

BEFORE THE POLLUTION CONTROL BOARD
OF THE STATE OF ILLINOIS

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No.

POLLUTION CONTROL BOARD
R83-25

In The Matter Of the Petition Of)
)
)
CLIFFORD-JACOBS FORGING CO.)
)
)
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

Clifford-Jacobs Forging Co. (hereinafter "Petitioner"),
by its attorneys Butler, Rubin, Newcomer, Saltarelli & Boyd,
petition 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 Champaign, 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 1923, located in a rural area in Champaign, Illinois. Petitioner's manufacturing complex covers approximately 32 acres; its operations are housed in several separate buildings.

4. Most of the property surrounding the Petitioner is zoned for heavy industry. North and directly west of Petitioner is farmland, east is industrial property including the ICG Railroad, south of Petitioner is industrial property, including the A. E. Staley Soybean Mill and southwest of Petitioner is some residential property. When Petitioner first constructed its forge shop in 1923 the surrounding property was either vacant or used for farmland with the exception of the ICG Railroad. Over the decades the property has

been gradually developed. The few residents living near the Petitioner have, 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 carbon and alloyed steel and a small amount of stainless steel using "closed dies." The dies are two matched blocks which have a particular pattern cut out of them. The metal is heated to nearly 2350 degrees Fahrenheit, 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 and 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 many different types of forgings ranging in size up to 700 pounds. Petitioner manufactures forgings for the off-highway equipment, construction, mining and material handling, aircraft and oil field equipment industries.

9. Petitioner employs approximately 240 people. In 1982 the operations utilized raw materials and supplies costing \$10,254,530. In 1982 Petitioner paid \$69,205 in property tax and \$40,627 in unemployment tax.

10. The facility currently operates fourteen steam-driven forging hammers, ranging in size from 1,500 lbs. to 25,000 lbs. They are housed in a single building identified as Building 1 on Exhibit B. The location of the individual forging hammers are identified on Exhibit C. The forging hammers currently operate from 7:00 a.m. to 3:00 p.m. five days per week. Historically (during normal economic conditions), the hammers have operated two shifts, between 6:00 a.m. and 11:00 p.m. five days per week, and occasionally on Saturdays.

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 stabilize during 1983.

	<u>No. of Forgings On Hammers</u>	<u>No. of Blows</u>	<u>Tonnage Of All Forgings</u>
1980	670,000	9,447,000	12,838
1981	580,000	8,178,000	12,536
1982	286,000	4,032,600	6,556

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 sixty years ago. The building's lower levels are composed principally of corrugated sheet metal, windows, roll-open doors approximately 10 feet high and supporting steel. The upper level consists of a roof monitor with windows and ventilators that run the length of the building.

The building houses furnaces which impose a tremendous ventilation requirement on the building. The individual furnaces can heat up to 3 1/2 tons of steel per hour to a temperature of nearly 2350 degrees Fahrenheit. 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 (the windows and roll-open doors) be open in order to generate sufficient air flow to the work area. Thermal convection currents created by the air heated around the furnaces induce the cooler outside air to enter through the many ground level openings. The heated air then exits through the roof monitor windows and ventilators.

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. Fortunately, Petitioner's new offices were constructed as an addition to the building which houses the hammers; the offices are between the hammers and the single residential area, so that the sound emitted by Petitioner is largely directed towards the north, east and west when the building is open.

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 engineers on the structural limitations of the existing forge shop.) Moreover ordinary acoustical barriers are ineffective when the receiver is downwind of the barrier and the forge shop.

16. Because of these limitations Petitioner has not achieved compliance with the regulatory limitations. Petitioner has, however, extended the existing buildings surrounding the forge shop in an attempt to shield the sound emitted to the neighborhood. Petitioner has also implemented a program to upgrade the steam hammer discharge mufflers to provide meaningful noise reduction at nearby residences. In addition, Petitioner has 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 7dB; 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 emissions measured at the closest Class A land is 65 Leq. 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 depends on whether the Petitioner operates during nighttime hours. Currently the Petitioner operates between 7:00 a.m. and 3:00 p.m. -- which does not include nighttime hours. Historically, Petitioner has operated two (2) shifts ranging from 8 to 10 hours per shift. This would be deemed to be nighttime operations whenever night hammer operations continue for more than 16 hours in a 24 hour period.

19. There are, according to house counts made by Petitioner, 66 residences consisting of houses and trailers potentially exposed to sound levels in excess of 53.5 Leq. This is the theoretical maximum number of residences exposed to levels exceeding Table 7 during the typical limiting case. 20. Petitioner has never received a single complaint about its hammer impact sound associated with the forging operations from any of the local residents.

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.

21. There is both a significant source of mobile noise and a stationary source of noise operating near Petitioner. The mobile noise source is the ICG Railroad. The stationary source is the A. E. Staley Soybean Mill.

22. 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.

23. Because of the inability to economically and realistically abate the impact sound emitted by the facility (see paragraph 26) 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 alter its normal hours of operation. Petitioner proposes to operate its fourteen hammers six days per week, from 6:00 a.m. until 11:00 p.m. Monday through Saturday.

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

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

24. Because of Petitioner's inability to economically and realistically 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.

25. In determining the properly allowable operational level for Petitioner the Board must remember that (i) the community surrounding Petitioner grew up with Petitioner already established and as active or more active than today; (ii) there have not been any members of the community who have complained about the hammer impact sound emitted by Petitioner's 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.

26. 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 forge shop building through the same openings as the masses of ventilation air used to cool employees; (v) space within and around the forge shop building is limited; (vi) additional acoustical noise barriers would have no significant effect on hammer noise emission to the nearby residences under prevailing weather conditions; (vii) noise barriers are only effective at distances greater than 250 ft. if the atmosphere is homogeneous (no wind or temperature gradients), a condition that seldom exists; (viii) at distances greater than approximately 250 feet from the hammer shop, weather conditions dominate the forge hammer sound propagation with or without the existence of noise barriers; (ix) weather conditions cause the forge hammer sound level to vary 1-2 dBA per 100 feet of distance (i.e., 17 dB at 1,000 feet); and (x) for all of the foregoing reasons environmental noise control at Clifford-Jacobs is not practical.

27. 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

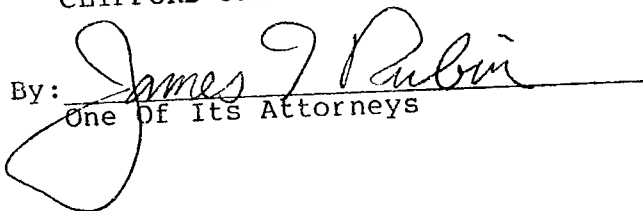
conditions, with the maximum number of grade level doors and windows open, there are summer days when the employees work half shifts or refuse to work at all because of heat stress. Employees of forge shops who testified before the Board in the R76-14 hearings uniformly stated they did not believe they 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).

28. 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.

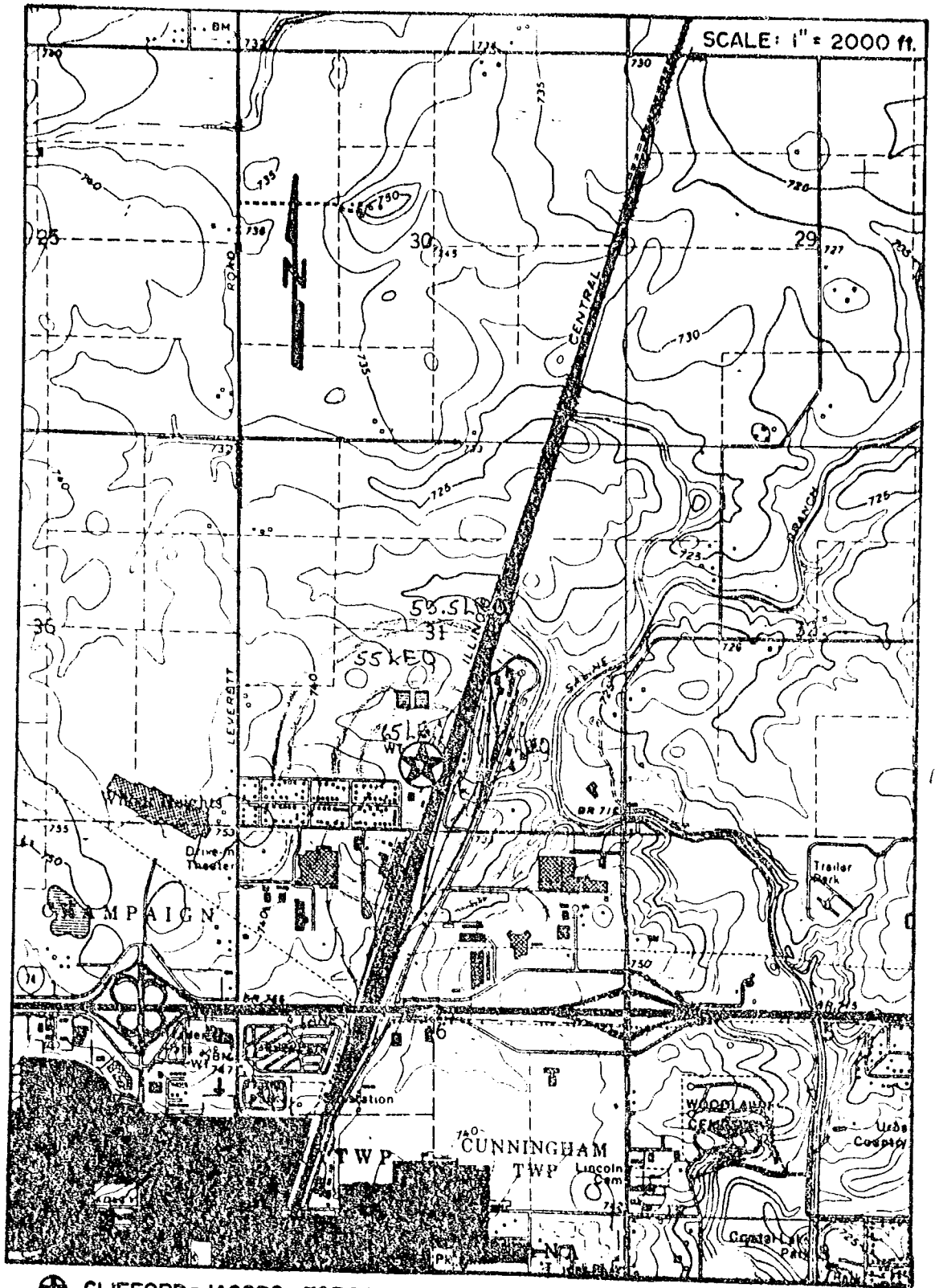
29. Therefore the proposed operational level described in paragraph 23 is the only reasonable or justified solution to the economic and technical considerations impinging on the Petitioner's operations.

Respectfully submitted,

CLIFFORD-JACOBS FORGING CO.

By: 
One Of Its Attorneys

James I. Rubin
BUTLER, RUBIN, NEWCOMER,
SALTARELLI & BOYD
Suite 1505
Three First National Plaza
Chicago, Illinois 60602
(312) 444-9660



CLIFFORD-JACOBS FORGING COMPANY

EXHIBIT "A"
 CLIFFORD-JACOBS PLANT LOCATION

RESTAURANT
PARKING

5" S.P. GAS
5" S.C.I.

5" S.C.I.

"EXHIBIT B"

PLANT SITE
CLIFFORD-JACOBS FORGING CO
CHAMPAIGN ILLINOIS
SEC 31 - TWP 20 N - R 9 E 3rd PM
SCALE 1" TO 50'

BUILDING DIRECTORY
11-BRICKSHED

MAIN BUILDING

SECTION LINE

2000 2266

OFFICE

(13)

18S
FURN

16N
FURN

16'0"

15'3"

19'

NO. 16 HAM NO. 16P

220

9'0"

NO. 16P

15'3"

11'2"

44'6"

NO. 15 HAM

NO. 16P

NO. 20P

13'0"

16'

18S
FURN

10'6"

15N
FURN

NO. 20P

220

15'3"

16'3"

16'0"

15'3"

(14)

EXHIBIT "C"

CLIFFORD-JACOBS FORGING CO.
CHAMPAIGN, ILLINOIS

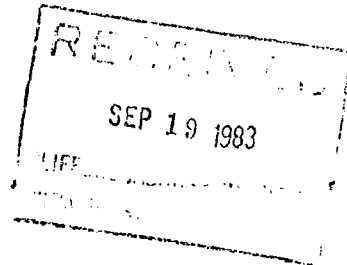
FORGE PRODUCTION SHOP EQUIPMENT

DRAWN 1-24-74 / RCE

APPROVED:
SCALE: 1"=10'

HOLLMAN ENGINEERING
4774 REDBUD CT. DECATUR, ILL. 62526
(217) 877-3177

September 16, 1983



Clifford-Jacobs Forging Co.
P. O. Box 757
Champaign, IL 61820

Attention: Mr. Brent Beazly

Re: Forge Shop Structural
Steel Stress Analysis

Gentlemen:

As directed by you, we have made an Engineering Analysis of the trusses and columns in the referenced structure, in the area of Hammer #14.

This structure was originally fabricated by Mississippi Valley Structural Steel Co., Decatur, IL - probably about 1926. A lean-to addition was also fabricated by Mississippi Valley Structural Steel Co., in approximately 1972.

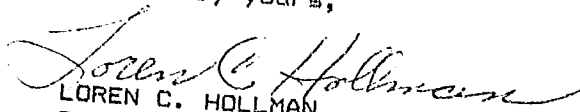
Based on our calculations, this Engineer recommends that no additional load be added to this structure. To add additional stresses in the main building columns, in particular, cannot be justified by calculations. Some secondary members obviously also would need to be replaced or reinforced. Evaluation of these secondary members cannot be completed until detailed information is available on how the proposed units would attach to these secondary members.

Our evaluation was based on material having a minimum yield strength of 30,000 Pounds Per Square Inch. This is based on American Society of Testing Material (ASTM) Specification A7 or A9, as adopted in 1923. This specification was in effect until 1931.

The evaluation was made using current specifications of The American Institute of Steel Construction. Wind and snow loads were based on the recommendations of the Boca Basic Building Code/1981.

As a matter of record, Mississippi Valley Structural Steel Co., was purchased by Bristol Steel and Iron Works, Inc., in 1978. The name has since been changed to Bristol Steel Corporation. The Decatur, IL Facility is presently no longer in operation. The writer of this letter was the former Chief Engineer at the Decatur, IL Facility of Bristol Steel Corporation.

Very truly yours,



LOREN C. HOLLMAN
Registered Structural Engineer

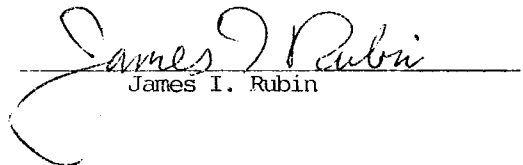
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CERTIFICATE OF SERVICE

I, JAMES I. RUBIN, certify that I have this day served by first-class mail (postage prepaid) a copy of the Clifford-Jacobs Forging Company Petition with Exhibits upon the following persons:

Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62702

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


James I. Rubin

November 10, 1983

BUTLER, RUBIN, NEWCOMER & SALTARELLI

BEFORE THE POLLUTION CONTROL BOARD
OF THE STATE OF ILLINOIS

In The Matter Of the Petition Of

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BUTLER, RUBIN, NEWCOMER & SALTARELLI
A PARTNERSHIP OF PROFESSIONAL CORPORATIONS
THREE FIRST NATIONAL PLAZA - SUITE 1505
CHICAGO, ILLINOIS 60602
TELEPHONE (312) 444-9660
