

Rec'd 11/30/16

Raging River Quarry Environmental Noise Monitoring Protocol – Provisional Operations 11/30/2016

Introduction

The Raging River Quarry operates in unincorporated King County, near Fall City, Washington. King County issued a series of stop work orders for the Raging River Quarry, which began on June 9, 2016. Subsequent noise monitoring data was provided to the County that indicated individual activities could comply with the King County noise limits, and the County amended its stop work orders to allow the quarry to conduct these activities separately. The activities to be tested are included as an attachment to this protocol.

Raging River Quarry is requesting to be allowed to conduct full operations for a one-month period to allow for noise monitoring and identification and application of noise mitigation, if necessary, to enable full operations of the facility to comply with the County noise limits. This noise monitoring protocol is being presented to King County to identify the required elements of the noise monitoring program during this provisional one-month period.

Applicable Regulations

The site and surrounding properties are located in unincorporated King County and are subject to the noise limits outlined in Chapter 12.86 of the King County Code (KCC 12.86).

KCC 12.86 establishes "maximum permissible" sound levels based on the district (i.e., zoning) of the noise source and the receiving properties. The quarry is zoned "M" for Mining and is considered an Industrial district. The surrounding properties are zoned for rural residential use (RA-10) and are considered Rural Districts. The applicable noise limits for noise sources located in Industrial Districts are displayed in **Table 1**.

Table 1. King County Maximum Permissible Sound Levels (dBA)

District of Sound Source	District of Receiving Property Within King County			
	Rural Day/Night	Residential Day/Night	Commercial	Industrial
Industrial	57 / 47	60 / 50	65	70

The limitations for noise received in Rural and Residential Districts are reduced by 10 dBA between 7 AM and 10 PM weekdays and between 9 AM and 10 PM weekends.
Source: KCC 12.86.110

Fred White

The sound level limits identified in **Table 1** are based on the energy-average sound level over a given time period, or "Leq". In addition, the sound level cannot exceed a level 15 dBA higher than the levels displayed in **Table 1**, represented by the L_{max} or maximum sound level. KCC 12.86.110(A) states that sound level measurements shall be taken for a minimum of one-minute for "constant" sound sources (i.e., sources that emit a constant sound that would not change over a given time period), and a minimum of thirty minutes for "non-continuous" sound sources (i.e., sources that are not continuous over a given time period). Given the varying nature of quarry noise, the appropriate time interval for the measurement would be a minimum period of thirty minutes.

Instrumentation

Sound levels shall be measured using Class I or Class II (previously referred to as Type 1 or Type 2) sound level meters. Class 1 meters are generally considered to be accurate within +/- 1 dBA while Class 2 meters are generally considered to be accurate within +/- 2 dBA. The microphone of each sound level meter will be mounted on a tripod at a height of approximately 5 feet above ground, and the microphone will be fitted with an acoustically neutral windscreen. The sound level meter will be calibrated immediately before the measurements begin, and the meter must have been factory calibrated and certified within the previous 12 months. The meter will be set to a Fast response and A-weighting.

Locations

Sound levels shall be measured at three locations representing the adjacent properties to the quarry site. The locations are expected to be the following:

- **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.

The previous locations represent the most-affected portions of the most-affected adjacent properties. Sound levels of quarry operations at other properties in the vicinity of the quarry are expected to be similar to or lower than the levels at these chosen measurement locations.

Frequency of Measurements

During the month-long period, sound level measurements will be taken a minimum of once per week. If analysis of the measurement data indicates that the quarry was not in compliance with the noise limits during the weekly monitoring event, the specific activity causing the elevated sound levels will cease until noise mitigation can be identified and implemented. If the activity restarts prior to the next scheduled monitoring event the following week, a spot test will be conducted upon

start-up of the activity to assess compliance. If the activity remains noncompliant, it will again cease, and another round of mitigation and follow-up monitoring will be conducted.

Duration of Measurements

Each of the first three noise monitoring events will occur between 8 AM and 4 PM to capture fluctuations in activities that would typically occur at an active quarry operation. Interim spot tests, if needed, may vary in length but are expected to last two hours or less.

The final (fourth) monitoring event will be conducted over three days of operation.

Measurement Procedures

Sound levels will be measured in 1-second intervals, recording both the 1-second L_{eq} and L_{max} . If sound level contributions from discrete, transitory noise sources not associated with the quarry (such as aircraft, birds, loud traffic, etc.) are identified after review of recorded audio taken during the measurement, these extraneous noises will be removed from the measurement data prior to calculating the final interval L_{eq} and L_{max} levels attributable to the quarry.

Reporting

The first three measurement events shall be documented in a brief report summarizing the overall results and describing:

- instrumentation used in the measurements
- measurement locations
- measurement times and durations
- the calculated L_{eq} and the L_{max} levels during each hourly interval representing both the overall sound levels and the levels with extraneous sources removed
- a description of the noise sources contributing to the measurements
- a description of the meteorology during the measurement period, including estimated temperature and wind conditions
- a description of equipment operating during the time of measurement
- a description of any mitigation measures implemented since the previous monitoring event.

The report shall compare the measurements with the environmental noise limits established by the County. The report shall be submitted to King County within three calendar days of each measurement event.

After the fourth measurement event of the month-long period has been completed, a final report shall be provided to King County that includes a brief summary of the first three measurement events, the same details for the fourth event as listed above, and the measurement data captured during the fourth monitoring event.

Response to Non-compliant Conditions

If violations of the County noise limits are measured, the quarry shall cease the activity causing the issue and identify and implement noise mitigation measures to reduce the levels. A follow-up spot test will be conducted. This process may need to be repeated more than once during the month-long period in order to demonstrate compliance with the County limits. The intent of this monitoring period is to allow for this iterative process during full operation of the facility in order to be able to identify the noise sources of concern, identify and install noise mitigation, and reassess compliance with the noise limits.

Noise Consultant

Ramboll Environ (RE) shall be employed to measure sound levels in the site vicinity as described above and to prepare reports required by this program. Kristen Wallace, who will be directing the monitoring efforts, has more than 20 years of experience conducting similar monitoring events in King County and the surrounding region. She has also worked with and for King County numerous times in preparing environmental noise impact assessments or noise monitoring plans for similar facilities.

Attachment A:
RRQ Quarry Operations Included in Testing Protocol

Individual Operations (to be tested independently and simultaneously)

- I. Crushing Plant Operations
 - a. Primary Crushing Plant Equipment (stationary)
 - i. Jaw Crusher
 - ii. Screening Plant
 - iii. Cone Crusher (is not required except when making certain products)
 - b. Accessory Equipment for Crushing Operations (moving throughout the quarry floor)
 - i. Loader I (moving rock to feed the crushing plant throughout the quarry floor)
 - ii. Loader II (moving freshly made product piles into inventory piles on the quarry floor)
 - iii. Excavator (moving rock into piles for the loader on the quarry floor and sorting large boulders)
 - c. Feed Material
 - i. Mixed material sized from sand up to 3 man boulders
 - d. Potential Noise Mitigation Strategies
 - i. Currently compliant on a standalone basis and in concert with Truck Loading
 - ii. Additional sound barriers
 - iii. Additional noise insulation in Cone Crusher enclosure
 - iv. Enclosure for Jaw Crusher

- II. Truck Loading Operations
 - a. Products to be loaded
 - i. 5/8" minus, 1 1/4" minus, 2" minus, 5/8" clean, 1 1/4" clean, 2" clean, 2"x4" spalls, 4"x8" spalls, rockery rock
 - b. Location to be loaded
 - i. Coarse products only loaded behind stacked loading containers
 - ii. Fine products can be loaded throughout the quarry floor
 - c. Loading Equipment
 - i. Loader for loading all products except rockery rock (moving throughout the quarry floor)
 - ii. Excavator for loading rockery rock (moving throughout the quarry floor)
 - d. Potential Noise Mitigation Strategies
 - i. Currently compliant on a standalone basis and in concert with Truck Loading
 - ii. Additional sound barriers

- III. Rock Breaking Operations
 - a. Rocks to be Broken

- i. Boulders larger than 3 man rockery rock
 - b. Location
 - i. Primarily on quarry floor
 - ii. Occasionally on upper benches from 50 to 200 feet above the quarry floor
 - c. Rock Breaking Equipment
 - i. Excavator affixed with Rock Breaking Attachment
 - d. Potential Noise Mitigation Strategies
 - i. Currently compliant on a standalone basis
 - ii. Use of portable sound wall
 - iii. Additional sound barriers

IV. Excavating Operations

- a. Equipment
 - i. Excavator affixed with bucket for digging
- b. Location
 - i. Quarry floor to 200 feet above the quarry floor on upper benches
- c. Activities
 - i. Sorting and separating large boulders
 - ii. Stripping overburden and placing in piles
 - iii. Casting material over the benches to quarry floor or lower benches
- d. Potential Noise Mitigation Strategies
 - i. Currently compliant on a standalone basis
 - ii. Reducing bench height to minimize the distance rock is falling
 - iii. Changing bucket configuration to reduce bucket noise\
 - iv. Drilling tighter patterns to reduce rock size

V. Drilling

- a. Equipment
 - i. Track mounted rock drill
 - ii. Excavator carrying fabricated drilling sheathe
- b. Location
 - i. Quarry floor to 200 feet above the quarry floor on upper benches
- c. Potential Noise Mitigation Strategies
 - i. Modifying drilling sheathe
 - ii. Changing Drills