

RE: Frontier Stone Shelby Quarry Ground Vibration Study

Sheeley, Scott E (DEC)

Wed 7/23/2014 11:40 AM

To: Kevin Brown <kbrown@bsdflaw.com>;

Cc: Army, Steve (DEC) <steve.army@dec.ny.gov>; Loew, Dudley D (DEC) <dudley.loew@dec.ny.gov>;

Dear Mr. Brown,

Thank you for providing the additional information.

The proposal to predict blast induced ground vibration at the STAMP project addresses our previous questions, and we don't have any additional comments. We recognize that what has been provided so far is just the proposed scope of work, and the analysis of the report will still need to be done once submitted for review. Please ensure that the AISC nanotechnology vibration guidelines are provided at some point, and, as requested this morning, please provide a copy of the Colin Gordon vibration site study (September 2012).

From our conversation this morning, it is our understanding that you will also be reaching out to representatives of the STAMP project to determine whether they have any comment on the proposed scope of work before proceeding.

If you have any questions, please feel free to contact me.

Sincerely,

Scott E. Sheeley
Regional Permit Administrator
NYSDEC Region 8
6274 E. Avon-Lima Road
Avon, NY 14414

ph.: 585-226-5382

fax: 585-226-2830

From: Kevin Brown <kbrown@bsdflaw.com>

Sent: Monday, July 21, 2014 10:29 AM

To: Sheeley, Scott E (DEC)

Cc: cmalcomb@hodgsonruss.com; rstapell@harrisbeach.com; jpiciotti@harrisbeach.com

Subject: Frontier Stone Shelby Quarry Ground Vibration Study

Dear Mr. Sheeley

As requested, attached are details for the Frontier Stone Project Induced Ground Vibration study to be performed by Vibra- Tech.

Kevin J. Brown, Esq.
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July 18, 2014

Mr. David J. Mahar, President
Frontier Stone, LLC
4172 East Lake Road
Wilson, New York 14172

**RE: Frontier Stone Project
Prediction of Blast Induced Ground Vibration at STAMP Research Park
Shelby, New York**

Dear Mr. Mahar:

As requested by Mr. John Hellert of Continental Placer, Inc. the following is our response for the request of additional information on the proposed testing for the above referenced project.

Signature Hole Test Blast and Ground Vibration Measurements

Source Hole

A field test will be conducted where a single hole test blast will be detonated using existing monitoring well MW-1 located on the proposed quarry property. The monitoring well is located at N43° 09.50754', W078° 21.69480'. The monitoring well is a 6 inch diameter hole drilled to a depth of 136 feet. The upper 29 feet of the hole is unconsolidated soil. The hole is cased with steel approximately 3 to 5 feet into rock of the Lockport formation. The bottom six feet of the hole is founded in the Rochester shale.

The bottom 18 feet will be backfilled with ½ inch crushed stone. The hole will be loaded with PowerAN 500 from a depth of 118 feet to 47 feet in the borehole giving a 71 foot explosive column with an approximate charge weight of 850 lbs. The PowerAN 500 product is a cartridge emulsion (5" x 30") having a density of 1.25 to 1.30 g/cc. The remainder of the hole (47 feet) will be stemmed with ½" crushed stone. The explosive column will be initiated from three points within the column utilizing 1 lb. Pentex boosters with Unitronics 600 electronic caps. The closest non-owned structure to this blast hole is 1830 feet to the northwest. The expected vibration level at this location would be 0.32 in/sec.

Data Acquisition Systems

A linear array of seismometers extending from the test blast to the STAMP Research Park will be utilized to collect attenuation data. Approximately 60 to 75 seismometers will be placed logarithmically along the ground surface starting at a scaled distance of approximated 10 ft./lb^{1/2}. These near field ground vibration measurements will be

collected using blasting seismographs capable of measuring energy in the 2Hz - 200 Hz range. The amplitude range of the units in the array will vary from 0.01 in/sec to 10 in/sec.

Ground vibration measurements at the research park will be made using ultra-sensitive seismic accelerometers at multiple locations. This system is similar to the system utilized by Colin Gordon & Associates during their site vibration study at the proposed STAMP site. The measurement equipment used at the research park will consist of a portable laptop computer with a multi-channel spectrum analyzer interface board and programmable analog filters. Each channel has a separate 16-bit analog to digital converter all synchronized to a master clock. Vibra-Tech's data collection/archival system allows for collection and archiving of vibration data in both the time and frequency domains as well as signal processing features which aid in analysis of both random and periodic vibration phenomena. The transducers used for conversion of physical vibration phenomena into analog current/voltage signals are Wilcoxon Research model 731 seismic accelerometers which are designed for low frequency seismic signals. The sensors are industry standard for measurement of vibration for semi-conductor and nano-technology facilities. The accelerometers have the following characteristics:

Accelerometer Model 731

Voltage Sensitivity: 10 v/g, 100 v/g, 1000 v/g

Frequency Response:

5%@0.12 Hz - 410 Hz

10%@0.08 Hz - 510 Hz

3dB@0.04 Hz - 690 Hz

Mounted Resonance 0.86 kHz

Max Amplitude Range 0.5 g Peak

Data Analysis

The single-hole data collected by the multi-channel spectrum analyzer at the STAMP site will be utilized to create a synthetic seismogram. This synthetic seismogram will represent STAMP Research Park ground vibration resulting from a simulated multi-hole production blast at the proposed quarry. The proposed blast parameters such as number of holes, number of rows, blast hole delay times, and maximum charge weight/hole will be considered in the model.

Data collected from the linear array will be analyzed using least squares regression analysis to determine the site specific attenuation rate from the proposed quarry location to the proposed STAMP facility. The rate of attenuation can be utilized to adjust the amplitude of the of the single hole data based upon changes in charge weight.

Both narrow-band and 1/3 Octave Spectrums will be calculated from both the signature hole test blast and the synthetic seismogram production blast. A comparison of the predicted ground vibration at STAMP Research Park to the vibration guidelines for nanotechnology and research facilities will be made. An example of these criteria can be found in Appendix A of the report authored by Colin Gordon Associates entitled "Western New York Science & Technology Advanced Manufacturing Park (STAMP)

Vibration Site Study” dated September 13, 2012. Prediction of maximum explosive charge weights necessary to meet ground vibration criteria limits will be reported.

If you should have any questions or require additional information, please contact our office.

Sincerely,

A handwritten signature in black ink, appearing to read "Douglas Rudenko". The signature is written in a cursive style with a large, sweeping initial 'D'.

VIBRA-TECH ENGINEERS, INC.

Douglas Rudenko, PG

Vice President