Proceedings of The Institute of Acoustics

NOISE CONTROL AT PRESSURE REDUCTION STATIONS

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INTRODUCTION

Natural gas comes ashore at the east coast reception terminals at Bacton, Theddlethorpe, Easington and St Fergus and is then pumped to most parts of the UK through 4000 km of high pressure pipeline at 69 bar by compressor stations sited every 64 km along the line. The high pressure is used to maximise energy transmission through and storage in the system.

As the pipeline approaches densely populated areas, the pressure is reduced by pressure reduction stations, which provide an interface between the transmission system and the regional distribution system where the pressure is again reduced prior to final distribution.

NOISE SOURCES

Water Bath Heaters

A bath heater is a large (up to 4.5 MW) gas-fired indirect heat exchanger in which water, heated by large atmospheric burners, preheats gas passing through a secondary heat exchanger in the main water bath. The preheating compensates for the temperature reduction the gas undergoes during decompression. Noise from bath heaters has three components:

(i) low frequency combustion "roar" from the flame

(ii) low frequency resonances of the smoke tube/exhaust stack driven by the combustion processes

(iii) high frequency "hiss" from the high pressure gas injector(s) on the burner(s)

Regulators

Regulators control the flow through the station by varying the restriction to flow in the line, noise being generated by the high velocity gas stream constrained within the regulator body and downstream pipework from which it subsequently radiates. Noise spectra normally peak in the 2 and 4 kHz octave bands. Figure 1 shows typical spectra for bath heaters and regulators.

DESIGN PROCEDURE

The procedure evolved to ensure that noise from pressure reduction stations does not annoy our neighbours is shown schematically in Figure 2. This procedure is being continually updated.

NOISE CONTROL AT PRESSURE REDUCTION STATIONS

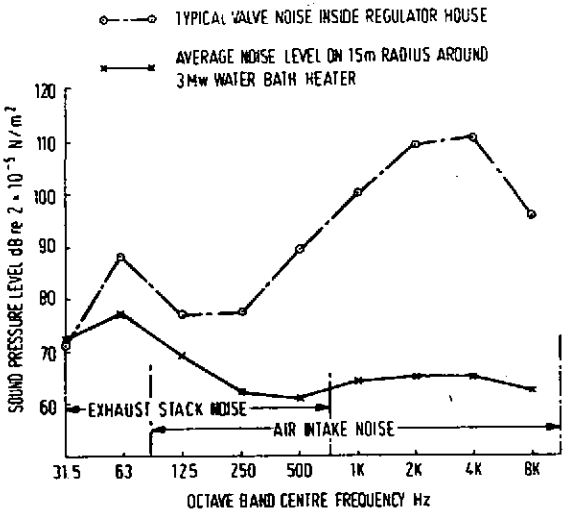

Figure 1

Typical spectra for bath heaters and regulators

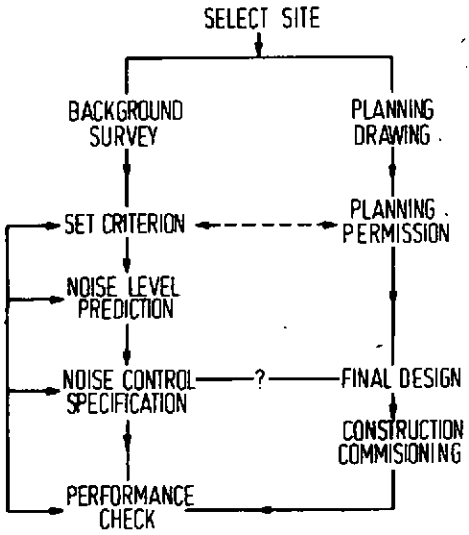

Figure 2

Noise control procedures