Carlson McCain

Memorandum

Date: April 2, 2012	**From: John McCain**
	Phone: 612-916-4400
To: Al Frechette, Kate Sedlacek	
Company: Scott County	

Re: Jordan Aggregates Noise Impacts

This memorandum provides revised noise calculations to evaluate the noise impacts from routing all Jordan Aggregates mine truck traffic on the Valley View Drive-173rd Street route between the mine entrance and Highway 169. The methods and descriptions used herein are the same as described in the noise analysis report used as supporting data for the EAW (Noise Analysis for Proposed Aggregate Mining Operation, McCain and Associates, August 17, 2010). The Noise Analysis report considered that a portion of the mining traffic would use the Valley View-173rd Street route (Route 1 in the report) and provided calculations regarding noise impacts along the route. This revised analysis evaluates noise impacts from routing all mine truck traffic on that route. A description of the analysis is provided below. Detailed calculations are attached.

Assumptions:
1) All truck traffic, both inbound to and outbound from the mine, drive past the critical receptor (Valley View Assisted Living Facility (ALF)) on the corner of Valley View Drive and 173rd Street.
2) Peak truck traffic associated with mining operations is 110 round trips per day (220 trips past the ALF), or about 18.3 trips per hour over a 12-hour day.
3) Trucks are traveling at an average speed of 30 mph as they drive past the ALF.
4) The ALF property boundary is the point at which noise impacts to a human receptor are determined. This approach was specified by the County for the original noise calculations and was the basis for the EAW. The ALF noise boundary is shown on the attached Figure 2 (from the August 17, 2010 Noise Analysis report).

The regulatory thresholds specify allowable noise levels for certain percentages of a one hour period. For example, the L10 Residential Daytime threshold of 65 dB means that a daytime residential receptor should not be exposed to noise in excess of 65 dB for more than 10% of a one-hour period. Likewise, the L50 Residential Daytime threshold of 60 dB means that a daytime residential receptor should not be exposed to noise in excess of 60 dB for more than 50% of a one-hour period.

Scenario: A human receptor is present on the ALF property line when a truck approaches on Valley View Drive. This is the critical location because a person away from the property line toward the interior of the ALF site would experience a lesser noise level. The truck is emitting noise at a level of 80 dB as measured at a distance 50 feet from the truck (maximum truck noise emission level per MN Rule 7030.1040). The truck noise is attenuated with distance (primarily by geometric divergence); i.e. the noise level perceived by the receptor increases as the truck gets closer, and would be 80 dB when the truck is 50 feet away. The distance between the truck and the receptor when the receptor first perceives a noise level equal to the regulatory threshold can be calculated ("threshold distance") by the methods of ISO 9613. The receptor will continue to perceive noise above the threshold as the truck passes by and until it reaches the threshold distance on its departure. The receptor has thus experience noise above the threshold for a period of time calculated by two times the

threshold distance (approach and departure distances, or "non-attainment zone") divided the speed of truck travel.

Question to be answered by this analysis: How many truck trips in an hour can be made without exceeding the noise threshold requirements?

Answer: Calculations are attached showing that 29 trips per hour would not exceed the regulatory noise limits for daytime (7 am to 10 pm). The calculations follow the same format and use the same table numbers as were presented in the April 17, 2010 Noise Analysis report.

Number of truck trips per hour that do not exceed regulatory noise levels:

L10 Daytime: 29 trips
L50 Daytime: 82 trips
L10 Nighttime: 9 trips
L50 Nighttime: 27 trips

Conclusion: Noise impacts to the critical receptor on the Valley View-173rd Street route are within regulatory limits when all mine truck traffic uses that route. Peak mine truck traffic of 18.3 trips per hour is below the maximum allowable trips indicated by the revised noise calculations as described above. Nighttime operation of the mine has not been proposed, however the calculations indicate that 9 truck trips per hour would be within the regulatory limit for the 10 pm to 7 am time period. The original EAW conclusion that noise from mine truck traffic does not present a significant environmental effect is unchanged when the Valley View-173rd route is considered for all traffic.

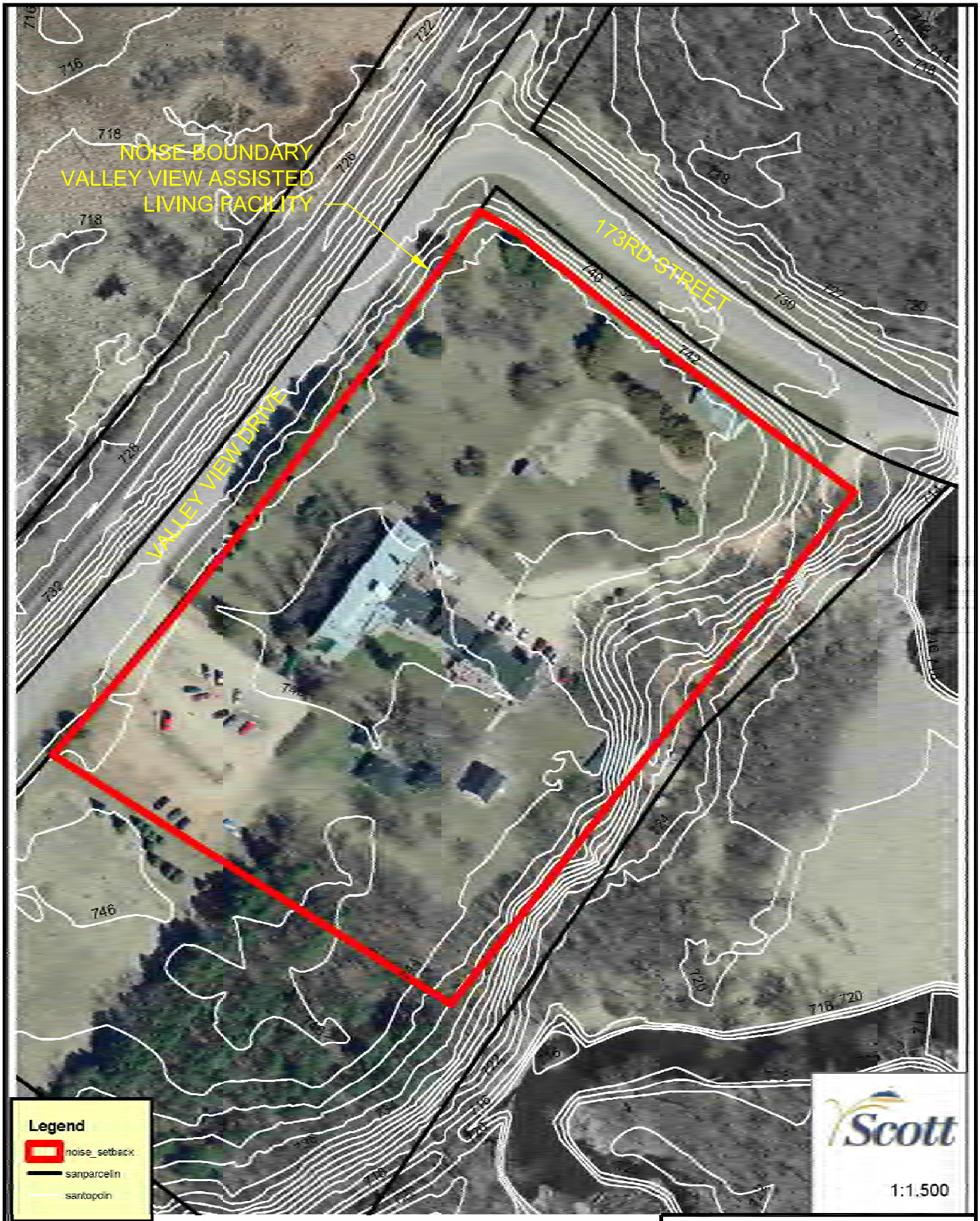

FIGURE 2
CLOSEST RECEPTOR
ROUTE 1
TRUCK TRAFFIC NOISE ANALYSIS
PROPOSED HENTGES MINE

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Table 3

L_{10} Daytime Truck Noise Calculation

Valley View Assisted Living Facility

Proposed Mining Operation, Sand Creek Township, Scott County

2-Apr-12

	Truck Noise Frequency		
Noise Data	250 Hz	500 Hz	1000 Hz
Source Noise Level (dBA, 50 feet)	80	80	80
Noise Standard (L_{10} Daytime, dBA)	65	65	65
Required Attenuation (dBA)	15	15	15
Distance Data			
Receptor Distance from Road Centerline (feet)	60	60	60
Distance from Receptor at which Required Attenuation is Achieved (feet)	148	174	276
Corresponding Road Distance from Receptor (feet)	136	163	269
Time Duration Calculations			
Travel Speed (mph)	30	30	30
Travel Time per Trip within Non-Attainment Zone (hours)	0.00171	0.00206	0.00340
Trips per Hour	58	48	29
Total Travel Time within Non-Attainment Zone (hours)	0.0993	0.0989	0.0985
Results			
Non-Attainment Percent of one-Hour Period	9.9%	9.9%	9.8%
Maximum Allowable Non-Attainment Percentage	10%	10%	10%

Noise Attenuation Calculations			
Distances, Factors, Functions			
Source Noise Level (dBA)	80	80	80
Reference Distance from Source (d_o, meters)	15.24	15.24	15.24
Sound Propogation Distance-Source to Receptor (d_p, meters)	45.2	53	84
Attenuation Coeficient for Air Absorption (alpha, dB/meter)	0.000869	0.000869	0.000869
Ground Attenuation Factor, near source (G_s)	0.5	0.5	0.5
Ground Attenuation Factor, near receptor (G_r)	1	1	1
Ground Factor Function-Source Area (A_s)	5.7	4.8	2.0
Ground Factor Function-Receptor Area (A_r)	5.7	4.8	2.0
Height of Source (H_s, meters)	1.5	1.5	1.5
Height of Receptor (H_r, meters)	1.5	1.5	1.5
Sound Attenuation			
Attenuation due to Geometric Divergence (A_{div}, dBA)	9.4	10.8	14.8
Attenuation due to Atmospheric Absorption (A_{atm}, dBA)	0.0	0.0	0.1
Attenuation due to Ground Effect (A_{gr}, dBA)	5.5	4.1	0.1
Total Attenuation at Distance "d_p" (dBA)	**15**	**15**	**15**

Table 4

L_{50} Daytime Truck Noise Calculation

Valley View Assisted Living Facility

Proposed Mining Operation, Sand Creek Township, Scott County

2-Apr-12

	Truck Noise Frequency		
Noise Data	250 Hz	500 Hz	1000 Hz
Source Noise Level (dBA, 50 feet)	80	80	80
Noise Standard (L_{50} Daytime, dBA)	60	60	60
Required Attenuation (dBA)	20	20	20
Distance Data			
Receptor Distance from Road Centerline (feet)	60	60	60
Distance from Receptor at which Required Attenuation is Achieved (feet)	221	269	482
Corresponding Road Distance from Receptor (feet)	213	262	479
Time Duration Calculations			
Travel Speed (mph)	30	30	30
Travel Time per Trip within Non-Attainment Zone (hours)	0.00269	0.00331	0.00604
Trips per Hour [mining(79) + background(3)]	185	151	82
Total Travel Time within Non-Attainment Zone (hours)	0.4979	0.5000	0.4955
Results			
Non-Attainment Percent of one-Hour Period	49.8%	50.0%	49.5%
Maximum Allowable Non-Attainment Percentage	50%	50%	50%

Noise Attenuation Calculations			
Distances, Factors, Functions			
Source Noise Level (dBA)	80	80	80
Reference Distance from Source (d_o, meters)	15.24	15.24	15.24
Sound Propogation Distance-Source to Receptor (d_p, meters)	67.5	82	147
Attenuation Coeficient for Air Absorption (alpha, dB/meter)	0.000869	0.000869	0.000869
Ground Attenuation Factor, near source (G_s)	0.5	0.5	0.5
Ground Attenuation Factor, near receptor (G_r)	1	1	1
Ground Factor Function-Source Area (A_s)	6.7	5.5	2.1
Ground Factor Function-Receptor Area (A_r)	6.7	5.5	2.1
Height of Source (H_s, meters)	1.5	1.5	1.5
Height of Receptor (H_r, meters)	1.5	1.5	1.5
Sound Attenuation			
Attenuation due to Geometric Divergence (A_{div}, dBA)	12.9	14.6	19.7
Attenuation due to Atmospheric Absorption (A_{atm}, dBA)	0.1	0.1	0.1
Attenuation due to Ground Effect (A_{gr}, dBA)	7.1	5.3	0.2
Total Attenuation at Distance "d_p" (dBA)	**20**	**20**	**20**

Table 5

L_{10} Nighttime Truck Noise Calculation

Valley View Assisted Living Facility

Proposed Mining Operation, Sand Creek Township, Scott County

2-Apr-12

	Truck Noise Frequency		
Noise Data	250 Hz	500 Hz	1000 Hz
Source Noise Level (dBA, 50 feet)	80	80	80
Noise Standard (L_{10} Nightime, dBA)	55	55	55
Required Attenuation (dBA)	25	25	25
Distance Data			
Receptor Distance from Road Centerline (feet)	170	170	170
Distance from Receptor at which Required Attenuation is Achieved (feet)	335	430	840
Corresponding Road Distance from Receptor (feet)	288	395	823
Time Duration Calculations			
Travel Speed (mph)	30	30	30
Travel Time per Trip within Non-Attainment Zone (hours)	0.00364	0.00498	0.01039
Trips per Hour	27	20	9
Total Travel Time within Non-Attainment Zone (hours)	0.0983	0.0997	0.0935
Results			
Non-Attainment Percent of one-Hour Period	9.8%	10.0%	9.3%
Maximum Allowable Non-Attainment Percentage	10%	10%	10%

Noise Attenuation Calculations			
Distances, Factors, Functions			
Source Noise Level (dBA)	80	80	80
Reference Distance from Source (d_o, meters)	15.24	15.24	15.24
Sound Propogation Distance-Source to Receptor (d_p, meters)	102	131	256
Attenuation Coeficient for Air Absorption (alpha, dB/meter)	0.000869	0.000869	0.000869
Ground Attenuation Factor, near source (G_s)	0.5	0.5	0.5
Ground Attenuation Factor, near receptor (G_r)	1	1	1
Ground Attenuation Factor, between source and receptor (G_m)	1	1	1
Ground Factor Function-Source Area (b', c', d')	7.6	6.1	2.2
Ground Factor Function-Receptor Area (b', c', d')	7.6	6.1	2.2
Ground Factor Function-Between Source and Receptor (q)	0.1	0.3	0.6
Height of Source (H_s, meters)	1.5	1.5	1.5
Height of Receptor (H_r, meters)	1.5	1.5	1.5
Sound Attenuation			
Attenuation due to Geometric Divergence (A_{div}, dBA)	16.5	18.7	24.5
Attenuation due to Atmospheric Absorption (A_{atm}, dBA)	0.1	0.1	0.2
Attenuation due to Ground Effect (A_{gr}, dBA)	8.4	6.2	0.2
Total Attenuation at Distance "d_p" (dBA)	**25**	**25**	**25**

Table 6

L_{50} Nighttime Truck Noise Calculation

Valley View Assisted Living Facility

Proposed Mining Operation, Sand Creek Township, Scott County

2-Apr-12

	Truck Noise Frequency		
Noise Data	250 Hz	500 Hz	1000 Hz
Source Noise Level (dBA, 50 feet)	80	80	80
Noise Standard (L_{50} Nightime, dBA)	50	50	50
Required Attenuation (dBA)	30	30	30
Distance Data			
Receptor Distance from Road Centerline (feet)	170	170	170
Distance from Receptor at which Required Attenuation is Achieved (feet)	528	719	1,463
Corresponding Road Distance from Receptor (feet)	500	698	1,453
Time Duration Calculations			
Travel Speed (mph)	30	30	30
Travel Time per Trip within Non-Attainment Zone (hours)	0.00631	0.00881	0.01835
Trips per Hour	79	56	27
Total Travel Time within Non-Attainment Zone (hours)	0.4988	0.4936	0.4955
Results			
Non-Attainment Percent of one-Hour Period	49.9%	49.4%	49.5%
Maximum Allowable Non-Attainment Percentage	50%	50%	50%

Noise Attenuation Calculations			
Distances, Factors, Functions			
Source Noise Level (dBA)	80	80	80
Reference Distance from Source (d_o, meters)	15.24	15.24	15.24
Sound Propogation Distance-Source to Receptor (d_p, meters)	161	219	446
Attenuation Coeficient for Air Absorption (alpha, dB/meter)	0.000869	0.000869	0.000869
Ground Attenuation Factor, near source (G_s)	0.5	0.5	0.5
Ground Attenuation Factor, near receptor (G_r)	1	1	1
Ground Attenuation Factor, between source and receptor (G_m)	1	1	1
Ground Factor Function-Source Area (b', c', d')	8.2	6.4	2.2
Ground Factor Function-Receptor Area (b', c', d')	8.2	6.4	2.2
Ground Factor Function-Between Source and Receptor (q)	0.4	0.6	0.8
Height of Source (H_s, meters)	1.5	1.5	1.5
Height of Receptor (H_r, meters)	1.5	1.5	1.5
Sound Attenuation			
Attenuation due to Geometric Divergence (A_{div}, dBA)	20.5	23.1	29.3
Attenuation due to Atmospheric Absorption (A_{atm}, dBA)	0.1	0.2	0.4
Attenuation due to Ground Effect (A_{gr}, dBA)	9.4	6.6	0.2
Total Attenuation at Distance "d_p" (dBA)	**30**	**30**	**30**