

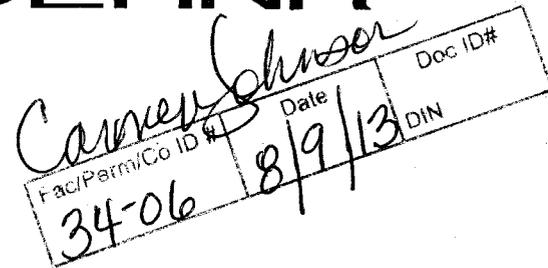
State of North Carolina  
Department of Environment,  
Health and Natural Resources  
Division of Solid Waste Management

James B. Hunt, Jr., Governor  
Jonathan B. Howes, Secretary  
William L. Meyer, Director



October 17, 1994

Bill Lewis  
9900 Freeman Road  
Kernersville, N.C. 27284



RE: Rock Removal At The Piedmont Landfill And Recycling Center  
(Permit # 34-06)

Dear Mr. Lewis,

If rock removal is necessary at the Piedmont Landfill, the Solid Waste Section authorizes RUST Environmental and Infrastructure to proceed with rock removal according to the Hard Rock Removal Plan proposed in their letter of July 29, 1994. Efforts should be made to minimize the amount of blasting necessary and to minimize the effects of the blasting that is necessary.

Blast monitoring should be conducted as proposed in the Hard Rock Removal Plan. A full report of the blasting activities should be submitted to the Solid Waste Section within 30 days of the completion of the rock removal. The Licensed Blaster shall certify that the drill hole pattern, charge weights, and delays were selected in such a manner as to minimize the amount of energy which may impact the underlying rock. The Professional Engineer shall also certify that rock blasting was kept to a minimum and that controlled blasting techniques were used to minimize blasting effects to the underlying rock.

The report of the blasting activities shall also include a discussion by the Professional Geologist of the effect of the heavy ripping and blasting on the ground-water flow regime at the site. Additional subsurface investigation may be required to determine the effect of blasting or heavy ripping on the hydrogeology of the area. If modifications to the monitoring plan are necessary based on information gained during any additional subsurface investigation, a revised water quality monitoring plan shall be submitted to the Solid Waste Section Hydrogeologist for review.

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During and after excavation of the area and prior to backfilling with soil, the Professional Geologist shall evaluate the excavation for any evidence of structural features (fractures, dikes, pegmatites, etc.) that could influence ground-water flow. The report of the blasting activities shall also include a report of the excavation evaluation by the Professional Geologist and recommendations of any modifications that may be needed to the ground-water monitoring system based on this evaluation.

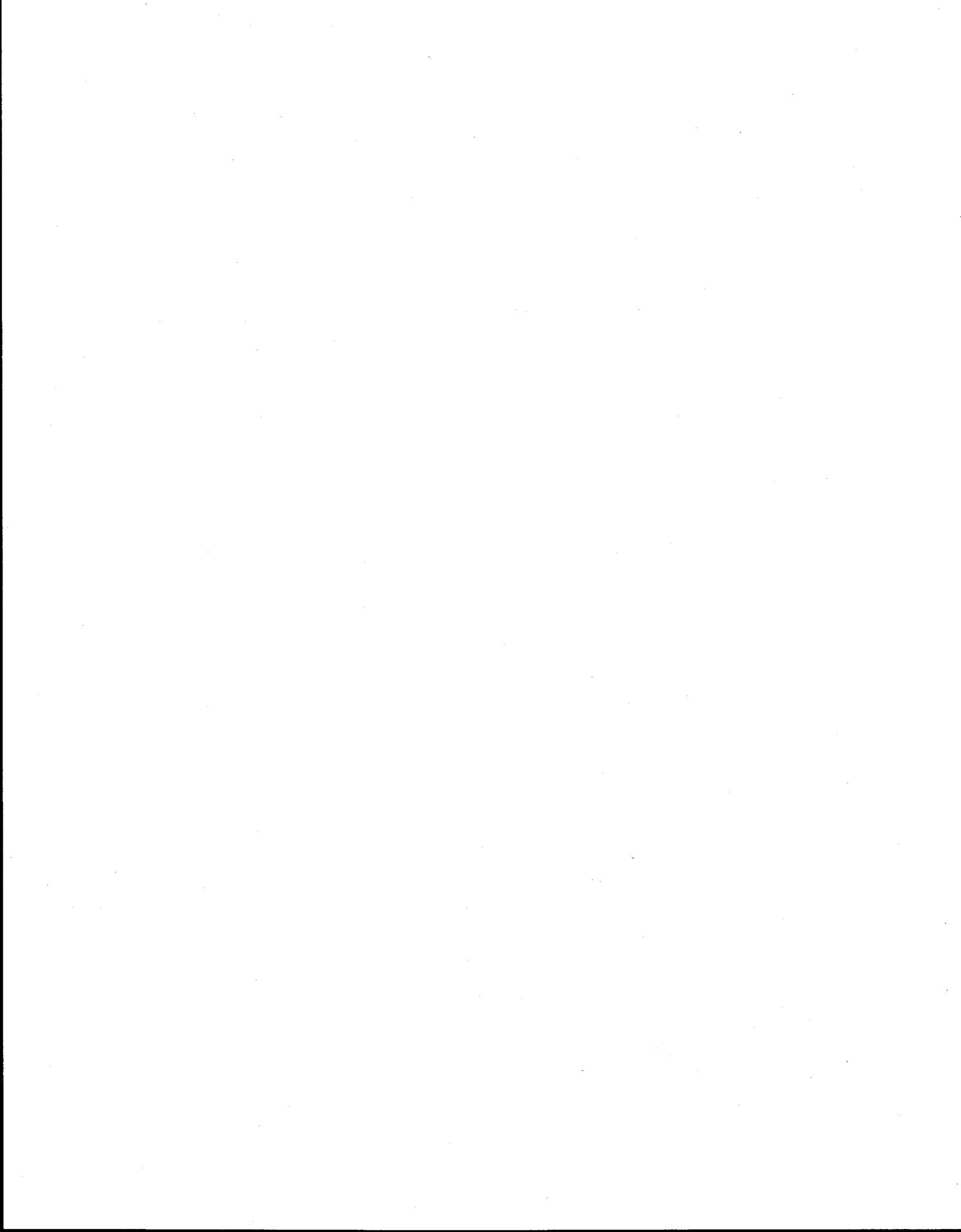
If you have any questions regarding this letter, please contact me at (919) 733-0692.

Sincerely,

*Bobby Lutfy*

Bobby Lutfy  
Hydrogeologist  
Solid Waste Section

cc: Sherri Hoyt  
Brent Rockett  
Peter Walls





15 BRENDAN WAY  
GREENVILLE, S.C. 29615  
PH. 803-234-3000  
FAX 803-234-3069 OR 803-234-3058

**FACSIMILE TRANSMISSION**

DATE: 7/29/94

TIME: 1530



TO: Bobby Lutfy

COMPANY: NCDEHNR - Solid Waste Section

CITY/STATE: Raleigh / NC

FAX NUMBER: (919) 733-4810

FROM: T. Yangschak / P. Walls EMPLOYEE # 6288

PROJECT NO: 87221.700

TOTAL PAGES INCLUDING THIS PAGE: 8

COMMENTS: Attached is our letter explaining the rock situation at Piedmont. The original is in the mail to you. Please call if you have any questions.

For Originator:

Return Original  Yes  No  Pickup

In case of transmission problems, please call (803) 234-2250

**RUST** ENVIRONMENT &  
INFRASTRUCTURE*Formerly SEC Donohue*RUST Environment & Infrastructure Inc.  
15 Brendan Way • Greenville, SC 29615  
P.O. Box 24000 • Greenville, SC 29616  
Tel. (803) 234-3000 • FAX (803) 234-3069

July 29, 1994

Mr. Bobby Lutfy  
North Carolina Department of Environment, Health and Natural Resources  
Solid Waste Section  
401 Oberlin Road  
Raleigh, NC 27605

Subject: Hard Rock Removal  
Piedmont Landfill and Recycling Center  
Kernersville, North Carolina  
RUST Job 87221.700

Dear Mr. Lutfy:

The purpose of this letter is to address concerns that you have expressed regarding the apparent presence of bedrock above the proposed subgrade at the Piedmont Landfill in the new cell areas proposed for construction. The areas of concern are located near Golder Associates, Inc. piezometer location GP-1 and boring P-9. In this area, RUST E&I intends to remove the rock to an elevation four feet below subgrade in accordance with regulation .1624 (b) (4).

RUST E&I understands DEHNR is concerned about removing rock if blasting is required. We wish to alleviate this concern with the following discussion.

**Bedrock Pinnacle at GP-1**

As shown on the RUST E&I top of bedrock map (Figure 4-2 of the Report for the Design Hydrogeologic Investigation), the top of bedrock at the GP-1 location is shown to be at elevation 781. The subgrade at this location as shown on the subgrade figure (provided in our Response to DEHNR Comments dated June 15, 1994 for the Design Hydrogeologic Investigation) is at elevation 774.

RUST E&I is under the opinion that the bedrock above the current subgrade elevations in this area is limited and the rock, as indicated in the core logs, appears to be well broken. The boring log for Golder piezometer P1DD is included in Attachment A for reference. Piezometer P1DD was the deepest piezometer of the cluster that was installed at boring location GP-1. The rock coring log indicates that at least the top 12 feet (elevation 781 to 769) of what was designated as competent bedrock was highly fractured with RQD values

of 68.5% and 37.2% for the two core runs, respectively. At elevation 769, coring was discontinued and a roller-cone bit was used to complete the borehole. The log indicates that very hard rock was encountered from elevation 761 to the end of boring at elevation 754.

The presence of the highly fractured rock within at least the top 12 feet of what was designated as bedrock indicates that this material should be rippable. We therefore propose to overexcavate the rock by ripping and to backfill with suitable buffer soils in order to achieve the required four-foot buffer zone.

### **Rock Shelf**

During the site visit on July 15, 1994, a rock shelf, which was observed in borings P-9 and GP-1, was exposed on the south side of the ridge. This shelf is located along the boundaries of Cell 1 Subcells 2 and 3. The softer material had been excavated from underneath the shelf as far as practical so that the shelf rock will loosen and drop. At present the rock is exposed as shown on the figure attached to a letter dated July 22, 1994. This letter was sent to you from Mr. Ed Gibson addressing the rock quantities. In order to efficiently remove this rock material so that excavation can continue, controlled blasting techniques are proposed to be employed. It is probable that the entire depth is not rock material, based on boring logs P-9 and GP-1.

### **Rock Removal Approach**

If bedrock is encountered at subgrade level, then a similar approach of undercutting and replacing with suitable buffer soils is planned for these locations. Ripping will be employed where practical. If blasting is required to remove the rock, then the following procedures will be implemented.

### **Blasting Plan**

Initially the contractor would excavate the soil from around the pinnacle. The area will be lowered enough so that adequate buffer can be placed below the designed subgrade. The rock which remains freestanding will be removed by blasting.

Controlled blasting techniques will be used to minimize blasting effects to the underlying rock. This is done by the licensed blaster selecting the drill hole pattern, charge weights, and delays for the explosives to reduce the amount of energy which may impact the underlying rock. Minimal energy will be used during the blast(s).

A blast vibration monitoring device (seismograph) will be placed in the close proximity to the pinnacle on another rock mass so that actual ground responses to the blast can be monitored. The maximum peak particle velocity allowed at the monitoring location will be 2 inches per second.

Loosely placed soil may be backfilled around the rock so that some of the blast energy may

be absorbed by the soil. Blasting mats will be used to minimize the hazard of flying rock fragments.

An appropriate soil buffer (a minimum of 4 feet) will be compacted back into this area until subgrade elevations are reached.

In support of this controlled blasting, the United States Bureau of Mines (USBM) has studied the extent of cracking in rock adjacent to "unrelieved" blast holes. Radial cracking does not extend more than 20 to 23 times the hole radii for hard rock. For a typical 2-1/4 inch diameter hole, this would translate into a radial damage of no more than 2.2 feet. Because the blast holes will not be confined, the actual radial damage should be less than 1 foot.

The explosive energy takes the path of least resistance, which is up and out in the case of the rock shelf. Because of this, the underlying rock will have negligible cracking since most of the energy generated by the blast will be dissipated upwardly rather than into the rock. The radial damage will also be into the rock which is to be removed.

In addition, ground vibrations required to crack in-situ rock are in excess of a peak particle velocity of 30 inches per second. This is much higher than the velocity levels that are anticipated to be experienced within the current landfill area (2 inches per second) during the blasting. The seismograph will measure actual velocities generated from this controlled blasting.

This blasting plan would protect the integrity of the underlying rock. A monitoring instrument will be used for each blast to verify that destructive blast velocities do not occur outside of the rock removal areas. We believe that this plan provides the safe-guards to protect your concerns for the underlying rock, and thus we seek approval for this plan.

### Other Considerations

The landfill consists of a Subtitle D composite compacted clay/geosynthetic lining system. In order to design and construct this system effectively, grade uniformity is essential. In the case of the Piedmont Landfill and considering the groundwater table, the base grades were developed to impact the smallest area of bedrock possible while maintaining grade uniformity for geosynthetic placement. At the design stage, the area around GP-1 was expected to be impacted.

The rock shelf is situated at the high end of Cell 1 Subcells 2 and 3. The top of this shelf is approximately 15 feet above base grade levels. Development and construction above this shelf would be difficult. As currently designed, leachate is expected to flow away from these areas and is not anticipated to amount to appreciable levels nor pond in these locations. With the construction of a Subtitle D liner and extensive construction quality assurance program, the potential for leachate releases in these areas is minimal. Liner construction

over overexcavated bedrock is not expected to have a negative impact on the environment.

### Conclusion

Minimal rock removal is anticipated in the undeveloped areas of the landfill. If bedrock is encountered at the subgrade level, this material will be overexcavated in accordance with regulation .1624 (b) (4).

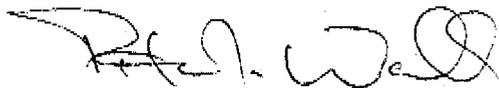
If hard rock material is encountered which cannot be ripped, controlled blasting techniques will be employed in accordance with the above blasting plan.

In conclusion, controlled blasting will not compromise the integrity of the underlying geologic and hydrogeologic features at the site. In addition, considering the already fractured nature of the underlying material, positioning of the rock shelf in relation to the landfill base grade configuration, construction of a Subtitle D liner and extensive construction quality assurance, it is concluded that rock removal as discussed above will not impact a change to ground water and will not adversely effect human health and the environment.

If you should have any questions, do not hesitate to call either Tom Yanoschak at (803)234-3042 or myself at (803)234-2261.

Sincerely,

RUST ENVIRONMENT AND INFRASTRUCTURE



Peter J. Walls, PG, PE  
Senior Geological Engineer

c. Ed Gibson - Piedmont  
Jeff Reed - RUST E&I

**ATTACHMENT A**  
**BORING LOG FOR PIEZOMETER P1DD**



PROJECT		WMT/Hydro/Kernersville N.C.		JOB NO. 83-3407.4		BORING NO. P100 DATE 5/31/97 SHEET 1 OF 1																									
BORING BEGAN		11:36 5/29/97		BORING COMPLETED		CORE HOLE LOCATION																									
METHOD OF CORING		DRILLING FLUID		ORZLEV.		WEATHER																									
CASING USED		60' SIZE 3"		NONE		INSPECT <input checked="" type="checkbox"/> OPERAT. Dev S																									
DEPTH (FT.)		CORING RECOVERY		DISCONTINUITIES		LITHOLOGY		DESCRIPTION		POINT LOAD TEST		HARDNESS		SAMPLES - LABORATORY TESTS		DRILLING RATE		MINUTE													
				DEPTH		TYPE		INFILLING		ANGLE W/AXIS		FREQUENCY		LITHOLOGY		COLOR		TEXTURE		WEATHERING											
59				.7		M																									
60				.7		JSIR		C		30																					
61				1.1		M																									
62		1		.8		M						15		BW		C		SW													
63				.2		M																									
64				.4		M																									
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81				.4		M																									
82				.4		M																									

NOTE: End of Boring 87ft From 80 down the bit was very hard and there was only to cracks 82 & 84ft  
 The Depth numbers are measurements from the top of the sample.

SCALE: 1 DIVISION = FEET

DATE 5/31/97 LOGGED BY 92