BEFORE THE POLLUTION CONTROL BOARD
OF THE STATE OF ILLINOIS

In The Matter Of the Petition Of	)
VAUGHAN & BUSHNELL MANUFACTURING CO.	) R83-32
for a Site Specific Operational Level, Pursuant to Chapter 8, Rule 206(d) of the Rules and Regulations of the Illinois Pollution Control Board	)

PETITION

TO: The Illinois Environmental Protection Agency and
The Illinois Pollution Control Board

Vaughan & Bushnell Manufacturing Co. (hereinafter "Petitioner"), by its attorneys Butler, Rubin, Newcomer, Saltarelli & Boyd, petitions the Pollution Control Board (hereinafter "Board") for a Site Specific Operational Level pursuant to Chapter 8, Rule 206(d) of the Illinois Pollution Control Board Rules & Regulations (hereinafter "IPCB Rules & Regs").

In support hereof, Petitioner states as follows:

I.
Identity of Petitioner

1. Petitioner is a corporation duly organized and existing under the laws of the State of Illinois, is authorized to do business in Illinois and maintains an office and manufacturing complex in Bushnell, Illinois.

II.
The Rules At Issue

2. On September 1, 1982 IPCB, Rules & Regs. Ch. 8, Rules 206(c) and (d) became effective pursuant to filing with the Secretary of State and prior action of both the Board and the Joint Committee on Administrative Rules. These Rules amend pre-existing rules of the Board governing the emission of impulsive sound emitted from impact forging operations. Pursuant to Rule 209(h), the Petitioner is required to either (i) comply with the prohibitions contained in Table 7 of Rule 206(c) no later than fifteen months following the effective date of the Rule, or (ii) seek a permanent Site Specific Operational Level. For the reasons set forth below, Petitioner herewith seeks a permanent Site Specific Operational Level for its impact forging operations in lieu of compliance with Table 7 of Rule 206(c).

III.
Rule 206(d)(2)(A)

The location of the Petitioner, a description of the surrounding community, and a map locating the Petitioner within the community.

3. The Petitioner is, and has been since 1940, located at Davis and Main Streets, Bushnell, Illinois. Petitioner's manufacturing complex covers approximately 3 square blocks; its operations are housed in several separate buildings.

4. The property surrounding the Petitioner is not zoned. The land to the north of Petitioner is generally commercial with some residential property to the northwest, to the west of Petitioner is the forging facility of C. S. Norcross & Sons Co., to

the east is a railroad line, commercial buildings and some residences, and to the south is light manufacturing. Petitioner first started its forge shop operations in 1940. Petitioner believes that all of the present residents living near the Petitioner purchased their properties after Petitioner began its forge shop operation and, as a consequence, acquired their land with knowledge of Petitioner's operations and at values that already reflect whatever disbenefits exist, if any, as a result of exposure to sound levels from the operations of Petitioner.

5. A map of the community with Petitioner's location identified is attached hereto as Exhibit A. A site plan layout with the location of the building containing impact forging hammers and other relevant operations of the Petitioner is attached hereto as Exhibit B.

IV.
Rule 206(d)(2)(B)

A description of the Petitioner's operations, the number and size of the Petitioner's forging hammers, the current hours of hammer operation, the approximate number of forgings manufactured during each of the three prior calendar years and the approximate number of hammer blows used to manufacture the forgings.

6. Forging is essentially a shaping process, accomplished through controlled plastic deformation which permanently alters the shape and internal structure of the materials used. The alteration improves the materials' mechanical properties and capabilities.

7. Petitioner forges different types of steel including C1070 and C1080, using "closed dies." The dies are two matched

blocks which have a pattern reflecting the piece to be forged. The metal is heated to nearly 2,400 degrees Farenheit, then inserted between the dies and pressure is applied. The pressure needed to shape the metal is supplied by the repeated impact of the upper die, which is fastened to a guided ram, falling or driven against the lower die, which is fastened to the anvil. The guided ram, the anvil and the machinery of which they are a part is commonly known as a forge hammer. The sound produced by the forge hammer is impulsive in nature and originates primarily from the impact between the upper die and the workpiece and lower die.

8. Petitioner's manufacturing complex produces different types of forgings ranging in size up to 4 pounds. The forgings are used by the construction, industrial, and hardware industries.

9. Petitioner employs 203 people. In 1982 Petitioner utilized raw materials and supplies costing $3,700,000, of which $1,500,000 or 45% was purchased in Illinois. In 1982 Petitioner paid $19,000 in property tax and $94,000 in unemployment tax.

10. The facility currently operates ten forging hammers, from 1,000 to 2,500 lbs. in size. They are housed in a single building identified as Building B-B on Exhibit B. The location of the individual forging hammers are identified on Exhibit C. The forging hammers currently operate from 6:00 a.m. to 1:30 a.m. 5-6 days per week. Historically, the hammers have operated 2 shifts, from 6:00 a.m. until 1:30 a.m. 5 or 6 days per week.

11. Below is a table which identifies the approximate number of forgings manufactured on hammers by Petitioner for each of the last three years, the approximate number of blows used to produce

the forgings manufactured on hammers and the weight of all forgings. As can be seen from the table, the number of parts manufactured on hammers has declined recently, as has the total number of blows and total tonnage. The decline in production is expected to end during 1983.

	No. of Forgings On Hammers	No. of Blows	Tonnage Of All Forgings
1980	2,700,000	21,600,000	2,050
1981	2,750,000	22,000,000	2,150
1982	1,880,000	15,040,000	1,800

V.
Rule 206(d)(2)(C)

A description of any existing sound abatement measure.

12. In order to appreciate the difficulty of designing and implementing abatement measures at Petitioner's facility, it is first necessary to understand the manner in which Petitioner's forge plant is constructed and operated, since these conditions preclude technically effective and economically reasonable noise control measures.

13. Petitioner's forging hammers are located in a building that was constructed 65 years ago. The building's lower levels are composed principally of brick and steel door panels with windows covered with plywood at the upper levels. The roof is composed of wood sheeting covered with tar paper.

The building houses 10 furnaces which impose a tremendous ventilation requirement on the building. The individual furnaces

can heat up to 1/4 ton of steel per hour to a temperature of nearly 2,400 degrees Farenheit and release heat at a rate of 1.2 million BTU's per hour. The building has been designed to utilize the "stack effect" for natural ventilation; this is an economical and highly reliable air circulation system. However, ventilation essential to a safe operation, especially during summer months, necessitates that virtually the entire perimeter be open in order to generate sufficient air flow to the work area. Thermal convection currents created by the air heated around the furnaces induces the cooler outside air to enter through the many ground level openings. The heated air then exits through the roof openings.

14. The impulsive sound generated by the forging hammers -- persisting for approximately 100 milliseconds -- is also emitted through the many building openings. Thus there is a relationship between adequate and necessary ventilation and sound emitted to the environment.

15. In addition to the ventilation demands there are other factors which impact on abatement strategies; these include structural limitations and space requirements. For example, sound absorptive wall treatments and mechanical ventilation cannot be placed on walls or roofs, or hung from beams without altering the existing load-carrying capacities. (See Exhibit D attached hereto, a report from Petitioner's outside contractor on the structural limitations of the existing forge shop.) And barriers cannot be installed due to space limitations; on the east and south boundaries the facility butts up against a public thoroughfare (on the east) and a railroad (on the south).

16. Because of these limitations Petitioner has not implemented any physical changes at its facility which have had a positive impact on the impulsive sound emitted to the neighborhood. Petitioner has, however, supported the research conducted by the Forging Industry Education and Research Foundation which has, among other things, conducted research that may someday lead to less loud hammers.

VI.
Rule 206(d)(2)(D)

The sound levels in excess of those permitted by Table 7 emitted by the Petitioner into the community in 5 decibel increments measured in Leq, shown on the map of the community.

17. Table 7 permits the emission of impulsive sound to Class A receivers of up to 58.5 Leq during the daytime and 53.5 Leq during the nighttime. Exhibit A contains isopleths describing the estimated worst case emissions in 5 decibel increments derived from both actual Leq measurements and data taken in dB(A) (fast meter response). The data taken in dB(A) has been converted to Leq by deducting 8 dB; this conversion is based on actual measurements to determine the average difference between the two measurements at Petitioner's facility.

Exhibit A discloses that the estimated worst case emission measured at the closest Class A land is 65 Leq; however, this level is estimated to be nearly the limiting case and typically will vary downward, depending upon atmospheric conditions, particularly wind velocity and direction.

VII.
Rule 206(d)(2)(E)

The number of residences exposed to sound levels in excess of those permitted by Table 7.

18. The number of residences exposed to sound levels in excess of those permitted by Table 7, according to house counts made by Petitioner, includes approximately 50 residences potentially exposed to sound levels in excess of the night-time standard of 53.5 Leq. This is the theoretical maximum number of residences exposed to levels exceeding Table 7 during the typical limiting case; however, the limiting case is unlikely to occur simultaneously at all residences impacted by the facility since the limiting case for each residence is dependent on atmospheric conditions which are antithetical to producing the limiting case at other residences. For example, when the wind blows from the east to the west, the residences to the east of the facility will be exposed to levels of sound lower than the limiting case, while those to the west may be exposed to levels approaching the limiting case.

19. Petitioner has received no complaints regarding its impact forging operations.

VIII.
Rule 206(d)(2)(F)

A description of other significant sources of noise (mobile and stationary) and their location shown on the map of the community.

20. There are several significant mobile and stationary sources of noise operating near Petitioner. The mobile noise sources include street traffic and main line railroads of Burlington Northern and TP&W cross along east and south plant boundaries.

The principal stationary sources are C. S. Norcross & Sons, another forging facility located within one block of Petitioner and continuous blower noise from Lauhoff Grain Company facility located approximately 500 feet to the south east.

21. Each of the significant sources of noise is shown on Exhibit A, which is the map of the community.

IX.
Rule 206(d)(2)(G)

A description of the proposed operational level and proposed physical abatement measures, if any, a schedule for their implementation and their costs.

22. Because of the inability to significantly abate the impact sound emitted by the facility Petitioner cannot alter existing community sound levels while continuing to operate. Because of the absence of any need for abatement and the community's satisfaction with Petitioner's operations, Petitioner does not propose to implement any further impact sound abatement measures, nor does it propose to limit its productive capacity or further alter its normal hours of operation. Petitioner proposes to operate its ten hammers up to 6 days a week, from 6:00 a.m. until 1:30 a.m.

X.
Rule 206(d)(2)(H)

The predicted improvement in community sound levels as a result of implementation of the proposed abatement measures.

23. Because of Petitioner's inability to significantly abate the impact sound emitted by its facility, the absence of any need for such abatement and the community's satisfaction with

Petitioner's operations, Petitioner will not alter existing community sound levels.

XI.
Rule 206(d)(2)(I)

A description of the economic and technical considerations which justify the permanent site specific allowable operational level sought by Petitioner.

24. In determining the properly allowable operational level for Petitioner the Board must remember that (i) the community surrounding Petitioner essentially grew up with Petitioner already established and as active or more active than today; (ii) there have been no members of the community who have complained about Petitioner's hammer operations; and (iii) there is no adverse impact on the community's health as a result of the emission of sound from Petitioner's hammer operations. This is the context in which the Board must necessarily review the economic and technical considerations which impact upon the operational level sought by Petitioner.

25. The technical and physical considerations, or limitations, which impact on the proper operational level for Petitioner include (i) there is no available method of controlling sound from forging hammers at the source; (ii) the building which houses the forging hammers is old, and cannot accommodate significant sound abatement measures without structural alteration; (iii) the furnaces housed along with the hammers create an enormous demand for ventilation; (iv) sound escapes from the buildings through the same openings as the masses of ventilation air used to cool employees; (v) space within and around the buildings is very limited and effective

noise barriers are not feasible; for all of the foregoing reasons environmental noise control at Petitioner is not practical.

26. The last conclusion is especially significant; there is no solution that will work at Petitioner within the realm of economic reasonableness. This includes completely enclosing the shop, since no one in the United States has yet demonstrated a working, completely enclosed renovated forge shop using mechanical ventilation and Petitioner seriously doubts that anyone will do so. Aside from the staggering costs and the absence of demonstrated need for such drastic measures, Petitioner is skeptical that employees will work under such conditions. Even under optimal operating conditions, with the maximum number of grade level doors and windows open, there are summer days when the employees work half shifts or refuse to work at all because of heat stress. Employees of forge shops who testified before the Board in the R76-14 hearings uniformly stated they did not believe they could or would work in a closed environment (see, e.g., R76-14, Feb. 23, 1981, Grabinski, pp.270-74; and Lamore, pp.429-31).

27. Consequently, there is (i) no practical, simple, economically reasonable solution to abating the sound emitted by Petitioner and (ii) the only potentially effective abatement measure -- reconstructing and closing the hammer shops using mechanical ventilation -- is technically untried, unreasonably expensive under any economic circumstances, unacceptable to affected employees and unnecessary.

28. Therefore the proposed operational level described in paragraph 22 is the only reasonable or justified solution to the

economic and technical considerations impinging on the Petitioner's operations.

Respectfully submitted,

VAUGHAN & BUSHNELL MANUFACTURING CO.

By: James I. Rubin
One Of Its Attorneys

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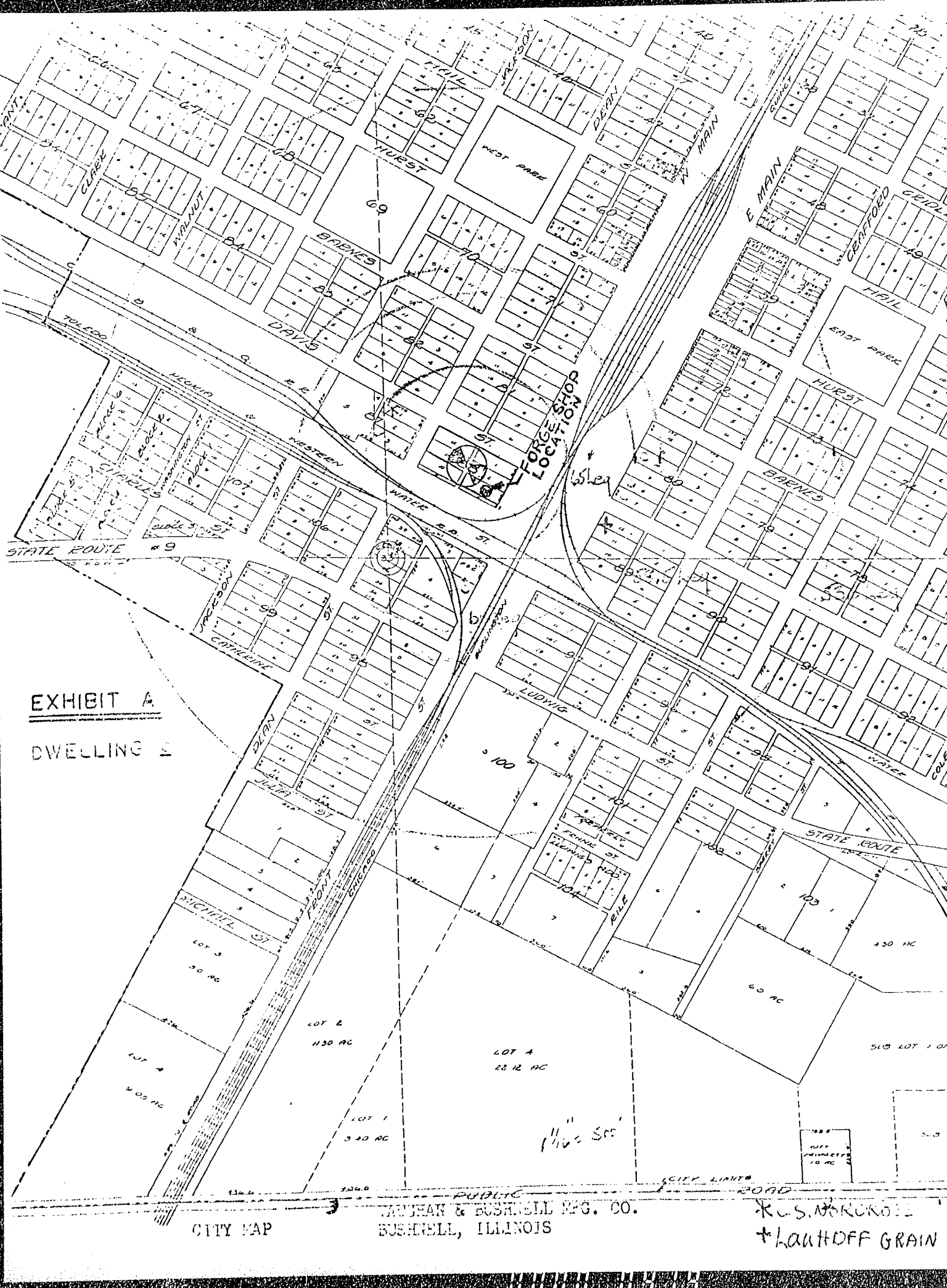

CITY MAP

JAUHEAN & BUSHNELL MFG. CO.
BUSHNELL, ILLINOIS

*C.S. NORCROSS
+LAUHOFF GRAIN

EXHIBIT B

REV LTR	DATE	MADE BY / CKD. BY	CHANGE

LIMITS UNLESS OTHERWISE NOTED:
FRACTIONAL ± 1/64; ANGULAR ± ½°
DECIMALS: THREE PLACE ± .005; TWO PLACE ± .010

V&B

VAUGHAN & BUSHNELL MFG. CO.
BUSHNELL, ILL.

TITLE
MAIN PLANT

SCALE 1/10" = 1'
TRACED FOR SIG By A.L. SMITH
DATE 9-28-63
APPR. BY
MATERIAL

FL-129

#6
800#

#5
2,500#

#4
2,000#

EXHIBIT C

VAUGHAN & BUSHNELL MFG. CO. BUSHNELL, ILL.			
TITLE: FORGE SHOP			
SCALE: 1/10" = 1'	CKD. BY	DR. BY J. FREBURG	
DATE: 9-29-83	APPD. BY	SHEET	OF
MATERIAL:		REV.	DRAWING NUMBER FL-129

LIMITS UNLESS OTHERWISE NOTED:
FRACTIONAL ± 1/64; ANGULAR ± ½°
DECIMALS: THREE PLACE ± .005; TWO PLACE ± .010

Exhibit D

CHADCO CONSTRUCTION COMPANY

The Dependable Builder

1311 WEST JACKSON MACOMB, IL 61455 309/833-2430

November 14, 1983

Mr. Don Crowl, Vice President
Vaughan & Bushnell Mfg. Co.
201 W. Main St.
Bushnell, IL 61422

Dear Mr. Crowl

Pursuant to your request, we have visited your plant on November 14, 1983, to investigate the structural condition of the roof system over the forge shop.

We understand that this building was constructed between 1915 and 1920 for use other than a forge shop by the previous owners. We can only assume that foundations, primary framing, and roof structures were designed for approximately 20 lbs. per sq. ft. live load capacity, and that douglas fir was used for wood roof frame and sheathing. The building presently has built-up asphalt roofing. Additional dead loads, such as motor support frames and vents, have been applied to the roof system since it was new.

The normal aging process as well as continued high temperature (up to 170°) at the roof has most certainly reduced the load capabilities. This is quite obvious from a visual observation of the sheathing and framing.

In view of the above, it is our considered opinion that no additional loads should be applied to this roof system.

Also, due to years of vibration caused by the drop hammers and again the heat factor, we do not feel that additional loads should be applied to the masonry walls.

The above opinions are based on my training as a graduate of Bradley University '51, and approximately 33 years of construction experience, 22 of which were with Hummel Construction Co. of Bushnell, IL. Throughout this time, I have been personally involved with many maintenance, repair and remodel projects at your plant and am throughly familar with the reference building.

We trust this is the information you require. If you have any questions or need more information, please let us know.

Yours very truly,
CHADCO CONSTRUCTION CO., INC.

James M. Lantz

JML/kal

James M. Lantz, A.I.C.
Executive Vice President

CERTIFICATE OF SERVICE

I, JAMES I. RUBIN, certify that I have this day served by first-class mail (postage prepaid) a copy of Vaughan & Bushnell Manufacturing Company Petition upon the following persons:

Illinois Pollution Control Board
309 West Washington Street
Suite 300
Chicago, Illinois 60606

Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62702

James I. Rubin

November 21, 1983