

Section 2.1

Overall Flow Process

The gas exported from the Miller production platform is used by SSE at Peterhead to fuel two boilers or two gas turbines for the generation of electricity. A maximum of 286MMscfd is required during the daytime when electrical demand is high, reducing at night when the demand falls. The PGRF is designed to supply gas at the following design conditions:

Boiler supply: 7 barg at 16°C (15°C superheat)

Gas turbines supply: 24 barg at 45°C (25°C superheat)

The gas arrives at the PGRF battery limits via an 18km, 26" underground insulated pipeline from the Miller reception facilities (MRF) at St. Fergus. Normally the gas arrives superheated to 47°C at a pressure of up to 29 barg, this is 24°C above the hydrocarbon dewpoint, so under normal operating conditions no liquids are expected to form in the landline.

Gas from the landline bypasses the pig receiver (V-1101) and flows via the slug catcher (V-1102) into the gas knock-out drums (V-1103A/B). The gas remains superheated, hence these vessels are normally expected to operate dry. Gas from the KO drums is metered to fiscal standards and supplied to the Peterhead Power Station boilers and gas turbines through separate supply lines.

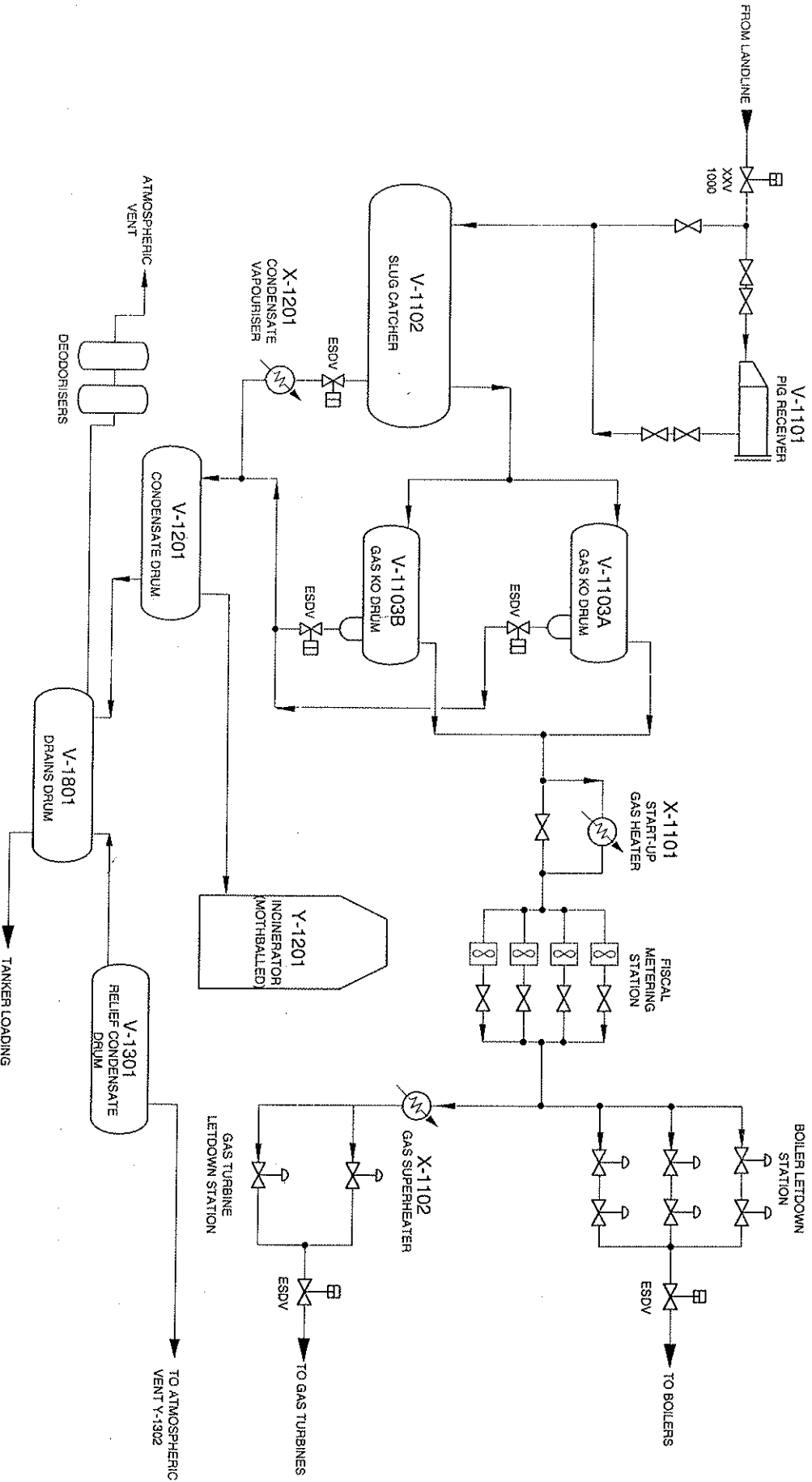
The Miller gas flowrate is determined by the demands of Peterhead Power Station and whether gas is also being supplied via the National Transmission System (NTS). The power station normally operates with two boilers on line; the gas turbines are installed to provide security of demand should one boiler be out of service.

If one boiler is unavailable, the remaining boiler and both gas turbines can be run continuously to consume 150MMscfd per boiler, plus 30MMscfd per gas turbine.

The swings in gas demand during a 24-hour period are catered for by packing and unpacking the 241km sealine from the Miller platform.

At St. Fergus the pressure is reduced from the sealine pressure of up to 172 barg to a landline inlet pressure of 29.5 barg. The pressure drop across the landline varies with flowrate such that the PGRF inlet pressure is dependent on the Power Station demand. At a flowrate of 286MMscfd, the PGRF inlet pressure is 24 barg. This inlet pressure increases to just over 29 barg when the flowrate drops to 60MMscfd.

PGRF Flow Diagram



Downstream of the PGRF, the Miller gas combines with gas supplied by the NTS in a common manifold to supply the SSE boilers. Normally when NTS is supplying gas, they will control the pressure at 6.5 bar in the supply manifold, and Miller gas will be supplied on a flow control basis through stream 1 of the HIPS/pressure/flow control station.

Stream 1 contains two slam-shut valves in series, followed by a pressure control valve. The downstream slam-shut valve also serves as a flow control valve, with the pressure control valve providing a pressure override should the NTS fail to control the manifold pressure.

When gas is not available from the NTS, the gas supplied to the boilers is reduced to 7 barg in streams 2 or 3, which are 2 x 100% HIPS/pressure letdown streams.

Each stream contains two slam-shut valves in series, followed by a pressure control valve. The downstream slam-shut valve in the stream also serves to provide the first stage pressure letdown, with the pressure control valves serving as the second stage pressure letdown.

For the initial start-up of the boilers, a line is provided to bypass the downstream control valve on stream 3, sized to permit one boiler to be brought up to it's load point. The boilers are brought on line by firing one burner at a time over a period of approximately 5-hours.

Gas supply pressure to the gas turbines is reduced to approximately 24.5 barg via one of 2 x 100% streams, each containing a single control valve.

A start-up stream is provided, containing a single let-down valve to cater for the low flows experienced when bringing one turbine up to full speed, no load point.

To meet the boiler feed specification of 15°C of superheat at 7 barg, the gas is heated to a minimum temperature of 43.3°C at the TFE MFR St. Fergus, (normally 53°C) which ensures that the boiler gas supply is always at a minimum of 15° above its dewpoint (the Miller gas dewpoint is 1°C at 7 barg).

The gas supplied to the gas turbines requires 25°C of superheat at 24 barg, it may therefore require additional heat, which is provided by the Gas Superheater (X-1102). The gas temperature is controlled by varying the steam pressure to the exchanger.

All process lines in the PGRF are insulated to reduce heat losses. The lines downstream of the start-up heater are also heat traced. The set point for trace heating thermostats is set slightly below the plant normal operating temperature to ensure the trace heating will normally remain switched-off. The heat tracing will automatically switch on whenever the flow stops and the gas temperature falls.

The landline and PGRF are protected against upstream overpressure by full flow relief valves at St. Fergus (PSV-5101B1/B2/B3/B4) set at 40.6 barg.