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BW	6/26/07	RCO2565

David Garrett & Associates
Engineering and Geology

June 15, 2007

Mr. Ed Mussler
Permitting Branch Head
Solid Waste Section
NCDENR – Division of Waste Management
401 Oberlin Road, Suite 150
Raleigh, NC 27605

RE: Rock Blasting Report
BFI Lake Norman C&D Landfill – Phase 2B
NCDENR Solid Waste Permit #55-04 (Lincoln County)

Dear Mr. Mussler:

This letter presents a report of observations made during the blasting of an estimated 5,300 cubic yards of rock exposed within the center of the proposed Phase 2B at the referenced landfill site. The blasting was conducted on June 7, 2007, attended by Mr. Brian Wootten of the Solid Waste Section (SWS) and myself. A map depicting relevant site features and monitoring locations is attached as **Figure 1**. Excavation activities at the site exposed a "pinnacle" of variably weathered grano-diorite that extended approximately 15 feet above the approved subgrade elevations, which required removal to facilitate cell drainage and orderly site operations. Light blasting was proposed for removing the rock in a blasting plan dated May 30, 2007, which was reviewed and approved by the SWS (B. Wootten) on that same date.

During our review of subsurface conditions (1998 S&ME report on file with the SWS), we determined that a test boring installed by others within approximately 100 feet of the exposure had revealed no rock within approximately 30 feet of the surface; this confirms that the rock body was relatively small and easily missed during the investigation. The 15-foot high exposure of rock-like materials appeared to be a "cap" or "pinnacle" of nested boulders of variable size, embedded in a matrix of soil and/or partially weathered rock. The rock exposure contained abundant soil seams that would have resulted in a low recovery and/or low rock quality determination (RQD) value, likely qualifying it as "partially weathered rock," but larger particles contained in the exposure proved to be isolated occurrences of more competent rock.

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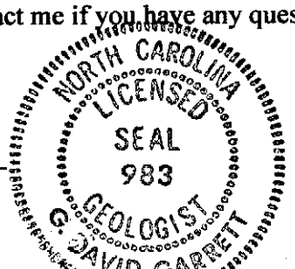
The rock was exposed during general grading of Phase 2B by Earnhardt Grading, Inc., (attempts were made at ripping with a D-8 dozer, or equivalent) and an exploratory drilling program conducted on a 50-foot grid pattern by Carolina Drilling, Inc. The top surface was surveyed by a licensed surveyor to provide an estimate the volume of rock above the proposed subgrade elevations. The Solid Waste Section was contacted to initiate the approval for removing the rock by blasting. **Figure 2** presents a map supplied by the surveyor depicting the top of rock contours and surveys of the post-excavation rock surface and final grades (with 4 feet of separation) on 25-foot centers. BFI decided to leave the rock approximately one foot above the approved subgrade and fill over the rock with compacted fill to provide 4 feet of vertical separation.

The blasting was conducted by Austin Powder Company, of Denton, North Carolina, in accordance with SWS guidelines for rock blasting at landfills. Prior to blasting, a series of shot holes was drilled on a 6-foot grid pattern, into which the charges were loaded. None of the shot holes encountered water. The shots consisted of ammonium nitrate-fuel oil delivered in bulk. Charges were limited to 30 pounds per shot. Delays were used to control and direct the blast energy up and out, so as to limit subgrade damage. Some rock-fly was observed during the blasting, but no ground vibration was detected at the observation site.

The shot was monitored by Sauls Seismic, Inc., using seismographs at two locations selected to monitor the nearest ground water monitoring well and the nearest practical location along the adjacent cell (see Figure 1). Seismograph reports (attached) indicate that peak particle velocities did not reach 1 inch per second at any of the monitoring locations during blasting. A visual inspection of the blast site immediately following the shot revealed no obvious veins, dikes, fissures or distinct linear features that extended into the subgrade. Based on the blast monitoring records, these observations and past experience, it is my opinion that the controlled blasting activities have not adversely affected the subgrade beneath any existing or future phases, nor has the blasting jeopardized the ground water monitoring systems.

Please do not hesitate to contact me if you have any questions or require further assistance.

Very Truly Yours,



G. David Garrett, P.G., P.E.

cc: Mike Gurley, Environmental Manager, BFI/Allied Waste Industries
Brian Wootten, Hydrogeologist, NCDENR Solid Waste Section

BLAST MONITORING SEISMOGRAPH

50' BUFFER ZONE

CELL LIMITS

100' BUFFER ZONE

1A (EXISTING)

1B (EXISTING)

2A

3A

3B

4A

4B

SURVEYED ROCK EXPOSURE

FUTURE PHASES/CELLS (UNDISTURBED WOODS)

BLAST MONITORING SEISMOGRAPH

CONSTRUCTION LIMITS

50' BUFFER ZONE

MW-1

MMW-4

MMW-3

BAR SCALE 1"=80'
0 30 60 120

LEGEND:

EXISTING CONTOURS	
FLOOR CONTOURS	
PROPOSED FINAL CONTOURS	
CUT QUANTITY	-13.8
CELL LIMITS	
PROPERTY BOUNDARY	
CONSTRUCTION LIMITS	
GROUNDWATER MONITORING WELL LOCATIONS	MW-2, MMW-4
METHANE MONITORING WELL LOCATIONS	

NOTES:

EXISTING LANDFILL CONTOURS TAKEN FROM TOPOGRAPHIC SURVEY PERFORMED BY ESP ASSOCIATES, P.A. DATED APRIL 4, 2004.

ALL OTHER EXISTING CONDITIONS TAKEN FROM "PROPOSED GRADING PLAN" – S&ME, INC. DATED 2/18/1998.

PROPOSED CONTOURS FOR LANDFILL BASE GRADES TAKEN FROM "PROPOSED GRADING PLAN" – S&ME, INC., DATED 2/18/1998.

CUT AMOUNT – 82,300 CYDS
FILL AMOUNT – 0 CYDS

AVAILABLE AIRSPACE – 451,500 CYDS (CELL 2A)

FIGURE 1

OWNER: BFI
P.O. BOX 219
PINEVILLE, NC 28134

PROJECT: LAKE NORMAN C&D LANDFILL
LINCOLN COUNTY, NORTH CAROLINA

SHEET TITLE: GRADING / CLOSURE PLAN CELL 2B

NO.	DATE	REVISION	BY

PROJECT NO. 5005
SCALE 1" = 80'
DATE 12/08/2004
DRAWN BY AVG
CHECKED BY DHW

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Engineering and Geology

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BFI/ALLIED WASTE INDUSTRIES LAKE NORMAN C&D LANDFILL ROCK DELINATION/REMOVAL FIGURE 2

FILE NAME SITEMAPS.DWG	SCALE AS_SHOWN	DATE 06/15/2007

Version 3.2
Executable Date: 23Apr07

C:\My Download Files\john mikesh\jkm0604CarolinaBFI\BFI-LKN Landfill\Berme\060407 temp.nsz

SAULS SEISMIC, INC. - Report

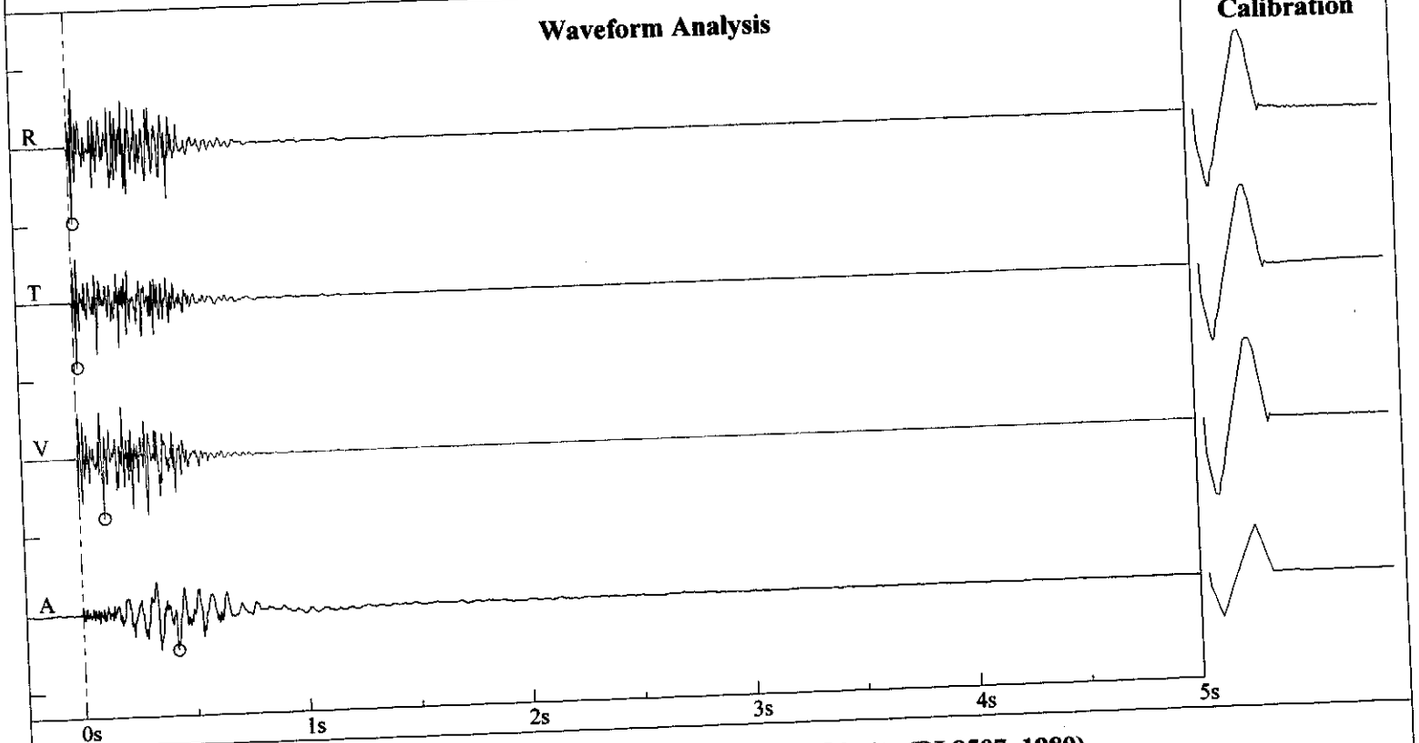
Telephone: 540-974-1029

Company: CAROLINA: BFI LANDFILL
Location: BERM N352615 W810050
Operator: JOHN MIKESH
Notes: SHOT LOC: N352615 W 810047

04-JUN-07 at 14:11:14 Event # 1
Graph: 4020
Last Calibration: 14JUL06
Record Duration: 5 sec
Sample Rate: 1024/sec

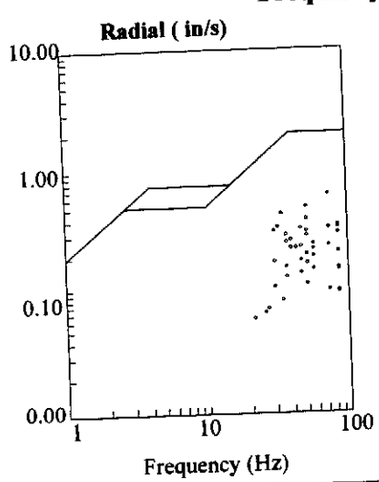
Amplitudes / Frequencies	Trigger >>> Peak	Scales / Triggers	Charge / Distance
○ Radial: 0.620 in/s @ 73.1 Hz	14.6 ms	Air Scale: .00461 psi/div.	Wgt. Per Delay: 30.0 lb
○ Transverse: 0.533 in/s @ 85.3 Hz	14.6 ms	Seismic Scale: 0.64 in/s/div.	Distance: 150.0 ft
○ Vertical: 0.495 in/s @ 42.6 Hz	112.3 ms	Air Trigger (dBL): N	Scaled Distance: 27.39
○ Air: 118 dBL @ 18.9Hz / .00221 psi	421.9 ms	Seismic Trigger: 0.05 in/s	

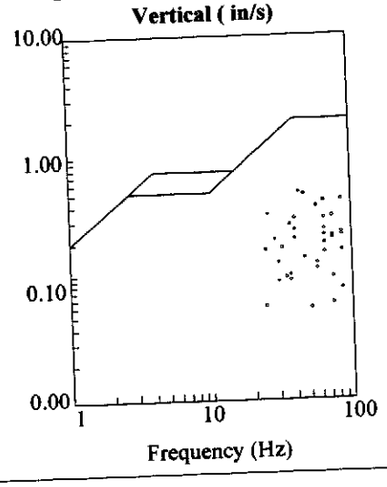
Waveform Analysis

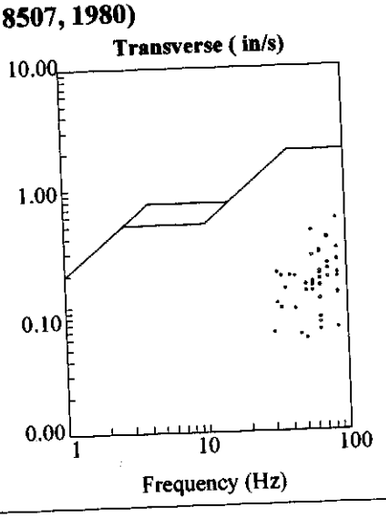


Calibration

Frequency vs. Amplitude Plot - USBM Limits (RI 8507, 1980)







NOMIS SEISMOGRAPHS, USA - Tel: 205-592-2466

Developped by EXPLO-TECH - FRANCE (W-NOMIS Version 4.4.1)

VIBRATIONS ANALYSIS REPORT

File name

NOMIS SEISMOGRAPHS
Tel :205.592.2466

Unit # :NS5400I-2329

Date : JUN 04, 2007 14:11

Customer : BFI

Location : N352618.4 W810042.8

Company : CAROLINA DRILLING
Operator : JOHN MIKESH

Event # 044

Record time: 5.0 sec
Sampling rate: 1024 E/s
Number of points:5120

Distance (Ft): 394.2 | *Charge per delay (lbs): 30.0* | *Scaled Distance : 71.97*

VIBRATIONS

Amplification: 1 Trigger (T): 0.02 in/s Vector Sum (in/s): N

Channel	Radial	Transverse	Vertical
Velocity (in/s)	**0.21**	**0.13**	**0.21**
Frequency (Hz)	**35.6**	**32.0**	**48.6**
Acceleration (g)	0.145	0.017	0.142
Displacement (in)	0.0009	0.0008	0.0007
*VMax/Trigger (ms) **	*593.8*	*491.2*	*405.3*

ACOUSTIC

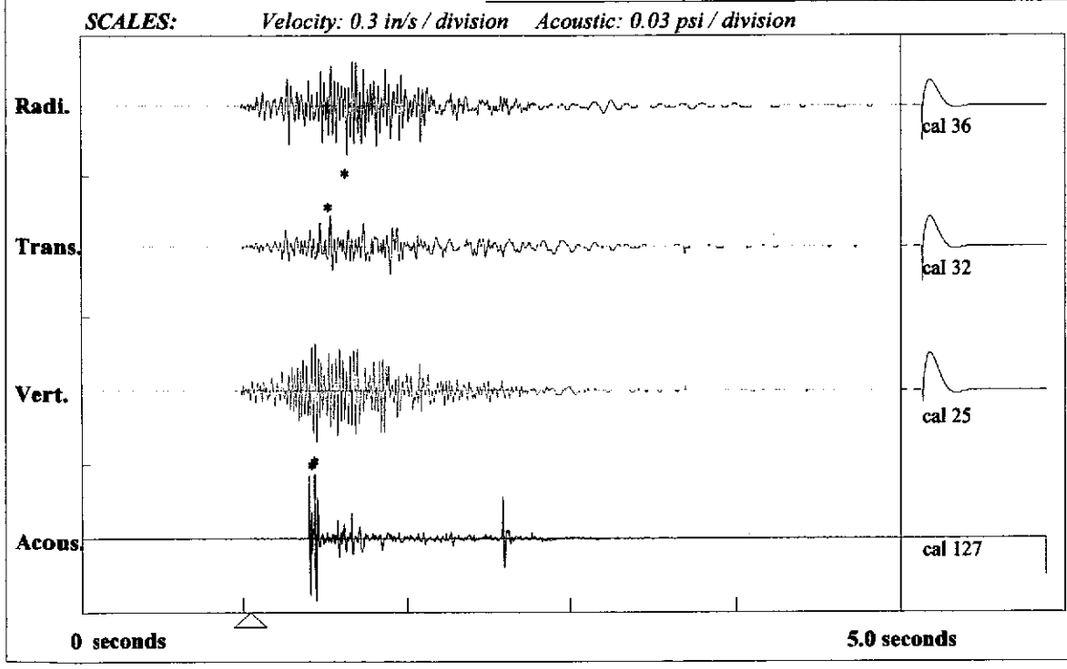
Amplification : 1 Trigger (dB) : N

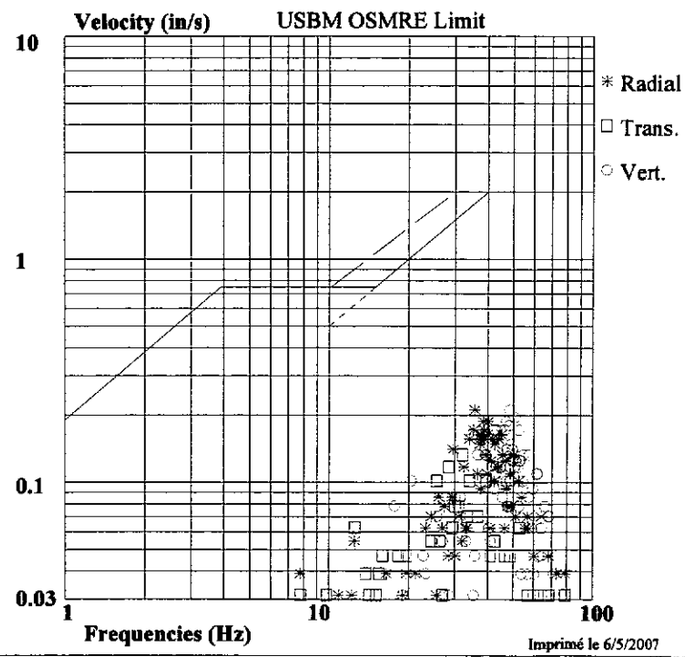
Parameters	Values	SMax/Trigger(*) :
Acoustic in psi	0.0257	390.6 ms
Acoustic in dBF	**139.0**	*34.8 Hz*

Comments :

» SHOT LOC: N352615.3 W810047.8

AMPLITUDE GRAPHS & FREQUENCY vs VELOCITY GRAPHIC





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