RAMBOLL ENVIRON

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& HEALTH

**January 16, 2017**

Mr. Blake Araki
Raging River Quarry LLC
6101 Preston Fall City Road SE
Fall City, WA 98024

Re: Monthly Provisional Operations
Compliance Noise Monitoring - Week 4 Results

Dear Blake,

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As you requested, Ramboll Environ US Corporation (Ramboll Environ) measured sound levels of operations at the Raging River Quarry on January 12, 2017. This measurement is the fourth of what were to be four weekly measurement events required by King County DDES during one month of provisional operations. However, at your request, the County allowed an additional week (this fourth week) in order to capture adequate sound levels of drilling activities. Details and results of the sound level measurement follow.

**Applicable Noise Limits**
The quarry was in operation during daytime hours (i.e., between 7 AM and 10 PM), so the hourly noise limits at the nearby rural-residential properties are an $L_{eq}$ of 57 dBA and an $L_{max}$ of 72 dBA.

**Sound Level Equipment**
Ramboll Environ deployed two Larson Davis LxT (Class 1) sound level meters and one Brüel & Kjær 2250 (B&K2250) Class 1 sound level meter for the sound level measurements. All of the meters were set to record 1-second histories, and the B&K2250 meter was also set to record audio. The meters were field calibrated immediately prior to the measurement and calibrated at the factory within the previous year. The microphones were mounted on tripods at a height of approximately 5 feet above ground.

**Measurement Locations**
Sound levels were measured at the following three locations representing the adjacent properties to the quarry site:

- **Location 1** – on the southeast boundary of the McClain property and the Raging River Quarry property
- **Location 2** – on the northern boundary of the Shimmel property (formerly known as the Johnson property), near the log pile on the

Trisko property

- **Location 3** – on the northern boundary of the Shimmel property (formerly known as the Johnson property), east of Location 2.

**Measurement Details**
The sound level measurements at all three locations were taken between 7 AM and 7 PM on January 12, 2017, with hourly $L_{eq}$s and $L_{max}$s calculated from the 1-second data.

The temperatures during the measurement period were in the upper 30s °F with no rain.

**Equipment in Operation**
During the sound level measurement period, the following equipment was in operation:

**7 to 9:30 AM**: truck loading

**9:30 AM to noon**: drill climbed to 100 foot bench, then truck loading and drill idling

**Noon to 3:30 PM**: truck loading and drilling on 100 foot bench

**3:30 to 4:15 PM**: drilling on 100 foot bench, cone crusher operating

**4:15 to 7 PM**: drilling on 100 foot bench, full crushing plant operations

**Sound Level Measurement Results**
The sound level measurement results for each SLM location are presented in the following tables. For hours where compliance with the limits is not initially demonstrated, we reviewed the audio recordings to identify the noise source that caused the elevated levels. If the elevated sound level was from a source that is exempt from the noise limits, we then provide the estimated sound level after removal of the exempt source.

**Table 1. SLM1 – McClain Property Sound Levels (dBA)**

| Time | $L_{eq}$ | $L_{max}$ |
|---|---|---|
| 7 – 8 AM | 49 | 60 |
| 8 – 9 AM | 51 | 62 |
| 9 – 10 AM | 53 | 67 |
| 10 – 11 AM | 50 | 62 |
| 11 AM – Noon | 49 | 61 |
| Noon – 1 PM | 49 | 56 |
| 1 – 2 PM | 51 | 60 |
| 2 – 3 PM | 51 | 61 |
| 3 – 4 PM | 51 | 63 |
| 4 – 5 PM | 54 | 62 |
| 5 – 6 PM | 56 | 63 |
| 6 – 7 PM | 54 | 64 |

**Table 2. SLM2 – Shimmel Property Sound Levels (dBA)**

| Time | $L_{eq}$ | $L_{max}$ |
|---|---|---|
| 7 – 8 AM | 48 | 62 |
| 8 – 9 AM | 50 | 67 |
| 9 – 10 AM | 52 | 64 |
| 10 – 11 AM | 50 | 64 |
| 11 AM – Noon | 49 | 62 |
| Noon – 1 PM | 49 | 59 |
| 1 – 2 PM | 50 | 62 |
| 2 – 3 PM | 51 | 63 |
| 3 – 4 PM | 51 | 64 |
| 4 – 5 PM | 54 | 62 |
| 5 – 6 PM | 56 | 65 |
| 6 – 7 PM | 54 | 62 |

No extraneous or exempt noise sources were removed from the levels measured at SLM1 or SLM2 between 7 AM and 7 PM on January 12, 2016. The measurements indicate that measured sound levels during all hours of operation complied with the applicable noise limits.

**Table 3. SLM3 – Shimmel Property (East of SLM2) Sound Levels (dBA)**

| Time | | Leq | Lmax | Major Noise Sources |
|---|---|---|---|---|
| 7 – 8 AM | | 48 | 63 | |
| 8 – 9 AM | | 51 | 63 | |
| **9 – 10 AM** | **With Extraneous** | 57 | **77** | Truck loading, drill climbed up to 100 foot bench, backup alarm, drill idling |
| | **Extraneous Removed** | 56 | 72 | Backup alarm removed |
| 10 – 11 AM | | 52 | 67 | |
| 11 AM – Noon | | 52 | 66 | |
| Noon – 1 PM | | 53 | 60 | |
| 1 – 2 PM | | 55 | 68 | |
| 2 – 3 PM | | 56 | 67 | |
| 3 – 4 PM | | 56 | 65 | |
| **4 – 5 PM** | **With Extraneous** | **58** | 66 | Backup alarm, drilling at 100 foot elevation, cone crusher |
| | **Extraneous Removed** | 57 | 65 | Backup alarm removed |
| **5 – 6 PM** | **With Extraneous** | **61** | 70 | Backup alarm, drilling at 100 foot level, full crushing plant |
| | **Extraneous Removed** | **60** | 70 | Backup alarm removed |
| **6 – 7 PM** | **With Extraneous** | **58** | 72 | Backup alarm, drilling at 100 foot level, full crushing plant |
| | **Extraneous Removed** | 57 | 72 | Backup alarm removed |

At SLM3, there were several hours where the measured Leq exceeded 57 dBA or the measured Lmax exceeded 72 dBA. Review of the audio during the hours with elevated sound levels indicated that backup alarms were often the dominant source during these time periods. The backup alarms were likely associated with equipment on the 100 foot bench used to reposition the drill or the fabricated partial enclosure. After removal of the backup alarm noise, the levels during all hours, except for the Leq between 5 and 6 PM, indicate compliance with the noise limits. The Leq between 5 and 6 PM continued to exceed 57 dBA, even after removal of the extraneous sources. This occurred during full operations at the site, including drilling and crushing plant operations.

Our conversations with you indicate that the reason for the noncompliant situation was because the opening of the drill shroud (i.e., partial enclosure) was oriented towards SLM3 between 5 and 6 PM. The drill was working in the same general vicinity for several hours, but between 5 and 6 PM the drill was moved and the shroud opening was directed towards SLM3, which resulted in the measured Leq of 60 dBA, even after removal of the extraneous noises. Because of this, the most effective noise mitigation during drilling would be to ensure that the open end of the drilling shroud not be directed at SLM3. In addition, given that it is not always feasible to orient the opening completely away from the affected properties, we suggest you line the partial enclosure

with acoustically absorbent material to reduce the amount of noise escaping the enclosure. Finally, we also discussed how it may be necessary to reduce other on-site operations (e.g., crushing operations) during the loudest drilling activities.

**Conclusion**

The measured sound levels complied with the noise limits during all hours of operation at the McClain property (SLM1) and at the Shimmel/Trisko boundary (SLM2). The measured levels at the Shimmel/Trisko boundary at SLM3 exceeded both the $L_{eq}$ limit and the $L_{max}$ limit during several hours of operation. Removal of the backup alarm noise reduced the sound levels during all but one instance to levels in compliance with the noise limits. The remaining measured level out of compliance is the $L_{eq}$ between 4 and 5 PM, when drilling was occurring concurrently with full crushing operations. As noted above, we have discussed potential methods to bring these activities into compliance as well.

Please call me (425-412-1807) if you have any questions regarding the above material.

Yours sincerely,

Kristen L Wallace

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