Executive Summary

To obtain a special land use permit for aggregate mining in Sharon Township, a mining applicant must prove its proposed mine will **not create any very serious consequences** for the township or its residents.

Stoneco of Michigan has applied for a special land use permit in order to create a 400-acre mine on Pleasant Lake Rd in Sharon Township. It has submitted its application and provided approximately 850 pages of supporting data and information. Based on the data and information, *Stoneco concludes its proposed mine will not create any very serious consequences.*

Sharon Preservation Society believes **Stoneco cannot draw that conclusion based on the data it provides.** This is NOT to say the data is inaccurate. However, in a number of instances, the data provided with the application is either incomplete, irrelevant, or inconclusive.

Specifically:

- **RE: Regulated Wetlands and Inland Streams** – *Stoneco claims the groundwater, surface water, soils and wetlands in the Township will not be adversely affected by the proposed mining operation*. However, the methodology and data provided do not prove that. In fact, it seems highly likely that regulated wetlands would be drained.
- **RE: Property Values** – Stoneco claims *there is no detrimental impact on residential market values resulting from proximity to an active gravel mining operation* but the data in the report submitted does not prove that. The data is insufficient and irrelevant, and the methodology for its statistical analysis is questionable.
    - **The study's analysis is not relevant. The study does not measure change in property values BEFORE and AFTER the start-up of a gravel mine.**
    - The report uses residential sales data from four study areas surrounding other aggregate mines in Washtenaw County – **but the mines in these study areas are not comparable to the mine proposed for Pleasant Lake Rd. Therefore, the conclusion would not be applicable.**
    - The study's author chose **only two variables on which to conduct analysis – this is insufficient and irrelevant to inform the conclusion**.
    - **The statistical analysis uses a less-then-optimal statistical methodology.**
- **RE: Traffic** – Stoneco claims *the proposed mine is not expected to significantly increase the traffic operations at the nearby intersection of Pleasant Lake Rd and M-52.* **The data for this claim is insufficient.**
- **RE: Health, Safety, and Welfare Interests** – Stoneco claims *it does not expect any impact from proposed use would be realized from the proposed operation*

    - **The Noise, Dust and Fumes Evaluation** relies on irrelevant data. The evaluation measured noise, dust and fumes from a mine that is smaller, has less output and appears to use different equipment.
    - The potential harm from silica **is not adequately addressed to satisfy public concern**.
    - **The Vibration Discussion** also relies on irrelevant data by taking measurements from a mine that has less output and appears to use different equipment.
- **RE: Economic Impact on the Township-** We do not know if a 400-acre mine will produce more economic benefits than losses.
- **RE: Cumulative Effect of Numerous Health, Safety, and Welfare Interests -** There are a number of individual areas in which a very serious consequence is possible or likely. We must also recognize the **cumulative effect** of all of these consequences **increases the overall harm** to the Sharon Township and its residents.

We have attached our specific findings in each of these areas. We expect the Planning Commission and Township Board to give this application the full measure of deliberation it is due.

Impact on Wetlands

Summary

In its application for Special Land Use (Part C (d)), Stoneco claims *"the groundwater, surface water, soils and wetlands in the Township will not be adversely affected by the proposed mining operation*.

However, the methodology and data provided do not prove that. In fact, it seems highly likely that regulated wetlands would be drained.

Specific Findings

See attached report from Pangea Environmental, LLC.

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Impact on Property Values

Summary

In its application for Special Land Use (Part C (b)), Stoneco claims, "According to the research and analysis of the data collected via George Bratcher of Bratcher & Associates, and the statistical analysis prepared by NRM, *there is no detrimental impact on residential market values resulting from proximity to an active gravel mining operation and or along proposed haul routes.*"

However, **neither the data nor the methodology in the Bratcher report support this claim**.

As concerned citizens, we've reviewed the report and consulted the following resources:

- A Certified General Appraiser, licensed in the State of Michigan with credentials similar to Mr. Bratcher's, who reviewed the report.
- Jim Brouwer, President of Friends of the Platte River Watershed, whose written summary is attached. Jim offers important credentials for a review: he studied statistical analysis in college; he has professional experience in business development using experimental design; and he studied, in-depth, the impacts of a proposed gravel mine near his home in Inland township.

- A report by the W.E. Upjohn Institute commissioned by Richland Township near Kalamazoo, Michigan in 2006, also attached. The W.E. Upjohn Institute is a non-profit economic research organization.
- Common sense, which would dictate that, of course, property value will be impacted by the intrusion of a 400-acre gravel mine that produces noise, dust, fumes and up to 300 daily round trips by gravel trucks daily. A residence next to such a disruption would not be able to command the same price as the same home in a pastoral setting. **Location. Location. Location.**

Specific Findings

1. **The study's analysis is not relevant. The study does not measure change in property values BEFORE and AFTER the start-up of a gravel mine.** In other words, this report does not determine whether or not a home near the proposed site in Sharon Township **would lose value after a mine began operations** OR if that home **would appreciate less than other homes after a mine began operations.**
    - The study looks at homes in the vicinity of four active gravel mines, and attempts to measure the correlation between the distance from the mine and two variables: price/sq foot and days on market. It does not measure the impact on the value of an established property's AFTER a mine begins operations.
    - According to a W.E. Upjohn report, all properties in proximity to the mine realize a decline in property value after the mine begins operation. **After that initial decline**, property values tend to increase at approximately the same rate as properties in the area that are not near the mine. After the initial loss, the value of properties near the mine never "catch up" to the values of similar properties away from the mine, and in fact the price spread between the two actually increases over time due to compounding.

2. **The Bratcher report uses residential sales data from four study areas surrounding other aggregate mines in Washtenaw County – but the mines in these study areas are not comparable to the mine proposed for Pleasant Lake Rd. Therefore, the conclusion would not be applicable.** The mine proposed for Pleasant Lake Road is significantly bigger, and has significantly more output and related activity than the study areas used in the Bratcher study.

    - Three of the four are considerably smaller than the proposed 400 acre mine in Sharon Township - ¼ to ½ the size of the proposed mine. The fourth is similar is size, but we don't know the ouput or level of activity.
    - The depiction of one of the mines used for comparison – the one in Sharon Township – is inaccurate. The figure in the study depicts a mine more than double in size to the actual mine.

- The annual output of any of mines used for comparison is significantly less than that of the proposed mine in Sharon Township. For instance, Stoneco owns two of the mines and states their combined output is 1.5 million tons per year - equal to the predicted output of the proposed site for Sharon Township. One can reasonably assume the mines used for comparison generate less truck traffic, less noise, less dust, and less disruption.

3. The study's author chose **only two variables on which to conduct analysis – this is insufficient and irrelevant to inform the conclusion**.

   - Only two variables were considered (price per sq. ft. and proximity to mine). Many more factors go into home valuation than these (as acknowledged on page 15), but all the other factors were not accounted for or controlled in any way.
   - Square footage has little, if any, impact on any meaningful analysis. One property could be a mansion, the next a hovel - their value will decline after a mine opens, regardless.

4. **There are alternative methodologies for the statistical analysis that might have been more reliable.**

   - NRM used ANOVA (Analysis of Variance) methodology rather than MANOVA (Multi-level Analysis of Variance). MANOVA takes into account whether or not the data sets interact with one another. *(See Brouwer memo)*

   - The results indicated very low (if any) correlation between price per sq. ft. and proximity to a mine. Correlation (or lack thereof) is simply an observation that says nothing about why there is or is not a relationship between the two variables. No cause-and-effect conclusions can be made. More intense statistical analysis is needed before any cause/effect statements can be made.

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Impact on Traffic

Summary

In its application for Special Land Use (Part C (c)), Stoneco claims *the proposed mine is not expected to significantly increase the traffic operations at the nearby intersection of Pleasant Lake Rd and M-52.*

However, the data to support this claim is insufficient.

Specific Findings

Stoneco uses a report from Midwest Consultanting, but the scope of the report is limited.

1. The report only measured traffic on a single day, Wednesday, June 8, 2022. Data from a single day is hardly sufficient to draw reliable conclusions.
2. The report only measures the impact on wait times at the intersection of Pleasant Lake Rd and M-52. It does NOT address the impact of the dramatic increase of heavy truck traffic on:

    - Drivers entering and exiting residential driveways on M52.
    - Emergency vehicles for which M52 is the only corridor to access the Sharon and surrounding townships to the south of Chelsea.
    - Schoolbus traffic for both Manchester and Chelsea schools

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Impact on Identifiable Health, Safety, and Welfare Interests:

Noise, Dust, Fumes, and Vibration

Summary

In its application for Special Land Use (Part C (d)), Stoneco claims, “NRM conducted an evaluation of noise, respirable dust, respirable silica, diesel vapors, and diesel particulates, groundwater, odor, light and vibrations at current operations that will be similar in setting, hours of operation, site access, and haul route use at the proposed facility… Based on the evaluation of these environmental factors conducted by NRM and observed by Stoneco at similar

operations, *we do not expect any impact from proposed use would be realized from the proposed operation."*

Stoneco submitted two documents to support this conclusion: Noise, Dust and Fumes Evaluation, prepared by NRM, and the Vibration Discussion, prepared by Vibratech.

- **Both reports are based on irrelevant data.**
- The potential harm from silica **is not adequately addressed to satisfy public concern**.

Specific Findings

Both reports rely on irrelevant data. The data was collected at other Stoneco aggregate mines, that are not comparable to the proposed mine on Pleasant Lake Rd.

1. **The Noise, Dust and Fumes Evaluation** measured noise, dust and fumes at Stoneco's Zeeb Rd mine. However:

    - The Zeeb Rd mine is considerably smaller - it appears to be approximately 100 acres compared to the 400-acre proposed mine on Pleasant Lake Rd.
    - It produces significantly less output than the proposed Pleasant Lake Rd site – this is based on the fact that the Zeeb Rd mine, combined with the Burmeister pit (another Stoneco mine) produce 1.5 million tons of gravel annually. The proposed Pleasant Lake Rd mine will produce this much gravel annually – by itself.
        - Based on size and volume alone, it seems reasonable to conclude that there will be significantly less noise, truck fumes, and dust at the Zeeb Rd. mine.
    - In addition, according to the Noise, Dust and Fumes Evaluation, the Zeeb Road plant was not operating the same equipment that will be in operation at the proposed Pleasant Lake Rd site.
        - According to the report, sound and sound pressure readings were taken at the Zeeb Rd plant on a day when the following equipment was in operation: floating dredge, mobile equipment (haul trucks and loaders), and conveyors. However, the proposed site on Pleasant Lake Rd will incorporate all of these machines, **plus stone crushing equipment**, which is most likely the noisiest of the various mining equipment. According to a Washington State Study that measured noise levels on microphones attached to a number of mine workers, crusher operators were exposed to the greatest noise levels (attached)
        - According to the report, the respirable dust and silica sampling was conducted on a day when the following equipment was in operation: mobile equipment (haul trucks and loaders), unspecified processing equipment.

Again, it does not specify that a crusher was in use during the evaluation period for dust and silica.

2. **Regarding respirable dust and silica**: the dangers posed by respirable dust, especially silica dust, are well-documented:
    - Exposure can result in irreparable lung damage – which does not manifest for many years after exposure.
    - Silica travels airborne for long distances and it's unlikely the berms around the proposed mine will contain the dust that blows from the stock piles. Sharon Township is considered a relatively windy area – a study by Washtenaw County in 2008-09 measured the wind just a few miles north on M52, near the Chrysler Proving Grounds. The study indicated the site was almost viable for a wind farm.

Yet, the report concludes that "operations at the plant are not likely to produce dust at concentrations that would affect the health of residents or *cause more dust to migrate off the proposed site than would naturally migrate off the site if no mining occurred*."

- This seems preposterous. How could it be physically possible for the current agricultural use to create or release as much respirable dust or silica as a gravel mine? The agricultural operations do not include digging, conveying, crushing, and creating large open stock piles.
- The report also asserts that mining operations at the Pleasant Lake Rd site will be conducted on glacial outwash materials beneath the site. It goes on to say, "This type of mining is not to be confused with silica sand mining and processing. The material being mined at the proposed site is similar to hundreds of operations in southern Michigan where there is no history of silicosis in long-term sand and gravel works." Note:
    - While *silica sand mining* is clearly a more certain threat than other *sand and gravel mining*, silica is almost certainly present in the sand and rock in SE Michigan. There is no way to know with certainty that mining one site will produce the same levels as another.

Finally, in its application, Stoneco's submitted a rebuttal to a 2022 study conducted by Michigan State University in the Journal of Occupational and Environmental Medicine. The MSU study suggests an increase in breathing concerns among aggregate workers. The rebuttal, submitted by Stoneco, was published in Rock Products magazine, a trade publication for the mining industry. The credibility of the rebuttal needs to be scrutinized.

3. **The Vibration Discussion** is a report on the vibrations produced at Stoneco's Burmeister operation. Again, the comparison between the Burmeister site and the proposed Pleasant Lake Rd site is not valid.
    - The Burmeister mine produces significantly less output than the proposed Pleasant Lake Rd site – this is based on the fact that the Zeeb Rd mine, combined with the Burmeister pit (another Stoneco mine) produce 1.5 million tons of gravel annually. The proposed Pleasant Lake Rd mine will produce this much gravel annually – by itself.
    - In addition, the Burmeister plant was not operating the same equipment that will be in operation at the proposed Pleasant Lake Rd site.
        - According to the report, "Common pieces of equipment utilized at the mine would be a front-end loader, dump trucks, bulldozer, and excavator." However, the proposed site on Pleasant Lake Rd will incorporate all of these machines, plus stone crushing equipment, **plus stone crushing equipment**, which is most likely the noisiest of the various mining equipment. According to a Washington State Study that measured noise levels on microphones attached to a number of mine workers, crusher operators were exposed to the greatest noise levels (attached)

Impact on Identifiable Health, Safety, and Welfare Interests: Cumulative Effects

The proposed 400-acre mining operation is likely to result in a number of very serious consequences that will negatively impact Sharon Township and its residents. **We must also recognize the cumulative impact of these consequences which will be more harmful than any one of them in isolation.**

Overall Public Interest in the Proposed Extraction: Economic impacts

The long-term economic impact on the township is unclear, and may well be negative.

While we don't yet know how much, if any, tax benefit will accrue to the township from the proposed mining operation, we can predict some detrimental impacts to the township.

- The operation is unlikely to generate enough local employment to benefit the township.
- Stoneco provides "agricultural or wetlands/waterfowl conservation habitat" as conceptual end uses for the site's reclamation plan. Agricultural seems highly unlikely, given the limitations imposed by the size and shape of the available land. Wetlands/waterfowl conservation remains the only suggested use. The ownership and potential tax benefit of such a property is questionable.

Pangea Environmental, LLC
Mike Wilczynski
Certified Professional Geologist
Pangea52@yahoo.com
248.318.4732

February 14, 2023

Sharon Preservation Society
P.O. Box 1
Chelsea, MI 48118

RE: Potential Adverse Impacts to Adjoining Wetlands and Inland Waters from the Proposed 400-acre mine on Pleasant Lake Rd, Sharon Township, Washtenaw County

Pangea Environmental, LLC has reviewed the data submitted by Stoneco of Michigan related to the hydrogeology of the wetlands and inland waters adjoining the proposed aggregate mine. Natural Resources Management (NRM), the firm retained by Stoneco to conduct the hydrogeology studies, concludes that wetlands and regulated inland water will not be impacted by the mining and creation of lakes under Part 301 of the Natural Resources and Environmental Protection Act (NREPA). We strongly disagree.

The wetlands are regulated by the Michigan Department of Environment, Great Lakes and Energy (EGLE) under Part 303 of NREPA and also by a local wetland ordinance, which regulates wetlands 2 acres and larger.

The computer model and other calculations used by NRM may not apply to the groundwater and surface water in the wetlands and Comstock Drain because these are not features that fit the steady state, or unchanging conditions, assumption used in the model.

The steady state conditions may apply to the main aquifer, but not to the limited area of the wetlands and inland waters. There is a limited supply of shallow groundwater and surface water that form the wetlands and Comstock Drain, so steady state conditions may not be achieved.

Groundwater elevation measurements from the monitoring wells and piezometers were collected from only a brief time period. (see attached Table 1: Groundwater Elevation Summary, NRM).

Groundwater elevation data were collected from 3 monitoring wells for approximately one year and the data indicate a variation in the groundwater elevation that ranged from approximately 2.1 to 2.6 ft. Longer term variations that are greater also likely exist.

The other three monitoring wells were not installed until later in the study and the water elevations were only collected twice in August 2022, so the variation is not known with certainty. However, it can be assumed to be similar to what was noted previously.

The groundwater flow map in the submittal from NRM is from the groundwater elevation data from one instance in time. This variation in the groundwater elevation needs to be kept in mind when reviewing groundwater flow maps and projected groundwater elevations.

We will examine this in more detail as we discuss the potential impact to the regulated wetlands and inland water (Comstock Drain).

NORTH LAKE IMPACT

According to the submitted information, the initial mining will start in the northern part of the 400 acres and will move south. Initial mining is to be above the groundwater and the mineral processing will utilize water from a 2-acre lake for process water. The expected flow rate in the report is 6000 gpm.

We attempted to run EGLE's Water Withdrawal Assessment Tool (WWAT) for the proposed 6000 gpm water withdrawal from the two-acre lake to be used for process water. The result was that a water withdrawal greater than 1388 gpm must have an EGLE site specific review. WWAT evaluates the proposed water withdrawal on surface water resources in the area.

We then ran the model for various withdrawal rates below the 1388 limit to gauge the potential impacts of withdrawing water from the two acre lake. For example, even a 1200 gpm withdrawal for 12 hr/day, 6 days/week for April through October indicates there may be adverse impacts to aquatic resources and surface water. The result is the withdrawal will need a site-specific review by EGLE.

In addition, if any additives are used in the processing, the operation may also require a Groundwater Discharge Permit from EGLE.

Review by EGLE should be completed before an approval is granted, simply because it may raise or support a "Very Serious Consequence" under the Michigan Zoning Enabling Act. Without this permit the mine plan, as presented, cannot move forward due to the lack of process water. Its review by EGLE may also raise issues that may be "Very Serious Consequences".

NRM believes the surface water level for the North lake will be 950 ft above mean sea level (asl). We do not believe this is accurate. A range of elevation would have been more

Pangea Environmental, LLC
Mike Wilczynski
Certified Professional Geologist
Pangea52@yahoo.com
248.318.4732

appropriate as the groundwater will become the surface water in the mine. Remember the variation in groundwater levels of approximately 2 to 2.5 ft in the monitoring wells? In the text, NRM does acknowledge seasonal variations. However, this is not conveyed in the figures.

Monitoring well MW1 is immediately adjacent to the east of proposed North Lake. The groundwater elevations measured in that well ranged from 946.24 ft asl to 948.83 ft asl. Water flows to the lowest possible elevation, so 950 ft asl for the North Lake appears to be optimistic.

The likely elevation could be closer to 946 ft to 949 ft asl. Based upon the water table elevation measured in MW 1.

Also, monitoring well MW 6 is to the immediate southeast of North Lake and had a groundwater elevation of 949.60 and 949.64 the two times the groundwater elevations in the well were measured in august 2022. With expected annual variation, this also does not support an elevation in the North lake of 950 ft.

The surface elevation of North Lake is important because the lower the elevation of the surface water, the greater the potential for adverse impacts to wetlands and Comstock Drain.

Piezometers PZ-1, PZ-2 and PZ-3 are installed near the proposed North Lake. The groundwater elevation data was collected for the most part over a very limited time frame. Most of the elevation data was collected in late summer when the groundwater in the regulated wetlands would be near the lower end of its annual variation. Even so, groundwater was as high as 951.12 in one piezometer (PZ-3) measured in late August. The other two both had groundwater elevations exceeding 950 ft.

This is important because groundwater flows to the lowest elevation, just like surface water. NRM asserts a surface water elevation of 950 ft asl for the North Lake. Based upon the groundwater elevation data supplied by the applicant, it appears the surface water elevation of North lake will likely be low enough to drain the regulated wetlands and impact Comstock Drain. Our expected lower water level of North Lake just increases the potential for adversely impacting wetlands and Comstock Drain.

There was no data provided to assess the impact on surface water (Comstock Drain) regulated under Part 301 of NREPA. The surface water in the drain that originated as a creek will respond to changes in groundwater elevation similar to the wetlands.

The proposed withdrawal of 6000 gpm from the proposed two acre lake for process water may also have an adverse impact on the regulated wetlands and surface water by lowering the

groundwater level. The proposed withdrawal failed EGLE WWAT screening. WWAT provides the initial review of a water withdrawal on surface water resources.

Pumping test data would be useful in determining the safe water withdrawal rate and also estimating the impact on the groundwater levels in the wetlands and Comstock drain caused by the water withdrawal and mining activity. It would have been useful in determining a safe distance to keep between the lake created by mining and the wetlands and inland water.

Any estimate without a pumping test is suspect. A 24 to 72 hour pumping test is normally required to obtain accurate hydraulic properties of an aquifer. The aquifer is the water supply for the 2 acre lake and the lakes created by mining.

Once the Lakes are created, the water level can also fluctuate due to mining and water withdrawal for processing activities. This is not accounted for in the application.

The Part 301 and 303 permits required under NREPA should be obtained prior to final approval of the mine. The review by EGLE may support the potential for a “Very Serious Consequence” to occur as a result of mining activities.

CENTER LAKE IMPACT

The proposed surface water elevation given for Center Lake by NRM is 949 ft asl. As stated in our discussion of the North Lake a range of elevations would have been more accurate as to the actual conditions due to annual seasonal and longer term variations.

With the permeability of the geological material being mined all three lakes will probably reach the same elevation. So, the 949 ft elevation given for Center Lake and South Lake also supports our assertion that the 950 ft elevation for North Lake is too high.

Individually, wetlands 3 and 4 each have a surface expression of less than 2 acres. However, the two wetlands are very close to each other and could be connected in the subsurface and combined exceed a surface area of two acres. An impact to one would likely impact the other. Therefore, these wetlands may be regulated under the Township Wetland Ordinance. The Township wetland Ordinance requires review by the Township Wetlands Board, according to the Township ordinance.

The groundwater elevations were only collected on two occasions in August 2022 from piezometers PZ-4 and PZ-5 and the elevations were approximately 960 ft asl, well above the 949 ft projected by NRM for the Center lake and we are contesting the surface water elevations

projected for the Lakes. Based upon the groundwater data from piezometers PZ-4 and PZ-5, the wetlands are most likely perched upon a clay rich layer and may likely drain if the clay rich layer is removed by mining.

SUMMARY

On review of the information submitted by NRM, we do not believe Stoneco or NRM have demonstrated there will not be serious adverse impacts to regulated wetlands and inland waters under NREPA and local ordinance.

Even with the overly optimistic water levels of the created lakes, there is evidence the wetlands and Inland water may be impacted by the mining. We attach two photos of a pond, now drained, that was located on property adjoining an aggregate mine in Gaines Township, Kent County. The situation is similar to that found on the wetlands adjacent to the proposed 400-acre mine on Pleasant Lake Rd.

We are available for more discussions on this important subject. Attached is a resume.

Pangea Environmental.LLC
Mike Wilczynski
Certified Professional Geologist-Emeritus
Hydrogeology and Mining

Pangea Environmental, LLC
Mike Wilczynski
Certified Professional Geologist
Pangea52@yahoo.com
248.318.4732

Table 1: Groundwater Elevation Summary

Well ID & Date	MW-1	MW-2*	MW-3	MW-4	MW-5	MW-6	PZ-1**	PZ-2	PZ-3	PZ-4	PZ-5	PZ-6	DM-1	DM-2
8/25/2022	947.39	950.46	948.54	950.094	948.718	949.597	948.78	950.34	951.12	959.27	961.23	981.69	949.48	948.96
8/16/2022	947.46	950.53	948.61	950.074	948.778	949.637	dry	950.02	951.03	959.23	961.20	981.61	949.20	948.63
8/4/2022	947.55	950.51	948.73	-	-	-	-	95.048	-	-	-	-	-	-
6/14/2022	948.56	951.12	949.15	-	-	-	-		-	-	-	-	-	-
5/5/2022	948.83	951.10	948.94	-	-	-	-	951.05	-	-	-	-	-	-
4/12/2022	948.77	950.97	948.76	-	-	-	950.04	950.93	-	-	-	-	-	-
3/17/2022	948.31	950.71	948.62	-	-	-	-	-	-	-	-	-	-	-
2/16/2022	947.28	950.27	948.19	-	-	-	-	950.17	-	-	-	-	-	-
1/18/2022	947.84	950.17	948.05	-	-	-	-	951.04	-	-	-	-	-	-
12/8/2021	947.49	949.83	947.71	-	-	-	-	950.10	-	-	-	-	-	-
11/9/2021	947.46	949.54	947.3	-	-	-	-	-	-	-	-	-	-	-
10/21/2021	946.71	949.28	947.12	-	-	-	-	-	-	-	-	-	-	-
9/17/2021	946.72	949.21	947.18	-	-	-	-	-	-	-	-	-	-	-
8/17/2021	947.2	949.41	947.35	-	-	-	-	-	-	-	-	-	-	-
7/19/2021	947.49	949.44	946.94	-	-	-	-	-	-	-	-	-	-	-
6/14/2021	946.24	948.93		-	-	-	-	-	-	-	-	-	-	-

Datum NAVD 88 Michigan State Plane Coordinate System feet, mean sea level.

"-" Not Collected
*MW-2 was discovered to have been damaged on 6/14/22 and re-surveyed (original TOC 977.48 ft.msl)
**PZ-1 Replaced and resurveyed on 8/25/22 (original TOC 954.68 ft.msl)

From NRM Wetland and Stream Delineation Report

Pangea Environmental, LLC
Mike Wilczynski
Certified Professional Geologist
Pangea52@yahoo.com
248.318.4732

Photos of drained pond adjacent to aggregate mine in Gaines Township, Kent County. In lower photo, the pond owner is shown (circled) for scale.

Resume of Michael Wilczynski, CPG-Emeritus

Education

Wayne State University, Detroit, Michigan, B.S., with Distinction, MS, Geology.
University of Wisconsin-Milwaukee, Post-Graduate Studies in Hydrogeology.
Tulane University, MBA Accounting Course.

Employment

Pangea Environmental, LLC, 2020 to present. Founder and principal, after retirement, in 2015. Pangea primarily works as a technical advisor for non-profits and community groups, often on a pro bono basis. Projects have included environmental and human health issues related to aggregate mining, groundwater contamination, and flooding. Recent expert witness testimony includes a class action lawsuit against the City of Detroit et al. and an Administrative Law Hearing against EGLE for the issuance of a Part 303 wetland permit.

Michigan Department of Environmental Quality (MDEQ), Remediation and Redevelopment Division, Warren Office, 2003 to 2015. As a Senior Geologist, oversaw responsible-party and state-funded environmental and remediation projects, mostly in Wayne County and Detroit. Responsibilities included senior level review of projects managed by others, as part of the Quality Review Team process; presentations related to geology, groundwater, and Part 201 and 213 Administrative Rules. Provided expert testimony in a bankruptcy in which the State obtained a $4.9 MM judgment. MDEQ Director's Award, 2006.

Macomb Community College, Clinton Township, Michigan. Adjunct Instructor, 2005-2018. Taught earth science and mentored students seeking to major in geology upon transfer to a university.

Omimex Energy, Inc., Site Remediation Manager/Hydrogeologist, Mason, Michigan, 1994-2002. Managed soil and groundwater remediation programs for Omimex Energy, an independent oil and gas producer based in Fort Worth, Texas, with responsibility for development of site investigation and remediation strategies, including technical and managerial responsibilities for budget cost estimates and communications with partners. Primary work was in Michigan, with additional projects in Oklahoma, and in Alberta, Canada, and Colombia, South America. In addition, performed environmental studies related to the acquisition of oil and gas properties, served on the Michigan Oil and Gas Association's Environmental Committee and presented several technical presentations to professional associations.

Superior Environmental Corp, Brighton, Michigan, Project Manager/Geologist, 1993-1994. As project manager for environmental investigation and remediation projects, was responsible for the technical accuracy, tracking budgets, and setting schedules. Also responsible for business development and meeting prospective clients.

Mcnamee Industrial Services, Ann Arbor, Michigan, Project Manager/Geologist ,1991-1993. As project manager for environmental investigation and remediation projects, was responsible for the technical accuracy, tracking budgets, and setting schedules. Also responsible for business development, proposal preparation and presentations, and meeting prospective clients. Responsibilities also included pre-construction environmental studies prior to sewer and road construction, municipal well projects, and contamination sites.

Geraghty and Miller Groundwater Services (now Arcadis), Milwaukee, Wisconsin and Troy, Michigan, Project Scientist/Hydrogeologist,1990-1992. As project manager for environmental investigation and remediation projects, was responsible for the technical accuracy, tracking budgets, and setting schedules. Also responsible for business development, proposal preparation and presentations, and meeting prospective clients. Projects included USEPA Superfund sites and other sites with soil and groundwater contamination.

University of Wisconsin-Milwaukee, Teaching Assistant, 1989. Taught mineralogy and x-ray lab sections while taking graduate closer work in Hydrogeology.

Unimin Corp, Utica, Illinois and Spruce Pine, North Carolina, Senior Geologist/Hydrogeologist, 1987-1989. Primary responsibility for mine geology and ore grade control at Unimin's North Carolina ultra-high purity quartz mine and shared geological responsibilities at the company's industrial sand operations, including reserve determination, ore grade, permitting, and hydrogeological studies.

International Mineral and Chemical Corp, Colony, Wyoming, Geologist, 1984-1987. Responsible for industrial mineral exploration, mine development, reserve management, and negotiation of purchase and sales agreements for mineral reserves in the western United States..

Gulf Oil Corporation (now Chevron), New Orleans, Louisiana, Exploration Geologist, 1981-1984. Developed a geological model for the Miocene trend in the central Texas offshore, with responsibility for tracking oil and gas developments by other oil companies in the same area. Oversaw the downhole geophysical logging of oil wells in the Gulf of Mexico, later joining the technology section as a petrophysicist and computer applications geologist.

IMC Colony, Wyoming and Detroit, Michigan, Summer Field Geologist and laboratory technician, 1979-1980. Summer field geologist at IMC's Colony, Wyoming, bentonite mine while a graduate student. Developed geological maps and cross sections using field techniques and drill hole data, some of which became the basis for a Master's degree thesis. To supplement a teaching stipend (see below), assumed a part-time position in IMC's Detroit research facility performing tests related to the civil engineering and foundry applications of bentonite clay.

Wayne State University, Teaching assistant and instructor, 1978-1980. Taught geology in both lectures and lab classes while a graduate student in geology.

Professional Activities and Awards

Virginia Prentiss Award, Michigan Chapter of the Sierra Club, 2020. Recognition for being the technical lead for the review of the permits for the proposed Line 5 tunnel under the Straits for Oil and Water Don't Mix (OWDM) and providing expert opinions related to mining issues.

Michigan Association of Environmental Professionals. Board member and committee co-chair of the Educational Committee, which had responsibility for the Association's continuing education program events.

Michigan Chapter of AIPG. President, officer, and Educational Outreach Committee chair, with responsibility for section activities, including arranging speakers for professional events.

Huron Valley Section, Michigan Archaeological Society, Board of Directors, 2021-present. Oversee chapter operations and assist with meetings, Mr. Wilczynski's interest is geoarchaeology and local history topics.

Publications

"Permitting Aggregate Mines Under Michigan's Zoning Enabling Act," Fractracker Alliance (2022).
https://www.fractracker.org/2022/01/permitting-aggregate-mines-under-michigans-zoning-enabling-act/

"Oil and Gas Developments in Louisiana Gulf Coast Offshore in 1981," AAPG Bulletin (1982).

"Oil and gas Developments in Louisiana Gulf Coast Offshore in 1982," AAPG Bulletin (1983)
https://www.osti.gov/biblio/7040388-oil-gas-developments-louisiana-gulf-coast-offshore

1-1-2006

An Assessment of the Economic Impact of the Proposed Stoneco Gravel Mine Operation on Richland Township

George Erickcek
W.E. Upjohn Institute for Employment Research, erickcek@upjohn.org

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August 15, 2006

George A. Erickcek
Senior Regional Analyst
W.E. Upjohn Institute for Employment Research

An Activity of the W.E. Upjohn Unemployment Trustee Corporation

W.E. Upjohn Institute for Employment Research

300 South Westnedge Avenue ● Kalamazoo, Michigan 49007-4686 ● U.S.A.
Telephone (269) 343-5541 ● FAX (269) 342-0672

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Executive Summary/Introduction

This report, which was completed at the request of the Richland Township Planning Commission, provides an estimation of the economic impact of the proposed Stoneco Gravel Mine Operation on Richland Township.[1] The following impacts are assessed in this study:

1. The potential impact on residential property values in Richland Township.
2. The potential employment impact of the proposed gravel mine on the area's economy.

In addition, we carefully reviewed the economic impact reports provided by Stoneco for consideration.

In the preparation of this impact analysis we used nationally-recognized modeling techniques that are the standard for academic research.

We estimate that the proposed gravel mine will have a significant negative impact on housing values in Richland Township. Once in full operation, the gravel mine will reduce residential property values in Richland and Richland Township by $31.5 million dollars, adversely impacting the values of over 1,400 homes, which represent over 60 percent of the Richland residences.

In addition, the mining operation will have an insignificant impact on area employment and personal income. At most, we estimate that only 2 additional jobs will be created in Kalamazoo County due to the mining operation. The mining operation serves the local

[1] The report was completed without charge as part of the W.E. Upjohn Institute's community service commitment. The Institute has prepared requested reports and analyses for the City of Kalamazoo, theCity of Hastings, the City of Battle Creek, the City of Grand Rapids as well as other local governmental units and school districts.

market, and analysis based on the Institute's econometric regional model for the Kalamazoo region shows that it will bring in an insignificant amount of new income into the area's economy, $58,000. Although the mine will employ an estimated 5 to 10 workers and require drivers to haul an estimated 115 to 120 truck loads of gravel per day, most all of these jobs would simply "displace" any employment growth in the county's 15 existing gravel pits.

Stoneco has not established a need for new aggregate capacity. Kalamazoo County is currently serviced by 15 gravel operations, and in recent years, employment in the county has been shrinking and the population has been stagnant. Consequently, there is no *prima facie* case that new capacity is needed. To definitively determine whether such a need exists, we would need to have information on projected demand for aggregated material in the county and capacity of the gravel pits currently servicing the county.

Finally, a careful evaluation of the five impact studies presented by the Stoneco finds that their methodologies are seriously flawed, and thus conclusions drawn from the analyses are invalid.

Qualifications

The W.E. Upjohn Institute for Employment Research is an internationally-recognized independent, non-profit economic research organization established in 1945 for the sole purpose of conducting research into the causes and effects of unemployment and measures for the alleviation of unemployment. The Institute currently has a staff of 60 including 10 senior-level economists, and its research agenda includes issues on the international, national, state, and local levels.

For the past 20 years the W.E. Upjohn Institute has maintained a strong research focus on west Michigan which includes

- The publication of its quarterly economic report: *Business Outlook for West Michigan.*
- The preparation of short- and long-term employment forecasts for all of the metropolitan areas in west Michigan including Kalamazoo, Battle Creek, Grand Rapids, Muskegon, and Holland.
- The completion of numerous economic impact reports and economic development strategies for communities in Michigan.

George Erickcek, the Institute's Senior Regional Analyst, was the lead researcher for this study. He received his Masters of Economics at the University of Pittsburgh and has been with the Institute since 1987. George has prepared numerous economic impact, benchmarking, and forecasting studies for the west Michigan region, and has conducted research on the national and international level.

Methodological Approach to Estimating the Impact on Housing Values of the Proposed Gravel Mine

Many factors influence housing prices. These include, of course, the characteristics of the house or dwelling unit, such as size, age, lot size, number of bedrooms and bathrooms, as well as its upkeep. In addition, the house's proximity to amenities such as a lake or pleasing neighborhood or "disamenities" (e.g. landfills, pollution sites) can have a substantial impact on its price.[2]

Economists have found that "hedonic pricing models" are extremely useful in isolating the contribution of specific factors on the price of housing, as well as other goods. First developed by University of Chicago economist Sherwin Rosen in 1974, hedonic pricing models use a statistical regression technique that allows the researcher to estimate the impact of one factor, e.g. the proximity of a neighborhood park, on the value of a house while holding all of the other factors impacting the house's value constant. There is an extensive literature applying hedonic pricing models to study the effects of environmental disamenities on residential property values. These studies generally show that proximity to landfills, hazardous waste sites, and the like has a significant negative effect on the price of a residential property.[3]

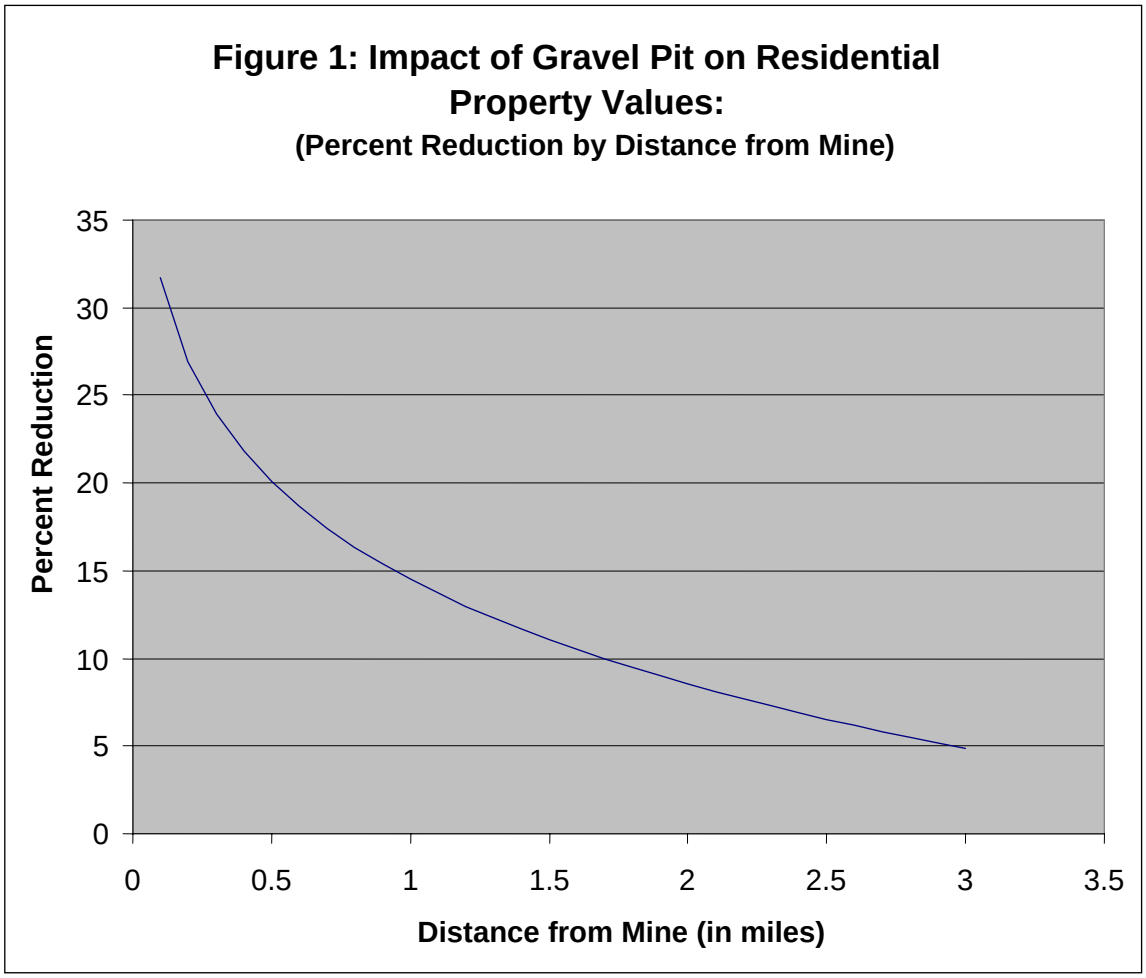
Professor Diane Hite, an economist who has published widely in the area of property value impact analysis, has recently applied hedonic pricing methodology to study the effects of a gravel mine on nearby residential values. This appears to be the only rigorous study to date of gravel mine impacts on property values.[4] Her study is based on detailed data from Delaware County, Ohio that were collected by the Ohio State University for the purposes of studying land use planning.

Hite examines the effects of distance from a 250-acre gravel mine on the sale price of 2,552 residential properties from 1996 to 1998. Her model controls for a large set of other factors that determine a house's sale price, including number of rooms, number of bathrooms, square footage, lot size, age of home, sale date, and other factors specific to the locality, so that she can focus solely on the effect of proximity to the gravel mine on house values. She finds a large, statistically significant effect of distance from a gravel mine on home sale price: controlling for other determinants of residential value, proximity to a gravel mine reduces sale price. Specifically, Hite reports that the elasticity of house price with respect to distance from a gravel mine is .097, implying that a 10 percent increase in distance from the gravel mine is associated with slightly less than a 1

[2] In a recent study of the impact of housing programs in the City of Kalamazoo, we found that moving a house from one neighborhood to another can add or subtract as much as $20,000 from its value.
[3] For reviews of some of this literature, see Arthur C. Nelson, John Genereux, and Michelle Genereux, "Price Effects of Landfills on House Values," *Land Economics,* 1992 68(4): 359-365 and Diane Hite, Wen Chern, Fred Hitzhusen, and Alan Randall, "Property-Value Impacts of an Environmental Disamenity: The Case of Landfills," *The Journal of Real Estate Finance and Economics* 22, no. 2/3 (2001): 185-202
[4] Diane Hite, 2006. "Summary Analysis: Impact of Operational Gravel Pit on House Values, Delaware County, Ohio," Auburn University.

percent increase in home value, all else the same.[5] Conversely, the closer the house to the proximity to the mine, the greater the loss in house value.

Figure 1 displays the estimated effects of distance from the gravel pit on house price. A residential property located a half mile from the gravel mine would experience an estimated 20 percent reduction in value; one mile from the mine, a 14.5 percent reduction; 2 miles from the mine, an 8.9 percent reduction; and 3 miles from the mine, a 4.9 percent reduction. These estimates are similar to estimates published in academic journals on the effects of landfills on nearby property values.



[5] This estimate is based on a constant elasticity model specification. At the Upjohn Institute's request, Professor Hite tested the sensitivity of these findings to model specification, and in all specifications finds a large, statistically significant negative effect of proximity to gravel pit on house prices. The simulations for Richland Township reported below are based on the estimates from the constant elasticity specification and yield slightly lower estimated negative property value impacts than those based on models using other functional forms. We consider this number to be a conservative estimate.

The loss in property value results from the negative consequences of the mining operation and reflects the deterioration in the area's quality of life due solely to the operation of the gravel mine. In other words, the loss in house value is a way to quantify in dollars the deterioration in quality of life, as capitalized in the price of the house. It captures the price reduction the homeowner would have to offer to induce a new buyer to purchase the property. Even if homeowners do not move as a result of the gravel mine, they will lose homeowner equity as the potential sale price of their house is less.[6] Therefore, regardless of whether or not a person actually sells their property, it measures the adverse effects in their quality of life in being subjected to the disamenities introduced into the area by the gravel mine.

The policy implications of Hite's study are clear: because property value losses are higher the closer to the gravel mine, all else the same, new sites should be located far from existing residences so as to minimize adverse consequences for homeowners.

Simulation of Gravel Mine on Residential Property Values in Richland

Utilizing the estimates from the Hite study and data on 2006 assessed values provided by Richland Township, the Upjohn Institute simulated the effects of the proposed gravel mine on residential property values in Richland Village and Richland Township. Our analysis is based on 2005 assessed values of single-family homes in Richland Township and Richland Village obtained from the Township's assessor office in June and July. In total 2,319 single-family homes, 88.7 percent of all single-family residences in the township and village, were geo-coded using the ArcView© mapping program, manually matched using Yahoo© maps and, finally, through drive-by inspection of addresses. Once all of the homes were mapped, the distance between each of the residences and the closest boundary of proposal Stoneco gravel mine was determined.

As shown in Table 1, more than 1,400 homes will be negatively impacted by the proposed gravel mine with the total cost reaching $31.5 million dollars.

[6] Only those owning property at the time of the establishment of the gravel mine would experience a loss in equity. Those purchasing property near an established mine would not experience an equity loss because any negative effects from the mine's operation would have been incorporated into the purchase price. By implication, few property owners near long-established mines could claim loss of property value from the mine because few would have owned the properties at the time the mine went into operation.

Table 1
Estimated Impact on Housing Values of the Proposed Stoneco Gravel Mine

Distance (miles from Stoneco Site)	Number of Houses Affected	Estimated Loss in Value	Distance (miles from Stoneco Site)	Number of Houses Affected	Estimated Loss in Value
0.1	2	$211,703	1.6	73	$1,207,011
0.2	3	$106,428	1.7	128	$2,500,456
0.3	2	$134,894	1.8	99	$1,630,149
0.4	9	$522,981	1.9	70	$1,146,761
0.5	3	$389,319	2	34	$633,720
0.6	8	$598,518	2.1	105	$952,068
0.7	24	$831,338	2.2	98	$1,311,040
0.8	25	$798,108	2.3	99	$2,843,845
0.9	27	$1,085,190	2.4	72	$2,699,584
1	22	$918,374	2.5	34	$912,133
1.1	75	$2,428,602	2.6	12	$377,548
1.2	62	$1,688,031	2.7	23	$373,873
1.3	45	$1,146,920	2.8	80	$939,861
1.4	32	$824,928	2.9	55	$944,061
1.5	30	$712,731	3	70	$655,846
			Total	1,421	$31,526,020

While Hite's original study covered a 5-mile radius from the gravel mine in Ohio, we chose to examine only a 3-mile area from the boundaries of the proposed Stoneco site.[7] Only properties located in Richland and Richland Township are included. Property values in other townships, notably Prairieville Township, also could be adversely affected by the location of a gravel mine near its border with Richland Township but were not included in the study. In addition, the analysis does not consider possible effects on commercial property. Our estimates do not factor in the likely negative impact on property values along the truck routes used for the mine. Finally, although Stoneco has proposed to reclaim some of the land for a lake and residential development, its proposed timeframe for this development would occur too far into the future to mitigate adverse property value impacts for current Richland area residents.

[7]Hite's statistical analysis intentionally includes homes at a distance deemed unaffected by the gravel operation. Our choice to study the impacts up to 3 miles is based on Nelson, et al. (1992) and the fact that estimated impacts for individual homeowners are still relatively large out to three miles in all of Hite's models.

Employment and Personal Income Impact

Stoneco estimates that 5 to 10 permanent jobs will be created at the proposed mine. In addition, truck drivers will be required for the 115 to 120 truck loads of gravel that will be hauled from the mine daily.

To measure the potential employment and income impact of the gravel mine, we used the Institute's econometric regional model of the Kalamazoo area.[8] Because of its weight and low-value, gravel is hauled for only short distances. It is not a part of the area's economic base that brings new monies into the area. Therefore, it is an activity that does not generate any significant new income or employment opportunities. We estimate that only 2 additional new jobs will be created in Kalamazoo County due to the gravel mine and personal income in the county will increase by only $58,000. In short, the jobs created at the gravel mine will displace jobs elsewhere in Kalamazoo County or the immediate region. The proposed mine would not result in any significant net benefit to the area from job or income creation.

Need for the Proposed Mine

Adverse economic effects of the proposed gravel mine to the Richland community must be balanced against the county's broader needs for aggregate material for road construction. Currently, 15 gravel mines operate in Kalamazoo County according to the Kalamazoo County Planning Department (Table 2). Stoneco's application materials do not provide any evidence for the need for additional capacity. Statistics were cited on projected needs, but no evidence was presented as to whether existing capacity could cover anticipated needs.

The need for additional capacity of gravel production is not supported by current and projected population or employment trends in Kalamazoo County. Population growth in Kalamazoo County has been modest during the past five years, and well below the national rate. From 2000 to 2005, population in the county increased annually at a rate of below 0.2 percent, compared to 0.9 percent nationwide.[9] An analysis of the individual components of population change—births, deaths, net migration—shows that individuals and households, on net, are leaving the county. From 2000 to 2005, the county's population increased by 6,342 individuals due to number of births surpassing the number of deaths. However, on net, 4,150 individuals moved out of the county.[10]

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[8] The Upjohn Institute maintains a regional economic impact and forecasting model for the Kalamazoo metropolitan area which was built by Regional Economic Models Incorporated (REMI) especially for the Upjohn Institute. The REMI modeling approach, which incorporates an input-output model with a forecasting model and a relative cost of production model, has been repeatedly reviewed and upheld as the industry standard.

[9] U.S. Census Bureau.

[10] U.S. Census Bureau. Furthermore, Internal Revenue Service (IRS) data from 2000 to 2004 shows that the majority of the individuals leaving the county are moving outside the greater Kalamazoo region.

Table 2

Kalamazoo County Gravel Pits		
Owner Name	Site Address	Site Township
Aggregate Industries	C Ave. Near 6th St	Alamo
Art Austin	6287 K Avenue	Comstock
Triple B Aggregates	2702 Ravine Rd.	Kalamazoo
Thompson McCully Co	3800 Ravine Rd.	Kalamazoo
Byholt, Inc.	1600 Sprinkle Rd.	Brady
Byholt, Inc.	4th St	Prairie Ronde
Fulton Brothers Gravel	4th St	Prairie Ronde
Balkema Excavating	8964 Paw Paw Lk.	Prairie Ronde
Balkema Excavating	6581 E. K Ave	Comstock
Balkema Excavating	4274 Ravine Rd	Kalamazoo
Balkema Excavating	40th St. & I-94	Charleston
Balkema Excavating	14500 E. Michigan	Charleston
Balkema Excavating	15600 E. Michigan	Charleston
Consumer Concrete	10328 East M-89	Richland
Consumer Concrete	700 Nazareth Rd	Kalamazoo

Source: Kalamazoo County Planning Department July 2006

During the same time period, employment declined by 3.4 percent, a loss of 5,000 jobs. The Michigan Department of Labor and Economic Growth estimates that from 2002 to 2012, total employment in Kalamazoo and St. Joseph counties will increase at a rate of 0.8 percent—substantially below the 1.3 percent rate of growth projected for the nation as a whole. If this rate of employment growth holds true for the future, it will be not until 2010 that the county will reach its 2000 employment level.

Thus, economic projections do not, in and of themselves, indicate a need for expanded aggregate capacity. However, we emphasize that any definitive determination of need would require information on the capacity and life expectancy of existing area gravel pits, to which the Institute does not have access.[11]

Review of Stoneco's Property Value Impact Analysis

The Environmental Study submitted by Stoneco in connection with its special use permit application concludes that gravel mining operations have no adverse impact on the value of nearby properties. This conclusion is based on five reports included in Appendix J of Stoneco's Environment Study:

[11] Note that whether there is a public need for additional capacity and whether it is in Stoneco's interest to develop a new mine are distinctly different issues. Stoneco has indicated that it would reduce its transportation costs by operating at the proposed Richland location. The degree to which any lower transportation costs translate into lower prices of aggregate material—and hence broadly benefit the public—versus increased company profits will depend on the competitive structure of the industry in this region.

1. "Impacts of Aggregate Mine Operations: Perception or Reality?" Anthony Bauer, 2001.[12]

2. "Social, Economic, and Legal Consequences of Blasting in Strip Mines and Quarries," Bureau of Mines, 1981.

3. "Impact of Rock Quarry Operations on Value of Nearby Housing," Joseph Rabianski and Neil Carn, 1987.

4. "Impacts of Rock Quarries on Residential Property Values, Jefferson County, Colorado," Banks and Gesso, 1998.

5. "Proposed Fuquay-Varina Quarry: Analysis of Effect on Real Estate Values," Shlaes & Co., 1998.

These reports, in fact, fail to show that mining operations have no adverse impact on property values. None uses the standard methodology (the hedonic pricing model, described above) for evaluating property value impacts. Four of the five reports are based on flawed logic (as explained below) and hence cannot be used to draw any conclusions about property value effects. Only one report, commissioned by the U.S. Bureau of Mines, used a defensible methodology, although this report also suffers from serious limitations. Notably, this study found some evidence of adverse impacts of gravel mining operations on property values in six out of the seven sites examined.

The Bauer, Rabianski and Carn, Banks and Gesso, and Shlaes & Co. reports rely on one or both of the following types of observations to argue that gravel mining operations have minimal adverse impact on nearby property values:

- Over time, housing and commercial developments have moved closer to and sometimes adjacent to aggregate mine operations.
- For property values in the vicinity of mining operations that have existed for many decades, the rate of growth in property values does not increase with distance from the mining site.

In neither case do such observations have any bearing on the impact of aggregate mine operations on nearby property values.

1. Residential and commercial developments have located closer to and sometimes adjacent to mines over time.

   Economic or real estate analysis does not predict that properties near mines have no value or no development potential. Rather, one would expect that nearby property values would be lower to compensate for any costs (e.g. noise, pollution, unsightly landscapes, and traffic congestion) associated with the mine. This reflects the

[12]Bauer (2001) is a two-page statement that in large part summarizes the results of a 1984 study by a Michigan State University student.

common sense observation that property that is near sources of noise, pollution, traffic congestion, and blight will (all other things being equal) be less valuable. Of course, these lower property values, in turn, will help lure development, especially over time, but the development more than likely will include non-residential activities, which are not affected by the disamenities generated by the mine.

Two studies (Bauer 2001; Banks and Gesso 1998) examined aerial photographs taken over the course of several decades that showed housing and commercial developments moving closer to mining operations. As the population has expanded, land values near central cities have increased, and transportation infrastructures have improved, development has fanned out all across the country. Any study would inevitably find that over the course of the last 20, 30, or 40 years, housing developments have moved closer to mines (and any other less desirable location), and such observations have no relevance to the question posed by Stoneco's application—whether the establishment of mining operations will lower nearby property values.

2. Near well-established mines, the year-to-year change of property values is no less for properties located close to mines than for those located somewhat farther away from mines.

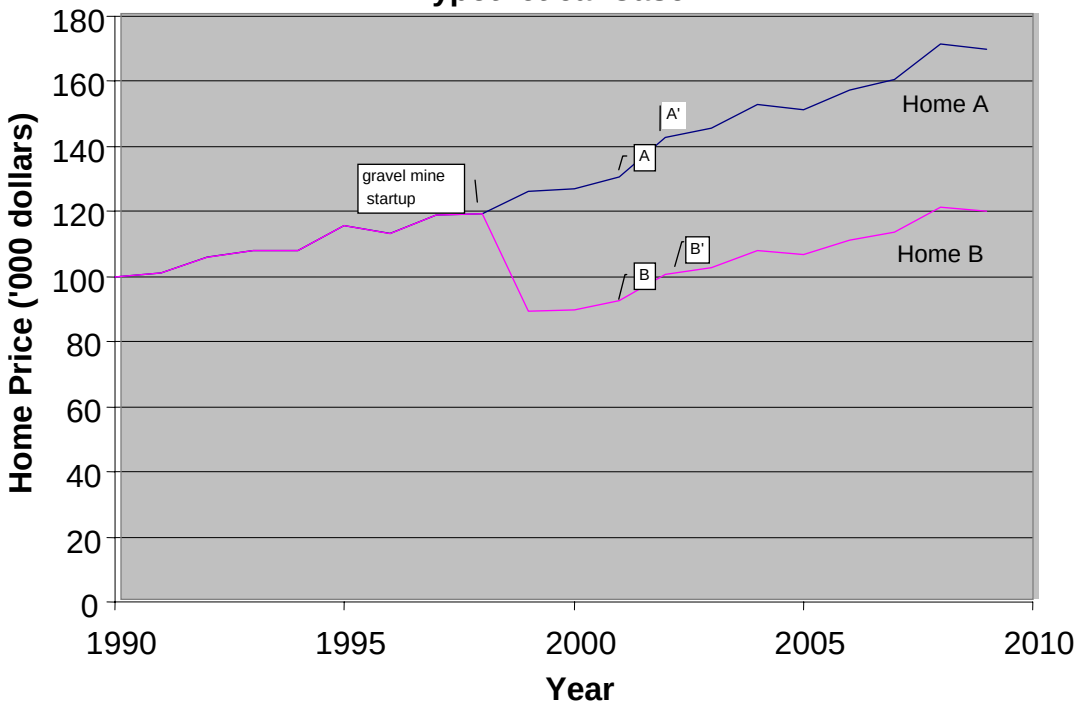
   The adverse impact that a mine will have on nearby property values will occur within a short period of time following the establishment or announcement of the mine. After the adverse effects of being located near a mine have been capitalized into the property value—that is, after the negative effects of being close to a mine operation has resulted in a decrease in property values—we would not expect the <u>future</u> rate of change of nearby properties to be different from those of other properties, all else the same.

   The analyses in Rabianski and Carn (1987), Shlaes & Co. (1988), and Banks and Gesso (1998) look at whether the relative difference in property values between properties close to and farther from a mine continue to widen 30, 50, even 100 or more years after the mine was established. All of these studies conclude that because we do not see continued widening of these differentials many decades after the establishment of mines, mines have no adverse effect on property values. This argument makes no sense: the adverse impact on property values would have occurred decades before. These studies shed no light on possible adverse impacts of mining operations on property values.

   Figure 2 illustrates this point. This figure depicts the prices of two hypothetical homes over a 20-year period. Home B is affected by the opening of a gravel mine in the middle of the time period; otherwise the homes are identical. Except in the year when the gravel mine is introduced, the annual *percentage changes* in the prices of the two homes are the same. The methodology used in the reports cited in the Stoneco environmental study compared the percentage change of homes near the gravel mine (percent change from B to B′ in Figure 2) to the percentage change in home prices farther from the gravel pit (percent change from A to A′ in Figure 2).

But even with adverse property value effects, these percentage differences should be approximately equal. To capture any adverse impact, one must measure the difference in values of otherwise comparable properties close to and farther from the gravel mine at a point in time. In Figure 2, the difference between points A and B or between A′ and B′ measure the true property value impact, which conceptually is what is measured in the hedonic pricing model used in the analysis reported above.

Figure 2: Methodology for Evaluating Gravel Mine Impact on House Prices: Hypothetical Case



Only the study commissioned by the U.S. Bureau of Mines attempted to assess how the value of comparable homes varied with distance from the mine. However, the Bureau of Mines study suffered from several serious shortcomings:

- The sample size at each of seven sites was very small, and hence no statistically valid conclusions could be drawn.
- Homes were classified into rough typologies, and hence controls for other factors affecting home prices were crude.
- The study was based on assessed values rather than on more accurate sale price data.
- The study only examined potential property value impacts within approximately a half mile of the mine site. More recent research shows that property value effects

may be significant up to two or three miles from such sites.[13] Limiting analysis to properties within a half mile of the mine site could lead to a significant understatement of any property value impacts.

- Researchers used subjective assessments to discount findings of adverse impacts on property values.

With these shortcomings in mind, the Bureau of Mines study found some evidence that the value of comparable homes increased with distance from the mine site in six of the report's seven case-study sites. In some cases, the differences in values were described as large.

[13] See, for example, Arthur C. Nelson, John Genereux, and Michelle Genereux, "Price Effects of Landfills on House Values," *Land Economics,* 1992 68(4): 359-365.

Friends of the Platte River Watershed
Jim Brouwer, President • platteriverwatershed.org
231.360.5602 • jim@platteriverwatershed.org
15250 Fewins Road • Interlochen, MI 49643

December 3, 2022

Sharon Preservation Society
Post Office Box 1
Chelsea, MI 48118

Re: Analysis of Bratcher & Associates September 6, 2022 flawed report
"Market Study Potential Impact of Active Gravel Mining Operation on Residential Market Values"

Summary: Having reviewed this report in detail, in my opinion it is poorly designed, needlessly verbose, and blatantly biased. The metrics used in this study have no bearing on the impact that opening a gravel mine would have on neighboring values. One major flaw in this study is that it does nothing to examine the negative impact that opening a mine had in other settings. While it appears Natural Resources Managment applied statistical analysis to the data, the selection of the metrics they studied have no relevance to the question at hand. The poor choice of examined metrics, coupled with questionable analysis techniques provides no real information upon which any valid conclusion can be drawn. To conclude from this study that there is no impact on residential property values when a gravel mine is opened is, at best, disingenuous.

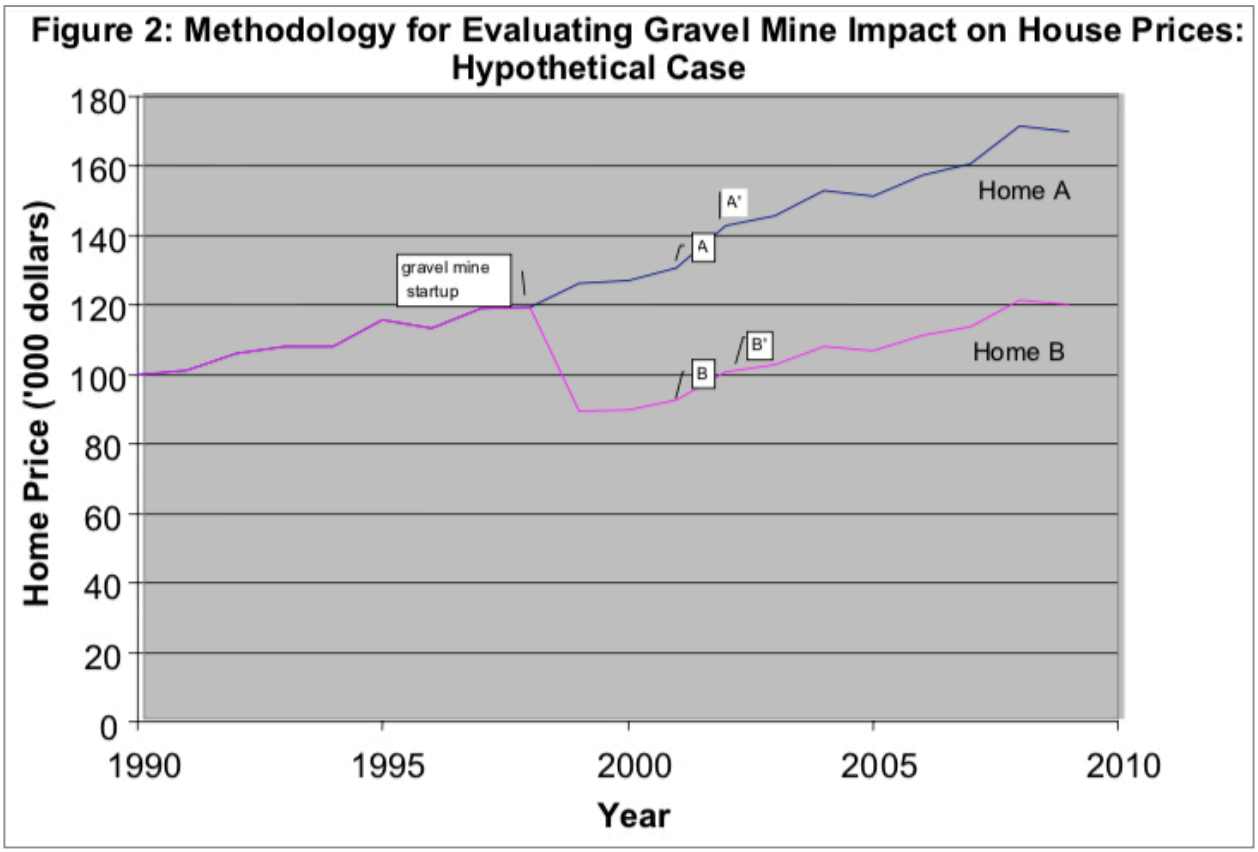
Flawed Methodology

The metrics chosen for use in this study are curious. Why use 'raw sales data' of the properties rather than their tax appraised value? The tax appraised value is considered by most to be a far more accurate figure as it reflects upgrades and additions that have been made to the property as well as rising values over time. The methodologies employed blurs the negative impact which proximity to the mines or proposed mine actually has. As it appears to be used in this study, properties situated six miles from a mine will experience only a fraction of property devaluation (and related annoyance) that properties immediately neighboring a mine will suffer. Using tax appraisal values would have easily provided an accurate baseline value of every property near the proposed site regardless of size, design, purpose, or quality.

The narrow four year timeframe from which this study drew its data ignores one of the fundamental needs for an honest investigation of the detrimental effects mining operations have on neighboring property values. To conduct a fair and accurate analysis, one needs to examine the value trajectory of properties both pre *and* post a mine's opening. All property values rise over time — that is not the question. The question is how much are properties devalued when a mine opens up in a residential neighborhood?

This point was clearly explained and accurately analyzed in the G.A. Erickcek's report *An Assessment of the Economic Impact of the Proposed Stoneco Gravel Mine Operation on Richland Township*, presented by W.E. Upjohn Institute for Employment Research on August 15, 2006.

As illustrated by Home B (the purple line) in Erickcek's Figure 2 from that report, at the point a mine opens (gravel mine startup), the value of Home B is depressed by 30%. Home A (the blue line), a similarly valued home located far away from the mine was not affected. Over time, the value of both homes grow. However, the value of Home B remains considerably depressed because of the mining operation.



To reiterate, the argument being put forward by the Bratcher & Associates / Natural Resources Management study glosses over this very important fact and never attempts to address the point.

The Bratcher study's examination of data is done in such a manner that obscures information rather than clarifying any point. As the E. Malikov, Y. Sun, & D. Hite study *Under Mining local residential property values: A semiparametric spatial quantile autoregression* (Journal of Applied Econometrics, June 22, 2018) clearly concludes, the closer a property is to a new mining operation, the greater the impact is on its depressed value. The Bratcher study appears to aggregate all data from close (though no closer than 1.6 miles) to far (5.7 miles). This ignores the relevant point of the Malikov, Sun, Hite study.

Further obscuring helpful information, the Bratcher analysis is performed on 'sales price per square foot.' The only meaningful metric to the question at hand is the percentage drop in property value when a mine opens in a residential neighborhood. The size or value of a property or its buildings has no meaningful bearing on the issue. Whether a mansion or a trailer home is located next to a new mine, its value will be negatively impacted by a similar percentage of value. Looking at price per square foot is a meaningless and purposeful distraction.

The Bratcher analysis looked at other meaningless data such as DOM (Days on Market). How long a property took to sell again obscures and distracts from the core point that opening a mine of any sort in a residential neighborhood will drastically depress values. The Bratcher analysis makes no clear attempts to factor in reasonable asking price, the state of the economy, staging, and other factors that experienced realtors all know contribute to the length of a sale / DOM. Inclusion of scattergrams of all of these meaningless metrics provides bloviating eye candy to the Bratcher report, nothing more.

As troubling as the methodology used and pointless as the analysis of the Bratcher report is, the statistical analysis prepared by Natural Resources Management did nothing to add clarity. Given the poor methodology and metrics chosen for use in this study, no amount of statistical analysis can be used to draw any meaningful conclusion.

While the Natural Resources Management report mentions the use of ANOVA (Analysis of Variance), MANOVA (Multi-level Analysis of Variance) would have been the preferred statistical methodology to employ as it takes into account whether or not the datasets being examined interact with each other. In the case of the Bratcher report, this would be metrics of sales price, square footage, days on market, and proximity to a mine. More meaningful metrics would have included such factors as the land's topography, location of pubic and private services, rivers, lakes, roads, surrounding neighborhoods, home build quality, number of bedrooms and bathrooms, level of maintenance, etc. — and of course percentage decrease in value experienced by properties located next to and near new mining operations. In the Natural Resources Management report, the old adage shared in every basic statistics class ever taught definitely applies here: Garbage in. Garbage out.

Mr. Bratcher's two conclusions are pointless and some may say disingenuous. His first conclusion that "There is no detrimental impact to residential market values …" is based on a flawed and meaningless analysis. Again, it totally ignores the critical point of the depressive impact on property value a mine has *when* it opens. The second conclusion that "The general demand for and value of the residential real estate …" ignores this same point.

As both the Bratcher report and its included analysis by Natural Resources Managment were both apparently commissioned by and for Stoneco of Michigan, the veracity of the findings must fairly fall into question. The Bratcher report attempts to make up in the volume of pages and fancy graphics what it lacks in honest and meaningful content. As this study totally ignores the most crucial point of analysis, it should not be relied upon in any fashion.

If you have any questions or need further clarification, do not hesitate to contact me.

Sincerely,

Friends of the Platte River Watershed

James R. Brouwer

Noise and Silica Exposures
A Survey of Washington State Quarry Operations

The Mine Safety and Health Administration (MSHA) issued a new standard for hearing protection effective in September 2000. The new rule requires that mine operators enroll miners in a hearing protection program if they are exposed to an average sound level of 85 decibels (dBA) or more during an eight-hour period. In order to determine average sound level, workplace noise monitoring is required.

The Field Research and Consultation Group (FRCG) at the University of Washington received requests from ten open surface mines in Washington State to conduct noise monitoring to meet these new requirements. In addition, mine operators also requested monitoring for silica to determine silica quartz exposures.

The companies evaluated were all small employers, with one to seven quarry operations employees working in three types of open surface mines. The three types of mines included two basalt excavation mines, three portable crusher operations, and five sand and gravel operations. The primary difference in the three operations is the source, size, and type of rock handled. In basalt excavation, blasting and drilling is employed to break rock free of an open face; sand and gravel quarries dredge material from an open pit or pond; and portable crusher plants obtain material from near a road or pond to process for roadbed construction. In all three types of operations dump trucks, excavators, and front-end loaders are used to transport material. The rock is delivered to a processing area where the material is transported via conveyors through a series of crushers and screens for breaking and sorting. There are two types of crushers: cone and jaw. Jaw crushers break large rock into smaller sizes, while cone crushers are used to break aggregate into smaller aggregate. The crusher is run by a crusher operator who usually stays inside the operator's booth. In small operations, the operator would sometimes go outside to clear jams or for other equipment maintenance purposes. At larger operations there was also often a crusher mechanic and groundsman. The crusher mechanic worked outside near the crusher doing maintenance/repair tasks and frequently worked during breaks when there were no other noise sources nearby. The groundsman was a laborer who cleared jams on conveyors, directed traffic and handled other labor requirements near the crusher.

In some cases, workers operated several pieces of equipment over the course of a shift.

Figure 1: Portable screening and crusher operation

Quarry operators reported that they control dust with water spray during dry weather conditions using water trucks or loaders to wet roadways. Some, but not all quarries had water spray systems to control dust during conveyor transport, at conveyor transitions, and during screening. Many of the samples gathered were collected during wet weather conditions and may not reflect dust/silica exposures during dry weather.

Figure 2: Loader feeding shaker

Figure 3: Truck loading from hopper

Figure 4: Crusher operator's booth at basalt excavation mine

Methods

Samples were collected between April 2000 and March 2001 across all seasons. Quarry employees were monitored if they had potential for exposure to noise or silica dust. At three operations monitoring occurred on two separate days, while monitoring was done for one day at the other quarries.

Noise – Noise samples were collected using Quest 300 or Metrosonics 308 noise dosimeters. Dosimeters were set for slow response with two sets of measurement parameters: 1) a criterion level of 90 dBA, a threshold limit of 90 dBA, and an exchange

rate of 5 dBA to measure MSHA PEL compliance, and 2) a criterion level of 90 dBA, a threshold limit of 80 dBA, and an exchange rate of 5 dBA for MSHA hearing protection program requirements. The microphone was clipped at the dominant hand shoulder. Measurement results using the first parameter set are compared to the MSHA PEL of 90dBA and results using the second parameter set are compared to 85 dBA, the hearing protection program level. The maximum sound level is compared to 115 dBA. When measures exceed 115 dBA, engineering controls must be implemented to reduce exposure.

Silica - Full shift TWA samples were collected from each worker using a Dorr-Oliver nylon cyclone at a flow rate of 1.7 lpm. Samplers were placed at the worker's lapel on the dominant hand side. Samples were collected on a pre-weighed PVC filter in a 2 stage cassette. Samples were analyzed gravimetrically by the FRCG lab for respirable dust then sent to the University of Washington Environmental Health Lab for percent quartz analysis. Field blanks were submitted with each sample set. The MSHA PEL is 10 mg/m^3/(% quartz + 2). The calculated quartz PEL is compared to the respirable dust concentration.

Results

The findings for noise and silica exposure are summarized in Table 1 by job type. For measurements using the PEL criterion, only groundsmen exceeded the PEL of 90 dBA, although crusher mechanics approached this limit with a mean of 89.1 dBA. When exposures exceed the PEL, exposures must be reduced below 90 dBA, and until exposures are reduced below that level hearing protectors are mandatory.

For all eight job types monitored, the mean 8-hour noise exposure was over the 85dBA hearing protection program level. When that level is exceeded, hearing protection program requirements must be implemented including training, voluntary hearing testing, and provision of hearing protectors for voluntary use.

The allowable maximum sound level of 115 dBA was exceeded for two jobs: crusher operator and crusher mechanic. When this occurs, the job must be analyzed to determine if engineering controls are feasible for reducing the sound level.

For silica exposure, only groundsmen had a mean exposure at the silica PEL, with 3 samples at a mean of 100% of the MSHA PEL. In westernWashington, where these companies are located, damp weather conditions can limit dust levels for much of the year. Many of these samples were collected under damp weather conditions. It is probable that higher exposures do occur during dry weather conditions frequently seen in summer months.

Table 1: Quarry Exposure Assessment for Noise and Silica

Job	Noise Samples (n)	Hearing Protection TWA (dBA)	PEL TWA (dBA)	Max Level (dBA)	Silica Samples (n)	% of Silica PEL
Loader	12	86.7	83.4	112.2	15	36%
Truck driver	4	89.4	84.0	112.4	5	22%
Excavator	5	86.1	81.3	113.2	4	15%
Crusher operator	4	86.8	82.7	117.7	3	17%
Crusher mechanic	2	91.0	89.1	118.4	1	43%
Groundsman	3	92.6	95.3	114.1	3	100%
Dredger	2	86.4	74.8	109.5	0	-
Multiple machines	6	86.9	87.1	113.8	5	57%
Other *	3	83.0	77.2	114.0	1	6%
Total	**41**	**86.7**	**83.6**	**114.2**	**37**	**38%**

Highlighted exposures are over related MSHA standard

*weigh station operator, scraper operator, and rock wash operator

Noise and silica exposures are presented by quarry type in Table 2. For basalt excavation and portable crusher plants, mean noise exposures exceeded the hearing protection program level, indicating a need for a plant-wide hearing protection program. For sand and gravel operations, full shift exposures measured with the PEL and hearing protection criterion where below their associated limits, although the maximum sound level of 115 dBA was exceeded for five of the seven jobs monitored.

Table 2: Noise and Silica Exposures by Quarry Type

Quarry Type	Loader	Truck Driver	Excavator	Crusher Operator	Crusher Mechanic	Grounds-man	Dredger	Multiple Machines	Other	TOTAL
Basalt Excavation – 2 operations										
Noise N	3	1	3	1				3	1	**12**
HP twa (dBA)	87.1	NM	89.4	93.2				90.1	75.1	**87.6**
PEL twa (dBA)	81.4	79.2	82.7	92.6				85.1	65.0	**82.0**
MAX (dBA)	107.4	99.9	110.8	128.4				111.9	110.8	**110.8**
Silica N	4	2	3	1				2	0	**12**
% of Silica PEL	26%	6%	20%	19%				24%	-	**20%**
Portable Crusher Plant – 3 operations										
Noise N	5	2		1	1	3	1	2	1	**16**
HP twa (dBA)	93.3	NM		83.6	89.4	92.6	92.1	NM	88.5	**90.4**
PEL twa (dBA)	90.9	84.8		74.3	86.4	95.3	89.7	96.4	84.0	**89.9**
MAX (dBA)	115.2	114.9		106.8	117.6	114.1	112.8	116.1	110.5	**114.3**
Silica N	6	1		0	0	3	0	2	1	**13**
% of Silica PEL	67%	77%		-	-	100%	-	116%	6%	**78%**
Sand and Gravel – 5 operations										
Noise N	4	1	2	2	1		1	1	1	**13**
HP twa (dBA)	83.1	89.4	82.8	85.2	92.6		80.7	80.7	85.6	**84.4**
PEL twa (dBA)	75.6	87.1	79.3	81.9	91.7		59.8	74.7	82.6	**78.5**
MAX (dBA)	111.9	117.8	116.8	117.8	119.2		106.2	115.1	120.8	**115.2**
Silica N	5	2	1	2	1			1	0	**12**
% of Silica PEL	5%	12%	2%	16%	43%			4%	-	**11%**

BE- basalt excavation; PP- portable crusher plant; SG- sand and gravel; NM- not measured

Highlighted exposures are over related MSHA standard

Discussion and Recommendations

Noise - The revised MSHA noise standard was developed to protect miners' hearing, based on research indicating that hearing loss occurs with average sound levels below 90 dBA. The operations monitored in this study had average sound levels less than 90 dBA but over 85 dBA, the new level for required hearing protection programs. MSHA has developed resources to assist mine operations with compliance with the revised noise standards. These resources can be accessed at:http://www.msha.gov/1999noise/noise.htm.

When average sound levels exceed 90 dBA or when maximum sound levels exceed 115 dBA, feasible engineering controls must be implemented to reduce noise levels. Hearing protectors are not an acceptable alternative if feasible engineering controls are available.

Some examples of controls for open surface mining operations include:

Heavy Equipment

- Fit heavy equipment with enclosed cabs and air conditioning. Ensure that doors and windows are kept closed.
- Ensure all equipment has exhaust mufflers and that exhaust pipes are directed away from the operator's cab.

Generator and Generator Trailer

- Fit generator with supply and exhaust air mufflers.
- Keep generator doors tightly closed.
- The generator hood can be lined with sound dampening material.
- If possible, keep the trailer closed. If that is not possible because of heat build up, position the doors away from where quarry personnel are located.
- Locate the trailer as far away as possible from personnel. Noise levels fall as the distance increases from the generator. For example, if a sound level at the generator is 120 dB, it will be 85 dB 50 feet away.
- Double hearing protection (plugs and muffs) should be worn if the trailer must be entered when the generator is operating. An alternative is to prohibit entry into the trailer when the generator is operating.

Conveyors

- Upgrade or install conveyor belt brushes to clear soil from belts to reduce the need for belt cleaning by the groundsman.

Crushers

- Sound proof and air condition the crusher operator's booth. Holes and cracks open to the outside are the greatest source for noise transmission from outside. The booth can be lined with sound proofing or thick plywood to further reduce sound levels inside the booth.
- The operator should spend as much time as possible inside the booth with doors and windows closed.

Shakers

- For rod decks, experiment with increasing the slot width during the wet season to reduce the frequency of jams and need for manual cleaning. Covering this apparatus would keep the unit drier and may reduce binding.

Other

- Install silencers on compressed air wands.
- Prohibit use of compressed air to clean clothes.
- Shift the groundsman work schedule to reduce time near operating equipment (e.g. remove accumulated soil beneath conveyors pre- or post-shift) or use a mini-cat with enclosed cab to remove accumulated soil.

Silica – During our survey, dust and silica exposures were usually below the PEL, although overexposures did occur at two of the portable crusher operations. Since the majority of sampling occurred during wet weather, further sampling is recommended to assess exposure during dry weather.