

8.0 OPERATIONS AND MAINTENANCE

8.1 INTRODUCTION

Operations and maintenance of the Point Thomson facilities will be governed by the operational requirements for the project. These specifications will incorporate a central control room (CCR) for functional control of plant processes, monitoring security, safety surveillance of emergency shutdown systems, a fire and gas monitoring system, remote activation of pig launching operations, and data gathering as may be required by a surveillance system. In addition, Production Operations Best Practices (POBP) will be used for any issues/concerns not covered by the specifications.

The following sections provide descriptions of the operational requirements, including maintenance issues, for the civil works, pipelines, and process facilities. A section is also included on anticipated air emissions.

8.2 CIVIL WORKS MAINTENANCE

8.2.1 Roads, Pads, and Airstrip

To ensure the integrity of the airstrip, pads, and roads, routine inspection will be required. The operations at Point Thomson will maintain and use road maintenance equipment such as motor graders, front-end loaders, backhoes, and water tankers for dust control. Maintenance will be performed on an as-needed basis. Care will be taken not to damage the permafrost or the tundra.

8.2.2 Drainage Structures

Drainage systems will be inspected periodically as part of routine operations. Required equipment will be dispatched to remove debris, snow, etc. from culverts and storm-water collection basins.

8.2.3 Snow Removal and Storage

In accordance with all ExxonMobil SHE guidelines, the Point Thomson facilities will be well kept and maintained. During the winter months, snow removal activities will be conducted on an ongoing basis. Personnel and equipment such as front-end loaders and motor graders will be available to handle the snow removal requirements at the Point Thomson CPF, well pads, and airstrip.

To ensure a safe operating facility, a Standard Operating Procedures (SOP) Manual will be developed before operations start-up. The SOP Manual will include a section detailing snow removal and handling procedures and adhere to the snow removal Best Management Practice

(BMP) associated with the National Pollutant Discharge Elimination System (NPDES) permit for storm water. These procedures (BMP) will also address handling and disposing of contaminated snow, which will be visually inspected for contamination before removal. Contaminated snow will be collected and stored in a specially designated area for proper disposal (the location of the storage area will be determined at a later date). Snow may be allowed to melt, or a snowmelter will be used; any contaminated meltwater will be injected into the disposal well. Uncontaminated snow will be pushed onto surrounding tundra and/or dumped onto the lagoon sea ice, where it will be allowed to melt into the ocean during breakup.

While large accumulations of snow are possible during some winters, potential effects of snow storage are anticipated to be minimal. Snow dumps not only can be located on unused portions of pads but also could be located off-pad for uncontaminated snow.

8.3 PIPELINE MAINTENANCE

8.3.1 Infield Gathering and Injection Lines

Gathering lines extend from the East and West Well Pads to the CPF, and the gas injection lines run from the gas compression modules to the gas injection wells. The field operator will conduct surveillance and visual inspections of the gathering and injection lines as part of the routine operations.

8.3.2 Export Pipeline

The condensate export pipeline from the CPF to the Badami facility will include a leak detection system and will be monitored by supervisory control and data acquisition (SCADA) system 24 hours a day (described in Section 6). The pipeline will require some special methods of planning the inspections and maintenance program, which will take into consideration the limited seasonal access to the pipeline right-of-way, tundra protection, wildlife protection, logistics, and workforce. Surveillance of the pipeline, typically performed on a weekly basis, will be performed via aerial surveillance (fly over) or by ground visual observations. Internally, the pipeline will be periodically inspected using “smart” pigs. Pig launchers and receivers, isolation valves and associated instrumentation and controls will be housed in enclosures.

Access to the pipeline and associated facilities can be gained from roads along the pipeline right-of-way (where roads are available), by using Rolligons when tundra travel is allowed, or from ice roads built during the winter to access a specific location. Access can also be achieved by mobilizing a helicopter to move personnel and equipment directly to a specific location for minor repair and maintenance. Typically, minor repairs will require only hand tools and, possibly, welding equipment. Major repairs might require the use of earth-moving equipment, cranes and lifting equipment, and specialized tools and materials. Minor and major pipeline repairs will be scheduled, where possible, to ensure equipment, materials, and personnel required to perform these repairs will be available.

In order to provide quick response to minor emergencies and to perform repairs to the facilities dedicated to the pipeline flow and leak detection, spare parts and replacement materials will be maintained at the Point Thomson warehouse. Personnel at Point Thomson will supervise all pipeline repairs.

8.4 PROCESS FACILITIES

8.4.1 Gas Injection

The injection compressors will be in a fully enclosed modular building. There will be a long-term service agreement with a contractor to provide scheduled maintenance for the facility. Regular inspections by Operations personnel of the entire injection system will be performed to minimize downtime. Critical spare parts for the injection system will be warehoused at Point Thomson. An independent console will be located in the CCR along with a local equipment room to display functionality and status of the entire system. An anti-surge system will be installed on the compressors to ensure the load is balanced among the compressors.

The gas injection system will be connected with the entire emergency shutdown system of the CPF. The gas injection wells will be located within the CWP, which is adjacent to the CPF.

8.4.2 Produced Water

Produced water from the low-pressure (LP) compressor scrubber, third-stage separator, and the condensate dehydrator will be routed to the produced water separator. The produced water will be pumped to the CWP for disposal in a disposal well. Condensate will be skimmed off the produced water in the separator and pumped back to the condensate dehydrator by the produced-water skim-oil pumps.

8.4.3 Exterior Lighting

Interior and exterior process areas will have high-pressure sodium lighting. Control and electrical rooms will have fluorescent lighting supplied from 120-volt alternating-current uninterruptable power supply systems (UPS). Process area egress lighting to meet Uniform Building Code requirements will be powered from Underwriters Laboratories-listed UPS.

8.4.4 Instrumentation and Controls

Operations at the Point Thomson Unit will be controlled from the CCR. Operating consoles located in the control room will display process conditions and equipment status, including any alarms, trip conditions, and fire/gas detection. Alarms will be relayed to the operator on a real-time basis, thus allowing the operator complete surveillance capability throughout the plant while remaining in the control room.

The process control system (PCS) will be able to monitor and control the entire operation (both plant and field). The PCS will have standard local-area-network-based workstations for operator consoles; this will provide the operator and the maintenance technicians the ability to check or configure a device from any location at the facility. The PCS will continually monitor devices and deliver real-time data on their operation. The system provides the following capabilities:

- Surveillance and control of the process facility (CPF), the well pads, and the pipeline;
- The ability to pinpoint poor equipment performance;
- Optimization of maintenance activities;
- Early detection of failures of key pieces of equipment, reducing lost production and repair costs; and

- Identification of faulty instruments and subsequent prevention of incorrect and potentially costly actions based on bad data.

Safety instrumented system (SIS) and PCS alarms and trips will be annunciated on the human/machine interface (HMI) in the CCR by way of visual images on the associated graphics and by an audible signal. Alarms that are acknowledged at the HMI and CCR will automatically be acknowledged at all other HMIs in the CCR and in the local equipment room buildings. Priority 1 alarms, including gas leaks, will be annunciated on a dedicated alarm panel.

The facilities' public address and general alarm system will receive signals from the safety systems, manual call stations, and PCS, and will provide unique audible alarms (tones with voice overlay messages) to the audible stations. In addition to control and monitoring from the CCR, certain major pieces of equipment will have their own stand-alone local control and monitoring panels. These panels will provide local control during start-up and shutdown operations, and will assist Operations during equipment start-up and system trouble-shooting. Local panel functions will also be duplicated and accessible from the HMI in the CCR.

8.4.5 Flare

The bulk of material in the Point Thomson gathering system, plant, and gas injection system will be natural gas. The flare system will be used to safely burn these gases, which may occasionally need to be released when pipelines and facilities are depressurized for maintenance or when there is a temporary facilities upset. Depressurization and flaring might also be necessary if there is an emergency in the facility. Vented gas will first flow to flare knock-out drums, where liquids will be separated before the gas is sent to the flare. There are two separate flare systems, one for high-pressure (HP) gases and one for low-pressure (LP) gases. Noise associated with high flare-rate excursions is expected to be similar to that generated at other North Slope operations.

Flaring will be limited to serious plant emergencies, or and when necessitated by maintenance. The maximum gas flow rate to the high-pressure flare system is about 1.75 billion cubic ft per day. This scenario represents an abnormal emergency situation where production gas is being vented at high rates from the gathering lines due to a plant shutdown. This high-rate venting to the flare is considered to be a very rare occurrence. The more typical flaring scenario represents flaring at times when a single injection compression train drops off-line or is shutdown. These events could occur several times a year, and are likely to decrease in frequency as problems with new equipment are resolved. The predicted low-pressure flare gas rate is approximately 34 million cubic ft per day based on a process upset in the second stage of the condensate separation train. The LP flash-gas compression system also vents to the LP flare system and can flow as much as 25 million cubic ft per day if the single flash-gas compression train is off-line or shutdown.

Typically only flare pilot and purge volumes will be burned in the HP and LP flares during normal (non-flaring) conditions. There will be little audible noise from this normal state. Air emissions from the pilot and purge will be included in the emission inventory for the CPF.

High- and low-pressure system flare stacks will be located just to the west of the CPF Pad. Each flare stack will be 100 ft above the ground surface. Gas and air will mix at the flare tips located at the top of the stacks. The flare stack height will also aid in dispersion of the combustion products and will reduce ground-level heat radiation.

The location of the flare stacks was selected to meet a number of criteria. First, the stacks need to be located as close to the plant site as practical to minimize the length and resulting pressure drop of the flare lines. Secondly, the flares must be located such that the heat radiation at any occupied area of the plant, roads, or pipeline right-of-way is maintained below a limit of 500 British thermal units (Btu) per hour per square ft. The flares will be also located downwind of the plant (based on the prevailing wind direction). Finally, the stacks will be situated so that the microwave path between Point Thomson and Badami is not obstructed during flaring.

8.5 AIR EMISSIONS

Point Thomson Gas Cycling Project activities have the potential to produce the following regulated air pollutants: nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO₂), particulate matter, and volatile organic compounds (VOCs). The type and amounts of air pollutants expected from this project will differ under drilling, construction, and operations phases and will be quantified as part of the air permitting process.

Sources of emissions anticipated during the drilling, construction, and operations phases include:

- Rig generators (diesel fired initially, switching to gas);
- Diesel generators located at the CPF to provide power during the first year of construction and drilling activities (will switch to power from gas turbines located at the CPF once fuel gas is available, and to provide backup power for essential loads during the operations phase);
- Drilling rig support equipment such as generators, boilers, and heaters;
- Gas-turbine-driven compressors, gas-turbine driven generators, and process heaters used for condensate separation/production and gas reinjection;
- Venting and flaring (intermittent source, with the exception of the pilot and purge volumes); and
- Vehicles, equipment (e.g., cranes etc.), marine vessels (in summer if required), helicopters, and airplanes used to transport equipment, materials, and personnel to and from the site.

The main sources of emissions during drilling and operations will likely be the gas turbines for power generation and gas compression. The emissions from these turbines will consist mainly of NO_x and CO, with lesser amounts of SO₂ and particulates. Diesel generators and support equipment will produce NO_x, with lesser amounts of SO₂, CO, and particulates. Flaring will burn most VOCs, but will produce some NO_x, with lesser amounts of SO₂, CO, and particulates. Vehicle, marine vessel, and airplane emissions are expected to consist mainly of CO, with small amounts of VOCs from aviation and other fuels.