EXPERIENCE OF IMPLEMENTING THE EEC CONSTRUCTION EQUIPPMENT NOISE DIRECTIVES

D J WARING
DEPARTMENT OF TRADE AND INDUSTRY

1. BACKGROUND

I am grateful for the opportunity to bring you up to date on the European Community front. Mike Hayter presented a paper at the Acoustics 86 gathering in Salford entitled Barriers to trade and how the EEC attempts to remove them, I followed that with a paper to the Noise to the year 2000 meeting in Birmingham last February and now have this further opportunity to explain how we in the DTI are attempting to do our bit to improve the environment. Those of you who were at either the Salford or Birmingham meetings will be aware that the main thrust of the Directives we in DTI deal with is the elimination of technical barriers to trade by the harmonization of Member States laws etc. Reference is made to the European Action Plan on the Environment in the introductory preamble of the Directives but in the UK the main advantages are seen to be the trading ones and that is why DTI and not the Department of the Environment or the Health and Safety Executive have led the UK delegations and continue to have overall responsibility for enforcing the Directives. That does not mean we ignore the environmental issues, we worked very closely throughout the negotiations

with our colleague in DOE and the HSE and continue to recognise the role both organisations have in safeguarding existing national legislation which is aimed at ensuring proper control of noise levels in the living and working environment.

2. IMPLEMENTED NOISE DIRECTIVES

I would like first of all to take a look at the group of Directives adopted back in September 1984 which became effective in March 1986. They are generally known as the Construction Equipment Noise Directives and cover compressors, tower cranes, welding generators, power generators and powered hand-held concrete breakers and picks. These particular items of construction plant were chosen by the Commission because some Member States had national requirements which made it difficult for manufacturers from other countries to access their markets. The aim of the Directives was to overcome those technical barriers to trade by the introduction of common noise levels based on the same test and certification procedures. It is probably worthwhile to take a few moments to explain how the Directives are intended to work and who has responsibility for doing what.

i. The Directives are addressed to Member States so the Member States have responsibility for ensuring the necessary procedures are implemented. The construction equipment noise directives are in EC terminology called 'total harmonisation' Directives. This means that after implementation only equipment which complies to the requirements of the Directive can be placed on the EEC market and consequently equipment which does not comply becomes illegal and should not be placed on the EEC market. Member States are charged with introducing the necessary legislation and setting up the necessary procedures to carry out the 'total harmonisation' requirements.

ii. These particular Directives call up the EC type examination procedures to show or prove compliance. For those not familiar with EC terminology the EC type examination procedure requires a 'prototype' to be type tested by an independent test body. Member States are required to select and appoint such bodies, who are called 'approved bodies'. We in the UK have appointed eight approved bodies who are approved to test some or all of the items of construction equipment covered by this first set of Directives.

iii. Although the Directives are addressed to Member States the Directives (through the national legislation) put the responsibility for ensuring a products conformity onto the manufacturer or the manufacturers agent (importer) resident into the Community. The manufacturer (or importer) must ensure his product conforms to the requirements of the Directives before he places the product onto the EEC market place. Very simply the procedure manufacturers (or importers) must follow is to submit a prototype for testing to one of the 'approved bodies' within the EEC. The approved body will conduct the test as laid down in the appropriate Directive. Once successfully tested the approved body issues a 'type examination certificate' to the manufacturer (or importer). On the basis of the type-examination certificate the manufacturer (or importer) is responsible for ensuring that a certificate of conformity is issued with, and a conformity mark is fixed on, each machine that conforms to the 'type' tested before the machines are placed on the EEC market. From a

manufacturers point of view this system provides for one test for the whole of the European Community market place. Previously he probably had to meet different noise levels and different test methods in a number of Member States.

iv. There is also, of course, an obligation on the Member States to ensure conformity. This is done in a number of ways. The approved bodies, for example, are required to conduct conformity checks to ensure the ongoing production continues to conform to the type-tested. We in DTI attend many of the UK and European trade fairs and exhibitions and considerable monitoring is undertaken this way. Manufacturers are usually quick to point out the misdemenours of their competitors. Way back in March 1986 we enlisted the assistance of the Environmental Health Organisations and the Health and Safety Executive Factory Inspectorate. In a letter sent out on 21 March 1986 to all Chief Environmental Health Officers we asked that if as part of the EHO's normal duties, he/she became aware of an item of construction equipment which they suspected may not conform to the requirements of the Directives to let us know. We in the DTI are responsible for any follow up action and if necessary, to instigate a prosecution. All that is asked of the EHO's and factory Inspectorate is to provide a few details, sufficient for us to identify the item of equipment and the manufacturer or importer, we would take all the necessary follow-up action. One important point to remember though is that our Regulations only apply to new machines placed on the market which have been manufactured on or after the

implementation date - 26 March 1986. Complying equipment is relatively easy to identify, the conformity mark quite prominent in most cases, hence the absence of a conformity mark is the first hint that the item of equipment may be illegal. Guidance notes were issued with the letter to Chief EHO's. Obviously there is still a large volume of pre-March 86 equipment in use and these will not have the conformity mark fixed on them. However, there are increasing number of compressors, generators, breakers and so on in use on construction and building sites with the conformity mark visible. It is also worth noting that with the passage of time users will get used to the availability of quieter construction equipment and start specifying for the quieter versions putting further pressure on the manufacturers to produce quiet products Taking everything into consideration I believe that we are winning and eventually as all the old stock disappears the noise from breakers, picks etc will become less of a nuisance.

v. A further feature of the construction equipment noise Directives is the second phase of noise levels. These are due to come into effect in September 1989 and reduce the prescribed maximum sound power levels by between 1 and 5 dB. A full check of current permissable noise levels and the second phase levels is given in AnnexII. Manufacturers, importers and the approved bodies are aware of these further reductions in sound power levels and we have no reason to believe that construction equipment will not meet them, indeed much of the equipment already does meet the lower levels. There are a number of documents floating

around showing further reductions in January 1991 but the validity of these documents has still to be established and certainly the only further agreed levels which can be imposed are the reductions scheduled for September 1989.

3. RELATIONSHIP WITH EXISTING NATIONAL REGULATIONS

A slightly comlex area is the relationship between our Regulations (The Construction Plant and Equipment (Harmonization of Noise Emission Standards) Regulations 1985) and the UK's existing national Regulations, primarily the Control of Pollution Act 1974 and the Health and Safety at Work Act 1974. Although the scope of the Construction Equipment Framework Directive extends to cover marketing, placing into service and use the DTI Regulations are restricted to the marketing aspects thereby leaving the use of the equipment to be covered by the existing Regulations. The EHO and Factory Inspectorate powers to restrict use under the Control of Pollution and the Health and Safety at Work etc remain as before but there are now additional powers to prevent non complying equipment going onto the market. If EHO, Factory Inspectors or anyone else for that matter suspects that an item of equipment does not comply then contact us at the DTI and we will investigate further. To date we have not had to prosecute, the threat of a hefty fine and the potential loss of a market opportunity has proved sufficient to persuade reluctant manufacturers to conform.

4. FURTHER WORK

A further 'Noise' Directive dealing with both the sound power level for environmental noise and sound pressure level at the operator position was adopted in December 1986 and becomes effective next month on 29 December. This Directive covers hydraulic or rope operated excavators, dozers, loaders and excavator-loaders. It also requires the total

harmonization of members states laws etc, and stipulates testing by the EC type examination procedures. Many of the approved bodies appointed for the earlier Directives have also been appointed to undertake the type-examination procedures for this Directive. The Directive prescribes the maximum sound power levels for each type of machine but does not set limits for the operator position, merely requires the manufacturer to indicate the recorded sound pressure level. Although the Directive does not set second phase noise levels there is an obligation on the Commission to submit a formal proposal to introduce a dynamic test method and a reduction in sound power levels by approximately 3 dB's as soon as possible and certainly not later than June 1990. A further Directive also adopted in December 1986 which comes into effect on 1 January 1989 deals with Self Propelled Industrial Trucks. This is a general safety Directive which includes an Annex on noise. Although the Directive comes into force on January 1 next year the Annex on noise is still awaited! I cannot really add anything to that other than a working document does now exist and negotiations have commenced but progress is slow. Watch this space! This Directive also requires the total harmonization of Member States laws etc but the method of conformity is by manufacturers self certification for manufacturers who can show that they have the necessary capability to perform the tests and inspections. Member States are still required to appoint test bodies for those manufacturers who either do not have the capability to carry out the tests themselves or for manufacturers who choose third party certification.

5. WHAT THEN

A bit further down the road towards 1992 comes the new style of Directives and the one DTI is dealing with - the machinery safety proposal will certainly include noise. These new style Directives are very wide ranging - the definition of machinery is 'an

assembly of mechanically linked parts or components, at least one of which moves, with the appropriate actuators, control and power circuits etc, joined together for a specific purpose'. The term also covers complex installations. There are a number of exclusions such as mobile machines and lifting equipment but these are to be dealt with separately. One of the original aims of the machinery Directive is to plug the gaps left by the old style product Directives so if it moves and its not already covered by an existing Directive its likely to be covered and if its noisey there is likely to be noise requirements to be met. The Machines Directive is likely to require total harmonisation of the Member States laws and manufacturers self declaration supported by a technical file is favoured by probably the majority of Member States with mandatory third party certification restricted to the more dangerous machines. A succession of Presidencies have given priority to this proposal thereby maintaining steady progress and the present Greek Presidency are seeking for a common position to be reached before the end of the year. We consider this to be rather premature but the Directive could well be adopted during 1989 with full implementation following two years later.

ANNEX I

DTI DIRECTIVES

The following Directives were adopted on 17 September 1984 and implemented on 26 March 1988. UK legislation in the Construction Plant and Equipment (Harmonisation of Noise Emission Standards) Regulations 1985.

84/532/EEC	Common provisions for construction plant and equipment
84/533/EEC	Permissible sound power level of compressors
84/534/EEC	Permissible sound power level of tower cranes
84/535/EEC	Permissible sound power level of welding generators
84/536/EEC	Permissible sound power level of power generators
84/537/EEC	Permissible sound power level of powered hand-held concrete breakers and picks

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The following Directives were adopted on 22 December 1986 and will be implemented either side of the New Year.

84/662	limitation of noise emitted by hydraulic excavators, dozers, loaders and excavators - loaders. (Phase 1)
84/663	self propelled industrial trucks.

ANNEX II

Noise Levels

3 The following tables give the sound power levels which shall not be exceeded for each item of equipment.

i) Compressors

Standardized nominal air flow Q in m^3/mm	Permissible sound power level in dB(A)/1 pW as from	
	26 March 1986	26 September 1989
Q 5	101	100
5< Q 10	102	100
10< Q 30	104	102
Q >30	106	104

ii) Tower cranes

	Permissible sound power level in dB(A)/1 pW as from	
	26 March 1986	26 September 1989
Lifting mechanism	102	100
Energy generator	Levels laid down in the Directive on power generation according to the power generated	
Assembly comprising lifting mechanism and energy generator	Highest values of the two components	

iii) Welding generator

Nominal maximum welding current	Permissible sound power level in dB(A)/1 pW as from	
	26 March 1986	26 September 1989
Not greater than 200 A	104	101
Greater than 200A	101	100

iv) Power generator

Electric Power (P)	Permissible sound power level in dB(A)/1 pW as from	
	26 March 1986	26 September 1988 1989
P 2kVA	104	102
2kVA < P 8kVA	104	100
8kVA < P 240kVA	103	100
P > 240kVA	105	100

v) Powered hand-held concrete breakers and picks

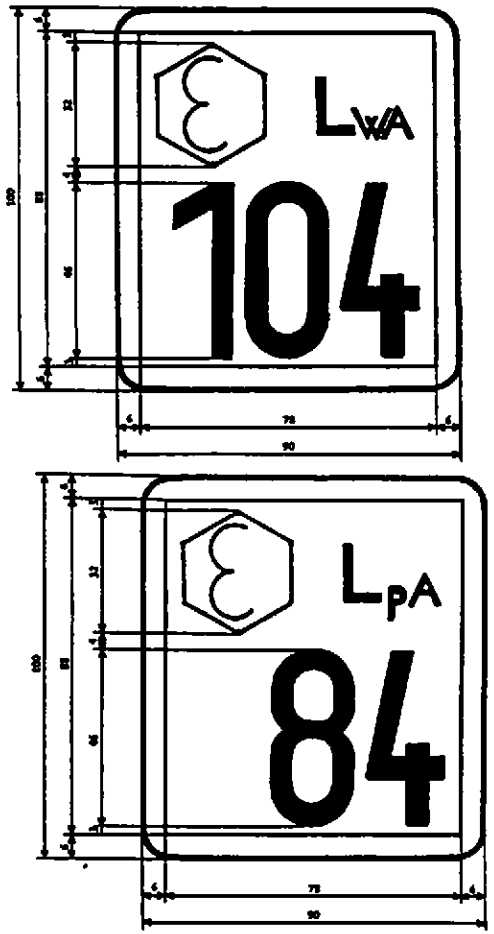
Mass of appliance (m)	Permissible sound power level in dB(A)/1 pW as from	
	26 March 1986	26 September 1989
m < 20kg	110	108
20kg m 35kg	113	111
m 35kg	116	114
and appliances with an internal-combustion engine incorporated		

vi) Dozers/loaders/excavators

Net installed power in kW	Permissible sound power level in dB(A)/1 pW
≤ 70	106
> 70 ≤ 160	108
> 160 ≤ 350	
- hydraulic and rope-operated excavators	112
- other earth-moving machines	113
> 350	118

ANNEX III

MODELS OF PLATE STATING THE SOUND-POWER AND SOUND-PRESSURE LEVELS AT THE OPERATOR'S POSITION GUARANTEED BY THE MANUFACTURER



ANNEX IV

The following proposals are under discussion at various stages in the EC negotiation procedures.

Proposal for a Directive on Machinery Safety	Formal proposal through Commission and Council Working Groups. Now under discussion in the Permanent Representatives group. Greek Presidency seeking to reach common position by end of 1988. If successful likely implementation date is end of 1990.
Proposal for a Directive on Mobile Machines	Commission now preparing a formal proposal to submit to the Council. Could reach common position by end of 1989 with implementation at the end of 1991.
Proposal for a Directive on Lifting Machines	Commission currently preparing the first working document. Commission

working groups likely to start mid 1989, Council Working groups early 1990. Common position possible by mid 1990 with implementation mid 1992.

All proposals will list essential safety requirements that have to be met but will include noise, probably sound power levels for the environment and sound pressure levels at the operator ear.

ANNEX V

UK APPROVED BODIES FOR EC NOISE TESTS

Organisation	Contact	Directive appointed for (see list below)
A V Technology AVTECH House Cheadle Heath Stockport Cheshire SK3 OXU	J F Bennett 061 491 2222	1,2,3,4,5,6
Acoustical Investigation & Research Org Ltd Duxons Turn Maylands Aenue Hemel Hempstead Herts HP2 4SB	Dr A J Jones 0442 46/9	3,4,
BSI Testing Maylands Avenue Hemel Hempstead Herts HP2 4SQ	J D Boss 0442 230442	1,2,3,4,5,6
Lloyds Register of Shipping Technical Investigations Dept 71 Fenchurch Street London EC3M 4BS	F Kunz 01 709 9166	1,2,3,4,5,6
Ricardo Consulting Engineers Noise Control Laboratory Bridge Works Shoreham-by-Sea West Sussex BN4 5FG	D Morrison	1,3,4,6
Sound Research Laboratories Saxon House Downside Sunbury-on-Thames Middlesex TW16 6RX	Mr T K Willson	3,4,6
Taywood Engineering 345 Ruislip Road Southall Middlesex UB1 2QX	Mr R L Elliott 01 575 4849	3,4,5
Wimpey Laboratories Beaconsfield Road Hayes Middlesex UB4 OLS	Mr R H Clough	1,2,3,4,5,6

Construction plant and equipment Directives in force 26 March 1986

1)	84/533/EEC	Compressors
2)	84/534/EEC	Tower cranes
3)	84/535/EEC	Welding generators
4)	84/536/EEC	Power generators
5)	84/537/EEC	Concrete breakers

Earth-moving equipment in force 30 December 1988

6)	86/662/EEC	Dozers, loaders, excavators and excavator-loaders.

Proceedings of The Institute of Acoustics

CONSTRUCTION SITE NOISE CONTROLS - POINT WEST

R McMillan (1), M R Forsdyke (2),

(1) Harris Simons Construction Ltd
(2) Travers Morgan Consulting Group

INTRODUCTION

The Point West Construction Site is situated in London SW7. It was formally the Head Office of British Airways and was known as the 'West London Air Terminal'.

The current works, which are to convert the offices to 430 flats, offices, restaurants and health centre, which include the re-building of one tower block and a three floor roof extension to house 33 penthouses.

The overall contract period is for three and a half years and was commenced in April 1987.

The works are being carried out by Harris Simons Construction Ltd (HSC) who are a relatively small firm, for this type of work, but are expanding rapidly assisted by the present property boom in the South East.

The firm was established in 1981 and progressed from the normal small builder doing extensions etc. to its present annual turnover of £27m. With such an expansion and pressure of work in the present climate, it is easy to see how the requirements of the Local Authority (The Royal Borough of Kensington & Chelsea) and the needs of the surrounding residents could be overlooked in the initial stages. These problems are now however being addressed due to both the legal requirements now placed on the Site and the wish for the Company to put forward a more professional approach. The company is now tending to specialise in the large, difficult and environmentally sensitive projects and the latter therefore becomes a necessity to help prevent the type of problems encountered on the Point West Site from recurring.

POINT WEST SITE

The site (see Figure 1) is unique in that it is a concrete raft built partially over three London Underground lines which at this point are all exposed at ground level. In addition to this, part of the raft and building were already leased to J Sainsburys plc for retail store and car park. Access to the site is via a private roadway around the periphery of the raft

which also serves for Sainsburys deliveries and customers. These two items dictate that some works must either be done on a Sunday or at times when the London Underground trains are not running (ie demolition over the roadway or any work within 10m of the Underground Line).

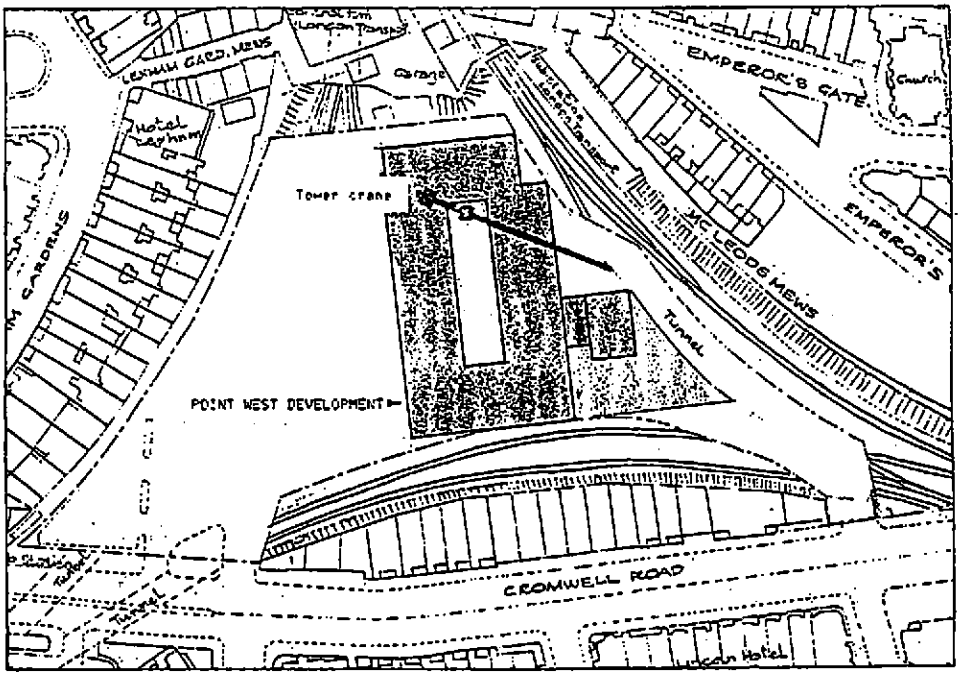


Figure 1. Location of Point West construction site

LEGAL ACTION

When works commenced on site the first stages involved the removal of the aluminium false flooring used in the computer areas, the removal of the glass facade and demolition to the lightwell area and access tower. Complaints regarding noise levels during the day and working outside the permitted hours (The RBK & C permitted hours are from 8.00am to 6.30pm Monday to Friday, from 8.00am to 1.00pm on Saturdays and at no times on Sundays or bank holidays) were received almost immediately and this resulted in a notice under section 60 of the Control of Pollution Act 1974 being served on the Site.

CONSTRUCTION SITE NOISE CONTROLS - POINT WEST

The following conditions were included in the notice:

a. Permitted hours of work

b. Best Practicable means to be employed (as covered in section 72)

c. All plant to be properly silenced

d. Any out of hours works required must be applied for in writing.

No overall noise levels were set and the Notice would not be suspended pending appeal.

HSC continued to carry out the works on site without due regard to the notice and this resulted in six contraventions being heard in the Magistrates Court in July 1987 resulting in fines totalling £3,000 plus £500 costs.

These offences were all witnessed by an Environmental Health Officer (EHO) employed by RBK & C on the councils Emergency Call Out Service whereby a resident can contact an EHO at any time outside office hours 365 days a year.

Problems with works on site continued and this resulted in the matter being referred to the High Court in October 1987 and April 1988 when HSC put forward a package to control operations on site and covering a system for:

a. Applications and approvals for out of hours works.

b. The employment of a Liaison Officer who would:

have weekly meetings with RBK & C, supply details of all proposed works, and apply for approval for out-of-hours works at least 96 hours in advance.

Ensure local residents are kept informed.

Organise a Public Meeting

c. The employment of 'Independent Observers' who would be on site whenever out-of-hours works were being done.

WORKS ON SITE

Works on the Point West site have never been straight forward. Firstly the plans for the building were inaccurate or showed insufficient detail, eg. reinforcing shown at 50% of the actual density, which prolonged programmed demolition times.

Secondly, constant design changes have resulted in greatly increased works to the extent that 18 months into the contract demolition work is still being done, much to the annoyance of local residents.

Thirdly, the reconstruction methods used are more akin to say bridge design than a residential block, eg. '50 grade' steel being used to rebuild demolished sections, and post tension concrete slabs being used in the basement to form new car parking levels.

Lastly, but not least, the constraints placed on the site by the leased part of the building and the railway tracks.

Following a contravention during normal working hours of the Section 60 notice early in the programme (in regard to best practicable means) advice was sought from Travers Morgan to ensure that current and proposed working methods and plant complied.

The contravention was for the use of a compressor driven diamond cutter which was being used to trim demolished surfaces (to a fine tolerance) to allow for steelwork to be erected off it. Due to the density of reinforcing, progress was very slow and a further electro-hydraulic powered cutter was brought in. Screening of the compressor driven cutter was attempted but was not successful. HSC stopped using the noisier plant when requested by RBK & C and eventually imported another electro-hydraulic cutter. Noise levels from the offending plant were recorded in the nearby mews at 103dB for a 1 minute L_{Aeq} ie. the time taken to cut through one reinforcing bar.

This therefore only left the noise from night and weekend work to be resolved and by a steady refinement of working methods and techniques it has been possible to reduce noise levels, at these sensitive times, to a minimum.

IMPLICATIONS OF THE HIGH COURT ORDER

It took two months for the Liaison Officer and 'independent observers' to be in place. The Order specified these observers as 'Surveyors' and a local firm was hired to give this cover. However, it soon became apparent that they were providing poor value for money in that:

1. They had no experience in regard to best practicable means and therefore could have no useful input at the weekly meetings.

2. They could not use sound level recording equipment.

3. Their charges were approximately double those quoted by acoustic consultants.

With the agreement of RBK & C they were replaced with the Planning & Environmental Division of Travers Morgan because of their experience in this field, and because they had a working knowledge of the site from the earlier court case and from their consultations regarding best practical means.

It has to be said that the use of acoustic consultants as independent observers had immediate benefit. They were considerably cheaper than the Surveyors and were able to professionally support any claims or proposals made by HSC.

The actual monitoring was also very useful for HSC. As stated the site is surround by railway tracks and a considerable amount of maintenance work is done on them between the hours of 1.00am to 5.00am. These hours are of course the only time HSC can do works within 10m of the tracks and with suitable monitoring it was possible to show that complaints from local residents were only received when track maintenance was being done. On each occasion reports were supplied to RBK & C to good result.

The weekly meetings with the Local Authority were quickly implemented and gave the EHO's a much better appreciation of the problems being encountered on site and proved a useful format for approvals of any out of hours works required. I think it is fair to say that the establishment of clear guidelines, regarding out of hours works, has proved of great benefit to HSC and has allowed the company to work whenever the need arose. I feel that these approvals would have been infinitely more difficult without the Court order and liaison meetings.

It was the policy of HSC to inform local residents of out of hours works from an early stage, but the appointment of a Liaison Officer allowed for this to be extended to also informing them of site problems, progress etc. in regular newsletters. Unfortunately the regularity of works recently has resulted in long lists of approved works being delivered and some of the goodwill between HSC and the residents recently built up, is being eroded. It is however important that this information is imparted as it allows for residents to plan holidays, weekend trips etc. to miss the worst of the works.

Not a great deal of response from local residents has been received regarding the public meeting however this is now being organised.

CONSTRUCTION SITE NOISE CONTROLS - POINT WEST

INDEPENDENT OBSERVERS

Travers Morgan were appointed as independent observers at the end of July 1988 and subsequently attended all 'out of core hours' work to observe and record the various construction activities and to advise on the best practicable means of minimising noise. The times of attendance were in general between 18.30 to 21.30 hours when bison floor slabs were being lifted into the building, between 0100 to 0430 hours when scaffold and steel erection was in progress, and during the occasional Sunday working.

NOISE CONTROL - THE PROBLEMS

Since much of the work was of a manual nature (only an electric tower crane was operated at night) our attentions did not focus on the use of alternative quieter machinery but on the need to improve working practices. However, when applying the 'best practicable means' as a way of minimising noise from manual activities one must remember that its success relies heavily on the co-operation of the individuals employed, their attitude towards our noise control requirements and their ability to work efficiently and safely at night-time.

From an observers point of view, the difficult working conditions cannot be overstated and it was easy to see how, when manhandling 5 metre lengths of scaffold 10 floors up at night-time or when assembling 4 tonne sections of steelwork while balanced precariously on a narrow steel beam, all thoughts of noise control could be forgotten.

Noise from scaffold work is typically generated by poles and clamps being dropped, from clamps being tightened or loosened, together with an accompaniment of shouts, whistles and singing. Steel work is generally less intensive due to the longer periods of relative inactivity whilst steel girders are slung and manoeuvered into position. During the initial stages of steel erection at Point West, steel beams had to be threaded through an existing framework of scaffold and flying-ties and problems frequently arose when beams slung horizontally from the crane swung against other pieces of steelwork. Noise from the chain slings moving against the steel beams was also identified as a problem.

The presence of noise consultants on site generally induced a conscious effort on the part of the workmen to carry out their duties with the minimum of noise. However there were occasions when our presence had an opposite and undesirable effect on one or two individuals who would try to create more noise. Fortunately the various contractors and their foremen were well aware of the possible consequences and such individuals did not remain in employment for long.

NOISE CONTROLS - THE SOLUTIONS

To reduce noise from the scaffold work, poles were not allowed to be dropped and where possible poles were passed over rather than slid across poles already in position. No hammering was allowed; timber gantries alongside the railway tracks were constructed using hand drills and ratchet screwdrivers; and the cutting of scaffold poles was carried out using a cutting torch. Verbal reinforcement of the need to minimise noise was often given before and during each night's work.

The problem of steel beams hitting the existing scaffold was resolved by striking the 10 floors of scaffold + flying-ties and rebuilding it after the steel erection. Although this answer was in itself a potentially noisy activity it was felt that overall the best practicable means was being taken to conclude the works in the quietest and most efficient manner.

Scaffold clamps were sprayed with lubricating oil during the day in order to reduce the screeching noises as they were uncoupled at night. The dismantled poles, clamps and boards were stacked on the adjoining floor-level ready for reassembly at a later date. To prevent noise from debris falling off the scaffold boards as they were lifted it was proposed to sweep the boards during the day. Unfortunately the LRT limitations on trackside working prevented this on occasions.

Noise from the steel erection was mitigated by using experienced banksmen who were in constant radio contact with the driver of the electric tower crane. Steel beams could be lowered accurately and quietly to within a few centimeters of other steelwork and when beams had to be slung horizontally guide ropes were attached at the ends so that the steel erectors could counteract motion generated by the wind. Noise from the subsequent release of the chain slings after each beam had been bolted into place was sufficiently reduced by having them hooked back and held clear of the steelwork whilst they were being raised by the crane.

NOISE MONITORING

Since no noise control limit had been imposed by the Local Authority there was no official need for the continuous monitoring of noise levels from the site. However for reference purposes routine noise measurements were carried out so that construction noise could be compared to other noise sources in the area - namely Cromwell Road traffic, Sainsbury's customer and service traffic, the three rail corridors, air-conditioning plant, electric substations and London Regional Transport (LRT) maintenance work. Strangely, although it was the proximity of the LRT railway lines that dictated the need for construction work at night, it was noise

from LRT maintenance work that was subsequently used to defend HSC's position with regard to night working!

Figure 2 shows the typical noise levels from steel erection (at approximately 15 metres from the microphone) followed by noise from the nearby railway track as LRT routinely tested the pneumatic switch gear (approximately 30m distant). In this example the maximum noise levels are respectively 87 and 84dB(A), however after correcting for distance it can be shown that the LRT noise levels are not only higher but are also closer to the local residents.

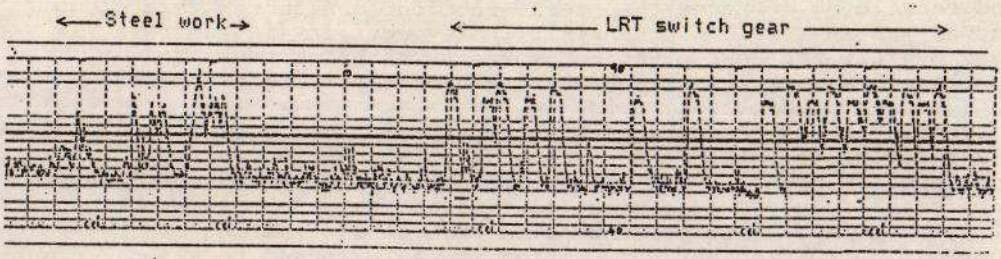


Figure 2. Night-time noise levels

Apart from the noise from the switch gear, LRT maintenance gangs were often present and the noise from shovelling gravel, and from drilling, hammering and shouting was clearly audible above the construction noise and subjectively was likely to be more annoying to residents. In fact a pattern soon emerged and for all those occasions when the local authority and the contractor received complaints about excessive noise from the site, our survey sheets showed that LRT work crews were active at the time and were the source of high noise levels.

Without our confirmation of this fact it is possible that the Local Authority would have automatically assumed Point West to have been the culprit and pressed the High Court for an injunction against further night-work.

CONCLUSIONS

Although practicable control measures have their limitations when the motive force is human and when the work is being carried out at night under dangerous circumstances, the control of noise from the Point West site has on the whole been successful.

CONSTRUCTION SITE NOISE CONTROLS - POINT WEST

Our control measures may sound rather simple and straightforward, as indeed they are, however for the workforce all this was very new to them and without very clear instructions, training and very tough and constant on site supervision they quickly reverted back to their normal 'day-time' mode of working. However over a period of time it has been possible to build up a workforce now used to this type of operation and although it clearly was impossible to make the work silent, all parties concerned have worked together to keep noise to a minimum.