

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

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JUN 02 2014

IN THE MATTER OF: )  
 )  
PROPOSAL OF CLIFFORD-JACOBS FORGING CO. )  
FOR AN AMENDMENT TO THE SITE-SPECIFIC )  
RULE AT 35 ILL. ADM. CODE 901.119 )

R2014- 22

STATE OF ILLINOIS  
Pollution Control Board



ORIGINAL

PROPOSAL FOR AMENDMENT TO 35 ILL. ADM. CODE 901.119

NOW COMES Clifford-Jacobs Forging Co. ("Clifford-Jacobs" or "Clifford-Jacobs") by its attorneys, Webber & Thies, P.C., and pursuant to 415 ILCS 5/28(a) of the Illinois Environmental Protection Act ["Act"] and Subpart B of Part 102 of the Pollution Control Board's Procedural Rules (35 Ill. Adm. Code 102.200 *et seq.*), hereby requests that the Pollution Control Board ("Board") amend the site-specific rule found at 35 Ill. Adm. Code Section 901.119 regarding the Clifford-Jacobs Operational Level to authorize an increase in the maximum hours of operation. This Proposal is supported by the information which follows:

INTRODUCTION AND BACKGROUND

Clifford-Jacobs is an Illinois Corporation which maintains an office and manufacturing complex in Champaign County, Illinois. Its manufacturing complex currently includes ten steam-driven forging hammers, ranging in size from 1,500 lbs. to 25,000 lbs.

In 1985, the Board adopted a site-specific "Operational Level" for Clifford-Jacobs' forging hammers [R83-25] in the form of a site-specific rule, 35 Ill. Adm. Code Section 901.119. That rule, which has been unchanged since 1985, authorizes Clifford-Jacobs to operate its forging hammers only between the hours of 6:00 a.m. and 11:00 p.m., Monday through Saturday. Clifford-Jacobs now wishes to be able to increase its maximum allowable hours of operation by an additional seven hours a day, so as to allow it to operate up to three shifts and/or adapt its hours of operation to accommodate fluctuations in demand and enhance worker safety during warm summer days.

PROPOSAL

- A. *The Language of the Proposed Site-specific Rule, Including Any Existing Regulatory Language Proposed to Be Amended or Repealed.* [Rules 102.202(a) and 102.210(a)]

The hours of operation for Clifford-Jacobs are set forth at 35 Ill. Adm. Section 901.119. Clifford-Jacobs requests that section be amended as shown below, utilizing the Board's conventions, i.e., with proposed additions shown by underlining and proposed deletions indicated by striking:

35 Ill. Adm. Section 901.119 Clifford-Jacobs Operational Level

Clifford-Jacobs Forging Company and future owners of the forging facility located at North Market Street, Champaign, Illinois, shall comply with the following site-specific operational level:

- a) Operate no more than fourteen hammers at any one time; and
- b) Operate its forging hammers ~~only between the hours of 6:00 a.m. and 11:00 p.m.~~ up to 24 hours per day, Monday through Saturday.

(Source: Added at 9 Ill. Reg. 7149, effective May 7, 1985; Amended at \_\_\_ Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_, 201\_)

- B. *Description of Clifford-Jacobs's Operations, and the Area Affected by the Proposed Change, including the Character of Surrounding Land Uses and Zoning Classifications.* [Rules 102.202(b) and 102.210(d)]

In order to provide the broadest possible understanding of its operational history and physical plant, including the practical considerations limiting available noise abatement methodologies, Clifford-Jacobs requests that the Board incorporate the record of its previous site-specific rulemaking proceedings relating to Clifford-Jacobs (R83-25, In the Matter Of: Clifford-Jacobs Forging Company Petition for a Site-specific Operational Level Pursuant to 35 Ill. Adm. Code 901.105(d)).

Clifford-Jacobs's manufacturing complex covers approximately 32 acres and its operations are housed in several separate buildings. A site plan map showing the location of those buildings and other struc-

tures and features within the facility is attached hereto as **Exhibit A**. A single large building, designated as Building 4 in Exhibit A, houses the forging hammers. For perspective, an aerial view of the area surrounding the facility is attached as **Exhibit B**.

Clifford-Jacobs manufactures forged metal products used in the construction, mining, forestry, energy, railway, and aerospace industries. Using solid steel bars, billets and ingots of sizes ranging from 5 to 800 pounds, Clifford-Jacobs uses forging hammers to cause the material to change shape while in the solid state. This is a different process than casting, by which metal is melted and poured into a mold in a molten state. Forging offers uniformity of composition and structure, and strengthens the resulting steel product, particularly in terms of impact toughness.

Forging employs a combination of heat and pressure. First, the metal to be shaped is heated to almost 2,350 degrees Fahrenheit in furnaces situated near the forging hammers. Then, the heated metal is placed into a forging hammer for shaping.

Each forging hammer uses "closed dies", which are two matched blocks with the desired pattern formed inside each block; one of the matched blocks is situated on a stationary "anvil" while the other block is situated within a guided ram or "hammer" suspended above the stationary block. When the "hammer" is activated, the dies are repeatedly driven together and the heated metal is forced under intense pressure to assume the desired shape. The sound produced by the forge hammer is impulsive in nature and mostly results from the impact of the upper die upon the piece being forged (which rests upon the lower die).

Clifford-Jacobs currently employs approximately 108 people, with an annual payroll of approximately \$3,021,750.00 *for the forging operation alone* [i.e., this figure does not include secretarial or

managerial personnel]. In 2012, Clifford-Jacobs purchased from local vendors raw materials and supplies costing over \$2,360,000.00, and paid over \$770,000.00 in local and state property taxes, payroll taxes, *etc.*

The forging hammers employed by Clifford-Jacobs are steam driven, and are by necessity situated in close proximity to the furnaces required to heat the work pieces to be forged. These furnaces are also located in Building 4. The location of each forging hammer and furnace within Building 4 is shown in **Exhibit C**.

One or more of the Clifford-Jacobs forging hammers currently operate from 7 a.m. to 3 p.m., 5 days a week. When economic conditions allow, Clifton-Jacobs has operated two shifts, between 6:00 a.m. and 11:00 p.m., Monday through Saturday, consistent with its current authorized Operational Level pursuant to 35 Ill. Adm. Code 901.119. It should be noted that in virtually no event are all of the hammers in the facility in operation at the same time; each hammer is only suited for production of a certain range of products. Thus, if a product being manufactured requires the use of a 6,000 lb. hammer, for instance, only the two 6,000 lb. hammers in place at Clifford-Jacobs would be suitable for use; the larger or smaller hammers would either be idled or employed on other projects, depending on the availability of qualified operators, customer demands, *etc.*

Clifford-Jacobs has occupied the same location, an unincorporated area north of the City of Champaign, since 1923. Most of the property surrounding the Clifford-Jacobs facility is zoned for heavy industry. North and directly west of the northern portion of the facility is farmland, while east of the facility is a large freight switching yard operated by the Canadian National Railway (formerly the Illinois Central Gulf [ICG] Railroad). South of the facility is industrial property, including the A.E. Staley soybean mill. Southwest of the facility is an



unincorporated residential area known as Wilber [a/k/a "Wilbur"] Heights. Since at least 1973, Wilber Heights has been zoned for heavy-to-light industry [with the portion immediately adjoining Clifford-Jacobs zoned I-2 (Heavy Industry), and the portion west of that zoned I-1 (Light Industry)]. When Clifford-Jacobs first constructed its forging facility in 1923, all the surrounding property was either vacant or used for farmland, except for the ICG Railroad yard to the east. The residences located in Wilber Heights were built on or after 1928, primarily by or for workers from Clifford-Jacobs. Hence, the residents living in Wilber Heights acquired their property and/or built their homes with knowledge of Clifford-Jacobs's presence and operations.

Since, as noted above, the entire Wilber Heights area is zoned for industrial uses, the existing residences are "grandfathered" in as non-conforming uses, which means that the rebuilding of or substantial repair to any residence within Wilber Heights is prohibited. This has led to a gradual reduction in the number of Wilber Heights properties still in use as residences. In addition, some properties which still appear to be residences are in fact owned or used by businesses or employees of businesses in the area (see Exhibit D, Page 1).

C. *The Reasons Supporting the Proposal, Including Information Pertaining to Existing Physical Conditions, the Character of the Area affected, the Purpose and Effect of the Proposal, and Environmental, Technical and Economic Justification for the Proposal.*  
[Section 27(a) of the Act; Rules 102.202(b) and 102.210(d)]

For a good portion of the last several decades, Clifford-Jacobs experienced declining production [See R83-25, Proposed Opinion and Order of the Board, First Notice, page 2] and employment. In recent years, however, Clifford-Jacobs has enjoyed somewhat of a resurgence in demand for its high-quality products. However, the nature of its industry is subject to substantial demand fluctuations, depending on the state of the nation's overall economy, the rise and fall of specific industries

served by Clifford-Jacobs, and the worldwide demand for forged metal products. In order to ensure its viability in a wildly fluctuating competitive market, Clifford-Jacobs must be able to readily expand its production capabilities in order to timely meet the demands of the marketplace. This can be accomplished either by (1) adding additional hammer mills at a new location, (2) outsourcing production to other suppliers, many of which are located in other countries, or (3) enabling increased production at its Champaign plant utilizing its existing equipment.

The first option, after allowing for site acquisition, design and construction, would require a prohibitively expensive capital investment, take years to come to fruition, and naturally favors lower-cost foreign locations, to the economic detriment of Champaign County and the State of Illinois. The second option would present quality control and assurance problems and also deprive Champaign County and the State of Illinois of well-paying jobs and significant income and property tax revenues. The third option, which is the subject of this Proposal, is to increase the allowable hours of operation such that Clifford-Jacobs could employ a third shift as would enable the facility to operate up to 24 hours per day, six days a week. Importantly, this option also would allow Clifford-Jacobs, in accordance with its collective bargaining agreements, to enhance worker safety and comfort during hot summer days by altering the starting and ending hours of each shift so as to switch operations away from the hottest hours of the workday.

Enabling Clifford-Jacobs to add a third shift and additional day to its operations would also enable the hiring of approximately 72 additional persons to work in its Champaign facility to meet periods of increased demand for its products. The average Clifford-Jacobs forging worker earns approximately \$23.74 per hr.

Building 4, which houses Clifford-Jacobs's forging hammers and furnaces, was constructed almost 90 years ago. The design and location of that building well suits its use, considering the twin needs of both dissipating heat and protecting the equipment.

The building's lower levels are composed mainly of steel supports clad in corrugated sheet metal, with openings for windows and large roll-open doors ten feet in height, able to accommodate service and materials-handling vehicles. The upper levels of the building feature a peaked roof monitor with windows and ventilators running the length of the building. The forge shop portion of the building occupies 25,500 square feet, and at its largest dimension is sixty feet wide and over 300 feet long. The building reaches approximately 45 feet in height at its highest point.

The sixteen furnaces within Building 4 impose a substantial ventilation requirement on the building. These furnaces can heat up to 3.5 tons of steel per hour to temperatures approaching 2400 degrees Fahrenheit. The building was thus designed to provide a "stack effect" for natural ventilation, by which thermal convection currents created by the furnaces rise to and through the windows and ventilators on the roof monitor, while drawing cooler outside air into the building through the windows and doors at ground level (the latter being approximately 10 feet high). This time-tested system works very well but, in order to generate sufficient air flow to ensure safe operation in the work area, requires that the aforesaid doors and windows at ground level be kept open for much of the year, particularly during the warm summer months.

The necessity for keeping the Building 4 ground floor doors and windows open (again, in order to maintain adequate ventilation) means that the impulsive sounds generated by the forging hammers cannot be confined to the interior or immediate environs of Building 4. However, the sound release towards Wilber Heights is buffered somewhat by another

large building on the Clifford-Jacobs grounds to the west of Building 4. This building houses Clifford-Jacobs' Inspection and Die Storage operations, and is designated as Building 5 on **Exhibit A**. Moreover, an office addition to the southern portion of Building 4 also lies between the forging areas of Building 4 and the Wilber Heights area to the southwest [See **Exhibit A**]. The result is that much of the impulsive sounds are generally directed to the non-residential areas to the east, north and west of Building 4, rather than towards The Wilber Heights area, which lies to the southwest.

Clifford-Jacobs has employed Schomer & Associates, Inc. ("Schomer") to assess the current and anticipated noise (acoustical) impact of Clifford-Jacobs's hammer mill operations and to investigate and assess the feasibility of various sound control options. The complete report by Schomer is attached hereto as **Exhibit D**. In summary, Schomer has concluded that there are no viable economically reasonable, technically feasible measures available to Clifford-Jacobs at this time to substantially reduce noise emissions (See **Exhibit 5**, pages 3-4). This is due in part to the nature of forging itself, in part to the physical limitations and necessary design parameters of Building 4, and in part to the heavily-industrialized character of the area in which Clifford-Jacobs is located. In addition, Schomer has determined that free-standing acoustical barriers would not be efficacious with respect to the residential/commercial areas to the southwest of Building 4 (See **Exhibit 5**, pages 2 and 4). In particular, Schomer has noted that even attempts to investigate alternative means of mitigating noise were frustrated by the noises emanating from the railroad marshaling yard (see **Exhibit 5**, page 3). The other noise sources in the area, and especially the ICG Railroad freight yard, are much more widely dis-



persed, pronounced and prolonged than the impulsive sounds generated by Clifford-Jacobs within Building 4.

As noted by Schomer in his report [Exhibit D, page 1], there were at one time as many as 66 residences, including houses and mobile homes, located in the small (4 blocks long by 2 blocks wide) Wilber Heights area to the southwest of the Clifford-Jacobs facility forges. For the reasons noted above, the number of residences in this industrial zoned neighborhood is gradually declining. Dr. Schomer specifically identifies the remaining residences as would be expected to be exposed to sound levels in excess of those permitted during night time hours in the event the instant Proposal is granted [Exhibit D, Figure F]. Dr. Schomer also identifies several other commercial and industrial properties within Wilber Heights itself which are from time to time potentially significant noise sources, including properties used for a concrete plant and warehouse, a recycling center, and a portable toilet rental business [see Exhibit D, Table 3 (page 6) and Annex B (pages B2-B3)]. Finally, the Eastern Prairie Fire Protection District fire station occupies the southeastern corner of Wilbur Heights.

Significantly, although Clifford-Jacob operations are already authorized by Section 901.119 to operate after 10:00 p.m., which under some circumstances would be defined as "nighttime hours" for purposes of 35 Ill. Adm. Code 901.105(a)(2), Clifford-Jacobs has never received a single complaint about its hammer forging sounds from any of the local residents or any of its commercial or industrial neighbors. It is apparent that area residents have for a variety of reasons over a lengthy period of time factored in and accepted Clifford-Jacobs' presence and activities in the vicinity.

In addition, Clifford-Jacobs enjoys the backing of the larger Champaign County community, which obviously appreciates the contributions made by Clifford-Jacobs to the economic well-being of the entire

area. This is evidenced by the tangible expressions of support for this Proposal embodied in **Group Exhibit E**, by and on behalf of diverse community interests, including Jon Reichard, President, A & R Mechanical Contractors, Inc.; Ron Stanley, District 8 Business Representative, International Association of Machinists and Aerospace Workers; Wilber Heights residents Jack and Ann Gaines; Senator Michael Frerichs and Representative Chad D. Hays.

D. **Synopsis of Testimony to be Presented at Hearing.** [Rule 102.202(c)]

As set forth in his report (**Exhibit D**), Dr. Paul Schomer will testify regarding his review and assessment of the current and proposed noise impacts of Clifford-Jacobs's operations and the treatment and control options available to Clifford-Jacobs which are technically feasible and economically reasonable. He will testify, *inter alia*, that at present there are no further reasonably viable options available to Clifford-Jacobs.

Jason Ray is Clifford-Jacobs' General Manager. He will testify regarding Clifford-Jacobs' operations, history, financial resources and limitations, its economic impact on the community, the present state of the forging industry, and the currently anticipated drivers for expanded hours of operation of the Champaign County facility.

George Martz, Facilities Manager for Clifford-Jacobs, will testify regarding the technical aspects of current forging operations at Clifford-Jacobs, including specific sources of noise, the current noise reduction technologies and features in place, and the relative costs and feasibility of available noise-control options.

Laura Weis, President and Chief Executive Officer, Champaign County Chamber of Commerce, is expected to testify regarding the valuable contributions made by Clifford-Jacobs to the economic well-being of the area.

Craig Rost, Executive Director of the Champaign County Economic Development Corporation, is expected to testify regarding the history of the industrial area occupied by Clifford-Jacobs and the economic significance of Clifford-Jacobs to the business community of Champaign County.

**E. A Descriptive Title or other Description of any Published Study or Research Report.** [Rules 102.202(e) and 102.210(c)]

No published study or research report was utilized by Clifford-Jacobs in developing this proposed amendment to the rule except and to the limited extent referenced or incorporated by Dr. Schomer in his report [Exhibit D].

**F. Statement of Most Recent Version of the Rule.** [Rule 102.202(i)]

The proposed amendment amends the most recent version of the rule as published on the Board's web site and verified by the Clerk.

**G. Consistency with Federal Law.** [Rule 102.210(e)]

There are no applicable federal laws or regulations which limit the Board's adoption of the proposed amendment.

**H. 200 signature Requirement.** [Rule 102.202(g)]

Clifford-Jacobs respectfully requests that the Board waive the signature requirement pursuant to 415 ILCS 5/28(a) of the Illinois Environmental Protection Act ["Act"] and 35 Ill. Adm. Code 102.410(d). See the separate Motion to Waive Requirement for 200 Signatures which accompanies this Proposal.

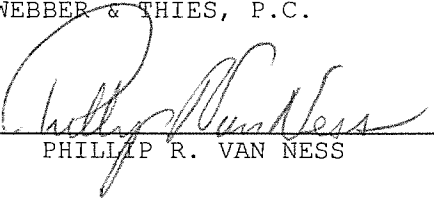
WHEREFORE, Clifford-Jacobs respectfully requests the Board to amend the site-specific rule found at 35 Ill. Adm. Code Section 901.119 regarding the Clifford-Jacobs Operational Level to authorize an increase

in the maximum hours of operation as prayed herein.

RESPECTFULLY SUBMITTED,

CLIFFORD-JACOBS FORGING CO.,  
BY: WEBBER & THIES, P.C.

BY:



PHILLIP R. VAN NESS

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CLIFFORD-JACOBS\PROPOSAL FOR AMENDMENT-R2014- PCB

THIS FILING IS SUBMITTED ON RECYCLED PAPER



BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF: )  
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PROPOSAL OF CLIFFORD-JACOBS FORGING CO. ) R2014-  
FOR AN AMENDMENT TO THE SITE-SPECIFIC )  
RULE AT 35 ILL. ADM. CODE 901.119 )

**LIST OF EXHIBITS**

- Exhibit A: Clifford-Jacobs Facility Site Plan Map
- Exhibit B: Google Aerial View of Clifford-Jacobs Facility and Environs [2012]
- Exhibit C: Map of the Forge Shop Area of Building 4
- Exhibit D: Noise Assessment and Feasibility Report by Schomer and Associates, Inc.
- Exhibit E: Group Exhibit: Expressions of Support from the Community
- Jon Reichard, President, A & R Mechanical Contractors, Inc.
  - Mr. & Mrs. Jack Gaines
  - Ron Stanley, District 8 Business Representative, International Association of Machinists and Aerospace Workers
  - Senator Michael Frerichs, 52<sup>nd</sup> District
  - Rep. Chad D. Hays, 104<sup>th</sup> District

**THIS FILING IS SUBMITTED ON RECYCLED PAPER**

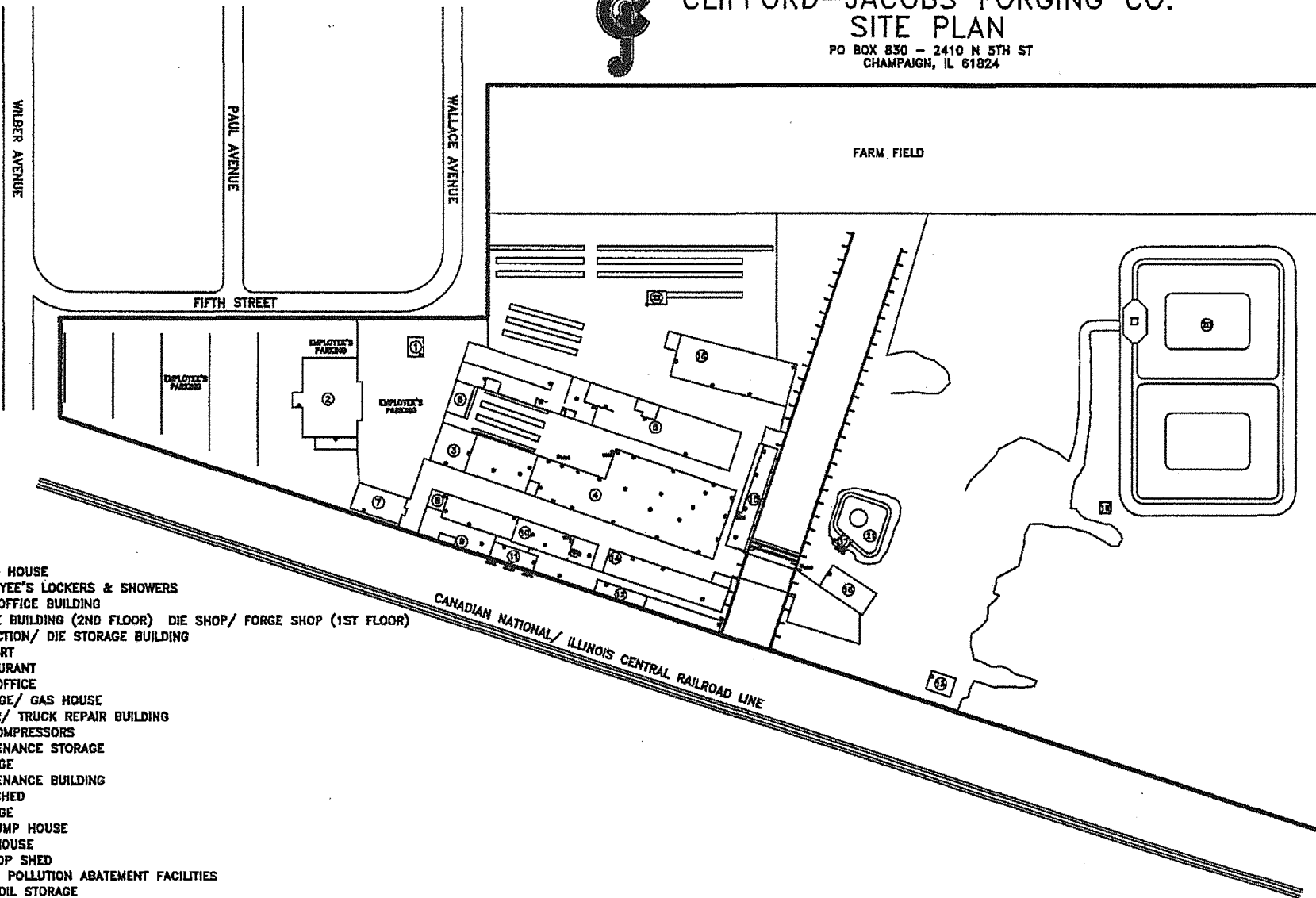
**EXHIBIT A**

CLIFFORD-JACOBS FACILITY SITE PLAN MAP



CLIFFORD-JACOBS FORGING CO.  
SITE PLAN

PO BOX 830 - 2410 N 5TH ST  
CHAMPAIGN, IL 61824



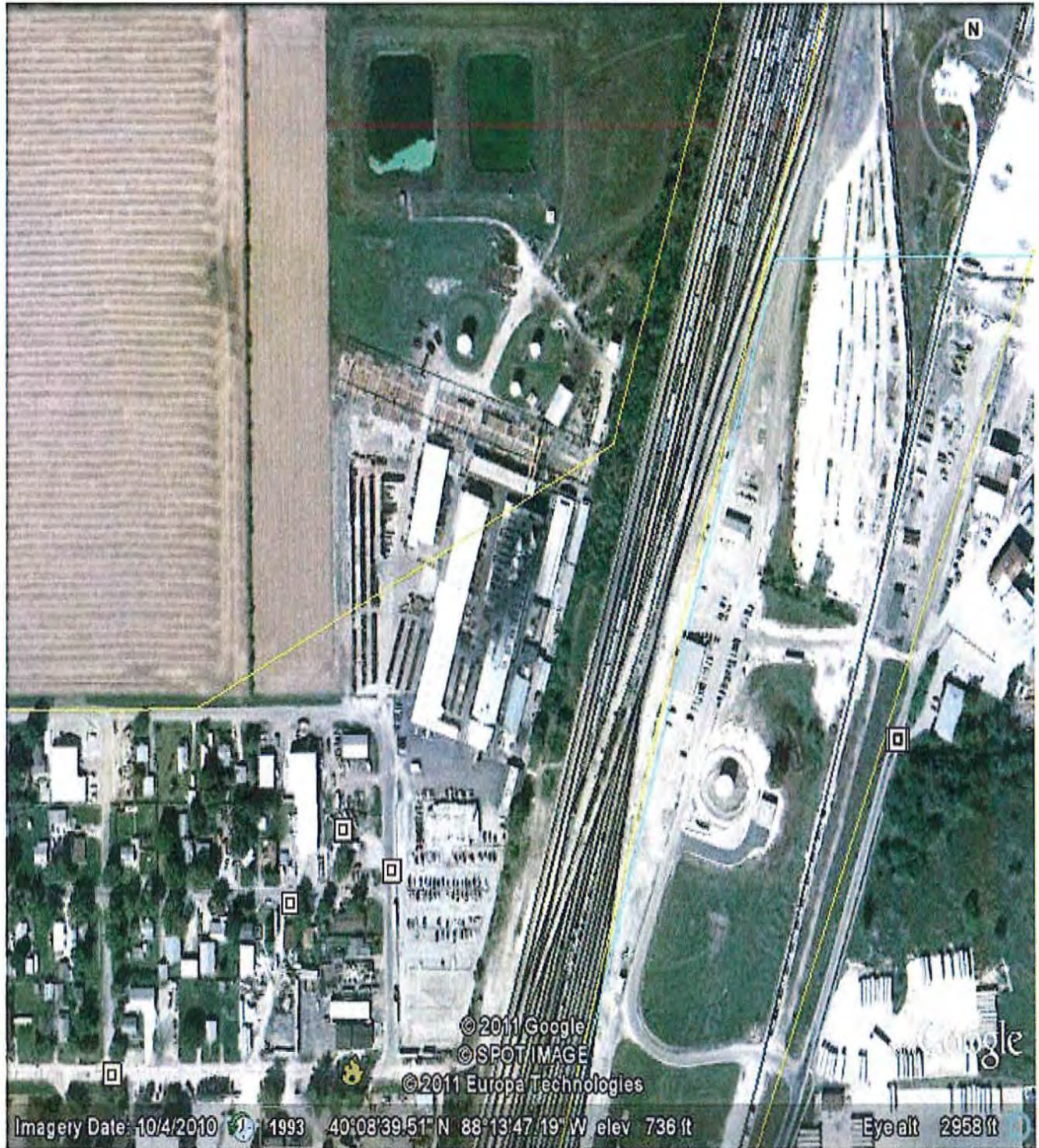
- ① GUARD HOUSE
- ② EMPLOYEE'S LOCKERS & SHOWERS
- ③ MAIN OFFICE BUILDING
- ④ OFFICE BUILDING (2ND FLOOR) DIE SHOP/ FORGE SHOP (1ST FLOOR)
- ⑤ INSPECTION/ DIE STORAGE BUILDING
- ⑥ CARPORT
- ⑦ RESTAURANT
- ⑧ TIME OFFICE
- ⑨ STORAGE/ GAS HOUSE
- ⑩ BOILER/ TRUCK REPAIR BUILDING
- ⑪ AIR COMPRESSORS
- ⑫ MAINTENANCE STORAGE
- ⑬ STORAGE
- ⑭ MAINTENANCE BUILDING
- ⑮ SAW SHED
- ⑯ STORAGE
- ⑰ OIL PUMP HOUSE
- ⑱ WAREHOUSE
- ⑲ OIL MOP SHED
- ⑳ WATER POLLUTION ABATEMENT FACILITIES
- ㉑ FUEL OIL STORAGE
- ㉒ GAS HOUSE

**EXHIBIT B**

AERIAL VIEW/MAP OF CLIFFORD-JACOBS FACILITY AND ENVIRONS

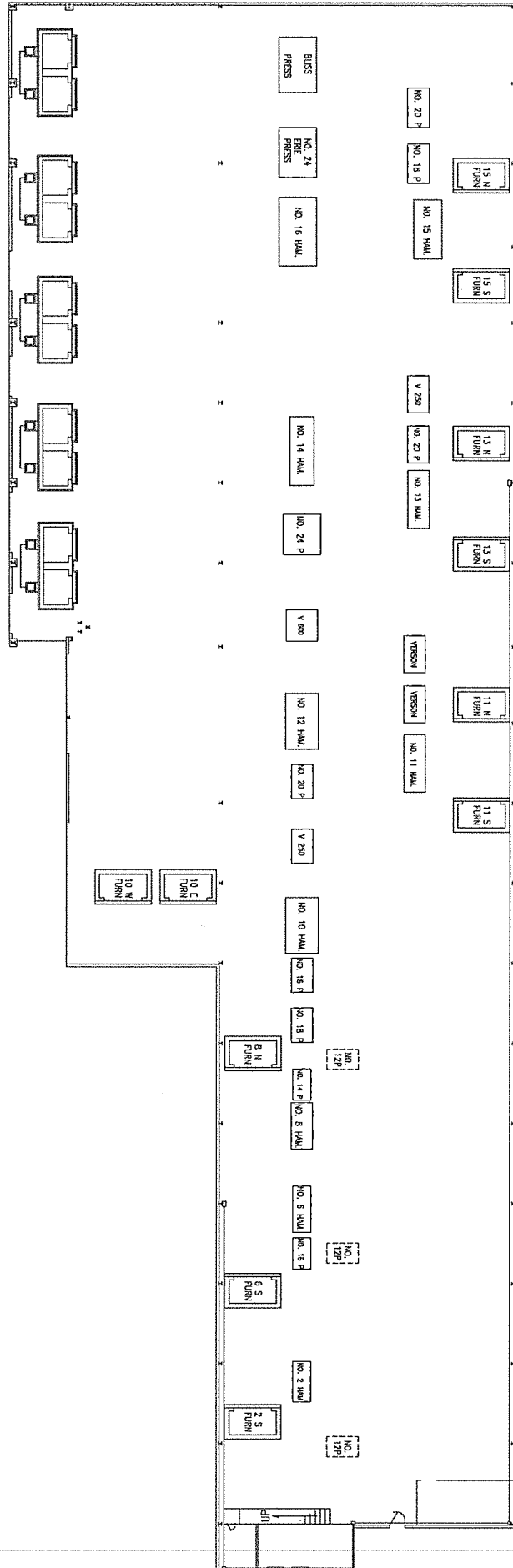


Exhibit B



**EXHIBIT C**

MAP OF THE FORGE SHOP AREA OF BUILDING 4



**EXHIBIT D**

NOISE ASSESSMENT AND FEASIBILITY REPORT BY  
SCHOMER AND ASSOCIATES, INC.

# SCHOMER AND ASSOCIATES, INC.

Consultants in Acoustics and Noise Control

## Noise Assessment and Feasibility Report

May 12, 2014

**Paul Schomer, Ph.D., P.E.**

**James Boyle**

**Schomer and Associates, Inc.**

**Champaign, IL 61821**



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# Noise Assessment and Feasibility Report

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

The Petitioner is, and has been since 1923, located in an industrial area in Champaign, Illinois. Petitioner's manufacturing complex covers approximately 22 acres; its operations are housed in several separate buildings.

Most of the property surrounding the Petitioner is zoned for heavy industry. North and directly west of Petitioner is farmland, north of the farm field (north and northwest of Petitioner) about 1600 ft is a new FedEx distribution center and other similar warehousing and trucking facilities that have been added in the last 10 to 20 years, east is industrial property, including the ICG Railroad (and east of the ICG Railroad there are warehousing facilities and a quarry), south of Petitioner is the remains of the A.E. Staley Soybean Mill, west and southwest of Petitioner is a mix of industrial, commercial and residential property; all of the residential property is located within an area zoned for heavy to light industry. This particular area is the largest industrial area in all of Champaign County. 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 residents living near the Petitioner (representing 54 residences) 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 and other noise sources in the area. Champaign County passed its current zoning ordinance in 1973. The ordinance prohibits the rebuilding of or substantial repair to any home within the affected residential area [*"Wilber Heights: Neighborhood hangs on against the odds"*, *Champaign News-Gazette*, July 25, 2010].

A map of measurement locations used in the community is attached hereto as Figure A (page 8); a map of the community with Petitioner's location identified is attached hereto as Figure B (page 9); 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 Figure C (page 10). In Figure D (page 11), 54 residences in the immediate vicinity of the forge are marked. This number is down 12 residences from thirty years ago. For the most part, these twelve structures still exist but are used for commercial or industrial purposes rather than residential purposes. Also, it is our belief (from door-to-door surveying, the results of which are included in Annex B [Annex B1-B3]) that at least 6 houses, mainly in the eastern half of this residential zone, are actually owned by businesses or employees of businesses in the area. Figure E (page 12) is a noise contour map showing the existing 58.5 dB daytime limit contour and contours in 5 dB increments above the limit (only the 63.5 dB contour is relevant in this case). Affected



residences are marked on Figure E (page 12) which shows that there are twelve houses used as residences that are in excess of 58.5 dB, and two of these are at or in excess of 63.5 dB.

## **B. A description of any existing sound abatement measure.**

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.

Petitioner's forging hammers are located in buildings that were constructed approximately ninety years ago. The buildings' lower levels are composed principally of corrugated sheet metal, windows, roll-open doors that are approximately 10 feet high, and steel to support the walls, windows and doors. 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 3.5 tons of steel per hour to a temperature of approximately 2400 degrees Fahrenheit. The building has been designed to utilize the "stack effect" for natural ventilation; this is an economical and highly reliable circulation system. However, ventilation, which is 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.

The impulsive sound generated by the forging hammers – persisting for approximately 100 ms – 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 offices were constructed as an addition to the building which houses the hammers; the offices are between the hammers and the single residential area to the west of petitioner (the only residential area near to petitioner), such that the sound emitted by Petitioner is largely directed towards the north, east, and west when the building is open—i.e., away from the residences.

In addition to the ventilation demands, there are other factors which impact abatement strategies, including 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 Figure G [page 14] 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.

Because of these limitations Petitioner has not achieved compliance with the generally applicable impact forging noise limitations of 35 Ill. Adm. Code 901.105. As early as 1972, Petitioner

began correspondence with Kittell Muffler & Engineering, a company that could supply Petitioner with exhaust silencers. In July, 1972, Petitioner ordered two silencers from Kittell Muffler, and ordered six more in August, 1972. In 1975, Petitioner ordered its ninth silencer from Kittell Muffler. Petitioner eventually found the silencers purchased from Kittell Muffler to be of marginal effectiveness and prone to failure at a commercially unacceptable rate. In 1984, Petitioner revisited the possibility that improved silencers that will work without causing breakdowns could be purchased and installed, and so Petitioner implemented a program to upgrade the steam hammer discharge mufflers with exhaust silencers from Donaldson Company, Inc. Silencers were indeed purchased from Donaldson but ultimately most were not installed. Petitioner discovered that the silencers worked well to attenuate the noise--about 22 dB--but the few silencers that were installed experienced frequent and repeated breakage, and the use of the silencers was finally abandoned. It appeared to Petitioner at that time that commercially designed and built silencers were inadequate for the vibration and shock transmitted through Petitioner's exhaust vent piping. Despite having difficulties attenuating its acoustic emissions through the use of silencers, Petitioner has, at least, been able to extend the existing buildings surrounding the forge shop in an attempt to shield the sound emitted to the neighborhood.

We have also looked at the mitigation that might be achieved by relocating the vent stacks to the east side of the forge building's roof, away from the residences to the west, so as to achieve the barrier effect of the sloped roof peak. With regards to this relocation, we conducted measurements to the east of the forge building in order to simulate what might happen to the west of the forge building if the vents were moved to the east side. However, measurements on the east side were limited to long distances where the uncertainty would be high, or to sites close to the ICG Railroad marshaling yard. Measurements were made with a wind from the west of the hammers to see if there was any discernible benefit by such a movement of the vent pipes. As expected, the railroad marshaling yard activities made these measurements difficult and uncertain. Within the uncertainty of these measurements, it was not possible to conclude that the forge would be benefited in any way by relocating the vent pipes.

It is expected based upon observations of the noise at the site that the steam vent noise is only important on the perimeter of the housing area and not in the interior. In the interior, the barrier action of intervening structures becomes more important as frequency increases, so the high frequency steam venting sound is attenuated more than the impulse sound of the hammer. Theoretically, installation of silencers on the five largest hammers could provide improvements that vary with position in the community. Currently, when one listens to and measures the acoustic emissions from Petitioner, there is a very clear "boom-shis" sound that can be heard and measured at measurement sites along Wallace Ave. But this "shis" sound is not very evident in measurements we made in the interior of the community, i.e., at Sites 4, 5, and 6 (see Figure A [page 8]); the sound is only evident where there is direct propagation from the forge building to the receiving location. When there is an intervening barrier, it knocks out the relatively high frequency "shis" sound, so the improvement the forge could accrue from using silencers would occur primarily along Wallace Ave. and at the two houses along the west side of Sixth Street. We estimate this improvement to be 3 to 6 dB at those approximately eleven residences that are currently above the 53.5 dB limit and along either of these two streets. The three



westernmost houses along Wallace Ave above 53.5 dB (shown in blue in Figure A1 [page A6]) would drop below the 53.5 dB limit if the aforementioned silencers were installed, leaving 21 of 24 houses with noise immissions predicted to be in excess of the nighttime limit, and no change to the number of houses, which is 12 houses in excess of the less stringent daytime limit. But most of the 12 houses would see about a 3 dB improvement.

The use of exhaust silencers might be investigated in the future, but as it is now, the conclusion is that commercial silencers may not be adequate for the needs of Petitioner, and in terms of houses exceeding the nighttime criteria, three houses would be excluded from that group after the introduction of silencers.

One might also suppose that a sound wall, perhaps along the east side of 5th Street, might provide some noise reduction to the homes near 5th Street. However, this does not appear to be the case. First of all, barriers and noise walls work well only when they are close to the source or the receiver; the east side of 5th Street is close to neither. Second, much of the high-frequency "shis" sound is emitted from the vent pipes which are very high above ground--so high that no noise wall of reasonable height would even break the line-of-sight from the vent pipes to nearby homes. Therefore, a sound wall is not a viable option.

In addition to all of the above, 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 quieter hammers.

### **C. The [1-hour, A-weighted Leq] sound levels in excess of those permitted by subsection (c) emitted by the Petitioner into the community in 5 decibel increments measured in Leq, shown on the map of the community.<sup>1</sup>**

Annex A (pages A1 to A8) gives the present and proposed noise contours (before and after amendment to Petitioner's site-specific operational level) and describes measurements to develop the sound exposure level versus distance for the various hammers. This development of the sound exposure level versus distance process involved measurements at seven community locations. These locations are shown in Figure A (page 8) as control site, and Sites 1 through 6.

Subsection (c) permits the emission of impulsive sound to Class A receivers of up to 58.5 dB (A-weighted Leq) during the daytime and up to 53.5 dB (A-weighted Leq) during the nighttime. Figure E

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<sup>1</sup> When Petitioner was seeking an exemption thirty years ago, the limits that applied to then existing forges existed in a "Table 7" of the then current rules. The present procedures for obtaining a variance in the site-specific operational level refer to subsection (c) rather than "Table 7," and to be consistent, this document refers to subsection (c) of section 901.105 in the Illinois Pollution Control Board (IPCB) Rules, which sets the limits for drop forges existing prior to September 1, 1982, as 58.5 dB for daytime and 53.5 dB for nighttime. References are made throughout this document to the IPCB 58.5/53.5 dB 1-hour A-weighted Leq limits by the use of the term "subsection (c)".

(page 12) shows the 58.5 dB and 63.5 dB A-weighted Leq isopleths. Annex A (pages A1 to A8) describes measurements and analyses of the sound exposure level versus distance to the hammers, and measurements and analyses which allow modeling of the excess attenuation afforded by the rows of buildings in the area west-southwest of Petitioner.

Figure E (page 12) discloses that the estimated worst case emissions measured at the closest Class A land is 63.5 dB (A-weighted Leq), and about 65 dB at the control position. This control point level is estimated to be nearly the limiting case and the sound levels will vary upward, towards this limit, depending upon atmospheric conditions, particularly wind velocity and direction. Given that the housing is all west and southwest of Petitioner, an east wind--one of the most uncommon wind directions in this area--is required for the housing to be downwind of Petitioner.

Table 1 shows the maximum hourly output of each of the largest three hammers. The maximum hourly output when the three largest hammers operate simultaneously, however, is not the sum of their individual maximum hourly outputs because in reality, the probability of all three large hammers operating at 100% simultaneously for any period of time is vanishingly small. Based on historical patterns of usage, the more realistic 'worst case' scenario would arise when one of the three largest hammers is operating at 100% of capacity while the other two largest hammers are operating at approximately 50% of capacity. Under that scenario, the realistic worst case is calculated by taking the maximum per hour of any single hammer of the three largest hammers (25 klb, 20 klb, or 12 klb), plus 50% of the maximum of the other two largest hammers, and the maximum production level on all other hammers, all while assuming this condition transpires during a rather uncommon east wind (historically, the prevailing winds in the area are from the west/southwest and the north).

Table 1. The maximum output of the three largest hammers, provided by Petitioner

|                  | Maximum pieces per hour |
|------------------|-------------------------|
| 25,000 lb hammer | 60                      |
| 20,000 lb hammer | 70                      |
| 12,000 lb hammer | 100                     |

The foregoing rationale as to a realistic 'worst case' scenario is consistent with historical conditions confirmed by direct observations. Table A1 of Annex A (page A3) shows Petitioner's operational counts during various measurement periods as utilized by Schomer and Associates. In only 3 out of 13 hours of measurement did any of the three largest hammer counts exceed 50% of maximum output, and then only by a small number.

Table 2 shows three situations of one of the three largest hammers operating at 100% output with the other two operating at 50% output (as described above). In each case, the level rounded to the nearest whole decibel is 65 dB (A-weighted Leq) at the control point. These levels appear to be very consistent with the levels predicted 30 years ago.



Table 2. Three situations of production, with one of the three largest hammers at 100% production, the other two largest hammers at 50% production each, and the 6000 and 3000 hammers constant at 100% production.

| Situation  | Corresponding level (A-weighted Leq) |
|--|--------------------------------------|
| 25,000 lb hammer at 100% and 20,000 and 12,000 lb at 50% | 65 dB                                |
| 20,000 lb hammer at 100% and 25,000 and 12,000 lb at 50% | 65 dB                                |
| 12,000 lb hammer at 100% and 25,000 and 20,000 lb at 50% | 65 dB                                |

#### **D. The number of residences exposed to sound levels in excess of those permitted by subsection (c).**

Figure E (page 12) shows that there are twelve houses used as residences that are in excess of 58.5 dB (A-weighted Leq) and two of these are in excess of 63.5 dB (A-weighted Leq).

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

There are both significant mobile and stationary sources of noise operating near Petitioner. Each of the significant sources of noise is included in Annex B (pages B1 to B3). Table 3 below summarizes the results of Annex B. Basically, as noted in Annex A (page A2) under "Current Noise," the noise from other industry in the vicinity of CJF was so loud that we could not directly, accurately measure the sound emitted from CJF into the nearby community such as at the control position.

Table 3. Inventory of noise producing establishments in the vicinity of CJF

| Business Name                   | Primary noise-making hours and days          | Noise sources / Notes                                 |
|---------------------------------|--|---|
| Illini Recycling                | 4 AM to 6 PM, M-F, Sat.                      | Bobcat machinery, semi trucks, end-loader             |
| Gotta Potty                     | 4 AM to 6 PM, M-F, Sat.                      | Bobcat machinery, semi trucks, end-loader             |
| Stark Excavating                | 7 AM to 5:30 PM, M-F, Sat.                   | End-loaders, backhoes, excavators                     |
| Duce Construction               | 7 AM to 3:30 PM, M-F, Sat.                   | Backhoes, excavators, delivery trucks, concrete pumps |
| Sport Redi-Mix                  | 7 AM to 5:30 PM, M-F                         | Heavy machinery (end-loaders, etc.), trucks           |
| Associated Transfer and Storage | 7 AM to 5:30 PM, all week                    | Trucks and heavy machinery                            |
| Mickey's Linen                  | 4:30 AM to 6:30 AM, 1 PM to 4 PM, M,T, TH, F | Delivery vans, semi truck                             |
| Bushman Trucking                | 4 AM to 7 AM <sup>2</sup> , M-F              | Semi trucks   |
| ICG Railroad Marshaling Yard    | All days and times                           | Brake, wheel, engine, horn, and coupling noise, etc.  |

<sup>2</sup> 4 AM to 7 AM are the noisiest hours when all or most of the trucks are leaving. Trucks individually arrive at various times throughout the day.



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

There are no improvements that can be recommended at this time. The most we can recommend is that the use of silencers again be revisited by Petitioner in the future. It would be necessary for the supplier of such silencers to have successfully demonstrated another forge with a similar design to that of Petitioner's, at a cost commensurate to the removal of three houses from exceeding the nighttime limit. Theoretically, silencers can decrease the noise levels emitted by the forge, but there is no guarantee that these silencers will withstand the shock of Petitioner's forge's hammers. As noted above, installation of silencers on the five largest hammers will provide improvements, primarily to houses in direct line-of-sight to the forge--houses along Wallace Ave. or Sixth Street.

## **G. The sound levels in excess of those permitted by subsection (c) that will result from granting Petitioner an exception to their current site-specific operational level (shown in 5 decibel increments measured in Leq, shown on the map of the community)**

Figure F (page 13) shows three contours: the 53.5 dB nighttime limit and two contours in 5 dB increments above this limit (the 58.5 and 63.5 dB contours).

## **H. The number of residences that will be exposed to sound levels in excess of those permitted by subsection (c) if Petitioner is granted an exception to their current site-specific operational level**

Figure F (page 13) shows that there are 24 houses (blue, yellow, and green) used as residences that will be at or in excess of the 53.5 nighttime limit, and of these, 12 (yellow and green) will be at or in excess of 58.5 dB, and of those twelve, two (green) will be at or in excess of 63.5 dB.





Figure A. A map of community locations used for measurements



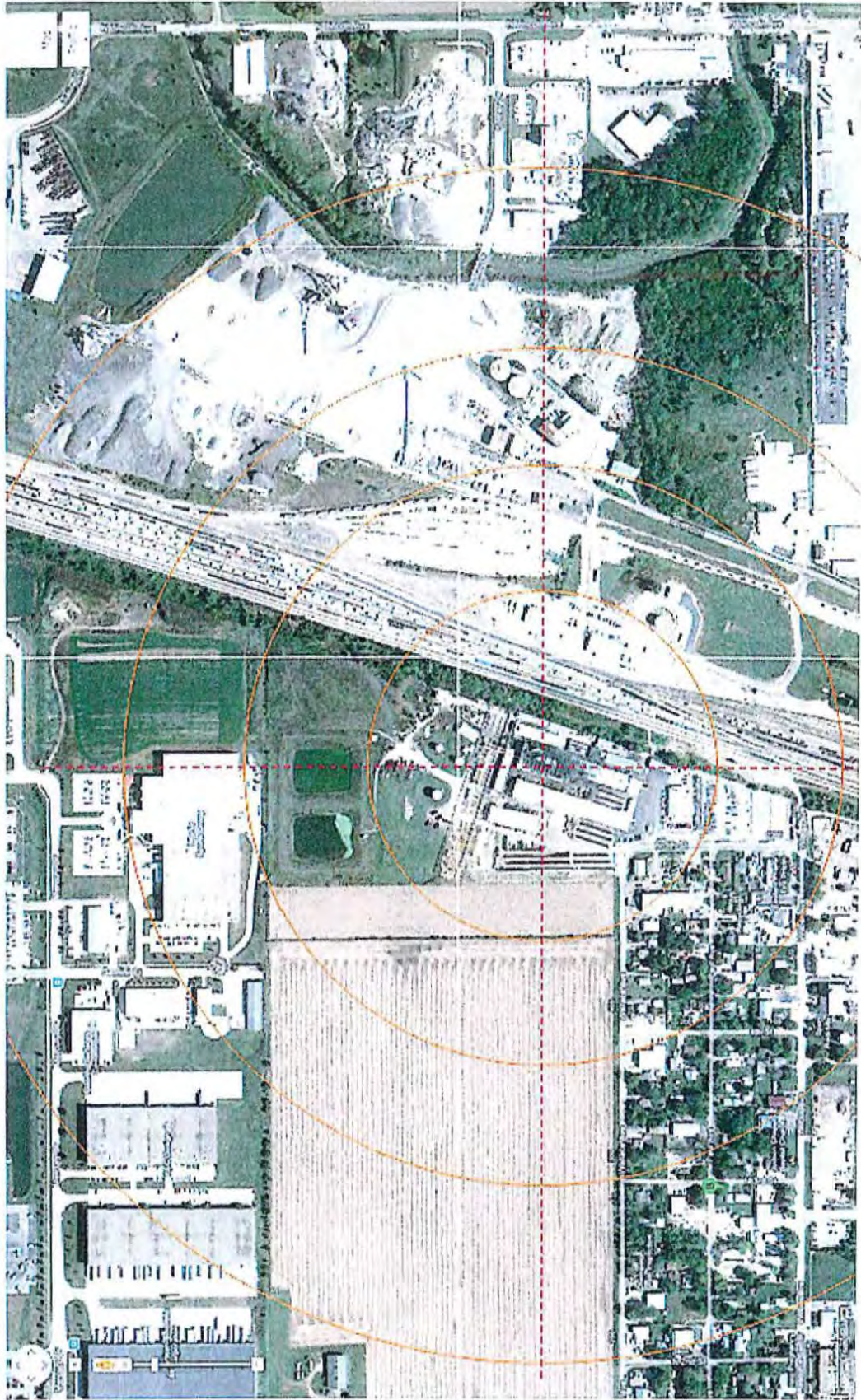


Figure B. A map showing Petitioner's location in the surrounding community





Figure C. A site layout with the location of the building containing impact forging hammers and other relevant operations of Petitioner. Below: a layout of Petitioner's facilities with its water treatment centers to the north. The black-roofed building contains all of the hammers.





Figure D. Map showing residences in the immediate vicinity of the forge





Figure E. A noise contour map showing the current 58.5 dB (A-weighted Leq) contour with affected residences marked; there are twelve houses used as residences that are in excess of 58.5 dB, and two of these are at or in excess of 63.5 dB (A-weighted Leq).





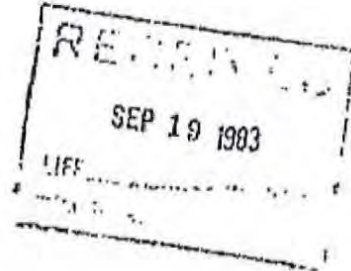
Figure F. If Petitioner's proposed operational levels go forth, 24 houses (blue, yellow, and green) used as residences will be at or in excess of the 53.5 dB (A-weighted Leq) nighttime limit, and of these, 12 (yellow and green) will be at or in excess of 58.5 dB (A-weighted Leq) daytime limit, and of those twelve, two (green) will be at or in excess of 63.5 dB (A-weighted Leq).



Exhibit G. A report from Petitioner's outside engineers on the structural limitations of the existing forge shop

**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.

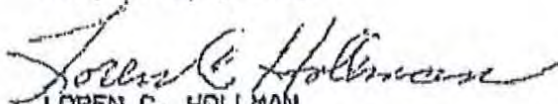
Based on our calculations, this Engineer recommends that no additional load be added to this structure. To add additional stresses in the main building columns, in particular, cannot be justified by calculations. Some secondary members obviously also would need to be replaced or reinforced. Evaluation 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

LCH:ef

## **ANNEX A: The Development of Present and Future Noise Contours**



# SCHOMER AND ASSOCIATES, INC.

Consultants in Acoustics and Noise Control

Paul D. Schomer, Ph.D., P.E.  
Member; Board Certified  
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## CURRENT AND PREDICTED FUTURE SOUND LEVELS GENERATED BY CJF OPERATIONS

July 15, 2012

This report deals with Phase 1, Phase 2, and Phase 3 as contained in the proposal dated January 5, 2012 prepared for Mr. Phillip Van Ness entitled: Proposed Noise Measurement, Analysis, and Possible Mitigation at Clifford Jacobs Forging Company. Specifically, this report deals with (Phase 1) assessment of the current noise in the nearby community, (Phase 2) an inventory of CJF noise sources and their emissions as a function of distance from CJF, and (Phase 3) prediction of the new noise situation that will result from the changes of operations at CJF. A discussion and results for each of these three topics are given sequentially below.

### CURRENT NOISE

It was contemplated for Phase 1 of the proposed plan that assessment of the current noise would be by direct measurement. This proposal contemplated background measurements prior to onset of CJF operations early in the morning (prior to 6 AM), and background measurements just after cessation of CJF operations in the night (after 11 PM). We have found that CJF does not actually begin until 7 AM with noise beginning at about 7:30 AM. This has proved to be too late in the morning to readily remove background noise from measurements. In the evening, CJF has only been operating one hammer, and operations of this hammer have ceased at various times, ranging from about 8:30 to 10:30 at night. Clearly, this too is inadequate for direct measurement. Thus, modeling is an integral part of the current noise assessment. We employ the same technique for the task required in Phase 3 for the new noise situation.

Specifically, our predictions are based on direct measurement combined with measurements for modeling purposes. We believe the direct measurements are systematically high because they include the sounds from other local businesses. This systematic corruption is greater the closer one gets to CJF because the nearby industries that make noise are concentrated near CJF. In contrast, we have a great deal of confidence in the measurements conducted to develop the models to predict CJF's noise output versus distance. The direct measurements were conducted on May 31, 2012, and June 13, 2012. Table A1 lists CJF's operations during these measurement periods. On May 31, we measured at what we term measurement Sites 1, 2, and 3. Each of these sites was along Wallace Avenue, on the north side of the street, in the grass midway between the street edge and the field. The first site was even with the peaked roof of Stark Excavating, just west of 4th Street, the second site was in line with the east edge of 3rd Street, and the third site was in line with the east edge of Second Street. During May 31 and June 13, we conducted the direct measurements as described above that proved to be corrupted by the noise from other sources in the vicinity of CJF. On June 5 and 6, and in the evening hours of June 13, we

conducted the sound exposure level measurements that are used for the modeling of the noise emitted by CJF. Table A2 contains the results of the modeling measurements on June 5, 6, and 13.

The propagation of sound, for the distances at which we measured, is very dependent on the change of wind velocity and direction with height, and on the change of temperature with height. Sound is substantially louder downwind or when there is a temperature inversion, such as occurs on clear or nearly clear nights with calm wind conditions. For all of our measurements, we were very careful to only measure when our receiving locations were downwind from CJF. Thus what we measure and predict is based on the worst-case noise propagation situation.

Table A1. CJF operations during the various measurement periods

|        |           | Hammer (number and pounds) |       |        |        |        | Total pieces |
|--------|-----------|----------------------------|-------|--------|--------|--------|--------------|
|        |           | 8                          | 10    | 12     | 14     | 16     |              |
| Date   | Time      | 3,000                      | 6,000 | 12,000 | 25,000 | 20,000 |              |
| 31-May | 0700-0800 | 0                          | 20    | 73     | 6      | 0      | 99           |
|        | 0800-0900 | 0                          | 39    | 40     | 7      | 41     | 127          |
|        | 0900-1000 | 0                          | 43    | 37     | 15     | 0      | 95           |
| 5-Jun  | 1800-1900 | 0                          | 0     | 0      | 8      | 0      | 8            |
|        | 1900-2000 | 0                          | 0     | 0      | 8      | 0      | 8            |
| 6-Jun  | 1700-1800 | 0                          | 0     | 0      | 29     | 0      | 29           |
|        | 1800-1900 | 0                          | 0     | 0      | 26     | 0      | 26           |
|        | 1900-2000 | 0                          | 0     | 0      | 30     | 0      | 30           |
| 13-Jun | 1130-1230 | 0                          | 0     | 0      | 0      | 0      | 0            |
|        | 1230-1330 | 0                          | 0     | 16     | 7      | 16     | 39           |
|        | 1330-1430 | 0                          | 0     | 0      | 28     | 17     | 45           |
|        | 1930-2030 | 0                          | 0     | 0      | 33     | 0      | 33           |
|        | 2030-2130 | 0                          | 0     | 0      | 33     | 0      | 33           |
|        | 2130-2230 | 0                          | 0     | 0      | 0      | 0      | 0            |



Table A3 lists the single-event, time-period average sound-exposure levels (SELs) measured at the Control, Site 1, and Site 2, the distances of each site from CJF, and the predicted level calculated using Equation A1. Theoretically, sound from a localized source, which the hammers at CJF approximate, decays at 20 dB for a tenfold increase in distance, so we tested these data by fitting a straight line to them and determining the decay with distance. To perform the fitting, we used the equation:

$$\text{Predicted sound exposure level (SEL)} = K1 - K2 * \text{LOG}(\text{distance}), \quad (\text{Eq. A1})$$

where  $K1 = 137.7$  and  $K2 = 20.1$ .

We find the best fit by minimizing the difference between the levels predicted by the equation above and the measured sound levels contained in Table A2.<sup>3</sup> (As is shown below when modeling measurements are discussed, we determined the sound decay with distance for the Control Site, Site 1, and Site 2, to be almost precisely 20 dB for a tenfold change in distance.<sup>4</sup>)

For the single events we find that a best fit is achieved with  $K2 = 20.1$  dB, essentially the theoretical value. Thus, we have a great deal of confidence in the single event data.

Table A2. Simultaneous single-event data collection for June 5, 6, and 13

| Date   | Time        | Event Count | Control | Site 1 | Site 2 | Site 4 | Site 5 | Site 6 |
|--------|-------------|-------------|---------|--------|--------|--------|--------|--------|
| 5-Jun  | 1800 - 1900 | 8           | 81.4    | 75.1   |        |        |        |        |
| 5-Jun  | 1900 - 2000 | 8           | 82.1    |        | 72.9   |        |        |        |
| 6-Jun  | 1700 - 1800 | 19          | 80.6    | 77.4   |        |        |        |        |
| 6-Jun  | 1800 - 1900 | 27          | 81.1    |        | 73.4   |        |        |        |
| 6-Jun  | 1900 - 2000 | 18          |         |        | 75.9   | 67.1   |        |        |
| 13-Jun | 1930 - 2100 | 17          |         | 74.4   |        |        | 67.6   | 70.6   |
| 13-Jun | 2130 - 2230 | 9           |         |        | 72     | 67     | 66.7   |        |

NOTE: Site 3 was not used for single-event measurements

CJF was operating only one hammer on the second shift, and every day we measured they were operating the 25,000 pound hammer. Because they were only operating one hammer, we could separate the sound generated by the making of each piece, and because it was evening, there were far fewer corrupting sounds. Thus, we were able to make measurements on an event basis to understand the decay of the sound of a single hammer with distance both with and without intervening large objects. Specifically, we made direct measurements at the Control Site and Sites 1 and 2 along with simultaneous comparative measurements internal to the Wilbur Heights area, at the Bushman's truck

<sup>3</sup> The goodness of fit is determined by the least square sum of the differences. That is, each of the differences is squared and summed. The minimum of these sums is taken to be the best fit.

<sup>4</sup> The actual best fit to the slope is between 20.0 and 20.1 dB with the mean square error being 0.44 for a slope of 20.0 and 0.43 for a slope of 20.1.

yard at the northeast corner of 3rd and Paul streets (Site 4), at the Church on Wilber Avenue just east of 3rd Street (Site 5), and at the Cook's parking lot on the south side of Paul street between 4th and 5th street (Site 6).

Measurement sites 4-6 are used to show the excess attenuation that result from the structures between these locations and CJF that act as barriers to the sound reaching these locations. Eq. A1 is used to predict the open-field attenuations at a distance equal to the distance that each of the three measurement locations (4, 5, and 6) are from CJF. For example, the church site (5) is 1707 ft from CJF. So Equation A1 is used to predict the open-field sound exposure level at CJF, which is 72.7 dB (A-weighted), as a function of distance from CJF, while the average measured value at the church from Table A3 is 67.1 dB (A-weighted). This indicates that the excess attenuation that results from intervening buildings acting as sound barriers is  $(72.7 - 67.1 = 5.6 \text{ dB})$  5.6 dB (A-weighted).

The three estimates for building-caused attenuation in Table A3 are: 5.6, 5.9, and 8.3 dB (A-weighted). To be conservative, we take the average attenuation to be 6 dB interior to the housing area.

Figure A1 contains our prediction for the current noise produced by CJF during what we believe to be the busiest hour of production and when sound is the loudest due to winds and temperatures. To construct this figure, we have made open field predictions that are simply circles at distances predicted by the 20 dB decay with a tenfold increase in distance. We have made the predictions based upon a 1-hour LEQ level of 65 dB (A-weighted) at the control site.

Clifford-Jacobs Forging estimates their maximum hourly capacity of each hammer as listed in Table A1 in the main text. However, it is unlikely that the forge actually will reach the maximum hourly usage of any one hammer; the probability the forge will simultaneously reach the maximum hourly usage for all five of their largest hammers is extremely unlikely. Thus, we have created three scenarios of hammer usage, as indicated in Table 2 of the main text. Each scenario envisions full output at one of the three largest hammers, and half output at the other two of the three largest hammers. One can note that the three maximum scenarios each have a predicted level of 65 dB at the control site. Because the probability of all hammers working simultaneously at their maximum is so unlikely, all of our predictions of CJF sound levels are based on a 1-hour maximum LEQ of 65 dB (A-weighted) at the control site. Figure A1 shows that a fraction of the 54 houses will be impacted during the night by the forge's emissions being in excess of the 53.5 A-weighted LEQ limit. A much smaller fraction will exceed the 58.5 dB daytime limit, and only very few will be at about 62 dB during the day. Specifically, 30 of the 54 houses will be below both the day and nighttime limits, that is, below 58.5 dB during the day and below 53.5 dB during the night (shown in orange in Figure A1). Twelve of the 54 houses will be below the daytime limit but above the nighttime limit (shown in red Figure A1). The remaining 12 houses are all above the daytime limit of 58.5; of these, 7 are close to being below the daytime limit (within 2 dB of the limit and shown in blue), and 5 will exceed the daytime limit by about 4 dB (shown in yellow).

Of the 54 houses, several are owned by businesses but used as residences, or are owned by employees of businesses in the area.





Figure A1. Basis for current and predicted noise contours for CJF



Table A3. Single-event time period averages from Table A2, averaged by site. Eq. (1) is a straight line fit to the overall measured averages for the Control Site, Site 1, and Site 2 using the least square sum of the differences, and predictions using Eq. (1) are as shown in the second to the bottom row of the table.

| Location                                | Control     | Site 1      | Site 2      | Site 3*     | Site 4      | Site 5      | Site 6      |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Day 1                                   | 81.4        | 75.1        | 72.9        |             | 67.1        | 67.6        | 70.6        |
| Day 2                                   | 80.6        | 77.4        | 73.4        |             | 67.0        | 66.7        |             |
| Day 3                                   | 82.1        | 74.4        | 75.9        |             |             |             |             |
| Day 4                                   | 81.1        |             | 72.0        |             |             |             |             |
| <b>Measured Average</b>                 | 81.3        | 75.6        | 73.6        |             | <b>67.0</b> | <b>67.1</b> | <b>70.6</b> |
| <b>Distance (ft)</b>                    | 667         | 1155        | 1610        | 2274        | <b>1670</b> | <b>1707</b> | <b>839</b>  |
| <b>Predicted by Eq.(1)</b>              | <b>80.9</b> | <b>76.1</b> | <b>73.2</b> | <b>70.2</b> | <b>72.9</b> | <b>72.7</b> | <b>78.9</b> |
| <b>Difference from Eq(1) prediction</b> | -0.4        | +0.5        | -0.4        | N/A         | <b>+5.9</b> | <b>+5.6</b> | <b>8.3</b>  |

\* Site 3 was not used for single-event measurements

In Figure A1, we are attempting to show the sound in the open field just north of Wilbur Heights, where there is no attenuation by structures, and the sound levels fully internal to Wilbur Heights where we measured the attenuation to be 5.5 to 6 dB (A-weighted). In particular, we show the 53.5 dB (A-weighted Leq) contour since this is the criteria for nighttime. Towards the south, this contour is parallel to what would be the open field circles, but reduced by 5.5 dB. In the open field, the level is not reduced to 53.5 dB (A-weighted Leq) until we are beyond 2nd Street and practically at Market Street. We estimate the transition between these two clear limits as is shown in Figure A1 based on three main factors. First, we consider the small change in attenuation due to structures between the Site 5 and the Sites 4 and 6. Second, we consider the fact that attenuation by a barrier is taken to be 3 dB when the sound "rays" are just tangential to the barrier edge. Third, we include the fact that the basic sound levels are decreasing with distance. In a similar fashion, we have constructed the 50 dB (A-weighted Leq) contour. For areas close to CJF, where the sound comes from a steeper angle, and thus passes through areas that are less structured, we have not included any excess attenuation due to barriers. Here we have simply shown the circles that are predicted for an open field. In reality, there is an attenuation due to structures, which is 0 on the 5th street side of the built up area, and which clearly transitions to the 5.5 dB attenuation by the time one travels the short distance to the Site 5, but the details of this transition are beyond the state of the art, and they are not so important because it is clear that this area is above the 53.5 dB (A-weighted Leq) criterion.

## SOUND SOURCE INVENTORY

As described above, we were able to get very detailed data on the 25,000 pound hammer, its emissions, and its decay with distance. Unfortunately, this was the only hammer we were able to measure in terms of single events, so we have no empirical data on other size hammers. Theoretically, a doubling or halving of power in a machine results in a 3 dB change in emissions. On this basis, we predict that the SELs for the 12,000 pound hammer are 3 dB below those for the 25,000 pound hammer, and those for the 6,000 pound hammer are 6 dB below the 25,000 pound hammer, etc. In terms of the sound decay with distance, there should be no change in the open field propagation of sound with distance. But smaller machines should produce higher frequency sound energies, and the barrier effects of structures should increase as the frequencies increase. This means that although we have not measured it, we can expect that the barrier effect will be no smaller than what we have already measured. So again, this makes our predictions conservative.

## FUTURE SOUND

To the extent that 65 dB represents the sound levels at the Control Site for a typical busy time, and with no known reason for busy times to differ between day and night, Figure A1 appears to be the best estimate for the loud conditions at night. That is, we are saying that the impact comes from adding nighttime operations and going to three shifts a day, 24 hours a day. To the extent that other scenarios are considered, one can predict the LEQ for any combination of hammers and number of pieces simply by adding the sound energies based on a 25,000 pound hammer producing an SEL equal to 80.9 dB for each event, and then the other hammers producing slightly lower SEL values, as indicated above.

As an example of predicting the hourly LEQ from the single event SEL for the 25,000 pound hammer, we know that the LEQ is given by the following:

$$\text{LEQ} = \text{SEL} + 10 * \text{Log}(\text{Number of Events} / \text{Number of Seconds}) \quad (\text{Eq. 2})$$

where the number of events are those that occur during the specified number of seconds. So with the SEL of a 25,000 pound hammer being 80.9 dB at the Control Site, and with 50 events in an hour, one calculates the hourly LEQ to be  $80.9 + 17 - 35.6$ , where 17 is  $10 * \text{Log}(50)$ , and  $-35.6$  is  $10 * \text{Log}(1/3600)$ . So the result is 62.3 dB.

**ANNEX B: A Sound Source Inventory of the Community Surrounding the Forge**



# SCHOMER AND ASSOCIATES, INC.

Consultants in Acoustics and Noise Control

Paul D. Schomer, Ph.D., P.E.  
Member; Board Certified  
Institute of Noise Control Engineering

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CHAMPAIGN, ILLINOIS 61821  
PHONE: (217) 359-6602  
FAX: (217) 359-3303

## A survey of businesses in the vicinity of Clifford-Jacobs Forging

April 29, 2012

## A survey of businesses in the vicinity of Clifford-Jacobs Forging

April 29, 2012

Schomer and Associates conducted a survey of all businesses that could possibly create noise and were in the vicinity of Clifford-Jacobs Forging; the businesses surveyed are all enclosed in or border the red rectangle on the north side of Wilbur Avenue, as shown in the map below.

In total, ten businesses were surveyed. The purpose of the survey was to ascertain when the fewest loud noise sources were in operation in the area around Clifford-Jacobs Forging, in order to perform testing of the Clifford-Jacobs Forging noise during the quietest part of the day. Employees in each business were asked to list what noise sources their business operated during the week, and at what time they operated those noise sources; some examples of noise sources include heavy machinery such as backhoes or bulldozers, semi-trucks, delivery vans, etc.



Figure B1: An aerial photo of the area of noise-producing businesses surveyed; businesses surveyed are all enclosed in or border the red rectangle on the north side of Wilbur Avenue. The end of the Clifford-

Jacobs Forging building with the larger hammers is marked with a red circle. Known businesses are marked with yellow numbered dots, corresponding to the entries in table B1.

For the ten businesses surveyed, the hours of noise operation mostly correspond to the hours of a business's operation. Table 1 lists the businesses that were surveyed, their hours and days of operation, and the noise sources associated with that business.

| Business Name                      | Primary noise-making hours and days          | Noise sources / Notes                                 |
|------------------------------------|--|---|
| 1. Illini Recycling                | 4 AM to 6 PM, M-F, Sat.                      | Bobcat machinery, semi- trucks, end-loader            |
| 2. Gotta Potty                     | 4 AM to 6 PM, M-F, Sat.                      | Bobcat machinery, semi -trucks, end-loader            |
| 3. Stark Excavating                | 7 AM to 5:30 PM, M-F, Sat.                   | End-loaders, backhoes, excavators                     |
| 4. Duce Construction               | 7 AM to 3:30 PM, M-F, Sat.                   | Backhoes, excavators, delivery trucks, concrete pumps |
| 5. Sport Redi-Mix                  | 7 AM to 5:30 PM, M-F                         | Heavy machinery (end-loaders, etc.), trucks           |
| 6. Associated Transfer and Storage | 7 AM to 5:30 PM, all week                    | Trucks and heavy machinery                            |
| 7. Mickey's Linen                  | 4:30 AM to 6:30 AM, 1 PM to 4 PM, M,T, TR, F | Delivery vans, semi-truck                             |
| 8. Bushman Trucking                | 4 AM to 7 AM, M-F                            | Semi trucks   |
| 9. Champaign Grain Inspection      |  | No consequential noise                                |
| 10. Send-a-Friend Auto Care        | 8 AM to 5 PM, M-F                            | No consequential noise                                |
| 11. ICG Railroad                   | All days and times                           | Brake, wheel, engine, horn, and coupling noise, etc.  |

**Table B1:** Businesses surveyed, hours and days of operation, and noise sources.

Other information that may be worth noting is that Illini Recycling and Gotta Potty had the same owner; Duce Construction and Sport-Redi Mix also had the same owner. A few employees or owners of the area businesses lived on the same street as their business.

Based on the information gathered from local businesses, and the fact that Clifford-Jacobs Forging ceases operations for the day at 11 PM, we plan to conduct most of our sound measurements in the period between 8 or 8:30 PM and 11 PM.

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**ANNEX C: Résumé of Paul D. Schomer**

# SCHOMER AND ASSOCIATES, INC.

Consultants in Acoustics and Noise Control

Paul D. Schomer, Ph.D., P.E.  
Member; Board Certified  
Institute of Noise Control Engineering

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## PAUL D. SCHOMER Acoustical Engineer

BS, Electrical Engineering, University of Illinois, 1965.  
MS, Electrical Engineering-Acoustics, University of California, Berkeley, 1966.  
Ph.D., Electrical Engineering-Acoustics, University of Illinois, 1971.

### EXPERIENCE

Dr. Schomer has extensive experience, publications, and patents in the areas of environmental noise and its assessment, human and community response to noise, instrumentation and methodology for the measurement and monitoring of noise, sound propagation, and acoustical measurements of building parameters. He is a consultant to industry and government and a research leader in acoustics. His recognition by his peers as an international leader in the area of environmental noise is demonstrated by his chapters in reference books, his more than 45 refereed publications, his leadership in Standards organizations and professional societies, and his awards and honors. Dr. Schomer is also standards Director for the Acoustical Society of America.

As an international leader in the area of environmental noise, Dr. Schomer is chairperson of the United States delegation to International Organization for Standardization (ISO) Acoustics and Noise committees, past chairperson of the American National Standards Institute (ANSI) Committee dealing with noise, chairperson of the ISO working groups which deal with environmental noise and with impulsive noise measurement, chairperson of the ANSI/ASA working group which deals with environmental noise, and he is the United States representative to the International Organization for Standardization in the areas of aircraft noise and impulsive sources. He is the Standards Director for the Acoustical Society of America, a past member of both the Society of Automotive Engineers Aircraft Noise and Construction/Agriculture Noise Committees, a principle contributor to current efforts in the area of standardizing airport noise monitoring, and former Executive Director, past vice-president for membership, and twice a past member of the board of the Institute of Noise Control Engineering. He is also a past adjunct Professor of Electrical and Computer Engineering (Acoustics) and member of the graduate faculty of the University of Illinois

Dr. Schomer has 48 years of experience dealing with noise measurement and the effects of noise on people and communities. This experience includes airport, aircraft, helicopter, construction and traffic noise, general industrial and urban noise, wind turbine noise, blast and mining noise, small arms gunfire noise. The citation for his selection as a Fellow of the Acoustical Society of America references his studies on community response to noise, and most of his work with the National Academy of Science has been concerned with noise assessment.

### MEMBERSHIPS AND AWARDS

Fellow - Acoustical Society of America.

Member, Board Certified, Institute of Noise Control Engineering

Selected as Corps of Engineers Engineer of the Year and One of the Top 10 Federal Engineers of the Year (1990)—National Society of Professional Engineers

Several times a member of the board and/or officer; Institute of Noise Control Engineering.

Former Executive Director, Institute of Noise Control Engineering of the USA, Inc.

Standards Director, Acoustical Society of America

Chairman, Acoustical Society of America Committee on Standards

Head of U.S. Delegation, International Organization for Standardization, Technical Committee 43 (acoustics) and Subcommittee 1 (noise).

Convener (chairman), International Organization for Standardization, Working Group 45 dealing with environmental noise assessment.

Chairman, S.A.E. Construction Site Sound Level Subcommittee, S.A.E. ConAg Committee.

Past Member, S.A.E. Aircraft Noise Committee and the noise monitoring subcommittee.

Reviewer for *Applied Mechanics Review*, *Journal of the Acoustical Society of America*, and *Noise Control Engineering Journal*.

Fellowship, University of Illinois (1968-1971).

Registered Professional Engineer (DC).

Member, Institute of Noise Control Engineering, Acoustical Society of America, Institute of Electrical and Electronic Engineers, German Acoustical Society (DEGA), European Acoustical Association

### BOOKS

**Handbook of Acoustical Measurements and Noise Control, Chapter 50. Community Noise Measurements**, 2nd edition, John Wiley and Sons, Inc., New York, 1991.

**Reference Data for Radio Engineers, Chapter 40. Electroacoustics**, 7th edition, ITT Press, a subsidiary of MacMillan, Inc., Indianapolis, 1985.

**Reference Data for Radio Engineers, Chapter 40. Electroacoustics**, 8th edition, Sams Publishing, Prentice-Hall Computer Publishing, Indianapolis, 1993.



MAJOR JOURNAL PUBLICATIONS

"A critical analysis of: Wind Turbine Health Impact Study: Report of Independent Expert Panel," Paper 3aNs2," 165th Meeting of the Acoustical Society of America (ASA), Proceedings of Meetings on Acoustics (POMA) Volume 20, 2014, paper published on 26 March 2014.

"Respondents' answers to community attitudinal surveys represent impressions of soundscapes and not merely reactions to the physical noise," *Journal of the Acoustical Society of America*, **134**(1) Pt. 2, 767-772, July 2013.

"Criteria for wind-turbine noise immissions," 21st International Congress on Acoustics (ICA), 165th Meeting of the Acoustical Society of America (ASA), and 52nd Meeting of the Canadian Acoustical Association, Montreal, Canada, 2-7 June 2013.

"Can wind turbine sound that is below the threshold of hearing be heard? 21st International Congress on Acoustics (ICA), 165th Meeting of the Acoustical Society of America (ASA), and 52nd Meeting of the Canadian Acoustical Association, Montreal, Canada, 2-7 June 2013.

"Role of a community tolerance value in predictions of the prevalence of annoyance due to road and rail noise," *Journal of the Acoustical Society of America*, **131**(4), 2773-2786, April 2012.

"A first-principles model for estimating the prevalence of annoyance with aircraft noise exposure," *Journal of the Acoustical Society of America*, **130**(2), 791-806, August 2011.

"A re-analysis of Day-Night Sound Level (DNL) as a function of population density in the United States," *Noise Control Engineering Journal*, **59**(3), 1xx-1xx, (May/June 2011).

"Limitations of current dosage-response relationships for predicting the prevalence of annoyance due to transportation noise," INTERNOISE 2011, Osaka Japan, 4-7 September 2011.

"Wind-induced pseudo-noise and leaf-rustle noise," *Noise Control Engineering Journal*, **58**(2), 121-131, (March/April 2010).

"Explanation of and conclusions drawn from American National Standard Methods for estimation of awakenings associated with outdoor noise events heard in homes," INTERNOISE 2010, paper 1126, Lisbon Portugal, 13-16 June 2010.

"Proposed Ai-Weighting; a weighting to remove insect noise from A-weighted field measurements." INTERNOISE 2010, paper 594, Lisbon Portugal, 13-16 June 2010.

"On Efforts to Standardize a Graphical Description of the Soundscape Concept," INTERNOISE 2010, paper 593, Lisbon Portugal, 13-16 June 2010.

"Wind-induced pseudo-noise and leaf-rattle noise," INTERNOISE 2009, Paper IN09\_584, Ottawa, Canada, 23-26 August 2009.

"The difference between Day-Night Average Sound Level and the European Union Day-Evening-Night Average Sound Level for a typical sample of 100 housing sites," INTERNOISE 2009, Paper IN09\_583, Ottawa, Canada, 23-26 August 2009.

“Visitor perception of park soundscapes: A research plan,” *Noise/News International*, 17(2), 51-56, (June 2009).

“Uncertainties in measuring aircraft noise and predicting community response to it,” *Noise Control Engineering Journal*, 55(1), 82-88, (January/February 2007).

“When there are audible rattle sounds, annoyance may depend only on the worst case— independent of number of events,” INTERNOISE 2006, Paper N190, Honolulu, HA, USA, 3-6 December 2006.

“A-weighting sometimes works for assessing environmental noise—sort of; it should be retired,” INTERNOISE 2006, Paper N202, Honolulu, HA, USA, 3-6 December 2006.

“A statistical description of sound propagation: A comparison of elevated and near-ground sources,” *Noise Control Engineering Journal*, 54(3), 25-36, (May-Jun 2006).

“Biases introduced by the fitting of functions to attitudinal survey data,” NOISE-CON 2005, *Institute of Noise Control Engineering*, Minneapolis, MN, USA, 17-19 October 2005.

“Criteria for assessment of noise annoyance,” *Noise Control Engineering Journal*, 53(4), 132-144, (July/August 2005).

“Overview of the theoretical development and experimental validation of blast sound absorbers,” *Noise Control Engineering Journal*, 53(3), 70-80, (May/June 2005).

“Basic results from full-scale tests at Ft. Drum,” *Noise Control Engineering Journal*, 53(3), 94-109, (May/June 2005).

“Some Important Factors in Community Response to Sonic Booms,” NOISECON 2004, *Institute of Noise Control Engineering*, Baltimore, MD, USA, 12-14 July 2004.

“The importance of proper integration of and emphasis on the low-frequency sound energies for environmental noise assessment,” *Noise Control Engineering Journal*, 52(1), 26-39, (January/February 2004).

“Noise Assessments: Interaction with the Public—Simplicity and Truth Will Help,” INTERNOISE 2003, Paper N706, pp 1216-1220, Seogwipo, Korea, 25-28 August 2003.

“Does the Soundscape Concept Have Real Utility,” INTERNOISE 2003, Paper N161, pp 2825-2826, Seogwipo, Korea, 25-28 August 2003.

“Noise Assessment Metrics and Criteria in a United States Department of Transportation Multi-Modal Noise Model,” NOISECON 2003, Paper No. 023, *Institute of Noise Control Engineering*, Cleveland, OH, USA, 23-25 June 2003.

“A statistical description of ground-to-ground sound propagation,” *Noise Control Engineering Journal*, 51(2), 69-80, (March/April 2003).

“On Normalizing DNL to Provide Better Correlation with Response,” *Sound & Vibration*, pp 14-23, December 2002.

"Further Results Using Loudness-Level Weighting to Assess Noise Annoyance," NTERNOISE 2002, Paper No. N489, *Institute of Noise Control Engineering International*, Dearborn, MI, USA, 19-21 August 2002.

"Alternative Methods to A-Weighting for Environmental Noise Assessment," NTERNOISE 2002, Paper No. N475, *Institute of Noise Control Engineering International*, Dearborn, MI, USA, 19-21 August 2002.

"Evaluation of loudness-level weightings for assessing the annoyance of environmental noise," *Journal of the Acoustical Society of America*, **110**(5) Pt. 1, 2390-2397, (November 2001).

"Criteria for the Assessment of Noise Annoyance," NOISECON 2001, Paper No. NC01\_018, *Institute of Noise Control Engineering USA*, Portland, Maine, 29-31 October 2001.

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"A statistical description of blast sound propagation," *Noise Control Engineering Journal*, **49**(2), 79-87, (March/April 2001).

"Using fuzzy logic to validate blast noise monitor data," *Noise Control Engineering Journal*, **48**(6), 193-205, (November/December 2000).

"A comparison between the use of loudness level weighting and loudness measures to assess environmental noise from combined sources," INTERNOISE 2000, Paper No. 101, *Institute of Noise Control Engineering International*, Nice, France, 27-30 August 2000.

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"Revision to the ISO 1996 series--Description, measurement and assessment of environmental sound," INTERNOISE 98, Paper No. 190, *Institute of Noise Control Engineering International*, Christchurch, New Zealand, November 1998.

"On spectral weightings to assess human response, indoors, to blast noise and sonic booms," *Noise Control Engineering Journal*, **46**(2), 57-71, (March/April 1998).

"Evaluation of a re-analysis of the relationship between the results obtained in laboratory and field studies on the annoyance caused by high-energy impulsive sounds," *Noise Control Engineering Journal*, **45**(6), 251-255 (November/December 1997).

"A comparative study of human response, indoors, to blast noise and sonic booms," *Noise Control Engineering Journal*, **45**(4), 169-182 (July/August 1997).



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"Penalties for assessing helicopter noise annoyance—There is none?" NOISE-CON 96, 581-584, *Institute of Noise Control Engineering*, Seattle, WA, September 1996.

"A Comparative Study of Human Response to Blast Noise and Sonic Booms," INTERNOISE 96, *Institute of Noise Control Engineering International*, Liverpool, UK, July 1996.

"Development of a New ANSI Standard for Assessment of Combined Noise Environments," INTERNOISE 96, 3265-3270, *Institute of Noise Control Engineering International*, Liverpool, UK, July 1996.

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"Human and community response to military sounds: Results from field-laboratory tests of small arms, 25 mm cannon, helicopter and blast sounds," *Noise Control Engineering Journal*, **43**(1), 1-13 (January/February 1995).

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"Human and community response to military sounds: Results from field-laboratory tests of small arms, tracked vehicles, and blast sounds," *Noise Control Engineering Journal*, **42**(2), 71-84 (March/April 1994).

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"Reduction of Wind Noise for Unattended Blast Noise Monitoring," *Noise Control Engineering Journal*, **34**(2), March/April 1990.

"Indoor human response to blast sounds that generate rattles," *Journal of the Acoustical Society of America*, **86**(2), August 1989.

"On a theoretical interpretation of the prevalence rate of noise-induced annoyance in residential populations: High-amplitude impulse noise environments," *Journal of the Acoustical Society of America*, **86**(2), April 1989.

"The role of Helicopter noise-induced vibration and rattle in human response," *Journal of the Acoustical Society of America*, **81**(4), April 1987.

"High-energy impulsive noise assessment," *Journal of the Acoustical Society of America*, **79**(1), January 1986.

"Assessment of community response to impulsive noise," *Journal of the Acoustical Society of America*, **77**(2), February 1985.

"Descriptor for rotary-wing aircraft noise," American Institute of Aeronautics and Astronautics, October 1984.

"A survey of community attitudes towards noise near a general aviation airport," *Journal of the Acoustical Society of America*, **74**(6), December 1983.

"Noise monitoring in the vicinity of a general aviation airport," *Journal of the Acoustical Society of America*, **74**(4), April 1983.

"Sampling strategies for monitoring noise in the vicinity of airports," *Journal of the Acoustical Society of America*, **73**(6), June 1983.

"An analysis of community complaints to noise," *Journal of the Acoustical Society of America*, **73**(4), April 1983.

"Time of day noise adjustments or 'penalties'," *Journal of the Acoustical Society of America*, **73**(2), February 1983.

"A model to describe community response to impulse noise," *Noise Control Engineering Journal*, **18**(1), January/February 1982.

For the plaintiff: Predicted and analyzed the effect of strip-mining explosions on a distant factory structure.

For the plaintiff: Class action and community suits against airport noise including a \$128,000,000 settlement for the city of Minneapolis.

EXPERT WITNESS REGARDING THE AUDIBILITY AND NOTICEABILITY OF SIGNALS AND ALARMS

For the defense: Analyzed the audibility of gunshot sound.

For the defense: Analyzed the noticeability of off-road truck noise in a quarry delivery plant.

For the defense: Analyzed the audibility and noticeability of truck noise in the presence of other neighborhood noise.

For the plaintiff: Analyzed the audibility and noticeability of siren noise at cross intersection.

For the plaintiff: Analyzed the noticeability of sirens when there is more than one.

For the defense: Analyzed the audibility of breaking glass and its ability to set off a glass-break detector.

For the defense: Analyzed the ability of a fire alarm to wake up and warn a person.

For the plaintiff: Analyzed the ability of a fire alarm to warn someone.

For the defense: Analyzed the ability of a fireman's PASS device to be noticed at a fire scene.

GUN CLUBS/POLICE FIRING RANGES

Performed noise assessment and mitigation at several civilian and police small arms firing ranges including siting, layout, operations, and noise mitigating structures and fixtures.

INDUSTRIAL NOISE CONTROL--OUTDOORS

Performed noise assessment and mitigation at a variety of outdoor industrial operations such as an asphalt plant, a kitty-litter plant (similar drum to asphalt plant for drying clay), an ammunition disposal plant (again a heated drum), and grain elevators.

MOTOR RACEWAY NOISE

Performed assessment, evaluated existing and planned mitigation and developed alternatives. Evaluated management and operational plans and developed alternative strategies.

PARK SOUNDSCAPES

Review and develop research plans for the NPS to develop the basis for National and International Standards for assessing and measuring park soundscapes.

PRODUCT DEVELOPMENT

Design, testing and evaluation of outdoor warning sirens.

VEHICLE/HIGHWAY NOISE

Assessment of highway noise. Monitoring highway noise. Establishing the need for mitigation. Assessing mitigation alternatives.



WIND FARM NOISE ASSESSMENT

For the proponents, established noise criteria, propagation model, and assessment for 100 + wind farm, presented the acoustical results before a large, well-attended, public hearing.

For the proponents, measured the ambient for two, one-to-two turbine installations in Champaign County, Illinois.

For concerned parties, provided background noise measurements. (NY)

For concerned parties, developed a draft wind law noise ordinance. (NY)

For concerned parties, presented health and modeling issues to regulatory commission (WI)

Serve as the "mediating" expert for both sides in legal proceedings (OR)

ILLINOIS NOISE REGULATIONS

Examination of the adequacy of existing noise regulations contained in Subtitle H, 35 Illinois Administrative Code. Analysis of the existing rules and whether they appropriately encompass the various types of discontinuous noise and specifically, impulse noise. Recommendations for changes to sections of the Code dealing with definitions and regulatory levels.

REVISIONS TO ILLINOIS PROPERTY-LINE NOISE MEASUREMENT PROCEDURES

Examination of existing measurement procedures as related to American National Standards. Recommendation of measurement procedures for determination of octave-band 1-hour equivalent levels corrected for background ambient. (No American National or International Standards exist for this type of measurement, but these are the type required by the Illinois Pollution Control Board.)

HUMAN AND COMMUNITY RESPONSE TO NOISE

Conducting and supervising international research experiments designed to explain, qualify and quantify human and community response to noise of varying character, spectra and temporal patterns. This research concentrates on comparing and contrasting special noises such as small arms, rotary-wing aircraft, or large explosions to more common noise such as road vehicles or artificially generated noise. A key to this work is conducting these experiments in real houses with real sources of sound.

TEMPORAL SAMPLING STRATEGIES FOR MONITORING AIRPORT NOISE

Analysis of daily monitoring results from many of the nation's airports. Modeling of the results by auto-regressive moving average (ARMA) models, and analysis of the results by "Monte Carlo" methods. Recommendation of airport noise sampling strategies for obtaining the required degrees of precision.

## **EXHIBIT E**

### GROUP EXHIBIT: EXPRESSIONS OF SUPPORT FROM THE COMMUNITY

- Jon Reichard, President, A & R Mechanical Contractors, Inc.
- Mr. & Mrs. Jack Gaines
- Ron Stanley, District 8 Business Representative, International Association of Machinists and Aerospace Workers
- Senator Michael Frerichs, 52nd District
- Rep. Chad D. Hays, 104th District

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ILLINOIS STATE SENATE  
**MICHAEL FRERICHS**  
STATE SENATOR · 52ND DISTRICT

May 23, 2014

Deanna Glosser, Chairman  
Illinois Pollution Control Board  
James R. Thompson Center  
100 W. Randolph  
Suite 11-500  
Chicago, Illinois 60601

**RE:** Petition of Clifford-Jacobs Forging Co. for Amendment to the Site-specific Rule at 35 Ill. Adm. Code 901.119

Dear Chairman Glosser:

I would appreciate the Board's favorable consideration of the referenced petition by Clifford-Jacobs Forging Company for an increase in its maximum hours of operation. Clifford-Jacobs seeks the Board's permission to expand its hours of operation and potentially increase its work force significantly. Clifford-Jacobs' employees enjoy above-average wages and benefits; allowing it to expand its operations would obviously be well received throughout my district and beyond.

Clifford-Jacobs manufactures forged metal products that are used in commerce around the world. It has been a major fixture in Champaign County industry for 92 years, having occupied the same location since 1922. Enabling the company to better meet demand for its products as an Illinois manufacturer will help ensure its continued viability at that location for years to come. The Board's considered support of the petition would be greatly appreciated.

Sincerely,

A handwritten signature in cursive script that reads "Michael Frerichs".

Senator Michael Frerichs



DISTRICT OFFICE:  
7 E. FAIRCHILD ST.  
DANVILLE, IL 61832  
(217) 477-0104  
chad@rephays.com

ILLINOIS HOUSE OF REPRESENTATIVES

SPRINGFIELD OFFICE:  
220-N STRATTON BLDG.  
SPRINGFIELD, IL 62706  
(217) 782-4811  
www.hays.ilhousegop.org



**CHAD D. HAYS**  
STATE REPRESENTATIVE • 104TH DISTRICT

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**MAY 29 2014**

STATE OF ILLINOIS  
Pollution Control Board

May 23, 2014

Deanna Glosser, Chairman  
Illinois Pollution Control Board  
James R. Thompson Center, Suite 11-500  
100 W. Randolph  
Chicago, Illinois 60601

**RE:** R2014- XXX; Petition of Clifford-Jacobs Forging Co. for Amendment to the Site-specific Rule at 35 Ill. Adm. Code 901.119

Dear Chairman Glosser:

I am pleased to add my name to the list of people and organizations supporting the proposal of Clifford-Jacobs Forging Company for an increase in its maximum hours of operation by seven hours each work day. Allowing Clifford-Jacobs to expand its hours would be a very positive development for the economy of my district as well as to the State of Illinois. It would also enable the company to better meet the challenges posed by overseas competitors in a global market.

Clifford-Jacobs has been a valued member of the Illinois business community for over nine decades and provides dozens of high-paying jobs. It is a trusted supplier of critical components for industries world-wide, and has been situated at the same Champaign County location throughout its history. I urge you to grant the company's petition which will help it remain and prosper in Illinois.

Thank you for your service.

Sincerely,

A handwritten signature in black ink that reads "Chad Hays".

Chad Hays  
State Representative – 104<sup>th</sup> District  
Assistant Minority Leader

May 15, 2014

Deanna Glosser, Chairman  
Illinois Pollution Control Board  
James R. Thompson Center  
100 W. Randolph  
Suite 11-500  
Chicago, Illinois 60601

**RE:** R2014- XXX; Petition of Clifford-Jacobs Forging Co. for Amendment to the Site-specific Rule at 35 Ill. Adm. Code 901.119

Dear Chairman Glosser:

As President of A & R Mechanical Contractors, Inc., and as a member of the Champaign County business community, I request that the Pollution Control Board favorably consider the proposal of Clifford-Jacobs Forging Company for an increase in its maximum hours of operation.

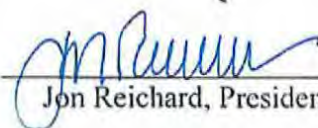
Although Champaign County is best known as the home of the University of Illinois, it has a relatively small but significant manufacturing base. Clifford-Jacobs is an important part of that manufacturing base, supplying vital forged products to the worldwide transportation and aerospace industries, among many others. In so doing, it provides scores of high-paying local jobs and a significant source of revenue to local businesses like ours and to all levels of government.

As every person engaged in business knows, the increasingly global nature of commerce threatens the viability of domestic manufacturers. In order to meet that challenge, American businesses need to have the ability to promptly respond to the demands of the market; enabling Clifford-Jacobs to increase its hours of operation up to an additional 7 hours a day when and as economic conditions warrant is eminently sensible. I strongly urge the Board to grant Clifford-Jacobs' request.

Sincerely,

A & R Mechanical Contractors, Inc.

By:

  
Jon Reichard, President

---

SINCE 1925



May 23-14

To Whom It May Concern

We are long-time residents off the Miller Heights community which lies southwest of Clifford-Jacobs. We know some of the people who work at Clifford-Jacobs and we are familiar with the noises it makes. Those noises don't bother us any more than the noises that other companies and nearby traffic makes.

In the past Jack worked in a manufacturing plant in Indiana. We know how hard it is these days to find jobs like those at Clifford-Jacobs, that pay well above the minimum wage and provide decent benefits.

It would be wonderful if Clifford-Jacobs could be allowed to expand its operations. Thanks



Sincerely,

Jack & Ann Grimes

2402 N. Market

Champaign, Ill. 61822



INTERNATIONAL ASSOCIATION of MACHINISTS and  
AEROSPACE WORKERS  
DISTRICT LODGE NO. 8

310 GREENWOOD AVENUE \* BLOOMINGTON, IL. 61704

PHONE (309)-829-1300

FAX (309)-829-1322

May 23, 2014

Deanna Glosser, Chairman  
Illinois Pollution Control Board  
James R. Thompson Center  
100 W. Randolph  
Suite 11-500  
Chicago, Illinois 60601

Re: Petition of Clifford-Jacobs Forging Co. for Amendment to the Site-specific Rule at  
35 Ill. Adm. Code 901.119

Dear Chairman Glosser:

As a Business Representative for District 8 of the International Association of Machinists and Aerospace Workers, certified by the National Labor Relations Board as collective bargaining agent for certain employees of Clifford-Jacobs Forging Company, I write to urge the Illinois Pollution Control Board to approve the referenced petition. This petition seeks to expand Clifford-Jacobs' permissible hours of operation by an additional seven hours per work day.

Granting the petition would help the company remain competitive as a world-wide provider of forged products to the aerospace, transportation and other industries, providing high quality to expand the company's hours of operation would enable the company and its employees to do an even better job of meeting customer needs and expectations. This is good for both labor and management.

The global nature of the forging industry necessitates that manufacturers such as Clifford-Jacobs have the chance to promptly respond to the demands of the market. Allowing the change requested goes a long way toward making sure that this is the case. Our union endorses the company's request without reservation.

Sincerely,

Ron Stanley  
Business Representative, District 8  
The International Association of Machinists and  
Aerospace Workers

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF: )  
 )  
PROPOSAL OF CLIFFORD-JACOBS FORGING CO. )  
FOR AN AMENDMENT TO THE SITE-SPECIFIC )  
RULE AT 35 ILL. ADM. CODE 901.119 )

R2014-

027  
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JUN 02 2014

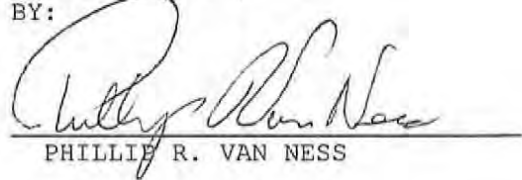
APPEARANCE

The undersigned hereby files its appearance in the proceedings on behalf of Petitioner CLIFFORD-JACOBS FORGING CO. **STATE OF ILLINOIS Pollution Control Board**

RESPECTFULLY SUBMITTED,

WEBBER & THIES, P.C.

BY:



PHILLIP R. VAN NESS

Webber & Thies, P.C.  
202 Lincoln Square  
P.O. Box 189  
Urbana, IL 61801  
Telephone: 217/367-1126  
Telefax: 217/367-3752



BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

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JUN 02 2014

IN THE MATTER OF: )

PROPOSAL OF CLIFFORD-JACOBS FORGING CO. )  
FOR AN AMENDMENT TO THE SITE-SPECIFIC )  
RULE AT 35 ILL. ADM. CODE 901.119 )

R2014-

STATE OF ILLINOIS  
Pollution Control Board

*22*

MOTION TO WAIVE REQUIREMENT TO SUBMIT 200 SIGNATURES

NOW COMES Clifford-Jacobs Forging Co. ("Clifford-Jacobs" or "Petitioner") by its attorneys, Webber & Thies, P.C., and pursuant to 415 ILCS 5/28(a) of the Illinois Environmental Protection Act ["Act"] and 35 Ill. Adm. Code 102.410(d), hereby requests that the Pollution Control Board ("Board") waive the requirement under 45 ILCS 5/28 and 35 Ill. Adm. Code 102.202(g) to submit 200 signatures with its Petition for Amendment to 35 Ill. Adm. Code 901.119. In support of this motion, Petitioner states as follows:

1. Clifford-Jacobs is seeking an amendment to a site-specific rule governing the hours of operation of its hammer forging facility in an unincorporated area of Champaign County north of the City of Champaign. The requested change would allow Clifford-Jacobs to operate its facility beyond the hours of 6:00 a.m. to 11:00 p.m.
2. As noted in its Petition, Clifford-Jacobs' facility is mainly surrounded by farmland and industrial and commercial properties, with a small mixed residential/industrial area to the southwest currently comprising fewer than 55 residences, all of which were built or placed after Clifford-Jacobs' facility was built and placed in operation in the 1920's. It is doubtful whether the total number of residents in that area equals 200 persons.
3. The Board has previously waived the 200-signature requirement in similar site-specific rule proceedings, including *In the matter of: Proposal of Vaughan & Bushnell Manufacturing Company of Amendment to a Site-Specific Rule*, 35 Ill. Adm. Code 901.121, R06-011.

WHEREFORE, Petitioner respectfully requests that the Board waive the 200-signature requirement and schedule a public hearing in this matter as authorized by 35 Ill. Adm. Code 102.410(d).

Respectfully submitted,  
CLIFFORD-JACOBS FORGING CO., Petitioner

By: *Chellip Man Ness*  
One of its attorneys

Dated: *May 30*, 2014

THIS FILING IS SUBMITTED ON RECYCLED PAPER

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CLERK'S OFFICE

JUN 02 2014

Case No. PCB 2014-R-\_\_\_\_\_

CERTIFICATE OF SERVICE BY UNITED STATES MAIL

STATE OF ILLINOIS  
Pollution Control Board

I, Phillip R. Van Ness, hereby certify that I delivered the foregoing APPEARANCE and PROPOSAL FOR AMENDMENT TO 35 ILL. ADM. CODE 901.119 upon:

John Therriault, Clerk  
IL Pollution Control Board  
100 West Randolph  
Suite 11-500  
Chicago, IL 60601

John J. Kim  
Chief Legal Counsel  
Illinois Environmental Protection Agency  
1021 N. Grand Avenue East  
P.O. Box 19276  
Springfield, IL 62794-9276

by placing a true and correct copy of said documents in the U.S. mail at Lincoln Square Mall, Urbana, Illinois, at or about the hour of 5:00 p.m. on the 30th day of May, 2014, with proper postage prepaid.



SUBSCRIBED AND SWORN to before me  
this 30th day of May, 2014



THIS FILING IS SUBMITTED ON RECYCLED PAPER



**WEBBER & THIES, P.C.**  
ATTORNEYS AT LAW  
202 LINCOLN SQUARE  
P.O. BOX 189  
URBANA, ILLINOIS 61803-0189

RICHARD L. THIES  
CARL M. WEBBER  
DAVID C. THIES  
HOLTEN D. SUMMERS  
JOHN E. THIES  
PHILLIP R. VAN NESS  
KARA J. WADE  
J. AMBER DREW  
G. MICHAEL SHEA

CHARLES M. WEBBER  
(1903-1991)  
CRAIG R. WEBBER  
(1936-1998)  
—  
TELEPHONE  
(217) 367-1126  
TELECOPIER  
(217) 367-3752  
—

May 30, 2014

WEBSITE:  
<http://www.webberthies.com/>

WRITER'S E-MAIL ADDRESS:  
pvanness@webberthies.com

John Therriault, Clerk  
IL Pollution Control Board  
100 West Randolph  
Suite 11-500  
Chicago, IL 60601



*R2014-022*  
ORIGINAL

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JUN 02 2014

STATE OF ILLINOIS  
Pollution Control Board

RE: Clifford-Jacobs Forging Co.; Proposal for Amendment to 35  
ILL. ADM. CODE 901.119

Dear Mr. Therriault:

Enclosed is the original and six copies of the above-referenced proposal for amendment to 35 Ill. Adm. Code 901.119 on behalf of the Clifford-Jacobs Forging Co., in addition to its Motion to Waive the requirement for 200 signatures. Also find our Illinois Attorneys check in the amount of \$75.00 as the applicable filing fee.

We ask that you kindly return a file-stamped copy of the proposal for our records. In addition, if you determine that there is any missing or incomplete documentation, please do not hesitate to contact the undersigned.

Lastly, as we discussed earlier this week, one of the letters of support of the proposal, from Representative Chad Hays, was mistakenly sent to you separately and previously. While the enclosed proposal package includes a photocopy of that letter, kindly add the *original* of that letter to your file docket for this proceeding.

Sincerely,

Phillip R. Van Ness  
WEBBER & THIES, P.C.

Encls.