RSG INC.
RESOURCE SYSTEMS GROUP, INC.

MEMORANDUM

To: Greg Adamovich
From: Kevin Hathaway and Kenneth Kaliski, P.E.
Subject: Summary of Noise Measurements for Allstone, Inc.
Date: 10 May 2004

At your request, we are providing a summary of the sound monitoring conducted by Resource Systems Group on March 24th at your existing quarry on VT 103 in Gassetts, Vermont and across the road from your proposed quarry over a five day period.

MONITORING OF QUARRY OPERATIONS

RSG staff conducted sound level monitoring at the existing quarry on VT Route 103 in Gassetts. The quarry activities that were monitored included the following:

1) Hydraulic drill,
2) Excavator,
3) 70-ton rock splitter,
4) Loader moving metal hoppers, and
5) Generator and 300-ton rock splitter.

We monitored sound levels for all equipment at the quarry and placed a second sound level meter roughly 1,100 feet away in a residential area on Cavendish Road. A Cesva 310, ANSI Type I integrating sound level meter was used to measure 1/1 octave center frequencies for all operating equipment in the quarry. A Brüel and Kjaer 2238, ANSI Type I integrating sound level meter was used for measurements on Cavendish Rd to the North of the site. Both meters were calibrated before and after the measurements and fitted with windscreens. The weather was mostly sunny, with winds 4-6 mph out of the North, and temperatures in the lower 50s. Figure 1 shows the location of the quarry equipment on the day of monitoring as well as the location of the monitor on Cavendish Road.

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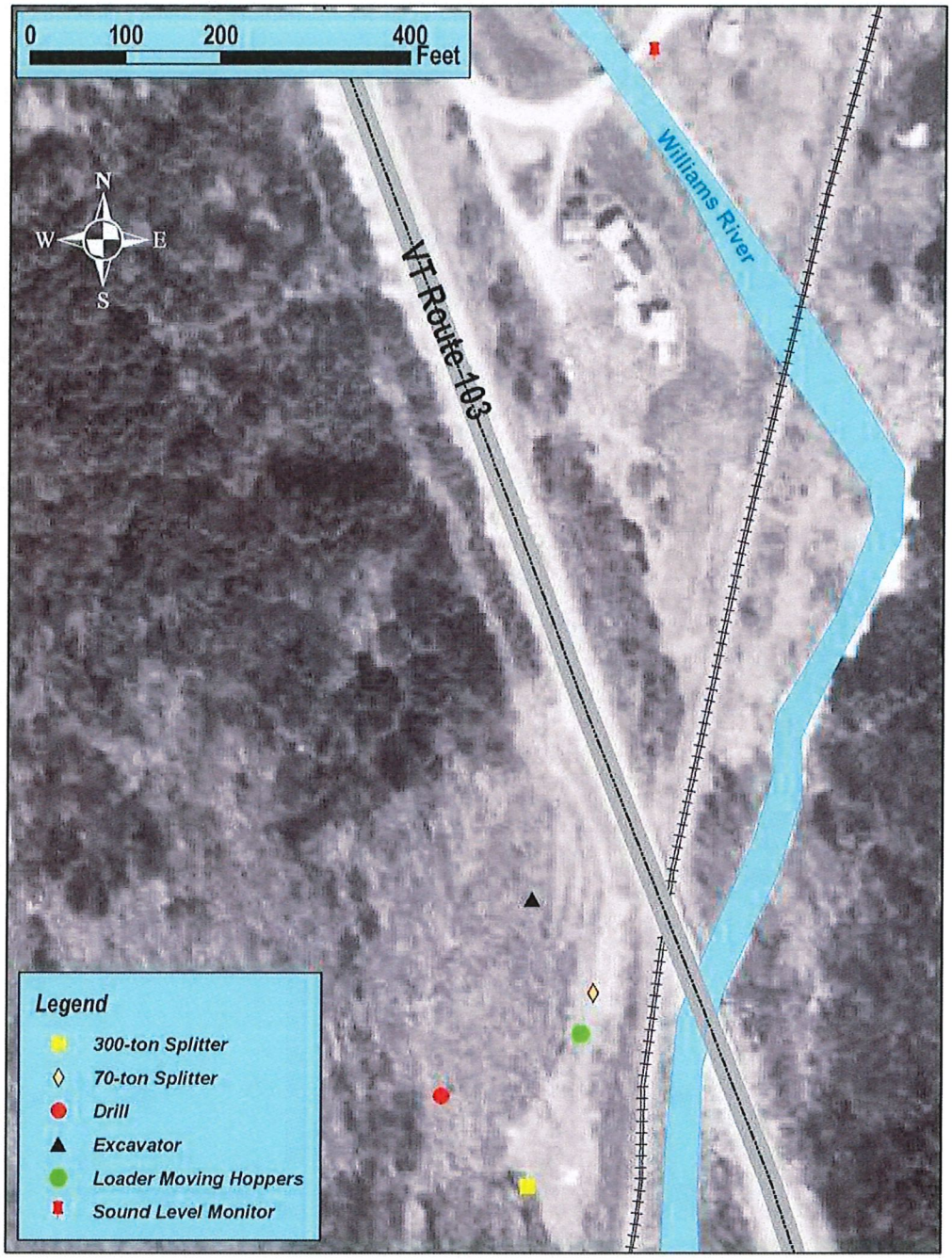
Figure 1: Layout of Existing Quarry and Monitoring Location at Cavendish Road



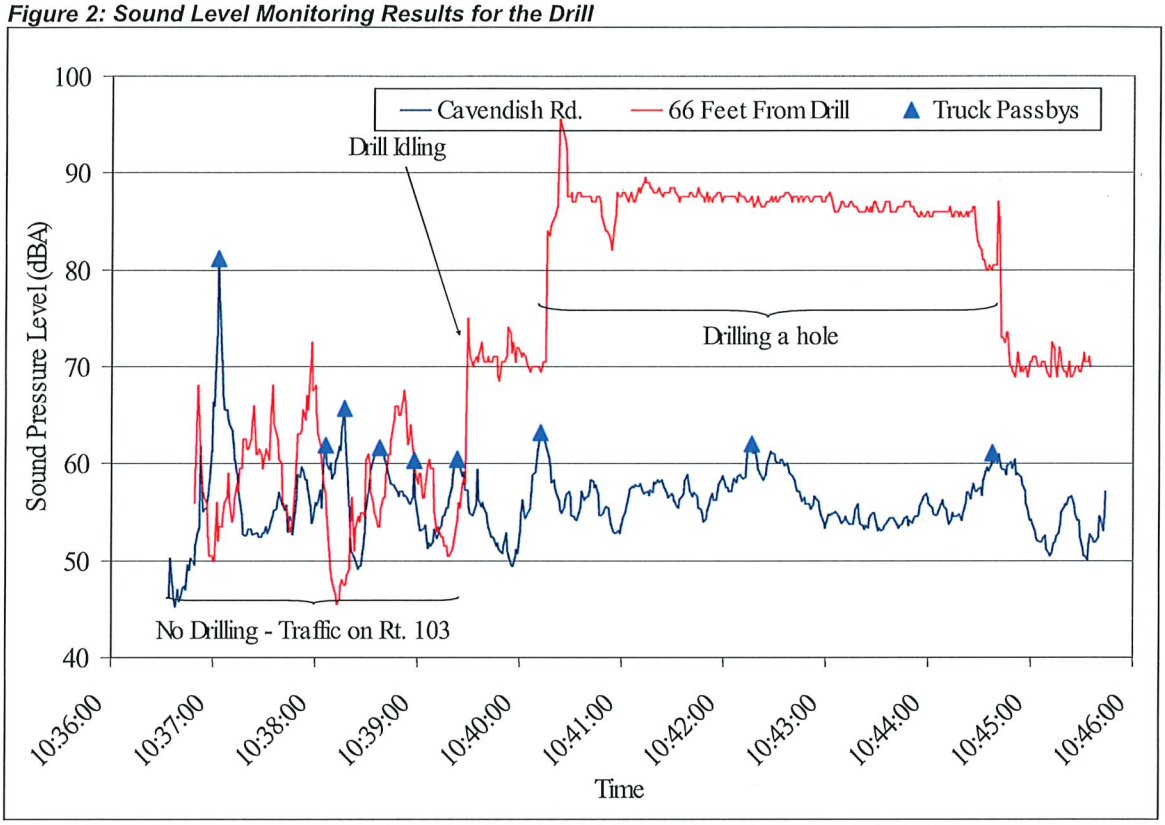
The results of the monitoring are described in the following sections.

Sound Test #1: Hydraulic Drill

A hydraulic drill was measured at 66 feet for several minutes. The results of this sound test are presented in Figure 2 below. The sound level meter recorded just over two minutes of background sound and then the drill was turned on, indicated by the sharp increase in sound levels measured near the drill (red line). At the same time, another sound level meter was recording sound levels 1,100 feet away on Cavendish Road. The rise and fall of sound levels at both monitors when there was no drilling was due to passing traffic on VT 103.

Upon the drill beginning, the loudest sound levels were recorded. This is due to the drill bit penetrating the rock surface. As the drill gets deeper into a hole, the levels slowly drop accordingly, represented by a gradual decline in the red line. The meter at Cavendish Road experienced a small rise in overall sound levels during drilling and the observer noted the drilling to be 'clearly audible'. However, the traffic noise from VT 103 continued to dominate noise at this location. By examining the blue line closely, we can see that the 'valleys' are generally higher during the drilling indicating an overall rise in the ambient sound level.

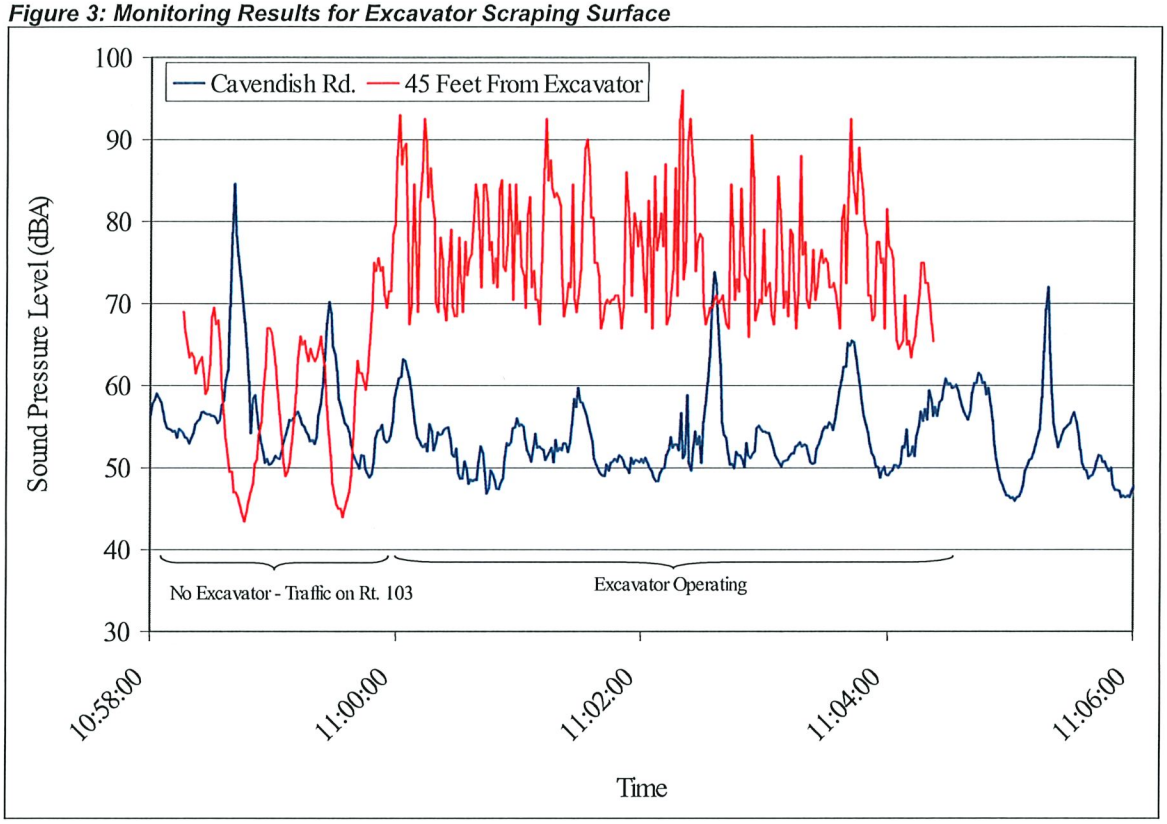
Figure 2: Sound Level Monitoring Results for the Drill



Sound Test #2: Excavator Operating on Surface Rock

We recorded sound levels for an excavator operating for several minutes. We observed the excavator bucket scraping loose rocks at the surface, swiveling the bucket, and moving. Similar to the drilling test, background sound levels were recorded for several minutes prior to the operation of the excavator. Figure 3 shows the results of the sound monitoring. This quarry activity includes noise from the engine, a backup alarm, and the impulsive noise from the bucket picking up and moving quarry debris. In Figure 3, no rise in overall sound levels was experienced at the Cavendish road monitor, though the observer noted the operations to be 'clearly audible'.

Figure 3: Monitoring Results for Excavator Scraping Surface



Sound Test #3: 70-ton Rock Splitter

A Mason 70-ton rock splitter was measured at 34 feet for several minutes. The operation of this piece of equipment includes idling with short impulsive periods of noise during the splitting of rock. The monitor at Cavendish Road did not experience any rise in sound levels and the observer there noted that the splitter was not audible. Tables 1 to 3 at the end of this section summarize the sound levels from this quarry activity.

Sound Test #4: Loader Moving Metal Hoppers

We measured a small loader with a forklift attachment picking up and moving metal hoppers filled with split rock. Noise from this operation includes engine noise, backup alarms, and the loader's steel banging the hopper. There was no rise in overall sound levels at Cavendish Road during this measurement and the observer there noted that the loader was not audible. Tables 1 to 3 at the end of this section summarize the sound levels from this quarry activity.

Sound Test #5: Generator and 300-ton Rock Splitter

A second rock splitter (300-ton hydro-split) was measured at the quarry that included the energy supply of a diesel generator (Olympian 50 kW). Because the splitter is only operated when the generator is running, these two sources of noise are summarized together for the purposes of this memorandum, though they have individual sound characteristics. Sound levels from this quarry activity include continuous engine noise from the generator and impulsive periods when splitting rock. There was no rise in overall sound levels at Cavendish Road, but the observer noted occasional faint quarry noise. Tables 1 to 3 summarize the sound levels from this quarry activity.

SUMMARY OF QUARRY ACTIVITIES

Table 1 summarizes the monitoring with the sound levels adjusted to 50 feet for comparison. Both L10s and maximum one-second Leqs are presented here. L10s describe the sound level that is exceeded 10% of the time. This statistic is useful for removing the short impulsive spikes of a noise source. The Leq levels are the sound level "equivalents" or averages for that noise source. For these Leqs, we have presented 1-second maximums to show the loudest observed event during the monitoring period.

Table 1: Summary of Quarry Activities Observed and Adjusted to 50 feet (Presented as L10s and Leqs)

Equipment Activity Observed	Pre and Post Calibration	Measurement Distance (feet)	L10 (dBA)	L10 Adjusted to 50 Feet (dBA)	$Leq_{1\text{-sec}}$ MAX (dBA)	$Leq_{1\text{-sec}}$ MAX Adjusted to 50 Feet (dBA)	Audible at Cavendish Rd?
Hydraulic Drill Penetrating Rock	Yes	66	88	90	96	98	Yes, Clearly Audible
Excavator Scraping Surface Rock	Yes	45	86	85	96	95	Yes, Audible
Mason 70-ton Splitter	Yes	34	79	76	94	91	No
Loader Moving Metal Hoppers	Yes	65	78	80	92	94	No
Generator &Hydrosplit 300-ton Splitter	Yes	50	81	81	99	99	Yes, Occasional

Tables 2 and 3 show the overall Leq and $Leq_{1\text{-sec}}$ maximum (Lmax) levels by octave band for sound pressure and sound power, respectively. The overall Leq levels represent the entire monitoring period for that source.

Table 2: Full Octave Sound Pressure Levels (Lp) for Quarry Activities Observed at 50 feet (in dBA)

Equipment Activity Observed		1/1 Octave Center Frequency (Hz)									Total Sound Level
		31.5	63	125	250	500	1k	2k	4k	8k	
Drilling Holes for Blasting	Leq	41	56	69	77	85	82	82	83	79	90
	Lmax	39	53	67	81	85	84	92	95	91	98
Excavator Scraping Surface Rock	Leq	33	52	60	67	76	77	76	68	54	82
	Lmax	46	61	67	80	88	92	90	84	67	95
Mason 70-ton Splitter	Leq	28	43	58	64	73	72	68	61	53	76
	Lmax	28	49	71	79	87	87	82	71	61	91
Loader Moving Metal Hoppers	Leq	40	65	70	65	67	74	75	71	59	79
	Lmax	34	64	73	66	65	80	93	89	78	95
Generator & Hydrosplit 300-ton Splitter	Leq	25	50	62	65	70	82	76	73	64	84
	Lmax	26	51	66	73	80	98	90	87	80	99

Table 3: Full Octave Sound Power Levels (Lw) for Quarry Activities Observed (in dB[1])

Equipment Activity Observed		1/1 Octave Center Frequency (Hz)									Total Sound Level
		31.5	63	125	250	500	1k	2k	4k	8k	
Drilling Holes for Blasting	Leq	111	113	118	120	122	115	114	115	114	126
	Lmax	110	111	116	123	122	117	123	127	125	132
Excavator Scraping Surface Rock	Leq	104	110	109	110	112	110	108	100	88	118
	Lmax	117	118	115	122	124	124	121	115	102	130
Mason 70-ton Splitter	Leq	99	101	107	106	109	104	100	92	87	114
	Lmax	99	107	120	122	123	120	114	102	96	128
Loader Moving Metal Hoppers	Leq	111	123	119	107	104	106	106	102	93	125
	Lmax	105	121	121	108	101	112	125	121	113	129
Generator & Hydrosplit 300-ton Splitter	Leq	95	108	110	107	107	115	108	104	99	118
	Lmax	96	109	114	115	116	130	121	119	114	131

LONG-TERM MONITORING NEAR PROPOSED QUARRY

Resource Systems Group staff placed a sound level meter roughly 65 feet from VT 103 on the east side of the road. This location represented a similar distance away from VT 103 as many other adjacent homes in this area. The monitor was set to record 1-minute Leqs, L90s, L50s, L10s, Lmins, and Lmaxs over a five-day period. Figure 4 shows the location of the monitor and the proposed quarry across the road. The results of the monitoring are presented in Figures 5 and 6. Figure 5 shows LAeq levels for the monitoring period and Figure 6 shows the L90 levels. Both graphs show the anticipated rise and fall of overall sound levels from day to night, respectively. VT 103 is a heavily traveled road for heavy trucks, which contributes to the relatively high daytime sound levels.

[1] Note that the sound power values are in dB and NOT dBA. Sound power is often presented as un-weighted.

Figure 4: Location of the Long-term Sound Level Monitoring and Proposed Quarry

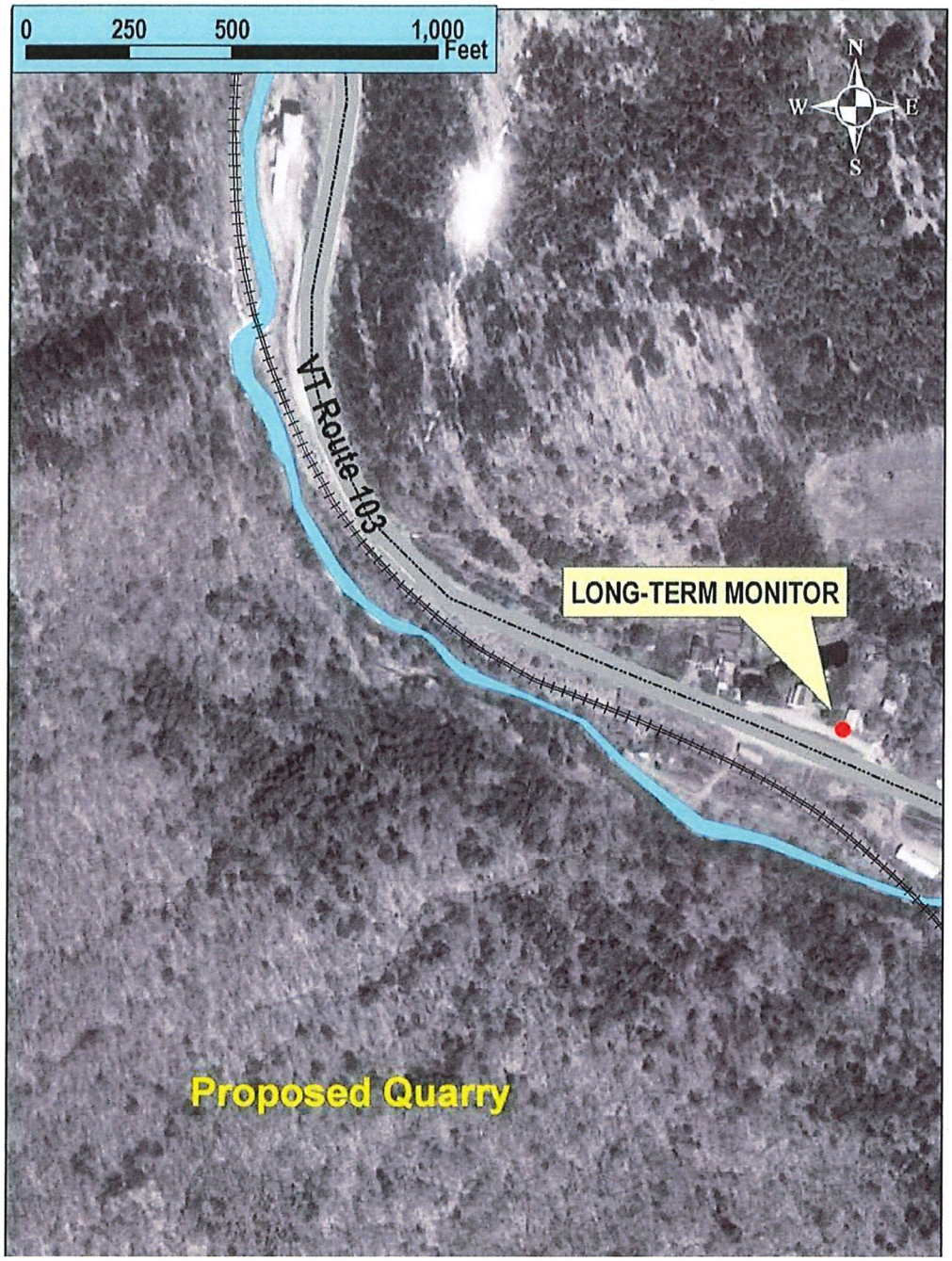


Figure 5: Long-term Monitoring Results (presented as LAeq) Near a Residential Home on VT 103

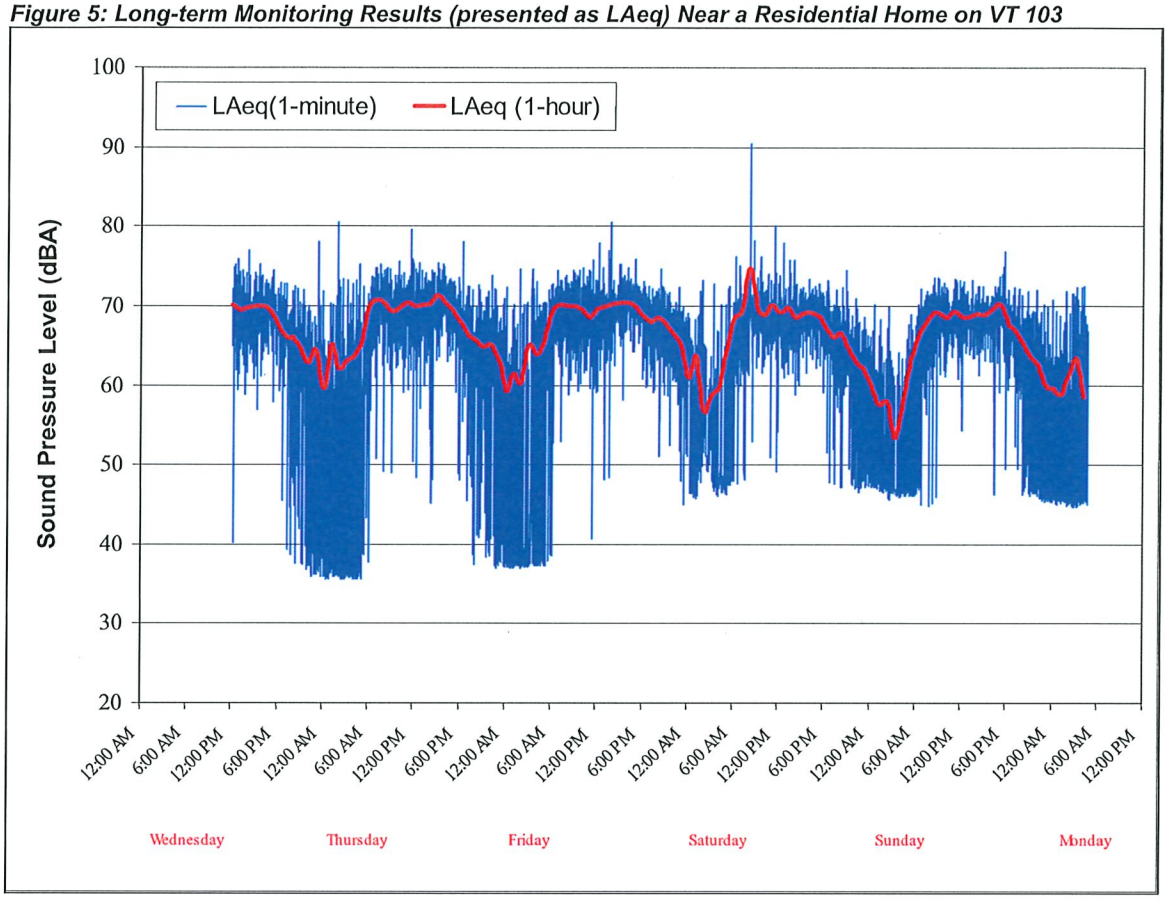
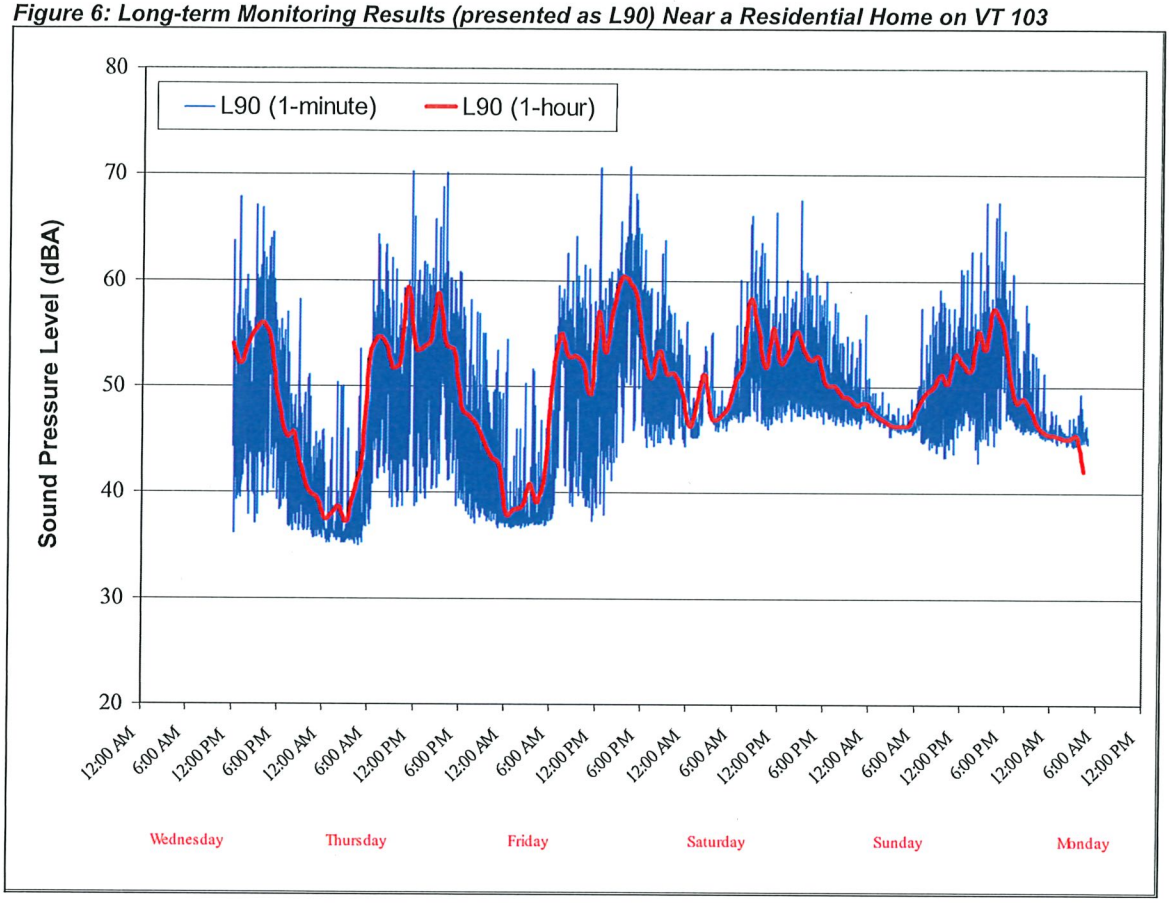


Figure 6: Long-term Monitoring Results (presented as L90) Near a Residential Home on VT 103



CONCLUSIONS

We conducted sound level monitoring of both the existing quarry operations and the background sound levels near the proposed quarry. Much of the noise measured at the existing quarry was not audible at Cavendish Road, though this in part is due to the high levels of existing heavy traffic on VT 103. The drilling was the most prevalent quarry activity noted in the Cavendish Road area, though the topography of the site contributes to this, as the drill was located high up on the hill. However, in locations with different topography, noise from the loader and the rock splitters could be audible at this same tested distance.

The results of the long-term monitoring indicate ambient Leq sound levels are close to 70 dBA during the daytime periods. The L90 levels were between the mid 50s to low 60s during the same periods.

Please contact us if you should have any questions.