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PROPOSED SURGE LAGOONS NLO, FERNALD, OHIO S&ME PROJECT NO. 021-84-233

11/02/84

S&M ENGINEERING INC/RUST ENGINEERING
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REPORT

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SOIL & MATERIAL ENGINEERS INC. ENGINEERING-TESTING-INSPECTION

11325 Reed Hartman Highway, Cincinnati, OH 45241, Phone (513) 489-3450

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1984
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November 2, 1984

The Rust Engineering Company
P.O. Box 368
Ross, Ohio 45061

Attention: Mr. N.E. Pennington
Project Superintendent

Reference: Proposed Surge Lagoon
NLO, Fernald, Ohio
S&ME Project No. 021-84-233

Gentlemen:

Attached are the logs of three test pits excavated at the project site October 17, 1984. Grid locations of the pits are shown on the logs.

The test pits were excavated to approximately 5 to 6 ft. below present grades with samples of each primary strata obtained. To about 4 to 5 ft. the soil is silty clay or clayey silt with some sand. Water bearing silty sand or sandy silt was encountered about 4 to 5 ft. below present grades.

As shown on the logs, the in situ moisture content within the depths explored is typically in the mid twenties to mid thirties. This is estimated to be approximately 10 to 15% over optimum moisture. Using a pocket penetrometer, the unconfined compressive strength is generally less than 1 tsf.

Based upon the conditions exposed in the test pits and observed equipment performance, it is our opinion that construction of the soil-bentonite liner cannot begin on the soft wet soils. There is insufficient foundation support for the contractor to achieve the specified 100% compaction. In our opinion, stabilization of the ground will not occur naturally in the dryer seasons of the year. Therefore, some means of ground stabilization will be required to improve the foundation soils for the compacted soil liner.

RALEIGH, GREENSBORO, ASHEVILLE, WILMINGTON, FAYETTEVILLE, CHARLOTTE, NC
SPARTANBURG, COLUMBIA, CHARLESTON, MYRTLE BEACH, SC
ATLANTA, ALBANY GA—TRI-CITIES, TN—CINCINNATI, OH—ORLANDO, TAMPA, FL

The soft natural soils have resulted from the topography (low marshy swale area), and the presence of near surface trapped or perched water. We recommend that a dewatering system be installed to collect seepage from the perched water zone and prevent further saturation of the foundation soils. The dewatering system could consist of perforated or slotted PVC installed in gravel filled trenches. We suggest that preliminary estimates assume underdrains running east-west on approximate 50 ft. centers beginning at the toe of the south dike. The underdrains can discharge to the swale west of the site. The underdrains should be installed at sufficient depths such that they are not affected by the following undercutting procedure.

Following installation of the underdrains, we recommend that the foundation soils be excavated and replaced with compacted fill. Preliminary estimates should assume that approximately 3 ft. of soil may have to be removed. The undercutting could be done in a progressive manner beginning along the south edge of the bottom area. A section could be undercut with the material stockpiled, then soil excavated further north could be placed in the previously excavated area. As noted previously, the soil is above optimum moisture content. Aeration using discs, etc., will be required to reduce the moisture content for best compaction results.

The initial lift should be aproximately 12" thick to bridge over soft underlaying foundation materials. The lift should be compacted to the greatest degree possible. We anticipate that the contractor will probably be able to achieve about 90% of Standard Proctor Density. Subsequent fill lifts should be thinner. The intent of the undercutting and replacement procedure is to provide increasingly dense compacted fill lifts below the soil liner. With proper moisture conditions, the contractor should be able to achieve at least 98% of Standard Proctor Density on the top foot (2 lifts) of fill. It is our opinion that a minimum of 98% compaction of the top 12" of fill is necessary to achieve the specified 100% compaction of the soil-bentonite liner.

Finished grade of the lagoon slopes to the south. Topographic drawings indicate that approximately 5 ft. of fill will be required along the north side with the south side finished grade at or near present grades. Estimates should assume that the undercutting and replacement procedure will be used where finished subgrade elevation (bottom of the soil bentonite liner) is within 3 ft. of present grades. This will provide at least 3 ft. of fill compacted to greater than 90% Standard Proctor beneath the liner.

The underdrainage and undecutting replacement recommendations are intended to provide stability of the foundation soils. Regulatory agencies should be contacted to determine if the underdrains will adversely affect the internal monitoring system of the lagoon.

If you have any questions concerning these recommendations please contact us.

Respectfully submitted,

SOIL & MATERIAL ENGINEERS INC.

James E. Veith, P.E.
Senior Geotechnical Engineer

Reviewed by:

John L. Payne, P.E.
Branch Manager

JEV:dls

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TEST PIT REPORT

CLIENT Rust Engineering Company JOB NO. 021-84-233

PROJECT NLO Storm Water Retention Lagoon TEST PIT NO. 1

LOCATION S-1882, E-2516

TECHNICIAN/ENGINEER Daniel R. Kennedy DATE 10-17-84

Elev.	Depth	Description of Materials	Sample Depth	Moisture Content (%)	Pocket Penetrome (TSF)
571.7	0'	Brown & gray silty clay with trace of sand	S-1 1.0'	27.6	1.0
568.2	3.5'	Brown & gray sandy clayey silt	S-2 3.0'	27.6	1.0
566.7	5.0'	Fine sand seam; water bearing	S-3 4.0'	25.6	0.5
566.5	6.2'	Pit terminated @ 5.2'			

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TEST PIT REPORT

CLIENT Rust Engineering Company JOB NO. 021-84-233

PROJECT NLO Storm Water Retention Lagoon TEST PIT NO. 2

LOCATION S-1882, E-2435

TECHNICIAN/ENGINEER Daniel R. Kennedy DATE 10-17-84

Elev.	Depth	Description of Materials	Sample Depth	Moisture Content (%)	Pocket Penetrome (TSF)
571.5	0'				
		Brown & gray silty clay with trace of sand	S-1 1.0'	27.6	1.0
568.5	3.0'				
		Brown & gray sandy clayey silt	S-2 3.0'	32.2	0.7
567.5	4.0'				
		Brown & gray sandy silt; water bearing	S-3 4.0'	12.9	0.5
566.5	5.0'				
		Pit terminated @ 5.0'			

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TEST PIT REPORT

CLIENT Rust Engineering Company JOB NO. 021-84-233

PROJECT NLO Storm Water Retention Lagoon TEST PIT NO. 3

LOCATION S-1912, E-2471

TECHNICIAN/ENGINEER Daniel R. Kennedy DATE 10-17-84

Elev.	Depth	Description of Materials	Sample Depth	Moisture Content (%)	Pocket Penetrome (TSF)
574.1	0'				
		Gray clayey silt with trace of sand	S-1 1.0'	23.2	3.0
572.1	2.0'				
		Brown & gray silty clay with trace of sand	S-2 3.0'	37.1	2.0
570.1	4.0'				
		Brown & gray sandy clayey silt	S-3 4.0'	27.2	1.0
		(water bearing @ 5.0')			
568.6	5.5'				
		Pit terminated @ 5.5'			