Petro Operating Company, LP
Blackjack Creek Treating Facility

Operations and Maintenance Plan

January 10, 2014

Change Log

Date: July 2, 2007
Reason: Revise BJC Air Pack Data Form – Appendix B, Page 10

Date: November 24, 2008
Reason: Update Chain of Command, Update Appendix A with current practices

Date: January 10, 2014
Reason: Update Compressor Engine information to be compliant with the RICE NESHAP (40 CFR 63 Subpart ZZZZ)

Scope

This document provides a description of the Operations and Maintenance program in place at Petro Operating Company's (POC's) Blackjack Creek Treating Facility (BCTF) in Jay, Florida. These procedures will provide safe and consistent operating procedures, as well as serve as a guideline for maintenance of the facility's operating and emission control equipment. By adhering to the procedures outlined in this document, it is intended that the following areas of concern will be adequately addressed:

- Protection of plant personnel and the neighboring community from personal injury
- Protection of the environment from accidental releases of process fluids and release of unnecessary emissions
- Protection of the facility from loss of production and loss of capital assets

This program is designed to meet the requirements of industry codes API RP 55, as well as Petro Operating Company guidelines, Florida Department of Environmental Protection requirements, and general industrial practice.

This document also addresses closed-loop reinjection of acid-gas, and considerations relative to the expected acceptable operating condition boundaries for utilizing this method of operation.

Process Description

The BCTF processes crude oil, water and natural gas from the Blackjack Creek Oil Field. These streams, in their natural state contain undesirable components, primarily hydrogen sulfide. The facility separates the crude oil, water, gas and hydrogen sulfide containing gases into separate streams. The produced water is sent to subsurface injection and disposal wells. The crude oil is stored in an onsite storage tank pending sale via pipeline. The gas is dehydrated in a TEG unit and then is either consumed on-site or sent to sale via pipeline.

The process may be described in more detail. The Blackjack Creek Field wells flow fluids from the Smackover formation at $\pm$ 15000' below ground surface. These fluids flow from the wellsites to the BCTF via steel pipelines. The fluids enter a three phase separator that separates the wellstream into vapor, oil, and water.

The vapor leaving the separator is natural gas, containing hydrocarbons, CO_2, N_2, H_2S and water vapor. The gas is routed to a vertical trayed contactor vessel, which causes the gas to bubble through Sulfinol. Sulfinol is utilized because it has an affinity for H_2S and thereby removes H_2S from the sour natural gas. The sweetened gas is recompressed and routed to a dehydrator contactor vessel, which removes water vapor from the gas using Triethylene Glycol (TEG); in much the same way that Sulfinol removes H_2S. The resultant sweetened and dried gas is then ready for use as a fuel or to be sold to a pipeline. Currently all gas is used for fuel to run BCTF, and is not sold to the pipeline. The TEG leaving the contactor is heated causing the water to leave the TEG, in the form of water vapor. The resultant "lean" TEG is recycled to the dehydrator contactor to repeat its function.

The oil leaving the inlet separator is routed to a crude oil stabilizer where steam is used to heat the crude in a closed fractionator vessel. The hydrogen sulfide and other light hydrocarbons are thereby vaporized and separated from the crude oil. The sweetened crude is then routed to a tank for storage until it is sold via pipeline.

Produced water is routed from the separator to a tank for storage and then pumped by high pressure centrifugal pumps to steel pipelines which transport the water back to Smackover injection or disposal wells.

The Sulfinol that absorbs the H_2S from the sour gas is heated using steam in order to release a vapor stream that is mainly H_2S, and is often referred to as "acid-gas". The resulting "lean" Sulfinol is recycled to the Sulfinol contactor where it repeats its function of sweetening the produced natural gas. The composition of this stream, ignoring water vapor is roughly 75% H_2S and 25% CO_2. In the past, a Claus sulfur recovery unit was used at BCTF to remove the sulfur from this stream. This delivered molten sulfur to a sulfur pit for sales via truck transportation. The remainder of the stream from the Claus was processed by a SCOT Unit to reduce the emissions further. Finally, the resultant stream from the SCOT was sent to an incinerator prior to atmospheric release. The new operation involves mixing the acid-gas stream with the produced water, allowing the water to absorb the acid-gas. The combined stream is then reinjected via the current injection pumps and injection wells.

The treating process at BCTF generates emissions at a number of points. Boilers burn natural gas to provide steam as a heating medium for the process. Natural gas fired internal combustion engines provide power to operate a natural gas compressor. The gas dehydrator uses natural gas for fuel and also has emissions associated with regeneration of the Triethylene Glycol (TEG). The crude storage tank also has emissions. Two flares are operated to allow for upset conditions and safer release of hydrocarbon vapors containing hydrogen sulfide. The table below shows the emissions for each point by type of emission (from Facility Wide Emissions Summary, Page 2 of Title V Permit 4/28/05)

EU	Emission Unit	NOx	CO	SOx	PM	VOC	HAP's
011	Boilers (including backup boiler)	X	X	X	X	X	
013	Engines	X	X			X	
010	Flares	X	X	X		X	
014	TEG Unit					X	X
015	Crude Storage Tanks					X	
	Slop Oil Tanks					X	

<u>Common Malfunctions and Corrective Actions, Malfunctions Requiring Shutdown or Emergency Response</u>

Common malfunctions for this facility are difficult to generalize due to the number of mechanical and electrical components used to run the process. Most malfunctions can be overcome by switching to a backup component that is built into the system, or by temporarily compensating by manually controlling the process. For instance, if a recompressor fails, there is a second unit that can be started and take over for the recompressor that has failed. Many of the rotating equipment components have backup components (See Appendix B for the rotating equipment switching report).

Malfunctions requiring shutdown of the facility include malfunctions that disable a critical portion of the process that the facility cannot operate without. For instance, a failure of the HP flare would require that the plant be shut down, because the loss of a flaring device would make the operation unsafe. Another example would be malfunction of the boilers. Without enough steam, sweetening of the oil and gas cannot occur, and the process must be shut down. Any emission control device failure could create a shutdown situation if it malfunctions and the duration of excess emissions is expected to exceed the permitted amounts or time limits, and authorization is not specifically received from the DEP for longer durations.

Malfunctions requiring immediate shutdown and emergency response include any situation that presents eminent danger to life. The most likely emergency response would be any significant release of fluids containing H_2S. This could occur due to failure of a pipeline, vessel, or failure of any component handling H_2S fluids. API RP 55 is the minimum benchmark standard adopted by BCTF for operating practice. Other emergency responses that would require immediate shutdown include fire, explosions, acts of terrorism, or extreme weather conditions.

Chain of Command and Contacts

- The chain of command for Petro Operating Company's BCTF operations is shown below:

Corporate Headquarters - Houston Office
Harlan H. Chappelle
President, Petro Operating Company, LP

Blackjack Creek Treating Facility Operations
Marty Lee
Plant Superintendent

Mike Wetzel
Backup Plant Superintendent

Don Belveal, David Ellis, Terry Slade, Terry Strength
Senior Operators

Engineering
Dale Hayes, Michael Ellis,
Eric Ecklund, Mark Jaggers
Engineers

- Contact addresses and telephone numbers are shown below:

Houston Office:	Petro Operating Company, LP 15415 Katy Fwy Suite 800 Houston, TX 77094	281.530.0991 281.530.5278 fax
Facility Location:	Blackjack Creek Treating Facility	850.675.4494 850.675.4209 fax 850.675.4061 plant office

Personnel List:	Office	Cellular	Home
Michael Ellis	281.530.0991	713.501.5552	281.579.0878
Marty Lee	850.675.4494	850.712.6895	850.675.4418
Mike Wetzel	850.675.4494	850.324.6271	850.675.3046
Dale Hayes	281.530.0991	713.724.2369	281.980.9617
Mark Jaggers	281.943.1376	281.979.4841	281.578.6889
Eric Ecklund	281.530.0991	713.444.5108	281.579.6978
David Reisdorf	281.530.0991	928.978.9144	928.474.5385
Hal Chappelle	281.530.0991	770.833.1215	281.681.1168

Operations Procedures and Policies

The procedures and policies listed below provide the basis for safe, consistent, and efficient operations at the Blackjack Creek Treating Facility.

- *Florida Department of Environmental Protection - Oil and Gas Regulations*

A copy of the Florida DEP Oil and Gas Rules (62C-25 through 62C-30, FAC) is maintained in the facility control room for reference purposes.

- *Emergency Contingency Plan and Spill Prevention Plan*

The H_2S Emergency Contingency Plan and Spill Prevention Plan are located in the control room for ready reference. The facility supervisor also maintains a copy with him at all times for use in case an event occurs. Telephone numbers and procedures are detailed for the appropriate contacts and responses to be taken.

- *H_2S Safety Training*

Pursuant to API RP 55, Petro Operating personnel assigned to the Blackjack Creek plant maintain valid H_2S safety training certification.

- *Visitor Safety Orientation*

Pursuant to API RP 55, visitors to the Blackjack Creek site are provided general safety orientation and provided a written safety orientation form for their reference.

- *Personnel Protective Equipment*

Pursuant to API 55, personnel protective equipment is strategically placed throughout the plant and plant personnel have received instruction regarding the use of the equipment. Minimum PPE requirement for employees and visitors to the process unit include the following:

  - Hard Hat meeting the ANSI Z89.1-2003 standard
  - Safety Glasses
  - H_2S Monitor
  - Sturdy Work shoes are recommended

- *Safe Work Practices*

Safe work practices for potentially dangerous activities, such as Confined Space Entry, Hot Work, Lock Out / Tag Out, Vehicle Entry, etc., are formalized and detailed procedures followed.

- *Operating Procedures*

Written operating procedures, including start-up, shut down, and purging, are provided in the plant's control room for the Oil Processing Facility, Salt Water Injection Facility, and the Waterflood facility.

- *New Operator Training*

New operators are trained in proper facility operating procedures by a number of methods. These include reviewing written operating procedures, walking down the facility, and on-the-job training working side by side with experienced operators as they perform their everyday tasks.

- *Operational Safety*

The safety of plant personnel, as well as that of the surrounding community, is of paramount importance to Petro Operating Company. All work practices are performed in accordance with the safety procedures outlined in the Petro Operating Company Safety Manual. A Monday morning safety meeting is required to occur every week. The major topics covered by this meeting are: 1) Any new safety issues or concerns, 2) Status of prior safety issues or concerns, 3) Safety Topic of the Week discussion (to address any relevant and/or expected upcoming events). Additionally, a monthly safety meeting is conducted to review Health, Safety, and Environmental policies and other topics as deemed necessary by the facility management.

- *Housekeeping*

Housekeeping is important to the safety and efficiency of the BCTF. A written housekeeping plan is located in the Control Room and addresses the relevant housekeeping issues for the facility.

- *Idle Equipment*

Any equipment not in use, and having no future utility will be removed, in compliance with Florida regulations (F.A.C. 62C 25-30). Any equipment not in use, but having future utility will be labeled “temporarily out of service”.

- *Title V Emission Units*

This facility is subject to Title V Permit Number 1130014-001-AV. A copy of this permit is maintained in the control room of the facility, as well as the plant superintendent’s office, for reference purposes. This O&M Plan addresses the emission units in the subject permit and describes the practices and requirements necessary to maintain these units to control emissions.

- *Plan Reevaluation / Modification Frequency*

This plan must be current and address all issues to serve its purpose. This plan will be reevaluated and any necessary modifications will be made at least once every 12 months. In addition, the plan will also be modified immediately if operating conditions change significantly or if equipment changes or modifications require changes in this plan. In addition, the plan will be modified as needed to address any new issues or concerns as they become visible.

Maintenance Program Procedures

All maintenance records are to be maintained at the facility in a filing system designed for easy audit of compliance. A maintenance scheduling system will be employed to provide a method to track compliance of operations with the required routine maintenance schedules.

The following maintenance procedures for plant equipment, listed below by equipment category, are covered in the Operations and Maintenance Plan for this facility.

- *Flowing Wells and Flow lines*

Applicable Codes: API 510 / API RP 55 / State of Florida

Maintenance requirements:

Type of maintenance	Frequency	Comments
Mechanical Integrity Testing	Per state requirements	Documentation maintained in the Plant Superintendent's Office
External Inspection	Periodic inspection required	Undocumented inspection, conducted daily during field operator rounds
Wellhead Equipment (valves, pressure gauges, safety controls)	Per state requirements.	See Appendix A for details

- *Pressure Vessels and Storage Tanks*

Applicable Codes: API 510 / API RP 55

Maintenance requirements:

Type of maintenance	Frequency	Comments
External Inspection	Every 5 years	Documentation maintained in the Plant Superintendent's Office
Internal Inspection	10 years, or 1/2 of remaining vessel life, whichever is less	Ultrasonic inspection for most vessels; mag flux for deaerator. Documentation maintained in the Plant Superintendent's Office.

- *Relief and Vent Systems and Devices*

Applicable Codes: API 510 / API RP 55

Maintenance requirements:

Type of maintenance	Frequency	Comments
Test/Repair as required	Every 5 years or more frequently	Valves w/ history of failures to be tested more frequently. Documentation maintained in the Plant Superintendent's Office.

- *Emergency Shutdown Systems (ESD)*

Applicable Codes: Plant policy

Maintenance requirements:

Type of maintenance	Frequency	Comments
Test/Repair as required	Perform functional check during scheduled turnaround shutdowns	ESD's must be repaired at once if found defective. Documentation of repairs maintained in the Plant Superintendent's Office.

- *Instruments and Controls*

Applicable Codes: API RP 55 / Plant policy

Maintenance requirements:

Type of maintenance	Frequency	Comments
All maintenance for General Instrumentation	Maintained per appropriate manufacturer's recommendations	See Appendix A for details
Calibration of H_2S Monitoring Instruments	At least once every 3 months	Documentation maintained in the Plant Superintendent's Office.

- *Mechanical Equipment*

Applicable Codes: Plant policy

Maintenance requirements:

Type of maintenance	Frequency	Comments
Maintenance of Seals, Lube oil system, wear parts	Maintained per appropriate manufacturer's recommendations	See Appendix A for details

➢ *Additional Regulatory Requirements for Recompressor Engines*

Applicable Codes: NESHAPs (40 CFR 63 Subpart ZZZZ)

The two existing natural gas fired, 1000 HP, 4 Stroke Lean Burn (4SLB) recompressor engines are subject to the national Emission Standard for hazardous Air Pollutatnts (NESHAPs). The applicable parts of these regulations 40 CFR 63 Subpart ZZZZ Table 2d #8 entitled "**Requirements for Existing Stationary RICE Located at Area Sources of HAP Emissions"**.

Maintenance requirements:

Type of maintenance	Frequency	Comments
Maintenance of Seals and wear parts	Maintained per appropriate manufacturer's recommendations	See Appendix A for details
Lube oil system	Establish and implement an Oil Analyses program or Change oil and filter every 2,160 hours of operation or annually, whichever comes first;[1]	See Appendix A for details
Spark Plugs	Inspect spark plugs every 2,160 hours of operation or annually, whichever comes first, and replace as necessary	See Appendix A for details
Hoses and Belts	Inspect all hoses and belts every 2,160 hours of operation or annually, whichever comes first, and replace as necessary	See Appendix A for details

[1]Sources have the option to utilize an oil analysis program as described in §63.6625(i) or (j) in order to extend the specified oil change requirement in Table 2d of this subpart.

- *Electrical Equipment*

Applicable Codes: Plant policy

Maintenance requirements:

Type of maintenance	Frequency	Comments
All maintenance for electrical equipment	Maintained per appropriate manufacturer's recommendations	See Appendix A for details

- *Personnel Protective Equipment*

Applicable Codes: Plant policy / API RP 55

Maintenance requirements:

Type of maintenance	Frequency	Comments
Breathing equipment (air packs / masks) check	Weekly visual inspection, Quarterly inspection by third party specialist vendor	
Safety Showers	Function test every eight hours	

Operations and Maintenance Specific to Emissions Compliance

- Boilers

The boilers burn natural gas to create the steam which is used as a heating medium for the process. Electrical motors are used to power blowers that blow air into the combustion chamber where the natural gas and air mix and combust. Emissions from this unit are from this combustion process. The boilers have electronic controls that shut down the boiler if sufficient air pressure and fuel gas pressure are not provided. The stack exhaust opacity and burner flame appearance is checked visually at least every shift (8 hours). Events exceeding the opacity limits are recorded and reported on the monthly flare reports. See Appendix A for other routine maintenance items. Emission limits compliance is demonstrated by maintaining records of the natural gas BTU and sulfur content, and testing the visible emissions prior to the expiration of the Title V permit. The limit for each of the boilers is 30 MMBTU/hour, operating 24 hours/day. With 1171 BTU/SCF fuel gas, the maximum gas rate is 25,612.5 SCF/hour. The opacity of the visible emissions shall not exceed 20% opacity except for one two-minute period per hour, during which opacity shall not exceed 40%.

- Engines

There are two (2) internal combustion type engines at BCTF that use natural gas and air for fuel. These engines provide power for the natural gas recompression. Only one of these two engines runs at any given time. The gas cannot be sold to the pipeline due to its high nitrogen content. The emissions in these engines are controlled by the proper mixture of air and gas and ignition of same. They have an exhaust oxygen analyzer which allows the fuel mixture to be adjusted at least once/shift (8 hours). The fuel mix setting is recorded every shift. The engine exhaust is checked visually every shift (8 hours). Cooling water temperature and lube oil pressure is also recorded every shift. Emission limits compliance is demonstrated by maintaining records of the natural gas BTU and sulfur content. Appropriate manufacturer's recommendations relative to tune-ups are performed by qualified mechanics.

- Flares

Two flares are in operation to handle startup and shutdown operations, and any upset situations that develop. The high pressure (HP) flare handles any vapors from the closed drain classifier and excess emissions resulting from plant startup, shutdown, or malfunctions. The LP flare handles vapors from the vapor recovery compressor (VRC) packing seal leaks, relief valves from the saltwater surge tank, and excess emissions resulting from VRC malfunctions. Emission limits compliance is demonstrated by material balance of flared vapors, and visible monitoring of opacity of flare. Emissions resulting from the flaring of excess emissions are limited to 2.1875 tons SO_2 per day. A sample of the flare report is included in Appendix B. The flare report is a spreadsheet that utilizes compositions from the most recent gas analysis for the various flare streams, along with time and rate of flare volumes to calculate the SO_2 emissions for a flare event. This is used to generate a monthly flare report and is also used in the quarterly flare reports submitted to the DEP.

- TEG Unit

The TEG unit dehydrates the sweetened natural gas. It is an unregulated emission unit. Triethylene glycol is utilized to contact the water saturated gas in a trayed vertical vessel and absorbs the water vapor due to its affinity for water. The TEG is then heated by a natural gas fired heater to remove the water and allow the TEG to be recycled to the contact tower. The emissions are therefore a combination of natural gas combustion products from the heater and the emissions created when the TEG is heated to remove the components absorbed during contact with the sweet natural gas. Emissions compliance for the combustion portion of the dehydrator is achieved by maintaining records of fuel BTU and sulfur content.

- Crude Oil Tank

There are two 15000 barrel (42 gallons /bbl) bulk storage tanks in use at BCTF. One tank is currently out of service, but will be brought back on-line upon completion of the refurbishment of the tank. The emissions from this unit are due to standing (breathing) losses of crude as the tank is filled and drained. Emissions limits compliance from this tank are achieved by proper operation of the facility and monitoring the oil from the oil stabilizer to make sure that only sweet oil is being sent to the tank.

- Sulfur Recovery Plant (Claus Unit), SCOT Tail Gas Unit, Sulfur Pit

These units are idled and are no longer permitted. It is anticipated that they will not be reactivated in the near future, so are currently excluded from this portion of the plan.

- Thermal Oxidizer (Incinerator)

The thermal oxidizer was designed to incinerate the tail gas from the SCOT Unit. However it also contains an integral steam generator which has utility as a backup boiler in the event that one of the boilers malfunctions. For this reason this unit will be kept in operation only as a steam source. The emissions for this unit will be the natural gas combustion portion in this mode of operation. Emissions compliance is maintained by adjusting the air blower flow as necessary to maintain smokeless operation. This unit is listed as a back-up boiler in the Title V Permit.

- *Closed Loop Reinjection*

The use of a closed-loop process at Blackjack Creek Field for reinjection of acid-gas is a method that mixes produced brine water with the waste acid-gas stream. The relatively large volumes of brine and small volumes of acid-gas provide conditions that allow the acid-gas to be absorbed into the brine. Once the acid-gas is absorbed into the water the resultant stream is a single phase liquid and has virtually the same density and viscosity as the brine prior to absorption of the acid-gas. This stream can therefore be safely and efficiently reinjected with the same equipment and pressure required for reinjecting only the brine. The principal operational factor for efficient application of this process is to preclude conditions that would cause vapor locking and/or cavitation in the centrifugal pumps used for injection at Blackjack Creek.

Beard Engineering (Beard) owns the U.S. patent on the “acid-gas absorption process,” and Petro Operating has signed an agreement with Beard to utilize this process. The principal criterion recommended by Beard for expected operating conditions at Blackjack Creek is a minimum ratio of 80 barrels of water to 1000 SCF of acid-gas. This ratio is based on chemical composition process modeling

calculations performed by Beard, and is subject to optimization and re-evaluation based on the results observed during implementation of this method. To preclude vapor locking and/or cavitation in the high pressure centrifugal injection pumps, the total water-to-acid-gas production ratio will be optimized by adjusting the individual rates of the production wells, as each well has slightly different production characteristics.

If determined to be necessary, other factors are also controllable to allow acid-gas absorption. These factors include temperature and pressure at which the mixing occurs, and the composition of the acid-gas and water. The temperature can be adjusted to improve the conditions for absorption by cooling the gas and brine prior to mixing. The mixing pressure can also be increased to aid absorption by resizing of the brine booster pumps and / or acid-gas compressor. The composition of the acid-gas can be improved by fine tuning the Sulfinol system to reduce volumes of the lighter compositional elements which will allow the absorption to more easily occur. The brine salinity can also be adjusted to some degree by adding fresh water to allow additional acid-gas solubility. These adjustments are process optimizations and will only be implemented if actual conditions justify their need.

The potential for vapor locking and cavitation will be monitored by surveillance of pump rates and pump performance. In addition, pump disassembly and inspections will be performed to aid in analysis of the operating conditions, as warranted by this monitoring.

Each process variable will be continuously measured, and will be routinely monitored. The acid-gas flow rate will be measured by an orifice meter. The brine flow rate will also be measured. Temperatures of the brine and acid-gas will be measured upstream of the mixing point. Pump and compressor discharge pressures will also be measured. The composition of the acid-gas will be measured using an onsite chromatograph, and the brine composition will be routinely analyzed for composition by the treating chemical vendor.

Monitoring parameters of most significance are the water to acid-gas ratio and the mixing temperature. The metered water rate and gas rates will be recorded at least once/shift. The ratio of water rate to acid-gas rate must be a minimum of 80 BBLS (barrels)/1000 SCF. The temperatures and pressures upstream and downstream of each pump will be recorded at least once/shift (8 hours). The mixing pressure must be at least 125 psig. If any of these criteria are not met, steps should be taken to immediately correct the situation. Recent individual well test rates will be utilized to selectively shut-in the wells with the highest gas/water ratios. The DEP will be contacted pursuant to Title V Permit and FGS requirements to advise them of the situation and with the suggested corrective plan of action. See Appendix B for data forms utilized to record operational data.

Closed-loop reinjection will be the normal mode of operation for Blackjack Creek Field and Treating Facility. If for some reason it is determined that closed-loop reinjection of acid-gas should be discontinued, all Florida DEP regulatory agencies will be notified of this determination, and production will be shut down until the Sulfur Recovery Plant can be evaluated, repaired as necessary, and restarted, according to prior agreements (Consent Order dated July 30, 2003).

Manufacturer Literature

All manufacturer literature that is received with new equipment is kept and filed for future reference. Much of the equipment was purpose built when the treating facility was constructed, and "job books" document the original equipment design, construction requirements, pressure ratings, materials of construction, dimensions, layout, interconnection, and controls. The associated controls, motors, valves, etc. have their own associated operation and parts documents that are filed for reference relative to operation and repairs.

Spare Parts

Spare parts are maintained based on safety considerations, experience, and economics. The spare part inventory is not a fixed list, but fluctuates based on the practicality of the situation. Commonly used piping, piping fittings (couplings, plugs, elbows, unions, bushings, tees, etc.), and valves are maintained in supply at the facility to allow for quick repairs as necessary. Electrical components, such as fuses, wiring, connectors, and switches are also maintained in inventory, based on experience with which components commonly fail and need to be maintained to allow timely repairs. An inventory of backup electrical motors for almost every type of motor being utilized at the facility is kept in inventory to avoid delays in acquiring new motors in the event of a failure. Spare pressure, level, and temperature controllers are also maintained in inventory. Routine maintenance items, such as lube oil, oil filters, and air filters are also maintained. Some unique items that have proven to be prone to failure and that are difficult to obtain and require long repair times are also maintained for backup purposes because the economics justify the cost. When an item is considered for inclusion or renewal in the spare parts inventory, the relative costs of the part must be weighed against the possibility of lost revenue associated with downtime.

Data Logs and Operational Monitoring

Facility operators record and analyze operational data in a format that facilitates their productivity and effectiveness. Forms are not designed to address a single emission unit, but are designed to flow with the sequence of inspection as the operator makes his inspection rounds through the facility. Appendix B includes data forms utilized on a daily basis to record operating parameters. These records allow troubleshooting and preventive maintenance to allow safe and compliant operations.

Appendix A

Maintenance Schedules

Flowing Wells and Flowlines

- **Wellhead and Flowline Valves**

  Every day: Visually inspect for leaks or signs of problems. Note any problems on daily field log.

  Every month: Turn handle on each valve at least 1 1/2 turns to confirm operability. Note degree of difficulty required to turn handle. Immediately report valves that are difficult to operate for service by a wellhead valve maintenance specialist vendor. Maintain monthly log sheet showing each well and results by each valve.

  Every 12 months or 50 complete operations, whichever occurs first: Perform third party inspection and service by a valve service specialist vendor. Operate all valves over full range of operation and test using in-place testing techniques and available wellhead pressures. Drain, grease and lubricate all valves. Refill sealant reservoir in those valves requiring sealant. Repack stems as necessary/possible and perform repairs as necessary. A written report by this third party will document equipment inventory at each wellhead and note services performed and findings of inspection.

  General Operation Notes:

  Do not use wellhead valves to throttle flow. This exposes the sealing surfaces of the gate and seats to erosion. It also causes excessive consumption of grease and sealant. Close and open wellhead valves in the sequence required to minimize wear and tear on valves closest to the pressure source, i.e., lower master valve should be opened first, and closed last.

  WKM, Gray, and similar expanding-gate type valves should be closed tightly and opened tightly – do not back off the handwheel after closing or opening the valve. This protects the sealing surfaces of the gate and seats.

  McEvoy and similar parallel-seated valve types should be backed off one-quarter turn after closing or opening the valve. Extra force is not required for sealing. The McEvoy valve requires sealing compound for positive bubble tight sealing. The reservoir in these valves holds enough sealant for at least 100 operations.

  Manufacturer Literature

  McEvoy and WKM owner's manuals are located in the Houston office. Other than routine greasing, these valves are not worked on by POC employees. A specialty vendor, such as Cooper Cameron, or Regional Valve is employed for work on these valves.

  Spare Parts

  Some used valve parts and stem packing are maintained in inventory for use as necessary in making repairs. Valve service vendors also provide parts as necessary for repairs.

- **Wellhead Pressure Gauges**

  Florida DEP rules require that wellhead gauges be tested / recalibrated every 3 months. An acceptable method of checking the gauges is to replace each gauge

with a gauge of known accuracy. A record of the gauge inspections will be maintained by the pumper for each wellhead and detailed by gauge on a quarterly pressure gauge inspection form.

Manufacturer Literature
Manufacturer literature is generally not maintained for gauges due to the fact that they are normally replaced rather than repaired when they fail.

Spare Parts
A variety of backup gauges are maintained to cover the range of pressures encountered.

- **Wellhead Safety Controls**

  Every day: Visually inspect controls for leaks or signs of problems. Inspect relevant pressure gauges for correct supply pressure.
  Every month: Function test master valve that is actuated by safety system. Check calibration / function test pressure safety pilots. On a rotating basis, check operation of each remote shutdown method/system for each producing well by shutting in each well.

  Manufacturer Literature
  Manufacturer literature for the electronic controls is maintained in the field truck. Pressure pilots are serviced by a third party.

  Spare Parts
  Spare stainless tubing, tubing fittings, piping, piping fittings, valves, gauges, and pilots are maintained in inventory. Spare remote control electrical circuit boards, batteries, and common electrical wiring and component connector parts are maintained.

- **Flowlines**

  Every day: Visually inspect full length (as possible using pickup truck) of flowline right of way for any signs of problems. Record flowline pressures at the wellsites and compare prior pressures as an indicator of any possible problems.

  Manufacturer Literature
  Not applicable.

  Spare Parts
  Blinding skillets and steel ring gaskets are available to provide for hydrotesting operations.

➢ ***Relief and Vent Systems and Devices***

- **Flares:**

  There is a fixed camera aimed at the flares to allow continuous visual monitoring of the flares for presence of flame and opacity of flame emissions from the control room by the Inside Operator. Visual observation is done routinely by outside operator while he his making his rounds. Pilot gas supply pressure is continuously monitored by a pressure gauge display in the control room. All flaring events are recorded and documented in the monthly flare report.

  Every 8 hours (once/shift): Check flares scrubbers for proper liquid level. Inspect flare tips, stacks, and controls for any signs of leaks, unusual noise, or any other unusual appearances. Inspect low pressure flare air blower and adjust air flow as necessary to provide smokeless flare flame. Adjust high pressure steam rate as necessary to provide smokeless flare flame.

  Monthly: Function test flame front igniter to make sure it is in working order. Sample, analyze, and record each well's wellstream produced H2S content.

  Manufacturer Literature
  Job books and owner / parts books contain the drawings and designs of the flares and controls. These are located in the control room.

  Spare Parts
  Common piping fittings and valves are maintained in inventory. Spare igniter transformer and spark plugs are available in inventory. Emergency lighting flare equipment is located at the facility to relight the pilot in the case of a flame front igniter failure.

- **Pressure Safety Valves:**

  Each shift Outside Operator monitors pressure safety valves for relief occurrences and addresses issues as they occur.

  Annually: Steam pressure safety valves only - test, inspect, and repair by third party specialist vendor.

  At least every 5 years: Per API 510 and API RP55 test, inspect, repair all pressure safety valves by third party valve specialist vendor.

  Manufacturer Literature
  Manufacturer owner's manuals and parts books are located in the instrument shop.

Spare Parts
Repairs and calibrations are performed by valve specialist vendor.

➢ ***Instruments and Controls***

- **Pall Air Dryer:**
  Every 8 hours (once/shift): Visually inspect for proper operation. Observe automatic water drains, note current cycle and record on shift log.

  Manufacturer Literature
  An owner's manual and parts manual by the manufacturer, Pall, is located in the control room.

  Spare Parts
  Spare pipe fittings and common valves are maintained in inventory.

- **Instrument Air System (Joy Compressor):**
  Every 8 hours: Observe automatic water drains and pressure gauges for proper supply and operation.

  Manufacturer Literature
  Joy air compressor owners manual and parts list is maintained in the mechanic's shop.

  Spare Parts
  Spare pipe fittings and common valves are maintained in inventory. A spare 60 HP electric motor is maintained in inventory.

- **Level Controllers (Foxboro and Fisher):**
  Every 8 hours: Visually inspect controller for normal appearance and sounds. Visually inspect sight glass for proper level. Adjust / troubleshoot as necessary.

  Manufacturer Literature
  A complete set of Foxboro Manuals and Fisher Manuals is maintained in the instrument repair shop.

  Spare Parts
  Spare controllers and parts are maintained in inventory.

- **Pressure Controllers (Foxboro and Fisher):**

  Every 8 hours: Visually inspect controller for normal appearance and sounds. Adjust / troubleshoot as necessary.

  Manufacturer Literature
  A complete set of Foxboro Manuals and Fisher Manuals is maintained in the instrument repair shop.

  Spare Parts
  Repair parts and controllers for the most common controllers are maintained.

- **Temperature Controllers (Foxboro and Fisher):**

  Every 8 hours: Visually inspect controller for normal appearance and sounds. Adjust / troubleshoot as necessary.

  Manufacturer Literature
  A complete set of Foxboro Manuals and Fisher Manuals is maintained in the instrument repair shop.

  Spare Parts
  Repair parts and controllers for the most common controllers are maintained

➢ ***Mechanical Equipment***

- **Vapor Recovery Compressor**

Vapor Recovery Compressor has automatic lubrication fed from an oil sump. Every 8 hours: Outside operator monitors for issues, and adds oil to sump or addresses issues as needed. Operator monitors for unusual noises, temperatures, or pressures. Any repairs noted are addressed with a White Sheet work order notification, and are addressed as needed to reduce emissions and improve equipment reliability.

Oil Filter: All lubricating oil coming from the power end sump going to the rotating and reciprocating parts passes through the oil filter. The oil filter uses a replaceable element. Replace element at every oil change.
Breather Cap: The breather cap located on top of frame should be inspected and cleaned at every oil change. Clean in a solvent and recharge by dipping in oil. DO NOT USE GASOLINE.

Frequency of Oil Change: Compressor has continual oil feed and makes up oil all the time, therefore oil is not routinely replaced on a specific interval. Oil is replaced as needed. In Service – it is not practical to definitely state how often the lubricating oil should be changed in the power end. Oil becomes contaminated with foreign material being held in suspension. Therefore, the length of time for changing is regulated by local conditions. Oil change periods must be determined by checking the discoloration and physical conditions of the oil in the power end.

Type of Oil – Use 40W oil or equivalent with low ash content.

Rate of Feed: It is impractical to state the exact amount of oil to be fed to the cylinder or packing as this amount will vary with load, operating conditions and quality of the oil used. Excessive oil tends to carbonize valves, causing leaks, and too little oil will cause "overheating" and "scoring".

The following table gives a general rate of feed for cylinders based on clean and dry air. Other conditions may require increased or decreased feed rates. The best way to determine the minimum amount of lubrication to feed is to remove the valves from each end of the cylinders periodically and examine the bores to determine the amount of oil present. A film of oil should be felt upon all parts but there should be no excess oil present. If the elements feel dry, the feed should be increased. If oil lies in the bores with excessive quantities in the discharge ports, the feed should be reduced. If the feed rate is increased or reduced, do so gradually and after several hours of operation check cylinder bores and ports for the amount of oil present. This periodic examination should determine the final amount to feed.

The rate of oil fed to the packing as previously stated depends on many conditions. Under normal conditions, two to three drops of oil per minute should be satisfactory. Inspection of the piston rod to insure that an oil film is present will indicate whether the oil feed is correct.

GENERAL RATE OF FEED FOR CYLINDERS – DROPS/MINUTE*

Cylinder Diameter (Inches)	Cylinder Discharge Pressure – PSIG *				
	0-75	76-150	151-300	301-600	601-1500
2 thru 6	1	2	3	4	6
Over 6 thru 8	2	3	4	5	7
Over 8 thru 10	2	4	6	8	
Over 10 thru 12	3	5	7	10	
Over 12 thru 14	5	6	8		
Over 14 thru 16	5	7			
Over 16 thru 18	6	9			
Over 18 thru 20	7				
Over 20 thru 22	8				

* For synthetic lubricants double drops/minute shown.

Type of Oil – Cylinder and Packing: A good Compressor Oil ASTM Viscosity Grade 465, well refined by a reputable oil company and processed specifically for air compressor cylinders should be used for the cylinders and packings.

Valves: The valves are a highly efficient form of automatic plate valves. They are simple, durable and usually quiet. Valve assemblies are easy to remove, may be taken apart quickly for inspection and are readily reassembled without special tools. Dirty valves not only cause loss of capacity of the compressor, but may be the source of other troubles. Operating a compressor with a valve that does not operate properly will cause excessive temperature and valve breakage. Valves must be inspected at regular intervals to insure that they are clean and free of

carbon. Servicing intervals are dependent on: filter service, atmospheric conditions, quality of oil used and operating temperatures.

Cleaning and Inspecting Valves - Soak the valve parts in cleaning solvent. DO NOT USE GASOLINE. If foreign accumulations are stubborn to remove, use a small bristle brush to aid the cleaning process. If valves are extremely dirty it may be necessary to take them apart and clean each piece separately. After cleaning, dry the parts and inspect for wear. Valve seat lips may be refaced in some cases. Valve springs should not be reused.

Manufacturer Literature
A complete Gardner Denver owner's manual and parts manual is located in the mechanics shop.

Spare Parts
Spare valves, common fittings, compressor valves, lube oil, and an electrical motor for the skid blower is maintained in inventory.

- **Gas Recompressor**

These gas engine compressors are designed and built for long periods of continuous full load operation and are equipped with automatic safety devices to shut them down in case of failure of cooling water supply, low oil pressure or over-speed. However, any internal combustion engine or compressor requires a certain amount of intelligent supervision and care if it is to give continued satisfactory performance. A qualified operator should periodically be in attendance while the machine is operating, to replenish the oil in the crankcase, fill lubricators, check temperatures and pressures, prevent tampering, change adjustments as may be required by changed operating conditions, keep the unit clean and take such action as may be indicated by any symptom of possible trouble.

Any time schedule of duties for the operator must be subject to intelligent interpretation and alteration by experience to fit actual conditions.

Every Day:
Observe automatic oilers to ensure proper levels. It is suggested that this be done only once a day and always on the same shift unless an unusual loss of oil through leaks or some other operating condition lowers the crankcase oil to a dangerous level.
Check the automatic valve stem lubricator for proper operation. Refill the lubricator as necessary, normally every shift.
Outside Operator checks for unusual noises or improper operation every shift. Abnormal conditions are noted and written up on a White Sheet, and are addressed as needed to reduce emissions and improve equipment reliability

Periodic Regulatory Required maintenance

The two existing natural gas fired, 1000 HP, 4 Stroke Lean Burn (4SLB) recompressor engines are subject to the national Emission Standard for hazardous Air Pollutants (NESHAPs). The applicable parts of these regulations 40 CFR 63 Subpart ZZZZ Table

2d #8 entitled “Requirements for Existing Stationary RICE Located at Area Sources of HAP Emissions”.

- Lube oil system: Establish and implement an Oil Anaylses program or change oil and filter every 2,160 hours of operation or annually, whichever comes first;1
- Spark Plugs: Inspect spark plugs every 2,160 hours of operation or annually, whichever comes first, and replace as necessary
- Hoses and Belts: Inspect all hoses and belts every 2,160 hours of operation or annually, whichever comes first, and replace as necessary

[1]Sources have the option to utilize an oil analysis program as described in §63.6625(i) or (j) in order to extend the specified oil change requirement in Table 2d of this subpart.

Manufacturer Literature
An Ingersoll Rand compressor owner’s manual and parts books is located in the mechanic’s shop.

Spare Parts
Common fittings, compressor valves, air and oil filters, common electrical components, and some engine components are maintained in inventory.

- **Ingersoll Rand Split Case Pumps**

Outside Operator checks for proper lubrication, unusual noises, or improper operation every shift. Abnormal conditions are noted and written up on a White Sheet, and are addressed as needed to reduce emissions and improve equipment reliability.

Manufacturer Literature
An Ingersoll Rand pump owner’s manual and parts books is located in the control room.

Spare Parts
Common pipe fittings, lube oil, and common electrical components are maintained in inventory.

- **Gould Centrifugal Pumps**

Outside Operator records discharge and suction pressures every shift. Unit is checked for unusual noises or improper operation every shift. Abnormal conditions are noted and written up on a White Sheet, and are addressed as needed to reduce emissions and improve equipment reliability.

Manufacturer Literature
Owner’s manuals and parts books are maintained for each pump type and are located in the control room.

Spare Parts

Common piping fittings, seals, lube oil, and backup electrical motors are maintained in inventory.

- **UV – 549 International Fire Pump Engine**

The International Fire Pump Engine system is utilized as a backup to the electric motor and pump system that pressures the fire suppression system. It would only be utilized in the event of a fire emergency that occurred during a power outage. As such, it is tested regularly to ensure that it will function as a backup to the main pumps for the fire suppression system.

The engine is started weekly to test engine and pump operation. Unit is checked for unusual noises or improper operation. Abnormal conditions are noted and written up on a White Sheet, and are addressed as needed to reduce emissions, improve equipment reliability, and ensure proper operation in the event the fire system electric pump and motor are not available.

Lubrication: The life and performance of an engine depends on the care that it is given and proper lubrication is probably the most important maintenance service for your engine. Thorough lubrication service performed at the scheduled intervals and according to an established routine will aid greatly in prolonging the life of the engine and in reducing operating expense. The type of work being done, load and weather conditions are all factors to consider in the frequency of lubrication. The schedule intervals of lubrication shown on the "LUBRICATION GUIDE" are approximate, being based on average operating conditions. It may be necessary to lubricate after shorter working periods under severe operating conditions such as extremely dusty conditions, low engine temperatures, intermittent operation, and excessively heavy loads with high oil temperatures. Due to the intermittent nature of the operation of the fire pump engine, lubricant and oil filters are replaced as needed when checked.

need to update with 500 hours oil change and 1000 hours spark plugs inspection Table 2d

Manufacturer Literature
An owner's manual and parts book is located in the mechanic's shop.

Spare Parts
Air and oil filters, lube oil, and common nuts and bolts and pipe fittings are maintained in inventory to facilitate routine maintenance.

- **Triplex Plunger Pumps**

Preventive Maintenance

1. Check the level of the crankcase lubricating oil. The crankcase holds 2½ gallons for triplex models of standard motor oil. Use 150 weight gear oil or equivalent.
2. Pumps equipped with grease fittings for lubricating the stuffing boxes should be greased daily when pumping crude oil, or as often as required when pumping non-lubricating fluids such as water, products, etc. Currently the pump at

Blackjack Creek processes only water, so pumps are greased as necessary using lubricating oil.

3. Use a spanner wrench to tighten the stuffing box nut. It should be wrench-tight at all times. The packing used in this pump is the hard core type and must be tight always.
4. Keep the pump clean.

General Maintenance

These pumps have been designed to simplify maintenance and make service easy. Preventative maintenance and overhauls before serious troubles occur will reduce operating costs. If an overhaul is required, follow the specific instructions from the manufacturer carefully. Contact the factory if additional information is needed.

Manufacturer Literature

A set of books for each pump is located in the mechanic's shop (David Brown Union Pumps).

Spare Parts

Common pipe and tubing fittings, lube oil, and a backup electrical motor is maintained in inventory.

- **Gear Reducer / Increaser**

Preventative Maintenance

Good preventative maintenance habits will prolong the life of the gear unit and possibly help in detecting trouble spots before they cause serious damage and long down time. WARNING: When working near rotating elements, be certain prime mover is turned off and locked.

Outside Operator checks for proper lubrication, oil leaks, unusual noises, or improper operation every shift. He also checks oil temperature and pressure against previously established norms. Abnormal conditions are noted and written up on a White Sheet, and are addressed as needed to reduce emissions and improve equipment reliability.

Manufacturer Literature

An owner's manual and parts book is located in the mechanic's shop.

Spare Parts

Lube oil, and a complete spare gear increaser is maintained in inventory.

- **Boilers:**

Every Shift:

Inspect boiler for normal visual appearance and sounds. Inspect fluid levels, pressures, temperatures and indicator lights. Observe and record boiler feed water level and boiler water maker operation. Visually inspect all sides of boiler for outer metal skin integrity. Observe area for signs of any leaks around boilers.

Check the burner flame and stack exhaust for appearance proper combustion.

Recalibrate all indicating and recording controllers, charts as needed

As needed:
Check boiler feed water pH and hardness for proper levels two times/week.
Lubricate blower bearings and any lubrication points as needed.

At Each Boiler Restart:
Test the fan and air pressure interlocks
Check for proper ignition and check the flame failure detection system.
Check the main burner safety shutoff valve
Check the low fire start switch
Test the high and low fuel pressure switch.

Every year: (coordinate w/ steam PSV Testing)
Test operating parts of all safety shutoff and control valves.

Manufacturer Literature
An owner's manual and parts book is located in the control room (Trane).

Spare Parts
Common piping fittings, a spare boiler feedwater pump motor, a spare boiler air blower motor, spare relief valves, and common electrical fittings are maintained in inventory.

- **TEG Unit**

Every Shift: Visually inspect unit for leaks or unusual sounds. Record TEG reconcentrator temperature and check level and add TEG from bulk storage as necessary. Visually inspect clarity of TEG in sight glass for signs of contamination problems. Record TEG volume additions from bulk storage to the TEG Unit. Record TEG bulk tank volume. Inspect TEG contactor tower pressure and gas inlet temperature. Visually inspect TEG reconcentrator vent for appearance of normal rate. Record TEG flow rate from TEG pump to contactor. Visually observe the heater exhaust for appearance of no smoke and proper operation.

Replace TEG filters as necessary, based on performance of unit. Analyze gas composition and water content of gas leaving TEG Unit as necessary.

Manufacturer Literature
Natco operations book and plant Job book, located in the control room, contain information regarding this unit.

Spare Parts
Common piping fittings, control parts, and electrical parts are maintained in inventory.

- **Tanks**

Every shift: Visually inspect stock tanks for signs of leaks. Gauge tanks and record levels. Pump out secondary containment as necessary.

Static level testing: At scheduled turnarounds, perform a static level test for 24 hours to certify no tank leakage.

Manufacturer Literature
Job books contain the specifications for the tanks.

Spare Parts
Common piping fittings and valves are maintained in inventory.

- **Valves:**

Every shift:
Inspect valves for signs of leaks. Upon operation, observe for any signs of need for lubrication or service. Tighten loose hand wheels. Repair critical valves immediately, otherwise record problem valve using White Sheet for future maintenance and repairs.

Manufacturer Literature
Some of the valve owner's manuals are available in the control room, depending on the origin and age of the valve. Other than routine valve greasing, most valve work and repair is done by valve service vendors.

Spare Parts
Lubrication grease is available for routine maintenance. All other spare parts are provided by valve repair specialist vendors.

➢ ***Electrical Equipment Maintenance***

Starters, Circuit Breakers:

Outside contractor tests breakers and disconnect switchgear at scheduled turnaround down periods, and makes necessary repairs to ensure proper function and reliability.

Motors:

Every Shift:
Observe operation for normal appearance and sound.

Every Month:
Grease or oil as appropriate.

Manufacturer Literature
Owner's manuals and parts books for the electrical equipment are located in the instrument shop.

Spare Parts
Fuses, breakers, light bulbs, and other common electrical components are maintained in inventory. Common wiring and connectors are also maintained. Electrical motor backups for most of the electrical motor types are maintained in inventory.

Appendix B

Data Log and Reporting Forms

Appendix B
Data Forms
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1. Compressor / Pump / Data Log Sheet
2. Blackjack Creek Daily Operating Log
3. Daily Operating Report Form
4. Blackjack Creek Lab Report Form
5. Monthly Inlet ESD Actuation Report Form
6. Blackjack Creek Gauge Off Data Form
7. Rotating Equipment Switching Report
8. Blackjack Creek Air Pack Data
9. Blackjack Creek Emergency Flare Report
10. Blackjack Creek Daily Field Log
11. Monthly Valve Inspection Form
12. Quarterly Gauge inspection Form

COMPRESSOR / SWI PUMPS / DATA LOG SHEET

PETRO OPERATING COMPANY, LP

BLACKJACK CREEK

DATE:_____	***"MORNINGS"***		***"DAYS"***		***"EVENINGS"***	
KVGR COMPRESSORS	***NORTH***	***SOUTH***	***NORTH***	***SOUTH***	***NORTH***	***SOUTH***
RPM						
ENGINE WATER IN TEMPERATURE						
ENGINE WATER OUT TEMPERATURE						
ENGINE OIL IN TEMPERATURE						
ENGINE OIL OUT TEMPERATURE						
MANIFOLD DEPRESSION WC"						
OIL PRESSURE TO BEARINGS						
LUBE OIL METER READING						
1ST STAGE SUCTION PRESSURE						
1ST STAGE DISCHARGE PRESSURE						
2ND STAGE SUCTION PRESSURE						
2ND STAGE DISCHARGE PRESSURE						
1ST STAGE DISCHARGE TEMPERATURE						
2ND STAGE DISCHARGE TEMPERATURE						
FUEL PRESSURE ("WATER COLUMN")						
GOULDS BOOSTER PUMPS BOOSTER PUMP DISCHARGE PRESSURE						
BOOSTER PUMP DISCHARGE TEMP.						
INGERSOLL-RAND S.W.I. PUMPS	***NORTH***	***SOUTH***	***NORTH***	***SOUTH***	***NORTH***	***SOUTH***
MOTOR AMPERAGE						
DISCHARGE PRESSURE (gauge)						
43-A CONTROLLER SUCTION PRESSURE						
PWIP FLOW (roots)						
FIELD INJECTION PRESSURE						
TEMPERATURE @ PUMP DISCHARGE						

| ***VAPOR RECOVERY COMPRESSOR *******ACID GAS INJECTION COMPRESSOR******

PETRO OPERATING COMPANY, LP
BLACKJACK CREEK DAILY OPERATOR LOG

DATE:_____	***MORNINGS***	***DAYS***	***EVENINGS***
DE-AERATOR PRESSURE (1-3 psig)			
ACID-GAS FLOW RATE (2 – 5 roots) (This is the acid gas flow rate from Sulfinol regenerator)			
ACID-GAS SCRUBBER PRESSURE (2 – 5 psig)			
ACID-GAS SCRUBBER TEMP (100 – 125 °F)			
TEG FLOW RATE (2 – 4 roots)			
TEG REGENERATOR TEMP (260 – 280 DEG. F)			
PROCESS STRIPPER REFLUX PUMP PRESS (20 – 30 psig)			
PROCESS STRIPPER REFLUX TEMP (100 – 150 DEG. F)			
PROCESS SOLVENT PUMP DISCHARGE PRESS (130 – 175 psig)			
RICH SOLVENT FLASH TANK TEMP (120 – 135 DEG. F)			
RECOMPRESSOR DISCH/1ST STAGE PRESS (300 – 550 psig)			
RECOMPRESSOR DISCH/2ND STAGE PRESS (650 – 1100 psig)			
FUEL GAS SCRUBBER TEMP (105 – 115 DEG. F)			
CONTACTOR OVERHEAD SCRUBBER PRESS (90 – 100 psig)			
CONTACTOR OVERHEAD SCRUBBER TEMP (90 – 100 DEG.F)			
TEST SEPARATOR GAS FLOW (0 – 10 roots)			
INLET SEPARATOR GAS PRESS (115 – 125 psig)			
INLET SEPARATOR GAS FLOW (2 – 4 roots)			
CHECKED INLET AREA CHEMICAL PUMPS			
CHECKED FLARE SUMPS			
CHECKED SAFETY SHOWERS			
BOILER FEED WATER TANK LEVEL (0-100%)			
SURGE TANK LEVEL (0-100%)			
SLOP OIL TANK LEVEL (0-100%)			
CLEAN WATER TANK LEVEL (0-100%)			
AUXILLARY COOLING WATER INLET TEMP (80-120 DEG. F)			
AIR DRYER ON REGENERATION CYCLE (N=North, S=South)			
INSTR AIR COMPRESSORS OIL PRESS (20-40 psig)			

RECTIFIERS > #1 SW-AMPS =	VOLTS=	#2 SHOP-AMPS=	VOLTS=

DAILY OPERATING REPORT

BLACKJACK CREEK PRODUCTION FACILITY

AT 100% FIRING RATE, SOUTH BOILER FUEL GAS MUST NOT EXCEED 1171 BTU/SCF

DATE: _____

ITEM #	***SERVICE:***	***MORN.***	***DAYS***	***EVE.***
FR-110	STAB. PROD. TO STRG. 0 – 450 BP/D)			
FR-114	SALES GAS (0 KCF/D)			
MAKEUP GAS	(0 – 1000 KCF/D)			
FIC-103	WASH WATER (7.4 – 12.0 GPM)			
FR-109	STABILIZER FEED (375 – 475 BP/D)			
FR-112	CONTACTOR FEED GAS (1000 – 1500 KCF/D			
FR-111	SOLVENT TO CONTACTOR (140-175 GPM)			
FR-117	SOLV. FUEL GAS CONT. (2.0 – 3.0 GPM)			
FR-119	STM. STRIP RBL. (11,100 – 14,100 LB/HR)			
FR-120	STRIPPER REFLUX (9.0 GPM)			
FR-201	ACID-GAS (150 – 250) KCF/D			
	PRODUCED WATER INJECTION RATE (20000 – 30000 BWPD)			
RATIO OF WATER TO ACID GAS (GREATER THAN 80 BBLS/KSCF OF ACID GAS)				
FR-116	FUEL GAS SUPPLY (0 – 1000 KCF/D)			
FI-401	A/B STEAM SUPPLY (12,800 LB/HR)			
FR-402A	SOUTH BOILER FUEL GAS (KCF/DAY)			
FR-402B	NORTH BOILER FUEL GAS (KCF/DAY)			
AR-801 / 800	FUEL GAS (800 - 1100 BTU/SCF)			
**********	STRIP. ACCUM. PRESS. (4.0-6.0 psig)			
PIC-103	CONTACTOR FEED GAS (95-100 psig)			
PIC-107	SALES GAS PRESSURE (750 psig)			
FR-201	ACID-GAS PRESSURE (1.0-3.5 psig)			
PI-112	FUEL GAS HEADER PRESSURE (60 psig)			
**********	STRIPPING GAS OUTPUT (9-15 psig)			
PI-412	INSTRUMENT AIR HEADER (90 psig)			
TI-105 #1	INLET SEPARATOR GAS (100-115 °F)			
TI-105 #30 / #9	STABILIZER OVERHEAD (100 – 129°F)			
T1-105 #2	STAB. SIDE STRM RET. (200 – 400°F)			
TIC-102	STABILIZER BOTTOM (340-360 °F)			
TI-105 #30 / #10	PROD. TO STORAGE (MAX.) 120 °F			
TI-105 #30 / #11	CONTACTOR FEED GAS (95-105 °F)			
TI-105 #3	SOLVENT TO CONTACTOR (112-117 °F)			
TR-103	CONTACTOR BOTTOM TRAY (113-118 °F)			
TI-105 #4	TEG CONTACTOR FEED (100 °F)			
TI-105 #5	TEG RESIDUE SCRUBBER OUTLET (100 °F)			
TIC-107	STRIPPER BOTTOM TRAY (220 °F)			
TI-105 #30 / #12	STRIPPER OVERHEAD (222 °F)			
TI-105 #30 / #4	INCINERATOR (422 – 1250 °F)			
TI-105 #30 / #5	STACK GAS (450-490 °F)			

AR-101 H_2S / SALES GAS MAX. 15 PPM			
TULSA PUMP PRESSURE “BIG BLUE” (1500-3300 psig)			
PWIP PRESSURE / INGERSOLL RAND SWI (1750-2300 psig)			
FLARE EVENT DURING THIS SHIFT? (Y=YES, N=NO)			

BLACKJACK CREEK LAB **NOTES FROM:**

CRUDE OIL ANALYSIS	STABILIZER	PIPELINE	**GAS ANALYSIS**	ACID-GAS (TOTAL)	FUEL	SALES	RECYCLE
PPM H_2S			N_2 NITROGEN				
R.V.P.			C1 METHANE				
LEAN SULFINOL	PROCESS	SCOT	CO_2 CO2				
DIPA:							
H2O:			C2 ETHANE				
SULFOLANE:			H2S H2S				
**********			C3 PROPANE				
**********			1C4 I BUTANE				
**********			NC4 N BUTANE				
**********	PURITY	PH	IC5 I PENTANE				
TEG			NC5 N PENTANE				
QUENCH H20			1C6 I HEXANE				
**********			*** TOTAL % ***	>			
**********			*****ACID-GAS	<	% TOTAL HYDROCARBONS		

WELL	% N2	CHLORIDE PPM		% N2	CHLORIDE PPM	JACKET H20 ANALYSIS	% TEG	PPM C 1	JACKET H2O ANALYSIS	% TEG	PPM C 1
11-E			14-N			COOLING H2O			WEST W/F		
13-N			14-S			RECOMP. TANK			EAST W/F		
13-S			14-5			W/F TANK			GEN #1		
13-3			19-W			NITROGEN			GEN #2		
13-4			23-W			NO. RECOMP.			GEN #3		
13-W			24-N			SO. RECOMP.			GEN #4		

SAMPLE	BLOW DOWN	T.P. PLUS COLOR	CHLORIDES HIGH/LOW		P-ALK	TDS	pH	TOTAL HARDNESS	DEHA	CHLOR. CYCLES
NO. BOILER	+/-			N/A			N/A	N/A	N/A	
SO. BOILER	+/-			N/A			N/A	N/A	N/A	

SUL. BOILER	+/-			N/A			N/A	N/A	N/A	
SUL. COND.	+/-			N/A			N/A	N/A	N/A	
INC. BOILER	+/-			N/A			N/A	N/A	N/A	
EVAP. BOTTMS	+/-			N/A			N/A	N/A	N/A	
SCOT BOILER	+/-			N/A			N/A	N/A	N/A	
BFW	N/A	N/A	N/A		N/A		N/A			
CONDENSATE	N/A	N/A	N/A		N/A			N/A		
N. SOFTENER	N/A	N/A	N/A		N/A		N/A		N/A	
S. SOFTENER	N/A	N/A	N/A		N/A		N/A		N/A	

REGENERATION CYCLE COMPLETED: NORTH SOFTENER_____ SOUTH SOFTENER_____

CONTROL: BAGS OF SALT USED
TODAY _____
TDS (350-750) P-Alk. (300-600) DEHA (5-10)
T. HARDNESS (<0.1) / pH (8.3-8.8)

DATE:_____
_____

Monthly Inlet ESD Actuation Report

Petro Operating Company, LP
Blackjack Creek Treating Facility

Month / Year _____

				Actuation			Operator	
Well	Date	Good	Slow	Failed	Initials	Valve Name	Actuator Name	Comments
24-5						Rockwell	Bettes Robot-Arm	
14-South						Rockwell	Matryx	
13-4East						Rockwell	Matryx	
13-West						Rockwell	Matryx	
13-North						Halliburton	Matryx	
14-North								
11-East						Rockwell	Matryx	
19-West						Rockwell	Matryx	
14-5						Rockwell	Matryx	
13-4West						Rockwell	Matryx	
13-South						Rockwell	Bettes Robot-Arm	

DATE: _____

BLACKJACK CREEK GAUGE OFF DATA

PRODUCTION WELLS

	PRESS.	TEMP.
24-5	_____	_____
14-N	_____	_____
13-W	_____	_____
11-E	_____	_____
13-4W	_____	_____
14-S	_____	_____
14-5	_____	_____
19-W	_____	_____
13-S	_____	_____
13-4E	_____	_____
15-E	_____	_____

INJECTION METERS

24-3 _____

12-3 _____

15-W _____

19-4 SW _____

25-N _____

19-4 FW _____

13-3 _____

WATERFLOOD FRESH WATER TO SURGE TANK

METER READING _____

DESALTER FRESH WATER

METER READING _____

OLD FRESH WATER TO SURGE TANK/TITLED PLATE

METER READING _____

	FUEL GAS	INLET GAS
F -	_____	_____
S -	_____	_____
T -	_____	_____

COMMENTS: _____

_____

_____

PETRO OPERATING COMPANY, LP

ROTATING EQUIPMENT SWITCHING REPORT

DATE:	**********	OPERATOR:
EQUIPMENT ITEM*******	UNIT SWITCHED TO ***	COMMENTS: *****
DESALTER FEED PUMPS	NORTH / SOUTH	
SULFINOL SOLVENT PUMPS	EAST / WEST	
SULFINOL REFLUX PUMPS	NORTH / SOUTH	
SULFINOL SOLV. COOLERS	EAST / WEST	
PRODUCT TO STRG. COOLERS	EAST / WEST	
T. E. G. PUMPS	NORTH / SOUTH	
CLASSIFIER WATER PUMPS	EAST / WEST	
OIL DRUM PUMPS	EAST / WEST	
UNION SWD PUMPS	NORTH / SOUTH	
BOILER FEED WATER PUMPS	EAST / WEST	
B.F.W. TRANSFER PUMPS	EAST / WEST	
AUX. COOLONG WATER PUMPS	NORTH / SOUTH	
JOY INSTR. AIR COMPRESSORS	NORTH / SOUTH	
1ST STAGE DISCH. COOLERS	EAST / WEST	
2ND STAGE DISCH. COOLERS	EAST / WEST	
RECOMPRESSORS (KVGR)	NORTH / SOUTH	
FIRE H20 PUMP	RAN PUMP _____ MINUTES	need to install an hour meter
PROPANE	_____ %	

BLACKJACK CREEK
AIR PACK DATA

DATE: OPERATOR:

(SERIAL NUMBERS) (PRESSURE)

#1 H5731C D174071 _____ FIRE PUMP PROPANE TANK

#2 449910 0168448 _____ _____ ____%

#3 NO LONGER IN SERVICE _____ RAW WATER TANK LEVEL

#4 H53556B D197049 _____ _____FT./INCHES

#5 H6766C D229228 _____

#6 H6081C D178334 _____

#7 AB 349342 D 161542 _____

#8 AA 117725 D 216012 _____

#9 H 7920B D 215165 _____

#10 H 7928B D 148629 _____

#11 H 4504E D 174252 _____

#12 H 6257C D 36264 _____

#13 AA 274141 D 162429 _____

#14 H 1229C D 178094 _____

#15 AB 349342 D 229486 _____

#16 449910 TC-3FCM-152 _____

BREATHING AIR
REFILL STATIONS

#STATION #1
HIGHEST BOTTLE PRESSURE
#
_____

LOWEST BOTTLE PRESSURE
#
_____

STATION #2
HIGHEST BOTTLE PRESSURE
#
_____

LOWEST BOTTLE PRESSURE
#
_____

STATION #3
HIGHEST BOTTLE PRESSURE
#
_____

LOWEST BOTTLE PRESSURE
#
_____

CHECK THAT ALL VALVES ARE IN CLOSED POSITION

#17	A 0939C	D 172546	_____
#18	NO LONGER IN SERVICE		_____
#19	H 5875C	D 162645	_____

OXEQUIP RESUSCITATORS

UNIT #1	D 12409	_____
UNIT #2	F147628	_____

BLACKJACK CREEK EMERGENCY FLARE REPORT (actual report is a spreadsheet and contains built-in formulas)

MONTH: _____

ID#: 1130014 PERMIT#: 1130014-001-AV

* Call (850) 595-8364 to REPORT Problems, Malfunctions,	
or EXCEEDANCES. (DAY or NIGHT)	
** DEP must be Notified if:	
1. Flaring Duration expected to exceed two hours at full rate	
2. Opacity above 20 % (Ringleman Number greater than 1).	

Gas Type and Well Code Legend

Type of Gas:		Well # Codes
A	0.0707	11-E= #1 13-W= #5 24-5= #09
B	6.80E-07	15-E= #2 14-N= #6 24-N= #10
C	0.0096	13-4= #3 14-S= #7 14-5= #11
D	0.0458	13-N= #4 19-W= #8 13-S= #12
		FWS Mixture = #13

Date:	START Time:	Duration: (minutes)	Rate: (kcf/day)	kcf FLARED	Type Gas:	l l#	SO2 Factor	Emissions: Tons flared

Time of SHUTDOWN: Flare Opacity: REASON for Flare or HIGH Opacity:

Type of Gas:	A	= Acid Gas : KSCF x .0.0707 = Tons SO2.
	B	= Sweet or Off-Spec Residue Gas : KSCF x .00000068 = Tons SO2.
	C	= Full Wellstream Sour Gas : KSCF x 0.0096 = Tons SO2.
	D	= Other : If VRC to EITHER Flare : KSCF x 0.0458 = Tons SO2.

SO2 Factor = Frac H2S in F.G. x M W of SO2 / (2 x M W of Air x Spec. Vol. of Air)
= Frac H2S in F.G. x 64.06 / (2 x 29 x 13.108)
OR = % H2S X .000845

Well Name	ID #	FACTOR	Well:	% H2S
11-E	1	0.0048	11-E	5.69
15-E	2	0.0141	15-E	16.64
13-4	3	0.0000	13-4	
13-N	4	0.0115	13-N	13.56
13-W	5	0.0121	13-W	14.30
14-N	6	0.0047	14-N	5.52
14-S	7	0.0083	14-S	9.84
19-W	8	0.0106	19-W	12.60

24-5	9	0.0098	24-5	11.58
24-N	10	0.0000	24-N	
14-5	11	0.0097	14-5	11.51
13-S	12	0.0108	13-S	12.81
MIXTURE	13	0.0096	MIXTURE	11.40

MAXIMUM PERMITTED ALLOWABLE

for H. P. Flare & L. P. Flare COMBINED:

2.1875 Ton SO2 per Day

PETRO OPERATING COMPANY, LP
BLACKJACK CREEK – DAILY FIELD LOG

PROD WELLS	L.P. PILOT IN/OUT	N2	UPSTREAM CHOKE	DOWNSTREAM CHOKE	PROD. / SURF. CASING		INJ. WELLS	TUBING	PROD./SURF. CASING	
11-E							11-W			
15-E							10-E			
14-5							15-W			
14-1							23-E			
14-4							25-N			
19-2							19-4			
13-4							12-3			
13-N							24-3			
13-W							23-W			
24-1B							13-3			
24-5										
13-S							SWD WELLS **********			
							#1			
							#3			

TECHNICIAN: _____ **DATE:** _____

FLUSH H20 METERS: **13-N** _____

13-S _____

11-E _____

INJECTION METERS: **10-E** _____

11-W _____

COMMINGLE VALVE	OPEN	CLOSED
13-4 & 13-N		
15-E & 11-E		
15-E & 14-N		
13-3 & 13-4		
11-E & 14-N		

REMARKS: _____

_____

_____

PETRO OPERATINGCOMPANY, LP
BLACKJACK CREEK –MONTLY VALVE INSPECTION

PROD. WELLS	DATE	CROWN	WING	UPPER MASTER	LOWER MASTER	PROD. CASING	SURFACE CASING	TECH. NAME
11-E								
15-E								
14-5								
14-1								
14-4								
19-2								
13-4								
13-N								
13-W								
24-1B								
24-5								
13-S								
11-W								
10-E								
15-W								
23-E								
25-N								
19-4								
12-3								
24-3								
23-W								
13-3								
#1								
#3								

MONTH:_____

PETRO OPERATINGCOMPANY, LP
BLACKJACK CREEK –*QUARTERLY GUAGEINSPECTION*
QUARTER:_____(1-4)
MARK*‘OK’*OR*‘REPLACED’*INBOX

COMMENTS:_____
_____
_____
_____
_____
_____

PROD. WELLS	DATE	CROWN	WING	UPPER MASTER	LOWER MASTER	PROD. CASING	SURFACE CASING	TECH. NAME
11-E								
15-E								
14-5								
14-1								
14-4								
19-2								
13-4								
13-N								
13-W								

24-1B								
24-5								
13-S								
11-W								
10-E								
15-W								
23-E								
25-N								
19-4								
12-3								
24-3								
23-W								
13-3								
#1								
#3								

_____

Appendix C
Maintenance Items Periodic Check Lists
Table of Contents

1. Bi-Weekly Check List
2. Monthly Check List
3. Quarterly Check List
4. Annual Check List
5. Every 2 Years Check List
6. Every 5 Years Check List

BI-WEEKLY CHECK LIST

Check boiler feed water pH and hardness for proper levels 2 times/week.

ITEM	DATE	COMMENTS
Boiler Feed Water pH		
“		
“		
“

MONTHLY CHECK LIST

ITEM	DESCRIPTION	COMMENTS
WELLHEAD FLOWLINE VALVES	Turn handle on each valve at least 1 ½ turns to confirm operability. Note degree of difficulty to turn handle. Report valves that are difficult to operate to wellhead valve maintenance specialist vendor. Maintain monthly log sheet showing each well and results by each valve.	Record in Wellhead Valve Inspection Form (Kept in Control Room)
WELLHEAD SAFETY CONTROLS	Function test master valve that is actuated by safety system. Ck. calibration/function test pressure safety pilots. On a rotating basis Ck. oper. Of each remote shutdown method/system for each producing well by shutting in each well.	
FLARES	Function test flame front igniter to make sure it is in working order. Sample, analyze and record each well's wellstream produced H2S content.	
TRIPLEX PLUNGER PUMPS	Wash the crankcase air filter in kerosene. Ins. The pump valves for signs of wear.	
TEG UNIT	Visually Ins. TEG purity using sight glass.	
MOTORS	Grease or oil as appropriate.	

QUARTERLY CHECK LIST

ITEM	DESCRIPTION	COMMENTS
WELLHEAD PRESSURE GUAGES	Test and recalibrate.	Record on Quarterly Inspection Form
GAS RECOMPRESSOR	Ck. oper. Of the overspeed safety stop. Service engine air filter. Ins. Crankcase for signs of sludge formation. Ck. camshaft drive chain and governor drive chain for excessive slack. Ins. Compressor valve. Ck. valve stem lubricator drip plugs and replace if necessary. Ins. Spark plugs and reset spark gaps as necessary or replace. This period may be extended as experience indicates. Change crankcase oil after 2500 hrs oper. Change the elements in the full flow lube oil filter every 1500 hrs.	
INGERSOLL RAND SPLIT CASE PUMPS	Change oil filter, depending on condition.	
ELECTRICAL EQUIPMENT MANITENANCE	Ins. Circuit breaker oil cups for proper level of clean oil. Drain and replace as necessary.	
TRIPLEX PLUNGER PUMPS	Tighten all studs, nuts, and cap screws.	

SEMI-ANNUAL CHECK LIST

ITEM	DESCRIPTION	COMMENTS
PALL AIR DRYER	Ins. Filters and replace as necessary.	
GEAR REDUCER/INCREASER	Clean air breather. Ck. tightness of foundation bolts. Clean filter. Ck. condition of oil and change if necessary. Ck. gear tooth wear, coupling alignment.	
TRIPLEX PLUNGER PUMPS	Drain and refill the crankcase two weeks after initial start up, and every six months thereafter, or immediately whenever foreign matter enters the crank end.	
GOULD CENTRIFUGAL PUMPS	Ck. foundation and hold down bolts for tightness. Ck packing if pump has been left idle. Change oil.	

ANNUAL CHECK LIST

ITEM	DESCRIPTION	COMMENTS
WELLHEAD AND FLOWLINE VALVES	12months or 50 complete operations, perform third party inspection. Oper. All valves in full range of oper. Drain grease and lub. All valves. Refill sealant reservoir in valves. Repack stems.	Covered by annual maintenance.
GAS RECOMPRESSOR	Ck. clearance of bearings by feeler gauge and record readings. Ck. bearings, clean oil cooler, clean heat exchanger, Ins. Air starting distributor and air starting valves. Ins. Camshaft drive chain and governor drive chain for wear. Pull compressor pistons and Ins. Rings for wear. Record compressor cylinder bore diameters.	
GOULD CENTRIFUGAL PUMPS	Ck. pump capacity, pressure, and power. Ins. System if pump performance does not satisfy process requirements.	
GEAR REDUCER/INCREASER	Ck. heat exchanger for erosion, corrosion, or foreign material. Ck. bearing clearance and end play. Ck. tooth pattern.	
BOILERS	Test oper. Parts of all safety shutoff and control valves.	Coordinate with steam PSV Testing.
TANKS	Static level testing: 24 hour test.	

EVERY 5 YEARS CHECK LIST

ITEM	DESCRIPTON	COMMENTS
PRESSURE SAFETY VALVES	Per API 510 and API RP55 test, inspect, repair by third party valve specialist vendor.	This data is recorded by valve in the PSV documentation filing system.