

CATS System Technical Overview

The CATS system carries natural gas from various points in the North Sea to the CATS terminal at Seal Sands, Teesside. Natural gas delivered into the CATS system at the CATS system offshore riser platform (CRP) or other points of entry along the pipeline (the CATS pipeline) is redelivered to CATS system users at specified redelivery points located at the CATS terminal.

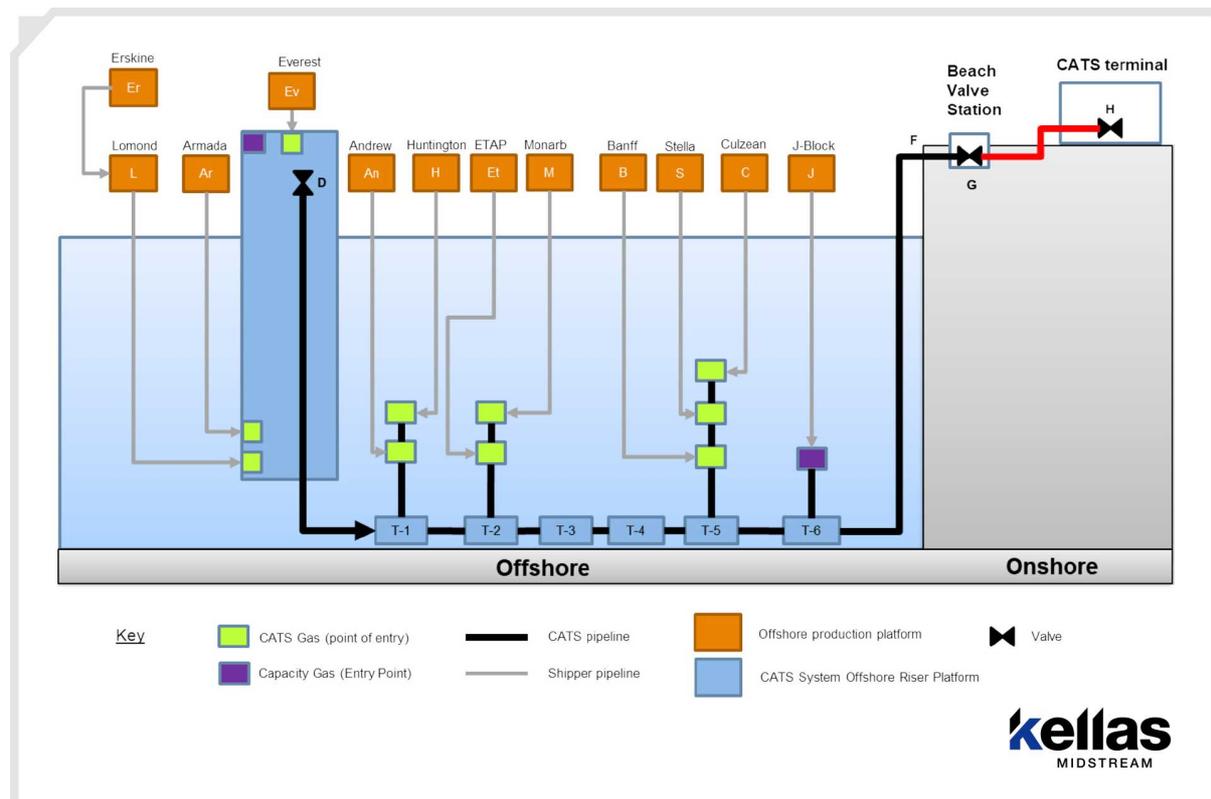


Diagram 1

The CATS System

1. The CATS system is shown in **Diagram 1**. It carries natural gas from various points in the North Sea to the CATS terminal at Seal Sands, Teesside. Natural gas delivered into the CATS system at the CATS system offshore riser platform (CRP) or other points of entry along the pipeline (the CATS pipeline) is redelivered to CATS system users at specified redelivery points located at the CATS terminal.
2. The Armada, Erskine, Lomond and Everest production platforms tie-in to the CATS system at the CRP.

3. The CATS pipeline was commissioned in 1992 with six subsea tee structures T-1 to T-6 pre-installed with subsea valves and tie-in points for future shippers to tie-in to the CATS system. When a new shipper connects into one of these subsea tee structures, a short new spur line in the CATS pipeline is created which connects to the new shipper's tee structure. The new shipper's tee structure itself provides a further connection point for future shippers. This process can be repeated for multiple new shippers, and the subsea tee structures "daisy chained" together; this arrangement exists at T-1, T2, and T-5. The shipper owns the pipeline connecting their offshore facilities/platform to the points of entry into the CATS pipeline.
 - (1) The Andrew and Huntington production platforms connect into the CATS system at T-1.
 - (2) The ETAP and Montrose-Arbroath production platforms connect into the CATS system at T-2.
 - (3) T-3 and T-4 are currently not used.
 - (4) The Banff and Stella facilities (and in due course the Culzean production platform) connect into the CATS system at T-5.
 - (5) The J-Block production platforms connect into the CATS system at T-6.

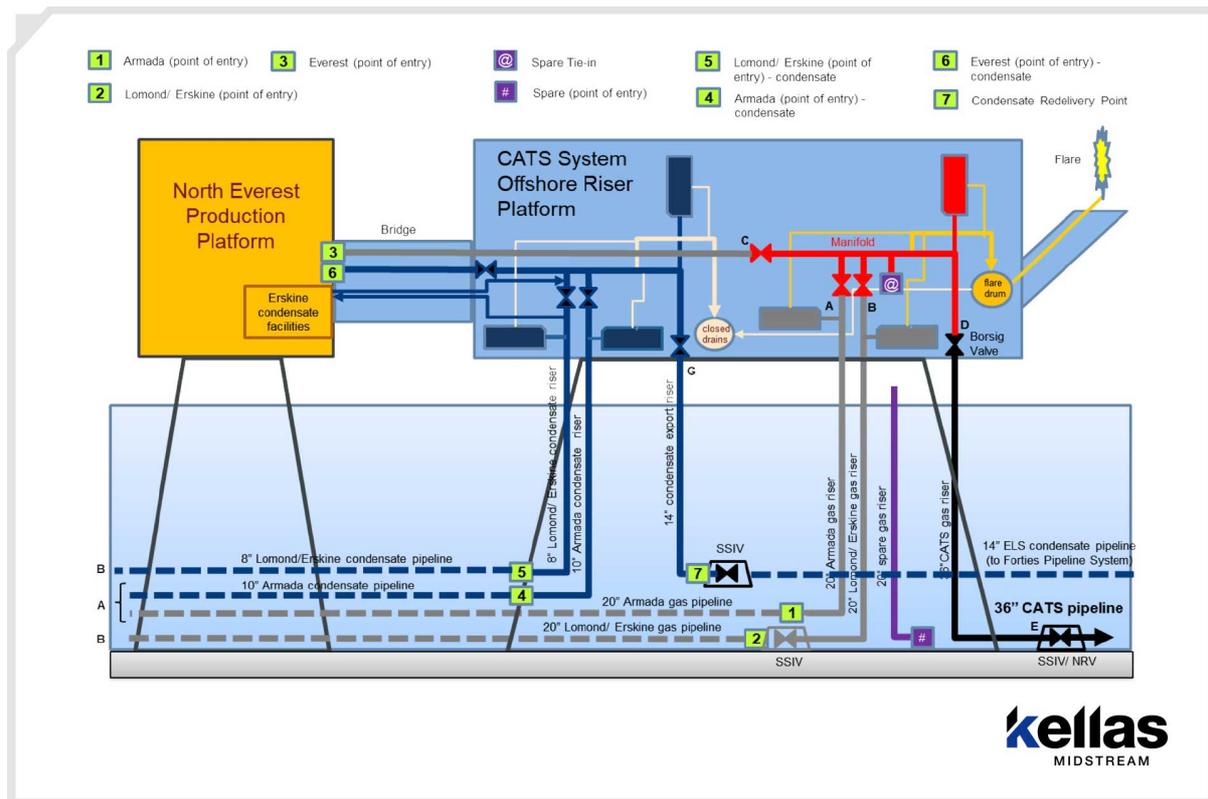


Diagram 2

The CATS System Offshore Riser Platform

1. The CATS offshore riser platform or CRP is shown in **Diagram 2**. It is located in the Central North Sea and is linked by a physical bridge structure to the North Everest production platform. The platforms are operated as a Combined Offshore Facility under a combined Safety Case.
2. The CRP is a gathering station for hydrocarbon gas and liquid condensate, which are produced from wells connected to the CATS system via the Armada, Lomond, and North Everest offshore production platforms.
3. The CRP is operated by the CATS system operator and owned by the CATS joint venture parties (CATS Parties) who have appointed the owners of the North Everest production platform as their duty holder.

4. All accommodation is located on the North Everest production platform.
5. The CATS system begins at the gas points of entry [1], [2], [3] to the CRP.
6. There is a spare 20" gas riser installed on the CRP (**shown in purple, Diagram 2**).
7. The common gas manifold (**shown in red, Diagram 2**), includes the CATS gas pig launcher and associated pipework, structures, valves, and instrumentation. The common gas manifold connects to the CATS 36" gas export riser **[D]**.
8. The CATS 36" gas export riser (**shown in black, Diagram 1**) connects the common gas manifold via the 36" emergency shutdown valve to the CATS subsea isolation valve/ non-return valve spool piece **[E]**.
9. The CATS subsea isolation valve/non-return valve spool piece connects to the CATS 36" diameter subsea pipeline (the CATS pipeline).
10. In addition to gas facilities, there are also liquid condensate facilities on the CRP. The 14" diameter condensate export riser connects to the Everest Liquid System (ELS) subsea pipeline, which connects into the Forties Pipeline System (FPS). The liquid condensate points of entry are at **[4]**, **[5]**, **[6]** and the condensate redelivery point on the CRP at **[7]**.

The CATS Pipeline

1. The CATS pipeline (**shown in black in Diagram 1**) transports methane, ethane, propane, butane, natural gas liquids, and various contaminants (such as water, hydrogen sulphide, and mercury) from offshore production facilities on the CRP to the onshore terminal for gas treatment, metering, and processing.
2. The CATS pipeline extends for 396km offshore from the tie-in point **[E]** at the subsea isolation valve/non-return valve spool piece to the pipeline landfall **[F]** at Teesside, where the offshore section of the CATS pipeline terminates at the beach valve station ('BVS') **[G]**.

3. The BVS is located at Redcar approximately 250m from the shore. The pipeline is fitted with an emergency shutdown valve **[G]** at the BVS, which enables the offshore section of the pipeline to be isolated from the onshore section of the pipeline in the event of an emergency. The BVS is unmanned and is operated remotely from the CATS terminal control room.

4. The 7.8km onshore section of the CATS pipeline **(shown as a red line, Diagram 1)** is buried for its full length and passes through heavily industrial land, and under the River Tees. It connects the BVS to the CATS terminal at Seal Sands. The CATS pipeline is fitted with an emergency shutdown valve **[H]** at the inlet to the CATS terminal so that the CATS pipeline may be isolated from the terminal in the event of an emergency.

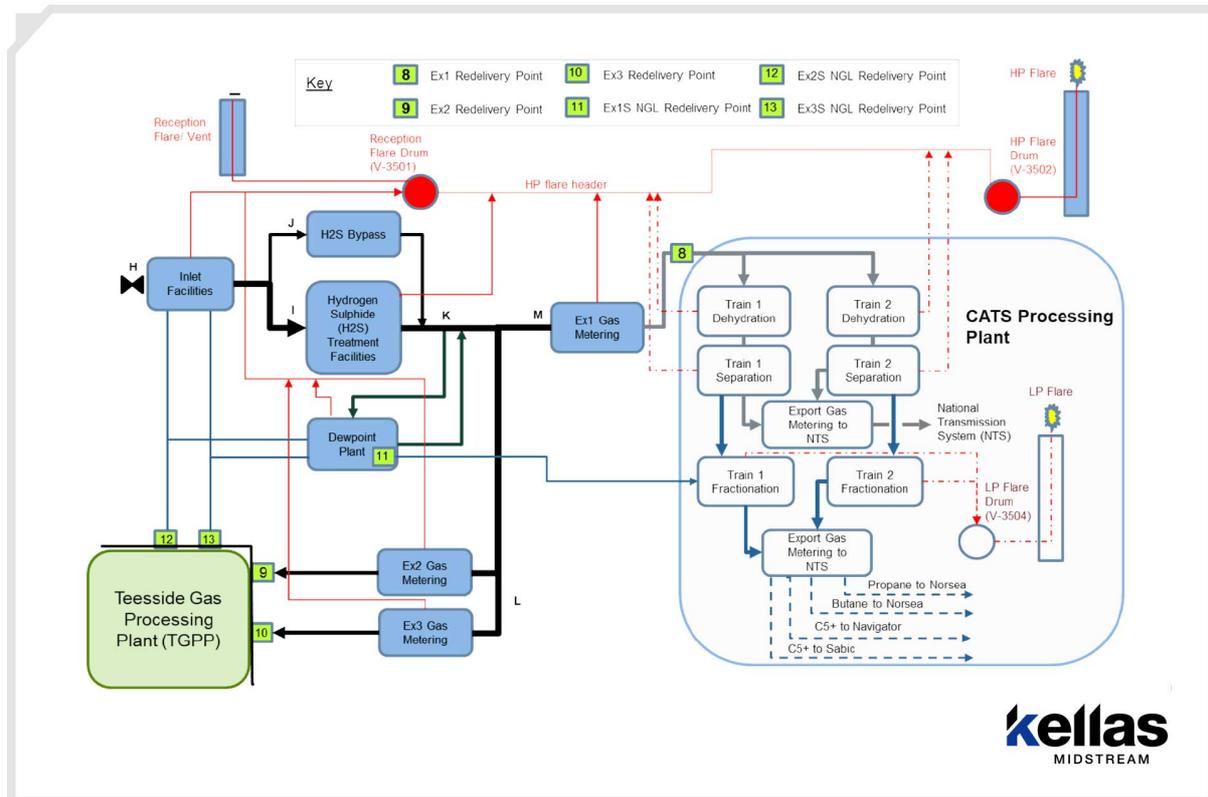


Diagram 3

The CATS Terminal

1. The CATS terminal is shown in **Diagram 3**. It has been designed to treat gas transported to shore, to meet the specification required for entry to the UK National Grid and domestic gas network. The gas that flows in the CATS pipeline must be treated and processed to achieve the requisite gas specification for the entry into the UK National Transmission System. This treatment involves removing contaminants from the gas (principally hydrogen sulphide and mercury), and removing the LPG (propane, and butane), and NGL (natural gas liquid) components.

Inlet facilities

2. CATS gas enters the CATS terminal at the tie-in point of the CATS pipeline to the inlet facilities [**H**]. The inlet facilities consist of vessels, piping, valves, filters, structures, instrumentation, and safety systems for the safe and efficient transportation of gas to the Gas Redelivery Points and NGL Redelivery Points.

3. Liquids can be routed from the inlet facilities to CATS processing facilities via NGL Redelivery Point Ex1S **[11]**, or to TGPP via NGL Redelivery Points Ex2S **[12]**, and Ex3S **[13]**.

Gas treatment

4. The gas treatment facilities consist of vessels, piping, valves, filters, structures, instrumentation, safety systems, and special absorbent materials to remove hydrogen sulphide (H₂S), mercury, and particulate contaminants from the gas transported via the CATS pipeline.

Metering and redelivery

5. Upon leaving the treatment facilities **[K]**, the gas is routed via fiscal quality gas metering facilities to the Gas Redelivery Points Ex1 **[8]**, Ex2 **[9]**, and Ex3 **[10]**. The fiscal gas metering facilities measures the volume of gas flowing through the terminal for HMRC (tax) purposes, and for billing the CATS system shippers for the CATS transportation service.

CATS processing plant

6. The CATS processing plant was built in 1997. It separates propane, butane, and natural gas liquid components from the gas that is routed **[M]** via Gas Redelivery Point Ex1 **[8]** to the two processing trains. Propane, butane, and NGLs are extracted from the gas and metered. The metered products are pumped via individual pipelines to third party storage and processing facilities on Teesside. The sales quality gas stream is metered and redelivered to the UK National Transmission System.

The Teesside Gas Processing Plant

7. Underground pipelines carry gas from the Gas Redelivery Points Ex2 **[9]** and Ex3 **[10]** to the Teesside Gas Processing Plant (TGPP). TGPP **(facilities shown in green, Diagram 3)**, is owned independently of the CATS system. Propane, butane, and NGLs are extracted from the gas and metered. The metered products are pumped via individual pipelines to third party storage and processing facilities on Teesside. The sales quality gas stream is metered and redelivered to the UK National Transmission System.