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POWER STATION NOISE CONTROL ENGINEERING

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The uncontrolled radiation from power stations can amount to 5 acoustic watts for normal operation and as much as 40,000 W during emergency and starting operations. To reduce this to an acceptable 0.04 watts may well cost £2 X 10^6 for a 2000 MW installation.

This is a considerable sum and economy can only be exercised by careful design and integration of the noise control into the overall system and plant items. This approach requires careful liaison with mechanical civil and electrical engineers and then provides the opportunity for general improvements to systems which while they do not completely offset the burden imposed by noise control they can make system changes acceptable.

Each installation is considered in relation to the surrounding environment which is carefully explored for its present and future 95% background noise level, weather pattern and typographical propagational influences. The size of the installation is large and several criteria have to be developed which ultimately lead to the grading of the emission control in each direction.

Off-site criteria are set in relation to the measured or future background noise predictions in general accord with BS.4142. Survey, design and assessment are undertaken in 1/1 or 1/3 octave bands.

Although it may be considered desirable to employ more detailed C.N.R. P.N.d.B based criteria we consider it is important to build up a fund of knowledge over seval years based upon what we at the moment judge to be a fairly reliable method.

The Control of Pollution Act has not caused us to change our approach and I am not certain if it has many advantages over the 1960 Act as far as the public are concerned. The onerous part of the legislation is section 59 of the COP Act, which in essence is the old 1960 Act. The most powerful incentive to initially control noise or to provide remedies for noisy plant has certainly come from our neighbours particularly on rural residential sites and this is enforced by the power station manager and his staff living in the locality.

For most industrial noise which predominates in the high and mid-frequency bands the procedures of BS.4142 for predicting annoyance have proved adequate. However they are not adequate when employed on low frequency sources such as gas turbine exhausts. N.R.N. and d.B.A. criteria developed from BS.4142 by comparison of the noise and background on a broad band basis can result in noise to background ratio of 20 d.B. or more at 31 - 63 Hz which may evoke complaint with an otherwise seemingly adequate criteria. Our criteria for this type of noise which we have so far found adequate is the broad band derived N.R.N. criteria reduced by 15 - 20 d.B. in the 31 Hz band tailing off to a 0 reduction at 500 Hz. The specified noise level for this source is quoted at 200 metres having regard to addition propagational effects the

absolute noise level and threshold.

In design each environmental area is considered from the source outward to achieve the noise levels appropriate to meet hearing conservation communication and annoyance requirements.

A C.E.G.B. Standard has been constructed which forms the basis of specifications for plant and civil works. A key factor in the formulation of this standard is the allocation of noise control and setting of plant emission noise levels to achieve an economic solution by providing for an equal contribution from each major source at the point of potential complaint.

The standard demonstrates the limitations to be applied to major sources of noise and the performance of civil constructions for a 2000 MW power station set in a rural/rural residential area. On completion of the overall acoustic design the plant and civil specifications provide amendments to the standard to suit the particular site and these and the standard form part of the contractual specification. The standard is held by all of our contractors and this enables them to see each total scheme, the part they must play and gives them the chance to identify the effect of any variation of the performance of their own plant in relation to the whole.

Whilst the clauses of the standard for off-site noise are amended to suit the site, criteria developed for the noise local to the plant is not varied. After careful analysis of power station plant propagation, the practical techniques available to plant manufacturer and our own hearing conservation programme we have set this criteria at 93 d.B.A. maximum surface noise level.

We have several reasons for employing maximum noise level limitations rather than averages. The maximum noise level provides a better indication of noise exposure and its measurement provides the manufacturer with immediate recognition of the significant sub-sources. Moreover it avoids problems associated with setting tolerances and this in particular gives advantage to the manufacturer that is able to closely predict the noise from his plant.

Users are the people responsible in law and can influence development in the environmental field more than any other group if for no other reason than that they foot the bill. To achieve economic working solutions and progress it is important that they aquire expertise. It is not the niceties of international controls and standards which are likely to set the pace particularly since these would often seem to be controlled by commercial factors and are limited in their production and use by the quest for scientific perfection. The real motive force comes from purchasing specifications derived from real effort expended on the practical and economic design of noise control for installations and plant based on the users clear understanding of his requirements linked to his responsibilities.