Kraemer Mining & Materials

Dresser Quarry
Polk County, Wisconsin

Report on Air Quality Blasting Traffic

C O N F I D E N T I A L

Prepared for

Kraemer Mining & Materials

by

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August 2008

EXECUTIVE SUMMARY

Report on Air Quality, Blasting and Traffic

Kraemer Mining & Materials Quarry
Dresser, Wisconsin

This report analyzes air quality, blasting and truck traffic associated with the proposed quarry near Dresser, Wisconsin. The level of analysis is intended to provide information on each of these subjects based upon assumptions related to quarry activity. This evaluation is based upon Wisconsin nonmetallic minerals regulations for particulate emissions and blasting. The information developed here and from initial small blasts at the commencement of the operation will be used to ensure that the quarry operation will be in compliance with all applicable standards. Potential impacts of product-hauling trucks to and from the quarry at three pertinent intersections are also included.

Air Quality

Air pollutant concentrations for total particulate matter (PM) and for particulate matter 10 microns or less (PM10) are based upon emission factors contained in Wisconsin regulations for the nonmetallic mining industry and compared with the 24-hour National Ambient Air Quality Standards (NAAQS) for PM and PM10. The State of Wisconsin does not consider other gaseous pollutants, e.g. Carbon Monoxide, Nitrogen Dioxide, and Sulfur Dioxide in the emission inventory for the nonmetallic minerals industry. Previous studies have shown that these concentrations from quarrying and processing equipment are well below the National Ambient Air Quality standards, and are therefore not evaluated in this assessment.

Particulate emission levels are controlled by the PM 24-hour standards of 150 micrograms per cubic meter since the PM10 standard is also 150 micrograms per cubic meter and PM10 emission are considerably less. It is anticipated that trained quarry personnel will ensure 90% control tier emission levels (per WI DNR emission calculations) to be achieved from both the initial and main quarry operations. PM and PM10 concentrations are predicted using basic dispersions modeling and assume downwind conditions and no terrain effects at any of the surrounding receptor sites and as such are considered conservative numbers. Assuming 90% control this analysis indicates that 475 tons per hour for processing materials from the initial quarry that will become the central processing area for the main quarry and 675 tons per hour for processing materials from the main quarry will be in compliance with the 24-hour 150 microgram per cubic meter PM standard at any receptor site.

Blasting

Blasting impact on air overpressure (blast noise) and ground vibration is governed by rules of the Wisconsin Department of Natural Resources (WDNR) and the US Office of Surface Mining (US OSM). WDNR limits air overpressure to 130 dB and ground vibration (particle velocity) to 1 inch per second. US OSM limits air overpressure to 129 dB for 6 Hz and below and 133 dB for 2 Hz and below. Ground vibration is generally limited to 1 inch per second for frequencies below 20 Hz and to 2 inches per second above 20 Hz.

The standard and most efficient production blasts will comply with all applicable standards for ground vibration and air overpressure at the nearest receptors. As quarry activities approach the site property line, adjustments will be made in the blast design to ensure that blasting will continue to comply with all applicable standards for ground vibration and air overpressure.

Truck Traffic on Public Roads

The quarry is anticipated to ship materials to the main market of the Twin Cities via both over the road trucks and from rail with actual utilized transportation being based upon market factors. Potential impacts on pertinent intersections have been evaluated for sales of approximately 1 million tons per year via over the road trucks. Truck traffic is assumed to be split equally between a northern and a southern route connecting the quarry with the Twin Cities Metropolitan Area and also emerging markets for development north thereof. The northern route will use US 8 from St. Croix Falls and the southern route will use Highway 243, and TH 95. Modeling for annual truck sales of 1 million tons per year, 10 roundtrip trucks per hour have been assumed along each of these routes.

The intersection of County Road F with Highway 35 in Dresser will serve both routes and has been analyzed for impact on capacity. Since the northern route will use a controlled access interchange from Highway 35 to Highway 8 which serves the market, no pertinent intersections have been identified that would have the potential to be significantly impacted. The most pertinent intersections along the southern route, Highway 35 at Highway 243 in Osceola and Highway 243 at TH 95 in Chisago County, Minnesota, have both been evaluated for AM and PM Peak Hour capacity. This analysis is based upon 2006 traffic flow maps and assumptions with respect to AM and PM Peak Hour traffic and directional distribution.

The Level of Service (LOS) at County Road F and Highway 35 in Dresser is estimated to be LOS D or better in the AM Peak and LOS C or better in the PM Peak with 10 trucks per hour in each direction (roundtrip). Level of Service (LOS) is a rating of traffic flow quality at an intersection where LOS A refers to unimpeded flow with low traffic volumes while LOS F is highly congested with delays. LOS D is considered average with limited delay due to the presence of other vehicles.

The LOS at Highway 35 and Highway 243 in Osceola is estimated to be currently at LOS C or better and the eastbound approach will be only slightly below LOS C with 10 additional trucks per hour. LOS C reflects better than average conditions with little delay.

In the AM period, the LOS at Highway 243 and TH 95 in Chisago County is estimated to be currently at LOS F with longer queues expected with more trucks. However in the PM Peak period, the intersection is estimated to be at LOS D in the PM Peak even with up to 40 trucks each way per hour. A protected left-turn acceleration lane on TH 95 could help this problem during the AM peak period in the future. However, intersection conditions are due to already existing traffic which will be only minimally impacted by trucks associated with the quarry.

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1.0 INTRODUCTION

1.1. Items Addressed in this Report

This report analyzes air quality, blasting and truck traffic associated with the proposed quarry near Dresser, Wisconsin. The level of analysis is intended to provide information to ensure compliance with applicable standards and regulations including the National Ambient Air Quality Standards and Wisconsin DNR regulations for particulate matter, and blasting ground motion and air overpressure.

Section 2.0 of the report addresses particulate air emissions and concentrations associated with crushing spreads. Section 3.0 of the report addresses air overpressure and ground-borne vibration associated with blasting. Section 4.0 addresses potential traffic impacts from trucks.

1.2. Assumptions on Quarry Activity

To develop quantitative estimates of emissions, and blast effects, specific assumptions as to quarry activity within the site have been developed. This section outlines the assumptions used in this report. The proposed quarry location within Polk County is shown in **Figure 1.1**. Location of the site within the immediate Dresser study area is shown in **Figure 1.2**. The proposed layout of quarry development and location of stationary processing within the property boundary is shown in **Figure 1.3.**

For this analysis, crushing spread equipment is based upon the Wisconsin DNR document Nonmetallic Mining Air Emissions Guidance for the Development of the 1998 Air Emissions Inventory (reference information in Appendix B).

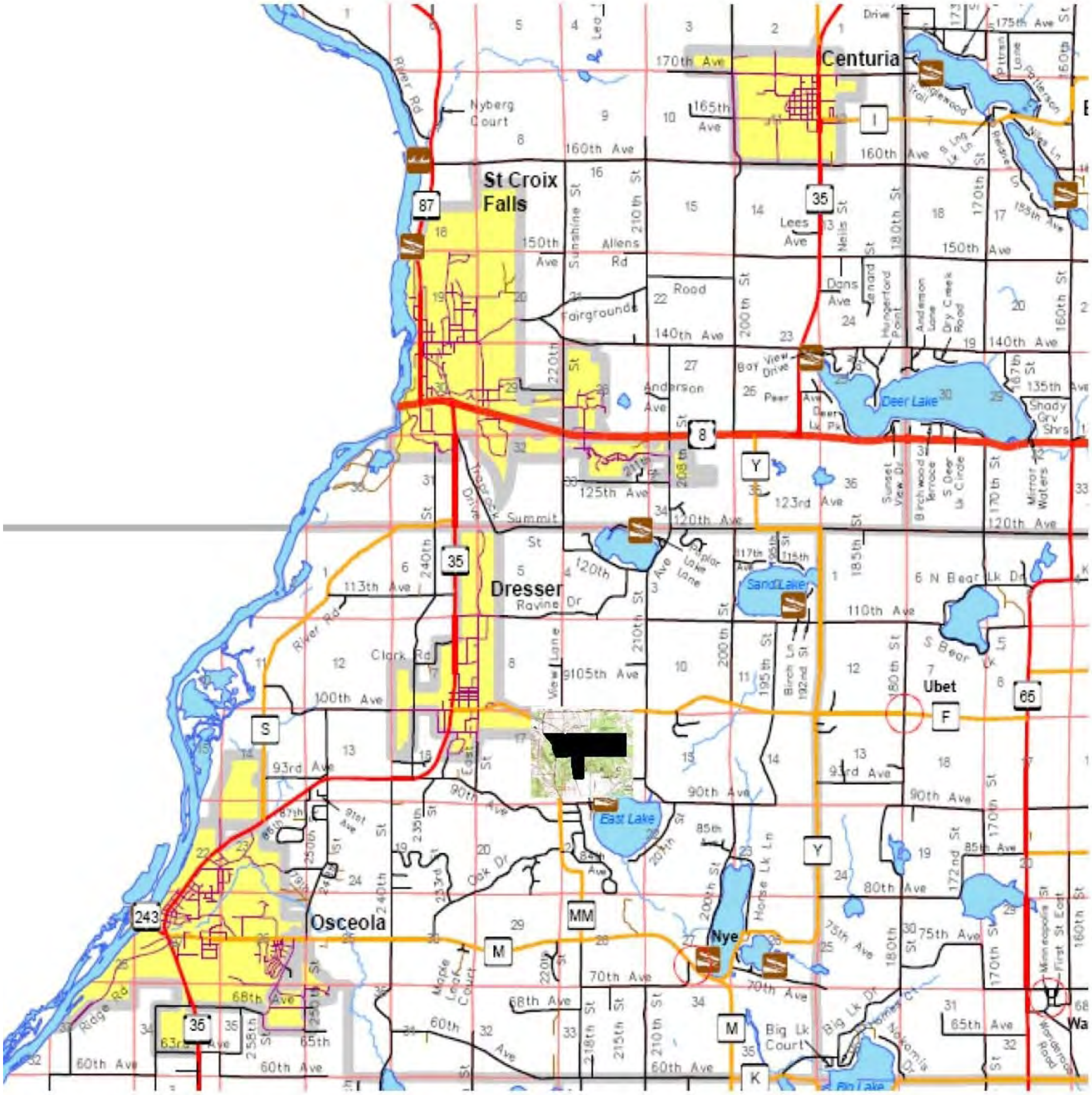
Crushing operation that produces more than 50,000 tons of rock per year and less than 300,000 tons of rock per year

- One primary crusher
- One secondary crusher
- One screen
- One unpaved haul road
- Four conveyors
- Two storage piles
- One loader

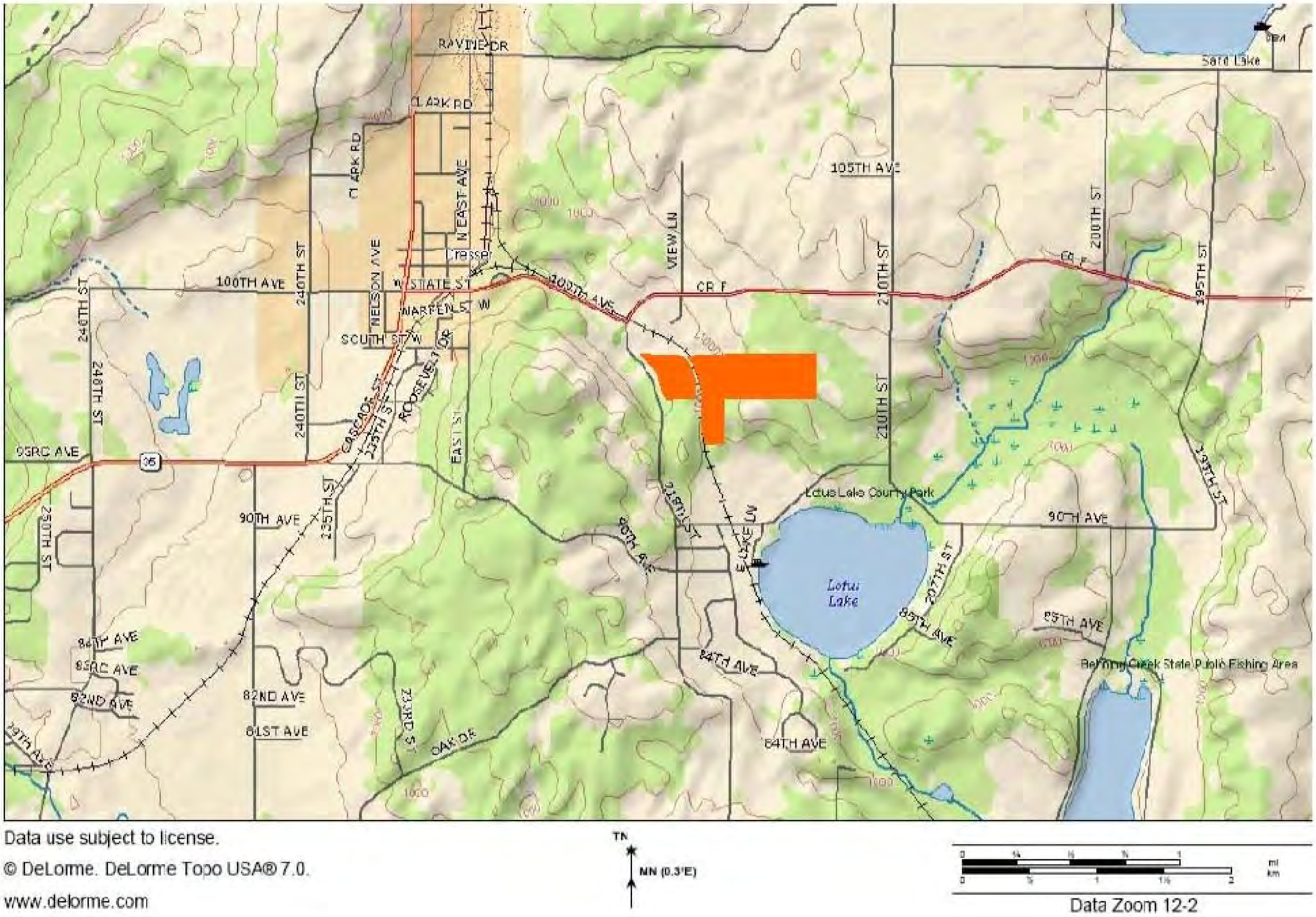
Each crushing spread that produces more than 300,000 tons of rock per year

- One primary crusher
- One secondary crusher
- One tertiary crusher
- Three screens
- One loader
- One unpaved road
- Six conveyors

Except for initial quarry operation, equipment will be operating adjacent to quarry faces or in the lower quarry area, and will be shielded by the higher topography surrounding the area. The analysis of air quality has been evaluated assuming generally level topography, and as such assumes a "worst-case" scenario and is therefore considered conservative.



Kraemer Mining & Materials, Inc. / David Braslau Associates, Inc.	Kraemer Mining & Materials Quarry (Polk County, Wisconsin) REPORT ON AIR QUALITY, BLASTING, AND TRAFFIC	FIGURE 1.1 Proposed Quarry Location in Polk County



Kraemer Mining & Materials, Inc. David Braslau Associates, Inc.	Kraemer Mining & Materials Quarry (Polk County, Wisconsin) REPORT ON AIR QUALITY, BLASTING, AND TRAFFIC	FIGURE 1.2 Location of the Quarry in the Dresser Study Area

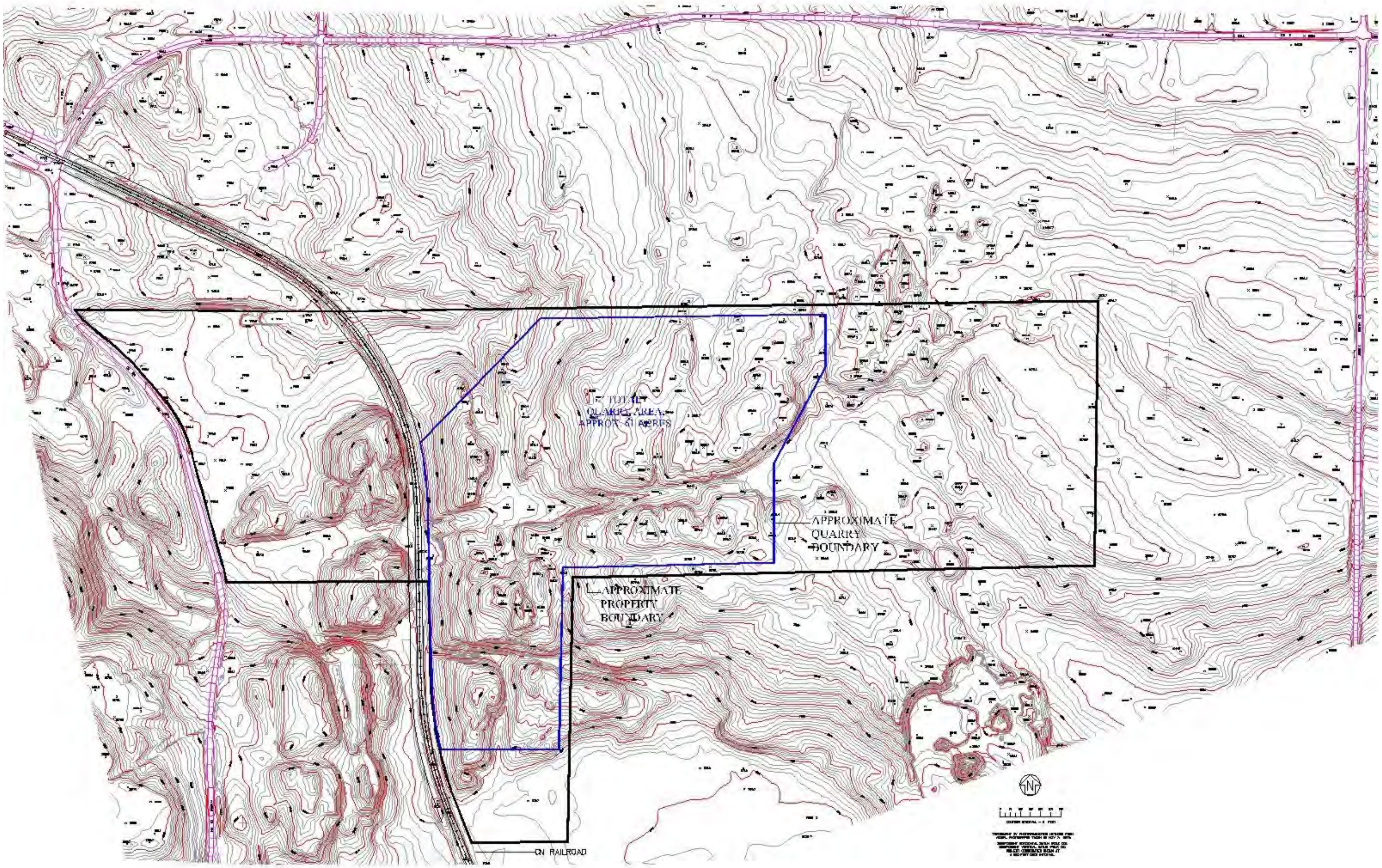


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FIGURE 1.3

Proposed Quarry Development

2.0 AIR EMISSIONS

2.1. Ambient Air Quality Standards for Particulate Matter

Wisconsin air quality standards for particulate matter include a 24-hour and annual standard for Total Suspended Particulates (TSP or PM) and a 24-hour and annual standard for particulate matter of 10 microns or less (PM10). For more information regarding the air quality standards refer to s. NR 404.04, Wis. Adm. Code.

Estimates of downwind concentrations of Total Suspended Particulate Matter (PM) are compared in this report with the Wisconsin ambient air quality standard for PM, based upon emission rates established by the State of Wisconsin for nonmetallic mining operations.

2.2. Emission rates

The 90% control tier will be used for all material processing. Emission rates in pounds per ton established by the Wisconsin DNR are included in Appendix B. Estimated emission rates in grams per second for crushing spread equipment, assuming a nominal throughput of 1000 tons per hour, are listed in **Table 2.1** to show relative differences in fugitive emissions mitigation rates.

Table 2.1 Comparison of Total Particulate Matter (PM) Emission Rates

Emission Rates for 1000 tons per hour	Control Tier		
To show relative differences	50%	75%	90%
	g/sec	g/sec	g/sec
Greater than 50,000, less than 300,000			
One primary crusher	0.044	0.022	0.008
One secondary crusher	0.318	0.159	0.057
One screen	1.986	0.993	0.358
One unpaved haul road (processing site)	10.279	5.140	1.850
Four conveyors	7.415	3.708	1.335
Two storage piles	0.928	0.464	0.167
One loader	1.735	0.868	0.312
TOTAL – Initial Quarry	**22.706**	**11.353**	**4.087**
300,000 or more			
One primary crusher	0.044	0.022	0.008
One secondary crusher	0.318	0.159	0.057
One tertiary crusher	0.318	0.159	0.057
Three screens	5.959	2.979	1.073
One loader	1.735	0.868	0.312
One unpaved haul road (processing site)	10.279	5.140	1.850
Six conveyors	11.123	5.562	2.002
TOTAL – Main Quarry	**29.776**	**14.888**	**5.360**

Fugitive dust emissions from the quarry face will be controlled. There are no reliable emission factors for this phase of quarry activity since it is highly dependent upon the type of material being extracted. Quarry operations will generally be conducted at depth in igneous bedrock with limited amounts of loose particulate material. Fugitive emissions from blasting are intermittent and will occur on only limited occasions and are not expected to contribute significantly to overall emissions. Wind speed and direction will be taken into account prior to any blasting to ensure maximum containment of fugitive emissions within the site. Fugitive emissions from hauling, transport, processing and storage on the site will also be controlled.

2.3. Pollutant Dispersion Analysis

2.3.1. Assumptions

The dispersion of pollutant is estimated using a standard dispersion model which takes into account the emission rate, the source and receiver heights, wind speed and atmospheric stability class. For this analysis, a wind speed of 1 meter per second, neutral atmospheric stability (D), and a source height of 2 meters have been assumed. Whether the crushing spread is on the surface or in a depressed area, no terrain effects have been assumed. As such the numbers are considered conservative or worst case. Concentrations of PM and PM10 have been predicted for each modeled receptor in the vicinity of the proposed quarry for the two proposed crushing spread areas.

2.3.2. Predicted Pollutant Concentrations

PM and PM10 concentrations have been estimated at all receptors from the two crushing spread locations. The initial crushing spread will be located just to the west of the initial quarrying area west of the tracks. Once extraction of materials from this quarry is completed to bring the area into grade to serve as the Central Processing Area, the final crushing spread will be located in this area. The crushing spread locations are shown in **Figure 2.1.** Location of modeled receptors in the vicinity of the proposed quarry is shown in **Figure 2.2**.

Assuming 90% control of emissions from material processing, processing rates of up to 475 tons per hour at the initial location, and up to 675 tons per hour from the final central processing area will be in compliance with emissions standards at all modeled receptors.

Based upon **Table 2.4** it can be seen that from the initial crushing spread even the closest modeled receptors at R3 and R4 are predicted to be below the 150 micrograms per cubic meter standard with processing rates less than 475 tons per hour and 90% control. From the final location even the closest modeled receptor at R4 is predicted to be below the 150 micrograms per cubic meter standard with processing rates less than 675 tons per hour and 90% control. Therefore, no exceedances of ambient air quality standards are likely to occur outside of the property line because of processing activities.

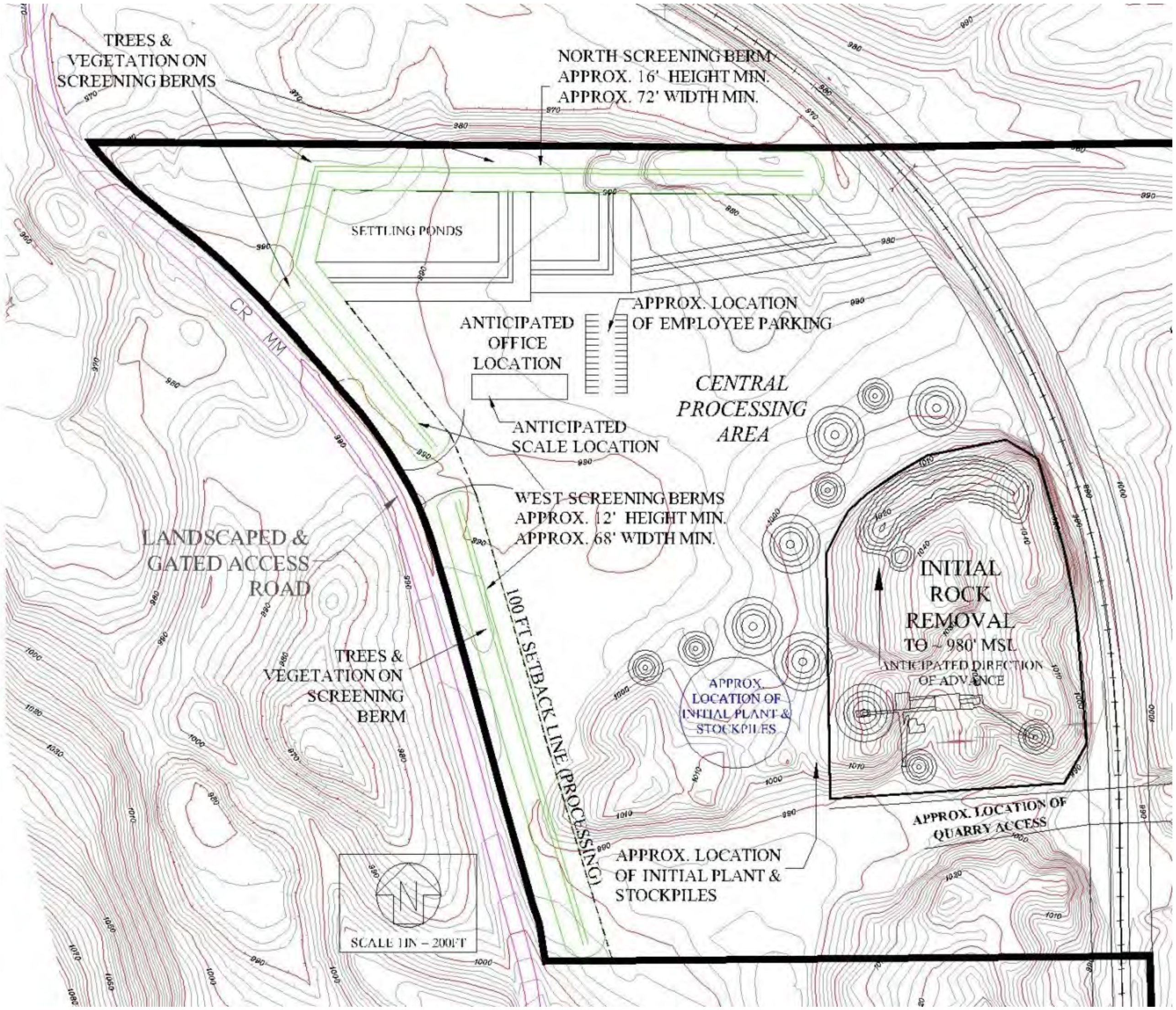

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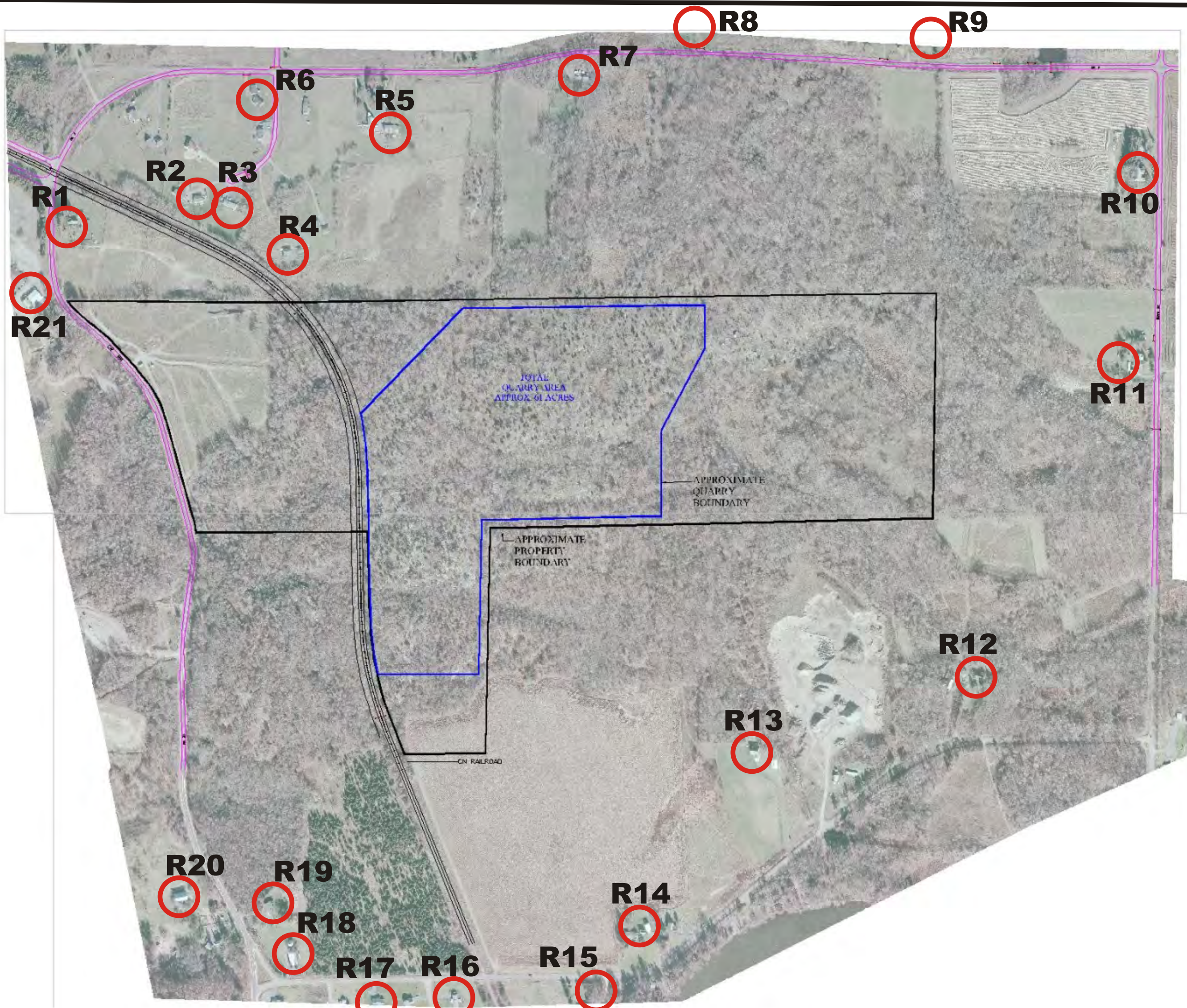
FIGURE 2.1

Location of Crushing Spreads for Interim and Main Quarry Operations



Kraemer Mining & Materials, Inc. David Braslau Associates, Inc.	Kraemer Mining & Materials Quarry (Polk County, Wisconsin) REPORT ON AIR QUALITY, BLASTING, AND TRAFFIC	FIGURE 2.2 Location of Modeled Receptors in the Vicinity of the Proposed Quarry

Table 2.2 Predicted Maximum PM and PM10 Concentrations at Modeled Receptors

	(micrograms per cubic meter)			
	PM (total part.)		PM10	
Hourly	475 T	675 T	475 T	675 T
Receiver	Initial	Main	Initial	Main
R1	92	66	23	20
R2	92	89	23	27
R3	150	131	37	40
R4	150	150	37	46
R5	46	66	11	20
R6	46	51	11	15
R7	28	39	7	12
R8	17	27	4	8
R9	13	18	3	6
R10	10	14	2	4
R11	10	16	2	5
R12	13	21	3	6
R13	19	33	5	10
R14	17	33	4	10
R15	17	27	4	8
R16	19	33	5	10
R17	19	33	5	10
R18	23	39	6	12
R19	28	51	7	15
R20	23	39	6	12
R21	92	66	23	20

3.0 BLASTING

3.1. Blasting Limits and Guidelines

Wisconsin DNR rules contain the following limits on measured impacts from blasting and are provided as **Appendix B**.

- Air overpressure: 133 dB (peak)
- Ground vibration: 2 inch per second maximum (particle velocity)
  (see table in Appendix B for limits by frequency)

The US Office of Surface Mining rules contain the following limit on measured impacts from blasting:

- Air overpressure: 133 dB (2 Hz or lower)
  129 dB (6 Hz or lower)
- Ground vibration: See chart of particle velocity versus frequency on Page 3 of Attachment A in the Blast Control Plan (Appendix B).

3.2. Estimating Ground Vibration Levels

Actual ground vibration data related to the particular rock conditions at the quarry can be established early in the operation with small initial blasts that will have minimum off-site impact, while providing measurable data that can be used to establish appropriate blast designs.

Ground vibration levels can then be predicted for different distances and charge weights. Initial estimates of ground vibration level can be based on data from similar hard rock operations. A chart of typical charge weights per hole used at the reference hard rock quarry (**Figure 4.1**) shows that charge weights generally range between 100 and 200 pounds. Some typical ground vibration data for hard rock blasting are shown in **Figure 4.2** along with fitted curve that could be used for predicting ground vibration. These data represent distances between 700 and 1800 feet with varying amounts of explosive charge weight, with a maximum ground vibration of less than 0.30 inches per second. Scaled distance provides a convenient means of plotting and analyzing ground vibration data and is simply equal to the distance from the blast in feet divided by the square root of the charge weight in pounds. The data are from 4-inch diameter holes that will likely also be used in the type of rock expected at the quarry. This smaller diameter hole limits the amount of explosive that can be used and yields lower ground vibration than larger diameter holes typically used in softer rock.

Based upon these data, the maximum ground vibration level at the nearest modeled receptor, during blasting in the initial quarry to prepare the central processing area as well as blasting in the main quarry, will be below 1 inch per second at frequencies normally associated with blasting in this type of rock. Therefore, initial predictions of ground motion are within both the Wisconsin DNR and USBM ground vibration limits.

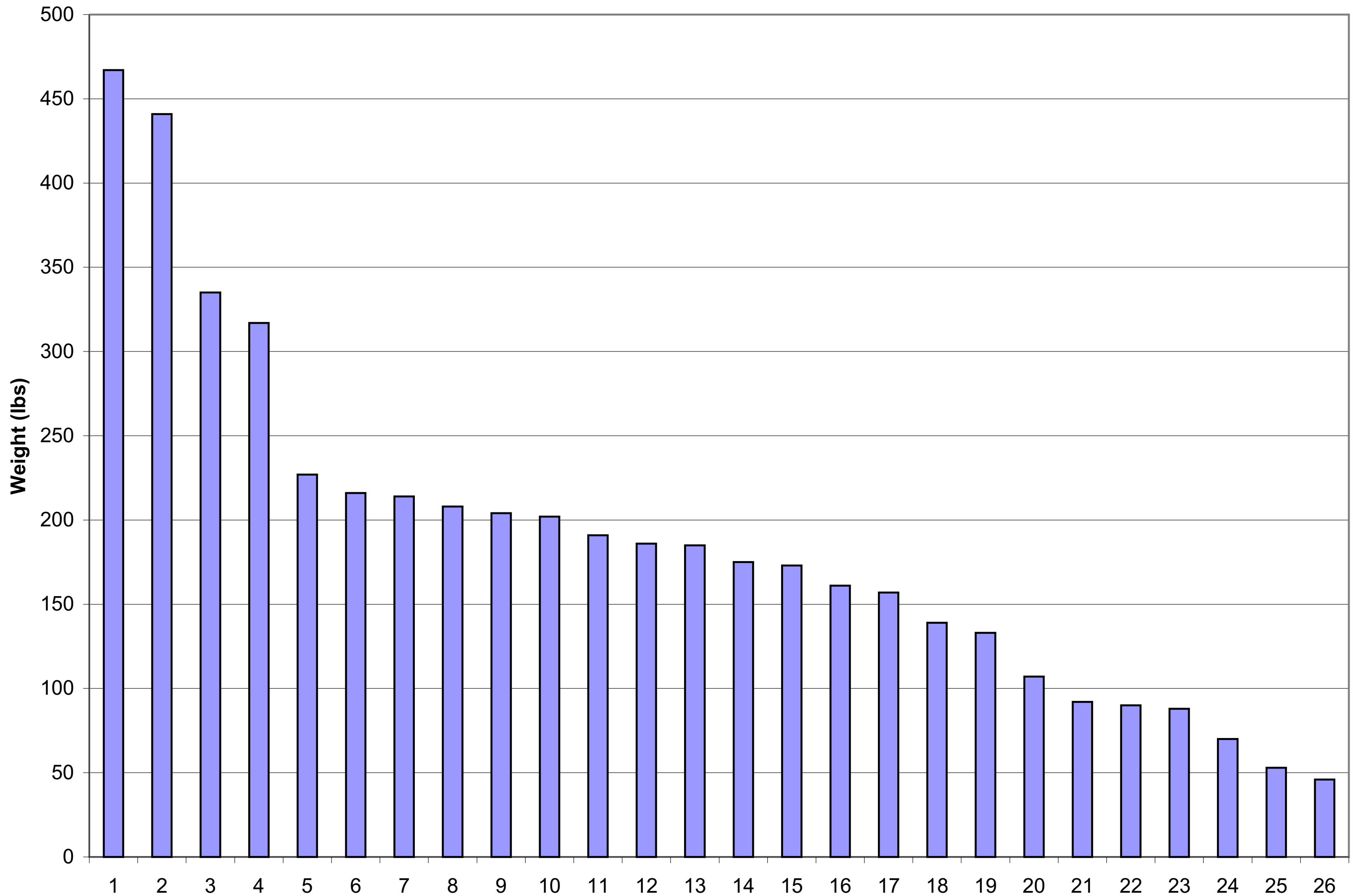
3.3. Estimating Air Overpressure Levels (Blast Noise)

Air overpressure can also be estimated using data from a similar operation, although air overpressure depends more upon atmospheric conditions than distance and charge weight. Some typical data for hard rock blasting is shown in **Figure 4.3** along with fitted curve that could be used for predicting maximum air overpressure. These data also represent distances between 700 and 1800 feet with varying amounts of explosive charge weight. As with ground vibration, scaled distance also provides a convenient means of plotting and analyzing air overpressure data and is simply equal to the distance from the blast in feet divided by the cube root of the charge weight in pounds.

Based upon these data, the maximum air overpressure level at the nearest receptor, during blasting in the initial quarry for preparation of the central processing area as well as blasting in the main quarry, will be below 130 dB, thus also complying with both the Wisconsin DNR and USBM air overpressure limits.

3.4. Compliance with Applicable Standards

Production blasts will comply with the Wisconsin standards (see **Appendix B**) for ground vibration and air overpressure at the nearest receptors. As quarry activities approach the site property line, adjustments will be made in the blast design to ensure that blasting will continue to comply with all applicable standards for ground vibration and air overpressure.



Kraemer Mining & Materials, Inc. David Braslau Associates, Inc.	Kraemer Mining & Materials Quarry (Polk County, Wisconsin) REPORT ON AIR QUALITY, BLASTING, AND TRAFFIC	FIGURE 3.1 Distribution of Typical Charge Weights For hard Rock Quarries

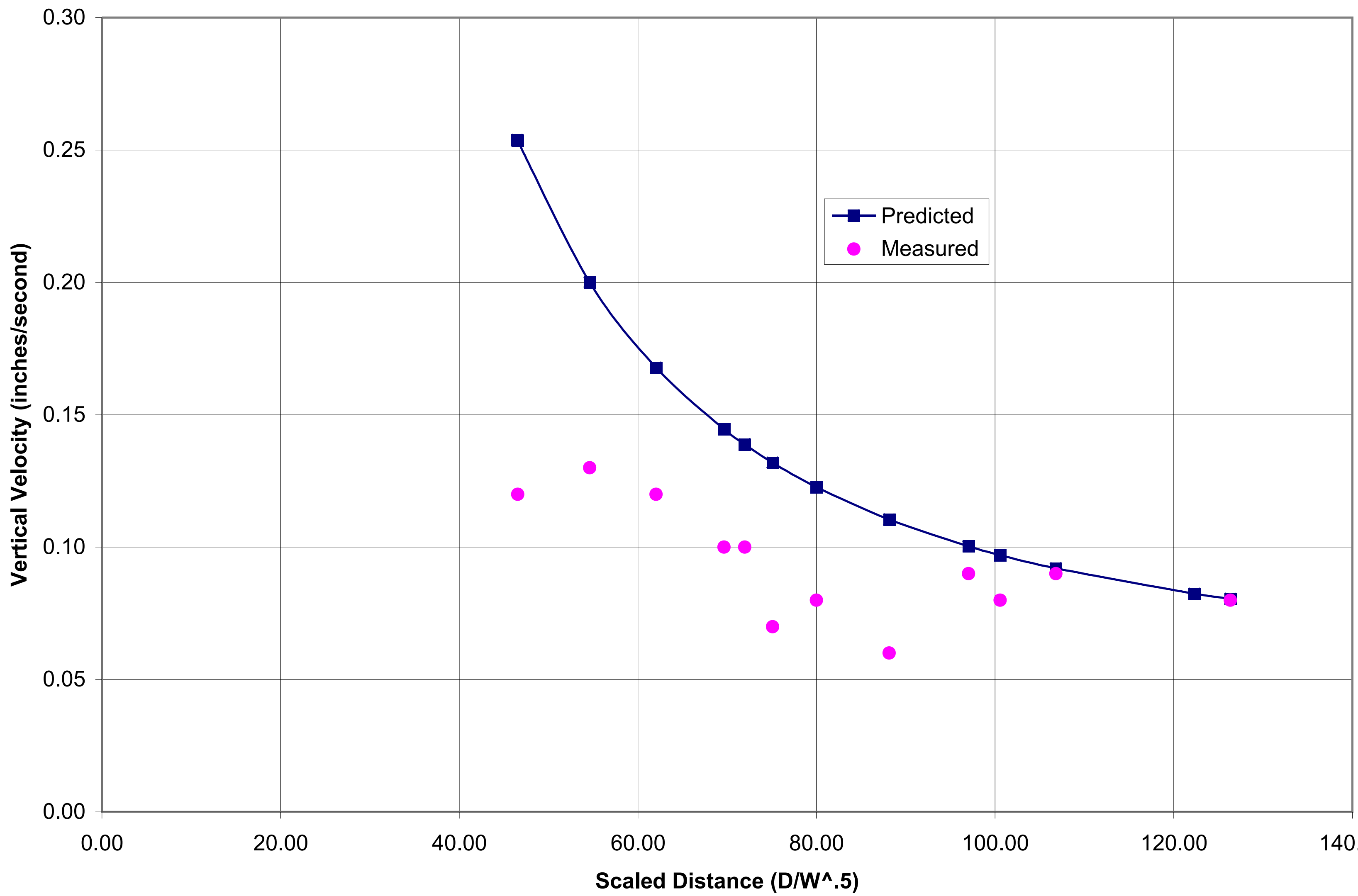


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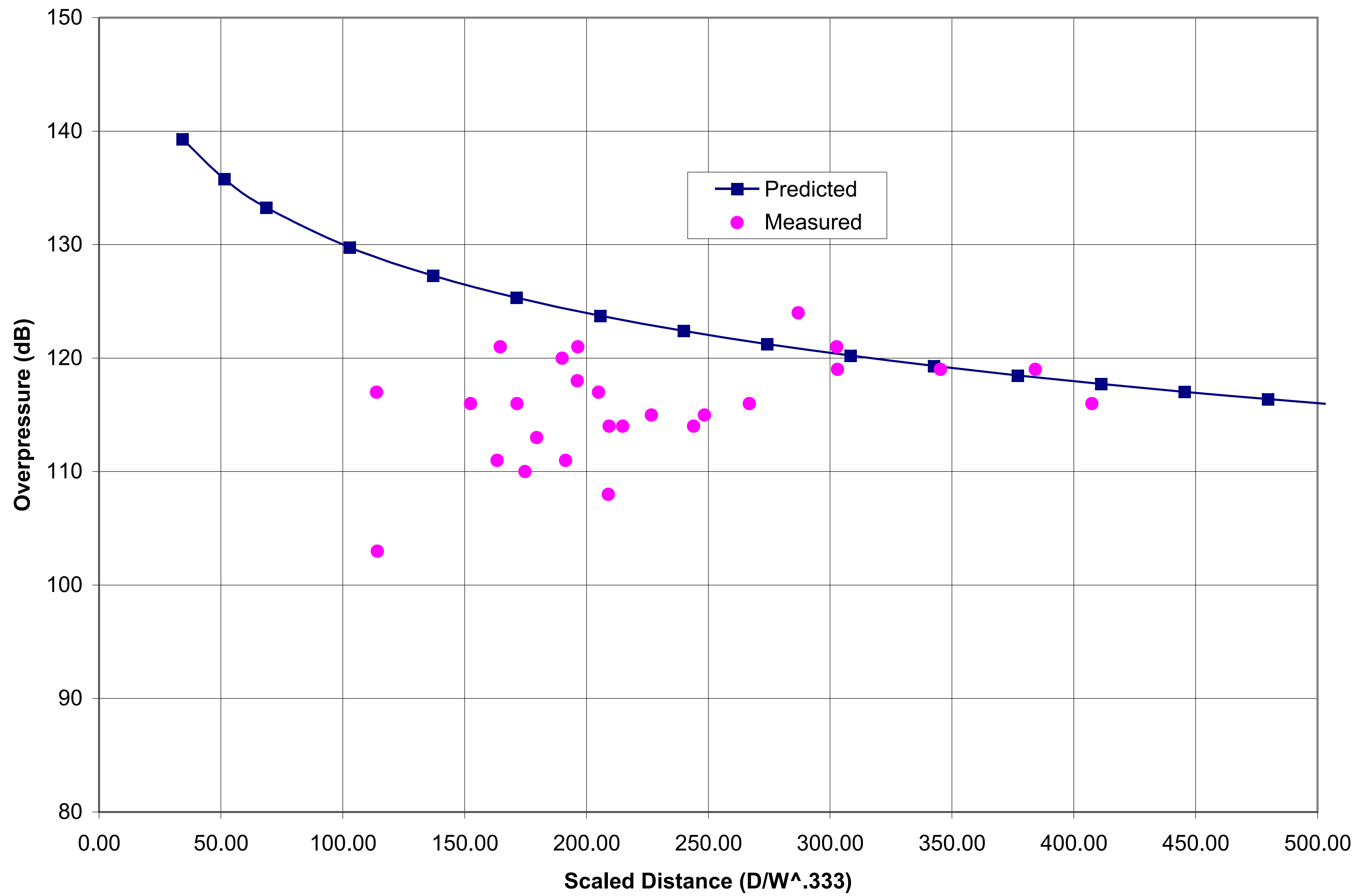
FIGURE 3.2

Typical Measured/Predicted
Ground Vibration Data
(Hard Rock Quarries)



Kraemer Mining & Materials, Inc. David Braslau Associates, Inc.	Kraemer Mining & Materials Quarry (Polk County, Wisconsin) REPORT ON AIR QUALITY, BLASTING, AND TRAFFIC	FIGURE 3.3 Typical Measured/Predicted Air Overpressure Data (Hard Rock Quarries)

4.0 TRAFFIC IMPACTS

Overview: `The quarry is anticipated to ship materials to the main market of the Twin Cities via both over the road trucks and from rail with actual utilized transportation being based upon market factors. Potential impacts on pertinent intersections have been evaluated for sales of approximately 1 MTPY via over the road trucks.

4.1. Spring Load Restrictions

Information has been obtained from the WisDOT and MnDOT websites relative to Spring load restrictions. The only roadway in the vicinity of Dresser that is identified as having restriction is Wisconsin Hwy 65 between US Hwy 8 on the north and New Richmond on the south. This roadway is approximately 10 miles east of the proposed quarrying operation and is not proposed to be significantly used by the operation.

4.2. Truck Routes to and from the Quarry

It is assumed that 10% of quarry product shipped by truck will serve markets in the immediate Wisconsin market. The remaining 90% will be trucked to the Twin Cities Metropolitan area and developing markets north of this point. It is assumed that 50% of these trucks will use a southerly route (Highway 35 to Highway 243 to TH 95 with access to the Twin Cities and developing markets) while 50% of these trucks will use the northerly route (Highway 35 to Highway 8 with access to the Twin Cities and developing northerly markets). The alternate routes through Wisconsin and Minnesota are shown **Figure 4.1.**.

Annual truck based sales of 1 million tons translates in to approximately 20 trucks per hour over a 10 hour day, and an estimated 200 days of sales per year. Of these 90% or 18 trucks per hour will be directed to and from the Twin Cities Metropolitan area, or 9 trucks per hour on each of the southerly and northerly routes. For simplicity the traffic impact analysis here assumes 10 trucks per hour each direction.

The intersection capacity analysis here is based upon 2006 traffic counts from the Wisconsin DOT. Comparison with previous traffic flow maps shows some increases and some reduction in area road traffic flows so no growth in traffic has been assumed. However, the Level of Service at intersections to be used by quarry trucks is determined by baseline traffic and requirements future improvements will be determined by existing and future background traffic and not significantly by an addition of 10 trucks per hour associated with the quarry.

The northern truck route uses the County F and Highway 35 intersection which is stop-controlled on County F. As shown in the analysis of this intersection in **Section 4.4**, the WB (westbound) to NB (northbound) turn is a LOS A and addition of 10 trucks per hour will not have a significant impact. The SB (southbound) to EB (eastbound) is also LOS A and addition of 10 trucks per will have only minimal impact. The next intersection where turns are involved, the interchange at Highway 35 and US 8 provides on- and off-ramps, and no problem with 10 additional trucks is anticipated. US 8 provides direct access to the Twin Cities and developing northerly markets.

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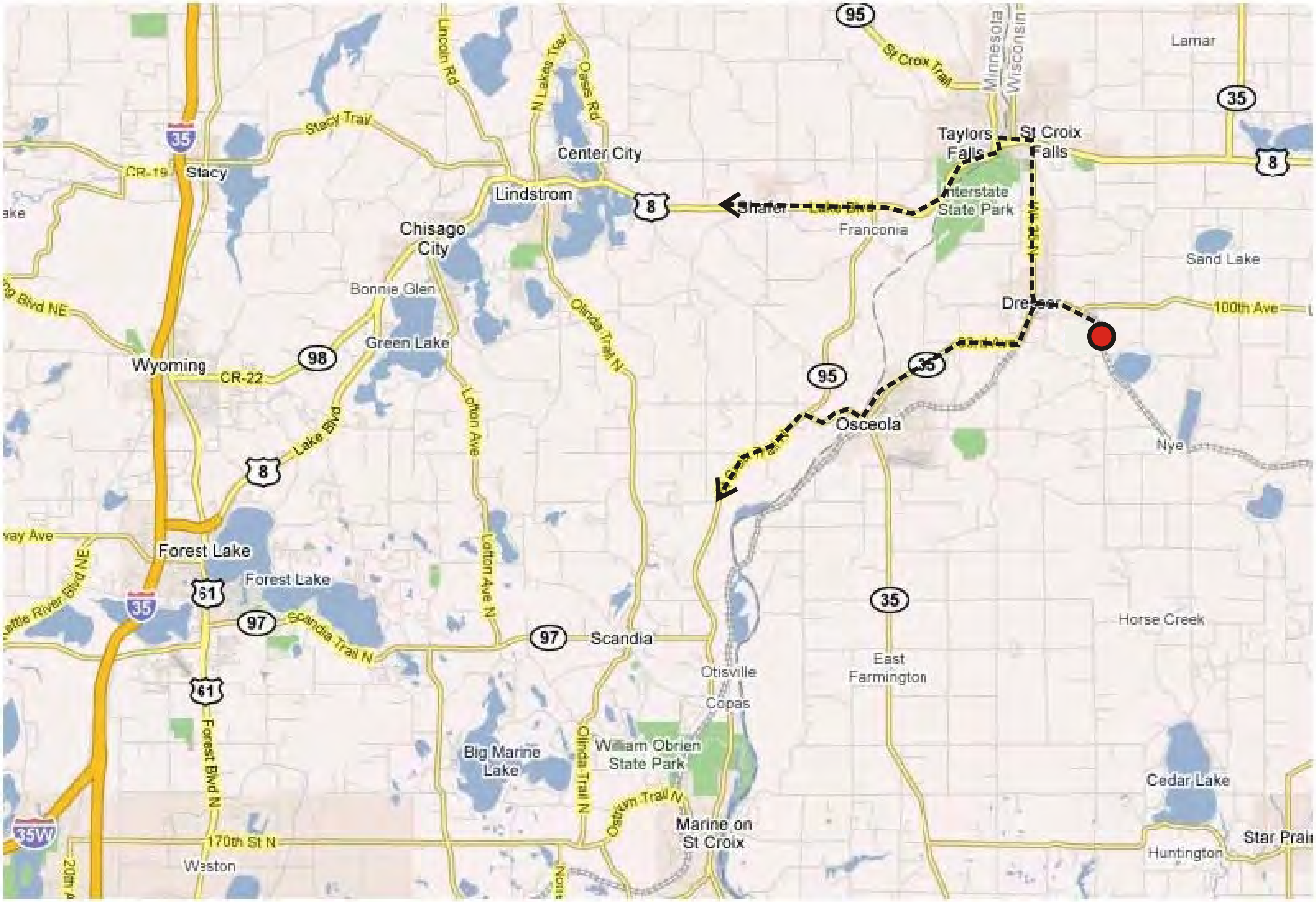


Kraemer Mining & Materials, Inc. David Braslau Associates, Inc.	Kraemer Mining & Materials Quarry (Polk County, Wisconsin) REPORT ON AIR QUALITY, BLASTING, AND TRAFFIC	FIGURE 4.1 Alternate Truck Routes

The southern route encounters more intersections where turns occur. As noted in **Section 4.4**, the WB left from County F to Highway 35 is estimated to be at LOS D with 10 trucks per hour in the AM peak. The SB right to Highway 243 in Osceola is estimated to be LOS A. Because all approaches are stop- controlled at this intersection, there is adequate capacity for EB left turn to NB Highway 35 with this movement at LOS C. The other intersection analyzed here is Highway 243 at TH 95 in Chisago County. As can be seen in **Section 4.6**, some delays during the AM Peak hour can be expected at this intersection. Use of the northern route is available if delays at this intersection become problematical.

4.3. Baseline Traffic Flows

Baseline traffic for 2006 has been taken from the Polk County traffic flow map for Wisconsin and the Chisago County map for Minnesota. Traffic volumes at the Highway 35 and Highway 243 intersection were higher in 2004 than 2006 and are used for this analysis. Two-way traffic volumes for approach legs at intersections analyzed are presented in **Figure 4.2**.

4.4. County F at Highway 35

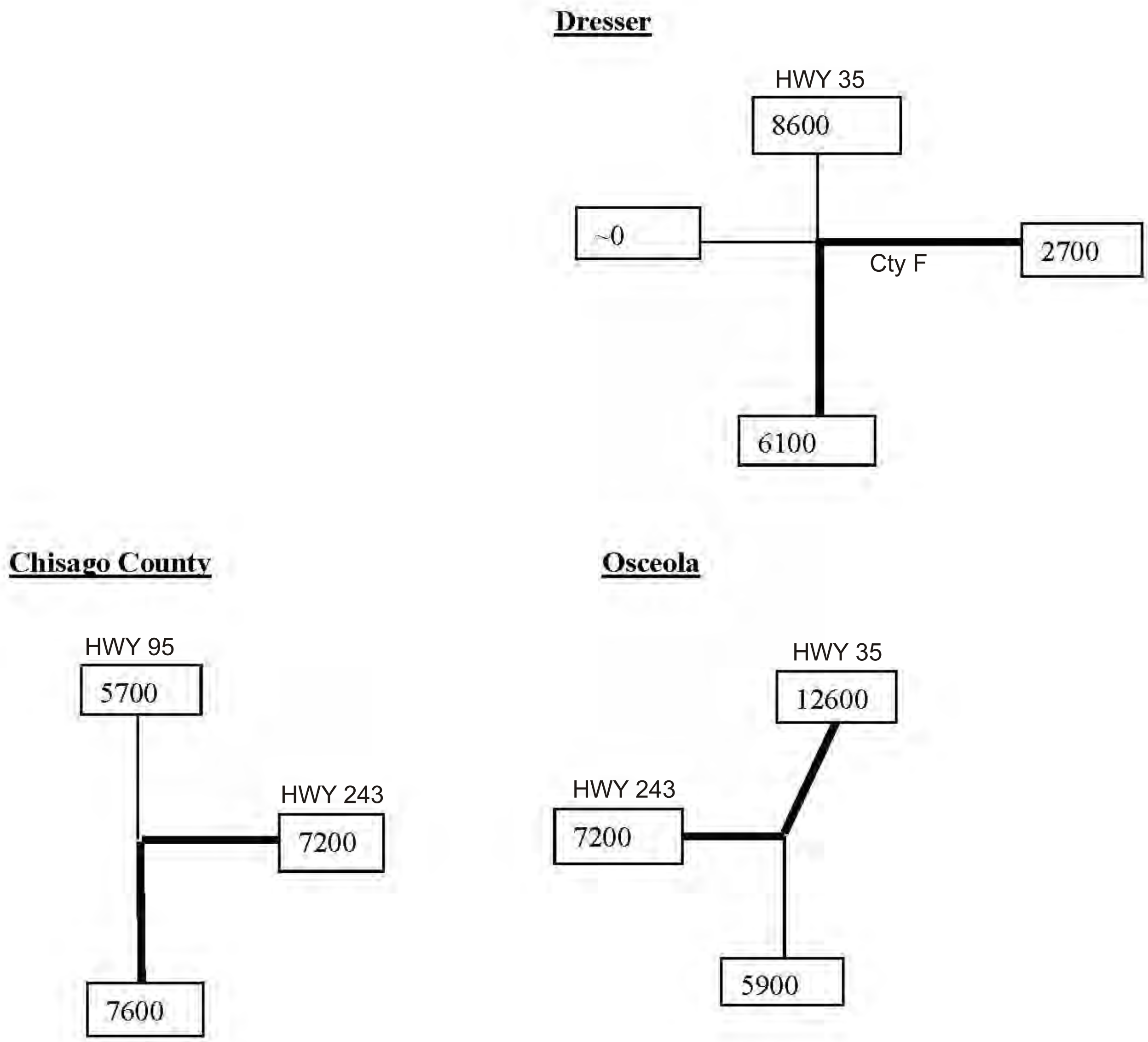
County Road F (State Street W) has recently been upgraded to an urban cross-section with curb and gutter). The westbound approach at Highway 35 now provides for a Left/Through lane and a Right Turn Only lane. The curb radii are relatively large and currently accommodate truck traffic. Because of the roadway width on Highway 35, it has been assumed for this study that northbound thru traffic will be able to pass right turning traffic onto County F.

The intersection currently carries through traffic on Highway 35 with stop-controlled traffic on County F.

An intersection capacity analysis was performed at this intersection based upon 2006 traffic counts from the Polk County traffic flow map. Both an AM and a PM peak hour were evaluated since these will represent worst case traffic flow conditions at the intersection. Assumed peak hour volumes and turning movements are estimated from two-way counts on Highway 35 and County F and included in **Appendix C**. The intersection was analyzed for baseline traffic and for 10 additional trucks per hour making the westbound left (WB L) and northbound right (NB R) turns. Since no traffic volume was available on County F west of Highway 35 it was assumed that this was negligible and the intersection analyzed as a T-intersection. An analysis with 15 to 30 vph eastbound at this intersection yielded the same Level of Service (LOS) for the movements that would be impacted by trucks to and from the quarry.

The resulting LOS and intersection reserve capacities for the critical movements (westbound left and southbound left) at this intersection are presented below in **Table 4.1.**

It can be seen that, because of the existence of the westbound turn lane, the level of service never exceeds LOS D in the AM peak or C in the PM peak with 10 trucks per hour to and from the Quarry. As such the intersection should readily handle up to 1MTPY of truck based sales without any adverse impact on this intersection.



Kraemer Mining & Materials, Inc. David Braslau Associates, Inc.	Kraemer Mining & Materials Quarry (Polk County, Wisconsin) REPORT ON AIR QUALITY, BLASTING, AND TRAFFIC	FIGURE 4.2 2006 Two-Way Average Daily Traffic at Pertinent Intersections

Table 4.1 Capacity Analysis Results for County F at Highway 35

Trucks	WB Left Movement (left turn lane)			SB Left		
AM	WB capacity	Reserved Cap	LOS	SB capacity	Reserve Cap	LOS
0	357	222	C	996	892	A
10	336	186	D	938	834	A

Trucks	WB Left Movement (left turn lane)			SB Left		
PM	WB capacity	Reserved Cap	LOS	SB capacity	Reserve Cap	LOS
0	300	277	C	731	626	A
10	297	262	C	722	617	A

It can be seen that the WB left turn movement is LOS C and changes to LOS D with 10 trucks but only in the AM Peak period. This movement remains at LOS C during the PM Peak period.

4.5. Highway 35 at Highway243

This is the next pertinent intersection south of Dresser through which trucks from the quarry will pass. A southbound right-turn lane on Highway 35 has been constructed at Highway 243 in Osceola. However, Highway 243 eastbound approach to Highway 35 in Osceola is one lane that accommodates left and right turns since there is no east roadway leg at this intersection.
The intersection is stop-controlled in all three directions.

An intersection capacity analysis was also performed at this intersection for both AM and PM peak periods based upon 2006 traffic counts from the Polk County traffic flow map. Assumed peak hour volumes and turning movements are estimated from two-way counts on Highway 35 and Highway 243 and included in **Appendix C**. The intersection was also analyzed for baseline traffic and for 10 additional trucks per hour making the eastbound left (EB L) and southbound right (SB R) turns. This intersection has been analyzed as a T-intersection since no east leg is present, but with stop control on all three approaches.

The resulting LOS for the Northbound plus Southbound approaches and for the Eastbound approach has been estimated using 4-leg stop control data in the Highway Capacity Manual. The results of this analysis are presented in **Table 4.2**.

Table 4.2 Capacity Analysis Results for Highway 35 at Highway 243

AM Peak Hour		80%	20%
Trucks	Total	NB+SB	EB
0	1280	992	288
10	1300	1007	303
LOS C		1149	287
LOS D		1260	398
PM Peak Hour		60%	40%
Trucks	Total	NB+SB	EB
0	1074	642	432
10	1094	652	442
LOS C		1127	752
LOS D		1238	862

During the AM Peak Hour the NB+SB flow is better than LOS C while with 10 trucks per hour the DB low is just slightly over the LOS C threshold but well below the LOS D threshold. During the PM Peak Hour, all traffic flows are well below the LOS C threshold. As such even with the proposed quarry traffic the intersection would perform generally at LOS C, and is able to accommodate the proposed traffic. Therefore, the intersection should readily handle up to 10 trucks per hour associated with 1 MTPY of truck based sales without any adverse impact on this intersection.

4.6. Highway 243 at TH 95 (Minnesota)

After traveling west on Highway 243, trucks will normally turn left southbound on TH 95 in Minnesota. Total traffic volumes as well as heavy commercial counts are available for these two roadways. As with the previous roadways, peak hour turning movements were estimated assuming 10% of daily traffic during the peak hour with 60% traveling in the direction of the Twin Cities in the AM period and 60% traveling away from the Twin Cities in the PM peak. Assumed volumes for this intersection are also included in Appendix A.

An intersection capacity analysis was also performed at this intersection for both AM and PM peak periods based upon 2006 traffic counts. As with other intersections, this was analyzed for baseline traffic and for 10 additional trucks per hour making the westbound left (WB L) and northbound right (NB R) turns. This intersection has also been analyzed as a T-intersection since no west leg is present.

The resulting LOS and intersection reserve capacities for the critical movements (westbound left and southbound left) at this intersection are presented below in **Table 4.3**. The intersection is estimated to be at LOS F under the baseline condition during the AM Peak, primarily because of the heavy left turn movement and southbound movement. No LOS problems are anticipated during the PM Peak with traffic moving away from the Twin Cities. With a westbound left turn lane, queue lengths could be fairly long. This could be alleviated with a protected southbound acceleration lane for left turning vehicles. As the number of trucks increases, a more detailed traffic study for this intersection may be warranted. The truck traffic in and of itself does not cause a significant LOS decline at this intersection and no adverse impact from quarry-related traffic is anticipated.

Table 4.3 Capacity Analysis Results for TH 95 and Highway 243

Trucks	WB Left Movement (single lane)			WB Left Movement (left turn lane)			SB Left		
AM	WB capacity	Reserve Cap	LOS	WB capacity	Reserved Cap	LOS	SB capacity	Reserve Cap	LOS
0	317	-130	F	276	-82	F	706	602	A
10	312	-149	F	273	-99	F	697	593	A

Trucks	WB Left Movement (single lane)			WB Left Movement (left turn lane)			SB Left		
PM	WB capacity	Reserve Cap	LOS	WB capacity	Reserved Cap	LOS	SB capacity	Reserve Cap	LOS
0	538	236	C	283	222	C	581	511	A
10	556	239	C	307	234	C	642	572	A

5.0 SUMMARY OF FINDINGS

5.1. Air Quality

Particulate matter (PM and PM10) is regulated by the State of Wisconsin. Emissions have been estimated using the Wisconsin DNR document Nonmetallic Mining Air Emissions Guidance for the Development of the 1998 Air Emissions Inventory, Concentrations have been estimated (reference information in Appendix B). The dispersion of pollutants is estimated using a standard dispersion model which takes into account the emission rate, the source and receiver heights, wind speed and atmospheric stability class. For this analysis, a wind speed of 1 meter per second, neutral atmospheric stability (D), and a source height of 2 meters have been assumed. Whether the crushing spread is on the surface or in a depressed area, no terrain effects have been assumed. As such, modeling represents a conservative or worst case scenario. Concentrations of PM (particulate matter) and PM10 (particulate matter with diameter of 10 microns or less) have been predicted for each modeled receptor in the vicinity of the proposed quarry for the two proposed crushing spread areas (preparation of central processing area and subsequent main quarry processing). The crushing spread for the initial quarry will be 990 feet from the nearest receptor. Processing throughput of up to 475 tons per hour will not exceed the 150 microgram per cubic meter 24-hour standard for PM under the conservative meteorological assumptions noted above. The crushing spread for the main quarry will be 1200 feet from the nearest receptor. Processing throughput of up to 675 tons per hour will not exceed the 150 microgram per cubic meter 24-hour standard for PM under the conservative meteorological assumptions noted above.

5.2. Blasting

Blasting impact on air overpressure (blast noise) and ground vibration is governed by rules of the Wisconsin Department of Natural Resources and the US Office of Surface Mining. The Wisconsin DNR limits air overpressure to 130 dB and ground vibration (particle velocity) to a maximum of 2 inch per second and lower, depending upon frequency. US OSM limits air overpressure to 129 dB for 6 Hz and below and 133 dB for 2 Hz and below. Ground vibration is generally limited to 1 inch per second for frequencies below 20 Hz and to 2 inches per second above 20 Hz.

Maximum predicted overpressure at the nearest receptor to proposed blasting operations is less than 129 dB. Maximum predicted ground motion at the nearest receptor is less than 1 inch per second, which for typical frequencies associated with blasting in rock of this type, will be incompliance with both the Wisconsin DNR and USBM limits.

For normal operations, standard production blasts will comply will all applicable standards for ground vibration and air overpressure. As quarry activities approach the site property line, adjustments will be made in the blast design to ensure that blasting will continue to comply with all applicable standards for ground vibration and air overpressure.

5.3. Traffic

Truck traffic from the quarry is assumed to either a northern or southern route between the quarry and the Twin Cities Metropolitan Area and developing markets north thereof. The northern route uses US 8 to reach the market while the southern route uses Highway 243, and TH 95 to reach the market. It is assumed that 50% of trucks will take each of the routes, or 10 additional round trip trucks per hour on each route.

Both routes will use the County F and Highway 35 intersection in Dresser. The other two pertinent intersections on the southern route are at Highway 35 at Highway 243 in Osceola and Highway 243 at TH 95 in Chisago County, Minnesota. These three intersections have been analyzed for level of service based upon data from 2006 traffic flow maps and assumptions with respect to peak hour and traffic distribution percentages.

County F at Highway 35 in Dresser

The recently completed improvements on County F east of Highway 35 provide a left turn lane. The wider urban section of Highway 35 provides sufficient space for northbound traffic to pass right-turning vehicles to eastbound County F. Therefore, the Level of Service (LOS) at this intersection is estimated to be LOS D or better in the AM Peak and LOS C or better in the PM Peak with 10trucks per hour in each direction. With less travel volumes during other hours of the day, the LOS will be higher. Thus, this intersection should readily accommodate the quarry traffic without any adverse impact on the intersection

Highway 35 and Highway 243 in Osceola

The recently completed improvements to Highway 35 in Osceola provide a southbound right turn and a northbound left turn to Highway 243. The intersection is stop-controlled in all three directions (there is no east leg). Based upon the directional split and traffic distribution during the AM and PM peak hours in this report, the intersection is estimated to operate at LOS C and will not be significantly impacted by an additional 10 trucks per hour.

Highway 243 and Trunk Highway 95 in Chisago County, Minnesota

Trunk Highway 95 (north/south) is a major north/south roadway in Chisago County and is not stop-controlled at its intersection with Highway 243. There are go-around lanes on TH 95 for southbound left traffic and a right turn lane. However there is only one westbound lane. In the AM period with heavy southbound high speed traffic on TH 95, the westbound left-turn onto TH 95 is constrained but is estimated at LOS C with the addition of 10 additional trucks per hour. The intersection is estimated to be better than LOS C in the PM Peak Hour with 10 additional trucks per hour. Therefore, no adverse impacts at this intersection are anticipated from the additional truck traffic associated with 1 MTPY sales from the quarry.

APPENDIX A
WISCONSIN AMBIENT AIR QUALITY STANDARDS

NR 404.04 Ambient air quality standards.
(1) APPLICABILITY
OF AIR STANDARDS. The air standards apply to the entire state without exception.
(2) SULFUR OXIDES. (a) *Primary standards.* The primary standards for sulfur oxides, measured as sulfur dioxide, are:
1 . 0.030 ppm − annual arithmetic mean.
2. 0.14 ppm − maximum 24−hour average concentration, not to be exceeded more than once per year.
(b) *Secondary standard.* The secondary standard for sulfur oxides, measured as sulfur dioxide, is: 0.5 ppm − maximum 3−hour average concentration, not to be exceeded more than once per year.
(3) PARTICULATE MATTER: SECONDARY STANDARD. The secondary standard for particulate matter measured as total suspended particulates is 150 micrograms per cubic meter − maximum 24−hour average concentration, not to be exceeded more than once per year.
(4) CARBON MONOXIDE: PRIMARY AND SECONDARY STANDARDS. The primary and secondary standards for carbon monoxide are:
(a) 10 milligrams per cubic meter (9 ppm) − maximum 8−hour average concentration, not to be exceeded more than once per year.
(b) 40 milligrams per cubic meter (35 ppm) − maximum 1−hour concentration, not to be exceeded more than once per year.
(5) OZONE: PRIMARY AND SECONDARY STANDARDS. The primary and secondary standards for ozone are:
(a) 0.12 ppm (235 micrograms per cubic meter) − maximum 1−hour average concentration. The 1−hour ozone standards are attained when the expected number of days per calendar year with maximum hourly average concentrations above the designated level is equal to or less than one, as determined by the methodology of 40 CFR part 50, Appendix H, incorporated by reference in s. NR 484.04 (4).
(b) 0.08 ppm — maximum 8−hour concentration. The 8−hour ozone standards are attained when the arithmetic mean of the fourth highest daily maximum 8−hour concentration at an ambient air quality monitoring site is less than or equal to 0.08 ppm, as determined by the methodology of 40 CFR part 50, Appendix I, incorporated by reference in s. NR 484.04 (4m).
(6) NITROGEN DIOXIDE: PRIMARY AND SECONDARY STANDARDS. The primary and secondary standards for nitrogen dioxide are: 0.053 ppm (100 micrograms per cubic meter) − annual arithmetic mean.
(7) LEAD: PRIMARY AND SECONDARY STANDARDS. The primary and secondary standards for lead and its compounds, measured as elemental lead, are: 1.5 micrograms per cubic meter, maximum arithmetic mean averaged over a calendar quarter, as a constituent of suspended particulate matter.

APPENDIX B

WISCONSIN DNR BLASTING REGULATIONS

Comm 7.64 Control of adverse effects. **(1)** GENERAL REQUIREMENTS. Blasting shall be conducted so as to prevent injury and unreasonable annoyance to persons and damage to public or private property outside the controlled blasting site area.

(2) FLYROCK. Flyrock travelling in the air or along the ground:

(a) Shall remain within the controlled blasting site area; and

(b) Shall not be cast from the controlled blasting site area more than one–half the distance to the nearest inhabited building within or outside of the controlled blasting site area.

(3) AIRBLAST. (a) Airblast shall not exceed a maximum limit of 133 peak dB at the location of any dwelling, public building or place of employment outside the controlled blasting site area.

(b) The blaster shall conduct monitoring of every blast to ensure compliance with the airblast limit. The measuring system used shall have a lower–end flat frequency response of not more than 2 Hz and an upper–end flat frequency response of at least 200 Hz.

(4) GROUND VIBRATION. (a) 1. The maximum ground vibration at the location of any dwelling, public building or place of employment outside the controlled blasting site area shall be established in accordance with either the blasting–level chart of par. (b) or by the department under sub. (5).

2. All structures in the vicinity of the controlled blasting site area, not listed in subd. 1., such as water towers, pipelines and other utilities, tunnels, dams, impoundments and underground mines, shall be protected from damage by establishment by the blaster of a maximum allowable limit on the ground vibration. The blaster shall establish the limit after consulting with the owner of the structure.

(b) The blaster shall use the ground vibration limits specified in Figure 7.64 to determine the maximum allowable ground vibration. Ground vibration shall be measured as the particle velocity. Particle velocity shall be recorded in 3 mutually perpendicular directions.

(c) The blaster shall make and keep a seismograph record including both particle velocity and vibration frequency levels for each blast. The method of analysis shall be subject to discretionary review by the department.

(d) For quarry operations, the blaster shall report any ground vibration levels to the department that are above 0.75 inch per second with frequencies less than 40 Hz.

(5) EXCEPTIONS. (a) The maximum ground vibration and airblast standards of subs. (3) and (4) shall not apply within the controlled blasting site area.

(b) If necessary to ensure that blasting resultants at a particular blast area do not cause injury, damage or unreasonable annoyance to persons or property outside any controlled blasting site area, more restrictive limits shall be established by the department.

Note: Local municipalities may have more restrictive regulations than the department.

History: Cr. Register, May, 1987, No. 377, eff. 6–1–87; renum. (2) and (3) to be (3) and (2) and am. (2) (b), r. and recr. (3), (4), am. (5), Register, October, 1999, No. 526, eff. 11–1–99.

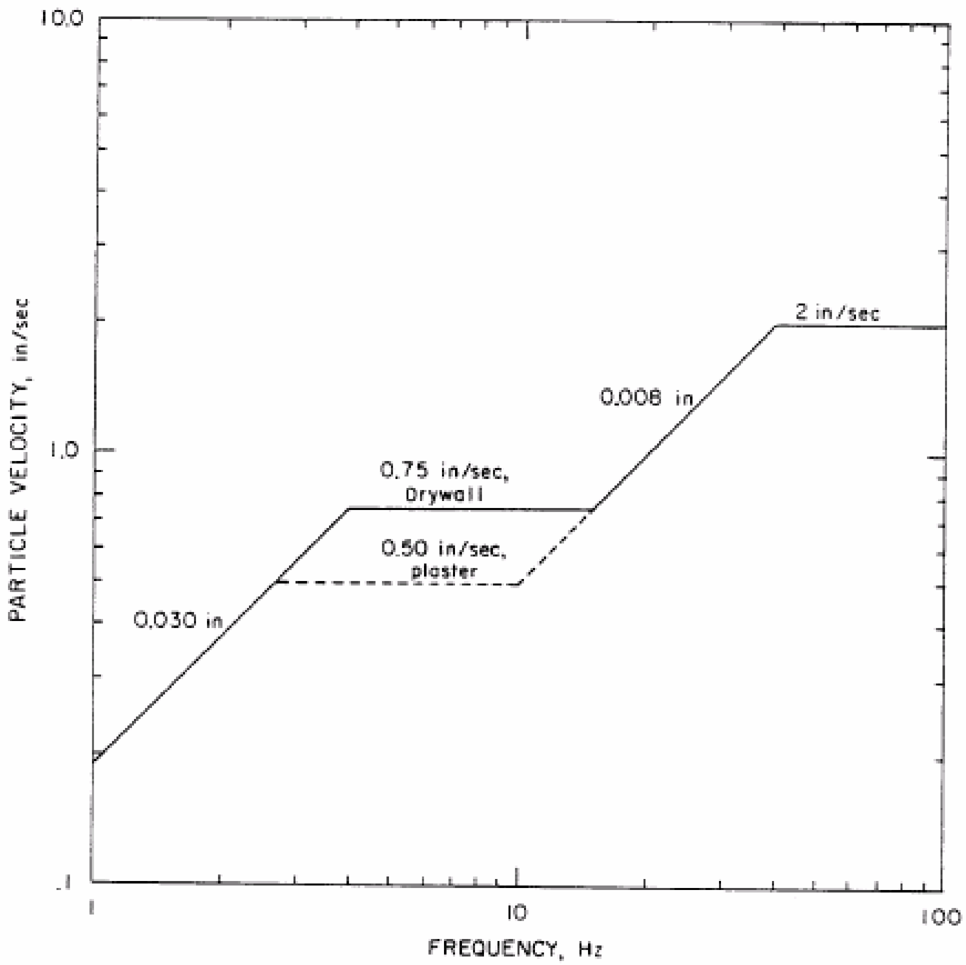


Figure 7.64
BLASTING LEVEL CHART

APPENDIX C

Assumed Turning Movements at Pertinent Intersections

County Road F at Highway 35

AM VOLUMES

BASELINE TRAFFIC

	All vehicle	Trucks	Pct trucks
SB total	516	6	1
SB thru	413	4	1
SB left	103	2	2
NB total	144	12	8
NB Thru	49	4	8
NB Right	95	8	8
WB total	162	12	7
WB left	130	8	6
WB right	32	4	13

WITH 10 QUARRY TRUCKS PER HOUR

	All vehicle	Trucks	Pct trucks
SB total	516	6	1
SB thru	413	4	1
SB left	103	2	2
NB total	154	22	14
NB Thru	49	4	8
NB Right	105	18	17
WB total	172	22	13
WB left	140	18	13
WB right	32	4	13

PM VOLUMES

BASELINE TRAFFIC

	All vehicle	Trucks	Pct trucks
SB total	344	6	2
SB thru	241	4	2
SB left	103	2	2
NB total	366	12	3
NB Thru	293	4	1
NB Right	73	8	11
WB total	108	12	11
WB left	22	8	36
WB right	86	4	5

WITH 10 QUARRY TRUCKS PER HOUR

	All vehicle	Trucks	Pct trucks
SB total	344	6	2
SB thru	241	4	2
SB left	103	2	2
NB total	376	22	6
NB Thru	293	4	1
NB Right	83	18	22
WB total	118	22	19
WB left	32	18	56
WB right	86	4	5

Highway 35 at Highway 243

AM VOLUMES

BASELINE TRAFFIC

	All vehicle	Trucks	Pct trucks
SB total	756	6	1
SB thru	227	4	2
SB RIGHT	529	2	0
NB total	236	12	5
NB Thru	118	4	3
NB LEFT	118	8	7
EB total	288	12	4
EB left	202	8	4
EB right	86	4	5

WITH 10 QUARRY TRUCKS PER HOUR

	All vehicle	Trucks	Pct trucks
SB total	766	6	1
SB thru	227	4	2
SB RIGHT	539	2	0
NB total	236	22	9
NB Thru	118	4	3
NB LEFT	118	18	15
EB total	298	22	7
EB left	212	18	8
EB right	86	4	5

PM VOLUMES

BASELINE TRAFFIC

	All vehicle	Trucks	Pct trucks
SB total	288	6	2
SB thru	173	4	2
SB RIGHT	115	2	2
NB total	354	12	3
NB Thru	177	4	2
NB LEFT	177	8	5
EB total	432	12	3
EB left	302	8	3
EB right	130	4	3

WITH 10 QUARRY TRUCKS PER HOUR

	All vehicle	Trucks	Pct trucks
SB total	298	6	2
SB thru	173	4	2
SB RIGHT	125	2	2
NB total	354	22	6
NB Thru	177	4	2
NB LEFT	177	18	10
EB total	442	22	5
EB left	312	18	6
EB right	130	4	3

Highway 243 at TH 95 (Minnesota)

AM VOLUMES

BASELINE TRAFFIC

	All vehicle	Trucks	Pct trucks
SB total	342	7	2
SB thru	239	6	3
SB left	103	1	1
NB total	304	14	5
NB Thru	61	4	7
NB Right	243	10	4
WB total	432	27	6
WB left	346	25	7
WB right	86	2	2

WITH 10 QUARRY TRUCKS PER HOUR

	All vehicle	Trucks	Pct trucks
SB total	516	7	1
SB thru	413	6	1
SB left	103	1	1
NB total	314	24	8
NB Thru	61	4	7
NB Right	253	20	8
WB total	442	37	8
WB left	356	35	10
WB right	86	2	2

PM VOLUMES

BASELINE TRAFFIC

	All vehicle	Trucks	Pct trucks
SB total	228	6	3
SB thru	160	4	3
SB left	68	2	3
NB total	456	14	3
NB Thru	137	4	3
NB Right	319	10	3
WB total	288	27	9
WB left	58	25	43
WB right	230	2	1

WITH 10 QUARRY TRUCKS PER HOUR

	All vehicle	Trucks	Pct trucks
SB total	228	6	3
SB thru	160	4	3
SB left	68	2	3
NB total	466	24	5
NB Thru	137	4	3
NB Right	329	20	6
WB total	298	37	12
WB left	68	35	51
WB right	230	2	1

APPENDIX D

RESUME

Dr. David Braslau

DAVID BRASLAU, P.E.	**Education**
President, David Braslau Associates, Inc.	**University of California Berkeley** Ph.D. Engineering -- 1965 M.Sc. Civil Engineering -- 1960 **Massachusetts Institute of Technology** B.Sc. Civil Engineering -- 1956

Qualifications in Environmental Assessment of Non-Metallic and Metallic Mineral Mining

Background

Dr. David Braslau, President, David Braslau Associates, Inc. received his B.Sc. Degree in Civil Engineering from the Massachusetts Institute of Technology in 1956, where he minored in geology and specialized in structures and design and completed a thesis on the effects of blast loading on structures. He expanded his work to linear and non-linear acoustics during his masters and doctoral studies at the University of California Berkeley and helped with development of the PISCES computer program at Physics International to evaluate effects of airborne and underground nuclear and conventional explosive blasts, high velocity impact, and long range wave propagation.

Following employment in the aerospace and civil engineering industry, Dr. Braslau taught Geophysics at the University of Minnesota in areas of seismicity, geophysical exploration techniques, effects of meteorite impact and underground nuclear explosions. Following the passage of the National Environmental Policy Act in 1969, he assisted environmental assessment techniques in the Department of Civil Engineering at the University of Minnesota, primarily in noise and air dispersion. He established the firm of David Braslau Associates, Inc. in 1971, to address environmental issues including noise, acoustics and vibration, air quality, and environmental planning and assessment. Dr. Braslau served as Interim Associate Director for Minerals at the Natural Resources Research Institute (NRRI) in Duluth in 1984.

Selected Projects Directed by Dr. Braslau

In addition to completing environmental assessments and impact statements (see attached list) and assisting with development of the Minnesota Noise standards and community noise ordinances, Dr. Braslau directed and completed the following projects for the mining industry.

Annandale Rock	Noise assessments for quarries in Annandale, MN
Apple Valley Generic EIS	Evaluation of noise for all potential future gravel pit locations in the City of Apple Valley, MN including associated heavy truck traffic.
Badger Mining	Noise assessment and control recommendations for large scale screening plant in Taylor, Wisconsin.
Bracht Bros. Scandia	Noise assessment and noise control recommendations.
Buffalo Bituminous	Noise assessment proposed new gravel pit and hot mix plant
Fisher Sand and Gravel	Noise and air quality assessment of gravel pit expansion in Apple Valley

Frattalone	Estimated noise levels from proposed future gravel operation
Gesell Conc. Prod.	Noise monitoring and recommendations for Wilton mine
Laurentian Mine	Blasting and noise components of Minnesota DNR EIS for new iron ore mine
Inland Steel	Blasting and noise assessment and recommendations for Virginia mine
Kasota Twp Mining	Noise, blasting and air quality components for a supplement EAW
Kraemer Mining and Materials	Noise, blasting and air quality studies for due diligence in support of quarry operation, Mille Lacs County, Minnesota
Kraemer Mining and Materials	Noise, blasting, air quality and traffic components for and EAW in Sauk Rapids, Minnesota
Shiely	Blasting assessment for Larson Pit and Robinson's Rocks scenic cliff protection
Shiely	Shakopee mining ordinance review and recommendations
Tiller	Noise assessments and mitigation for quarries in Sherburne County, MN
Tower Asphalt	Noise assessment of sand, gravel and hot mix facility and recommendation for noise control
UNIMIN	Noise and air quality assessments for quarry expansion in Ottawa, MN

SELECTED PROJECTS
ENVIRONMENTAL ANALYSIS

David Braslau Associates, Inc.

David Braslau Associates, Inc. has completed or been involved in a wide range of environmental studies and reviews beginning in 1972. Unless otherwise note, all of the EIS, EAW and ISP studies have involved have involved traffic, air quality and traffic noise assessments. Many of the traffic engineering studies have been completed with the assistance of subcontactors. The following abbreviations are used below:

EIS	Environmental Impact Statement
EAW	Environmental Assessment Worksheet
ISP	Indirect Source Permit Application (no longer required of projects)

The firm has been involved in most major projects in downtown Minneapolis since the early 1970s as well as projects throughout the Twin Cities Metropolitan Area and elsewhere in Minnesota. Some of these studies are listed below.

Minneapolis Community College/Votech (traffic/air quality studies)

Loring Park Development District (EIS)

Minneapolis Convention Center (EIS/ISP)

Laurel Village (EAW)

Lincoln Center (traffic and air quality study)

Stadium Club (Traffic/environmental Studies)

Twin Cities Sports Facility (Hubert H. Humphrey Metrodome)(noise/air quality/energy)

LaSalle Plaza (EIS)

Plaza 7 Hotel (traffic and air quality studies)

Minneapolis City Center (ISP)

MCCII (EIS for west portion of block)

Norwest Center 1984 (EIS/ISP for entire block)

Norwest Center 1985 (EIS for east portion of block)

IBM Minneapolis Office Complex

Hennepin/1st Ave. N. one-way pair (part of Trans. Control Plan)

Pennys Block (EIS)

Cowles Publishing (Mpls Tribune) Printing Plant (Traffic/Air Quality)

Hennepin Avenue Bridge Approach (Traffic projections/air/noise)

River Road Apartments (traffic/environmental studies)

Mill Place (Traffic/air quality/noise)

Riverplace I and II (Traffic/air quality/noise)

Two-way Hennepin Avenue Study

Transportation Control Plans for Twin Cities Metropolitan Area

Transportation Control Plans for Duluth, St. Cloud and Rochester

Redesignation Air Quality Study for St. Cloud

Riverplace (traffic/air quality studies)

Twin Cities People Mover Study (environmental studies)

Minnesota Veterans Hospital (environmental studies)

Mall of America (environmental/economic studies for City of Minneapolis)

Eagan and Woodbury horserace tracks (environmental studies/EIS)

Pheasant Ridge Music Center (EAW/environmental studies)

St. Louis Center (EAW/ISP)

Kensington Development (ISP)

Edinburgh Development (Traffic Study)

Alden Pond Townhomes (Traffic Study/EAW)

Victoria Business Center (EAW)

Mounds View Business Park (EAW/EIS)

Eagan Heights Commercial Park (EAW/environmental studies)

Town Center 70 (EAW/environmental studies)

Deluxe Corporation-Shoreview (EAW/ISP)

Ridgedale Center (ISP)

Oakdale Shopping Center (ISP)

Prime West Business Park (EAW Supplement/ISP)

Sci-Med Life Systems Maple Grove Facility (EAW/ISP)

Twin Cities Vehicle Inspection Stations (air quality/noise studies)

Vadnais Heights Center (ISP)

Sears Minneapolis Retail-Office Development (EAW/ISP)

St. Marys Hospital (Rochester) (ISP)

Mayo Parking Ramp (Rochester) (EAW/ISP)

MSP and New Airport Air Quality Studies (Dual-Track Planning Process)

Meridian Crossings (Richfield)(EAW/ISP)

Minneapolis Factory Shoppes (Albertville)(ISP)

Gonda Building - Mayo Clinic/Rochester (EIS)

New High School - Prior Lake-Savage Area Schools (EAW)

New Lakeville High School (EAW)

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