conducting inspections at locations in the Jonah Field and the area to be inspected should be checked for an atmosphere above the LEL.
- **5.4.2** CDP units and wellhead huts should be opened and aired out before entry.
- **5.4.3** Leave cell phones in your vehicle.

5.5 Possible trip hazards exist everywhere.

- **5.5.1** Be aware of your surroundings at all times especially when operating an infrared camera.
- **5.5.2** Remember to be careful when viewing and walking.
- **5.5.3** Do not use camera when climbing or descending stairs.
- **5.5.4** Do not use camera while entering or exiting a building or unit.
- **5.5.5** Take every precaution to prevent the camera operation from being a distraction from what you are doing and where you are at.

5.6 Possible inhalation hazards exist on tanks and in units.

- **5.6.1** Wear respiratory protection when opening tanks to work on thief hatches.

5.7 Wear minimum required Personal Protective Equipment

- **5.7.1** Hard Hat
- **5.7.2** Safety toe work boots
- **5.7.3** Safety glasses

5.7.4 Fire retardant clothing that is suitable for current weather conditions

5.7.5 FRC or cotton gloves

5.7.6 LEL monitor

5.7.7 Respirator

6.0 CALIBRATION

6.1 Although the FLIR GF series camera does not have specific parameters or functions that are subject to calibration, the sensitivity level of the camera can be determined and checked on a regular basis. To conduct this sensitivity check, a known concentration of gas is released at a known flow rate. The camera is set up at a known distance, not to be exceeded during inspections, from the point of release of the known concentration gas. When an image of the gas emission is seen through the camera view finder, the sensitivity has been verified. The source of the gas emission will also be subjected to a fan created wind draft. This draft will be increased until the gas emission can no longer be seen. This wind speed will not be exceeded during inspections. Each GF series camera will undergo a sensitivity check once per week.

6.2 Camera Sensitivity Check Procedure

6.2.1 Start the GF series camera according to the manufacturer's instructions. Put the camera into AUTO mode.

6.2.2 Use 100% methane of at least 98% purity for the sensitivity check.

6.2.3 Apply a flow meter in Liters (1-5 Liter per minute) to the regulator on the methane cylinder.

6.2.4 Set up the GF series camera at a maximum distance necessary for the inspections, 10 feet from the outlet of the flow meter (this distance is not to be exceeded for imaging during the inspections.)

6.2.5 Use the Camera Sensitivity Check Calculator to determine the gas flow rate for the Sensitivity Check. (approximately 2 LPM)

6.2.6 Open the valve on the flow meter to the calculated flow rate while observing and recording the gas flow image on the GF series camera.

6.2.7 Once the flow rate sensitivity check has been verified, set up a fan to blow on the source of the gas emission. Increase wind speed, measured with an anemometer, until the emission is no longer visible. Determine the highest wind speed at which the emission is visible. This wind speed will not be exceeded during inspections while viewing from 10 feet away.

6.2.8 Repeat the wind speed sensitivity check at 5 feet and 2 feet to determine maximum wind speed for inspections from these distances. This step is optional.

6.2.9 Document the sensitivity check with the sensitivity check form (hard copy in camera storage room and electronic in the system) recording date, inspector, gas used, flow rate, distance, video ID, lens size, camera thermal tuning settings (Auto or Manual and integration setting), wind speed, temperature and pressure. (video ID naming convention: CAL Camera# DATE video#) example: CAL 4 2-24-10 1

6.2.10 Store the video in the EDI&M Sensitivity Check video file

6.3 HI Flow Sampler Calibration Procedure

6.3.1 The Hi Flow Sampler will be calibrated, as suggested by the manufacturer, once per month.

6.3.2 The following equipment, set-up shown in Figure 6.3 -1, is needed to check calibration and to perform a calibration procedure on the Hi Flow Sampler.

6.3.2.1 Calibration Gas Cylinders

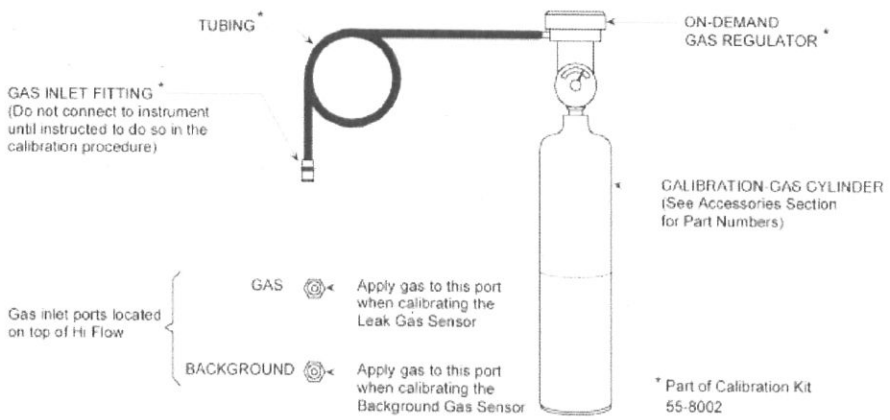
6.3.2.1.1 2.5% Methane

6.3.2.1.2 100% Methane

6.3.2.2 Tubing with gas inlet fitting

6.3.2.3 On-Demand gas regulator

Figure 6.3 -1. Calibration Equipment Setup



6.3.3 Check Calibration procedure

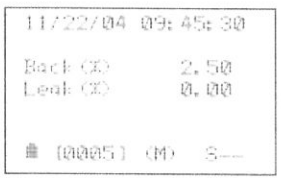
6.3.3.1 This procedure checks the calibration of both the leak-gas sensor and the background-gas sensor using 2.5% methane and 100% methane. After setting up the calibration equipment as described above, proceed to check the instrument's sensor calibration as follows.

6.3.3.2 Before turning on the instrument, be sure that the calibration equipment is not connected to the instrument's **GAS** or **BACKGROUND** inlet port, and that the instrument is in an area of clean air.

6.3.3.3 Turn on the instrument and wait for its warm-up period to complete before proceeding with step 6.3.3.4.

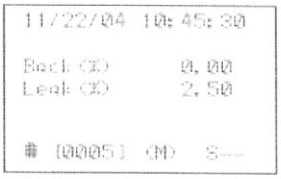
6.3.3.4 Apply 2.5% methane from the calibration equipment to the instrument's **BACKGROUND** inlet port.

6.3.3.5 From the Main Screen select **Menu>Calibration>Verify Calibration** to begin the calibration verification process. Observe that the gas-sampling pump motors start. Wait several minutes for the gas reading to stabilize. At this time the gas concentration shown on the display should match the concentration on the calibration gas cylinder. Write the instrument response on the Hi Flow Sampler Calibration Form and determine the percent difference. If it is less than 10% move on to step 5. If it is greater that 10%, follow the Gas Calibration Procedure below.



6.3.3.6 Disconnect the hose from the **BACKGROUND** inlet port and connect it to the **GAS** inlet port.

6.3.3.7 Again wait several minutes for the gas reading to stabilize. At this time the gas concentration shown on the display should match the concentration stamped on the calibration gas cylinder.



6.3.3.8 Disconnect the hose from the **GAS** port, and then allow the pumps to run until both the **Back** and **Leak** readings on the display fall to zero percent.

6.3.3.9 Repeat this process with 100% methane calibration gas. Write the instrument response on the Hi Flow Sampler Calibration Form and determine the percent difference. If it is less than 10% the calibration is complete, save the Hi Flow Sampler Calibration Form in the system. If it is greater that 10%, follow the Gas Calibration Procedure below.

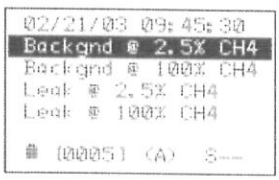
6.3.4 Gas Calibration procedure

6.3.4.1 This procedure calibrates both the leak-gas sensor and the background–gas sensor at 2.5% and 100% methane. After setting up the calibration equipment as described in the set-up section, proceed to calibrate the sensors as follows.

6.3.4.2 Before turning on the instrument, be sure that the calibration equipment is not connected to the instrument's **GAS** or **BACKGROUND** inlet port, and that the instrument is in an area of clean air.

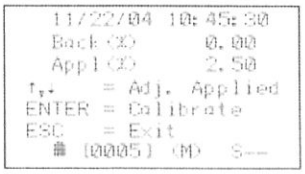
6.3.4.3 Turn on the instrument and wait its warm-up period to complete before proceeding to step 3.

6.3.4.4 From the Main Screen select **Menu>Calibration>Calibrate Sensors** to display the Sensor Calibration Screen.



6.3.4.5 Using the ▲▼ keys, highlight the sensor to be calibrated along with its gas concentration.

6.3.4.6 Apply the appropriate level of calibration gas from the calibration equipment to the instruments appropriate **GAS** or **BACKGROUND** inlet port. Then press the **I/O** < ┘ key to start the calibration process. Observe that the gas sampling pump motors start and the calibration screen appears.



6.3.4.7 If necessary, use the ▲▼ keys to adjust the **Appl (%)** reading to match the concentration of the gas cylinder.

6.3.4.8 Wait until the measured gas reading stabilizes, then press the **I/O** < ┘ key to calibrate the actual gas reading to that of the applied reading. The message "**Calibration Passed!**" Will appear at the bottom of the screen if the calibration was successful. If, however, the calibration was not successful, the message "**Calibration Failed!**" will appear. Refer to instrument manual for troubleshooting guidance for this failure.

6.3.4.9 Disconnect the gas hose, and wait until the measured gas reading falls to zero %.

6.3.4.10 Press the **ESC** key to return to the Calibration Menu Screen.

6.3.4.11 Repeat this procedure as necessary to calibrate both sensors at 2.5% and 100% methane.

6.3.4.12 Write the instrument response on the Hi Flow Sampler Calibration Form and save the Hi Flow Sampler Calibration Form in the system.

6.3.5 Condensate Flash Gas Response Curve

6.3.5.1 Describe the process to make HI Flow response curve to condensate flash gas.

6.3.5.2 Due to the different composition of flash/waste gas from field gas, the response of the HI Flow Sampler to flash/waste gas is different than that of field gas which is mostly methane. To compensate for this difference in response a flash/waste gas response curve shall be created.

6.3.5.3 A sample line shall be connected to a condensate tank. The pressure from the tank will force the flash/waste

gas through the sample line to a rotometer with a valve. The gas shall be measured with a methane calibrated HI Flow sampler at several different flow rates and the response shall be recorded.

6.3.5.4 A response factor will be determined to apply to any flash/waste gas leaks measured with the HI Flow Sampler.

7.0 PROCEDURE

7.1 General Process

7.1.1 Fugitive gaseous emissions are identified by the EDI&M Inspector with a FLIR GF series infrared camera and using sensory observation during routine monthly facility screening inspections.

7.1.2 Leaking components are assigned a Leak ID number and tagged.

7.1.3 Gaseous leak rates of tagged components are measured using a Hi Flow® Sampler operated by the EDI&M Inspector.

7.1.4 The EDI&M Inspector documents the name of the facility, date of inspection, description of the leaking component, and the measured leak rate, and assigns a Leak ID number to each leaking component.

7.1.5 After each leaking component has been identified, tagged, and the leak rate has been measured at a CDP facility, the EDI&M Inspector will, as deemed safe and allowable by the Encana Jonah Operations Team, make a first attempt at repair of each leaking component. The EDI&M Inspector will assess the effectiveness of each attempt at repair using the FLIR GF series infrared camera. If the repair is confirmed to have been effective, the EDI&M Inspector shall remove the Leak ID Tag from the component and document the leak and subsequent repair in the EDI&M database.

7.1.6 If the Inspector can not repair the leak, the component shall remain tagged and the EDI&M Inspector shall notify, within 24 hours of inspection, the designated area Coordinator and two Leads assigned to the facility, who will then determine the course of action required to repair the tagged components at the facility. The repair is to be attempted by the end of next business day

from notification. If a leak is greater than 5 CFM and the inspector can not make the repair, immediate notification of the Pumper must be made and an attempt at repair must be made with in 24 hours.

7.1.7 After the Pumper or Construction has repaired a tagged component and notified the EDI&M Inspector that the repair has been attempted, the EDI&M Inspector shall return to the facility, within 24 hours of repair notification, to confirm that the attempt at repair has been successful using the FLIR GF series infrared camera, remove the identification tag from the component, and document the repair and confirmation in the EDI&M database. If the EDI&M Inspector determines that the repair of a tagged component has not been successful, the component shall remain tagged and the EDI&M Inspector shall notify the Coordinator and both leads for that area within 24 hours. They will determine appropriate further corrective actions to promote the success of further attempts at repair of the tagged component. Attempts at repair that take longer than 24 hours to repair will be noted in the database with a reason for delay. This process will continue until the repair is confirmed successful.

7.1.8 The EDI&M Inspector shall schedule and inspect each facility in their area monthly to identify leaking components in gas/vapor and light liquid service.

7.1.9 The designated EDI&M Inspector shall be responsible for routinely notifying the appropriate area Coordinator and two Leads, that leaking components requiring repair have been identified at specific facilities. The EDI&M Inspector shall coordinate the scheduling, completion, and verification of first attempts at repair with the Coordinator and two Leads via email and all other readily available means of communication deemed appropriate.

7.1.10 The EDI&M Inspector shall transfer all EDI&M Inspection data into the EDI&M database on a routine daily basis.

7.1.11 The EDI&M Inspector shall be responsible for maintaining inspection equipment, ordering equipment and supplies for the Hi Flow sampler, and for tracking expiration dates and pressures of calibration gases.

7.2 Routine Facility Inspection Procedure Details

7.2.1 The EDI&M Inspector shall plan his/her day.

7.2.1.1 Determine which locations will be inspected and the best order and route to efficiently reach them.

7.2.2 Review report from previous inspections of location and note what fugitive emissions were found.

7.2.2.1 Pay special attention to these components on this inspection.

7.2.2.2 If any component is leaking repeatedly, inform the EDI&M Coordinator.

7.2.3 The Inspector shall assemble all equipment, parts and tools needed for inspection and repair. Including replacement gaskets, rags for gasket maintenance, wrenches, etc…

7.2.4 Drive to 1st location.

7.2.4.1 Driving is the most dangerous aspect of inspections. Do not exceed the posted speed limit within the Jonah field. Drive defensively at all times.

7.2.5 Read the JSA for using the FLIR camera on a location.

7.2.5.1 Note any new hazards on the JSA. Look over the location to see if there are any special circumstances.

7.2.6 Protect the camera

7.2.6.1 Use the safety strap around your neck.

7.2.6.2 Use the lens cover when the camera is not being used.

7.2.6.3 Place the camera and case out of sight when it is left in a vehicle and lock the vehicle.

7.2.6.4 Lock up the camera in the storage room when it is left at office.

7.2.6.5 Remember that the camera costs about $85,000.00.

7.2.7 Perform a walk through of the entire location to check for a gas concentration that is above the Lower Explosive Limit.

7.2.7.1 The Inspector shall perform a pre-sweep of the location to look for any gas concentration above the LEL before you use the camera on location.

7.2.7.2 Ensure the LEL monitor is on your upper body. It must be on the outermost layer of clothing. Do not cover it with anything.

7.2.7.3 Leave the FLIR Camera and your phone in your pickup while doing your walk through with your LEL monitor.

7.2.7.4 Use a good grounding routine before touching the doors of any unit. Stand on the grating at the unit and then touch bare metal with a bare hand to eliminate static. This needs to be done each time you open the door to a unit or walk into a unit.

7.2.7.5 The Inspector shall open both doors of all combination units on location before walking into units. Open doors by walking around unit and not through them. Check the units last, after the entire location has been checked for LEL, giving the unit time to air out after opening the doors.

7.2.7.6 The Inspector shall walk on all sides of the tank battery inspecting every tank from the top to the bottom, looking for missing plugs, bolts, cracked welds, liquid leaks or spills, or anything out of the ordinary. Verify that the tank hatches are closed.

7.2.7.7 Ensure well head huts have the doors open and are given time to air out.

7.2.7.8 Leave the area immediately if you are in a LEL atmosphere.

7.2.8 Record on the electronic inspection sheet the Date, Time, Facility, Well, Inspector and the result of the Safety/LEL inspection.

7.2.9 Make weather observations and take weather measurements with the anemometer.

7.2.9.1 Measure temperature, wind speed, and humidity and note the conditions.

7.2.9.1.1 If wind speed exceeds the wind speed sensitivity check for the minimum distance, do not inspect the location outside.

7.2.9.2 Enter the weather measurements into the electronic inspection form.

7.2.10 Infrared Camera inspection of the location

7.2.10.1 Make sure the LEL monitor is on your upper body. It has to be on the outermost clothing. Do not cover it with anything.

7.2.10.2 The EDI&M Inspector shall operate the camera such that the contrast between the component and background is optimized, thereby making the fugitive emission appear more prominent in the camera's view. If the camera's AUTO mode provides poor visibility and contrast, the EDI&M Inspector may use the MANUAL mode and fine tune the camera settings by adjusting the camera's GAIN and LEVEL controls.

7.2.10.3 Do not rush and miss a leak. Emissions at any rate will be documented and the component will be tagged for repair. Once a leak is identified, record it leaking for 20 to 30 seconds on the video.

7.2.10.4 Start at the tanks. Record the inspection of hatches, VOC piping, pressure relief valves and the equalizer lines.

7.2.10.4.1 The Camera should not be at the top of the tanks when the hatches are opened to check for gasket integrity.

7.2.10.5 Record the VOC system from the ground next to the Drip pot. View the VOC line from the top of the tank down to the VOC drip pot. Then continue with BTEX line up to the unit.

7.2.10.6 Record all of the outside piping that connects to the units.

7.2.10.7 Walk over to where the VOC 4" line comes out of the ground at the combustor. Record with the camera while inspecting the line and all piping connected to the combustor.

7.2.10.8 Walk over to the units and use the camera to inspect the unit inside. If at any time the LEL monitor beeps, immediately exit the unit.

7.2.10.8.1 The following is a list of the controllers that are designed to vent and are not subject to this program if venting normally.

7.2.10.8.1.1.1 Separator dump controllers
7.2.10.8.1.1.2 Flash separator dump controllers
7.2.10.8.1.1.3 High Low controller in unit
7.2.10.8.1.1.4 High Low controller in well head hut

7.2.10.8.1.1.5 BTEX pot dump controller and 3pg valve

7.2.10.8.1.1.6 SCADA valve controllers I/P and Pulse

7.2.10.8.1.1.7 SCADA well head valve controllers I/P and solenoid

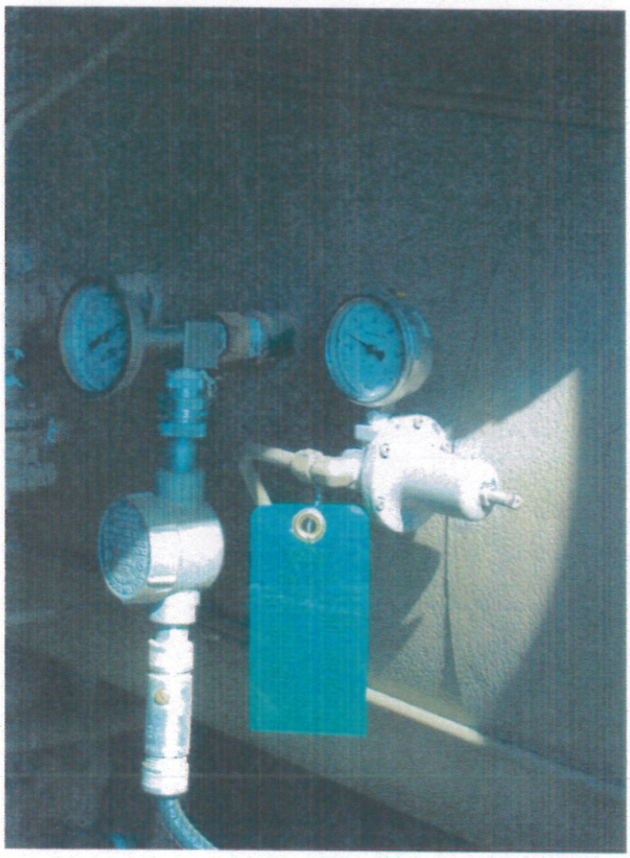
7.2.10.8.1.1.8 Big Joe, Little Joe and all other small regulators

7.2.10.9 The wellhead huts can be inspected with the camera from outside the hut on most occasions.

7.2.10.9.1 The well head huts should be opened an allowed to air out before entering or inspecting with the Camera.

7.2.10.10 After a Component with fugitive emissions has been identified, the EDI&M Inspector shall place identifying information upon a weather resistant fugitive emission Tag and attach it to the Component with fugitive emissions using bailing wire or a zip tie in a manner that will not impede day to day operation of the component. Fugitive emissions will be identified with a 19 or more digit code. The first digits will be the location name. The next 12 digits will be the date and the time. The last will be the leak # found at that location. i.e.: For the second leak found at SHB 13-26 on March 20, 2010 at 1:00 pm, the code would be SHB1326032020101330-2.

7.2.10.10.1 Tag numbers are generated on the electronic inspection forms.



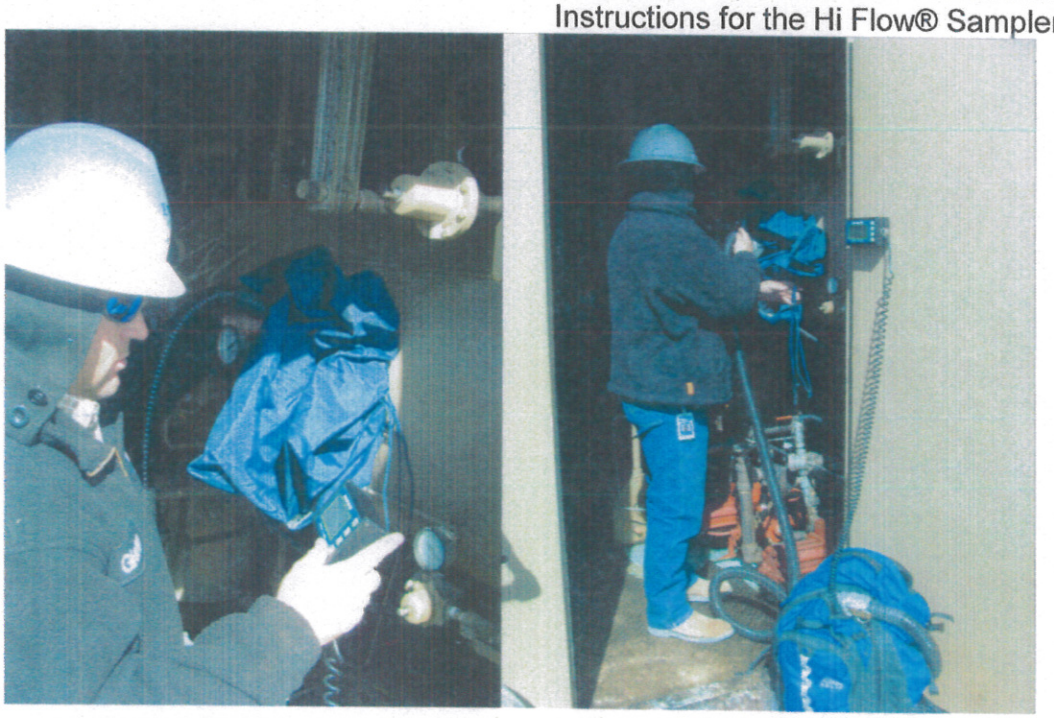
7.2.10.10.2 Tag must be an Encana Green Leak Tag and labeled with the following information

- Date of Inspection
- Inspector Name and Phone #
- Fugitive Emission ID # (i.e. 01060125101)
- Component Type
- Description of location within the facility
- Fugitive Emission Rate
- Facility Name
- Gas Stream: Field Gas or Waste Gas

7.2.10.11 The EDI&M Inspector shall record fugitive emission information on the Electronic EDI&M Inspection Form to upload to the system.

7.2.10.12 After a Component with fugitive emissions in gas/vapor service has been identified, the EDI&M Inspector shall measure the volumetric flow of the fugitive emission using the Hi Flow® Sampler.

7.2.10.12.1 The Hi Flow ® Sampler is equipped with special attachments to effect complete emissions capture and to prevent interference from other nearby sources. Depending upon the type of Component with fugitive emissions, the EDI&M Inspector shall choose the most appropriate attachment to capture the fugitive emission. For further information, the EDI&M Inspector shall refer to the Operation and Maintenance Instructions for the Hi Flow® Sampler.



7.2.10.12.2 After establishing a stable fugitive emission measurement, in CFM, the EDI&M Inspector shall record the fugitive emission rate on the Encana Green Leak Tag and on the Electronic EDI&M Inspection Form under the appropriate Leak ID#.

7.2.10.13 Once the fugitive emission has been documented and measured, any repair the Inspector is competent to make should be attempted before leaving the location.

7.2.10.14 If the Inspector can make the 1st attempt at repair or the Pumper is on site and available during the inspection, and a Component with fugitive emissions is identified, the first attempt at repair shall be made at that time.

7.2.10.15 When a first attempt at repair is made on site during inspection the EDI&M Inspector shall re-inspect the component with the camera to confirm that the first attempt at repair has been successful. If confirming a repair on the tank vapor collection system, take a video confirmation that the repaired component is not leaking and also confirm that the other components on the tank vapor collection system are not leaking. The EDI&M Inspector shall document the fugitive emission and repair in accordance with the normal recordkeeping procedures presented herein and remove the leak tag.

7.2.10.16 If no first attempt is possible or the first attempt is unsuccessful, the fugitive emissions will be reported to the area Coordinator and two Leads, within 24 hours of the inspection.

7.2.11 If the leak is greater than 5 CFM or the leak rate is too high to measure and the inspector can not make the repair, call the Pumper and EHS On-Call, then call the area Lead, if the Lead is unavailable call any Lead, if no Lead is available, call the area Coordinator. An attempt at repair must be made within 24 hours.

7.2.11.1 Complete all data entry and documentation before leaving the location.

Electronic Inspection Input Form

General		Weather		Pumper
Facility	Stud Horse Butte 13-26	Conditions	Cloudy	Cole Peterson
Well		Temp. (F)	56	Ryan McCoy
Date	05/19/2010	Wind (mph)	5	
Time	10:05	Humidity (%)	54	Construction
Inspector	Glenn Whicker	Barometric Press. (in Hg)	23.5	
Safety				
Sensory and LEL Inpection	Yes			
Comments				
Other Comments				

Issue			Tag No.	
Leak			SHB1326051920101005-1	

Location	Type	Service	Rate (cfm/gpm)	Video File Id	Notes
Tank	LP Connector	Waste Gas	0.5	SHB1326051920101005-1A	Hammer union on top of 1st water tank from stairs

Repaired	Date	Time	Time Reqd (min)	Cost of Repair	Notes
No					

Issue			Tag No.	
Leak			SHB1326051920101005-2	

Location	Type	Service	Rate (cfm/gpm)	Video File Id	Notes
Separator	LP Connector	Field Gas	0.15	SHB1326051920101005-2A	fitting nut loose on oil dump level controller

Repaired	Date	Time	Time Reqd (min)	Cost of Repair	Notes
Yes	05/19/2010	10:55	2	0	1st attempt successful
				vidID	SHB1326051920101005-2B

7.2.11.2 At the end of the day's inspections the Inspector will return to the office and upload all electronic inspection forms into the Access Database and notify the appropriate parties about the repairs needed. All inspection video will be properly named and saved in the video storage files.

7.2.11.3 Initial inspection videos that cover the entire location shall be identified with a 18 or more digit code. The first digits will be the location name. The next 12 digits will be the date and the time. Then a letter designation for CDP Facility (F) or Wellhead (W) i.e.: For the initial inspection video at SHB 13-26 CDP on March 20, 2010 at 1:00 pm, the video code would be SHB1326032020101330F. In the event that more than one video file is created for the inspection the second video for that inspection would be

called SHB1326032020101330Fa and the third would be SHB1326032020101330Fb.

7.2.11.4 For leak repair confirmation videos, use the leak ID # for the video name. If the video confirms the leak was repaired add "FINAL" to the end, i.e.: For the confirmation inspection video for the second leak found at SHB 13-26 on March 20, 2010 at 1:00 pm, the video code would be SHB1326032020101330F-2FINAL. If the confirmation video shows that the leak was not repaired the video would be named SHB1326032020101330F-2. The second confirmation video that shows that the leak was not repaired would be named SHB1326032020101330F-2a. The second confirmation video that shows that the leak was not repaired would be named SHB1326032020101330F-2b.

7.3 Repair

7.3.1.1 Repair any and all things that you can before leaving location. Repairs have to be completed that the inspector feels comfortable repairing. If the repair is under pressure of more than 50 pounds the inspector can not attempt repair. If an inspector cannot find the shut off valve before attempt is made or does not have experience with repairing a component do not attempt first repair. Call the lease operator and let them teach you to make repair. If you are not comfortable in your skills to repair, DO NOT ATTEMPT REPAIR.

7.3.2 If the Pumper is not present during the inspection and the Inspector can not make the repair, the EDI&M Inspector will send an email work order of all the repairs needed on the Pumper's route within 24 hours of inspection.

7.3.2.1 First attempt at repair should be made within 24 hours of notification if the pumper can make the attempt. If a construction crew is required for the repair, it shall be attempted by the end of the next day of business from notification. If the repair is not completed by the end of next business day a reason must be entered in the database.

7.3.2.2 Include the Pumper, the lead operators and the production coordinator for each CDP in the email.

7.3.2.3 Title the emails "Repairs". The emails must be clear and to the point. The Inspector must name the valves

and or other components with fugitive emissions so that the Pumpers know where to look. Do not generalize anything.

7.3.2.4 Ask the Pumper to email you back upon completion of the work order with the cost of repair.

7.3.2.5 All repair emails are kept in a repair folder on the Jonah S drive.

7.4 Confirmation

7.4.1 The Inspector shall return to the location of a repaired component to conduct a repair confirmation.

7.4.1.1 The Inspector will execute all safety procedures explained in the inspection portion of this plan before conducting the repair confirmation.

7.4.1.2 The Inspector will use the FLIR camera to record the repaired component and verify the fugitive emission has been fixed. If confirming a repair on the tank vapor collection system, take a video confirmation that the repaired component is not leaking and also confirm that the other components on the tank vapor collection system are not leaking.

7.4.1.3 If the component has been repaired and no emissions are visible, the leak tag will be removed.

7.4.1.4 If the EDI&M Inspector determines that the repair of a tagged component has not been successful, the component shall remain tagged and the EDI&M Inspector shall notify the Coordinator and both leads for that area within 24 hours. They will determine appropriate further corrective actions to promote the success of further attempts at repair of the tagged component. Second attempts at repair that take longer than 24 hours to repair will be noted in the database with a reason for delay. This process will continue until the repair is confirmed successful.

7.4.2 The inspector will update all confirmed repairs in the Access Database.

8.0 RECORDKEEPING

8.1 Inspection Forms

8.1.1 An electronic form has been developed for inspections. The form identifies all information to be collected during an inspection,

including weather conditions, tag number, and rate of identified fugitive emissions. The EDI&M Inspector will complete the form for each inspection at a facility during or immediately after the inspection is completed. All forms will be uploaded into the EDI&M database by the end of each day. Also by the end of each day, the EDI&M Inspector shall issue Work Orders for repair of fugitive emissions found during inspections that the Inspector could not repair. After the Work Order has been executed, the EDI&M Inspector will be notified, and the Inspector will enter the date, time and nature of the corrective action taken, into the EDI&M database. The EDI&M Inspector shall enter data related to the confirmation of the repair into the database on a daily basis.

8.1.2 Once an inspection form for a fugitive emission has been uploaded into the database, all modifications to that record, such as repair date or confirmation video ID, shall be made by accessing the database.

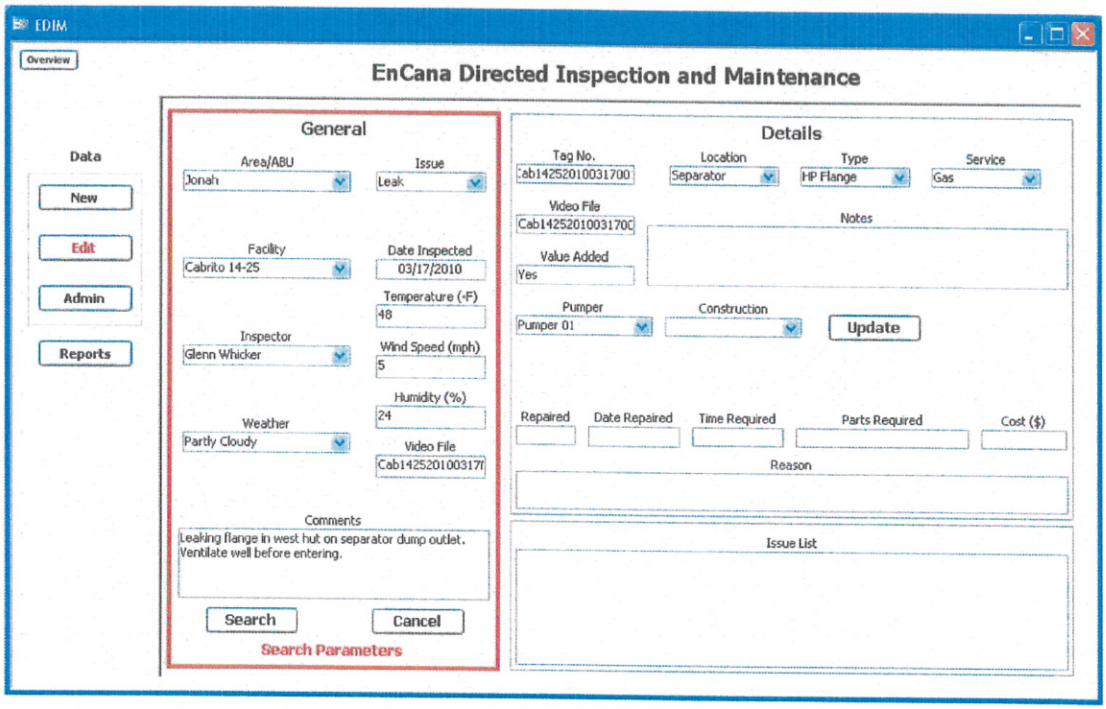
8.2 Inspection Videos

8.2.1 The EDI&M Inspector shall download FLIR camera inspection video files from the camera to the Encana local area network. The files will be cataloged by tag number. The file name of confirmation videos will identify the facility, year, month and the tag number of the leak. The file name of inspection videos for each facility will be identified in the EDI&M database. The video files will be retained for a minimum of 3 months.

8.2.2 Videos will be up loaded to the company drive: S:\Emissions Compliance\ EDI&M\EDIM tools\EDI&M Flir Video\2010\Month\Emission Route #\location.

8.2.3 Inspection Records

8.2.3.1 The EDI&M Coordinator and each EDI&M Inspector can access inspection records through a user interface into the EDI&M database by facility, date, inspector, or the leak tag number. This same interface will also be used to generate quarterly reports. Below is an example of the interface screen for the database.



8.2.3.2 The database will hold a current and historic list of all tagged leaking equipment components. The database will also contain at a minimum, the tagged identification number of all components with fugitive emissions, date the component was identified with fugitive emissions, the measured fugitive emission rate of the component, date the component was repaired, date of confirmation of repair and notes containing other pertinent information regarding the identification and repair of the component with fugitive emissions.

8.2.4 Database Security and Maintenance

8.2.4.1 A back-up of the database will be performed on a weekly basis, at a minimum; to ensure minimal loss of data should a network failure occur.

8.2.4.2 Database maintenance will be performed by select individuals from Encana's EH&S staff on a monthly basis to ensure all data is intact and remains current.

8.2.4.3 No FLIR camera inspection videos shall be sent out of the Encana network. They may only be viewed on the Encana network.

9.0 REPORTING

9.1 The results of the EDI&M will be reported to the WDEQ once per quarter. The reports will contain a great deal of information conveyed in a concise, yet transparent manner. Raw data from the EDI&M database will be submitted in Access format and a summary report will be submitted in a hardcopy form. The reports will be compiled and submitted within 30 days following the end of a calendar quarter.

9.2 The Access database submission will consist of the following items:

- **9.2.1** No Findings – condensed list of facilities
  - **9.2.1.1** Facility name
  - **9.2.1.2** Date of inspection
- **9.2.2** Findings - line item by facility
  - **9.2.2.1** Facility name
  - **9.2.2.2** Date of inspection
  - **9.2.2.3** Weather condition
  - **9.2.2.4** Wind speed
  - **9.2.2.5** Component description
  - **9.2.2.6** VOC Stream type
  - **9.2.2.7** Leak rate
  - **9.2.2.8** Tagged ID number
  - **9.2.2.9** Date(s) of repair
  - **9.2.2.10** Date of repair confirmation
  - **9.2.2.11** Date of last confirmed leak-free status
    - **9.2.2.11.1** This date will be the most recent of the following events where no leak was observed on the specified component.
      - **9.2.2.11.1.1** FLIR camera inspection
        - **9.2.2.11.1.1.1** EDI&M inspection from previous month
        - **9.2.2.11.1.1.2** New construction inspection
        - **9.2.2.11.1.1.3** Vapor recovery system certification
        - **9.2.2.11.1.1.4** WDEQ inspection
      - **9.2.2.11.1.2** Certification of vapor recovery system
      - **9.2.2.11.1.3** Water or Condensate run ticket
      - **9.2.2.11.1.4** Lease operator log book comments
      - **9.2.2.11.1.5** Other means documenting no leak present.

9.2.2.12 Duration of leak (repair date – last confirmed leak-free date)

9.2.2.13 Comment field

9.3 The hardcopy report will contain the following:

9.3.1 Unable to inspect

9.3.1.1 Facility name

9.3.1.2 Reason for not inspecting

9.3.2 Field Summary

9.3.2.1 Total number of inspections completed

9.3.2.2 Total number of leaks found

9.3.2.3 VOC fugitive emissions found by month

9.3.2.4 Annualized VOC emission reduction

9.3.2.5 Rolling 12-month VOC fugitive emissions (sum of all 9.2.3.1 for last 12 months)

9.3.2.6 Permitted fugitive emissions (649 Tons per year)

9.3.2.7 Percent fugitive emissions found (12 months) vs. permitted fugitive emissions (9.3.2.3 / 649)

9.3.3 Late repair attempts and late repairs

9.3.3.1 List of facilities that had repair attempts or repairs later than next business day

9.3.4 New Well and Modified Facility Inspections

9.3.4.1 Location and date of inspection 30 days from when production from any new well is added to a facility or a facility is modified.

9.3.5 Attachments

9.3.5.1 Summary of VOC streams and associated VOC compositions used for calculation purposes

9.3.5.2 All equations used for calculations

9.4 These reports will be reviewed for completeness, accuracy and quality by three EDI&M managers.

Jonah Enhanced Directed Inspection and Maintenance Program Plan Enforcement Agreement

I have read, understand and agree to the enforcement of the Encana Enhanced Directed Inspection and Maintenance Program Plan as written in the PERMIT AMENDMENT for all Jonah Field CDPs.

Plan Revision # 6

WDEQ Representative

Name _____

Position _____

_____

Signature and date

Encana Representative

Name Michael Cugnetti

Position NRBU EHS Lead - Air Compliance

_____ 3/5/12

Signature and date

Plan Change Approval Sheet

I have read, understand and agree to the enforceable changes made to the Encana Enhanced Directed Inspection and Maintenance Program Plan as written in the revised plan for all Jonah Field CDPs.

Plan Revision #_____

WDEQ Representative

Name_____

Position_____

_____

Signature and date

Encana Representative

Name_____

Position_____

_____

Signature and date