

ST FERGUS

Choosing the site

Once oil and gas had been extracted from fields in the Northern North Sea, they had to be brought ashore to be processed and distributed. The coastal village of St Fergus in Aberdeenshire was not the first choice for the Frigg gas processing plant. Initially, planning permission was sought to build the terminal several miles away on the disused airfield at Crimond, next to the Loch of Strathbeg, Britain's largest coastal dune lake. The pipes bringing the gas ashore would have had to cross the loch to get to the airfield. They were 32 inches (81 centimetres) in diameter; in places the water is only three feet deep (1 metre)! The loch was, and still is, an important and sensitive ecological area and is a Grade 1 Site of Special Scientific Interest. Local and national conservation bodies protested, and representatives from the University of Aberdeen's biology and geography departments set up an environmental liaison group to advise Aberdeen County Council. The Ministry of Defence also raised objections over the site of the terminal; it had its own plans for Crimond airfield. Ultimately, the MOD's needs took precedence, and British Gas agreed to relocate the terminal landfall, to near the village of St Fergus.

The Frigg UK Terminal is owned 100% by TOTAL E&P UK LTD.

Construction and Development

Phase I & Phase II

Phase I construction began in 1977, and Phase II followed in 1978. When referring to pipelines, facilities or construction, 'one' refers to the UK and 'two' to Norway e.g. Phase 1 construction was of the receiving facilities for the UK's gas, brought ashore by Pipeline 1. In December 1979, the terminal was awarded the Financial Times Industrial Architecture Award, when it was praised for "setting a high standard for this type of industrial complex". Initially the terminal was only built to process gas from the Frigg Field, and only sold the processed gas to British Gas.



St Fergus Terminal

British Gas had purchased all the gas in the reservoir, both the British and Norwegian share. This situation lasted until British Gas terminated the agreement in 2000, after which the remaining gas in the reservoir was opened up to any company wishing to buy it.

FNATEC (Frigg Norwegian Association Transportation Expansion of Capacity)

With planning beginning in May 1981, this two-year project resulted in the installation of compression facilities on MCP-01. As gas travelled hundreds of kilometres through the pipeline, its pressure fell, meaning a smaller quantity of gas could be transported in a given time. Compressors increased the capacity of

Pipeline 2 (the Norwegian line) and, consequently, increased the amount of gas needing to be processed at the terminal. Work began in early 1982 and was completed 18 months later. The main additions to the plant were a fifth condensate tank, extra refrigeration and heating equipment, a stainless steel stabiliser, and the modification of metering facilities. The pipelines also had to be insulated, as higher gas flow rates mean lower gas temperatures. Gas temperatures as low as -10°C would freeze the surrounding soil, which would expand and exert pressure on the pipeline. In total, 60 metres (197 feet) of underground pipeline from landfall to terminal was insulated with foam. A new, larger laboratory was also constructed. Samples of condensate and gas, as well as effluent, are analysed daily.

Phase III

The composition of gas varies between each field. St Fergus was designed to handle Frigg gas. Throughout the 1980s, other North Sea gas fields were discovered and exploited, and it was logical to utilise the existing processing plant at St Fergus rather than build another. Beginning in 1987, facilities were expanded and modified to allow the terminal to process richer (heavier and wetter) gas from the Alwyn Field. The project included the enlargement of the fire pond, extra



underground storage tanks and a nitrogen-injection unit. Further development was completed in 1992 and 1993 to accommodate gas from Miller and BP's Bruce Field respectively, although Miller's facilities are separate, whereas Bruce gas is processed by the Phase III facilities. Together, the three gas trains can nominally process 36 million standard cubic metres a day.

Inauguration

St Fergus and the pipelines were successfully tested on the 11th September 1977 and became fully operational on the 13th. On 9th May 1978, Queen Elizabeth II and the Duke of Edinburgh arrived at St Fergus to officially inaugurate the terminal. A day previously, the King of Norway had presided over the official Frigg Field ceremony.

Guests invited to St Fergus included representatives from the British and Norwegian governments, diplomats and the companies who owned and operated St Fergus. The royal party arrived at the terminal shortly after 11 o'clock. After a few brief presentations about Total and Frigg, the royal party were given a tour of the terminal and met members of staff from Total, Elf and British Gas, and 800 local schoolchildren invited for the occasion. A plaque was unveiled at half-past twelve and this was immediately followed by lunch, after which the Queen was presented with the gift of a painting. Simultaneous celebrations were held in Grosvenor

House, London, and at the University of Aberdeen, where guests watched the proceedings at St Fergus via live satellite link. The celebrations in the capital were attended by government ministers and industry figures. Those invited to the lunch at the University included academics, local MPs and representatives from the council.

Invitation to the Inauguration Ceremony



Invitation to the Inauguration Ceremony

The Inauguration at St. Fergus

*Sir Denis Roche, M. Rene Granier de Lilliac and M. Paul Le Rest
the Chairmen of the British Gas Corporation, Total Oil Marine Ltd. and Elf Norge A/S
on behalf of the Participating Companies in the development of the Frigg Gas Field,
jointly request the pleasure of your company at St. Fergus on Tuesday May 9 1978,
when Her Majesty The Queen
is to inaugurate the St. Fergus terminals as part of the celebrations
to mark the completion of a major international energy project.*

*RFP Stephen Dagnold Head of Public Relations Total Oil Marine Limited,
Berkeley Square House, Berkeley Square, London W1A 6LJ*

*For security reasons guests to St. Fergus on May 9 will only be allowed entry on production of their invitation cards.
There will be no exception to this rule.
Please therefore make absolutely certain that you retain this card and bring it with you on May 9.*

Function

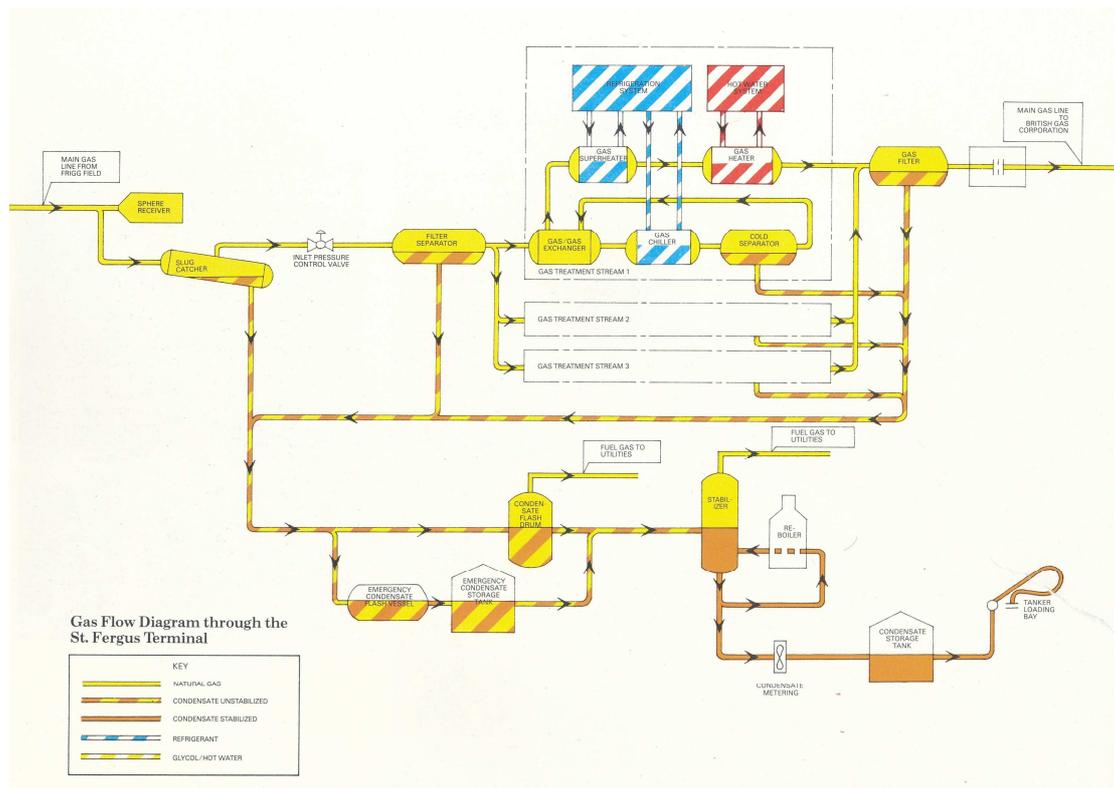
For the first ten years, the St Fergus terminal only processed gas from the Frigg Field. The gas, like all natural gas, was a mix of hydrocarbons and contained condensates; heavier hydrocarbons that condensed to liquid on the inside of the pipelines taking it ashore, due to the high pressure. St Fergus terminal's main function is to remove liquids (water and condensate) from the gas that arrives, and process it so that no further liquids form once it leaves the terminal and enters the national distribution network. Domestic and industrial gas appliances cannot cope with liquids in the supply, and condensate would cause damage in the national distribution network.

Gas from the pipeline passes through a slug catcher and inlet scrubbers. 'Slugs' are the volumes of liquids that are discharged from the pipeline as the gas comes in; the slug catchers and scrubbers remove the liquid from the gas supply.

After passing through a pressure control station, the gas is de-hydrated in a chiller where it is cooled to -18°C , originally by adding Freon. This produces condensates, thereby removing the last liquids from the gas. In the separator, the liquids fall to the bottom and are removed. The condensates are sent to facilities at either

Mossmoran (Shell) or Cruden Bay (BP). The cold gas moves from the separator to be warmed.

Additionally, the terminal has pig receiving facilities. Pigs are neoprene-rimmed plugs and one of their functions is to remove liquid that accumulates in the pipelines. They are built to fit exactly the diameter of the pipe and travel through it due to the pressure of the gas behind them. Condensates constantly build up in pipelines and slow the gas down. A certain amount arrives at the terminal continuously, and regular pigging helps remove build-ups of up to 3500 barrels of condensate per line.



Frigg gas flow through St Fergus

The British Gas Corporation - now Transco - built its own facility next to St Fergus to feed the processed gas into the national distribution network. Custody transfer (Metering) facilities monitor the flow for volume and calorific value as the gas is passed from Total's terminal across the boundary to Transco's plant. The rate Transco pays is dependent on both the quantity and quality of the gas provided by St Fergus.

The highest flow rate produced was 80 mscm/d (million standard cubic metres/day), although the average is about 70 mscm/d. The maximum continuous operating pressure for the pipeline and MCP-01 is 2160psig (pound-force per square inch gauge) (147.9 bars absolute). The terminal's maximum continuous operating pressure is 800psig, protected by pressure control and safety valves at the entrance to the terminal.

Fields

At its peak in the late 1970s and early 1980s, Frigg gas supplied Britain with a third of the gas consumed. Production from the Frigg Field ceased in October 2004. Currently, the terminal processes gas from about twenty fields, including Alwyn (since 1988), Ivanhoe/Rob Roy (1989), Bruce (1990), MacCulloch (1997), Ross (1999) and Captain (2000). In 2000, the terminal was supplying some 11% of the UK's requirement, but with the addition of Heimdal gas from the Norwegian sector in 2001, this percentage almost doubled.



Environment and Community

Mindful of environmental concerns, the former Aberdeen County Council originally granted planning permission for the terminal on condition that measures were taken to protect the environment. Total has focussed on minimising the environmental impact from the beginning and this has now become part of the St Fergus culture. After the pipelines to the Terminal were pulled ashore, the sand dunes were restored and the vegetation replaced. On a wider scale, it heralded a change in land development as authorities increasingly considered environmental impact when examining planning applications. The Dunes Committee, born from the University of Aberdeen's environmental concerns over the construction, still meets biannually to monitor the condition of the sand dunes. Total has been awarded ISO 14001, an international standard in recognition of its efforts to manage and minimise damage to the environment at St Fergus. Environmental initiatives have included planting 2000 hardwood trees in 1991 and extensive recycling campaigns. St Fergus also actively engages with the local community, having hosted Open Days for the families of employees and for primary-age school parties, and funded construction of the St Fergus village hall and bowling green. In 2006, Total E&P UK was presented with the Melville Watson Corporate Award for Charitable Fundraising, in recognition of the company's support for the charity Voluntary Service Aberdeen.