Andros, Pamela

From: Don Schuster <schustersfam@gmail.com>
Sent: Wednesday, January 16, 2019 4:04 PM
To: Andros, Pamela
Subject: Forever Sand and Lime
Attachments: scan0001.jpg; scan0002.jpg; scan0003.jpg; scan0004.jpg; scan0005.jpg; scan0014.jpg

Schuster's Playtime Farm, Inc.
1326 US Highway 12 and 18
Deerfield, WI 53531
608-764-8488
Theresa@schustersfarm.com
www.schustersfarm.com

January 14, 2019
Submission of substantial evidence-primary source
Re: Oak Park Quarry, LLC, CUP (DCPCUP-2018-02449) request.

First, I would not be standing here before you unless I had been shaken so bad I thought I was experiencing an earthquake.

Six Standards of a Conditional Use Permit (reference to three standards)

1. The establishment, maintenance or operation of the conditional use will not be detrimental to or endanger the public health, **safety**, comfort of **general welfare**.

Based on the recent history (since 2010 purchase by Jon Halverson) of the Oak Park Quarry, we are concerned for nearby property owners, as well as the historic structures that are located within up to a one mile radius of the gravel pit. One specific structure is the round barn on our property. This historic agricultural structure was completed in 1903 and is the last of its kind still standing in Dane County. In 2002, after 100 years of use and weather, we began to restore and preserve the barn. As part of the process we tuck-pointed the foundation of the barn in 2010 and window sills in 2015. We consulted with restoration specialists and used a mortar mix specifically for tuck-pointing work with limestone from that time period. In the winter of 2015/16, we noted cracking in the tuck-pointing at the window framing and in the foundation below the windows.

Over 40,000 guests come to Schuster's Playtime Farm on an annual basis. If the structure of the barn and other structures continue to be shaken as in the past the structures will continue to be damaged and thus jeopardize our family's and guests' welfare. Evidence of damage is provided in the form of photos taken of the round barn window sills and foundation in January 2016 and again in January 2019. The cracks shown in the corresponding photos taken three years apart are unchanged. (Exhibit 1S)

Over the last three years however, the foot traffic and use of the barn has increased. We have not made any structural changes or done renovations to the barn since the spring of 2015. The variable that has changed is that there has not been blasting at the pit since December 2015.

2. The uses values and enjoyment of other property in the neighborhood for purposes **already permitted** shall be in no foreseeable manner substantially impaired or diminished by establishment, maintenance or operation of the conditional use.
If blasting continues at the rate it has been, the round barn will not continue to stand for the many years to come even though it should given the skilled initial construction, substantial care by its first owners (Gangstads) and restoration by the current owners (Schusters). The damage caused by the blasts is evident and continued blasts of such magnitude will further damage the barn and decrease its potential longevity. The round barn was built and established for use prior to the quarry's first conditional use permit. The Wisconsin Department of Transportation has established Schuster's Playtime Farm property as historical and thus any construction that has been or is planned to be done requires a historical survey. Examples include: Surveying of property and round barn structure prior to the 1998 US Highway 12 and 18 construction with placement of the road right-away determined according to required distance from the round barn. The round barn and property were again surveyed prior to the moving of the farm driveway in 2012.

3. That the establishment of the conditional use **will not impede the normal and orderly development and improvement of the surrounding property** for uses permitted in the district.
The brand for Schuster's Playtime Farm is the round barn. As fifth generation farmers from Dane County with the sixth generation readying to take the reins damage and destruction of the barn greatly impacts the business and the family's livelihood. Schuster's Farm has a longstanding history of actively supporting the community through annual employment of almost 200 seasonal staff, donations for community functions, scholarships and support of many area high schools.

After spending almost two hundred thousand dollars and hundreds of hours labor to preserve the centennial round barn for future generations, we are very concerned about the impact of future blasting. Please consider the impact of reinstated blasting on surrounding structures and neighbors.

Our presentations opposing the renewal of the CUP are factual and evidence-based. A CUP is required to meet the six standards. We could have filled this room with supporters of Schuster's Farm and St. Paul's Liberty Church but the task before us was not to present opinions and emotions. We encourage you to really take a look at the 150 plus postcards…where are they from, what is there relationship to the quarry, what is their relationship to this township? Are they simply letters of support or are they substantial evidence?

Sincerely,

Don and Theresa Schuster

Notes from Theresa Schuster's presentation to the ZLR committee 1.22.19

I wish to speak today in regards to past history and future choices.
There is an underlying issue here in that the quarry is on one hand denying all evidence before them (and you) in regards to past unsafe practices and structural damage at multiple sites and then also presenting as a new and changed business...willing to follow procedures, to have an open forum for complaints to be filed, to keep records of clean fill and so on.

If we start by taking a look at the CUP, there are some discrepancies that need to be addressed.
--The permit itself lists varied parcels but not all parcels are indicated in some of the descriptions or even on the front of the permit.

--Under the category Blasting Protocol at numbers 2 and 11 and in many other instances throughout the document, it is indicated that notification will be made to St. Paul's Church and anyone residing within 1320 feet. At the town board meeting in May 2016, Jon Halverson agreed that notification would be given to all within a minimum of 2640 feet or ½ mile. Truly given the information just shared in regards to the lay of the bedrock surrounding the pit and the distance of buildings from the pit that have incurred damage a ½ mile is not even inclusive of the potentially affected area.

--The PPVs indicated in the CUP are indicated from 2015 not the PPVs adopted in 2016.

--In conjunction with the PPVs indicated. The projected tons of rock per year and projected blasts don't seem to match based on tonnage/blasting level according to the PPVs indicated in 2016 adoption and number of blasts. Curiously however the projections are closer if using the incorrect blasting levels that are indicated as the town ordinance levels by the applicant.

--In addition, the amount of expected tonage and blasts is indicated as "not limited to". This is very concerning given the damage that began to occur to area structures once blasting rate increased under the ownership of Jon Halverson but had not been an issue with past quarry owners and businesses that blasted and hauled from the Oak Park Quarry.

--Under the category of Blasting Log, what does logging mean. The measuring and logging is being done by the quarry. In other words they are their own watchdog. Now whereas that may be typical, this is highly concerning given that out of 24 blasts full data was not available for 7 of the blasts due to either the seismographs not being placed at all locations or the seismograph just not working. Please see exhibit 3T. Monitoring is imperative.

--The CUP indicates that they did not exceed state regulations. However, the blast decibels exceeded even the state limit in both 2014 and 2105. Please see exhibit 1T.

--The length of the proposed permit is for a substantially longer period of time than was being discussed several years ago. Actions speak louder than words. A ten year permit is not warranted given past actions, damages that have already occurred and the presence of historic buildings.

--The presentation for filing complaints and documentation suggestions for clean fill are not data or substantial evidence rather they are just processes they are presenting. They are not a meeting of conditions.

--Along the topic of the community response program...What does a community response program mean, if what has been being presented for several years and again today (tombstones moving uphill, mortar crumbling, new mortar cracking, changes not occurring for three years) is not deemed as evidence? What is evidence…do one of these historic structures need to collapse? Does someone need to die?

--A dialog does not occur when one party refuses to look, listen or even compromise. Being a community member would imply that one operates at least equally or gives more than one takes. The quarry pays approximately $7000.00 in taxes and does not employ any town residents. The actions of the quarry have cost the township and local residents a significant amount of time and money. These are not actions of a group that wish to be part of a vibrant community.

Theresa Schuster

Points for 1/14/19 Deerfield town board meeting- Presented by Theresa Schuster

I wish to speak today in regards to past history and future choices.
There is an underlying issue here in that the quarry is on one hand denying all evidence before them (and you) in regards to past unsafe practices and structural damage at multiple sites and then also presenting as a new and changed business...willing to follow procedures, to have an open forum for complaints to be filed, to keep records of clean fill and so on.

If we start by taking a look at the CUP, there are some discrepancies that need to be fixed.
The permit itself lists varied parcels but not all parcels are indicated in some of the descriptions or even on the front of the permit.
Under the category Blasting Protocol at numbers 2 and 11 and in many other instances throughout the document, it is indicated that notification will be made to St. Paul's Church and anyone residing within 1320 feet. At the town board meeting in May 2016, Jon Halverson agreed that notification would be given to all within a minimum of 2640 feet or ½ mile. Truly given the information just shared in regards to the lay of the bedrock surrounding the pit and the distance of buildings from the pit that have incurred damage a ½ mile is not even inclusive of the potentially affected area.
The PPVs indicated in the CUP are indicated from 2015 not the PPVs adopted in 2016.
In conjunction with the PPVs indicated. The projected tons of rock per year and projected blasts don't seem to match based on tonnage/blasting level according to the PPVs indicated in 2016 adoption and number of blasts. Curiously however the projections are closer if using the incorrect blasting levels that are indicated as the town ordinance levels by the applicant .

Under the category of Blasting Log, what does logging mean. The measuring and logging is being done by the quarry. In other words they are their own watchdog. Now whereas that may be typical, this is highly concerning given that out of 24 blasts full data was not available for 7 of the blasts due to either the seismographs not being placed at all locations or the seismograph just not working. Monitoring is imperative.

The misfire blast decibels exceeded even the state limit.

The length of the proposed permit is for a substantially longer period of time than was being discussed several years ago. Actions speak louder than words. A ten year permit is not warranted given past actions, damages that have already occurred and the presence of historic buildings.

The presentation for filing complaints and documentation suggestions for clean fill are not data or substantial evidence rather they are just processes they are presenting. They are not a meeting of conditions.

Along the topic of the community response program...What does a community response program mean, if what has been being presented for several years and again today (tombstones moving uphill, mortar crumbling, new mortar cracking, changes not occurring for three years) is not deemed as evidence? What is evidence…do one of these historic structures need to collapse? Does someone need to die?

A dialog does not occur when one party refuses to look, listen or even compromise.
Being a community member would imply that one operates at least equally or gives more than one takes. The quarry pays approximately $7000.00 in taxes and does not employ any town residents. The actions of the quarry have cost the township and local residents a significant amount of time and money. These are not actions of a group that wish to be part of a vibrant community.

2015 AHLGRIMM EXPLOSIVES BLASTING REPORT

OWNER: Yahara
QUARRY NAME: Oak Park
LOCATION: Deerfield
COUNTY OF: Dane
DATE: 8-12-15
BLASTER: Trent Heins
DRILLER: Yahara
WEATHER CONDITIONS:
WIND: (calm) gusty windy
CLOUDS: (clear) cloudy overcast
BLAST LAYOUT: (Rectangular) Staggered (One Open Face) Two Open Faces Sink Cut Trench
TIME FIRED: 1:16 PM
NUMBER OF HOLES: 20
HOLE DEPTH: 48'
HOLE DIAMETER: 3"
PATTERN: 8' x 8'
MAXIMUM HOLES PER DELAY: 3 Decks/Hole.
STEMMING: 6'
TYPE OF INITIATION: electronic (non-electric)
DIST. TO NEAREST STRUCTURE: ____FT. 500 FT. 750 FT. +1000 FT.
SEISMOGRAPH READING: (Yes) No

SEISMOGRAPH NUMBER:	5358	4795	4379	3053
SEISMOGRAPH VALUES: T	1.520 in/sec.	.330 in/sec.	.130 in/sec.	.038 in/sec.
V	.820 in/sec.	.215 in/sec.	.055 in/sec.	.025 in/sec.
L	1.680 in/sec.	.280 in/sec.	.138 in/sec.	.050 in/sec.
NO TRIGGER AT	— in/sec.	— in/sec.	— in/sec.	— in/sec.
PPV	1.680 in/sec.	.320 in/sec.	.138 in/sec.	.050 in/sec.
NOISE	127.6 db.	128.9 db.	118.1 db.	<100.0 db.
DIST. FROM BLAST	300 FT.	792 FT.	____FT.	____FT.
SEISMOGRAPH LOCATION:	Gas Line	1285 Olstad	3680 Oak Park Rd/ Halverson Prop. Line	3513 Oak Park Rd.

MAXIMUM LBS. OF EXPLOSIVES PER DELAY: 36
POWDER FACTOR: (Lbs. / Ton): .41
TONS OF ROCK BLASTED: 5211
TOTAL LBS. OF EXPLOSIVES USED: 2160

Revised 01/05/2015

* NOTE - MIS-FIRE: BAD CAP BETWEEN 1ST DECK & 2ND DECK ON HOLE NUMBER 1.

Instantel

Event Report

#9

Date/Time	Vert at 13:16:51 August 12, 2015
Trigger Source	Geo: 0.020 in/s
Range	Geo: 4.999 in/s
Record Time	4.0 sec at 1024 sps

Notes
Location:
Client:
User Name: Ahlgrimm Explosives Company, Inc.
Converted: August 13, 2015 08:34:45 (V10.72)

Extended Notes

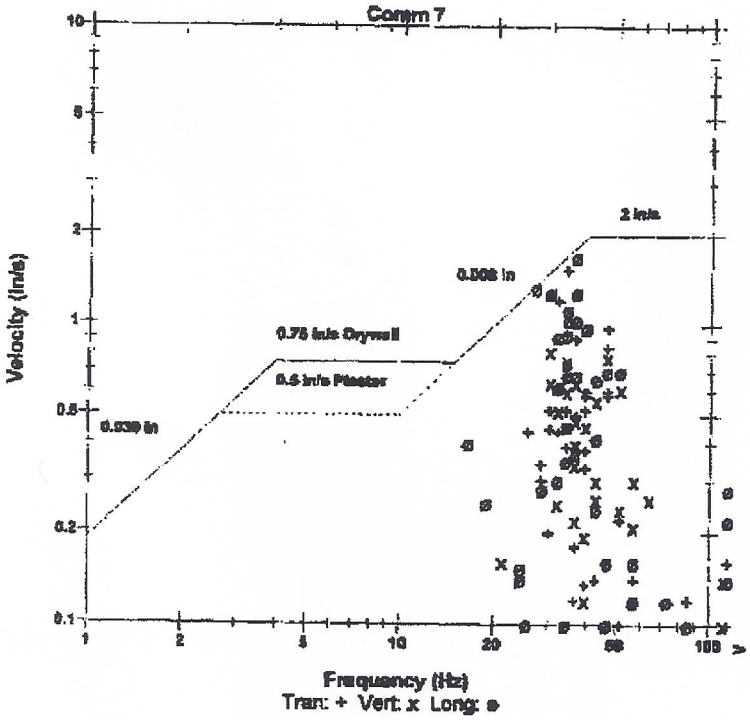
Microphone	Linear Weighting
PSPL	127.6 dB(L) at 0.271 sec
ZC Freq	20 Hz
Channel Test	Passed (Freq = 20.0 Hz Amp = 307 mv)

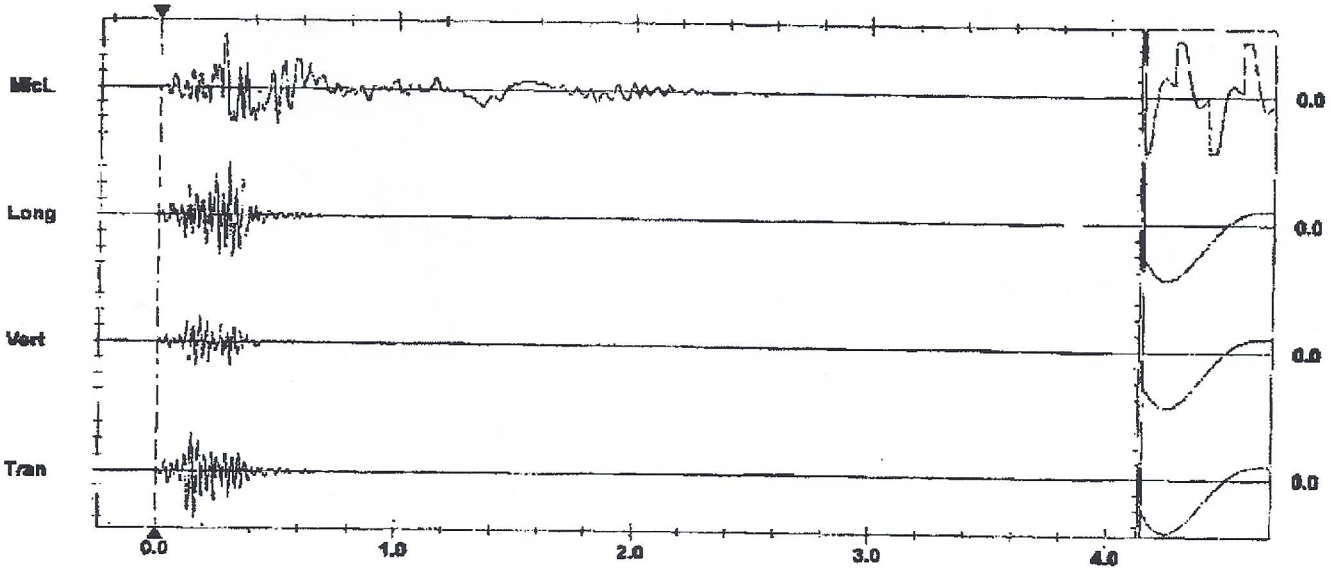
	Tran	Vert	Long	
PPV	1.520	0.820	1.680	in/s
ZC Freq	34	30	34	Hz
Time (Rel. to Trig)	0.163	0.179	0.288	sec
Peak Acceleration	0.848	0.583	0.901	g
Peak Displacement	0.006	0.003	0.008	in
Sensor Check	Passed	Passed	Passed	
Frequency	7.7	7.8	7.8	Hz
Overswing Ratio	3.6	3.6	3.5	

Peak Vector Sum 1.723 in/s at 0.163 sec

Serial Number	5358 V 2.61 MiniMate
Battery Level	6.6 Volts
Unit Calibration	February 4, 2015 by Instantel
File Name	G358FZ8K.W30
Post Event Notes	
Client : Yahara Oak Park	
Location : Gas Line	

Wisconsin Administrative Code





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.500 in/s/div Mic: 0.002 psi(L)/div
Trigger = ▶— — —◀

Sensor Check

p.2

Aug 15 15:07:34a

Instantel

Event Report

#5

Date/Time	Long at 13:16:58 August 12, 2015
Trigger Source	Geo: 0.020 in/s
Range	Geo: 4.999 in/s
Record Time	4.0 sec at 1024 sps

Notes
Location:
Client:
User Name: Ahlgrimm Explosives Company, Inc.
Converted: August 13, 2015 06:19:16 (V10.72)

Serial Number	4795 V 2.61 MiniMate
Battery Level	6.4 Volts
Unit Calibration	February 12, 2015 by Instantel
File Name	F795FZ6K.WAC

Post Event Notes
Client : Yahara Oak Park
Location 1285 Olstad

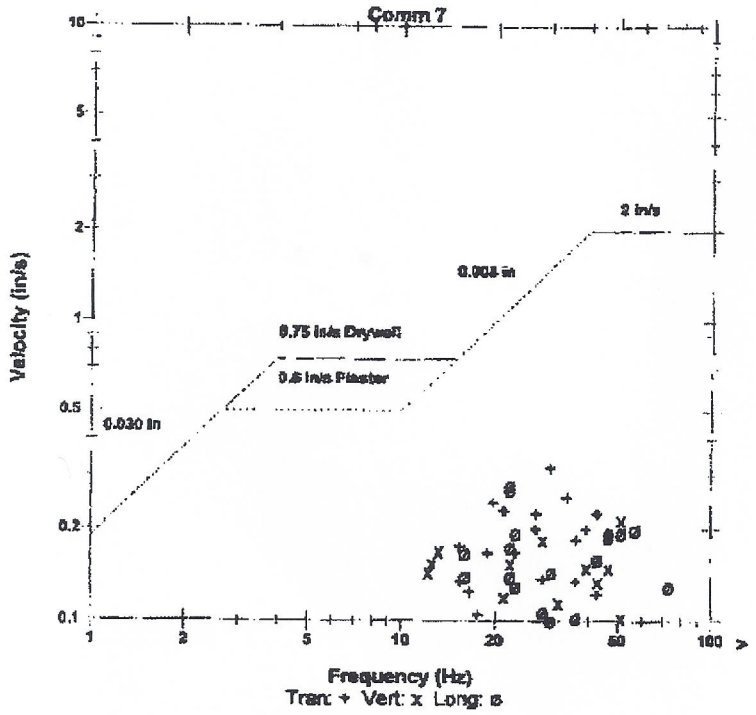
Extended Notes

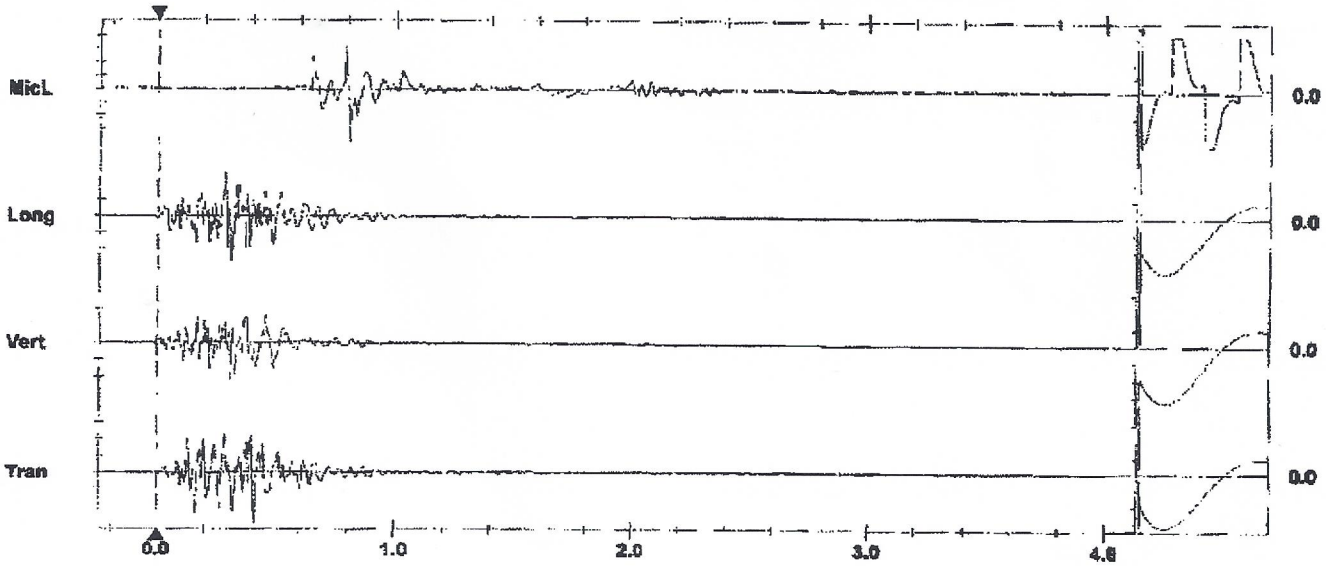
Microphone	Linear Weighting
PSPL	128.9 dB(L) at 0.807 sec
ZC Freq	9.1 Hz
Channel Test	Passed (Freq = 20.0 Hz Amp = 498 mv)

	Tran	Vert	Long	
PPV	0.320	0.215	0.280	in/s
ZC Freq	27	51	21	Hz
Time (Rel. to Trig)	0.412	0.310	0.312	sec
Peak Acceleration	0.172	0.159	0.212	g
Peak Displacement	0.002	0.002	0.002	in
Sensor Check	Passed	Passed	Passed	
Frequency	7.7	7.8	7.8	Hz
Overswing Ratio	3.8	3.5	3.8	

Peak Vector Sum 0.374 in/s at 0.286 sec

Wisconsin Administrative Code





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.002 psi(L)/div
Trigger = ▶—— ——◀

Sensor Check

p.3

Aug 15 15:07:34a

Instantel

Event Report

4/

Date/Time	Long at 13:17:01 August 12, 2015
Trigger Source	Geo: 0.020 in/s
Range	Geo: 4.999 in/s
Record Time	4.0 sec at 1024 sps

Notes
Location:
Client:
User Name: Ahlgrimm Explosives Company, Inc.
Converted: August 13, 2015 05:46:40 (V10.72)

Serial Number	4379 V 2.61 MiniMate
Battery Level	6.4 Volts
Unit Calibration	January 7, 2015 by Instantel
File Name	F379FZ6K.WD0
Post Event Notes	
Client : Yahara Oak Park	
Location : 3680 Oak Park Rd / Halverson Property Line	

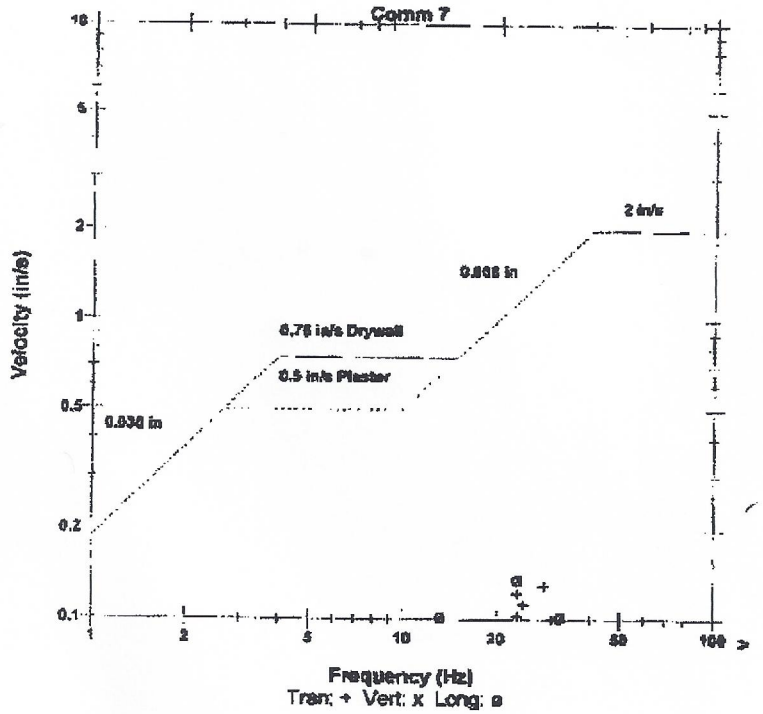
Extended Notes

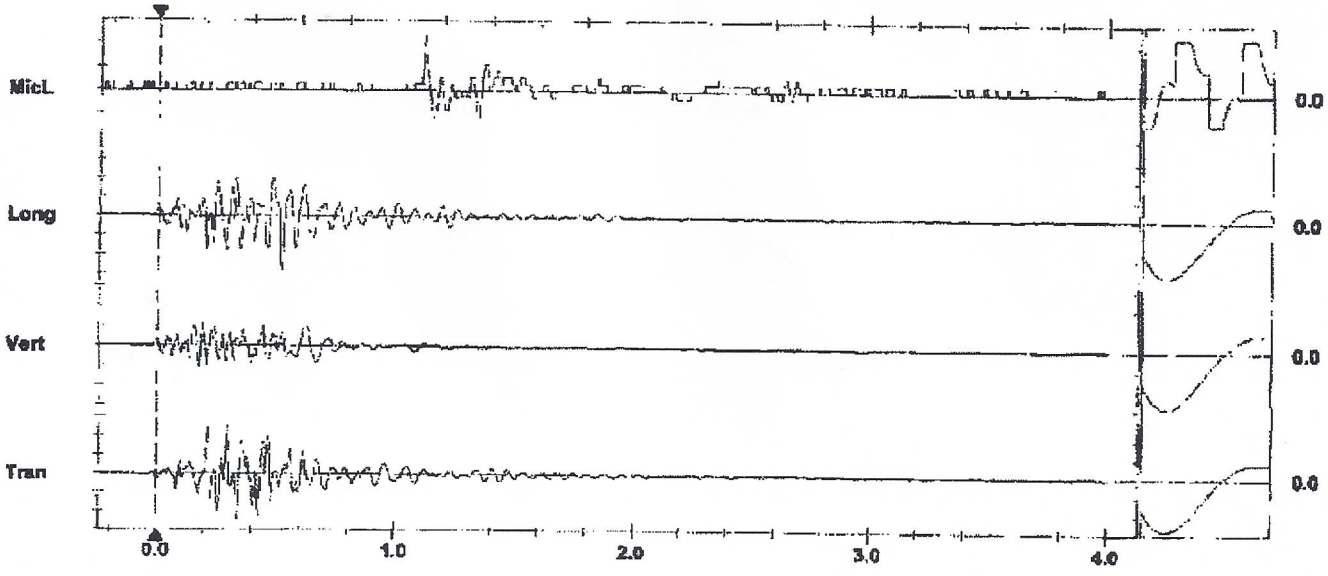
Microphone	Linear Weighting
PSPL	118.1 dB(L) at 1.112 sec
ZC Freq	8.0 Hz
Channel Test	Passed (Freq = 20.0 Hz Amp = 640 mv)

	Tran	Vert	Long	
PPV	0.130	0.055	0.138	in/s
ZC Freq	28	28	24	Hz
Time (Rel. to Trig)	0.301	0.175	0.522	sec
Peak Acceleration	0.066	0.040	0.053	g
Peak Displacement	0.001	0.001	0.001	in
Sensor Check	Passed	Passed	Passed	
Frequency	8.1	8.0	7.7	Hz
Overswing Ratio	3.8	3.5	3.8	

Peak Vector Sum 0.144 in/s at 0.522 sec

Wisconsin Administrative Code





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.050 in/s/div Mic: 0.001 psi(L)/div
Trigger =

Sensor Check

p.4

Aug 15 15:07:35a

Instantel

Event Report

Date/Time Tran at 13:16:53 August 12, 2015
Trigger Source Geo: 0.020 in/s
Range Geo: 4.999 in/s
Record Time 4.0 sec at 1024 sps

Notes
Location:
Client:
User Name:
Converted: August 13, 2015 05:20:16 (V10.72)

Serial Number 3053 V 2.61 MiniMate
Battery Level 6.3 Volts
Unit Calibration February 11, 2015 by Instantel
File Name E053FZ6K.W50
Post Event Notes
Client : Yahara Oak Park
Location : 3513 Oak Park Rd

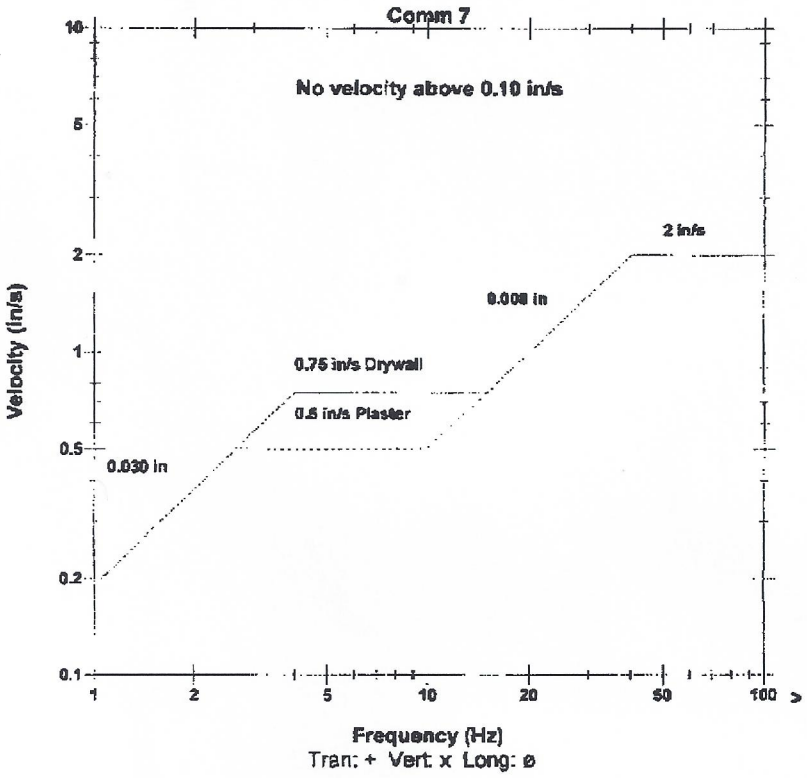
Extended Notes

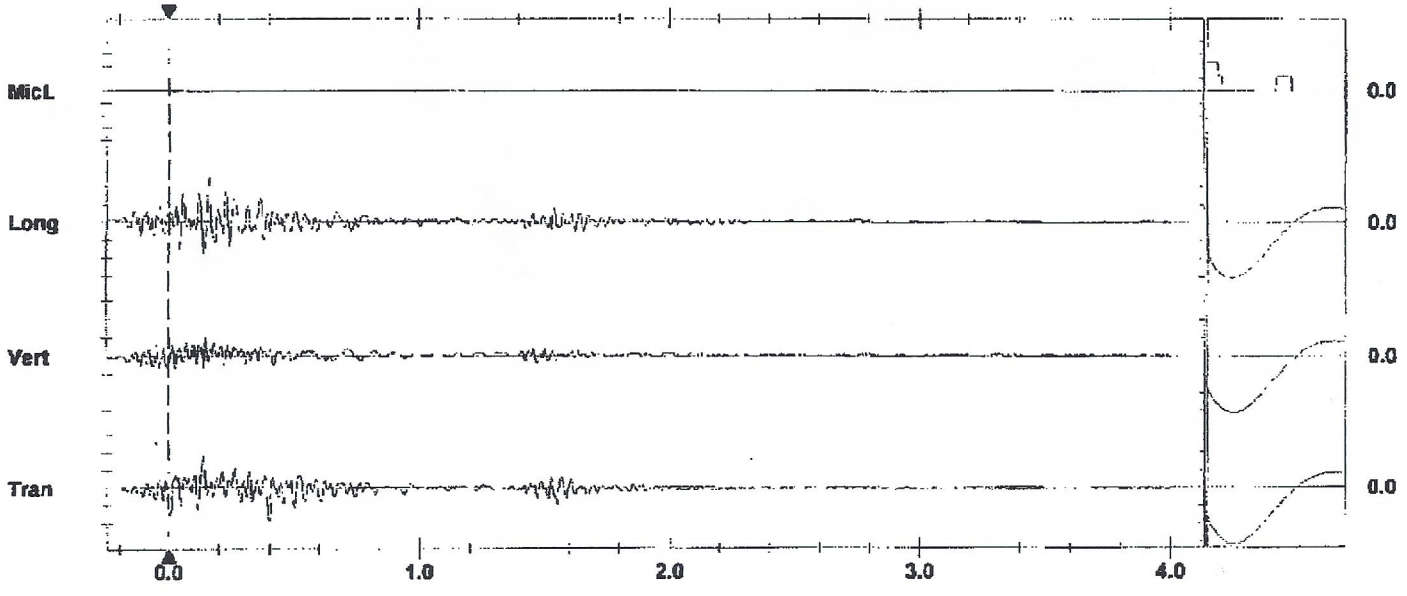
Microphone Linear Weighting
PSPL <100 dB(L)
ZC Freq N/A
Channel Test Check (Freq = 0.0 Hz Amp = 1 mv)

	Tran	Vert	Long	
PPV	0.038	0.025	0.050	in/s
ZC Freq	20	43	28	Hz
Time (Rel. to Trig)	0.138	0.148	0.163	sec
Peak Acceleration	0.020	0.020	0.020	g
Peak Displacement	0.000	0.000	0.000	in
Sensor Check	Passed	Passed	Passed	
Frequency	7.7	7.8	8.1	Hz
Overswing Ratio	3.4	3.5	3.9	

Peak Vector Sum 0.053 in/s at 0.139 sec
N/A: Not Applicable

Wisconsin Administrative Code





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.020 in/s/div Mic: 0.001 psi(L)/div
Trigger =

Sensor Check

p.1

Aug 15 15:07:34a

2015 AHLGRIMM EXPLOSIVES BLASTING REPORT

OWNER: Yahara

QUARRY NAME: Oak Park

LOCATION: Deerfield

COUNTY OF: Dane

DATE: 8-12-15

BLASTER: Trent Heins

DRILLER: Yahara

CONTINUATION OF SEISMOGRAPHS AND THEIR READINGS:

SEISMOGRAPH NUMBER:	4794			
SEISMOGRAPH VALUES:	T .193 in/sec.	T_____ in/sec.	T_____ in/sec	T_____ in/se
	V .125 in/sec.	V_____in/sec.	V_____in/sec.	V_____in/sec.
	L .145 in/sec.	L_____in/sec.	L_____in/sec.	L_____in/sec.
NO TRIGGER AT	— in/sec.	_____in/sec.	_____in/sec.	_____in/sec.
PPV	.193 in/sec.	_____in/sec.	_____in/sec.	_____in/sec.
NOISE	135.3 db.	_____db.	_____db.	_____db.
DIST. FROM BLAST	_____FT.	_____FT.	_____FT.	_____FT.
SEISMOGRAPH LOCATION:	1191 Liberty			

Instantel

Event Report

Date/Time Long at 13:16:55 August 12, 2015
Trigger Source Geo: 0.020 in/s
Range Geo: 4.999 in/s
Record Time 4.0 sec at 1024 sps

Notes
Location:
Client:
User Name:
Converted: August 13, 2015 06:46:50 (V10.72)

Extended Notes

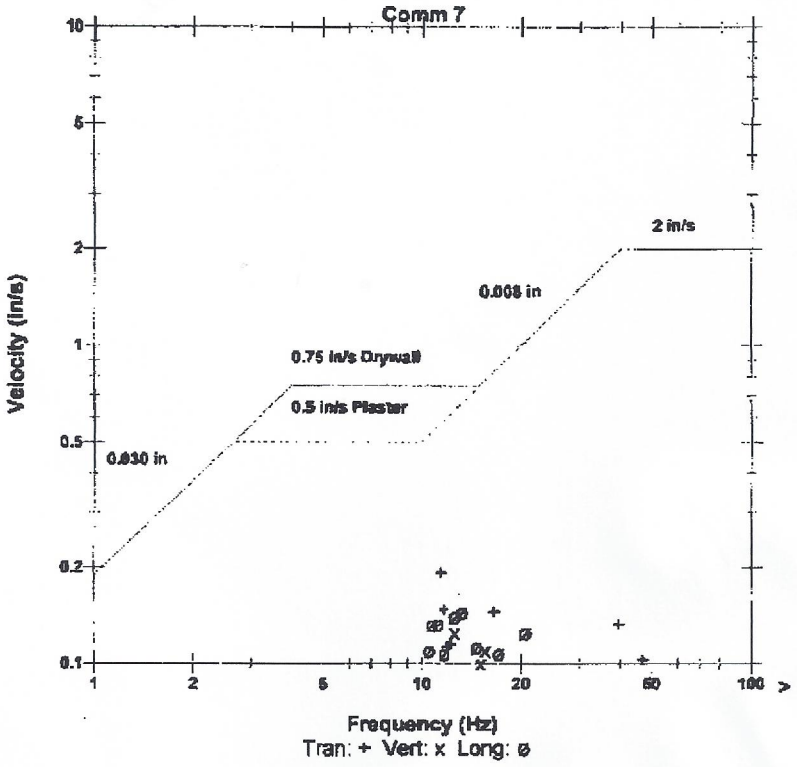
Microphone Linear Weighting
PSPL 135.3 dB(L) at 0.851 sec
ZC Freq 21 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 506 mv)

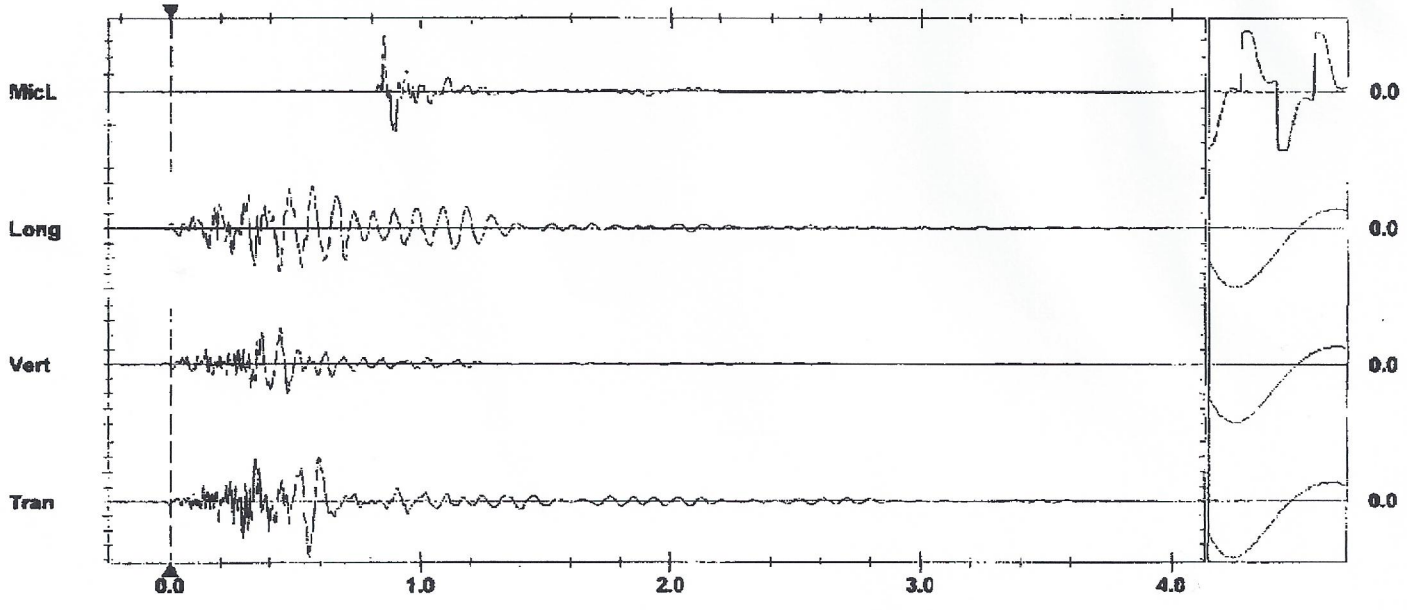
	Tran	Vert	Long	
PPV	0.193	0.125	0.145	in/s
ZC Freq	11	12	13	Hz
Time (Rel. to Trig)	0.556	0.440	0.436	sec
Peak Acceleration	0.086	0.060	0.060	g
Peak Displacement	0.002	0.001	0.002	in
Sensor Check	Passed	Passed	Passed	
Frequency	8.3	8.0	8.0	Hz
Overswing Ratio	3.5	3.5	3.5	

Peak Vector Sum 0.218 in/s at 0.559 sec

Serial Number 4794 V 2.61 MiniMate
Battery Level 6.5 Volts
Unit Calibration January 15, 2015 by Instantel
File Name F794FZ5K.W70
Post Event Notes
Client : Yahara Oak Park
Location : 1191 Liberty

Wisconsin Administrative Code





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.050 in/s/div Mic: 0.005 psi(L)/div
Trigger =

Sensor Check

Aug 15 15 06:50a

1T

Vibra-Tech

VibraTechinc.com

777 Roosevelt Road
Suite 110
Glen Ellyn, IL 60137

Phone 630.858.0681
Fax 630.858.0682

Report

To: Mr. Jon Halverson
Forever Sand & Lime
Oak Park Quarry
Deerfield, Wisconsin

Date: March 19, 2015

Subject: Review of the Proposed "Town of Deerfield Blasting Ordinance", Chapter 2: Blasting

PURPOSE

The purpose of this report is to review the proposed "Town of Deerfield Blasting Ordinance", which was drafted on March 6, 2015. Of particular focus in this report will be Section 2.08, Control of Adverse Effects of Blasting.

BACKGROUND INFORMATION ON VIBRA-TECH

Vibra-Tech has over 60 years of experience working in the construction and mining industries. We are the largest and most diversified vibration consulting company in the world and support 19 field offices nationwide. Vibra-Tech employs a world-class staff with expertise that includes Physicists, Geophysicists, Mining Engineers, Civil Engineers and Geologists. Many of our staff have over 20 to 30 years of experience in various aspects of blast consulting and vibration control. Our depth of experience results from over 20,000 structural pre and post inspections per year, thousands of vibration/sound studies, thousands of damage-claim investigations, and hundreds of public presentations.

PROCEDURE

In addition to the references that are cited within this report the following documents have been made available to the authors for review in preparing this report:

- All blast logs and seismograph recordings for the calendar year 2014
- A draft copy of the proposed "Town of Deerfield Blasting Ordinance", Chapter 2
- A letter written by Attorney Glenn M. Stoddard (retained by several adjacent property owners), which is dated March 9, 2015 and addressed to the Town of Deerfield Board of Supervisors.
- Wisconsin Administrative Code, Chapter SPS 307, Explosives and Fireworks

GROUND VIBRATION and AIR OVERPRESSURE DAMAGE CRITERIA

Seismological research by the U.S. Bureau of Mines, foreign investigative groups and individual seismologists has established criteria relating the occurrence of blast vibration damage to certain frequencies and levels of ground motion.

The most widely accepted of these studies is the USBM Report of Investigations 8507[1], which states that residential structures are most prone to damage as a result of vibration energy within the frequency range of 4-12 hertz. Within this range a 0.50 inch-per-second maximum particle velocity is recommended for the protection of plaster on lath interior construction. A maximum particle velocity of 0.75 inch-per-second is recommended for the protection of modern drywall interior construction. Above 12 hertz the maximum particle velocity limit increases as the frequency increases up to 40 hertz. Above 40 hertz, a constant 2.0 inches-per-second level is recommended to protect interior walls and ceilings of structures. Figure 1 is a graphical representation of the USBM recommended criteria as shown in the velocity versus frequency curve.

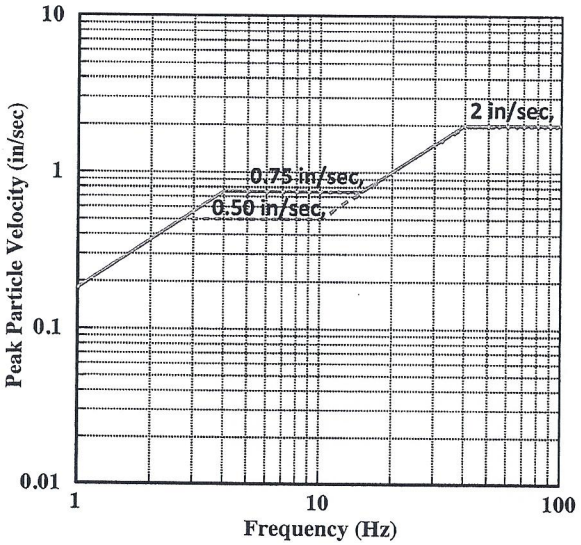


Figure 1: U.S. Bureau of Mines Recommended Vibration Criteria (From RI-8507)

The limits cited above are designed to prevent the occurrence of even threshold damage to the most brittle portions of a structure. More massive materials such as brick and mortar can withstand vibrations greater than 2.0 inches-per-second. A study by Crawford and Ward[2] established the threshold level of damage to be 3.0 inches-per-second for masonry walls regardless of type. Far greater velocities would be required to damage poured concrete. Motion on the order of 10 inches-per-second would be required before blasting vibrations could be considered responsible. Therefore, a conservative vibration limit for building elements such as poured concrete foundations and slab floors is generally accepted as being 10.0 in/sec.

In conjunction with the ground vibration recording, peak air overpressure was also monitored. Structural damage as a result of air overpressure is generally considered not to be possible without extensive window breakage, as the glass is the weakest portion of a structure's exterior where this pressure acts. Windowpanes are designed to safely withstand changes of 1.0 psi (170 dB) when properly installed, and even in the worst situation a pane should be able to withstand 0.1 lbs/in (150 dB). Air overpressures from blasting rarely exceed 0.01 psi. (130 dB), about one one-hundredth of the overpressure that a window can safely withstand.

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1 Siskind, David et al, Structure Response and Damage Produced by the Ground Vibration from Blasting, U.S. Bureau of Mines RI 8507, 1980.

2 Crawford, R., and H.S. Ward, Dynamic Strains in Concrete and Masonry Walls, National Research Council of Canada, Note 54, December 1965.

The U.S. Bureau of Mines has concluded in its Report of Investigations RI 8485[3] based on a minimal probability of the most superficial type of damage in a residential-type structure that 133 dB(L) represents a safe maximum air overpressure level for a 2 Hz High-Pass system.

RESEARCH on REPEATED VIBRATIONS from RI-8896

In 1984, the USBM published RI-8896 entitled, "Effects of Repeated Blasting on a Wood Frame House". This study was the first to document long term strain response on a house. Strain is an engineering measure of deformation used to predict failure. A strain of 1 mil/in indicates that on average, every inch of a material was stretched or compressed one thousandth of an inch. For example, the length of an eight foot long section of wallboard would change by approximately ± 0.1 in. Long-term strain measurements allowed blast-induced strains to be compared with those produced by changes in environmental factors such as temperature, humidity, and human activity.

During this study the Bureau arranged to have a wood-frame test house built in the path of an advancing surface coal mine so that the effects of repeated blasting on a residential house could be studied. In a two-year test period 587 production blasts were fired with peak particle velocities ranging from 0.10 in/sec to 6.94 in/sec. Later the entire house was shaken mechanically to produce fatigue cracking in walls. The first crack appeared in a drywall tape joint after the equivalent of 56,000 cycles. This is the equivalent of 28 years of shaking by blast-induced ground motions of 0.50 in/sec twice a day.

DISCUSSION of SEISMIC DATA COLLECTED at the OAK PARK QUARRY (2014)

During the calendar year 2014 there were a total of thirteen blasting events at the Oak Park Quarry in Deerfield, Wisconsin that is operated by Forever Sand & Lime. On every occasion at least three portable seismographs were utilized by the blasting contractor, Ahlgrimm Explosives, to measure the effects of the blasting at the quarry. For all thirteen blasts during 2014 a seismograph was set up at both 1285 Olstad Road and 3680 Oak Park Road. In addition, for twelve blasts a seismograph was set up at 3702 Nelson Lane and for eleven blasts a seismograph was set up at 1191 Liberty Lane.

The highest peak particle velocity recordings at each of the monitoring locations during 2014 was as follows:

1191 Liberty Lane:	0.420 in/sec at 11 Hz (56% of USBM RI-8507 limit for drywall)
1285 Olstad Road:	0.400 in/sec at 20 Hz (40% of USBM RI-8507 limit for drywall)
3702 Nelson Lane:	0.180 in/sec at 20 Hz (18% of USBM RI-8507 limit for drywall)
3680 Oak Park Road:	0.133 in/sec at 23 Hz (12% of USBM RI-8507 limit for drywall)

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[3] Siskind, David et al, Structure Response and Damage Produced by Airblast from Surface Mining, U.S. Bureau of Mines, RI 8485, 1980.

Figure 3 below is a data plot of all the recorded seismograph results from 2014 at the Oak Park Quarry compared to the USBM RI-8507 recommended limits for the protection of residential structures from blasting damage.

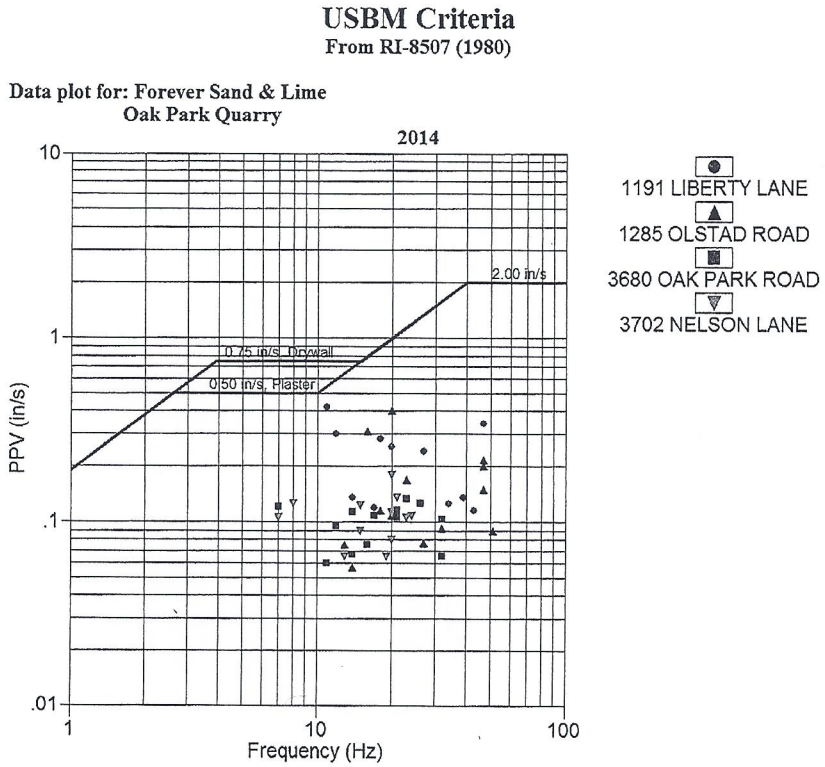


Figure 3: Oak Park Quarry Seismograph Data from 2014 compared to USBM RI-8507

The highest air overpressure recording at each of the monitoring locations during 2014 was as follows:

1191 Liberty Lane:	129 dB(L) on September 24, 2014
1285 Olstad Road:	137 dB(L) on September 24, 2014
3702 Nelson Lane:	133 dB(L) on September 24, 2014
3680 Oak Park Road:	122 dB(L) on July 22, 2014

Therefore, one of the air blasts that was recorded during this time period did exceed the USBM RI-8485 recommended maximum air overpressure level of 133 dB(L). However, other than the blast on September 24, 2014 the highest recorded air overpressure level at any monitoring location was 125 dB(L). Furthermore, only 18% of the recorded air overpressure levels during 2014 exceeded 120 dB(L).

CURRENT BLASTING REGULATIONS

Currently, the Oak Park Quarry is regulated by the Wisconsin Administrative Code, Chapter SPS 307, which establishes standards for the use of explosive materials. Section 307.44, Control of adverse effects, establishes an Airblast (aka. Air overpressure) limit of 133 dB(L) at the location of any dwelling, public building or place of employment outside the controlled blasting site area. Section 307.44 also states that

There is ample supporting evidence for the conservative safe nature of the USBM recommended limits for the protection of residential structures. As an example, in recent years numerous crack studies have been conducted with the involvement of a well-known university and various public and private entities. These studies measure and report very miniscule changes in existing cracks as they respond to blast vibrations versus weather changes. Several of these studies are summarized in the publication Micrometer Crack Response to Vibration and Weather[4] and invariably demonstrate that "Long-term or climatological crack response overwhelms the vibratory response not only at ordinary but also at high vibration levels." It also states that "cracking at vibration levels below USBM guidelines is impossible. Climatological and other environmental effects deform cracks far more than do allowable vibrations and air over-pressures."

CONCLUSION

It is Vibra-Tech's professional opinion that the limits set forth in the proposed ordinance are arbitrary and unnecessarily restrictive and should not be adopted as they are currently written. After consulting with Forever Sand & Lime our recommendations on how to amend Section 2.08 of the proposed Blasting Ordinances are as follows:

(A) Ground vibrations shall not exceed a PPV of 0.60 inches per second. However, there may only be one exceedance of that level over a rolling sample of the ten (10) prior blasting shots, inclusive of the subject.

(B) Ground vibrations shall not exceed a PPV of 0.70 inches per second from any individual blast.

(C) Ground vibrations shall not, in any case, exceed any ground vibration limitation imposed by the Wisconsin Department of Safety and Professional Services in Figure 7.44 of SPS 307, Wis. Admin. Code.

(D) The blasting operation shall not cause an airblast of an intensity greater than 128 dB(L), except that there may be one exceedance of that level over a rolling sample of the ten (10) prior blasting shots, inclusive of the subject. The maximum airblast shall not exceed 133 dB (L) from any individual blast.

Respectfully Submitted,
Vibra-Tech, Inc.

Mike Spors
Area Manager

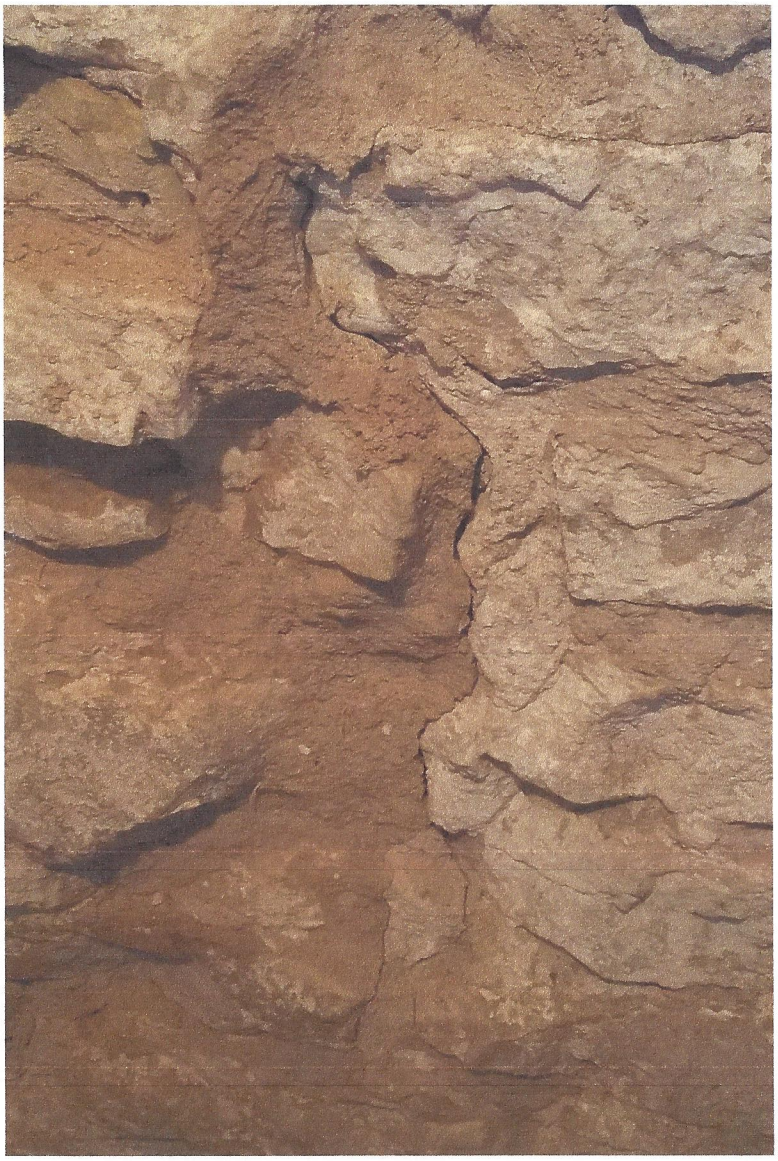
Phyllis Hasser
VP / Area Manager

[4] "Micrometer Crack Response to Vibration and Weather", Charles H. Dowding, 2008, International Society of Explosives Engineers

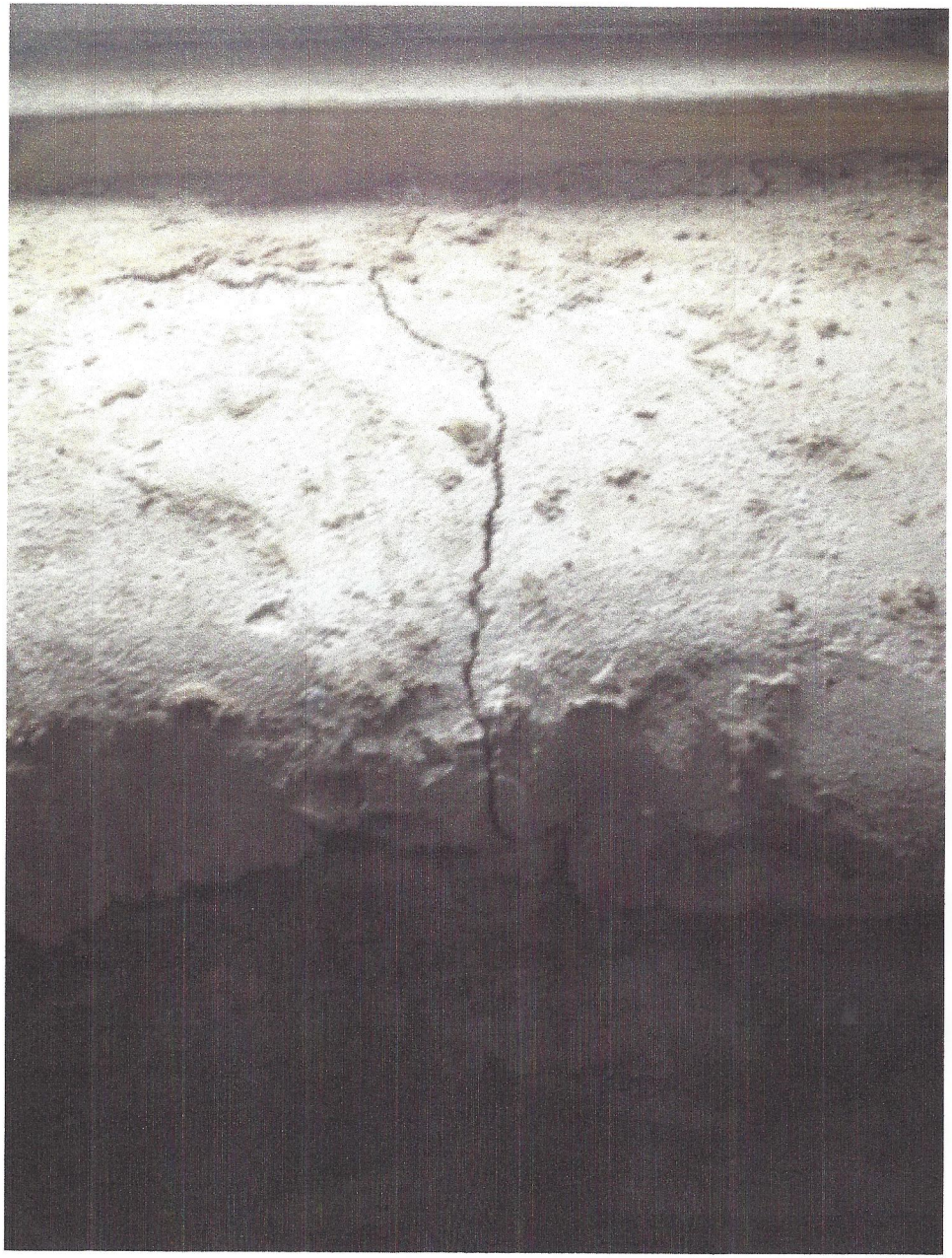
Jan. 2016

Schuster's Farm

Round Barn wall 1



Jan. 2019



Jan. 2016

Schuster's Farm
Round Barn sill 1

Jan. 2019

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