

## Extracts from Mogas Export Project Control and Operating Philosophy

### Section 5 Overview

#### 5.3 Tranmere

##### 5.3.2 Marine Loading Arm (FA-008) and Vapour Return Hose (FR-001)

A new marine loading arm and vapour return hose will be provided at the South Jetty. The loading arm should be suitable for use in both MoGas and Gasoil service if required to be changed in the future. The vapour return hose will be dedicated to MoGas duty only.

At the base of the loading arm and vapour return hose, an ESD (commonly called ESD-1) (36-V-029/24 respectively) will be installed to isolate the jetty from the ship. An ESD system will govern all loading operations at the South Jetty. The new loading arm will be equipped with excessive movement detection which firstly initiate the ESD-1 valves and upon further excessive movement will initiate a powered emergency release coupling (PERC) (commonly called ESD-2) in the loading arm and vapour return hose to minimise loss of containment in the event of a ship breakaway.

During ship loading, vapour will be vented from the ship's tanks to the new Vapour Recovery Unit (VRU) located in the South Compound.

### Section 6 Process Control and Operation Description

#### 6.1 MoGas Transfers – Stanlow to Tranmere

##### 6.1.12 Ship Loading Operation

Ship loading is controlled by Tranmere utilising the DCS and communication link to Stanlow. The quantity of MoGas exported is measured by 34-FQ-0200. MoGas will be loaded to ship via a loading arm FA-008.

The loading arm and vapour return hose are fitted with a dry break mechanical emergency release coupling to minimise loss of containment in the event of uncontrolled ship sailing from the loading Jetty.

Level control to protect against overfilling the ship's tanks during MoGas loading will be the responsibility of the ship. The ship will be provided with a pendant with a push button that can close the Jetty ESD-1 Valves (38-V-024/29).

Closure of the Jetty ESD-1 Valves (38-V-024 and 38-V-029) may be initiated manually via a pushbutton or from the Control Room at Tranmere. Closure of the ESD valve at the South Jetty will also stop MoGas Export Pump P-101A/B operation via the DCS.

Following completion of the Gasoil Displacement operation, ship loading can begin subject to ship availability.

To initiate ship loading, the duty MoGas Export Pump is started with:

- its spillback flow control valve (35-V-251 for P-101A and 35-V-270 for P-101B) set to automatic for minimum flow protection
- its suction and discharge isolation valves in the open position (as listed in Section 6.1.7)
- the flow control valve (34-V-109) at Stanlow in the closed position
- the route to the South Jetty at Tranmere lined up (Gasoil and Crude routes closed)

Note: the suction and discharge isolation valves of the standby pump remain in the closed position.

When the spillback flow rate around the duty MoGas Export Pump (P-101A/B) has stabilised the flow control valve (34-V-109) at Stanlow is opened slowly (to minimise surge problems) allowing MoGas to the ship at the South Jetty.

Initially, the ship is loaded at a reduced flow rate of about 500 m<sup>3</sup>/h to mitigate against static build-up and to allow operations to ensure there are no leaks. This flow rate will be achieved using a single MoGas Export pump P-101A/B and will depend on the type of ship being loaded. The ship will agree the flowrate required with Essar as part of existing procedures.

Once the signal has been received from operations to increase the loading rate, the MoGas flowrate can be increased up to the maximum filling rate (1000 m<sup>3</sup>/h) by starting the standby MoGas Export Pump P-101A/B and then increasing the setpoint of the flow control valve (34-V-109) at Stanlow.

The second MoGas export pump will be started with its discharge isolation valve in the closed position and its spillback flow control valve in automatic. When the spillback flow around the pump has stabilised, the remote operated discharge valve (35-V-254/35-V-255 for P-101A/B respectively) will then be opened with both pumps now discharging into the TEP.

As the end of the MoGas batch approaches, the setpoint of the flow control valve (34-V-109) at Stanlow is reduced to 500 m<sup>3</sup>/hr followed by closure of the standby pump discharge isolation valve (35-V-254/35-V-255 for P-101A/B respectively). Once the discharge isolation valve is confirmed closed the standby pump is stopped.

When the 34-FQ-0200 indicates the end of the MoGas export batch, the pump will be stopped via DCS with the spillback and flow control valve remaining open.

Following completion of MoGas Export, the MoGas Export Pumps (P-101A/B) should be isolated by ensuring the pump suction and discharge isolation valves and the isolation valves (36-V-211 and 36-V-216) on the line to the South Jetty at the Tranmere Pig Valve Station manifold should be closed in anticipation of the MoGas Displacement sequence.

The loading arm and associated piping at the jetty head may be purged with nitrogen with the contents routed to the Crude system, following completion of MoGas Export operation.

## Section 9 Generic Requirements

The following sections discuss the general requirements for the DCS control system that apply across the Stanlow and Tranmere sites.

### 9.1 Operating Modes

#### 9.1.1 Manual

Control Loops will be able to be selected to run in manual. This will allow the operator to take command of the controller from the central control room. All automatic control (e.g. cascade control) on the device shall be inhibited.

#### 9.1.2 Automatic Mode

In auto mode, the DCS controllers shall control the device.

### 9.2 Control Valve Action on Trip or Shut-down

Control valve actions and closure (or opening) rates during a trip or shutdown shall be considered on a case-by-case basis to ensure that:

- Surge pressures do not exceed equipment design pressures.
- Cross contamination between MoGas and Gasoil is minimised.

### 9.3 Pumps / Blowers

Both the MoGas Export Pumps (P-101A/B) and the Gasoil Transfer Pumps (P-112/113) will be remote manually started and stopped. At the beginning of each product transfer, it is envisaged that the pumps in use will be left running against closed valves until the operator initiates the transfer or stops the pump(s) as required. Under this condition the pumps will be protected by the spillback flow systems and high temperature trips / low flow stops (MoGas Export Pumps P-101A/B). At the end of each product transfer, the pumps will be switched off.

The failure of a pump shall raise an alarm in the DCS upon which the operator will select to start the standby if available. Stand-by equipment will not be brought on-line automatically.

The operation of the blower inside the VRU will be controlled by a pressure control loop within the VRU package (Ref. 5).

### 9.4 Alarms

Alarms will be enunciated in the plant control room. All alarms will be prioritised and shall be displayed in the DCS along with the alarm priority.

To avoid surplus alarms, conditional alarms will be provided as appropriate, e.g., when pumps are off, any associated low flow or pressure alarms are inactivated.

## 9.5 Process Trips

Process trips initiated by the DCS may be provided with automatic resets where required (for example pumps), although machinery will not automatically restart in the event of an auto restart.

Wherever a sequence is locked out, the operator shall be able to use the DCS screens to diagnose where the sequence is being inhibited.

## 9.6 Alarm / Trip Overrides

Under normal circumstances trips shall not be provided with overrides. Any DCS trip overrides required for start-up or shut-down shall be provided wherever possible as timed or conditional overrides. Any trip that must be overridden manually shall be done so by exception, with the appropriate access rights.

## 9.7 Trending and Historical Data

All process variables (both control and information) shall be displayed within the DCS with the facility to trend.

Historical process data shall be available via the DCS.

## 9.8 Control Loop Tuning

Control loops will be tuned during commissioning and settings recorded as part of the handover package. Loops will not be auto tuned by the DCS.

## 9.9 Operator Access Levels

The DCS will be configured to allow access to the operator to perform all necessary normal operations, and management of process trips and alarms. Where deemed appropriate, operators may be able to manipulate control set-points within pre-defined boundaries to fine tune day-to-day fluctuations.

Password-protected access will be provided at both supervisory level and maintenance levels. This will allow changing of process control set points and overriding of trips / interlocks and alarms as deemed necessary.