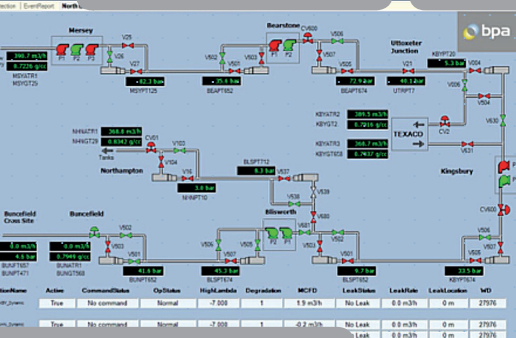


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Schematic overview of the leak detection system (LDS).

SCADA System Replacement Project

BPA engineer commissioning the emergency shut down system (ESD).

- Client:** United Kingdom Oil Pipelines Ltd (UKOP)
- Asset:** UKOP, West London Pipeline and Storage Ltd, Walton Gatwick Pipeline Ltd
- Role:** Project Management of the design, procurement, construction, commissioning/decommissioning
- Contractor:** various, Yokogawa United Kingdom Ltd
- Date:** May 2015 – March 2018
- Value:** ca £9M

Background

The UKOP system is an oil products pipeline system owned by a consortium of UK oil companies, it is one of the most highly used, complex and fully automated multi-product installations of its kind – and a key UK strategic supply asset. Since its opening in 1969, BPA has been responsible for management and development of the system. UKOP comprises of three integrated pipeline systems totalling 650km and transports around 5 million tonnes of mixed products each year from a refinery on the River Mersey and an Oil Storage Terminal on the Thames Estuary to inland distribution terminals. The system carries two grades of petrol, two grades of kerosene (including Jet-A1) and two grades of gas oil-diesel, providing a significant proportion of Heathrow and Gatwick airports fuel needs. The pipeline systems are currently controlled by two SCADA systems that BPA have maintained and upgraded since the late 1980s. Product movements are managed through automated scheduling system, a separate stock accounting system keeps track of and records product volumes, up/down-grading, etc.

The problem

Although reliable and secure for the time being, the hardware required to run the current SCADA system and its OpenVMS operating system is now obsolete. The long term security of the systems and the pipelines they operate is therefore at risk. Other elements of the Control system are also approaching end-of-life and it was deemed prudent to incorporate their replacement in an all-encompassing SCADA replacement project. These include the Wide Area Network, emergency shut down (ESD) systems, flow computers and PLC processors.

Pipeline specific applications (in the form of Movement Accounting and Pipeline Scheduling systems) are also old bespoke systems that have become difficult to support and failure would result in a need to revert to manual scheduling, manual accounting of all pipeline movements and difficulty in meeting the statutory requirement to provide HMRC fuel movement data.

A recent complication is that the increase in thefts from pipelines in the UK meant that the existing leak detection systems (LDS) needed upgrading to identify the unique signature of a pipeline theft.

The solution

Replacement of the SCADA systems, end-of-life equipment and pipeline applications in their entirety. New systems use current, proven, “off-the-shelf” technology with a robust roadmap for future-proofing and building longevity into the systems by allowing future upgrades to follow the same path rather than replacing the whole system. Current functionality is maintained whilst taking advantage of the inherent advances in technology that come with replacing a 30 year old system. The existing leak detection system (LDS) will be maintained however additional protection is provided in the form of negative pressure-wave leak detection technology to provide more accurate leak/theft identification.

The pipelines operated by the two SCADA systems form part of the UK’s critical national infrastructure, a high level of security is therefore required. This is at odds with the business requirement for increased access to operational data and vendor requirements to provide remote support. Digital (Cyber) security is intrinsic to the design of the systems and the network they operate across which is being implemented in liaison with GCHQ and the NCSC.

To address the increased threat of pipeline thefts the existing LDS has been complemented with the Atmos Wave Flow system, which has already detected and located a number of theft attempts.

Cost Reduction

The change from bespoke to standard, off-the-shelf product significantly reduces the overall cost of maintenance and makes future upgrades of the SCADA system easier.

Challenges

Due to the remote locations of some pipeline sites, the installation of the fibre optic communications lines has posed challenges.