Lead Industries Association, Inc.
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July 6, 1973

SUBJECT: REPRINT ON LEAD NOISE BARRIERS

TO THE MEMBERS OF THE LEAD INDUSTRIES ASSOCIATION, INC.:

Attached is a reprint of an article prepared and placed by our publicity agency in ELECTRICAL WORLD Magazine. The article tells how a major utility used sheet lead in prefabricated panels to solve a community noise problem.

ELECTRICAL WORLD is considered a key "utilities" publication and has a twice-monthly circulation of 34,500. Many cities and other governmental entities, being faced with high industrial noise levels, are drafting legislation designed to limit excessive sound beyond a plant's property lines. These regulations would supplement the already existing OSHA regulations on in-plant noise. Such new controls may have a positive effect on the demand for noise barrier materials, one of the most efficient of which is lead.

Should you have questions on this subject, or require additional copies of the attached reprint, please contact us.

Sincerely,

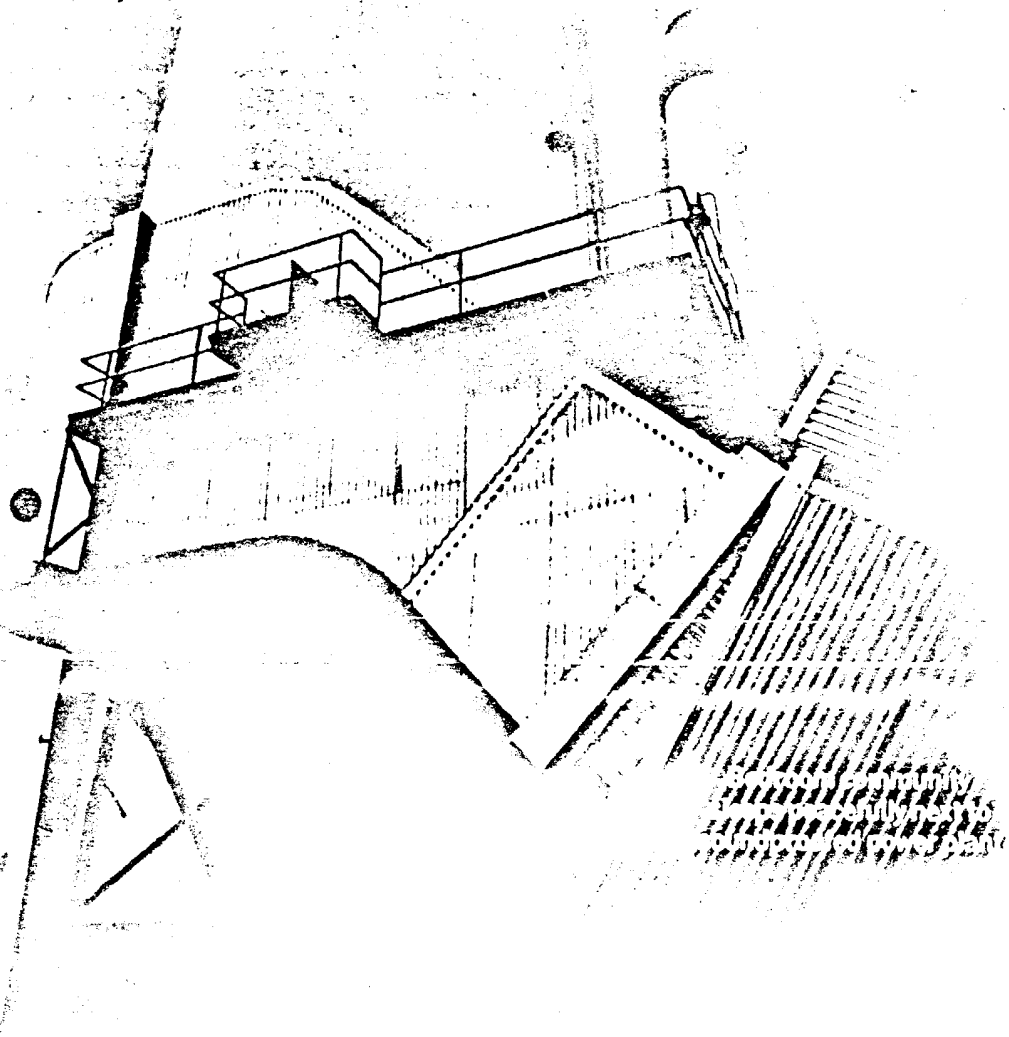
Jerome F. Smith

JFS:lm
Attachment

Jerome F. Smith
Secretary & General Manager

A McGraw-Hill Publication

May 15, 1973



Bedroom community's quiet undisturbed

As a result of an antinoise-oriented construction project now nearing completion, the Long Island Lighting Co (Lilco) power plant at Northport, N.Y., remains one of the utility industry's quietest fossil-fuel generating stations.

The problem Lilco faced was, "How to increase the capacity of a large generating station in the middle of a 'bedroom' residential community without generating huge noise problems?" Lilco's solution involved the extensive use of acoustic barriers, plus noise-dampened intake ducts – both relying on the noise-deadening characteristics of sheet lead.

There are three 400-Mw generating units at the Northport plant. The recent construction program involved the installation of new equipment as follows:

- Induced-draft-fan equipment and associated ductwork, which are being installed to improve the operating efficiency of Unit 1, installed in 1967, and Unit 2, installed in 1968.
- Induced-draft-fan equipment and associated ductwork and an electrostatic precipitator, which are being installed as original equipment for Unit 3, which went on line in 1972.

To understand the problems Lilco faced in soundproofing the new equipment, it is necessary to understand why the utility is so concerned with noise control at its Northport plant.

Situated on Long Island Sound, the plant is flanked on three sides by a quiet suburban residential community. It contains more than 700 homes, some of which are as close as 1,200 ft to the power-station structures. Except for the Lilco plant, Northport has no commercial or business zones, or even any nearby commercial or industrial developments. The area also is removed from excessive vehicular, air, or rail traffic.

Because of the low ambient decibel levels in the community, Lilco engineers faced a particularly difficult noise-control problem when the first two units were being designed. They knew that operation of the machinery and associated equipment for the two units would produce source-sounds in the 90-to-150-db range, and that such levels would annoy homeowners in the surrounding community. Further complicating the problem was the fact that such sound would travel far in the quiet suburban atmosphere.

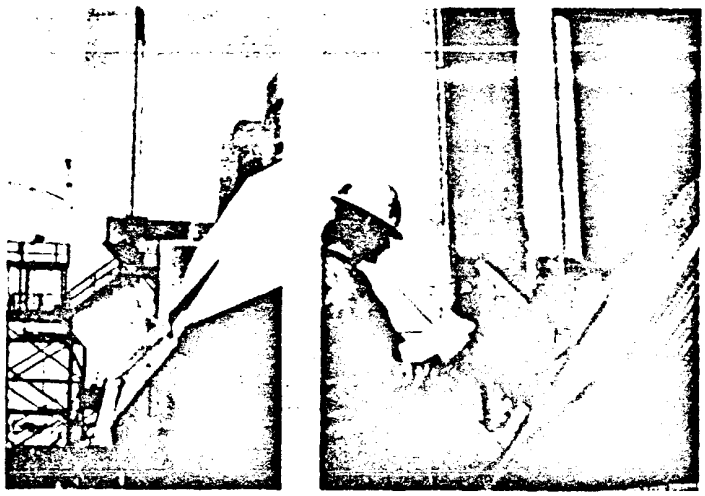
Studies in 1963 of community sound levels determined that a 3-to-5 decibel increase in ambient sound level would be acceptable, and would avoid widespread complaints from homeowners. Therefore, when the plant was being designed, Lilco specified that noise from the plant could not exceed 70 db outside the general plant walls, and 90 db immediately outside the exhaust ductwork and walls of the mechanical particulate collectors of each unit. To accomplish these goals, four basic steps were involved:

- Various equipment inside the plant was purchased with low sound level where practicable, or were enclosed in sound-deadening materials.
- Wherever needed, walls and ceilings inside the plant were covered with sound-absorbing panels and materials.
- The entire plant was enclosed in sound-deadening walls and exterior panels.
- Acoustic silencers were provided for forced-draft fans and ventilating systems.

As a result, when Units 1 and 2 were initially completed Lilco had no need to be concerned with noise complaints from the community. When the recent decision was made to install new induced-draft-fan equipment in Unit 1, however, additional noise-reduction work was required. Because the ID fans and their associated ductwork are too large to be installed inside the plant, the existing plant walls could not be used even partially to attenuate sound. So alternative noise-reduction methods had to be implemented.

Tests conducted within the ductwork on the exhaust side of the induced-draft fan installed in Unit 1 revealed an average reading of 125 db, a sound level far in excess of the original 90-db level set for noise outside the plant wall. As an indication of what the 125-db sound level means, it can be compared to the sound of a low-flying jet plane. And it is on the threshold of pain for the human ear.

While the 600-ft-high emission stack, duct-connected to the induced-draft fan, was initially found to be a primary noise source, conventional filtering of the noise exiting from the top of the stack resolved this problem. It was then determined that a basic primary noise source, which required acoustical treatment, was the induced-draft-fan cas-



Thermal/acoustical panels were installed on ductwork leading from induced-draft-fan equipment (left) to No. 3 unit's 600 ft high stack. Additional panels cover ductwork leading to induced-draft fan housing and ductwork from precipitator to fan (right)

ings, and the ductwork leading to and from them.

According to Frank J. Wells, of Lilco's electrical engineering staff, the steel enclosures for the ductwork and fan housing provided a very large sound-radiating surface, much like that of a gigantic loudspeaker system. Therefore, Lilco decided to enclose both the fan housing and the ductwork inside a sound-barrier system. This sound barrier had to be able to withstand the approximately 450F operating temperatures of the equipment.

To help solve the problem, Lilco called on Transco Inc, Chicago (Ill.) manufacturer of prefabricated thermal-insulation panels. While Transco had installed its standard thermal insulation panels at more than 50 power plants throughout the country, the company had only recently developed two types of insulated panels specifically designed to provide a sound-transmission loss of up to 52 db. Lilco's Northport plant is the first application of the company's combination thermal/acoustical panel system.

Noise-transmission-loss capabilities of the new panel system are achieved through use of either a single or double layer of 1/64-in.-thick sheet lead, weighing 1 lb/sq ft. For maximum efficiency, the lead is sandwiched between layers of the mineral wool that is one of the standard materials used to produce the company's thermal insulation panels. According to the Lead Industries Assn, sheet lead was selected for the thermal/acoustical panel because it was found to be the most efficient sound-barrier material among the many tested.

Five materials are used to produce the new thermal/acoustical panel: an exterior sheet of either corrugated or box-rib aluminum or galvanized steel; a layer of mineral-wool insulation; single or double layers of sheet lead sandwiched between one or more additional layers of mineral wool; a layer of aluminum foil; and a wire-mesh retainer on the sound-source side of the panel. The box-rib panels are available in 40-in. widths; corrugated panels in 32-in. widths.

The thickness of the thermal insulation is established as a function of the operating temperature of the equipment to be enclosed. The choice of one or two layers of sheet lead is determined by the amount of noise reduction desired.

Transco field engineers worked at the site with Lilco to install the panels. "We learned from experience as we began installing the system," says Wells. After enclosing Unit 1 and its associated ductwork, he points out, it was learned that panels containing one layer of sheet lead were not sufficient to solve the specific noise-control problems associated with the equipment. This was due to the fact that noise levels in the induced-draft-fan housing were much higher than in the ductwork leading to and from the housing.

The location and specific geographical orientation of the equipment, and the resultant travel path of the noise generated by the equipment, can sometimes resolve the potential noise-annoyance problem—but it can also create more problems. For example, it was learned that noise emanating from the east and west sides of the plant would have to be carefully controlled, since it travels directly and without restriction toward the surrounding community. However, noise emanating from the north and south sides of the plant—as caused by Unit 1's induced-draft-fan housing, for instance—was not a particular problem, because it either dissipates over Long Island Sound or is blocked by high bluffs behind the plant.

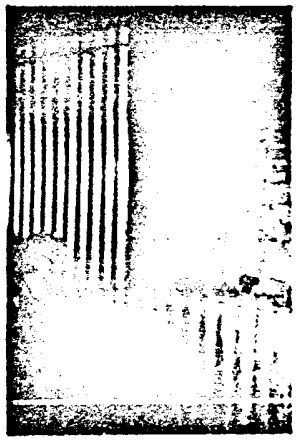
Based on this knowledge, thermal insulation with two sheets of 1-lb/sq ft lead was specified to enclose the induced-draft-fan housing of Unit 2—oriented east and west—as well as the ductwork leading from the housing to the stack. Ductwork leading from the particulate-collector house to the induced-draft fan was covered in thermal insulation with only one sheet of lead.

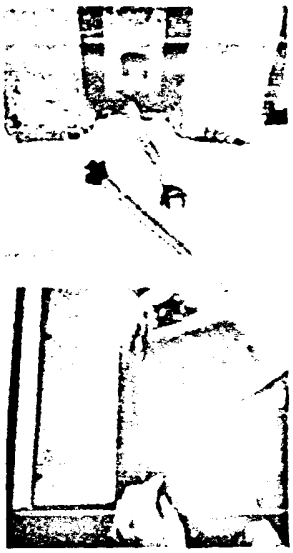
With this problem solved, the job of controlling the noise from Unit 3 began. While different than the first two units, since an electrostatic precipitator had been included in its design, experience gained in controlling noise from the first two units indicated that a combination of all three types of panels—thermal only, thermal/acoustic (one layer of lead), and thermal/acoustic (two layers of lead)—should be used to enclose its fan, ductwork, and precipitator.

First, the ductwork leading from the power plant to the precipitator and its hoppers (used to remove particulate matter resulting from operation of the precipitator) were enclosed with thermal-insulation panels. Next, the precipitator and ductwork leading from it to the induced-draft fan were enclosed in thermal/acoustical panels containing one layer of sheet lead. Then, the induced-draft-fan housing and the ductwork leading from it to the stack were enclosed with thermal/acoustical panels containing two layers of lead. To achieve maximum acoustical insulation, these two lead sheets are separated by a layer of mineral wool. In essence, the lead remains "free-floating," and is therefore more effective.

The ductwork and induced-draft-fan housing for the first two units required about 20,000 sq ft of panels. Approximately 53,000 sq ft were required to enclose the third unit because, in addition to the unit's induced-draft-fan housing and associated ductwork, its precipitator housing and the ductwork from the plant to the precipitator also had to be enclosed. Transco delivered the panels precut to size and ready for installation. This considerably reduced installation costs and decreased equipment downtime while the first two units were being modified. Also, use of the precut panels permitted the third unit to be readied for operational testing faster than would have been possible had the panels not been cut to size. ■

Boxed-rib acoustic panels, readily installed with hand-powered socket tools, contain one or two 1/64-in.-thick layers of lead, sandwiched between layers of mineral wool





ADDITIONAL INFORMATION AVAILABLE

For further details or engineering assistance with a noise problem contact Lead Industries Association.

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"DIRECTORY OF ACOUSTIC SPECIALTIES"

A 26-page brochure including descriptions of various lead bearing elements in sheet, laminated, powder, or bulk form for acoustical purposes and including lists of manufacturers.

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