GEORGIA INSTITUTE OF TECHNOLOGY — OFFICE OF CONTRACT ADMINISTRATION

PROJECT ADMINISTRATION DATA SHEET

[X] ORIGINAL [ ] REVISION NO. ______

Project No. A-3577 GTRI/~~GIT~~ DATE 6/28 /83

Project Director: Joseph C. Wyvill ~~School~~/Lab TAL

Sponsor: Perdue, Inc.

Type Agreement: Research Agreement dtd. 6/21/83

Award Period: From 7/1/83 To 12/31/83 (Performance) ______ (Reports)

Sponsor Amount:

	This Change	Total to Date
Estimated:	$	$ 9,622
Funded:	$	$ 9,622

Cost Sharing Amount: $ ______ Cost Sharing No: ______

Title: An Evaluation of the Noise Environment and Treatment Options for Perdue Poultry's Lewiston, N.C. Processing Plant

ADMINISTRATIVE DATA

OCA Contact John W. Burdette

1) Sponsor Technical Contact:

Same as (2)

2) Sponsor Admin/Contractual Matters:

Howard F. Yerges
Director of Engineering
Perdue, Inc.
P.O. Box 1537
Salisbury, MD 21801

Defense Priority Rating: N/A

Military Security Classification: N/A
(or) Company/Industrial Proprietary: N/A

RESTRICTIONS

See Attached ______ Supplemental Information Sheet for Additional Requirements.

Travel: Foreign travel must have prior approval — Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of $500 or 125% of approved proposal budget category.

Equipment: Title vests with ______

COMMENTS:

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Research Property Management	~~Reports Coordinator (OCA)~~	Project File
Accounting	Research Communications (2)	Other I. Newton

GEORGIA INSTITUTE OF TECHNOLOGY — OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

Date January 5, 1984

Project No. A-3577 School/Lab TAL

Includes Subproject No.(s) ______

Project Director(s) Joseph C. Wyvill GTRI / ~~GIT~~

Sponsor Perdue, Inc.

Title An Evaluation of the Noise Environment and Treatment Options for Perdue Poultry's Lewiston, N.C. Processing Plant.

Effective Completion Date: 12-31-83 (Performance) ______ (Reports)

Grant/Contract Closeout Actions Remaining:

- [ ] None
- [X] Final Invoice or Final Fiscal Report
- [ ] Closing Documents
- [ ] Final Report of Inventions
- [ ] Govt. Property Inventory & Related Certificate
- [ ] Classified Material Certificate
- [ ] Other ______

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Form OCA 60:1028

A-3577

Report

AN EVALUATION OF THE NOISE ENVIRONMENT AND TREATMENT OPTIONS FOR PERDUE POULTRY'S LEWISTON, N.C. PROCESSING PLANT

GEORGIA INSTITUTE OF TECHNOLOGY
A Unit of the University System of Georgia
Engineering Experiment Station
Atlanta, Georgia 30332

Report

AN EVALUATION OF THE NOISE ENVIRONMENT AND TREATMENT OPTIONS FOR PERDUE POULTRY'S LEWISTON, N.C. PROCESSING PLANT

Submitted To

Perdue, Inc.
P.O. Box 1537
Salisbury, Maryland

Submitted By:

The Technology Applications Laboratory
Engineering Experiment Station
Georgia Institute of Technology
Atlanta, Georgia

Prepared By

J. Craig Wyvill
October 1983

Introduction

On August 9, Georgia Tech initiated a three day intensive study of the noise environment in Perdue's Lewiston, N.C. Poultry Processing Plant. This report highlights both the methodology used to evaluate the noise environment together with a subsequent analysis of the severity of the noise problem and suggested methods for dealing with it.

Identification of the Noise Environment

To better understand the intensity and mechanics of the noise field in the Lewiston Plant, a measurement grid was laid out on 3 foot centers for use in systematically recording noise levels throughout the plant. The measurement program was confined primarily to the trim and evisceration areas of the plant because expansion activities in the cut up and pack out areas negated the usefulness of intensive studies there. The grid used is displayed in Appendix A.

Using a Type 1, B&K sound pressure level meter with slave octave filter set, readings were taken at each grid point using 5 to 15 second intervals to observe an average level. Slow meter response was selected in making these readings to allow more accurate averaging of the values. Both "A-Weighted" and linear values were recorded at most points to allow observations of possible signature changes in the frequency makeup of the field. Octave band sound level readings were also taken at select locations for use in evaluating noise control options. Dosimeters were also used to observe time weighted average levels at selected points. These values (over a three hour interval) were compared to the short interval values obtained with the sound level meter to determine how significant long term fluctuations in the noise field affected exposure levels. Figure 1 shows both the "A-Weighted" levels observed and the resulting noise contour developed. The actual data sheets for the measurement program are in Appendix B.

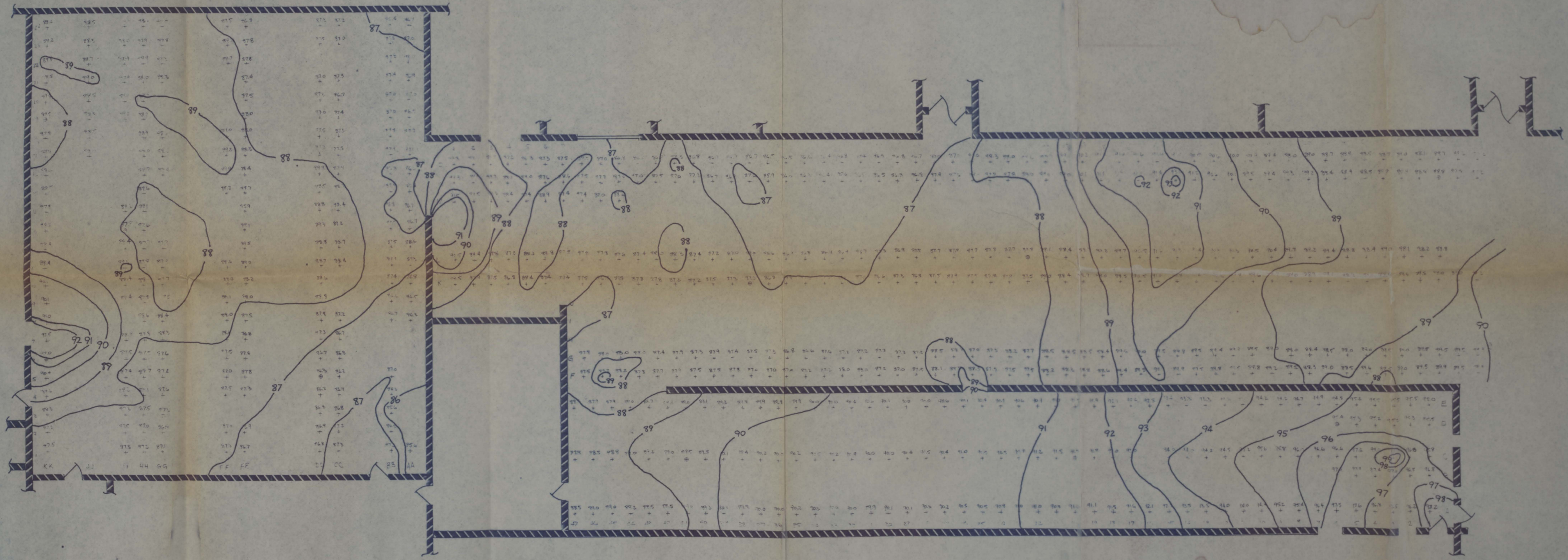
Table 1 shows a comparison of the short interval and long interval readings taken at selected points in the plant. Based on observations made during the measurement program, it is believed that the public address system, which was intentionally filtered out of the short interval readings, may have had a significant impact on the differences observed. The P-A system was found to be loud and in use regularly offering a potential for significantly elevating the time weighted average sound level to which employees are exposed.

With regard to the contour shown in Figure 1, it appears much of the plant is dominated by reverberant noise powered at least from five distinguishable areas:

- The two picking rooms
- A motor station
- A gizzard harvestor
- The chiller area

Ironically, levels in much of the plant are remarkably low (87-89dBA) for a poultry processing operation. However, this appears to be due more to the unusually large internal volume of the plant than to any discernable noise control effort.

While not intensively studied, readings were taken in the cut up, pack out, picking and live hang areas of the plant. The locations of these measurements are also shown in Appendix A. The values observed are shown in Appendix B and redisplayed in Table 2. The cutup and pack out areas appear similar to the trim and eviscerating areas in



87
88
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98

TABLE 1

Long Term vs. Short Term Sound Level Averages

Measurement Point	Dosimeter Reading (L_D) (3 hour average)	Sound Level Meter Reading (L_{SLM}) (10-15 second average)	Difference (L_D-L_{SLM})
41c	89.6dBA	89.5dBA	0.1dBA
20C	92.4dBA	91.3dBA	1.1dBA
6D	96.5dBA	95.4dBA	1.1dBA
17K	88.2dBA	87.2dBA	1.0dBA
54N	88.9dBA	88.0dBA	0.9dBA
5DD	88.0dBA	86.3dBA	1.7dBA
19KK	88.8dBA	87.5dBA	1.2dBA

TABLE 2

"A" Weighted Sound Level Reading
In Cut-Up And Pack Out Areas

Measurement Point	Dosimeter Reading (L_D) (1 hour average)	Sound Level Meter Reading (L_{SLM}) (10-15 second average)	Difference (L_D-L_{SLM})
o Near Giblet Wrap Tables and Chillers (DOS 1)	90.5dBA	89.3dBA	1.2dBA
o Near Fillet Tables and Carcass Halving Machines (DOS 2)	87.1dBA	86.2dBA	0.9dBA
o Near Wiring Cutting Table (DOS 3)	88.4dBA	87.5dBA	0.9dBA

terms of noise makeup and intensity. The sources of the noise, however, appear to differ.

Noise Control Assessment

Based on the data in the noise contour of Figure 1, it would appear that "A-Weighted" noise level reductions of from 3 to 5 dB would bring much of the plant below 85dBA. For the most part, this could be achieved effectively with ceiling acoustical treatment. As a goal, such treatment should strive for at least a 5dBA overall reduction in reverberant field noise levels to improve the potential for compliance with the 85dBA OSHA statue (using time weight average values typically observed to be 1 to 2 db higher than the values in Figure 1). Figure 2 shows the typical frequency spectrum for the observed reverberant field.

Even with proper ceiling treatment, however, some areas of the plant will remain in excess of this desired criteria. One such problem area is the trim room immediately after the main picking room. Here sound energy buildup in one end of the room drives levels above 90dBA. While ceiling treatment will indeed help this situation, opportunities to block or shield the room from the energy originating from the picking room would also help immensely. The same is true, to a lesser extent, in eviscerating #2 immediately outside of the smaller picking room.

With regard to the main eviscerating room, two major sources were observed. One, an electric motor in the salvage area in the northwest corner of the room, probably could be reduced using attentive maintenance. If not, a barrier wall around the unattended unit is another feasible option. The second, the gizzard harvesting area, is

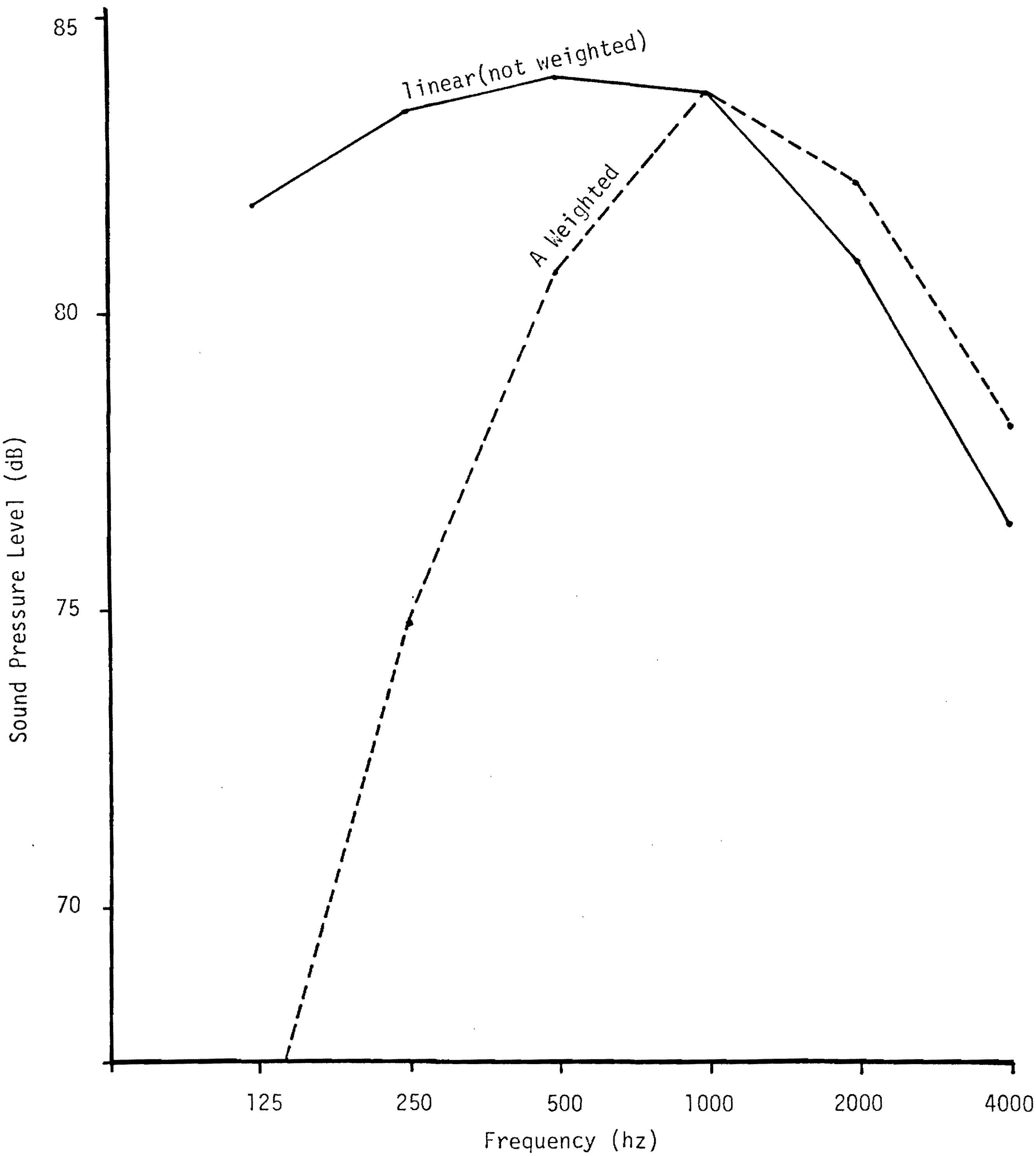


FIGURE 2

Typical Frequency Spectrum Observed for the Reverberant Field of the Plant more difficult. Here at least one motor was observed in need of attention that could possibly help lower overall levels. But it is doubtful this alone or even with ceiling treatment can reduce levels below 85 dBA. Perhaps the best method of dealing with this area will entail ceiling treatment, attentive maintenance, and selective use of barriers. This last measure, however, should be used after the first two have been completed.

In the cut up and pack out areas, again ceiling treatment appears the best option. Ironically an earlier visit to the plant in February showed noise levels at or below 85dBA in this area. The slight escalation observed (86-87dBA) is indicative of a problem with untreated rooms. Any change in overall sound power can escalate levels throughout the room. Ceiling treatment achieving a 3 to 5 dBA drop in reverberant noise levels should greatly reduce exposure throughout cut up and pack out.

Commercial and Other Designs Capable of Meeting Noise Control Needs

In the previous section, noise control was discussed. This section addresses control designs that can be used to achieve noise reduction goals.

The first such design is ceiling treatment. Perhaps the most practical method of treating a room for improved absorption is to hang a series of vertical baffles in the ceiling. Such a design typically allows ready adaptation of an absorbing media to an existing room without creating problems with the accessibility of piping/wiring (as would be the case with a drop ceiling) or increasing the risk of contact with operations (as would be the case if panels were placed on the walls or floor). Many manufacturers have recognized the needs of poultry and other food processing plants to have access to suitable absorbing materials. In researching the area at least nine companies were identified who supply a product approved for use by USDA in food processing operations. These nine were identified from inquiries to twenty-three such firms.

In selecting a product for this application, a number of items must be taken into consideration. Perhaps of upmost importance is acoustical performance. Of additional concern is the mechanical integrity of the design (or more appropriately how long will it last). Finally there is the issue of cost.

In evaluating the products potentially suited for this application we found wide variation in acoustical performance, mechanical integrity, and price. Unfortunately the acoustical performance values reported by manufacturers often differ in test methodology and panel orientation used. As a result, comparisons of values can be somewhat misleading. Nonetheless six panel designs were evaluated, using published data, with regard to determining how many would be required to lower the observe intensity of the reverberant field in the main eviscerating room 5 decibels. Table 3 displays the results of these calculations with the name of the panel's manufacturer heading each analysis. The Fiber Flex panel was found to acoustically outperform the other panel designs requiring only 400 panels in the main eviscerating room, nearly 100 less than any other. The Peabody panel, on the other extreme, needed 1100 panels to achieve this reduction.

With regard to mechanical performance, two distinct categories of panel were found:

TABLE 3

Acoustical Performance Estimates of selected Commercial Noise Baffles if used in Main Eviscerating Room (Evis #1)

Cover: Mylar Composite — FIBER-FLEX — Est. Price: @$25/panel $10,000

SOUND PRESSURE LEVEL ANALYSIS FOR 400 PANELS**

EVISCERATION #1

OCTAVE	LIN-LEV	A-ADJT	A-LEV	PNL COEF	ABSORB+	A-QUIET
125	81.9	-16.1	65.8			
250	83.5	-8.6	74.9	1.24	7.1	67.8
500	84.0	-3.2	80.8	1.29	5.4	75.4
1000	83.8	0.0	83.8	1.09	6.8	77.0
2000	81.0	1.2	82.2	0.80	4.5	77.7
4000	76.6	1.0	77.6	0.46	1.1	76.5
OVERALL	90.2		87.9			82.9

Cover: Tydlar — CHILDERS — Est Price: @$40/panel $23,000

SOUND PRESSURE LEVEL ANALYSIS FOR 575 PANELS**

EVISCERATION #1

OCTAVE	LIN-LEV	A-ADJT	A-LEV	PNL COEF	ABSORB+	A-QUIET
125	81.9	-16.1	65.8			
250	83.5	-8.6	74.9	0.53	5.2	69.7
500	84.0	-3.2	80.8	0.76	4.5	76.3
1000	83.8	0.0	83.8	0.77	6.5	77.3
2000	81.0	1.2	82.2	0.71	5.0	77.2
4000	76.6	1.0	77.6	0.61	2.0	75.6
OVERALL	90.2		87.9			82.9

Cover: Vinyl — PEABODY PANEL — Est Price: @$10/panel $11,000

SOUND PRESSURE LEVEL ANALYSIS FOR 1100 PANELS**

EVISCERATION #1

OCTAVE	LIN-LEV	A-ADJT	A-LEV	PNL COEF	ABSORB+	A-QUIET
125	81.9	-16.1	65.8			
250	83.5	-8.6	74.9	0.32	5.1	69.8
500	84.0	-3.2	80.8	0.69	5.5	75.3
1000	83.8	0.0	83.8	0.73	7.9	75.9
2000	81.0	1.2	82.2	0.43	4.5	77.7
4000	76.6	1.0	77.6	0.21	0.2	77.4
OVERALL	90.2		87.9			82.9

Cover: Polyethylene — GRT LAKES IND ASSO — Est. Price: @$5.18/panel $2487

SOUND PRESSURE LEVEL ANALYSIS FOR 480 PANELS**

EVISCERATION #1

OCTAVE	LIN-LEV	A-ADJT	A-LEV	PNL RATE (*)	ABSORB+	A-QUIET
125	81.9	-16.1	65.8			
250	83.5	-8.6	74.9	4.6	5.9	69.0
500	84.0	-3.2	80.8	8.4	4.2	76.6
1000	83.8	0.0	83.8	10.6	6.6	77.2
2000	81.0	1.2	82.2	10.20	5.1	77.1
4000	76.6	1.0	77.6	7.3	1.8	75.8
OVERALL	90.2		87.9			82.9

Cover: Tydar — ARMSTRONG — Est Price: @$24.50/panel $11,515

SOUND PRESSURE LEVEL ANALYSIS FOR 470 PANELS**

EVISCERATION #1

OCTAVE	LIN-LEV	A-ADJT	A-LEV	PNL COEF	ABSORB+	A-QUIET
125	81.9	-16.1	65.8			
250	83.5	-8.6	74.9	0.56	4.9	70.0
500	84.0	-3.2	80.8	0.77	4.1	76.7
1000	83.8	0.0	83.8	0.92	6.7	77.1
2000	81.0	1.2	82.2	0.89	5.3	76.9
4000	76.6	1.0	77.6	0.71	2.1	75.5
OVERALL	90.2		87.9			82.9

Cover: Polyethylene — IND NOISE CONTROL — Est. Price: @$4.95/panel $2376

SOUND PRESSURE LEVEL ANALYSIS FOR 480 PANELS**

EVISCERATION #1

OCTAVE	LIN-LEV	A-ADJT	A-LEV	PNL RATE	ABSORB+	A-QUIET
125	81.9	-16.1	65.8			
250	83.5	-8.6	74.9	4.7	6.0	68.9
500	84.0	-3.2	80.8	8.3	4.1	76.7
1000	83.8	0.0	83.8	10.6	6.6	77.2
2000	81.0	1.2	82.2	10.30	5.2	77.0
4000	76.6	1.0	77.6	7.4	1.8	75.8
OVERALL	90.2		87.9			82.9

** Estimated number of panels needed to bring about a 5 decibel, A-Weighted drop in the Reverberant Field overall level

(*) For Great Lakes Industrial Asso, these numbers are admitted estimates. No tests have been performed to substantiate the values and they are therefore highly suspect.

- Those covered in a rugged material designed to increase life and performance
- Those using low cost polyethylene

It is doubtful long term performance will be achieved with the latter group, particularly if hot water or steam cleaning and chemical detergents are used from time to time. The designs falling into this class are those from Great Lakes Industrial Associates and Industrial Noise Control. Their main advantage is that they are relatively cheap (approximately $5 per panel). Using the calculations shown in Table 3, (and as stated in the table some of the acoustical values are not substantiated) the main eviscerating area could be treated for around $2500 (not including mounting hardware). This is about one-fourth the average cost of the other group of panels. But the question must be how long will they survive?

The other group of panels includes designs intended to improve mechanical performance in poultry processing environments and the like. Within this group, price and performance still vary widely. Using the values in Table 3, Fiber Flex seems to display the lowest overall total cost because of its superior acoustical performance. However, there is only a small difference between it and the Armstrong and Peabody Panels. In that calculation, the main eviscerating area was estimated to be treatable for these three for around $10,000 to $11,000 (not including mounting hardware). Mechanically, the cover of the Fiber Flex panel is probably the best. In studies by Georgia Tech this cover was found to have superior qualities over Tydlar for this application. The vinyl cover of the Peabody Panel while probably good mechanically, is too thick to allow proper acoustical performance.

Panel placement appears best achieved by hanging the baffles in parallel rows in the recesses of the prestressed concrete roof. For the Fiber Flex Panel, 4 foot intervals are what would be required. For hanging, it is suggested that the panels be mounted so that the bottom edge is flush or possibly even 1 foot below the bottom edge of the support strut (see Figure 3). This arrangement, however, will necessitate lowering the ceiling lights in the plant to maintain illumination standards in the plant.

With regard to source quieting, the sound energy migrating from the picking rooms, can be dealt with using a "passage absorber" installed to absorb much of the random incident sound leaking from the room. The absorber could be designed as shown in Figure 4. Approval of such a design, however, by the USDA chief inspector would be required. As an alternative, a commercial design is available from a company called Body Guard. However, the design (see Figure 5) is relatively expensive, ($500 per 3' x 8' panel) and its performance as an absorber is not as strong as is anticipated with the Figure 4 design.

Another source quieting measure is the use of barriers. Again, the Body Guard design can be used to both block and absorb sound. However, a simple vinyl or polyethylene sheets of 1/2" to 3/4" thickness can effectively be used as a barrier to divert sound. If used in conjunction with ceiling treatment, these barriers can prove quite effective in an overall noise reduction plan.

<u>Recommendation</u>

As a basic plan of attack, Perdue is encouraged to try ceiling treatment throughout the eviscerating, trim, cut up and pack out areas.

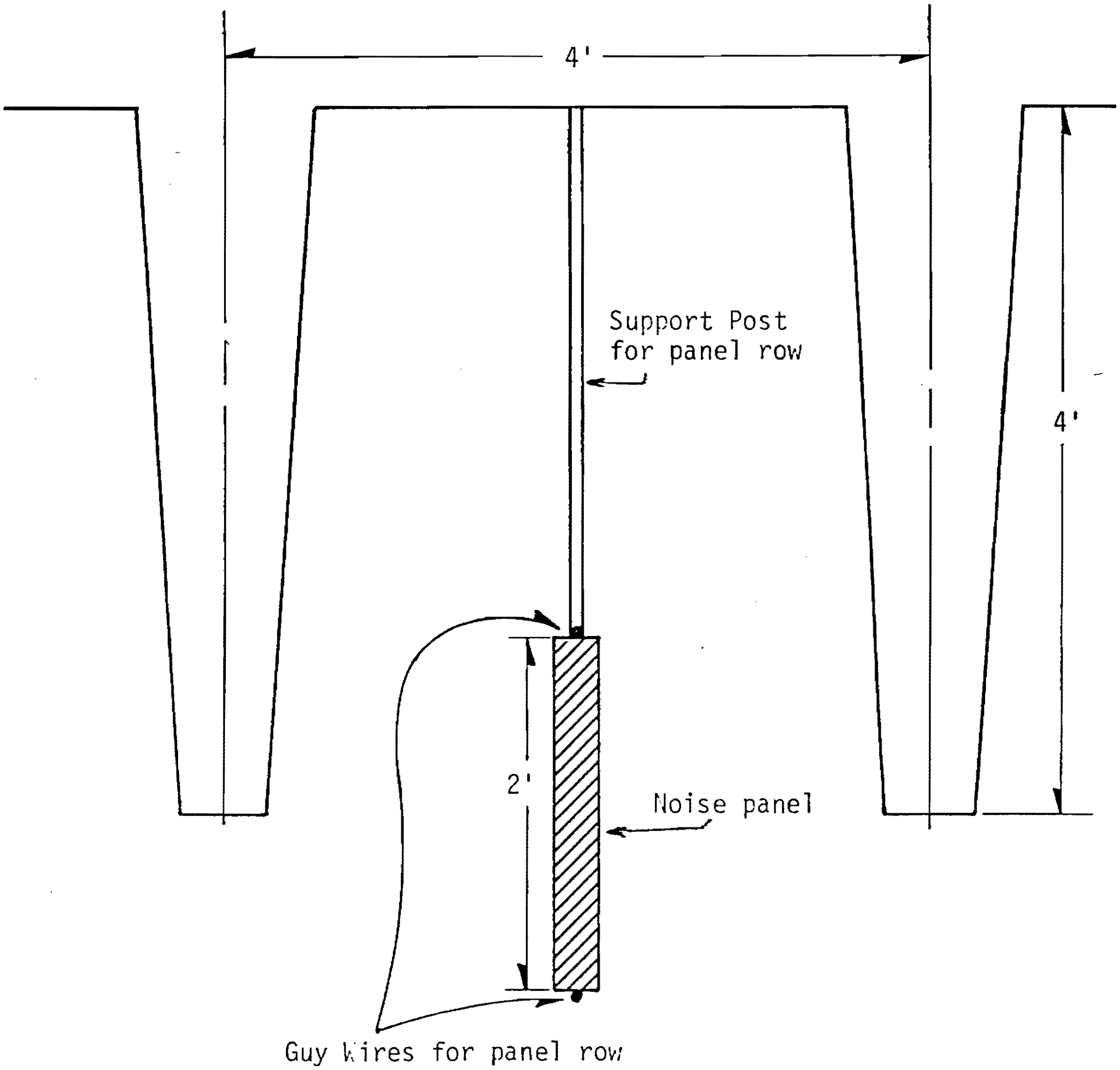


FIGURE 3

Suggested Acoustical Baffle Mounting
Arrangement

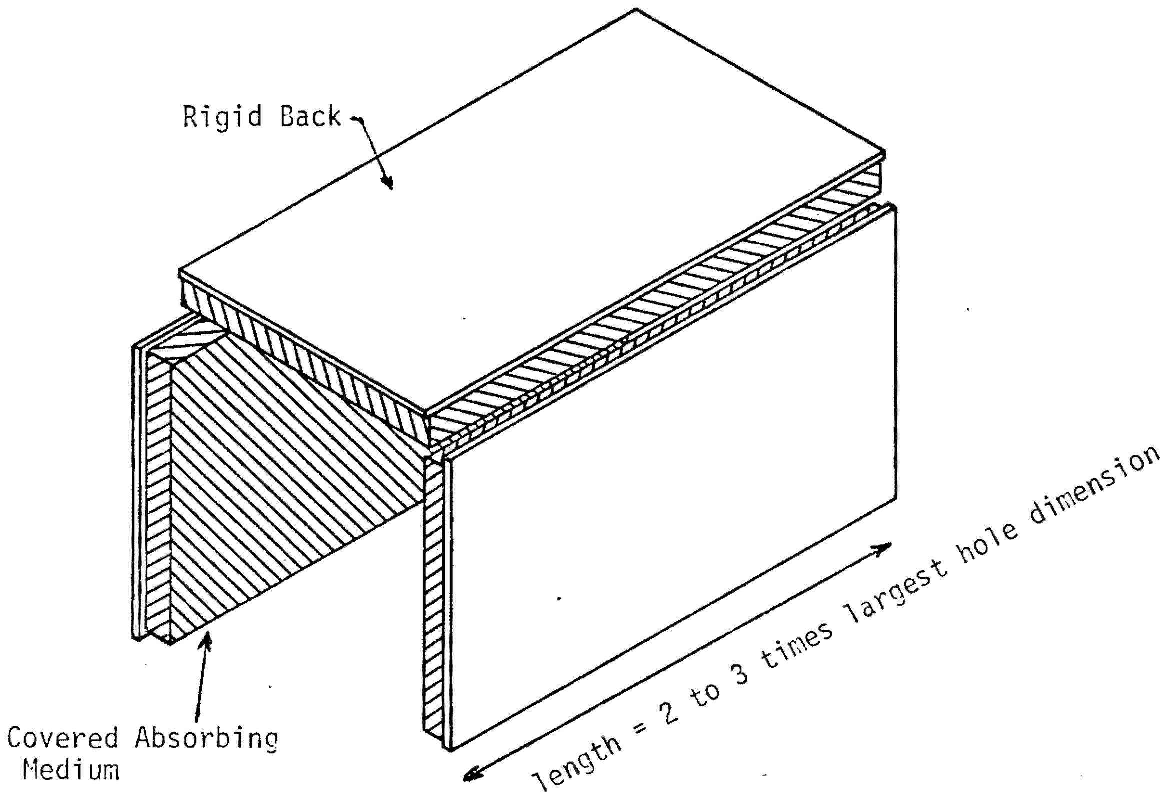
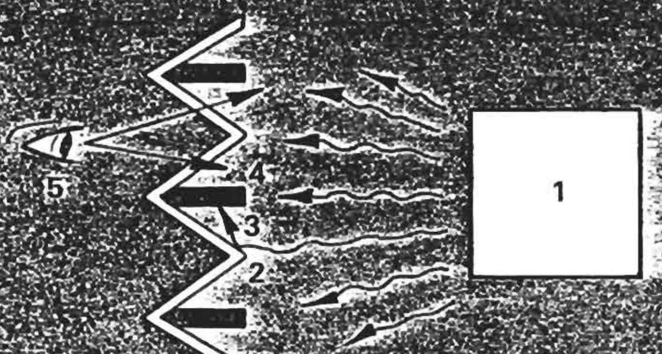


FIGURE 4

Conceptual Design of a "Passage Absorber"

HOW "CLEAR & QUIET"® WORKS*

1. Noise source emits sound wave.
2. Wave strikes panel and is directed into
3. Acoustical foam wedge where
4. Sound energy is absorbed and dissipated.
5. Operator is protected from noise source, but maintains visual contact with operation.



*U.S. PATENT NO. 4,094,379

SERVICES

END CAPS — Vacuformed plastic fits over ends to provide additional strength, rigidity and moisture resistances.

DESIGN — A personal visit to your plant to measure, layout, and present an engineered proposal.

INSTALLATION — Experienced crews available for "turn-key" projects.

SUPERVISION — A skilled Body Guard lead man to direct and assist your maintenance staff in installation.

GENERAL CHARACTERISTICS

TRANSPARENCY — 87-88% Clear.

HEAT RESISTANCE — Withstands 180-200°F. Self-extinguishing foam.

IMPACT RESISTANCE — Specimen at 73°F, absorbed 39 foot pounds without failure.

SANITATION — FDA approved. Cleans easily.

CORROSION RESISTANCE — Inert to most corrosive agents.

ACOUSTICAL PERFORMANCE AT VARIOUS FREQUENCIES

SOUND ABSORPTION	
125 Hz	32%
250	39%
500	64%
1000	110%
2000	92%
4000	92%

SOUND ATTENUATION	
125 Hz	22dB
250	16dB
500	20dB
1000	31dB
2000	35dB
4000	36dB

NOISE REDUCTION CLASS
75%

SOUND TRANSMISSION CLASS
26dB

Test results certified by Riverbank Acoustical Laboratory

FIGURE 5

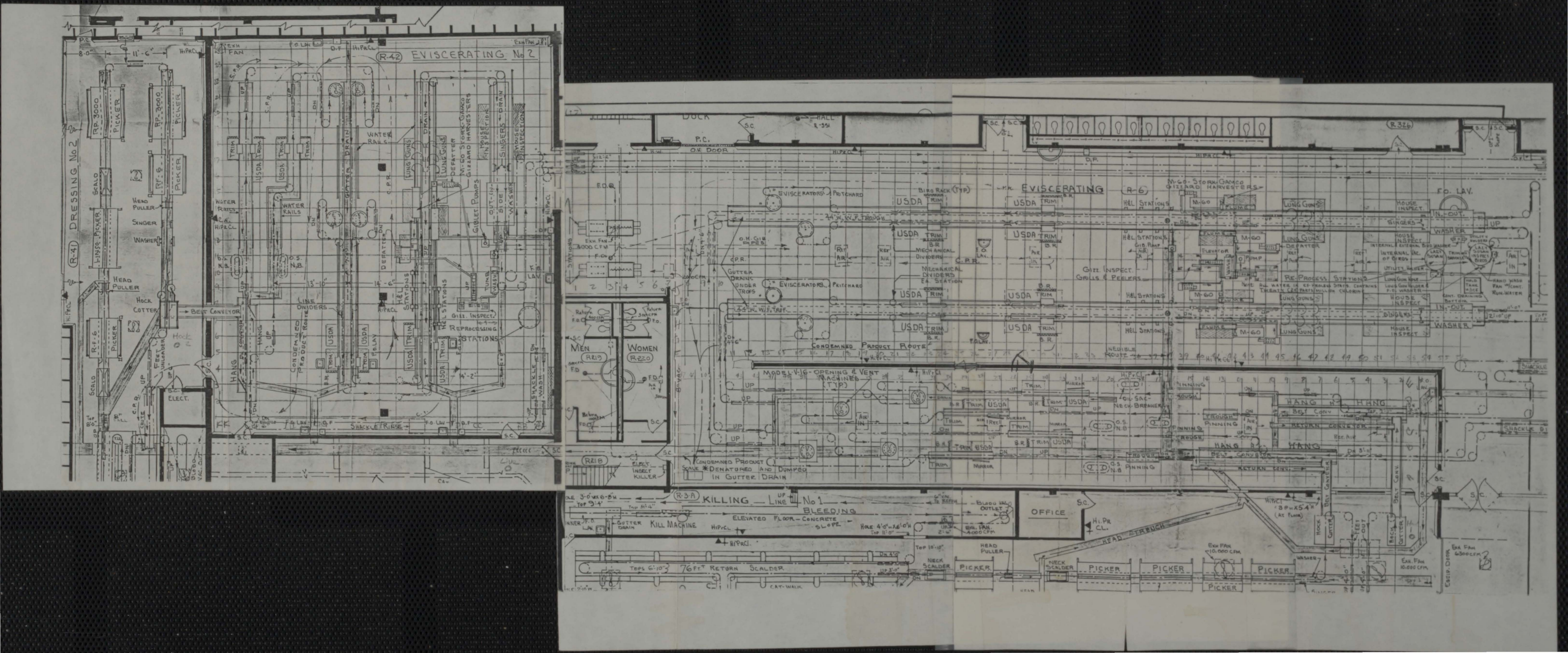
Commercial Barrier and Absorber Design

Based on rough calculations about 825 Fiber Flex panels would be needed in the eviscerating and trim areas alone. Cut up and pack out probably could require anywhere from 1000 to 2000 additional panels, the exact number depending on the reduction needed. At $25 per panel (only a rough estimate) the cost of treating the trim and eviscerating areas would be slightly over $20,000 (without mounting hardware and the cost of lowering the lights). The benefits of such treatment, however, should be significant. As an alternative to initially treating all of the plant, a staged introduction of panels in noisy areas and over major sources is a viable alternative. However, much of the plant will eventually require such treatment.

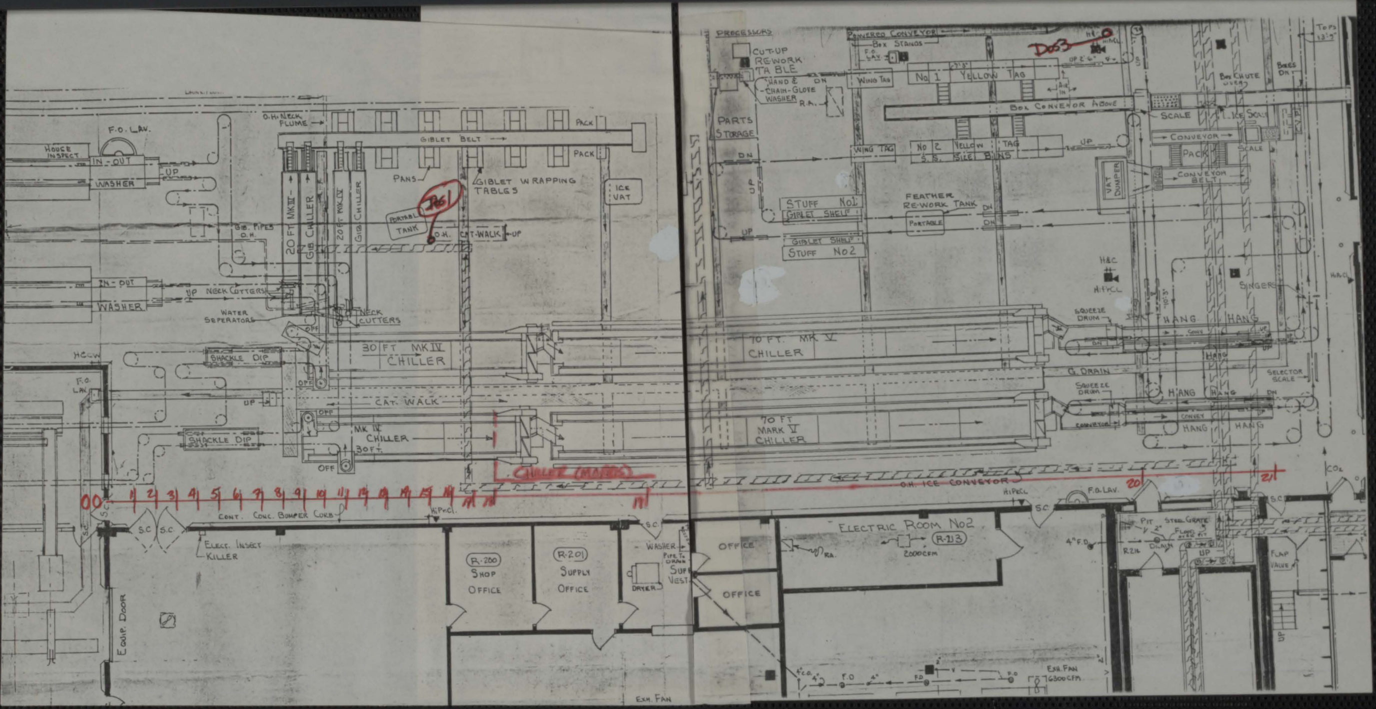
After ceiling treatment, a concerted attack on identifiable noise sources is suggested. The "passage absorber" discussed earlier would be a good focus of attention as would maintenance attention on readily identifiable "noisy" machines. Barriers are suggested only as a last resort and then only if the impact of the source is considered significant and the barrier design practical. In those areas of the plant studied, only two possibilities for barrier installation were found.

APPENDIX A

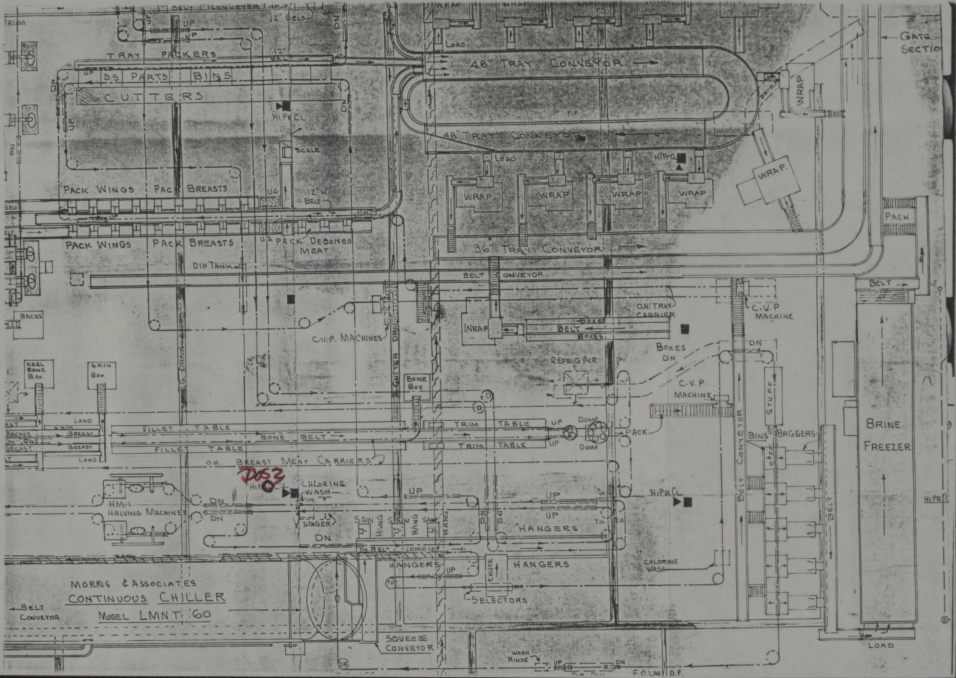
Plant Layouts
with Measurement
Positions Superimposed



EVISCERATING No 2
R-42
DRESSING No 2
R-41
PICKER
SCALD
HEAD PULLER
SINGER
WASHER
HOCK CUTTER
BELT CONVEYOR
FEET UNLOADER
ELECT.
HANG
WATER RAILS
USDA
TRIM
LUNG GUNS
DEFATTER
M-60 STORK-GAMCO GIZZARD HARVESTERS
GIBLET PUMPS
HOUSE INSPECTION
SINGERS
DRAIN
LINE DIVIDERS
CONDEMNED PRODUCT ROUTE
H&L STATIONS
GIZZ. INSPECT.
REPROCESSING STATIONS
SHACKLE WASH
SHACKLE RINSE
DOCK
P.C.
O.H. DOOR
EVISCERATING
R-6
EVISCERATORS
PRITCHARD
MECHANICAL DIVIDERS
EXH FAN 3000 CFM
GUTTER DRAINS UNDER TROFS
GIZZ INSPECT. GRILLS & PEELERS
RE-PROCESS STATIONS
INEDIBLE ROUTE
MEN
R-219
WOMEN
R-220
MODEL V-16 OPENING & VENT MACHINES (TYP)
AIR IN
NECK BREAKER
PINNING
TROUGH
BELT CONV
RETURN CONVEYOR
R-218
INSECT KILLER
CONDEMNED PRODUCT DENATURED AND DUMPED IN GUTTER DRAIN
R-3-A
KILLING LINE No 1
BLEEDING
ELEVATED FLOOR-CONCRETE SLOPE
KILL MACHINE
GUTTER DRAIN
BLOOD VAC OUTLET
EXH. FAN 4,000 CFM
OFFICE
HI. PR CL.
HEAD TROUGH
HEAD PULLER
NECK SCALDER
76 FT RETURN SCALDER
CAT-WALK
PICKER
EXH FAN 10,000 CFM
WASHER
HOCK CUTTER
FEET CUT



PROCESSORS
CUT-UP RE-WORK TABLE
HAND & CHAIN-GLOVE WASHER
R.A.
PARTS STORAGE
POWERED CONVEYOR
BOX STANDS
F.O. LAV.
WING TAG
No 1 YELLOW TAG
BOX CONVEYOR ABOVE
No 2 YELLOW TAG
S.S. SHELF BINS
UP
DN
FEATHER RE-WORK TANK
PORTABLE
STUFF No1
GIBLET SHELF
STUFF No2
VAT DUMPER
SCALE
ICE SCALE
CONVEYOR
PACK
CONVEYOR BELT
BOX CHUTE OVER
BOXES ON
H&C
HI-PR.CL.
SINGERS
SQUEEZE DRUM
HANG
G. DRAIN
SELECTOR SCALE
70 FT MK V CHILLER
70 FT MARK V CHILLER
O.H. ICE CONVEYOR
F.O. LAV.
S.C.
PIT
STEEL GRATE
DRAIN
FLAP VALVE
ELECTRIC ROOM No2
R-213
2000CFM
OFFICE
EXH. FAN 6300 CFM
F.O
4"
HOUSE INSPECT.
F.O. LAV.
IN-OUT
WASHER
O.H. NECK FLUME
GIBLET BELT
PACK
PANS
GIBLET WRAPPING TABLES
ICE VAT
PORTABLE TANK
D061
D063
GIB. PIPES O.H.
O.H. CAT-WALK
20 FT MK III GIB CHILLER
20 FT MK IV GIB CHILLER
NECK CUTTERS
WATER SEPERATORS
OFF
30 FT MK IV CHILLER
SHACKLE DIP
CAT. WALK
MK IV CHILLER 30 FT.
CHILLER (MARKS)
00 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
CONT. CONC. BUMPER CURB
HI-PR.CL.
ELECT. INSECT KILLER
R-200 SHOP OFFICE
R-201 SUPPLY OFFICE
WASHER
DRYER
SUPP. VEST.
EQUIP. DOOR
EXH. FAN


TRAY PACKERS
S.S PARTS BINS
CUTTERS
HI PR CL
SCALE
48" TRAY CONVEYOR
48" TRAY CONVEYOR
WRAP
LOAD
GATE SECTIO
PACK WINGS
PACK BREASTS
PACK WINGS
PACK BREASTS
PACK DEBONED MEAT
12" W BELT
DIP TANK
36" TRAY CONVEYOR
BELT CONVEYOR
PACK
BELT
BACKS
C.V.P. MACHINES
WRAP
BELT
BOXES
O.H. TRAY CARRIER
C.V.P MACHINE
BOXES ON
REFRIG AIR
C.V.P. MACHINE
KEEL BONE BOX
SKIN BOX
BONE BOX
DRAIN
GUTTER DRAIN
FILLET TABLE
BONE BELT
FILLET TABLE
TRIM TABLE
TRIM TABLE
DUMP
PACK
BINS
BAGGERS
STUFF
BELT CONVEYOR
BRINE FREEZER
O.H. BREAST MEAT CARRIERS
D052
CHLORINE WASH
HM-1 HALVING MACHINES
SINGER
SAW
HANG
HANGERS
HI PR CL
BELT CONVEYOR
HANGERS
HANGERS
CHUTE
SELECTORS
CHLORINE WASH
MORRIS & ASSOCIATES
CONTINUOUS CHILLER
MODEL LMNT 60
BELT CONVEYOR
SQUEEZE CONVEYOR
WASH RINSE
LOAD
F.O. LAV D.F.

APPENDIX B

Data Collected on Sound Levels
During Measurement Program

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 8-9-83

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
A-1	93.2	101.5							
A-2	96.2	100.5							
A-3	96.5	100.2							
A-4	96.8	100.6							
A-5	97.6	101.0	92.0	96.2	95.0	93.0	98.5	85.4	78.0
A-6	97.5	101.5							
A-7	96.4	100.4							
A-8	95.4	99.3							
A-9	95.2	99.0							
A-10	94.4	98.6							
A-11	94.0	98.7							
A-12	94.0	98.2							
A-13	93.5	98.0	89.0	92.5	91.0	88.9	85.0	81.0	75.8
A-14	93.2	97.5							
A-15	92.3	97.0							
A-16	92.1	97.0							
A-17	91.6	97.2							
A-18	91.5	96.5							
A-19	91.1	96.2							
A-20	91.0	96.0							
A-21	90.8	95.6							
A-22	91.0	96.6	88.4	90.5	88.6	85.8	82.5	78.2	74.4
A-23	91.0	96.2							
A-24	90.8	95.8							
A-25	90.5	95.6							
A-26	90.5	95.5							
A-27	90.2	95.5							
A-28	90.3	95.6							
A-29	90.1	95.2							
A-30	90.1	95.1							
A-31	89.9	95.2							
A-32	90.0	95.5							
A-33	90.6	95.6	86.8	90.0	86.5	84.6	82.0	81.5	83.0
A-34	90.3	95.2							

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 8/9

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
A-35	90.2	95.8							
A-36	90.0	95.5							
A-37	90.0	95.5							
A-38	89.8	95.7							
A-39	90.1	95.8							
A-40	89.3	94.5							
A-41	89.0	96.0							
A-42	88.5	95.2							
A-43	88.5	95.2							
A-44	88.2	95.5							
A 45	89.0	95.0							
A 46	89.0	95.5							
A 47	88.5	96.5							
B 47	87.7	95.8							
B 46	88.5	94.6							
B 45	88.4	96.5	87.5	88.0	85.8	85.3	80.8	76.7	75.2
B 44	89.0	94.6							
B 42	89.0	94.6							
[illegible]	89.2	94.0							
C 41	89.5	94.5							
C 40	89.8	95.0							
C 39	90.1	95.6							
C 38	90.4	94.6							
C 37	90.2	95.2							
C 36	90.0	95.8							
C 35	90.2	96.0							
C 34	90.5	96.0							
C 33	90.2	95.6							
C 32	90.4	95.3	87.8	90.5	87.8	85.4	82.0	77.8	76.5
C 31	90.0	95.6							
C 30	90.0	95.6							
C 29	90.4	95.3							
C 28	90.5	95.5							
C 27	90.4	95.6							

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 8/9

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
C-26	91.0	95.9							
C-25	90.5	95.8							
C-24	90.5	96.6							
C-23	90.7	96.7							
C-22	91.2	96.5							
C-21	91.5	96.8							
C-20	91.[illegible]	96.8							
C-19	91.8	97.0							
C-18	92.0	97.2							
C-17	93.0	97.9							
C-16	N/A	—							
C-15	94.0	98.5							
C-14	94.0	98.3							
C-13	94.2	98.6							
C-12	94.5	99.2							
C-11	95.2	99.5							
C-10	95.6	100.0							
C-9	95.8	100.3							
C-8	96.0	100.0							
C-7	96.6	101.2							
C-6	96.6	101.0							
C-5	97.6	102.0							
C-4	98.0	102.2							
C-3	98.5	102.5							
B-3	97.0	101.0							
B-4	97.4	100.8							
B-5	97.6	101.0							
B-6	97.0	100.2							
B-7	96.5	100.6							
3-1	[illegible]	100.5							
[illegible]-2	96.3	100.4							
[illegible]-1	95.8	100.1							
D-1	95.5	99.6							
D-2	95.5	99.5							

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 8/9

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
D-3	95.2	99.6							
D-4	95.2	99.2							
D-5	95.3	99.5							
D-6	95.4	99.5	91.7	95.2	92.4	90.3	86.6	83.6	77.[illegible]
E-1	95.0	99.7							
E-2	95.5	99.5							
E-3	95.5	99.4							
E-4	95.[illegible]	99.[illegible]							
E-5	95.2	99.3							
E-6	94.[illegible]	99.2							
E-7	94.4	99.1							
E-8	94.7	99.0							
E-9	94.2	98.6							
E-10	94.2	98.5							
E-11	93.8	98.0							
E-12	93.6	98.4							
E-13	93.3	98.0							
E-14	93.2	98.0							
E-15	93.2	97.5							
E-16	92.8	97.2							
E-17	92.2	97.2							
E-18	92.1	97.2							
E-19	91.9	97.1							
E-20	91.5	96.8							
E-21	91.0	97.2							
E-22	90.9	96.5							
E-23	90.6	96.2							
E-24	90.4	96.0							
E-25	91.4	95.4							
E-26	90.1	95.6							
E-27	90.6	95.2							
E-28	90.6	95.4							
E-29	90.0	95.5							
E-30	90.1	95.4							

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 8/9

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
E-31	90.0	95.4							
E-32	90.4	95.4							
E-33	90.0	95.5							
E-34	90.0	95.0							
E-35	89.9	95.6							
E-36	89.8	95.2							
E-37	89.4	95.6							
E-38	89.8	95.5							
E-39	89.2	94.8							
E-40	89.1	94.5							
E-41	89.0	94.5							
E-42	88.9	94.0							
E-43	88.7	93.7							
E-44	88.0	93.5							
E-45	87.9	94.4							
E-46	87.9	94.1							
E-47	88.3	94.3							
F-8	87.5	~~[illegible]~~							
G-8	87.8								
F-9	89.2								
G-9	88.6								
F-10	88.2								
G-10	88.0								
F-11	87.8								
G-11	88.0								
F-12	87.7								
G-12	87.4								
F-13	87.9								
G-13	87.9								
F-14	87.5								
G-14	87.2								
F-15	87.8								
G-15	87.9								
F-16	87.8								

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 8/9

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
G-16	87.4								
F-17	87.0								
G-17	87.5								
F-18	87.[illegible]								
G-18	87.3								
F-19	87.[illegible]								
G-19	8[illegible]								
F-20	87.[illegible]								
G-20	8[illegible]								
F-21	[illegible]								
G-21	87.[illegible]								
F-22	88.[illegible]								
G-22	87.[illegible]								
F-23	88.0								
G-23	87.7								
F-24	87.[illegible]								
G-24	87.[illegible]								
F-25	87.0								
G-25	87.2								
F-26	87.[illegible]								
G-26	87.[illegible]								
F-27	88.1								
G-27	88.5								
F-28	88.8								
G-28	88.[illegible]								
F-29	88.3								
G-29	87.0								
F-30	87.5								
G-30	87.3								
F-31	87.[illegible]								
G-31	88.[illegible]								
F-32	87.7	93.0	82.9	83.0	85.6	85.4	91.4	76.2	72.[illegible]
G-32	87.5								
F-33	88.[illegible]								

8/9/83

8/10/83

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 8-10

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
G-33	88.5								
F-34	88.3								
G-34	88.5								
F-35	88.5								
G-35	88.5								
F-36	88.6								
G-36	88.4								
F-37	89.4								
G-37	89.6								
F-38	89.5	94.5							
G-38	90.0	94.2							
F-39	90.1	94.4							
G-39	89.5	94.6							
F-40	89.9	94.1							
G-40	89.9	93.7							
F-41	89.5	93.8							
G-41	89.5	93.4							
F-42	89.9	94.0							
G-42	89.4	94.1							
F-43	89.5	94.2							
G-43	89.4	94.0							
F-44	89.8	94.2							
G-44	89.5	94.0							
F-45	89.0	94.2							
G-45	89.2	93.7							
F 46	89.5	94.0							
G 46	88.8	93.5							
F 47	88.5	94.0							
G 47	88.4	93.5							
F 48	89.6	93.6							
G 49	88.5	94.0							
F 49	88.5	94.5							
G 49	88.0	93.5							
F 50	89.6	94.0							

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 5-10

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
G-50	89.0	93.6							
F-51	88.5	93.8							
G-51	89.5	93.4							
F-52	89.0	93.5							
G-52	90.0	93.8							
F-53	89.5	94.0							
G-53	89.8	93.6							
F-54	89.9	93.6							
G-54	89.5	93.8							
F-55	89.5	93.7							
G-55	89.5	93.3							
F-56	89.9	94.1							
G-56	89.9	94.0							
K 1	88.5								
L 1	90.5								
2	89.4								
3	87.9								
3	87.5								
2	87.9								
4	87.7								
4	86.9								
5	88.2								
K 5	88.4								
K 6	87.4								
6	88.9								
K-7	87.4								
L-7	87.8								
K-8	87.5								
-8	87.6								
K-9	87.6								
L-9	87.8								
K-10	87.5								
L-10	87.6								
K-11	87.5								

* NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 8-10

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
L-11	87.4								
K-12	87.5								
L-12	88.0								
K-13	87.2								
L-13	88.3								
K-14	87.2								
L-14	87.4								
K-15	87.5								
L-15	87.2								
K-16	87.4								
L-16	87.0								
K-17	87.2	92.0	81.7	85.2	83.0	82.2	80.5	77.9	73.8
L-17	87.2								
K-18	86.5								
L-18	86.6								
K-19	87.4								
L-19	86.9								
K-20	87.2								
L-20	86.8								
K-21	87.3								
L-21	86.4								
K-22	87.1								
L-22	86.9								
K-23	87.0								
L-23	86.7								
K-24	86.6								
L-24	87.3								
K-25	87.3								
L-25	86.4								
K-26	86.4								
L-26	87.5								
K-27	87.5								
L-27	87.7								

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 8-10

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
K-28	87.9								
L-28	87.8								
K-29	87.5								
L-29	87.7								
K-30	87.8								
L-30	87.8								
K-31	87.9								
L-31	87.[illegible]								
K-32	87.[illegible]								
L-32	87.8	92.0	81.9	83.5	84.0	83.8	81.0	76.6	73.0
K-33	88.0								
L-33	88.1								
K-34	88.4								
L-34	88.4								
K-35	88.7								
L-35	88.[illegible]								
K-36	89.2								
L-36	89.2								
K-37	89.5								
L-37	89.7								
K-38	90.5								
L-38	90.5								
L-39	91.2	94.5							
L-40	91.3	94.5							
L-41	91.4	94.4	83.1	85.0	87.9	86.8	84.5	79.0	75.2
L-42	90.3	93.7							
L-43	90.3	94.3							
L-44	90.5	94.3							
L-45	90.4	93.8							
K-39	91.1	94.3							
K-40	90.8	94.5							
L-41	90.[illegible]	94.1							
K-41	90.1	94.3							
K-42	90.8	94.2							

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 8-10

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
K-44	89.6	93.8							
K-45	88.7	93.5							
K-46	89.0	93.3							
L-46	89.1	93.4							
K-47	88.8	93.0							
L-47	89.2	93.2							
K-48	89.1	92.8							
L-48	89.4	93.7							
K-49	[illegible]	93.0							
L-49	88.8	92.6							
K-50	89.0	93.0							
L-50	88.4	92.8							
K-51	88.4	92.4							
L-51	89.0	92.3							
K-52	88.6	92.4							
L-52	88.1	92.5							
K-53	88.8	92.8							
L-53	88.2	92.3							
K-54	88.0	92.3							
L-54	88.8	91.8							
K-55	89.0	93.4	82.3	84.8	85.2	84.5	84.0	81.0	74.8
L-55	N/A								
K-56	90.2	92.8							
N-1	89.3	[illegible]							
O-1	88.8	[illegible]							
N-2	89.4	92.1	79.8	82.4	84.2	82.8	82.1	78.5	73.3
O-2	88.6	[illegible]							
M-1	91.5								
M-2	89.5								
M-3	89.3								
N-3	88.7								
O-3	88.8								
O-4	87.2								
N-4	88.1								

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 5-10-83

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
O-18	86.5								
N-19	86.0								
O-19	86.5								
N-20	86.3								
O-20	86.6								
N-21	86.4								
O-21	86.4								
N-22	87.6								
O-22	86.9								
N-23	86.5								
O-23	87.4								
N-24	86.5								
O-24	86.8								
N-25	86.8								
O-25	86.8								
N-26	86.8								
O-26	86.7								
N-27	87.4								
O-27	87.0								
N-28	87.6								
O-28	87.0								
N-29	88.0								
O-29	88.0								
N-30	87.9								
O-30	88.3								
N-31	87.8								
O-31	88.0								
N-32	88.0								
O-32	88.6								
N-33	89.0								
O-33	88.7								
N-34	89.0								
O-34	89.2								
N 35	90.1								

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date____________

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
O 35	90.2								
N-36	91.1								
O-36	91.0								
N-37	91.8								
O-37	91.0								
N-38	92.1								
O-38	91.6								
N-39	9[illegible].4	95.5							
O-39	91.6	94.8							
N-40	93.0	95.5							
O-40	91.0	95.2							
N-41	91.2	94.5	83.0	83.4	86.6	86.6	85.0	79.4	75.5
O-41	90.5	94.3							
N-42	90.6	94.2							
O-42	90.6	95.7							
N-43	90.1	94.0							
O-43	90.0	94.1							
N-44	89.5	93.8							
O-44	89.9	94.1							
N-45	89.4	94.1							
O-45	89.4	94.0							
N-46	89.3	94.8							
O-46	88.8	93.5							
N-47	89.2	93.2							
O-47	89.0	93.2							
N-48	88.4	93.1							
O-48	88.7	93.7							
N-49	88.1	93.1							
O-49	88.6	93.3							
N-50	98.5	93.0							
O-50	88.5	93.0							
N-51	88.8	92.8							
O-51	88.7	92.1							
N-52	88.1	93.3							

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 8-10-83

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
O-52	89.0	93.8							
N-53	88.8	92.6							
O-53	88.1	92.5							
N-54	88.0	92.3	81.8	83.8	84.8	84.2	82.0	76.8	73.5
O-54	88.7	92.8							
N-55	87.8	92.4							
O-55	88.3	92.8							
N-56	88.2	92.7							
O-56	88.0	92.7							
4A-1	85.6	91.2							
3B-1	87.2	91.0							
3B-2	86.5	90.6							
3B-3	85.6	90.7							
3B-4	86.8	91.0							
3B-5	87.0	90.5							
4A-8	86.3	91.0							
3B-8	86.7	90.5							
4A-9	86.5	90.0							
3B-9	86.6	90.2							
4A-10	86.8	90.2							
3B-10	87.4	91.2							
4A-11	87.3	90.7							
3B 11	87.9	90.6							
4A 12	88.6	91.0							
3B 12	87.5	90.7							
4A 13	86.7	90.9							
3B 13	87.5	90.9							
4A-14	86.7	90.9							
3B-14	86.8	90.6							
4A 15	86.8	91.0							
3B 15	87.3	90.8							
4A 16	86.3	90.5							
3B 16	86.8	90.6							
4A 17	87.1	91.8							

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 8-10-83

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
BB 17	87.9	91.8							
AA 18	87.2	91.1							
BB 18	87.8	90.6							
AA 19	86.5	90.5							
BB 19	87.0	90.7							
AA 20	87.0	91.5							
BB 20	87.0	91.0							
AA 21	86.9	91.3							
BB 21	87.4	91.6							
AA 22	88.0	91.0							
BB 22	87.2	91.0							
AA 23	87.0	91.5							
BB 23	87.2	91.0							
AA 24	86.5	91.8							
BB 24	86.4	91.2							
CC 1	87.3	90.5							
DD 1	86.8	90.6							
CC 2	87.2	90.0							
DD 2	86.9	89.8							
CC 3	86.8	90.4							
DD 3	86.8	90.6							
CC 4	86.7	90.3							
DD 4	86.2	90.6							
CC 5	86.2	90.3							
DD 5	86.3	90.0	80.7	81.8	83.0	82.2	79.8	77.5	74.8
CC 6	86.8	90.2							
DD 6	86.7	90.5							
CC 7	86.7	90.4							
DD 7	87.3	91.2							
CC 8	87.2	90.8							
DD 8	87.8	90.2							
DD 9	88.8	91.6							
DD 10	88.6	91.4							
DD 11	88.7	91.5							

?

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 8-10-83

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
CC-11	88.4	91.2							
DD-12	88.8	91.6							
CC-12	88.7	90.7							
CC-13	89.2	90.9							
DD-13	89.3	91.3							
CC-14	88.4	91.0							
DD-14	88.8	91.4							
CC-15	88.7	91.2							
DD-15	88.5	91.2							
CC-16	87.8	90.7							
DD-16	88.8	91.1							
CC-17	87.8	90.8							
DD-17	87.7	90.4							
CC-18	87.3	90.3							
DD-18	87.5	90.5							
CC-19	87.4	90.3							
DD-19	88.0	90.7							
DD-20	87.3	90.8							
CC-20	86.7	90.4							
CC-21	87.3	90.7							
DD-21	87.0	90.7							
CC-22	N/A	—							
DD-22	N/A	—							
CC-23	87.0	90.7							
DD-23	87.5	91.3							
CC-24	87.2	90.6							
DD-24	87.3	90.8							
EE-1	86.7	90.2							
FF-1	87.2	90.4							
EE-2	86.9	90.0							
FF-2	87.0	90.6							
EE-3	N/A	—							
FF-3	N/A	—							
EE4	87.3	90.2							

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date [illegible]-10-83

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
FF 4	87.5	91.0							
EE 5	87.8	91.0							
FF 5	87.0	90.5							
EE 6	87.8	90.2							
FF 6	87.5	90.5							
EE 7	86.8	90.4							
FF 7	88.1	90.4							
EE 8	87.5	90.5							
FF 8	88.0	91.0							
EE 9	88.0	91.2							
FF 9	88.1	90.1							
EE 10	88.2	90.5							
FF 10	88.0	91.2							
EE 11	89.0	91.5							
FF 11	88.2	90.8							
EE 12	89.5	91.4							
FF 12	N/A	~~91.5~~							
EE 13	89.1	91.5							
FF 13	N/A								
EE 14	89.5	91.3							
FF 14	N/A								
EE 15	88.7	91.4							
FF 15	88.2	90.9							
EE 16	88.4	90.8							
FF 16	89.0	91.5							
EE 17	88.3	91.0							
FF 17	89.2	91.5							
EE 18	88.0	91.0							
FF 18	~~N/A~~ 89.0	91.4							
EE 19	88.0	91.0							
FF 19	~~[illegible]~~	N/A							
EE 20	87.5	90.5							
EE 21	87.4	91.5							
EE 22	87.8	90.4							

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 6-10-83

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
FF 22	88.7	91.5							
EE 23	87.8	91.0							
FF 23	88.2	91.0							
EE 24	86.8	91.0							
FF 24	87.5	91.0							
GG-1	87.1	90.8							
HH-1	87.2	90.5							
II-1	87.3	90.8							
GG-2	86.8	90.2							
HH-2	87.0	90.7							
II-2	87.5	90.7							
GG-3	87.3	90.7							
HH-3	87.5	91.0							
II-3	87.3	91.0							
GG-4	87.6	90.9							
HH-4	88.1	91.4							
II-4	88.2	91.5							
GG-5	87.4	91.0							
HH-5	87.7	91.6							
II-5	87.4	90.8							
GG-6	87.6	90.5							
HH-6	87.5	91.0							
II-6	88.5	91.6							
GG-7	88.3	91.4							
HH-7	87.8	91.3							
II-7	88.7	91.4	81.7	84.3	85.5	83.4	80.8	79.7	77.0
GG-8	88.4	90.8							
HH-8	88.6	91.3							
II-8	88.4	91.3							
GG-9	87.5	91.0							
HH-9	87.8	91.4							
II-9	88.4	91.6							
GG-10	87.7	91.0							
HH-10	88.0	90.7							

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 8-10-83

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
II-10	88.4	91.6							
GG-11	87.3	90.6							
HH-11	87.8	90.8							
II-11	88.3	91.7							
GG-12	87.9	91.2							
HH-12	87.7	92.2							
II-12	88.4	91.1							
GG-13	N/A	—							
HH-13	87.6	91.1							
II-13	87.8	91.1							
GG-14	N/A	—							
HH-14	88.1	91.3							
II-14	88.3	90.8							
GG-15	N/A	—							
HH-15	89.6	90.6							
II-15	N/A	—							
GG-16	88.4	91.0							
HH-16	88.7	91.1							
II-16	N/A	—							
GG-17	88.2	91.6							
HH-17	88.0	91.3							
II-17	N/A	—							
GG-18	88.3	91.7							
HH-18	88.4	91.3							
II-18	N/A	—							
GG-19	N/A	—							
HH-18	88.7	91.2							
II-19	N/A	—							
GG-19	N/A								
HH-19	88.7	91.5							
I-19	88.2	90.8							
GG-20	N/A	—							
HH-20	89.2	91.7							
I-20	88.1	91.2							

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 8-10-83

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
GG-21	88.3	91.7							
HH-21	88.0	91.9							
II-21	87.9	91.2							
GG-22	89.3	92.0							
HH-22	88.8	91.7							
II-22	87.9	91.6							
GG-23	87.8	91.1							
HH-23	87.9	91.4							
II-23	88.2	91.8							
GG-24	88.4	91.4							
HH-24	88.2	91.5							
II-24	88.0	91.7							
JJ-24	88.5	92.0							
JJ 23	88.3	91.7							
JJ 22	88.7	91.5							
JJ 21	89.0	91.8							
JJ 20	88.5	91.8							
JJ 19	88.3	92.0							
JJ 18	88.5	91.4							
JJ 17	88.0	91.5							
KK 24	88.2	92.1							
KK 23	88.2	92.2							
KK 22	89.2	92.4							
KK 21	88.8	91.8							
KK 20	87.8	91.8							
KK 19	87.5	91.5							
KK 18	87.9	91.6							
KK 17	87.8	91.0							
KK 16	88.6	91.2							
KK 15	88.5	91.0							
KK 14	87.8	91.2							
KK 13	88.2	91.2							
KK 12	88.4	92.5							
KK 11	89.4	92.4							

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 8-10-83

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
KK 10	90.1	93.0							
KK 9	90.1	92.8							
KK 8	91.0	94.4							
KK 7	92.5	96.4							
KK 6	92.0	95.5							
KK 5	90.4	93.4							
KK 4	89.2	92.8							
KK 3	88.3	92.1							
KK 2	87.7	91.5							
~~[illegible]~~	~~[illegible]~~								
KK 1	87.5	91.7							

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 8/11

Reading Position Number	Sound Pressure Level								
	Overall		Octave						
	Awt.	Linear	125	250	500	1000	2000	4000	8000
Dos 1	89.3	92.6	82.1	83.8	85.4	86.7	82.6	76.2	71.4
Dos 2	86.2	90.8	83.0	84.5	83.0	80.5	78.6	74.8	71.8
Dos 3	87.5	94.8	83.6	84.8	83.1	83.6	79.5	75.0	72.0
00-1	92.0	[illegible]							
00-2	90.5								
00-3	90.1								
00-4	90.2								
00-5	90.0								
00-6	90.0								
00-7	90.0								
00-8	90.0								
00-9	90.5								
00 10	90.3								
00 11	90.6								
00 12	91.0								
00 13	90.4								
00 14	90.3								
00 15	90.8								
00 16	90.3								
00 17	90.3								
00 18	90.0								
00 19	89.2								
00 20	87.8								
00 21	86.2								
Hock 1	103.2	106.0	95.8	100.8	100.0	98.6	95.6	89.0	84.7
	~~[illegible]~~								
Live	88.4	91.4	82.5	83.2	83.8	84.0	81.0	79.5	78.2
Hock 2	101.7	104.8	96.2	99.7	99.3	97.8	93.4	87.7	84.1

NOISE SURVEY DATA SHEET

Perdue Poultry Processing Plant

Lewiston, N.C.

Date 8-9 thru 8-11

Dosimeter Reading Position Number	Sound Pressure Level: % dose	Sound Pressure Level: TWA-SPL	Duration (hrs. - min.)
6D	94%	96.5 dBA	1:30 — 4:30
20C	54%	92.4 dBA	1:35 — 4:31
~~[illegible]~~ 41C	36%	84.6 dBA	1:40 — 4:33
K 17	30%	88.2 dBA	8:47 — 11:47
L 32	(*) 4%	—	8:52 — 11:49
N 54	32%	88.9 dBA	8:55 — 11:51
DD 5	29%	88.0 dBA	1:10 — 4:10
TT 13	(*) 11%	~~[illegible]~~	1:12 — 4:11
KK 19	32%	88.8 dBA	1:16 — 4:12
Dos 1 (8/11)	14%	90.5 dBA	9:50 — 10:56
Dos 2 (8/11)	8%	87.1 dBA	10:05 - 11:03
Dos 3 (8/11)	10%	88.4 dBA	10:15 - 11:15

(*) Dosimeter reading appears highly inaccurate - value suspect, believe dosimeter not operating properly

APPENDIX C

Selected Technical Brochures on
Commercial Baffles Designed for Use In
Food Processing Applications

(Note: This display in no way constitutes an endorsement of any product by Georgia Tech)

Fiber Flex of Georgia, Inc.

Testing Data for Acoustic Panels

TEST METHOD:

The sound absorption tests were conducted in accordance with ASTM C423-81. For the A mounting a 80 square foot sample was placed directly on the Reverberation Room floor.

Hanging: the baffles were suspended six feet from the Reverberation Room floor in three rows of three each, rows were three foot on center, the baffles were placed end to end in each row to form rows 12 feet in length. The values obtained for the suspended baffles are reported in sabins per baffle. This is the amount of absorption which can be expected for each baffle of this design when placed in an array similar to that used for evaluation.

RESULTS:

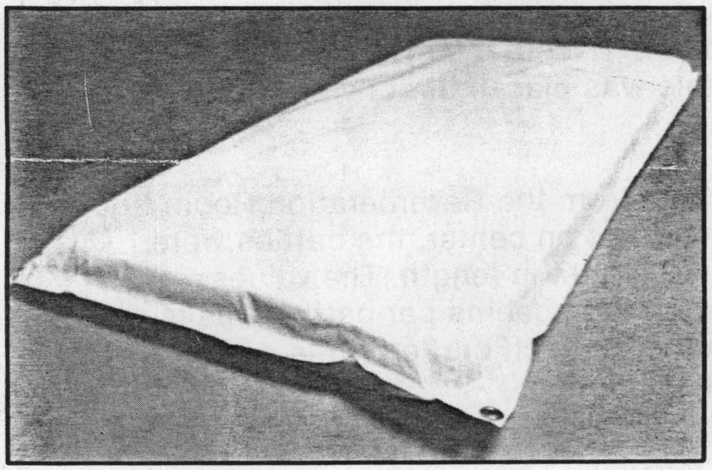
OCF Test No.	Mounting No.	Sound Absorption Coefficients, 1/3 Octave Band Center Frequencies, Hz. 125	250	500	1000	2000	4000	NRC
A48781	4	.53	1.24	1.29	1.09	.80	.46	1.10

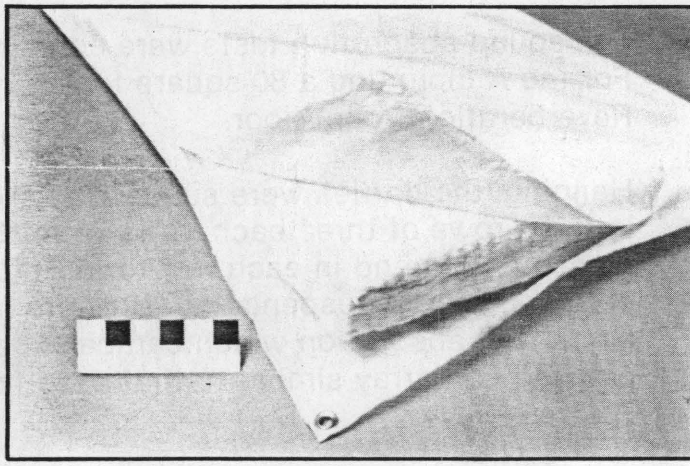
OCF Test No.	Mounting No.	Sabins/Baffle, 1/3 Octave Band Center Frequencies Hz. 125	250	500	1000	2000	4000	Avg. (250-4000)
A48681	Hanging	3.06	8.22	15.00	14.03	10.37	5.85	11.90

In the preceding table, some of the measured coefficient values are shown greater than 1.00. This is a real effect which is due to the diffraction of sound waves adjacent to the test specimen. As recommended by the ASTM C-423 test method, no adjustment has been made to these coefficient values.

Fiber Flex
of Georgia, Inc.

Fiberflex Acoustic Panels





FEATURES Of Acoustic Panel	BENEFITS To User
Fiberglas	High accoustical performance
Reinforced Polyester Film Covering	High accoustical transmission Long wear life High resistance to tear
Total encapsulation	Permanent vapor barrier protection for acoustical insulation
4 corner grommet design	Universal mounting mechanism for ease of installation
USDA Approval	Product can be used in most food processing applications

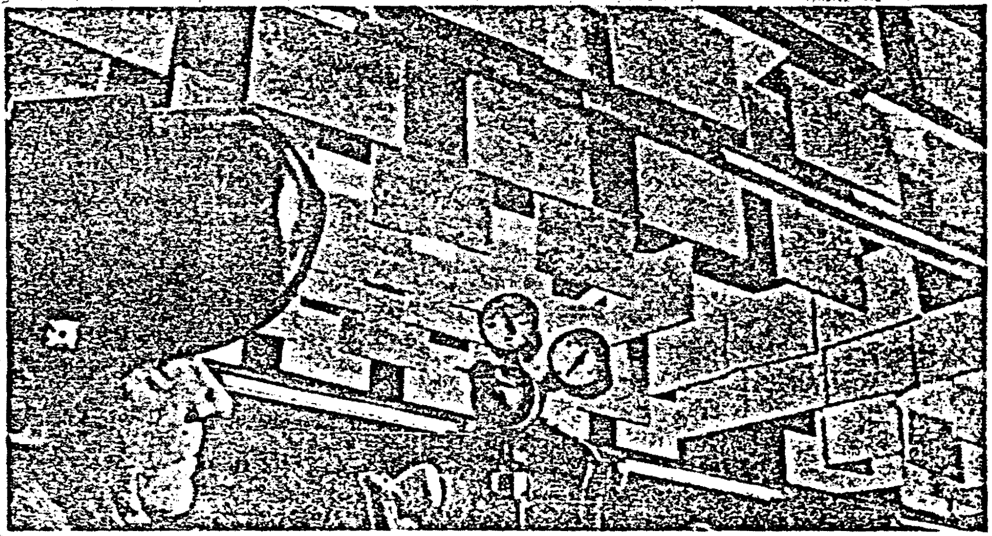
OWENS CORNING FIBERGLAS

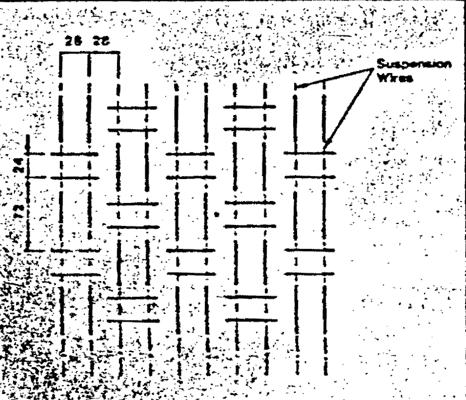
Fiber Flex
of Georgia, Inc.

Peabody-Noise Control

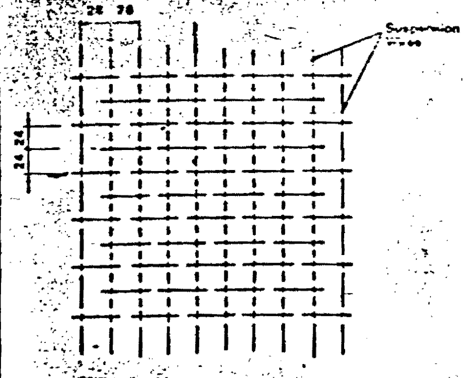
baffles

Kinetics Noise Control Baffles are used to reduce overall noise levels in industrial, recreational, or other high noise areas, and are suspended from wires or from the structure near the noise source. Kinetics Noise Control Baffles are 2.7 pcf fiberglass, 2'0" x 4'0" x 1½" thick sealed into a 3 mil white fire retardant vinyl film cover. When tested according to UL E-84, the cover material exhibits flamespread of 15, smoke development of 45, and fuel contribution of 0. The Average Absorption rating of Kinetics baffles is 10 Sabins. Actual noise reduction can be up to 10 dB, but depends on the configuration of the space and the absorption present before installing baffles. Baffles are packaged ten (10) per carton.





Honeycomb



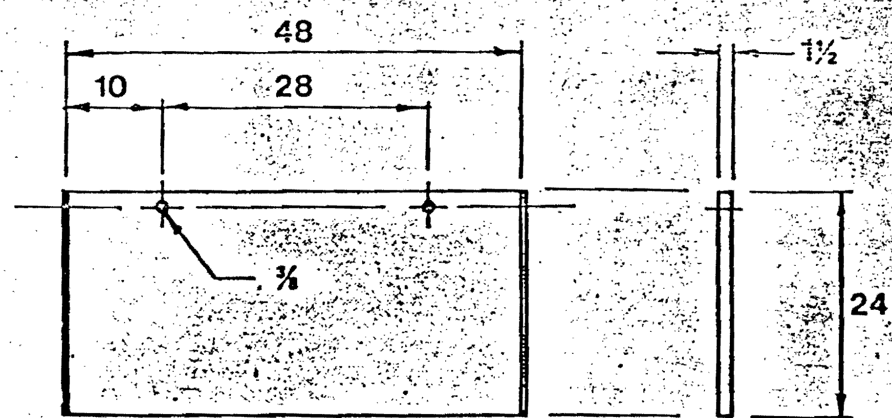
Parallel
Installation Pattern

Acoustical Performance

Frequency	Absorption Coefficient	Sabins per Baffle
125	.11	2.0
250	.32	5.8
500	.69	12.5
1000	.73	13.2
2000	.43	7.8
4000	.21	3.8
NRC	.55	AV 10.0

When suspended in the Honeycomb Pattern, .42 Baffles can be installed per square foot. When suspended in the Parallel Pattern, .54 Baffles can be installed per square foot.

Baffle Dimensions



Average Room Absorption Coefficient	
Terminology	**Description**
Hard	All (6) Surfaces Brick, Concrete, Marble, Tile, Steel
Medium Hard	(5) Surfaces Hard, (1) Surface Absorptive — Carpet, Acoustical Tile, Drapes, or Open to the Outside
Medium	(4) Surfaces Hard, (2) Surfaces Absorptive
Medium Soft	(3) Surfaces Hard, (3) Surfaces Absorptive
Soft	(1) or (2) Surfaces Hmz. Balance Absorptive

Example:

Consider an 80′ x 40′ x 20′ industrial plant.

Step 1 Determine surface area:

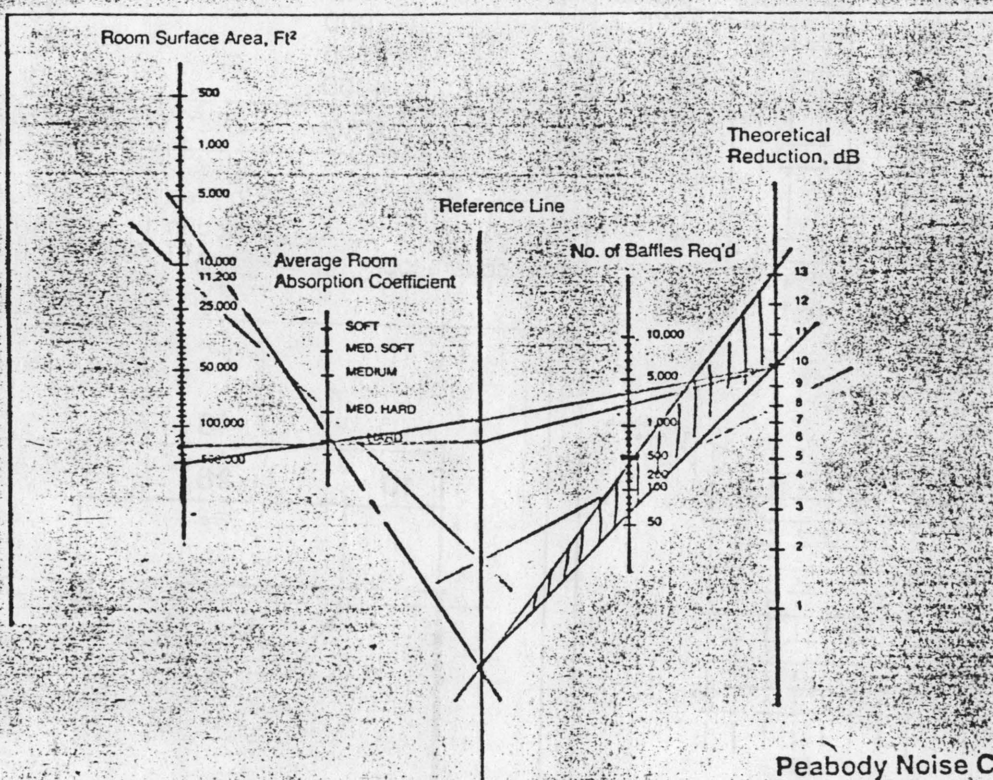
80 x 20 x 2 (walls)	=	3200
40 x 20 x 2 (walls)	=	1600
80 x 40 x 1 (ceiling)	=	3200
80 x 40 x 1 (floor)	=	3200
Total Surface		11200 sq. ft.

Step 2 Determine the overall acoustical character of the building. Assume this building is medium hard since the floors and walls are hard, and the ceiling is medium.

Step 3 Connect 11,200 ft.² and medium hard on the nomogram. Extend the line to its intersection with the vertical reference line.

Step 4 If an 8 dB noise reduction is desired, connect a line between 8 on the "Reduction" scale, and the intersection point on the "Reference Line".

Step 5 Read 200 as the number of baffles required on the "Required" line.



Peabody Noise Control

Peabody Noise Control Inc.
6300 Irelan Place/PO Box 65
Dublin, Ohio 43017
Telephone 614 889-0[illegible]

Armstrong

Vertical Baffle Sound Absorbers

Industrial Acoustical Control

Armstrong Vertical Baffle Sound Absorber panels are designed for overhead installation in exceptionally noisy areas such as:

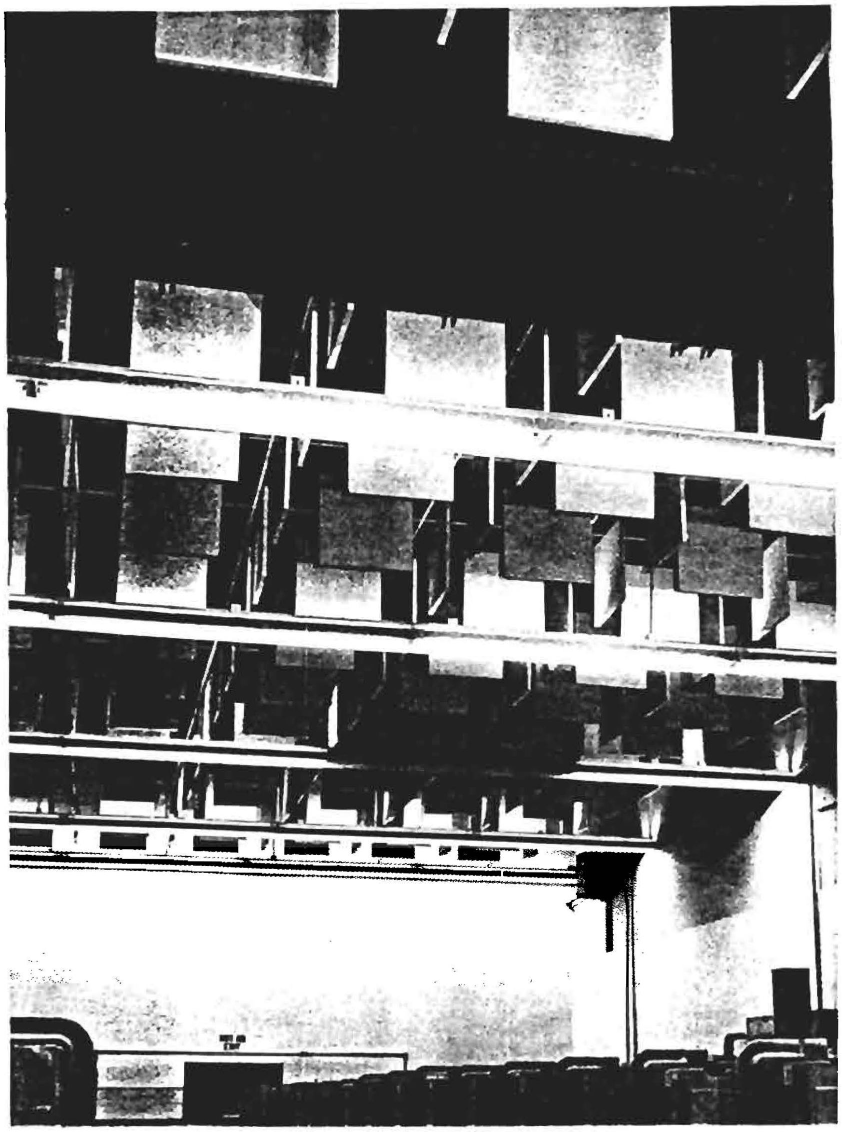
industrial plants
machine shops
food-processing plants
gymnasiums

These panels are particularly effective in all areas where reduction of excess sound, especially in the reverberant field levels, is desirable.

Made of a mineral-fiber core encased in an opaque white Tedlar film, the panels are unaffected by moisture or high humidity. They have excellent ultraviolet stability, capable of withstanding up to 2,000 hours of U-V exposure without any significant change in physical properties or appearance.*

Easy to install, the panels are supplied fully assembled with an integral hanging system.

* Du Pont Company



Size and Detail
2'x4'x1½" (nominal) panels
Mineral-fiber core, encased in Tedlar film
Opaque White
8 lb/unit

Fire Data
Flame spread: 0-25 (ASTM E 84 Tunnel Test)
Class A—Federal Spec. SS-S-118B, Class IV

Maintenance
The exceptionally durable Tedlar surface is easy to clean. Any regular detergent is suitable for most problems—any really tough situations may require stronger solvents—use of either will not damage the Tedlar surface.

These washable baffles are acceptable by USDA for use in meat- and poultry-processing plants.

Acoustical Data
Sound-absorbtion-tested according to ASTM C 423, Sound Absorbtion of Acoustical Materials in Reverberation Rooms.

Vertical baffles suspended in rows, 4' oc

Freq. (Hertz)	Sabins/Unit
125	3.6
250	4.4
500	9.5
1000	13.9
2000	13.2
4000	10.2
Four-freq. average	10.2

Armstrong

Sound Absorber Lay-in Panels

Industrial Acoustical Control—Lay-in Panels

As a special order, these mineral-fiber shrink-wrapped panels are available as 2'x4' lay-in panels. Their physical properties are similar to those of the Armstrong Vertical Baffle Sound Absorber panels, but rather than hanging from the ceiling they may be installed directly in a conventional grid system.

They are USDA-approved for use in meat- and poultry-processing plants and are easy to clean.

Acoustical Data

Sound-absorption-tested according to ASTM C 423, Sound Absorption of Acoustical Materials in Reverberation Rooms.

Lay-in units, mounting #7

Freq. (Hertz)	Absorption Coefficients
125	.37
250	.56
500	.77
1000	.92
2000	.89
4000	.71
NRC	.80

Installation

Baffles and Lay-in Panels

Baffles—are suspended from wires or cables attached to structural members of the building. This system allows for quick, easy installation or replacement.

Calculations to determine suspension cable size and anchoring should be based on a weight of 8 lbs. per baffle. Slight differences in acoustical performance are obtained by varying the pattern of installation.

Lay-in Panels—may be cut for border applications or for pipe or conduit perforations. Simply cut the film with a knife or razor blade to provide an overlapping flap to cover board edges, then cut the board to size. The film is resealed using a Tedlar tape such as 3M No. 838.

These panels are installed in standard grid systems.

For further information on Armstrong Vertical Baffle Sound Absorbers, contact your Armstrong Representative.

CS-770-1281J

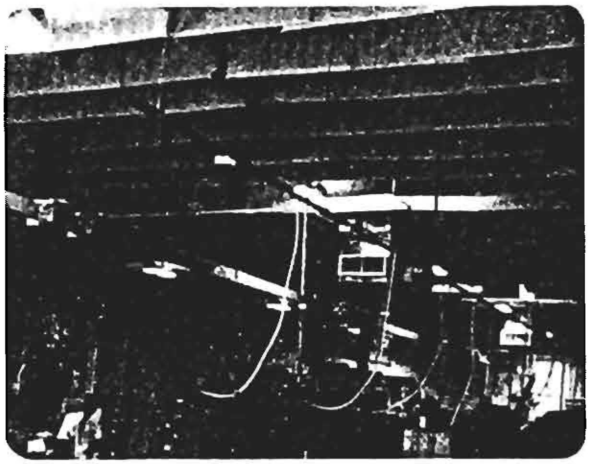
Printed in United States of America

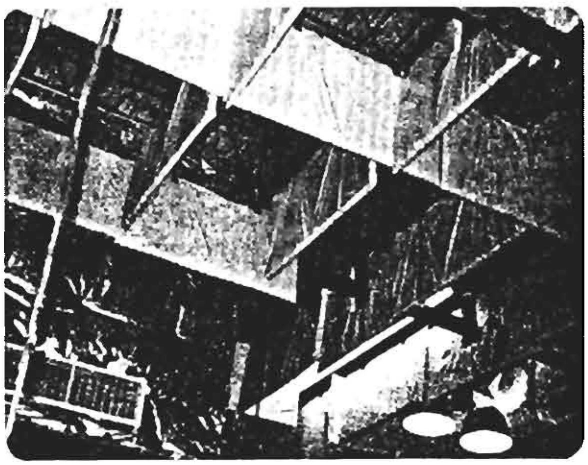
industrial noise control, inc.

CASE HISTORY

PUNCH PRESS BAFFLES
File No. 153

A successful noise control project requires proper planning, appropriate materials, and competent installation. This report represents a factual summary of a situation where we and our customer worked together to solve a noise problem.





The Problem:

Noise level in the press room of a manufacturer of electrical switch parts was consistently running at 95-96 dBa during punching operations. The level was considered to be hazardous for the workers.

Limitations:

The 18 presses, all contributing to the overall noise level in the room, were arranged close together and the operational scheme was such that enclosures or screens would be a "last resort" solution.

Solution:

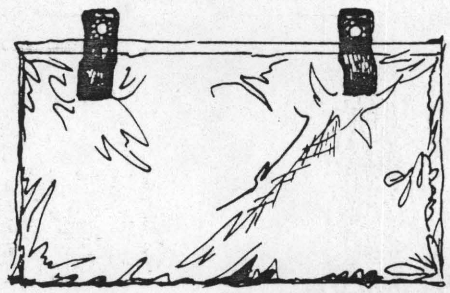
Since the floor, walls, and "ceiling" in the 110' x 58' x 20' high room were hard surfaces, it was decided that free hanging absorbers, hung from bar joists and perpendicular strung wires would have a substantial effect on the overall noise level with virtually no interference to the production scheme.

INC Type 24-T absorbers were hung, one per each 9.4 square foot of floor area (680 absorbers in all). They were hung in an egg-crate array to achieve proper installation density, ventilation, and appearance.

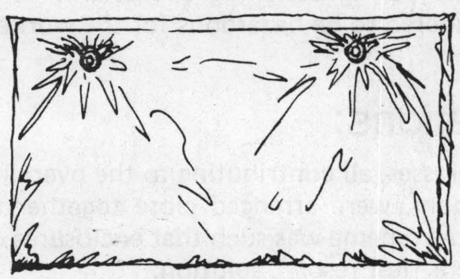
Measured Results:

Tabulation of reduction of 12 strategic points revealed a minimum of 4 dB reduction, maximum of 7 dB. The project was considered successful; worker exposure was well within OSHA reguations

About the Product:



24-T



24-G

BAFFLES ARE AVAILABLE WITH TABS OR GROMMETS.

The I.N.C. 24 Series absorber is a very efficient noise reducing device when used in specific situations. Those situations are generally where there are many noise sources in a factory area and much of the noise is being reflected from hard surfaces. It is generally not a good idea to hope for more than two or three dB overall reduction in a situation like this one but very often reductions are greater. In cases where four or five dB reduction would "solve the problem" it is usually practical to employ absorbers as a first step.

Free hanging absorbers are also very effective when used in conjunction with screens and partial enclosures or in just about any situation where noise is being reflected to other parts of an enclosed space.

The cost of the materials used on this particular job was approximately $2600.00. Installation costs will vary with specific circumstances.

Color photos available upon request.

The growth of INC since 1970 has been strictly in response to the need for noise control in industry. In essence, our customers have dictated the kinds of services and products we offer.

Consequently, it is highly probable that your specific needs for noise control match our capabilities.

PLANNING • SYSTEMS • MATERIALS • INSTALLATION

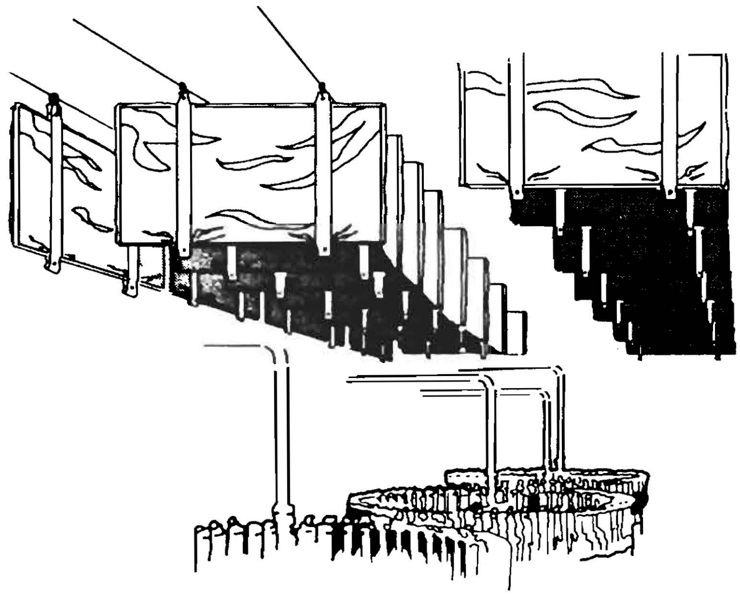
When noise pollution becomes your problem . . . make it ours©

INC

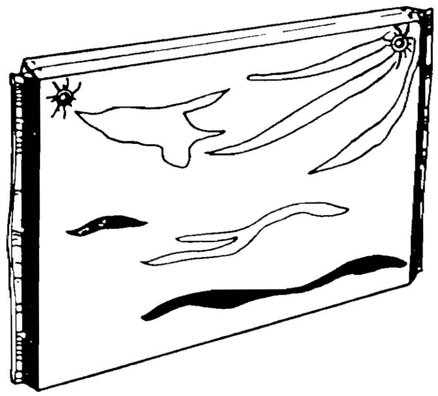
industrial noise control, inc.

AB-1000 NOISE ABSORBING BAFFLES

Safe, low cost baffles for industrial, commercial, school or institutional use with complete protective cover and non combustible media. Installation method and hardware for various ceiling and deck structure can be provided.



Food Can Fill Room

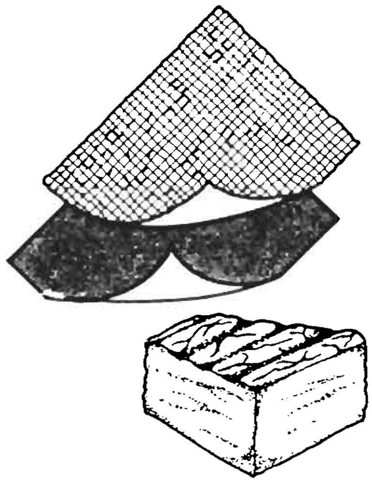


AB-1000 BAFFLE

– Firm, dense, media enclosed in plastic cover maintains shape therefore retaining absorption performance and good appearance.

– Noise absorption rating of media NRC = .90

Baffle installations can produce 4 to 6 db reduction; combined with barriers 10 to 18 db reduction can be achieved. We will evaluate your potential application and recommend use only when conditions dictate success.



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e can help select the optimum for your application.

- Flexible, weighted, barrier vinyls. A variety of weights, colors, strengths and fire ratings.
- Quilted Fiber Glass Absorbers. Bulk or fabricated panels. Also available in a composite with barrier.
- Vinyl/Foam and Lead/Foam composites.
- Damping Products: Compounds, sheets, pre-damped sheet metals for any damping application.
- Prefabricated Acoustical Panels.
- Accessories to apply materials including adhesives.

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