

CHEMICAL CASE STUDY - SABIC, UK

# Continuous improvement of pipeline alarm system



ABB reduces impact of nuisance alarms on operators by 50%.

SABIC UK Petrochemicals Limited operate two pipelines running between the Wilton Site in the North East of England and the sites at Grangemouth in Scotland and Runcorn in the North West of England.

Fig 1: Pipeline map.

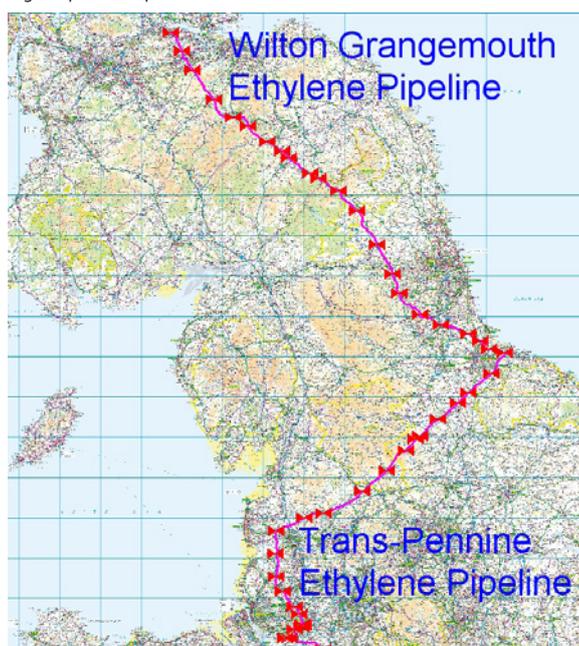
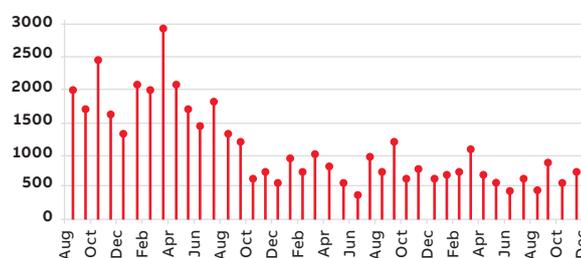


ABB have been managing the SCADA (supervisory control and data acquisition) system controlling the SABIC Ethylene pipeline network for many years. Ethylene is a highly volatile chemical transported at high pressure in underground pipelines between the major producers and consumers in the UK.

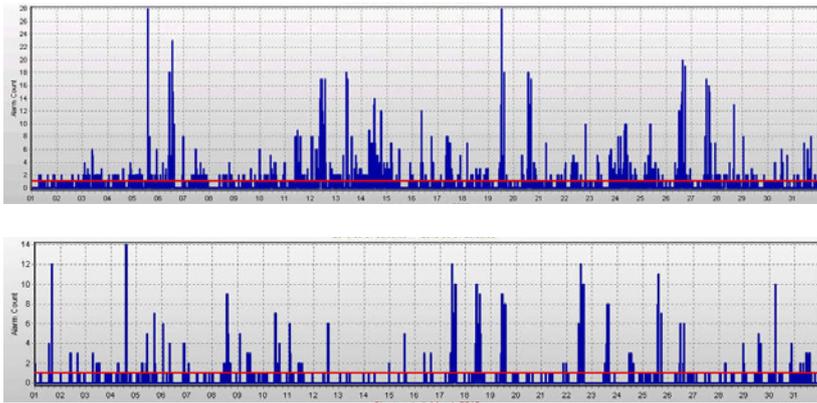
The SCADA systems collect process information from a number of unmanned valve stations located along the length of the pipeline via telemetry links. In addition to the process conditions (pressures, flows, temperatures etc.), the system monitors the state of the cathodic protection system, and the valve station installation.

The pipeline maintenance team routinely test all the alarm systems at the valve stations, and it is this activity which results in significant fluctuation in the number of alarms recorded each month as shown in fig 2.

Fig 2: CCPL alarm history.



SABIC wished to meet best practice in alarm management and engaged ABB to carry out a alarm rationalisation project.



Above - Fig 3: Monthly alarm statistics (before and after).

### Solution

A multi-disciplinary team comprising of SABIC personnel from operations and maintenance along with ABB consultants performed a fundamental review of the alarm system looking at:

- Capabilities of the SCADA application software
- Operational requirements (e.g. process, maintenance, leak detection system)
- Alarm priorities and message groups
- Alarm limits and hysteresis to minimise nuisance alarms
- Derived alarms recognising process conditions giving rise to multiple alarms
- Alarm flooding as a result of telemetry or other system upsets
- Reclassification of alarms as events where no operator action is required

The exercise was largely successful in eliminating problem alarms. Never the less, limited evidence to demonstrate performance was being collected, due in part, to the lack of analysis capabilities in the SCADA system.

To overcome this, ABB introduced routine monitoring of the alarm system performance using ABB's Alarm Insight software to collect and analyse the alarm and event messages produced by the SCADA. Alarm Insight allows alarms and events to be analysed in accordance with the EEMUA guidelines, and provides metrics for alarm rate and individual alarm frequency. This information was reviewed on a monthly basis to identify possible areas of further continuous improvement.



The reduction in alarms generated is illustrated in Figure 3. This illustrates that the system generally operates within the EEMUA 191 guidelines of less than 1 alarm every 10 minutes (the red line on the graph). The number of peaks (primarily associated with routine testing) is about the same, although the impact on the operators of nuisance alarms has been reduced by 50%.

SABIC have since upgraded the WGEF SCADA system to a new hardware platform, and are planning to upgrade the TPEP system in the near future. By conducting a formal alarm review as part of their project process, SABIC will ensure that the lessons learned from many years of operation will be properly captured and applied to the new systems.

### Benefits

- Impact on operators reduced by 50% as average alarm rates reduced to 1 alarm per hour and peak alarm rate reduced from 28 alarms in a 10 minute period to 14
- Ability to demonstrate to the HSE that leak detection and other important alarms are being properly managed to help ensure safe operation of the pipeline
- Meeting government regulations; improvements in alarm management are being mandated by government regulators, insurance companies and corporate standards
- Demonstrating good practice to stakeholders