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WEST MONROE, OUACHITA PARISH, LOUISIANA

SOLID WASTE PERMIT RENEWAL APPLICATION

NPDES WASTEWATER TREATMENT FACILITY
GD-073-0405/P-0199

AND

ASH/SLUDGE LAGOONS
GD-073-0405/P-0244

COPY

AGENCY INTEREST NO. 1432

MAY 2007

PROVIDENCE

PROVIDENCE ENGINEERING AND ENVIRONMENTAL GROUP LLC
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PROVIDENCE PROJECT NO. 001-007

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GEOTECHNICAL REPORT

DAMES & MOORE

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November 23, 1992

Mr. J. E. Boyles, Station 6
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Geotechnical Investigation
Preparation of a Permit Modification
Proposed Surface Impoundment
Riverwood International USA, Inc.
West Monroe, Louisiana
D&M Project No. 24379-002-137

Gentlemen:

Dames & Moore is pleased to present our geotechnical investigation for the referenced project located in West Monroe, Louisiana.

We appreciate the opportunity to assist Riverwood International USA, Inc. on this project. Please contact us at your convenience should you have any questions or desire additional information.

Very truly yours,

DAMES & MOORE, INC.

Stephen M. Meunier

Stephen M. Meunier, P.E.
Senior Engineer

Ken Messer

Ken Messer, P.E.
Manager, Engineering &
Design Services

SMM\KPM

Enclosure

REPORT
GEOTECHNICAL INVESTIGATION
PREPARATION OF A PERMIT MODIFICATION
PROPOSED SURFACE IMPOUNDMENT
RIVERWOOD INTERNATIONAL USA, INC.
WEST MONROE, LOUISIANA

D&M Project No. 24379-002-137
November 23, 1992

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REPORT
GEOTECHNICAL INVESTIGATION
PREPARATION OF A PERMIT MODIFICATION
PROPOSED SURFACE IMPOUNDMENT
RIVERWOOD INTERNATIONAL USA, INC.
WEST MONROE, LOUISIANA

1.0 INTRODUCTION

An approximately 41-acre surface impoundment is currently proposed for the existing Riverwood International USA, Inc. pulp and paper mill facility located in West Monroe, Louisiana. It is proposed to construct a surface impoundment utilizing a composite liner system with perimeter levees. The composite liner system will consist of a minimum three foot thick recompacted clay liner having a maximum permeability of 1×10^{-7} cm/sec with a manufactured liner overlying the clay liner. The bottom of the liner will be constructed at elevations +59 feet MSL to +61 feet MSL. Perimeter levees will be constructed to elevation +85 feet MSL along the north, east and south boundaries of the impoundment. The proposed impoundment will share the western boundary with the existing 21-acre impoundment. It is planned to construct the impoundment over two construction seasons, which will be at periods of low groundwater. The perimeter levees may be constructed initially, with the clay liner completed during the second construction season. Backflooding controls will be instituted during these construction periods in order to ensure protection of the liner system before the impoundment is placed into service.

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 FIELD INVESTIGATION

Subsurface soil and groundwater conditions at the proposed site were investigated by performing a total of 31 borings. Borings DM-1 through DM-20 were drilled to a minimum of 30 feet below the proposed excavation depth of the impoundment, and DM-20 was drilled to a depth of 100 feet below land surface. The borings were spaced no more than 450 feet apart. Hand auger borings HA-1 through HA-10 were performed to approximate depths of 8 to 12 feet below land surface, and were located approximately mid-way between the primary "DM" impoundment boring locations. Figure 4-2 shows the location of the borings relative to the proposed impoundment layout.

During the field exploration program, relatively undisturbed soil samples were obtained at selected depths. Typically, samples were obtained continuously from the upper 30 feet of

each borehole, with the exception of boring DM-20, which was sampled continuously to a depth of 45 feet, and at five foot intervals thereafter. Three-inch O.D. Shelby Tube Samplers were utilized to obtain relatively undisturbed samples of cohesive (clayey) materials. Shelby Tube samples were mechanically extruded in the field, visually classified, appropriately labeled, then packaged. The samples were then transported to the geotechnical laboratory for testing.

In addition, pocket penetrometer readings were taken in cohesive soil samples to estimate their consistencies or strengths in the field. The pocket penetrometer readings are also presented on the boring logs attached to this report.

In the field, all samples were visually classified in general accordance with the Unified Soil Classification System (USCS). The soil boring logs containing strata descriptions, sample depths, Unified Soil Classifications, field and laboratory test results, and other pertinent information are presented as an attachment to this report.

2.2 LABORATORY TESTING

Upon completion of the drilling program, laboratory tests were performed on selected samples representing the major strata in order to evaluate and classify the samples according to the USCS. Fifty-nine atterberg limits tests, eight grain size analyses, sixty moisture content, and forty-three unit dry densities were performed on selected soil samples to determine index properties and to further classify the subsurface materials. Shear strength characteristics were evaluated by means of unconfined compression tests, unconsolidated-undrained triaxial compression test, or by consolidated-drained direct shear tests. In the unconfined compression test, a cylindrical specimen of a relatively undisturbed cohesive soil sample is subjected to axial compression without lateral confinement. The ultimate stress at failure divided by two is generally representative of the shear strength or cohesion of the cohesive soils. Fourteen unconfined compressive strength tests, four unconsolidated-undrained triaxial compression tests, and three consolidated-drained direct shear tests were performed on selected soil samples, and are presented in Table 4-2 and on the individual boring logs attached to this report. Twelve flexible wall vertical permeability tests and twelve flexible wall horizontal permeability tests were performed on selected undisturbed samples, as shown tabulated in Table 4-2. The vertical coefficient of permeabilities for the in-situ clays ranged from 3.6×10^{-7} to 3.6×10^{-9} cm/sec, and are also tabulated in Table 4-2.

3.0 GEOLOGICAL CONSIDERATION

3.1 SITE CONDITIONS AND LOCAL GEOLOGY

The proposed impoundment is located between the Ouachita River and Toney Bayou, within the Mississippi River Alluvial Plain. The terrain is relatively flat, except for several borrow pits. Toney Bayou forms the southern and western boundaries of the property. The reach of Toney Bayou on the southern boundary has been improved by the installation of a drainage ditch. Toney Bayou on the western boundary is a shallow, meandering stream.

The surficial soils consist of Holocene (Recent) alluvial clay, silt and sand sediments. The sand and gravel deposits of the lower alluvium are considered to be Pleistocene Age. Beneath the alluvium lies the interbedded sand and clay of the Claiborne Group at depths of 60 to 70 feet. (Rogers, et al, 1972)

There are a few faults indicated by the geologic data in Ouachita Parish. Displacements of 60 to 70 feet are present in the Sparta Sand at depths of 700 to 800 feet. (Rogers, et al, 1972) However, no surface faulting is detected. Reference: J. E. Rogers, A. J. Calandro, and M. W. Gaydos, 1972, Water Resources of Ouachita Parish, La, Water Resources Bulletin No. 14, Louisiana Geological Survey, Louisiana Department of Public Works.

3.2 SOIL CONDITIONS

The boring locations are as shown on Figure 4-2. Geological cross-sections were developed through the impoundment at five locations, and are shown on Figures 4-3 through 4-8. As shown on these cross-sections, the soils in this area consist of clays underlain by silty-sands to sandy-silts, silty clays, and sandy clays. The following is a stratigraphic description of the soils encountered at this site:

3.2.1 Stratum I

This stratum is generally a loose to medium dense silty-sand (SM), occurring at depths ranging from 0 to 6 feet below land surface (bls). This stratum is quite widespread throughout the area, and generally accounts for most of the surficial soils encountered at the site.

3.2.2 Stratum II

Stratum II generally consists of a medium-stiff to stiff silty-clay to clay (CL-CH) with silt and sand lenses, occurring at depths ranging from 1 to 11 feet (bls). This material possessed liquid limits ranging from 30 to 79, and a vertical coefficient of permeability on the order of 8×10^{-9} cm/sec. The material is considered suitable for construction of the clay liner and perimeter levees.

3.2.3 Stratum III

Stratum III consists of a loose to medium dense silty-sand to sandy-silt (SM-ML) with some gravel and traces of clay, occurring at variable depths ranging from 8 to 27 feet (bls). The vertical coefficient of permeability for this stratum is on the order of 9×10^{-7} cm/sec, which is partly attributed to the thin layers of silty clay occuring in the samples.

3.2.4 Stratum IV

Stratum IV generally consists of a medium-stiff to stiff silty-clay to clay (CL-CH), occurring at depths ranging from 11 to 34 feet (bls). This stratum has a vertical coefficient of permeability on the order of 1×10^{-7} cm/sec.

3.2.5 Stratum V

Stratum V consists of a loose to medium dense silty-sand to sand (SM-SP), occurring at depths ranging from 26 to 38 feet (bls). The vertical coefficient of permeability for this stratum is on the order of 5×10^{-6} cm/sec.

3.2.6 Stratum VI

Stratum VI consists of a medium-stiff to hard sandy-clay to clay (CL-CH) with occasional silty-clay lenses and concretions, occurring at depths ranging from 28 to 40 feet (BLS). This stratum has a vertical coefficient of permeability on the order of 8×10^{-8} cm/sec.

3.2.7 Stratum VII

Stratum VII consists generally of a medium dense clayey-sand (SC) with silty-sand layers (SM), occurring at depths ranging from 40 to 50 feet (bls). The vertical coefficient of

permeability for this stratum is approximately 5 x 10^{-6} cm/sec.

3.2.8 Stratum VIII

Stratum VIII consists of a stiff clay (CH) with sand and silt lenses, occurring at depths ranging from 50 to 100 feet (bls). The vertical coefficient of permeability for this stratum is on the order of 6 x 10^{-6} cm/sec.

3.3 GROUNDWATER CONDITIONS

Initial and final groundwater readings were made during the drilling phase of the work as performed in July of 1992. The results of those readings are tabulated in Table 1 for the borings DM-1 through DM-20. The final groundwater elevations varied from +50 to +66 feet MSL during this activity. The groundwater level will fluctuate according to seasonal fluctuations of the Ouachita River, and during periods of heavy rainfall.

4.0 GEOTECHNICAL CONSIDERATIONS

4.1 SLOPE STABILITY ANALYSES

Stability analyses were performed using Dames & Moore's computer program, PCSTABL5M, as developed by Purdue University. The Modified Bishop Method was employed for all of the stability analyses for the proposed levee slopes, utilizing a highly sophisticated critical failure surface searching method, providing failure surfaces with minimum factors of safety for the following conditions:

I. Short-Term, End-of-Construction Case
II. Long-Term, End-of-Construction Case
III. Short-Term, Sudden-Drawdown Case
IV. Long-Term, Sudden-Drawdown Case
V. Short-Term, Earthquake Case
VI. Long-Term, Earthquake Case

Since the proposed impoundment is located in Seismic Zone 1, as represented in the American Society of Civil Engineers publication for Minimum Design Loads, the design acceleration used for the Earthquake load Cases V and VI is the minimum recommended value of 0.10 x gravity. This design acceleration was applied in both the horizontal and

vertical directions, using the "worst-case" combination which yielded the lowest factor of safety against failure. It should be noted that the earthquake coefficients used in these analyses represent a pseudo-static model of earthquake loads, as they are applied to limiting equilibrium methods of analysis. These analyses are somewhat conservative in nature and should produce a stable structure in the event of a seismic event.

4.1.1 Inside Levee Slopes

Stability analyses were performed for both short-term and long-term conditions for the end-of-construction case, with the impoundment empty. The results for a levee configuration consisting of 2.5(H):1(V) inside slope, with a top of levee elevation of +85 feet MSL indicate a stable condition with minimum factors of safety of 1.85 in the short-term case, and 1.63 in the long-term case. The results of these analyses, showing the cross sections analyzed, the soil parameters used, with the most critical failure surfaces identified, are as illustrated in Figures 1 and 4.

4.1.2 Outside Levee Slopes

Slope stability analyses were performed for the impoundment levees using the following configuration: the top of the levees are 14 feet wide, and are at elevation +85 MSL; the inside side slopes are 2.5(H):I(V); and the maximum waste elevation is at +83 MSL. The analyses were performed for two different levee sections, labeled as Sections I and II, due to the variability in the geology and the existing ground surface.

4.1.2.1 Outside Levee Slopes - Section I

Section I is representative of a typical levee cross-section, and was used as the model for stability analyses for the majority of the proposed levee system. The only exception to this typical cross-section is the portion of levee designated as Section II. Section I consists of 2.5(H):1(V) inside and outside slopes, using a worst-case cross-section taken adjacent to the existing pond bordering the proposed northern boundary of the impoundment. The results of these analyses indicate minimum factors of safety of 1.22 and 1.14 for short-term and long-term earthquake Cases V and VI, respectively. This represents a stable condition for a seismic event of 0.10 g's, applied in both the horizontal and vertical directions simultaneously. These factors of safety exceed the normally acceptable factor of safety of 1.1 for earthquake loads, which is the most critical loading condition for the Section I levees. The results for load Cases I through IV yield the following minimum factors of safety: I.

Short-Term End-of-Construction Case, F.S. = 1.93; II. Long-Term End-of-Construction Case, F.S. = 1.63; III. Short-Term Sudden Drawdown Case, F.S. = 1.70; IV. Long-Term Sudden Drawdown Case, F.S. = 1.43. Figures 1 through 3 illustrate the critical failure surfaces for the stability analyses performed for Section I outside levee slopes.

4.1.2.2 Outside Levee Slopes - Section II

Section II is an approximately 250 foot long section of levee located near the northwest corner of the proposed impoundment at boring location DM-1. This section of levee straddles an existing reach of Toney Bayou with ground surface elevations at approximately +54 feet MSL. Stability analyses were initially performed for inside and outside slopes of 2.5(H):1(V) for the earthquake and sudden drawdown load cases. The results of these analyses indicated factors of safety which were unacceptable for a stable slope. Analyses were then performed using a stabilizing toe berm consisting of recompacted spoil material with the following slope configuration: a minimum bench width of 20 feet at elevation +66 feet MSL with 2.5(H):1(V) side slopes. The results of these analyses indicate a stable slope with the following minimum factors of safety: I. Short-Term End-of-Construction Case, F.S. = 1.93; II. Long-Term End-of-Construction Case, F.S. = 1.86; III. Short-Term Sudden Drawdown Case, F.S. = 1.44; IV. Long-Term Sudden Drawdown Case, F.S. = 1.25; V. Short-Term Earthquake Case, F.S. = 1.14; VI. Long-Term Earthquake Case, F.S. = 1.23. The most critical load condition for this section were the short-term earthquake and long-term sudden drawdown cases, which yielded minimum factors of safety of 1.14 and 1.25, respectively. These minimum factors of safety satisfied the normally acceptable factors of safety of 1.1 and 1.25 typically used for earthquake and sudden drawdown conditions, respectively. Figures 4 through 6 illustrate the critical failure surfaces generated for the 250 foot long Section II levee section.

4.1.2.3 Existing Eastern Levee Section

The eastern perimeter levee section for the existing surface impoundment consisted of stabilizing toe berms, due to the presence of relatively silty strata underlying these previous "slough" areas. Stability analyses were performed on these sections in order to ascertain whether it is feasible to reduce the stabilizing toe berms to that of a 2.5(H):1(V) inside side slope for the new impoundment, thus providing more storage volume available for the waste material. Considerations were taken into account for the estimated additional shear strength of these layers due to consolidation of the overlying embankment materials. The results of these analyses indicate the following minimum factors of safety: I. Short-Term

End-of-Construction Case, F.S. = 1.49; II. Long-Term End-of-Construction Case, F.S. = 1.51; III. Short-Term Sudden Drawdown Case, F.S. = 1.32; IV. Long-Term Sudden Drawdown Case, F.S. = 1.18; V. Short-Term Earthquake Case, F.S. = 1.11; and VI. Long-Term Earthquake Case, F.S. = 1.12. This represents a stable condition for the short-term cases, which will govern at this section, considering the short duration of the construction period, and the fact that this levee section will become a common interior dike between the existing and new impoundments. Figures 7 through 9 illustrate the critical failure surfaces for the stability analyses performed for this levee section.

4.2 POTENTIOMETRIC HEAVE

During construction of the impoundment, consideration must be given for the possibility of variable potentiometric levels of the more permeable soil strata underlying the clay layers remaining after excavation. The pressure head caused by this condition is resisted by the weight of the remaining clay layer along with the shearing strength of the clay itself. It is generally accepted practice to ignore the shearing resistance provided by the clay, and to calculate the factor of safety against potentiometric or bottom heave as the weight of the remaining clay layer divided by the pressure head exerted upon the base of the clay.

Factors of safety against potentiometric or bottom heave have been calculated for each of the Dames & Moore boring locations DM-1 through DM-20, for two separate cases, i.e., before construction of the clay liner, and after construction of the 3-foot thick clay liner. Table 1 provides the results of these analyses, using final water level readings from the boring locations, which were performed in July of 1992. The 0.0 safety factors shown in the fifth column of Table 1 indicate excavation into the more permeable silty-sand layers, with no clay layer remaining after the excavation. The values shown in the sixth column of Table 1 indicate factors of safety for potentiometric heave after construction, using final water level readings taken during July of 1992. Based on Riverwood's previous experience during construction of the existing 21 acre surface impoundment, the groundwater level will be at an approximate elevation of +58 feet MSL during the construction season. In the event that groundwater levels approach elevation +66 (±) feet MSL, it is recommended that groundwater controls be instituted or backflooding of the impoundment be performed in order to protect the integrity of the liner system before waste loads are actually placed on the liner.

The above recommendations also apply to lateral heave considerations, since there exists the potential for lateral heave both during construction and after construction of the liner system. Since the clay liner will be constructed only when the groundwater level has been controlled, or when backflooding measures have instituted, this should preclude most of the lateral seepage problems during construction. Also, since positive surface drainage will be provided during construction (in addition to normal dewatering measures), by the sloping of the subgrade underlying the clay liner from elevation +61 feet MSL at the northeast corner of the impoundment to +59 feet MSL at the southwest corner of the impoundment, this should permit a more rapid method of drainage during this most critical period.

In the event that normal dewatering measures are not adequate during construction, it is recommended that interceptor trenches be considered as a contingency, in order to insure proper placement of the liner system.

4.3 SETTLEMENT CONSIDERATIONS

Settlement analyses were performed for the case of long-term consolidation of the existing clay layers due to the weight of the proposed levee system and of the impoundment under full waste load. Correlations, using the results of the moisture content and Atterberg limits for the clays were employed, with the assumption that the clays were somewhat pre-consolidated. The results of these analyses indicate a long-term settlement of approximately 5 to 6 inches under the center of a typical perimeter levee, and approximately 3 to 4 inches within the impoundment area. It is anticipated that most of this settlement should be realized within a time period of approximately 5 years, realizing that time of consolidation calculations are, at best, only crude estimates. Swell potential of the compressible clays due to the excavated material will be minimal, and should be on the order of 0.5 - 1 inches.

It is anticipated that there will not be any additional tensile stresses induced in the liner system, because it appears that the perimeter levees will settle at a greater value than the waste impoundment, which in reality, is causing an unloading of the liner system.

4.4 BEARING CAPACITY CONSIDERATIONS

The bearing capacity of the foundation underlying the impoundment must be capable of supporting any additional loading imposed on it due to the weight of the waste overlying it. Using a conservative value of undrained shear strength for the materials representing the impoundment foundation, without regard to the increase in shear strength due to

consolidation effects, the following represents the approximate factor of safety against a bearing capacity failure:

$$FS = Cu \times Nc / (Qb - Qe) = 500 \times 5.14 / (20 \times 80 - 100 \times 6) = \underline{2.6}$$

where,

FS = the factor of safety against a bearing capacity failure.
Cu = the average undrained shear strength of the soil.
Nc = the dimensionless bearing capacity factor for clayey soils.
Qb = the gross applied pressure due to the weight of the waste material.
Qe = the weight of the excavated soil, which partially compensates for the waste loading.

Reference: Peck, Hanson and Thornburn, 1974, Wiley, pp. 276-277.

4.5 OTHER CONSIDERATIONS

Some organic material was encountered in the soils underlying the proposed elevation of the constructed clay liner system. It is unlikely that this will cause an accumulation of methane gas, due in part to the relatively minor amount of organic material encountered during the field investigation, and because of the pervious silty-sand strata, which will provide an avenue of escape, should these gases develop. Normally, the accumulation of methane gases occur within the environment of a sanitary landfill, where there are large deposits of decaying material within a confining area.

5.0 CONSTRUCTION RECOMMENDATIONS

All construction areas should be cleared and grubbed of all trees, stumps, roots, organic material, and shall be stripped to a depth of at least 6 inches in order to remove all deleterious material from the site. The exposed clays should then be scarified and recompacted to a depth of 6 to 12 inches in order to provide a good seal between the exposed clay surface and the initial lifts of the new levees or overexcavated areas. Only clay (CL/CH) having a plasticity index greater than 15, and a permeability coefficient of less than 1×10^{-7} cm/sec may be used for construction of the recompacted clay liner and perimeter levees. Any soft areas should be overexcavated and filled with recompacted clay material, as necessary. It is recommended that the clays be compacted to a minimum of 90

percent of the maximum density based on the Standard Proctor (ASTM D698) method with a initial moisture content between 2 and 8 percent above the optimum moisture content. The purpose for this "wet-side compaction" specification is to ensure a stable structure with lower permeabilities. This specification should be re-evaluated during the initial stages of construction by performing permeability and strength tests on recompacted samples.

The clay material should be placed in horizontal lifts and compacted using a sheepsfoot roller. Smooth-wheeled rollers and vibratory compactors are not suitable for this type of construction, and are therefore not recommended, except for the use in sealing the top surface of the clay at the end of a construction day. All clay material should be placed in 8-inch compacted lifts. All tie-ins to the existing levees should be performed in accordance with the specifications for new construction, in order to provide adequate bonding between the new construction and existing levees.

6.0 LIMITATIONS

The analyses and recommendations contained in this report are based on the existing conditions at the time of our field investigation, and are based on the further assumption that the soil borings are representative of subsurface conditions at the proposed Riverwood International USA, Inc. Surface Impoundment site. It should be noted that it is possible that subsurface conditions may vary between the borings. If subsurface conditions are encountered during construction which vary significantly from those conditions discussed in this report, Dames & Moore should be notified immediately in order to re-evaluate their effects, and to prescribe any remedial measures as necessary.

o O o

It has been a pleasure to assist Riverwood International USA, Inc. with this project. Please contact us at your convenience should you have any questions or desire additional information.

Very truly yours,

DAMES & MOORE, INC.

STATE OF LOUISIANA
STEPHEN M. MEUNIER
REG. No. 24191
REGISTERED
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING

11-23-92

Stephen M. Meunier

Stephen M. Meunier, P.E.
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Ken Messer, P.E.
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SMM/KM:sgt

Enclosure

TABLE 1
POTENTIOMETRIC HEAVE

Boring	Elev. of Boring	Elev. of Initital Water Reading	Elev. of Final Water Reading	F.S. Heave Before Clay Liner Construction	F.S. Heave After Clay Liner Construction
DM-1	59.0	49.5	50.0	O.K.	O.K.
DM-2	68.0	59.5	60.0	O.K.	O.K.
DM-3	72.2	61.7	62.7	0.0	3.4
DM-4	72.4	61.9	62.9	0.0	3.0
DM-5	70.4	61.9	62.9	0.0	3.0
DM-6	68.0	61.5	62.0	1.9	7.7
DM-7	67.9	61.4	62.9	0.5	3.5
DM-8	69.0	60.5	60.5	0.0	O.K.
DM-9	71.0	63.0	63.0	0.0	2.9
DM-10	72.0	63.0	63.5	0.0	2.3/1.3*
DM-11	79.0	61.0	65.5	1.1	2.3
DM-12	72.0	64.0	64.0	0.0	1.9
DM-13	71.4	63.9	63.9	0.0	2.0
DM-14	68.0	60.0	61.5	19.0	30.8
DM-15	69.9	61.4	63.9	0.0	2.0
DM-16	71.9	61.9	62.4	0.0	4.1
DM-17	70.5	62.5	63.0	0.0	2.9
DM-18	70.0	61.9	62.5	0.0	3.8
DM-19	70.0	60.5	66.5	1.1	2.3
DM-20	71.6	62.6	62.6	0.0	3.6

*Denotes factor of safety against heave for liner construction at minimum elevation +59 feet MSL.

TABLE 4-1
GEOTECHNICAL LABORATORY TEST RESULTS
EXISTING 21-ACRE ASH/SLUDGE IMPOUNDMENT
RIVERWOOD INTERNATIONAL USA, INC.
WEST MONROE, LOUISIANA

Boring No.	Sample Depth ft bls	Soil Description	% Moisture Content	Dry Density (pcf)	Atterberg Limits LL	PL	PI	Grain Size Analysis Percent Passing the No. 200 Sieve
HB-2	0.5-1	Silty clay	24		32	13	19	
	3-4	Silty clay	24		24	12	22	93
	4.5-6.5	Clay w/si pockets	40		81	29	52	
HB-3	5-5.5	Clay w/si pockets	35		60	16	44	
	7-7.5	Clay w/si pockets	35		78	29	49	
	8.5-9	Clay	42		95	27	68	99
HB-4	3.5-5	Clay w/si pockets	33		62	20	42	
	6-6.5	Clay w/si pockets	43		74	23	51	
	11-12	Clay w/si pockets	46		81	23	58	
HB-5	0-2	Clay w/si pockets	28		63	21	42	
	2-4	Clay w/si pockets	37		65	21	42	
HB-6	2-4	Clay w/si pockets	26		56	16	40	97
	6-8	Si clay w/cl layers	25		45	17	28	
HB-7	2-4	Clay w/si pockets	31		67	14	53	
HB-8	4-6	Clay w/si pockets	35		67	20	47	
	6-8	Si cl w/cl si layers	28		42	16	26	
HB-9	2-4	Clay w/si pockets	31					97
HB-10	2-4	Clay w/si cl layers	40		59	15	44	
	10-12	Clay w/si pockets	34		58	22	36	
HB-11	2-4	Silty clay	22		30	15	15	
	4-6	Clay w/si pockets	36		64	19	45	
HB-12	4-6	Clay w/si pockets	37		71	23	48	
HB-13	2-4	Clayey silt	24		23	17	6	
HB-14	2-3	Clay w/si cl layers	24					82

TABLE 4-2
GEOTECHNICAL LABORATORY TEST RESULTS
PROPOSED 41-ACRE ASH/SLUDGE IMPOUNDMENT
RIVERWOOD INTERNATIONAL USA, INC.
WEST MONROE, LOUISIANA

Boring No.	Sample Depth ft bls	Soil Description	% Moisture Content	Dry Density (pcf)	Atterberg Limits LL	PL	PI	Coefficient of Permeability cm/sec @ 20°C	Shear Tests Cohesion (psf)
DM-1	4-5	Silty clay	23.4	98.0	37	18	19		595 (UC)
		Clay w/sandy clay	19.9	107.5				1.8×10^{-8} (V)	
		Clay w/sandy clay	24.0	96.9				5.3×10^{-8} (H)	
	25-26	Clay w/silt lenses	32.3		89	25	64		
DM-2	19-20	Silty clay	31.9	89.8	48	20	28		920 (UC)
		Silty clay	29.7	95.7				1.8×10^{-8} (V)	
		Silty clay	26.4	96.8				1.0×10^{-8} (H)	
	22-23	Clay	32.5	89.8	49	21	28		735 (UC)
		Clay w/silt lenses	31.8	92.4				6.4×10^{-8} (V)	
		Clay w/silt lenses	34.9	86.6				2.7×10^{-8} (H)	
DM-3	3-4	Clayey silt	18.2		26	19	7		
	30.5-32	Si clay w/se si lay	24.1		31	17	14		
DM-4	0.5-2	Clayey silt	15.1		26	19	7		
	25.5-27	Si clay w/cl layers	43.8		38	18	20		
	35.5-37	Clay w/sand pockets	31.0		64	22	42		
DM-5	7-10	Silty clay w/clay & sandy silt layers	22.7	97.7	39	18	21		C=0, O=43° (direct shear)
	10.5-12	Sandy silt w/clay poc	23.9		24	18	6		
DM-6	4-5	Clay w/silt pockets	30.0	91.2					960 (UC)
	5-6	Clay w/silt pockets	41.0	79.9	79	25	54	1.7×10^{-9} (V)	
		Clay w/ se si pockets	40.2	79.7				9.6×10^{-9} (H)	
	21-22	Silty clay	27.8	94.5					1215 (UC)
DM-7	4-5	Clay w/silt pockets	29.9	90.5	71	23	48		1120 (UC)
	27-28	Clay w/tr silt	25.0	100.8	66	20	46	3.6×10^{-7} (V)	
		Clay w/silt pockets	25.4	98.1				3.5×10^{-8} (H)	
DM-8	6-7	Silty clay	24.4	100.1	33	19	14		775 (UC)
	36-37	Sandy clay	20.7	106.4	36	18	18		1240 (UC)
DM-9	7-8	Clay w/silt pockets	30.2	89.5	58	19	39		615 (UC)
	22-23	Silty clay	30.3		41	18	23		

TABLE 4-2
GEOTECHNICAL LABORATORY TEST RESULTS
PROPOSED 41-ACRE ASH/SLUDGE IMPOUNDMENT
RIVERWOOD INTERNATIONAL USA, INC.
WEST MONROE, LOUISIANA

Boring No.	Sample Depth ft bls	Soil Description	% Moisture Content	Dry Density (pcf)	Atterberg Limits LL	PL	PI	Coefficient of Permeability cm/sec @ 20°C	Shear Tests Cohesion (psf)
DM-10	2-3	Cl silt w/cl len	21.0	102.9	27	18	9		1085 (UU)
	15-16	Sa silt w/cl len			26	19	7	2.9×10^{-7} (V)	
		Sa silt w/cl len	22.8	105.4				1.0×10^{-6} (H)	
	36-37	Si clay w/tr sand	23.8	100.9	45	19	26		1630 (UC)
DM-13	4-5	Silty clay	22.4		30	17	13		
	22-23	Sa silt w/cl layers	25.3	98.2					960 (UU)
	28-29	Si clay w/cl layers	31.9		47	19	28		
DM-15	4-5	Si cl w/sa si lenses	22.4		40	18	22		
	31-32	Clay w/silt pockets	34.6	88.8	53	21	32	8.1×10^{-8} (V)	
		Clay w/si cl len	35.0	86.9				1.3×10^{-7} (H)	
	37.5-39	Cl sand w/sand lay						grain size	
DM-16	6-7	Clay w/silt pockets	39.5		72	23	49		
	36-37	Sandy clay	21.6		31	17	14		
DM-17	10-11	Sa si w/si cl layers	26.8	96.2					395 (UU)
	22-23	Clay w/si len & poc	30.4	90.8	52	21	31		555 (UC)
	34-35	Clay	43.7	77.2	77	20	50	1.2×10^{-8} (V)	
		Clay	42.1	77.1				2.1×10^{-8} (H)	
DM-18	0.5-2	Si cl w/cl si lay			27	18	9		
	4-5	Si cl w/sa cl lay			46	19	27	3.6×10^{-9} (V)	
		Si cl w/sa cl lay						1.2×10^{-8} (H)	
	15-16	Sa si w/si cl lay	30.2	91.3	26	19	7		265 (UU)
	31-32	Clay w/si pockets	31.6	86.7	66	22	44		1510 (UC)
DM-20	4-6	Clay w/sa si	26.5						
	8-9	Cl w/cl si lay	24.6	96.3					1305 (UC)
	17-18	Sa si w/cl len			23	18	5	1.5×10^{-6} (V)	
		Sa si w/si sa lay	21.8	84.5				2.4×10^{-4} (H)	
	20-21								
	44-45	Cl sa w/si sa lay	21.4	106.2	26	19	7	5.1×10^{-6} (V)	
		Cl sa w/si sa lay	23.2	103.4				2.1×10^{-6} (H)	
	53-55	Si sa w/cl layers	25.3	102.3	28	19	9	6.4×10^{-6} (V)	
		Si sa w/cl layers	24.3	100.5				7.5×10^{-4} (H)	
	59-60	Clay w/sa si lenses	36.4	84.0					1255 (UU)

EUSTIS ENGINEERING COMPANY, INC.
GEOTECHNICAL ENGINEERS
CONSTRUCTION QUALITY CONTROL AND MATERIALS TESTING
3011 28th Street • Metairie, Louisiana 70002 • 504-834-0157

14 October 1992

Dames and Moore
Suite 900
4949 Essen Lane
Baton Rouge, Louisiana 70809

Attention Mr. Steve Meunier

Gentlemen:

Results of Soil Mechanics Laboratory Tests
Riverwood International Corporation
Surface Impoundment
West Monroe, Louisiana

As requested, Eustis Engineering Company, Inc.'s (Eustis Engineering) laboratory has performed laboratory tests for the subject project. As previously discussed, there were substitutions for some of the assigned samples.

Test Methods used on these samples are as follows:

ASTM D 2487 - Classification of Soils
ASTM D 2166 - Unconfined Compression Test of Soils
ASTM D 2850 - Unconsolidated Undrained Triaxial Compression Test of Soils
ASTM D 2216 - Moisture Content of Soils
ASTM D 4318 - Liquid and Plastic Limits of Soils
ASTM D 5084 - Flexible Wall Permeability Test of Soils
ASTM D 3080 - Consolidated Drained Direct Shear Test of Soils
ASTM D 422 - Particle Size Analysis of Soils

The results of these tests are shown on the enclosures.

If we can be of any further assistance to you on this project, please do not hesitate to contact us.

Yours very truly,

EUSTIS ENGINEERING COMPANY, INC.

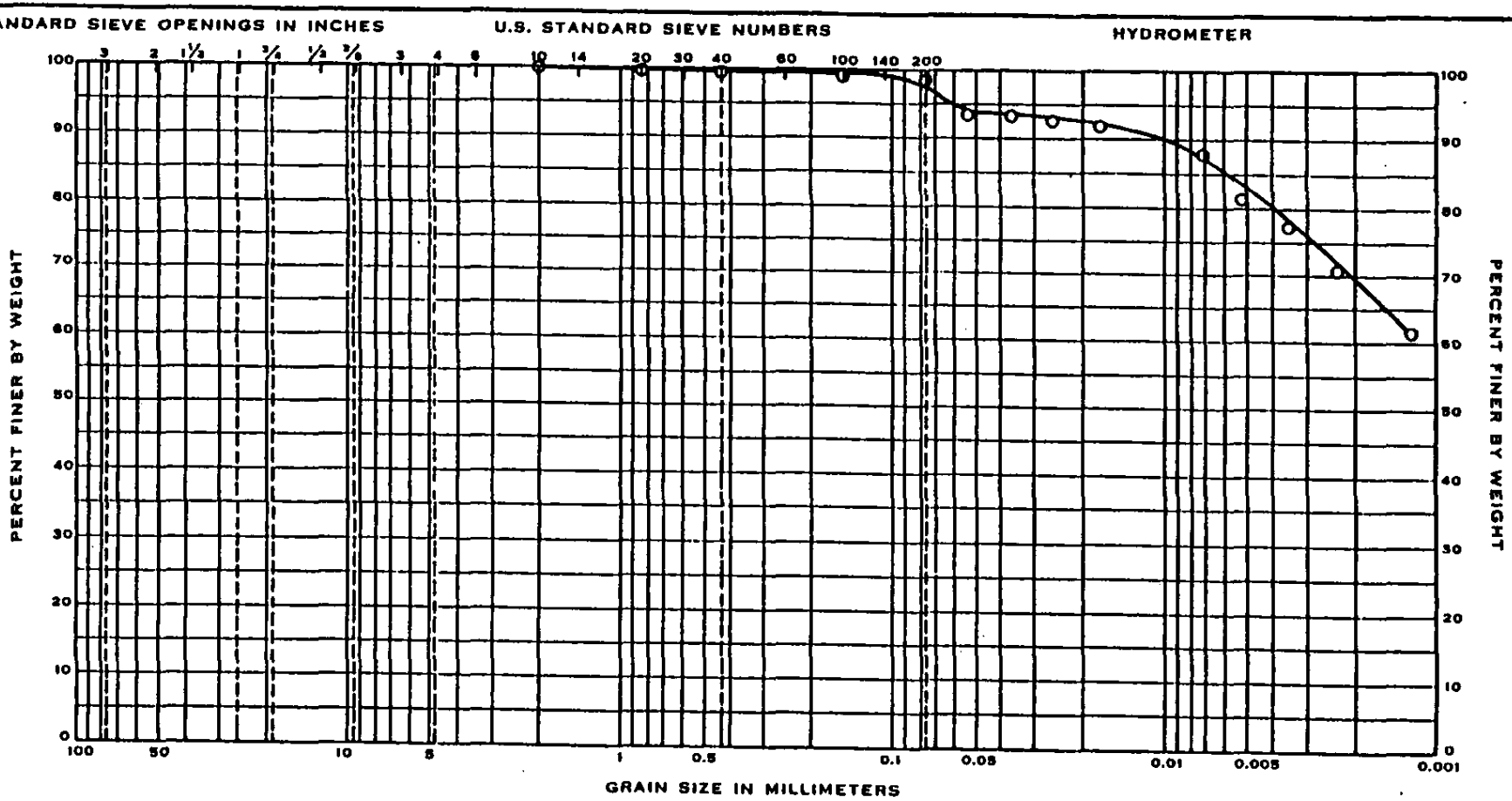
LLOYD A. HELD, JR.

ASE:kdl

EE 12097

Enclosures

EUSTIS ENGINEERING



UNIFIED	GRAVEL			SAND			SILT OR CLAY	
	COARSE	FINE		COARSE	MEDIUM	FINE		
AASHO	GRAVEL			SAND			SILT	CLAY
	COARSE	MEDIUM	FINE	COARSE		FINE		

GRAIN SIZE ANALYSIS

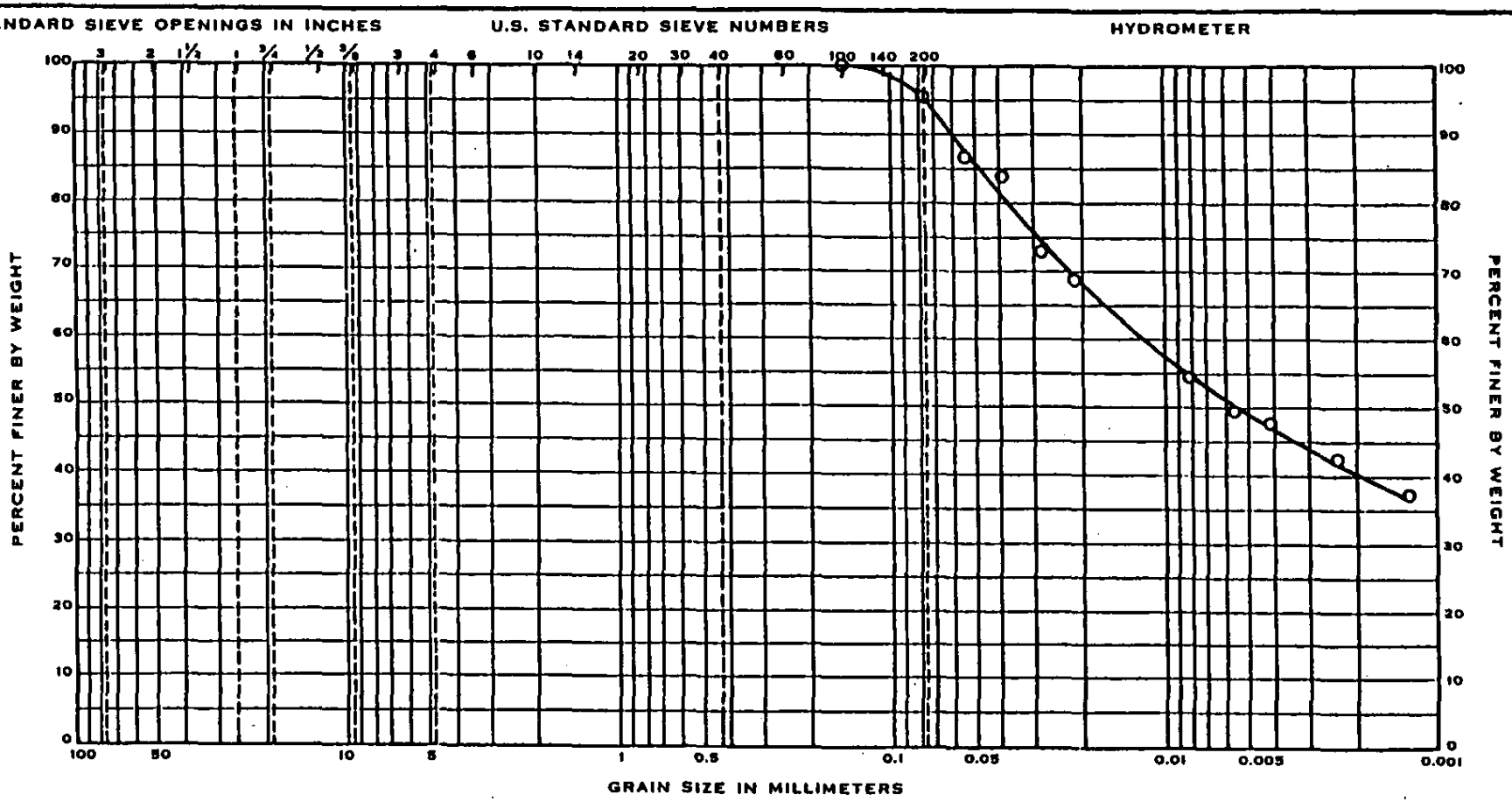
CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS		
					LL	PL	PI
	DM-6	3	5-6	38.0	79	25	54

PROJECT RIVERWOOD INTERNATIONAL CORPORATION

SURFACE IMPOUNDMENT

WEST MONROE, LOUISIANA

EUSTIS ENGINEERING



UNIFIED	GRAVEL			SAND			SILT OR CLAY	
	COARSE	FINE		COARSE	MEDIUM	FINE		
AASHO	GRAVEL			SAND			SILT	CLAY
	COARSE	MEDIUM	FINE	COARSE		FINE		

GRAIN SIZE ANALYSIS

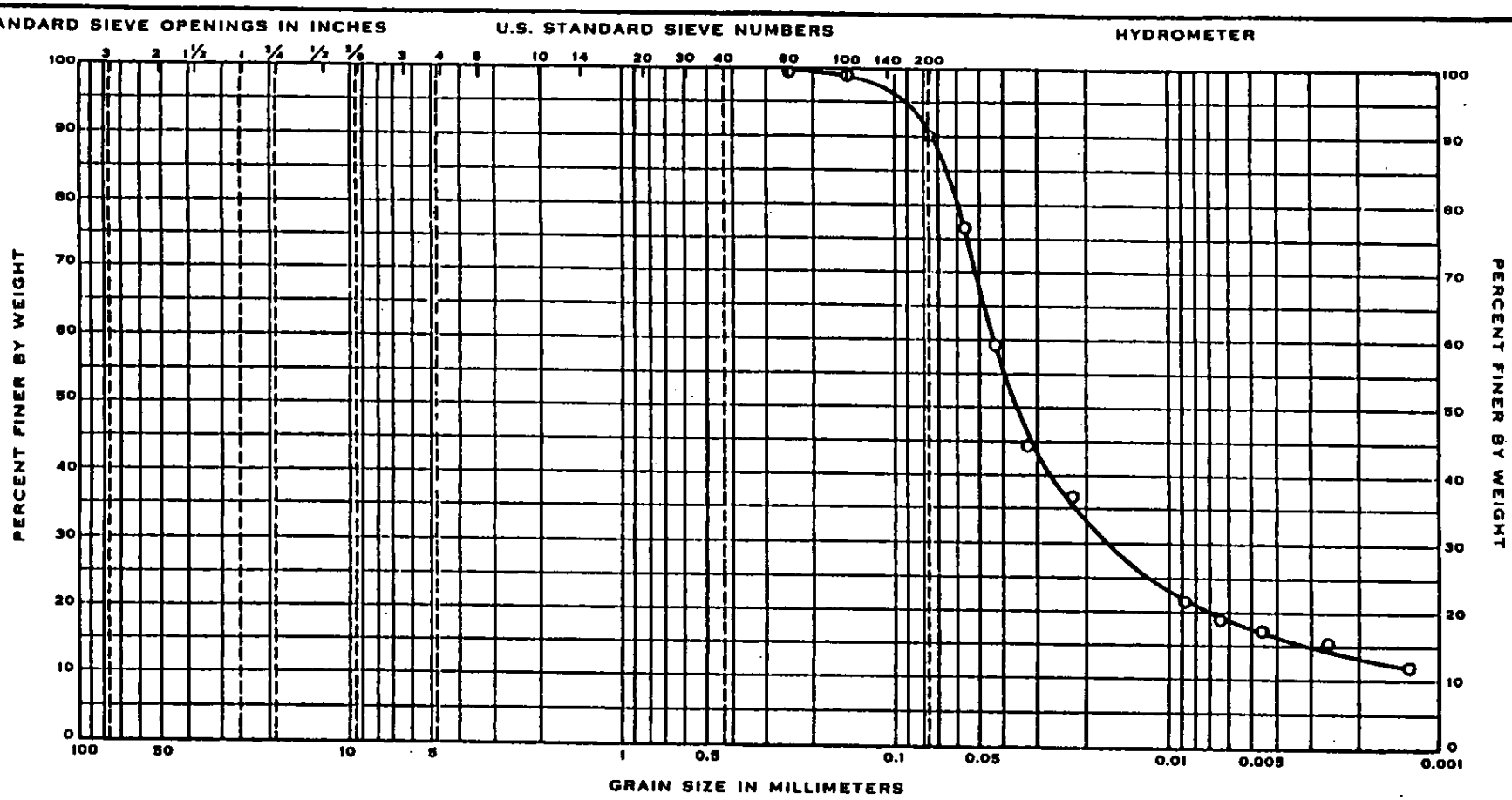
CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS		
					LL	PL	PI
	DM-7	18	27-28	26.0	66	20	46

PROJECT RIVERWOOD INTERNATIONAL CORPORATION

SURFACE IMPOUNDMENT

WEST MONROE, LOUISIANA

EUSTIS ENGINEERING



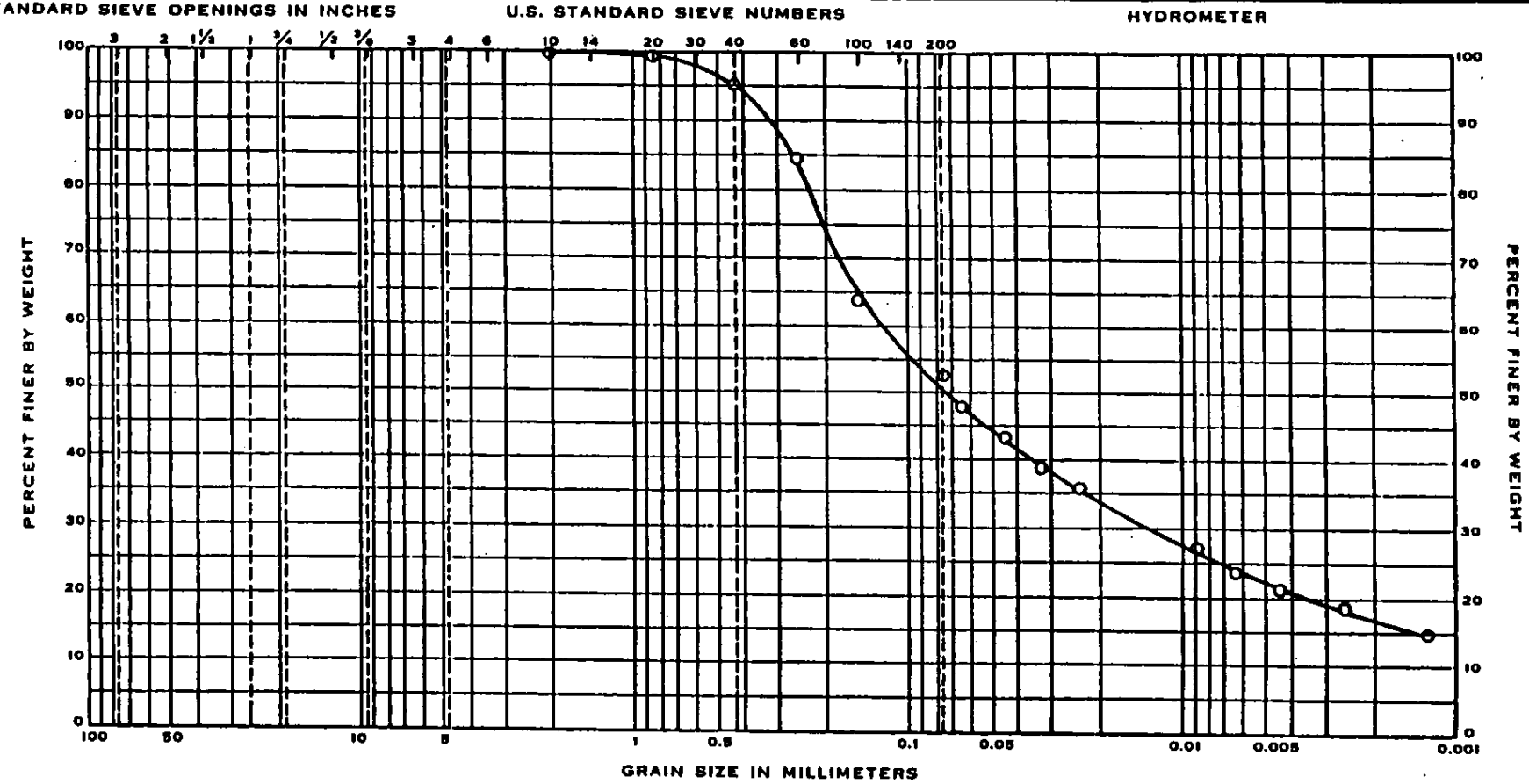
UNIFIED	GRAVEL			SAND			SILT OR CLAY	
	COARSE	FINE		COARSE	MEDIUM	FINE		
AASHO	GRAVEL			SAND			SILT	CLAY
	COARSE	MEDIUM	FINE	COARSE		FINE		

GRAIN SIZE ANALYSIS

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS		
					LL	PL	PI
	DM-10	7					

PROJECT RIVERWOOD INTERNATIONAL CORPORATION
SURFACE IMPOUNDMENT
WEST MONROE, LOUISIANA

EUSTIS ENGINEERING



UNIFIED	GRAVEL			SAND			SILT OR CLAY	
	COARSE	FINE		COARSE	MEDIUM	FINE		
AASHO	GRAVEL			SAND			SILT	CLAY
	COARSE	MEDIUM	FINE	COARSE		FINE		

GRAIN SIZE ANALYSIS

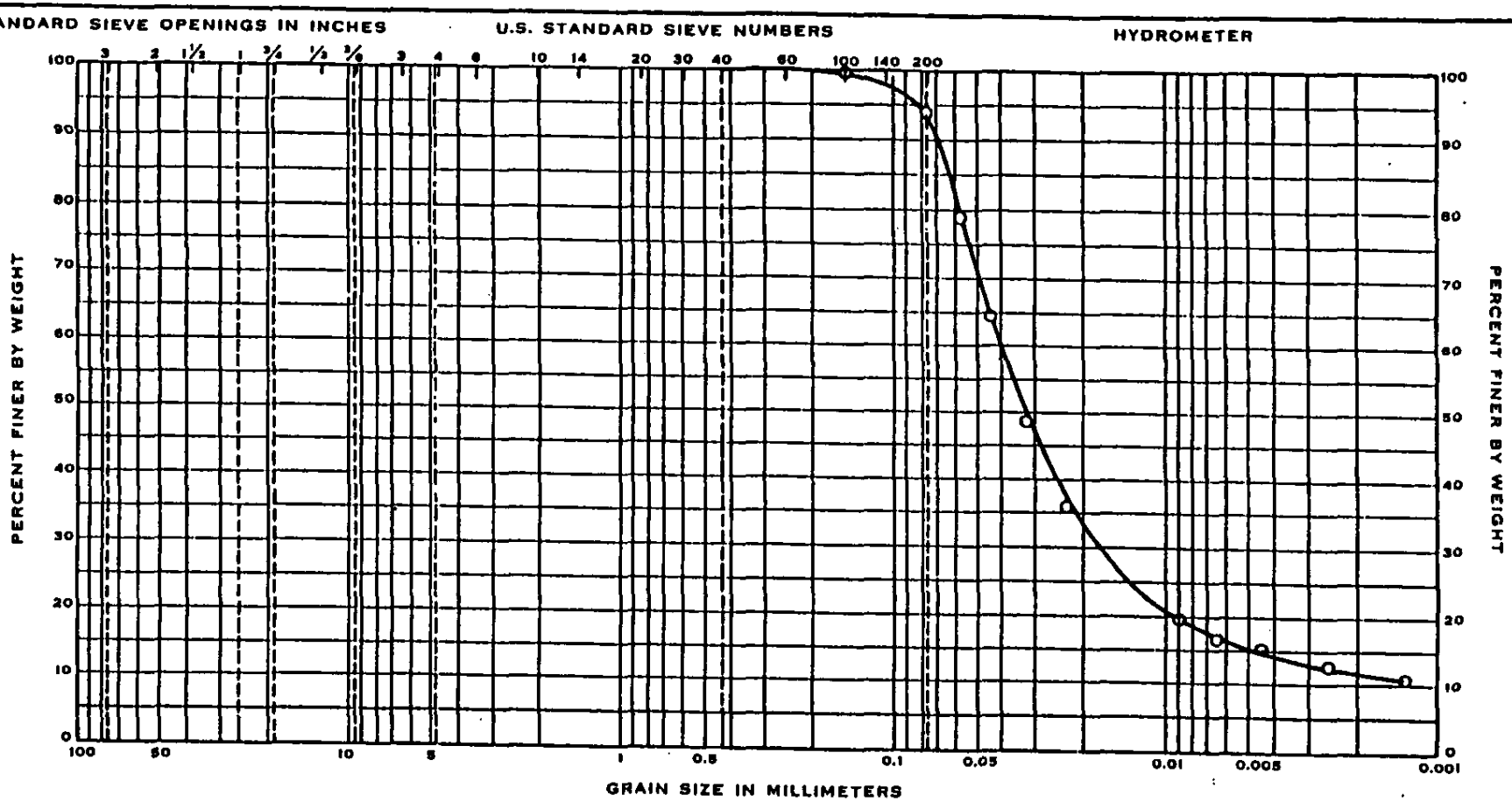
CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS		
					LL	PL	PI
	DM-15	13	37.5-39				

PROJECT RIVERWOOD INTERNATIONAL CORPORATION

SURFACE IMPOUNDMENT

WEST MONROE, LOUISIANA

EUSTIS ENGINEERING



UNIFIED	GRAVEL			SAND			SILT OR CLAY	
	COARSE	FINE		COARSE	MEDIUM	FINE		
AASHO	GRAVEL			SAND			SILT	CLAY
	COARSE	MEDIUM	FINE	COARSE		FINE		

GRAIN SIZE ANALYSIS

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS		
					LL	PL	PI
	DM-18	1	0.5-2.0		27	18	9

PROJECT RIVERWOOD INTERNATIONAL CORPORATION
SURFACE IMPOUNDMENT
WEST MONROE, LOUISIANA

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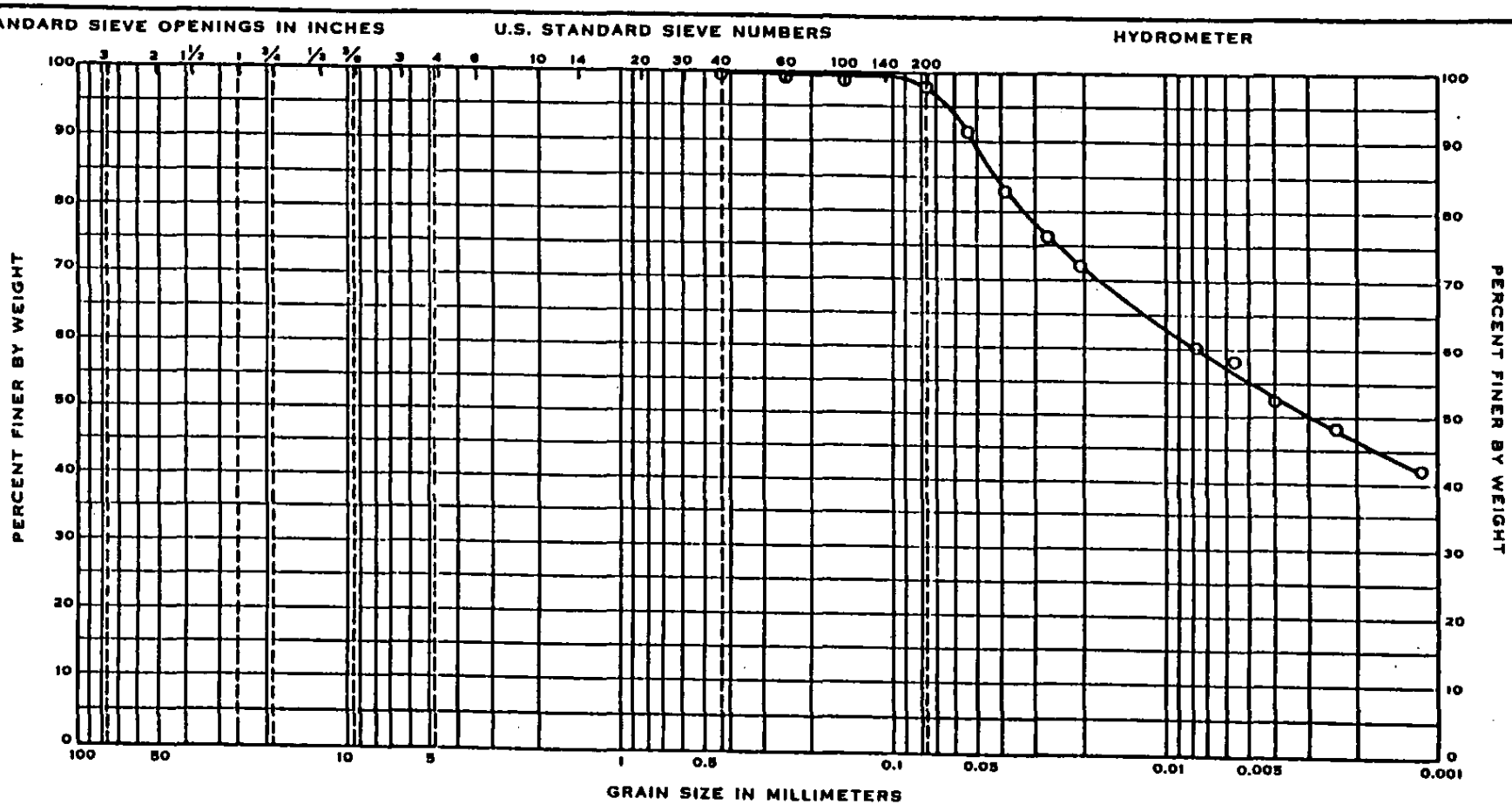

UNIFIED	GRAVEL			SAND			SILT OR CLAY	
	COARSE	FINE		COARSE	MEDIUM	FINE		
AASHO	GRAVEL			SAND			SILT	CLAY
	COARSE	MEDIUM	FINE	COARSE		FINE		

GRAIN SIZE ANALYSIS

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS		
					LL	PL	PI
	DM-18	2					

PROJECT RIVERWOOD INTERNATIONAL CORPORATION
SURFACE IMPOUNDMENT
WEST MONROE, LOUISIANA

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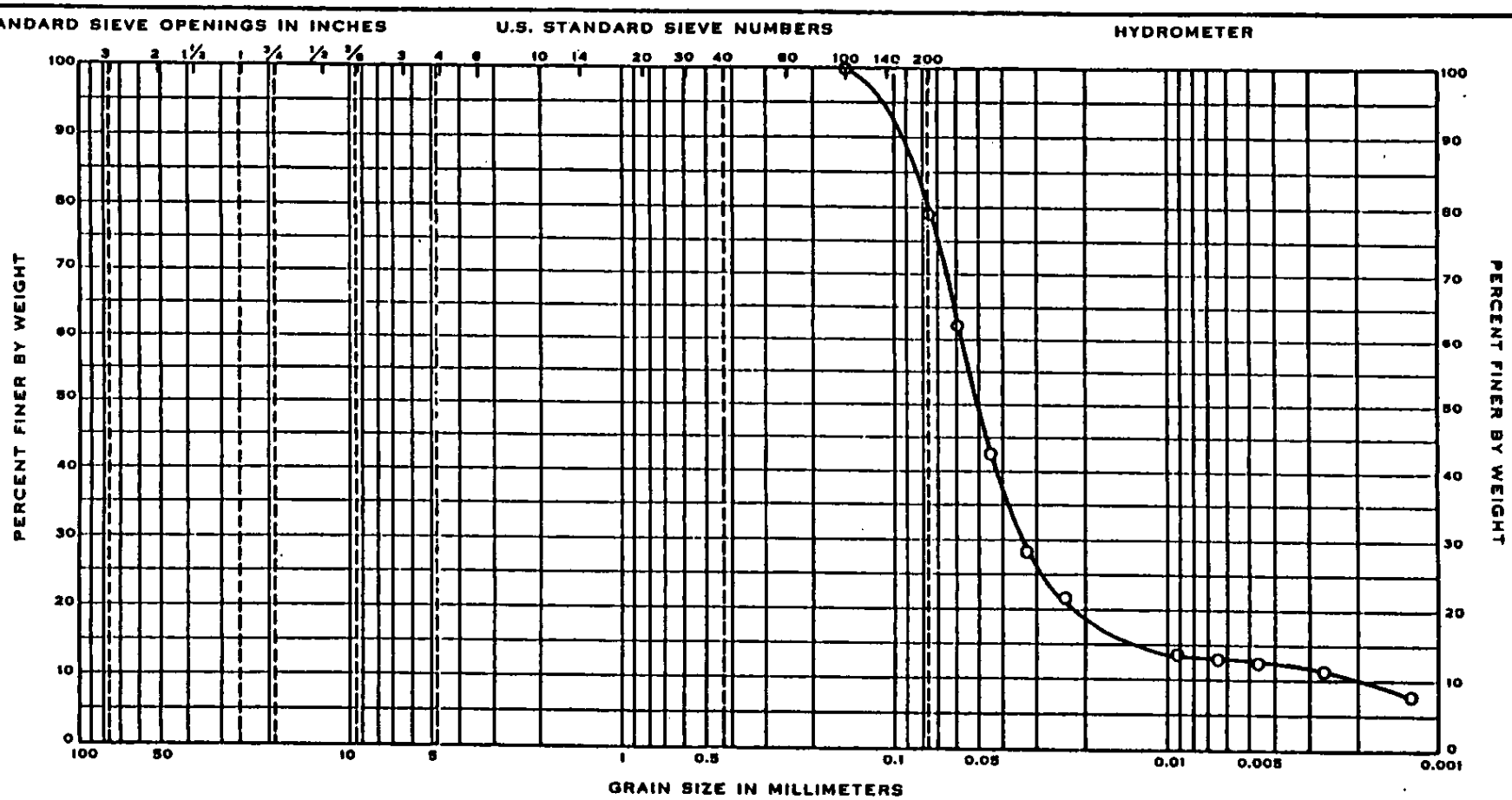

UNIFIED	GRAVEL			SAND			SILT OR CLAY	
	COARSE	FINE		COARSE	MEDIUM	FINE		
AASHO	GRAVEL			SAND			SILT	CLAY
	COARSE	MEDIUM	FINE	COARSE		FINE		

GRAIN SIZE ANALYSIS

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS		
					LL	PL	PI
	DM-20	11					

PROJECT RIVERWOOD INTERNATIONAL CORPORATION

SURFACE IMPOUNDMENT

WEST MONROE, LOUISIANA

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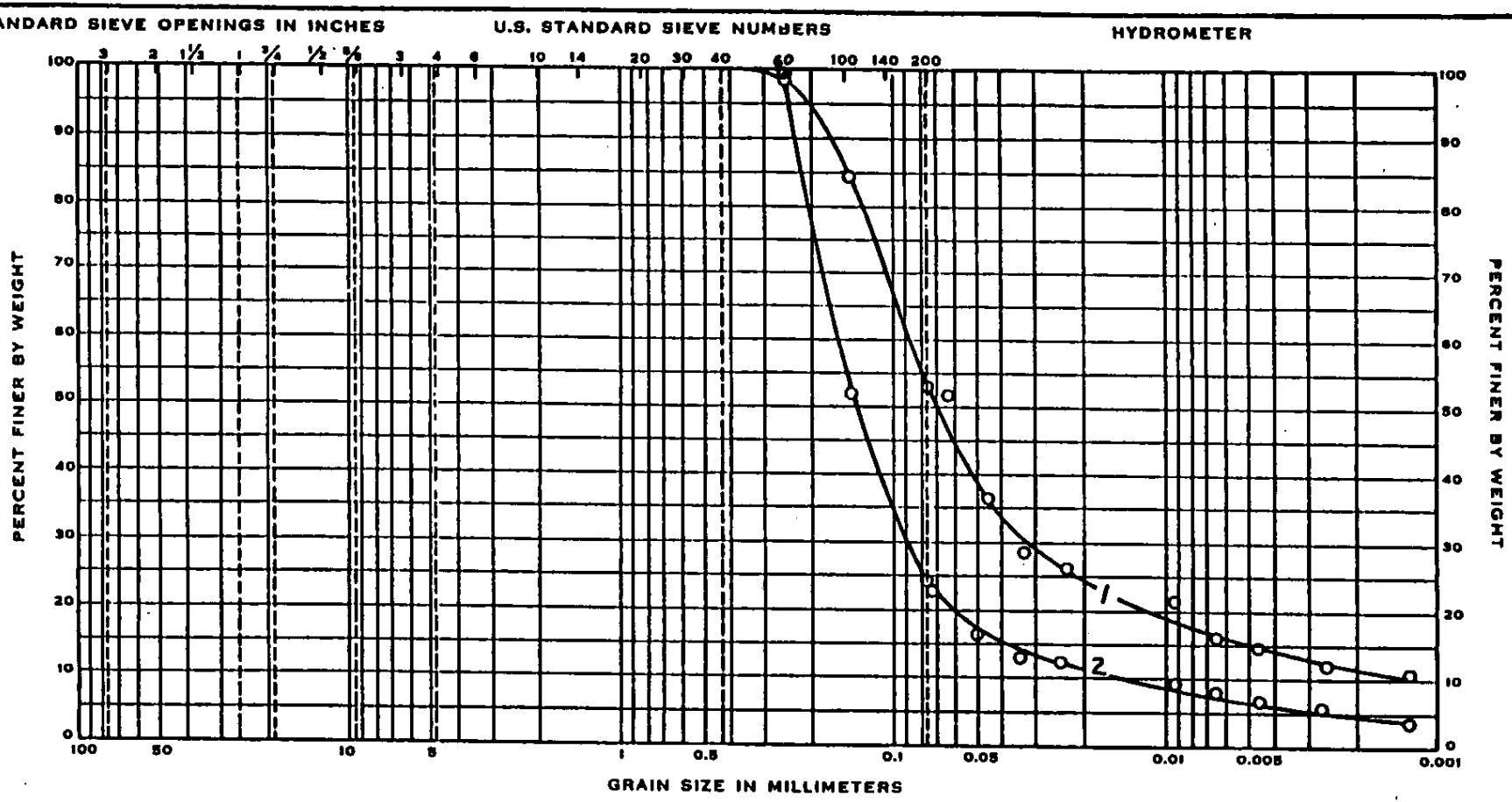


UNIFIED	GRAVEL			SAND			SILT OR CLAY	
	COARSE	FINE		COARSE	MEDIUM	FINE		
AASHO	GRAVEL			SAND			SILT	CLAY
	COARSE	MEDIUM	FINE	COARSE		FINE		

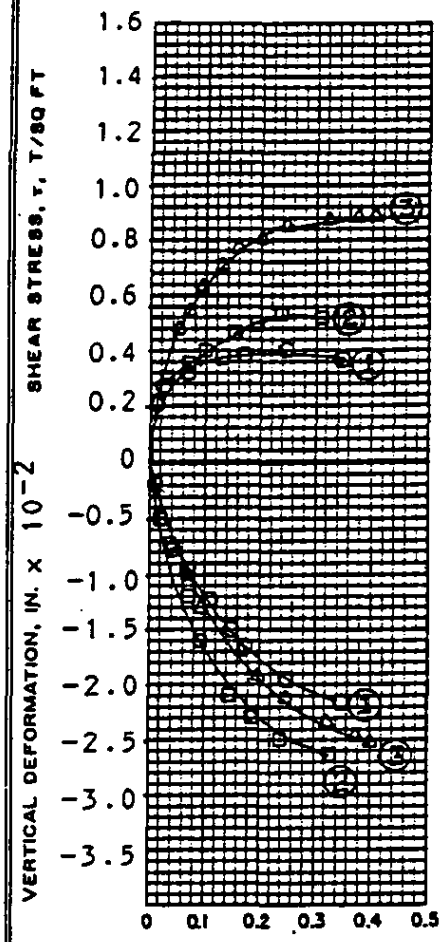
GRAIN SIZE ANALYSIS

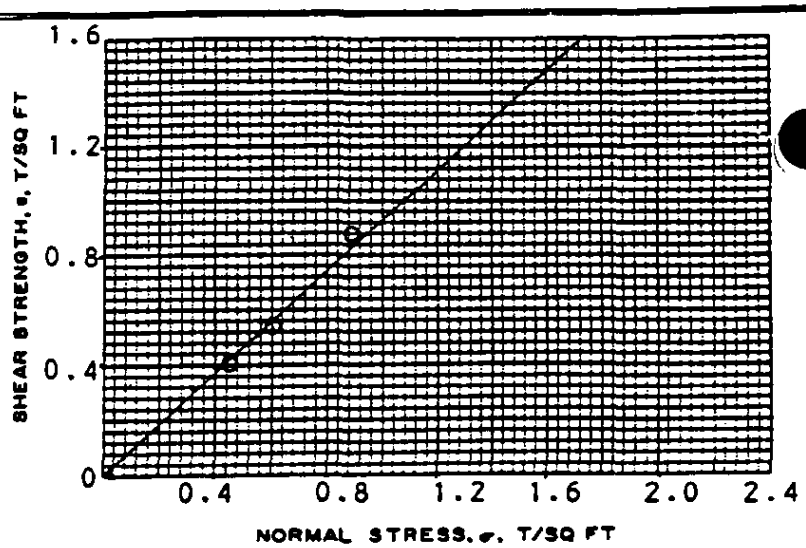
CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH IN FT.	NATURAL WATER CONTENT	ATTERBERG LIMITS		
					LL	PL	PI
1	DM-20	26					
2	DM-20	28					

PROJECT RIVERWOOD INTERNATIONAL CORPORATION

SURFACE IMPOUNDMENT

WEST MONROE, LOUISIANA





TEST NO.			1	2	3	
INITIAL	WATER CONTENT %	w_o	22.7	21.3	23.0	
	VOID RATIO	e_o	0.725	0.702	0.690	
	SATURATION %	S_o	84	82	90	
	DRY DENSITY, LB/CU FT	γ_d	97.7	99.0	99.7	
VOID RATIO AFTER CONSOLIDATION		e_c	0.665	0.642	0.600	
TIME FOR 50 PERCENT CONSOLIDATION, MIN		t_{50}				
FINAL	WATER CONTENT %	w_f	22.0	21.1	22.9	
	VOID RATIO	e_f	0.602	0.584	0.549	
	SATURATION %	S_f	100	100	100	
NORMAL STRESS, T/SQ FT		σ	0.45	0.60	0.90	
MAXIMUM SHEAR STRESS, T/SQ FT		τ_{max}	0.390	0.530	0.880	
ACTUAL TIME TO FAILURE, MIN.		t_f	420	632	2235	
RATE OF STRAIN, IN/MIN			.00040	.00038	.00017	
ULTIMATE SHEAR STRESS, T/SQ FT		τ_{ult}	0.377	0.523	0.880	

SHEAR STRENGTH PARAMETERS

$\phi' =$ 43°

TAN $\phi' =$ 0.933

$c' =$ 0.0 T/SQ FT

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

TYPE OF SPECIMEN Undisturbed 2.0 IN. Dia. 1.0 IN. THICK

CLASSIFICATION Medium stiff reddish-brown, tan & gray silty clay w/clay & sandy silt layers

LL 39 PL 18 PI 21 G_s 2.70

REMARKS

PROJECT RIVERWOOD INTERNATIONAL CORPORATION

SURFACE IMPOUNDMENT

AREA WEST MONROE, LOUISIANA

BORING NO. DM-5 SAMPLE NO. 4A

DEPTH EL 7-8' DATE 9/18/92

DIRECT SHEAR TEST REPORT

RESULTS OF SOIL MECHANICS LABORATORY TESTS
RIVERWOOD INTERNATIONAL CORPORATION
SURFACE IMPOUNDMENT
WEST MONROE, LOUISIANA

BORING DM-1

Sample Number	Depth In Feet	Classification	Moisture Content Percent	Density PCF		Atterberg Limits			Coefficient of Permeability cm/sec at 20°C	Shear Tests	
				Dry	Wet	LL	PL	PI		Type	C - PSF
2	4 - 5	Medium stiff gray & tan silty clay w/roots	28.4	98.0	120.9	37	18	19	-	UC	895
		Medium stiff gray, tan & brown clay w/sandy clay layers, wood & organic matter	19.9	107.5	128.9	-	-	-	1.8×10^{-8} (V)	-	-
		Ditto	24.0	96.9	120.2	-	-	-	5.3×10^{-8} (H)	-	-
11	25 - 26	Extremely stiff dark gray & tan clay w/silt lenses	32.3	-	-	89	25	64	-	-	-

NOTE: (V), (H) denote a vertical or horizontal permeability test, ASTM D 508-90.

RESULTS OF SOIL MECHANICS LABORATORY TESTS
RIVERWOOD INTERNATIONAL CORPORATION
SURFACE IMPOUNDMENT
WEST MONROE, LOUISIANA

BORING DM-2

Sample Number	Depth In Feet	Classification	Moisture Content Percent	Density PCF		Atterberg Limits			Coefficient of Permeability cm/sec at 20°C	Shear Tests	
				Dry	Wet	LL	PL	PI		Type	C - PSF
7	19 - 20	Medium stiff brown & gray silty clay	31.9	89.8	118.5	48	20	28	-	UC	920
		Medium stiff brownish-gray silty clay w/clay layers	29.7	95.7	124.1	-	-	-	1.8×10^{-8} (V)	-	-
		Ditto	26.4	96.6	122.4	-	-	-	1.0×10^{-8} (H)	-	-
8	22 - 23	Medium stiff brown & gray clay w/decayed roots & wood	32.5	89.8	118.9	49	21	28	-	UC	735
		Medium stiff brown & gray clay w/silt lenses, large concretions & roots	31.8	92.4	121.8	-	-	-	6.4×10^{-8} (V)	-	-
		Ditto	34.9	86.6	116.8	-	-	-	2.7×10^{-8} (H)	-	-

NOTE: (V), (H) denote a vertical or horizontal permeability test, ASTM D 508-90.

RESULTS OF SOIL MECHANICS LABORATORY TESTS
RIVERWOOD INTERNATIONAL CORPORATION
SURFACE IMPOUNDMENT
WEST MONROE, LOUISIANA

BORING DM-3

Sample Number	Depth in Feet	Classification	Moisture Content Percent	Density PCF		Atterberg Limits		
				Dry	Wet	LL	PL	PI
2	3 - 4	Medium compact tan clayey silt	18.2	-	-	26	19	7
15	30.5 - 32	Medium stiff gray & tan silty clay w/sandy silt layers	24.1	-	-	31	17	14

RESULTS OF SOIL MECHANICS LABORATORY TESTS
RIVERWOOD INTERNATIONAL CORPORATION
SURFACE IMPOUNDMENT
WEST MONROE, LOUISIANA

BORING DM-4

Sample Number	Depth In Feet	Classification	Moisture Content Percent	Density PCF		Atterberg Limits		
				Dry	Wet	LL	PL	PI
1	0.5 - 2	Medium compact tan & gray clayey silt	15.1	-	-	26	19	7
13	25.5 - 27	Extremely soft brown silty clay w/clay layers	43.8	-	-	38	18	20
18	35.5 - 37	Stiff brown & gray clay w/sand pockets	31.0	-	-	64	22	42

EUSTIS ENGINEERING COMPANY, INC.

RESULTS OF SOIL MECHANICS LABORATORY TESTS
RIVERWOOD INTERNATIONAL CORPORATION
SURFACE IMPOUNDMENT
WEST MONROE, LOUISIANA

BORING DM-5

Sample Number	Depth In Feet	Classification	Moisture Content Percent	Density PCF		Atterberg Limits			Coefficient of Permeability cm/sec at 20°C	Shear Tests	
				Dry	Wet	LL	PL	PI		Type	C - PSF
4	7 - 10	Medium stiff reddish-brown silty clay w/clay & sandy silt layers	22.7	97.7	119.9	39	18	21	-	D.S.	$\phi = 43°$ C = 0
5	10.5 - 12	Loose to medium compact gray sandy silt w/clay pockets	23.9	-	-	24	18	6	-	-	-

RESULTS OF SOIL MECHANICS LABORATORY TESTS
RIVERWOOD INTERNATIONAL CORPORATION
SURFACE IMPOUNDMENT
WEST MONROE, LOUISIANA

BORING DM-6

Sample Number	Depth In Feet	Classification	Moisture Content Percent	Density PCF		Atterberg Limits			Coefficient of Permeability cm/sec at 20°C	Shear Tests	
				Dry	Wet	LL	PL	PI		Type	C - PSF
2	4 - 5	Medium stiff brownish-tan & gray clay w/silt pockets	30.0	91.2	118.5	-	-	-	-	UC	960
3	5 - 6	Stiff brown & gray clay w/silt pockets	41.0	79.9	112.7	79	25	54	1.7×10^{-8} (V)	-	-
		Stiff brownish-gray & tan clay w/concretions & sandy silt pockets	40.2	79.7	111.7	-	-	-	9.6×10^{-8} (H)	-	-
13	21 - 22	Stiff brown, gray & red silty clay	27.8	94.5	120.8	48	21	27	-	UC	1215

NOTE: (V), (H) denote a vertical or horizontal permeability test, ASTM D 508-90.

RESULTS OF SOIL MECHANICS LABORATORY TESTS
RIVERWOOD INTERNATIONAL CORPORATION
SURFACE IMPOUNDMENT
WEST MONROE, LOUISIANA

BORING DM-7

Sample Number	Depth In Feet	Classification	Moisture Content Percent	Density PCF		Atterberg Limits			Coefficient of Permeability cm/sec at 20°C	Shear Tests	
				Dry	Wet	LL	PL	PI		Type	C - PSF
3	4 - 5	Stiff tan & gray clay w/silt pockets	29.9	90.5	117.5	71	23	48		UC	1120
18	27 - 28	Medium stiff gray & tan clay w/trace of silt, vertical partings & decayed roots	25.0	100.8	126.0	66	20	46	3.6×10^{-7} (V)	-	-
		Medium stiff gray & tan clay w/silt pockets	25.4	98.1	123.0	-	-	-	3.5×10^{-8} (H)	-	-

NOTE: (V), (H) denote a vertical or horizontal permeability test, ASTM D 508-90.

RESULTS OF SOIL MECHANICS LABORATORY TESTS
RIVERWOOD INTERNATIONAL CORPORATION
SURFACE IMPOUNDMENT
WEST MONROE, LOUISIANA

BORING DM-8

Sample Number	Depth In Feet	Classification	Moisture Content Percent	Density PCF		Atterberg Limits			Coefficient of Permeability cm/sec at 20°C	Shear Tests	
				Dry	Wet	LL	PL	PI		Type	C - PSF
3	6 - 7	Medium stiff brown & gray silty clay	24.4	100.1	124.6	33	19	14	-	UC	775
14	36 - 37	Stiff gray & tan sandy clay w/concretions	20.7	106.4	128.4	36	18	18	-	UC	1240

EUSTIS ENGINEERING COMPANY, INC.

RESULTS OF SOIL MECHANICS LABORATORY TESTS
RIVERWOOD INTERNATIONAL CORPORATION
SURFACE IMPOUNDMENT
WEST MONROE, LOUISIANA

BORING DM-9

Sample Number	Depth In Feet	Classification	Moisture Content Percent	Density PCF		Atterberg Limits			Coefficient of Permeability cm/sec at 20°C	Shear Tests	
				Dry	Wet	LL	PL	PI		Type	C - PSF
3	7 - 8	Medium stiff brown & gray clay w/silt pockets	30.2	89.5	116.5	58	19	39	-	UC	615
9	22 - 23	Medium stiff dark gray & brown silty clay	30.3	-	-	41	18	23	-	-	-

RESULTS OF SOIL MECHANICS LABORATORY TESTS
RIVERWOOD INTERNATIONAL CORPORATION
SURFACE IMPOUNDMENT
WEST MONROE, LOUISIANA

BORING DM-10

Sample Number	Depth In Feet	Classification	Moisture Content Percent	Density PCF		Atterberg Limits			Coefficient of Permeability cm/sec at 20°C	Shear Tests	
				Dry	Wet	LL	PL	PI		Type	C - PSF
1	2 - 3	Compact tan & gray clayey silt w/clay lenses & concretions	21.0	102.9	124.5	27	18	9	-	UC	1085
7	15 - 16	Loose reddish-brown sandy silt w/clay lenses & silty sand layers	25.4	101.1	126.8	26	19	7	2.9×10^{-7} (V)	-	-
		Ditto	22.8	105.4	129.4	-	-	-	1.0×10^{-6} (H)	-	-
14	36 - 37	Stiff tan & gray silty clay w/trace of sand	23.8	100.9	124.9	45	19	26	-	UC	1630

EUSTIS ENGINEERING COMPANY, INC.

RESULTS OF SOIL MECHANICS LABORATORY TESTS
RIVERWOOD INTERNATIONAL CORPORATION
SURFACE IMPOUNDMENT
WEST MONROE, LOUISIANA

BORING DM-13

Sample Number	Depth In Feet	Classification	Moisture Content Percent	Density PCF		Atterberg Limits			Coefficient of Permeability cm/sec at 20°C	Shear Tests	
				Dry	Wet	LL	PL	PI		Type	C - PSF
2	4 - 5	Stiff gray & tan silty clay	22.4	-	-	30	17	13	-	-	-
8	22 - 23	Medium compact tan & gray sandy silt w/clay layers	25.3	98.2	123.0	-	-	-	-	UU	960
10	28 - 29	Medium stiff gray silty clay w/decayed wood & clay layers	31.9	-	-	47	19	28	-	-	-

RESULTS OF SOIL MECHANICS LABORATORY TESTS
RIVERWOOD INTERNATIONAL CORPORATION
SURFACE IMPOUNDMENT
WEST MONROE, LOUISIANA

BORING DM-15

Sample Number	Depth In Feet	Classification	Moisture Content Percent	Density PCF		Atterberg Limits			Coefficient of Permeability cm/sec at 20°C	Shear Tests	
				Dry	Wet	LL	PL	PI		Type	C - PSF
2	4 - 5	Very stiff brown & gray silty clay w/vertical sandy silt lenses	22.4	-	-	40	18	22	-	-	-
11	31 - 32	Medium stiff gray clay w/trace of roots, silt pockets & concretions	34.6	88.8	119.5	53	21	32	8.1×10^{-8} (V)	-	-
		Medium stiff gray & tan clay w/silty clay lenses & concretions	35.0	86.9	117.3	-	-	-	1.3×10^{-7} (H)	-	-
13	37.5 - 39	Medium dense gray clayey sand w/sand layers	-	-	-	-	-	-	-	-	-

NOTE: (V), (H) denote a vertical or horizontal permeability test, ASTM 508-90.D

EUSTIS ENGINEERING COMPANY, INC.

RESULTS OF SOIL MECHANICS LABORATORY TESTS
RIVERWOOD INTERNATIONAL CORPORATION
SURFACE IMPOUNDMENT
WEST MONROE, LOUISIANA

BORING DM-16

Sample Number	Depth In Feet	Classification	Moisture Content Percent	Density PCF		Atterberg Limits		
				Dry	Wet	LL	PL	PI
3	6 - 7	Stiff brown & gray clay w/silt pockets	39.5	-	-	72	23	49
13	36 - 37	Medium stiff gray & tan sandy clay	21.6	-	-	31	17	14

RESULTS OF SOIL MECHANICS LABORATORY TESTS
RIVERWOOD INTERNATIONAL CORPORATION
SURFACE IMPOUNDMENT
WEST MONROE, LOUISIANA

BORING DM-17

Sample Number	Depth in Feet	Classification	Moisture Content Percent	Density PCF		Atterberg Limits			Coefficient of Permeability cm/sec at 20°C	Shear Tests	
				Dry	Wet	LL	PL	PI		Type	C - PSF
5	10 - 11	Loose tan sandy silt w/silty clay layers & concretions	26.8	96.2	122.0	-	-	-	-	UU	395
9	22 - 23	Medium stiff brown & gray clay w/silt lenses & pockets	30.4	90.8	118.5	52	21	31	-	UC	555
13	34 - 35	Stiff tan, gray & black clay w/concretions	43.7	77.2	110.9	77	20	50	1.2×10^{-8} (V)	-	-
		Ditto	42.1	77.1	109.6	-	-	-	2.1×10^{-8} (H)	-	-

NOTE: (V), (H) denote a vertical or horizontal permeability test, ASTM D 5084-90.

EUSTIS ENGINEERING COMPANY, INC.

RESULTS OF SOIL MECHANICS LABORATORY TESTS
RIVERWOOD INTERNATIONAL CORPORATION
SURFACE IMPOUNDMENT
WEST MONROE, LOUISIANA

BORING DM-18

Sample Number	Depth In Feet	Classification	Moisture Content Percent	Density PCF		Atterberg Limits			Coefficient of Permeability cm/sec at 20°C	Shear Tests	
				Dry	Wet	LL	PL	PI		Type	C - PSF
1	0.5 - 2	Soft tan & gray silty clay w/clayey silt layers	22.8	-	-	27	18	9	-	-	-
2	4-5	Very stiff tan & gray silty clay w/sandy clay layers	28.8	93.8	120.8	46	19	27	3.6×10^{-8} (V)	-	-
		Ditto	20.4	104.5	125.9	-	-	-	1.2×10^{-8} (H)	-	-
7	15 - 16	Loose tan sandy silt w/silty clay layers	30.2	91.3	118.9	26	19	7	-	UU	265
16	31 - 32	Stiff brown & gray clay w/silt pockets & concretions	31.8	86.7	114.1	66	22	44	-	UC	1510

NOTE: (V), (H) denote a vertical or horizontal permeability test, ASTM D 508-90.

RESULTS OF SOIL MECHANICS LABORATORY TESTS
RIVERWOOD INTERNATIONAL CORPORATION
SURFACE IMPOUNDMENT
WEST MONROE, LOUISIANA

BORING DM-20

Sample Number	Depth In Feet	Classification	Moisture Content Percent	Density PCF		Atterberg Limits			Coefficient of Permeability cm/sec at 20°C	Shear Tests	
				Dry	Wet	LL	PL	PI		Type	C - PSF
3	4 - 6	Medium stiff gray & tan clay w/sandy silt	26.5	-	-	-	-	-	-	-	-
5	8 - 9	Stiff brown & gray clay w/clayey silt layers & pockets	24.6	96.3	119.9	-	-	-	-	UC	1305
11	17 - 18	Loose reddish-tan sandy silt w/clay lenses & pockets	23.1	104.1	128.2	23	18	5	1.5×10^{-6} (V)	-	-
		Very loose reddish-tan sandy silt w/clay lenses & pockets	21.8	84.5	102.9	-	-	-	2.4×10^{-4} (H)	-	-
26	44 - 45	Medium dense greenish-gray clayey sand w/silty sand layers	21.4	106.2	128.9	26	19	7	5.1×10^{-6} (V)	-	-
		Medium dense gray clayey sand w/silty sand layers	23.2	103.4	127.4	-	-	-	2.1×10^{-6} (H)	-	-
28	53 - 55	Medium dense gray silty sand w/clay layers	25.3	102.3	128.2	28	19	9	6.4×10^{-6} (V)	-	-
		Ditto	24.2	100.5	124.8	-	-	-	7.5×10^{-4} (H)	-	-
29	59 - 60	Stiff dark gray & brown clay w/sandy silt lenses	38.4	84.0	114.5	-	-	-	-	UU	1255

NOTE: (V), (H) denote a vertical or horizontal permeability test, ASTM D 5084-90.

EUSTIS ENGINEERING COMPANY, INC.

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Sheet No. 1 of			
Calc. No.			
Rev. No.			
Job No. 24379-002	Job SURFACE IMPOUNDMENT	By KM	Date 10/
Client RIVERWOOD	Subject EXCAVATION & CLAY QUANTITIES	Chk'd.	Date

PERIMETER OF NEW LEVEE = 5,234 FT.

~~AREA OF LEVEE CROSS SECTION = 961 FT² (TYP)~~
~~= 3509 FT² (APPROX. 300' ALONG NORTH TIE~~

APPROX. VOLUME OF TOTAL LEVEE = ~~(4934 x 961) + (300 x 3509)~~
~~= 5,794,274 FT³~~
~~= 214,602 YD³~~

177,405 YD³
(SEE SHEETS 11 - 14)

AREA OF IMPOUNDMENT BOTTOM ≅ 1,752,704 FT² = 40.24 ACRES

VOL. OF 3' CLAY LINER = 5,258,112 FT³

= 194,744 YD³

TOTAL VOL. OF CLAY REQUIRED = ~~409,346 YD³~~ 372,149 YD³

VOLUME CHANGE DUE TO DIFFERENT MOISTURE CONTENTS, VOID RATIO, AND OPTIMUM COMPACTION ≅ 30%

VOLUME OF CLAY NEEDED IS APPROX. (1.3 x ~~409,346~~ 372,149) = ~~532,149 YD³~~ 483,794 YD³

VOLUME OF CLAY ON SITE IS APPROX. 340,211 YD³

VOLUME OF CLAY TO PURCHASE ≅ ~~191,938 YD³~~ 143,583 YD³

A-A' AREA OF SECTION

$$\frac{10.4}{0} \times \frac{3.0}{24.5} \times \frac{2.0}{164.5} \times \frac{3.8}{314.5} \times \frac{3.8}{640.5} \times \frac{3.0}{710.5} \times \frac{7.0}{815.5} \times \frac{5}{890.5} \times \frac{9}{885} \times \frac{9}{815.5} \times \frac{5}{710.5} \times \frac{5}{640.5} \times \frac{5}{314.5} \times \frac{9.4}{164.5} \times \frac{10.4}{0}$$

$$(10.4 \times 24.5) + (3 \times 164.5) + (2 \times 314.5) + (3.8 \times 640.5) + (3.8 \times 710.5) + (3 \times 815.5) + (7 \times 890.5)$$
$$+ (5 \times 885) + (9 \times 815.5) + (9 \times 710.5) + (5 \times 640.5) + (5 \times 314.5) + (5 \times 164.5) - (2 \times 24.5)$$
$$- (3.8 \times 164.5) - (3.8 \times 314.5) - (3 \times 640.5) - (7 \times 710.5) - (5 \times 815.5) - (9 \times 890.5) - (9 \times 885)$$
$$- (5 \times 815.5) - (5 \times 710.5) - (5 \times 640.5) - (9.4 \times 314.5) - (10.4 \times 164.5)$$

$$= 38{,}947.6 - 44{,}320.8$$

$$= \frac{5373}{2} = \underline{\underline{2686\ FT^2}}$$

B-B' AREA OF SECTION

$$\frac{8.5}{0} \times \frac{2.0}{16.25} \times \frac{2.4}{228.25} \times \frac{3.1}{675.25} \times \frac{0}{1071.25} \times \frac{5.0}{1083.75} \times \frac{8.3}{675.25} \times \frac{8.4}{228.25} \times \frac{8.5}{0}$$

$$(8.5 \times 16.25) + (2.0 \times 228.25) + (2.4 \times 675.25) + (3.1 \times 1071.25) + (5.0 \times 675.25)$$
$$+ (8.3 \times 228.25) - (2.4 \times 16.25) - (3.1 \times 228.25) - (5.0 \times 1071.25)$$
$$- (8.3 \times 1083.75) - (8.4 \times 675.25) - (8.5 \times 228.25)$$

$$= 10{,}806.83 - 22{,}710.18 = \frac{11{,}903.35}{2} = \underline{\underline{5{,}952\ FT^2}}$$

VOL. FROM A-A' TO B-B'

$$\frac{2686 + 5952}{2} \times 394' \cong \underline{1{,}701{,}686\ FT^3} = \underline{\underline{63{,}025\ yd^3}} \quad (1)$$

VOL. FROM A-A' TO WEST END

$$2686 \times 246' \cong \underline{660{,}756\ FT^3} = \underline{\underline{24{,}472\ yd^3}} \quad (6)$$

VOL. FROM B-B' TO C-C' $= \underline{5952 + 5392} \times 379' = \underline{2{,}149{,}688\ FT^3} = \underline{\underline{79{,}618\ yd^3}}$ (2)

C-C' AREA OF SECTION

5.5	0	2	0	0	5	7.6	7	5.5
0	13.75	257	601	895	907.5	601	257	0

$$(5.5 \times 13.75) + (2 \times 601) + (5 \times 601) + (7.6 \times 257) - (2 \times 13.75) - (5 \times 895) - (7.6 \times 907.5) - (7 \times 601) - (5.5 \times 257)$$

$$= 6235.83 - 17{,}020 = \frac{10{,}784}{2} = \underline{\underline{5392\ FT^2}}$$

D-D' AREA OF SECTION

5.9	0	1.7	2.4	9.4	8.5	5.9
0	14.75	343.75	692.75	715.25	343.75	0

$$(5.9 \times 14.75) + (1.7 \times 692.75) + (2.4 \times 715.25) + (9.4 \times 343.75) - (1.7 \times 14.75) - (2.4 \times 343.75) - (9.4 \times 692.75) - (8.5 \times 715.25) - (5.9 \times 343.75)$$

$$= 6212.55 - 15{,}469.68 = \frac{9257.13}{2} = \underline{4629\ FT^2}$$

VOL. FROM C-C' TO D-D'

$$\frac{5392 + 4629}{2} \times 387' = \underline{1{,}938{,}986\ FT^3} = \underline{\underline{71{,}814\ yd^3}}$$

3

E-E' - AREA OF SECTION

$$\begin{matrix} 5.9 & 0 & 1.7 & 2.4 & 9.4 & 8.5 & 5.9 \\ 0 & 14.75 & 257.75 & 597.75 & 620.25 & 257.75 & 0 \end{matrix}$$

$$(5.9 \times 14.75) + (1.7 \times 597.75) + (2.4 \times 620.25) + (9.4 \times 257.75)$$
$$- (1.7 \times 14.75) - (2.4 \times 257.75) - (9.4 \times 597.75) - (8.5 \times 620.25)$$
$$- (5.9 \times 257.75)$$

$$= 5014.65 - 13055.38 = \frac{8040.73}{2} = \underline{4020.4 \text{ FT}^2}$$

VOL. D-D' TO E-E'

(4)

$$\frac{4628.6 + 4020.4}{2} \times 152' = \underline{657{,}324 \text{ FT}^3} = \underline{\underline{24{,}345 \text{ yd}^3}}$$

VOL. E-E' TO EAST END (AVG. THICKNESS OF CLAY ≈ 6')

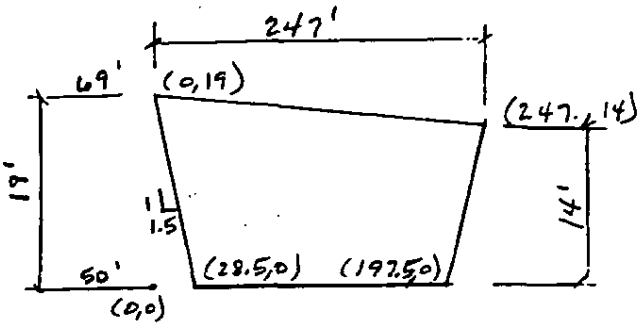
(5)

$$\text{VOL} = \left[\tfrac{1}{2}(600)(398)\right] \times 6' = \underline{716{,}400 \text{ FT}^3} = \underline{\underline{26{,}533 \text{ yd}^3}}$$

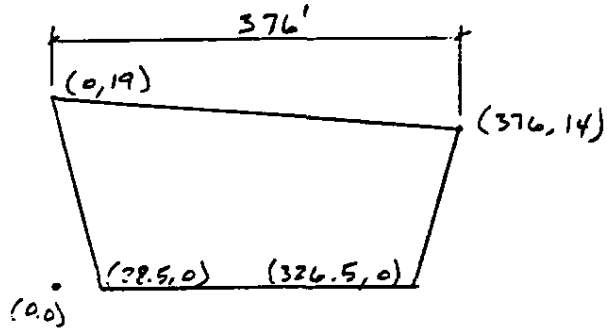
DEDUCT FOR PONDS IN SECTION B-B'

$$(150' \times 300' \times 5') + (500' \times 150' \times 4') \cong \underline{525{,}000 \text{ FT}^3} = (\underline{\underline{19{,}444 \text{ yd}^3}})$$

VOLUME OF BORROW AREA (EXCLUDING WETLANDS AREA)



BEGINNING SECTION (A_1)



ENDING SECTION (A_2)

A_1 $\frac{19}{0} \times \frac{0}{28.5} \times \frac{0}{197.5} \times \frac{14}{247} \times \frac{19}{0}$

$(19 \times 28.5) - (14 \times 197.5) - (19 \times 247)$

$= \frac{6916.5}{2} = \underline{3458.25 \text{ FT}^2}$

A_2 $\frac{19}{0} \times \frac{0}{28.5} \times \frac{0}{326.5} \times \frac{14}{376} \times \frac{19}{0}$

$(19 \times 28.5) - (14 \times 326.5) - (19 \times 376)$

$= \frac{11,173.5}{2} = \underline{5586.75 \text{ FT}^2}$

Volume (Borrow) $\cong \frac{3458.25 + 5586.75}{2} \times 417' = 1,885,883 \text{ FT}^3$

$= \underline{\underline{69,848 \text{ yd}^3}}$

TOTAL VOLUME OF CLAY AVAILABLE ON SITE:

① ⑥ ② ③ ④ ⑤ (PONDS) (BORRO

63,025 + 24,472 + 79,618 + 71,814 + 24,345 + 26,533 - 19,444 + 69,84

$\cong \underline{\underline{340,211 \text{ yd}^3}}$

VOLUME OF OTHER EXCAVATION ((SM) MATERIAL)

SECTION A-A'

(TOP) 11/0 × 11/164.5 × 7/314.5 × 6/640.5 × 8.5/710.5 × 10/815.5 × 10/815 × 9/885 × 9/815.5 × 5/710.5 × 5/640.5 × 5/314.5 × 9.4/164.5 × 10.4/0 × 11/0

AREA (TOP) = 2281 / 2 = 1141 FT²

(BOTTOM) 0/29.5 × 3/29.5 × 2/164.5 × 3.8/314.5 × 3.8/640.5 × 3/710.5 × 7/815.5 × 5/890.5 × 1/950 × 0/950 0/815.5 0/710.5 0/640.5 0/314.5 0/164.5 0/29.

AREA (BOTTOM) = 6805.6 / 2 = 3403 FT²

TOTAL AREA (A-A') = 4544 FT²

SECTION B-B'

(TOP) 8.5/0 × 10/0 × 16.9/228.25 × 8.9/675.25 × 8.3/675.25 × 8.4/228.25 × 8.5/0

AREA (TOP) = 2298.7 / 2 = 1149 FT²

(BOTTOM) 0/16.25 × 2/16.25 × 2.4/228.25 × 3.1/675.25 × 0/1071.25 0/675.25 0/228.25 0/16.25

AREA (BOTTOM) = 4618.9 / 2 = 2310 FT²

TOTAL AREA (B-B') = 3459 FT²

SECTION C-C'

(TOP) $\frac{5.5}{0} \times \frac{2}{0} \times \frac{9.5}{257} \times \frac{10.6}{601} \times \frac{11.2}{907.5} \times \frac{5}{907.5} \times \frac{7.6}{601} \times \frac{7}{257} \times \frac{5.5}{0}$

AREA (TOP) $= \frac{5996.8}{2} = \underline{2998 \text{ FT}^2}$

(BOTTOM) $\frac{0}{13.75} \times \frac{2}{257} \times \frac{0}{895} \times \frac{0}{13.75}$

AREA (BOTTOM) $= \frac{1762.5}{2} = \underline{881 \text{ FT}^2}$

TOTAL AREA (C-C') = $\underline{\underline{3879 \text{ FT}^2}}$

SECTION D-D'

(TOP) $\frac{5.9}{0} \times \frac{6.9}{0} \times \frac{9}{343.75} \times \frac{11.4}{715.25} \times \frac{9.4}{715.25} \times \frac{8.5}{343.75} \times \frac{5.9}{0}$

AREA (TOP) $= \frac{1444}{2} = \underline{722 \text{ FT}^2}$

(BOTTOM) $\frac{0}{0} \times \frac{1.7}{343.75} \times \frac{3.4}{692.75} \times \frac{0}{692.75} \times \frac{0}{343.75} \times \frac{0}{0}$

AREA (BOTTOM) $= \frac{2015}{2} = \underline{1008 \text{ FT}^2}$

TOTAL AREA (D-D') = $\underline{\underline{1730 \text{ FT}^2}}$

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Sheet No.	8 of		
Calc. No.			
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SECTION E-E'

TOP) 5.9, 6, 9, 11.4, 9.4, 8.5, 5.9
0, 0, 257.75, 620.25, 620.25, 257.75, 0

AREA (TOP) = $\frac{1061}{2}$ = 530 FT^2

BOTTOM) 0, 1.7, 2.4, 0, 0, 0
14.75, 257.75, 597.75, 597.75, 257.75, 14.75

AREA (BOTTOM) = $\frac{1807}{2}$ = 904 FT^2

TOTAL AREA (E-E') = 1434 FT^2

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Calc. No.
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VOLUMES OF OTHER MATERIAL EXCAVATED (SM)

(6) A-A' TO WEST END

$4544\ FT^2 \times 246' = 1,117,824\ FT^3 = \underline{41,401\ yd^3}$

(1) A-A' TO B-B'

$\frac{4544 + 3459}{2} \times 394' = 1,576,591\ FT^3 = \underline{58,392\ yd^3}$

(2) B-B' TO C-C'

$\frac{3459 + 3879}{2} \times 379' = 1,390,551\ FT^3 = \underline{51,502\ yd^3}$

(3) C-C' TO D-D'

$\frac{3879 + 1730}{2} \times 387' = 1,085,341\ FT^3 = \underline{40,192\ yd^3}$

(4) D-D' TO E-E'

$\frac{1730 + 1434}{2} \times 152' = 240,464\ FT^3 = \underline{8,906\ yd^3}$

(5) E-E' TO EAST END

$[\frac{1}{2}(600)(398)]\ 3.55'_{(AVG)} = 423,870\ FT^3 = \underline{15,699\ yd^3}$

TOTAL VOLUME OF OTHER EXCAVATION (SM) MATERIAL = $\underline{216,098\ yd^3}$

EXCAVATION SUMMARY

TOTAL APPROX. EXCAVATION (WITHIN IMPOUNDMENT) = (clay, cl-ch) 270,363 + (SM) 216,098 = 486,461 yd³

TOTAL CLAY AVAILABLE ON SITE (EXCLUDING WETLANDS) = 270,363 + (BORROW) 69848 = 340,211 yd³

IMPOUNDMENT CONSTRUCTION

LEVEES = ~~214,602 yd³~~ 177,405 yd³

CLAY BOTTOM (40.24 ACRES) = 194,744 yd³

TOTAL CLAY (BEFORE LOSS) ≅ ~~409,346 yd³~~ 372,149 yd³

LOSS FACTOR ≅ 30%

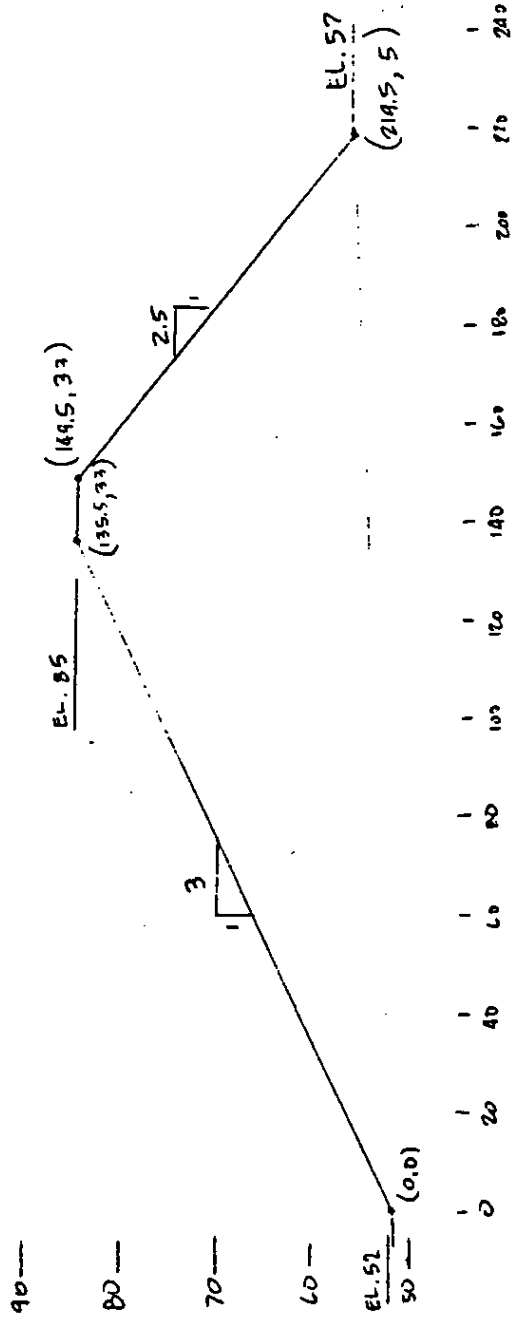
- TOTAL CLAY REQUIRED (INCLUDING LOSS) = ~~532,150 yd³~~ 483,794 yd³

- APPROXIMATE (SM) MATERIAL REQUIRED TO FILL OLD BORROW PONDS ≅ 80,000 yd³

DAMES & MOORE

Sheet No. 11 of			
Calc. No.			
Rev. No.			
Job No. 24379-002	Job SURFACE IMPOUNDMENT	By RS	Date 11/
Client RIVERWOOD	Subject EXCAVATION & CLAY QUANTITIES	Chk'd.	Date

MODIFIED SECTION (BY BORING DH-1)



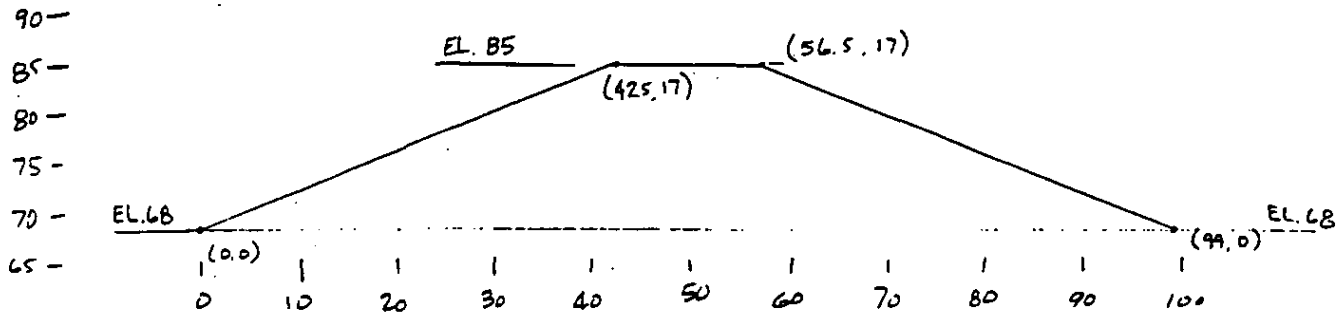
$$\frac{0}{0} \times \frac{33}{135.5} \times \frac{33}{149.5} \times \frac{5}{219.5} \times \frac{0}{0}$$

$$(33 \times 149.5) + (33 \times 219.5) - (33 \times 135.5) - (5 \times 149.5) = 6958$$

$$\text{AREA} = \frac{1}{2} \times 6958 = \underline{\underline{3479 \text{ FT}^2}}$$

$$\text{LENGTH} = 250 \text{ FT}$$

$$\text{VOL} = 250 \times 3479 = 869{,}750 \text{ FT}^3 = \underline{\underline{32{,}213 \text{ CY}}}$$



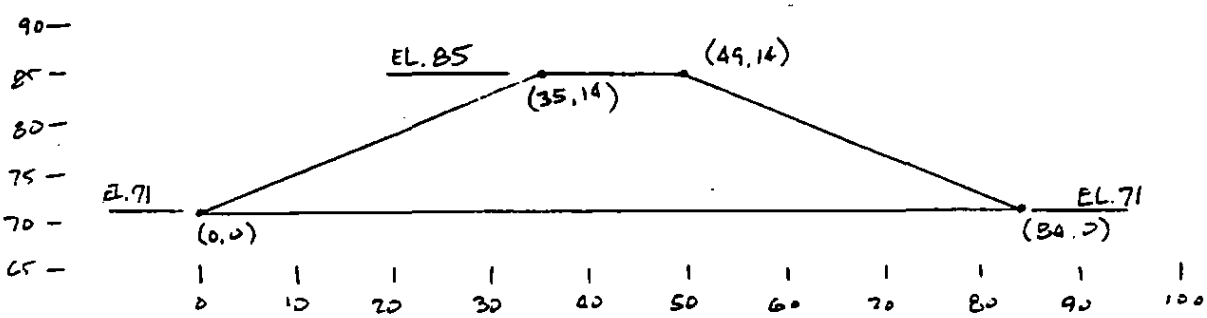
$$\frac{0}{0} \times \frac{17}{42.5} \times \frac{17}{56.5} \times \frac{0}{99} \times \frac{0}{0}$$

$(17 \times 56.5) + (17 \times 99) - (17 \times 42.5) - (0 \times 56.5) = 1921$

AREA $= \frac{1}{2} \times 1921 = \underline{960.5}$ FT^2

SECTION LENGTH = 1,700 FT

VOL. = 1,700 x 960.5 = 1,632,850 FT^3 = 60,476 CY



$$\frac{0}{0} \times \frac{14}{35} \times \frac{14}{49} \times \frac{0}{84} \times \frac{0}{0}$$

$(14 \times 49) + (14 \times 84) - (14 \times 35) - (0 \times 49) = 1372$

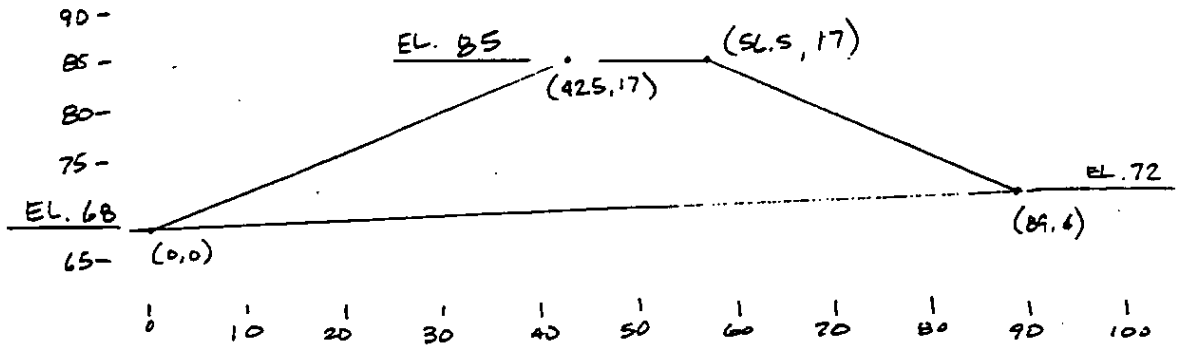
AREA $= \frac{1}{2} \times 1372 = \underline{686}$ FT^2

SECTION LENGTH = 680 FT

VOL. = 686 x 680 = 466,480 FT^3 = 17,277 CY

DAMES & MOORE

Sheet No. 13 OF			
Calc. No.			
Rev. No.			
Job No. 24379.002	Job SURFACE IMPOUNDMENT	By RS	Date 11/31
Client RIVERWOOD	Subject EXCAVATION & CLAY QUANTITIES	Chk'd.	Date



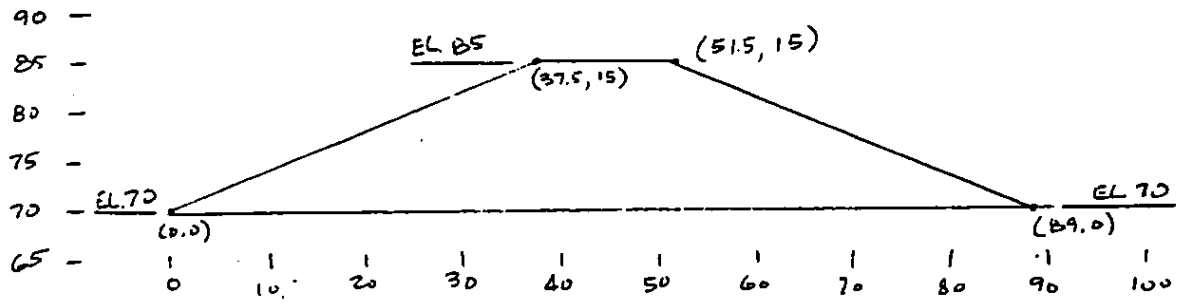
$\frac{0}{0} \times \frac{17}{42.5} \times \frac{17}{56.5} \times \frac{4}{84} \times \frac{0}{0}$

$(17 \times 56.5) + (17 \times 84) - (17 \times 42.5) - (4 \times 56.5) = 1440$

AREA $= \frac{1}{2} \times 1440 = \underline{\underline{720 \text{ FT}^2}}$

SECTION LENGTH = 900 FT

VOL. $= 900 \times 720 = 648{,}000 \text{ FT}^3 = \underline{\underline{24{,}000 \text{ CY}}}$



$\frac{0}{0} \times \frac{15}{37.5} \times \frac{15}{51.5} \times \frac{0}{89} \times \frac{0}{0}$

$(15 \times 51.5) + (15 \times 89) - (15 \times 37.5) - (0 \times 51.5) = 1545$

AREA $= \frac{1}{2} \times 1545 = \underline{\underline{772.5 \text{ FT}^2}}$

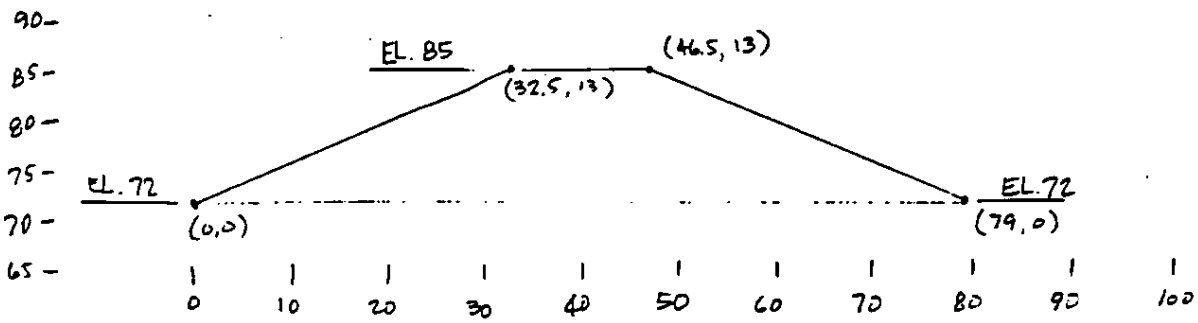
SECTION LENGTH = 850 FT

VOL. $= 772.5 \times 850 = 656{,}625 \text{ FT}^3 = \underline{\underline{24{,}319 \text{ CY}}}$

DAMES & MOORE

Sheet No. 14 OF
Calc. No.
Rev. No.
By RB Date 11/3/97
Chk'd. Date

Job No. 24379.002 Job SURFACE IMPOUNDMENT
Client RIVERWOOD Subject EXCAVATION & CLAY QUANTITIES



$\frac{0}{0} \times \frac{13}{32.5} \times \frac{13}{46.5} \times \frac{0}{79} \times \frac{0}{0}$

$(13 \times 46.5) + (13 \times 79) - (13 \times 32.5) - (0 \times 46.5) = 1209$

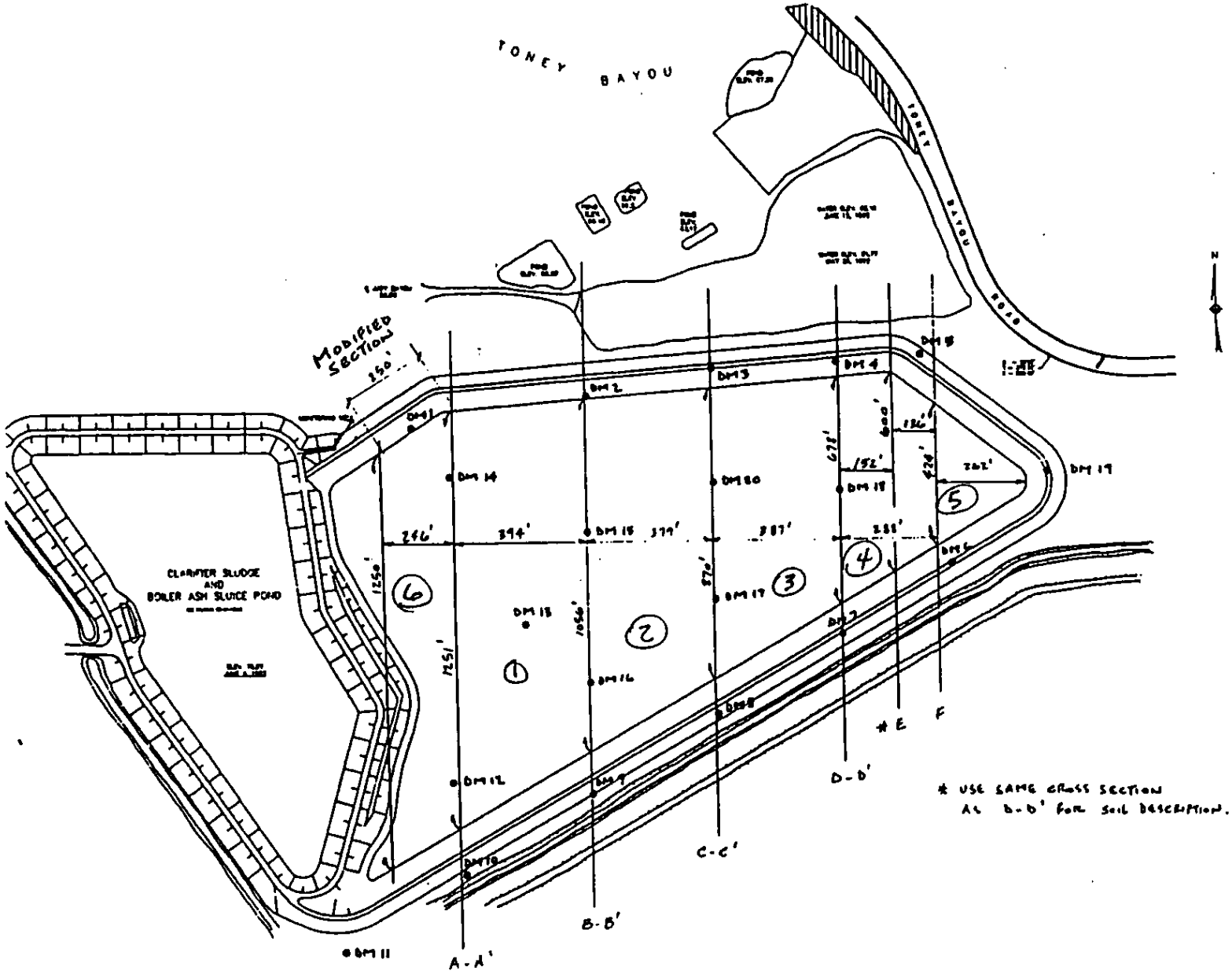
AREA = $\frac{1}{2} \times 1209 = \underline{604.5 \text{ FT}^2}$

SECTION LENGTH = 854 FT

VOL. = 854 × 604.5 = 516,243 FT³ = <u>19,120 CY</u>

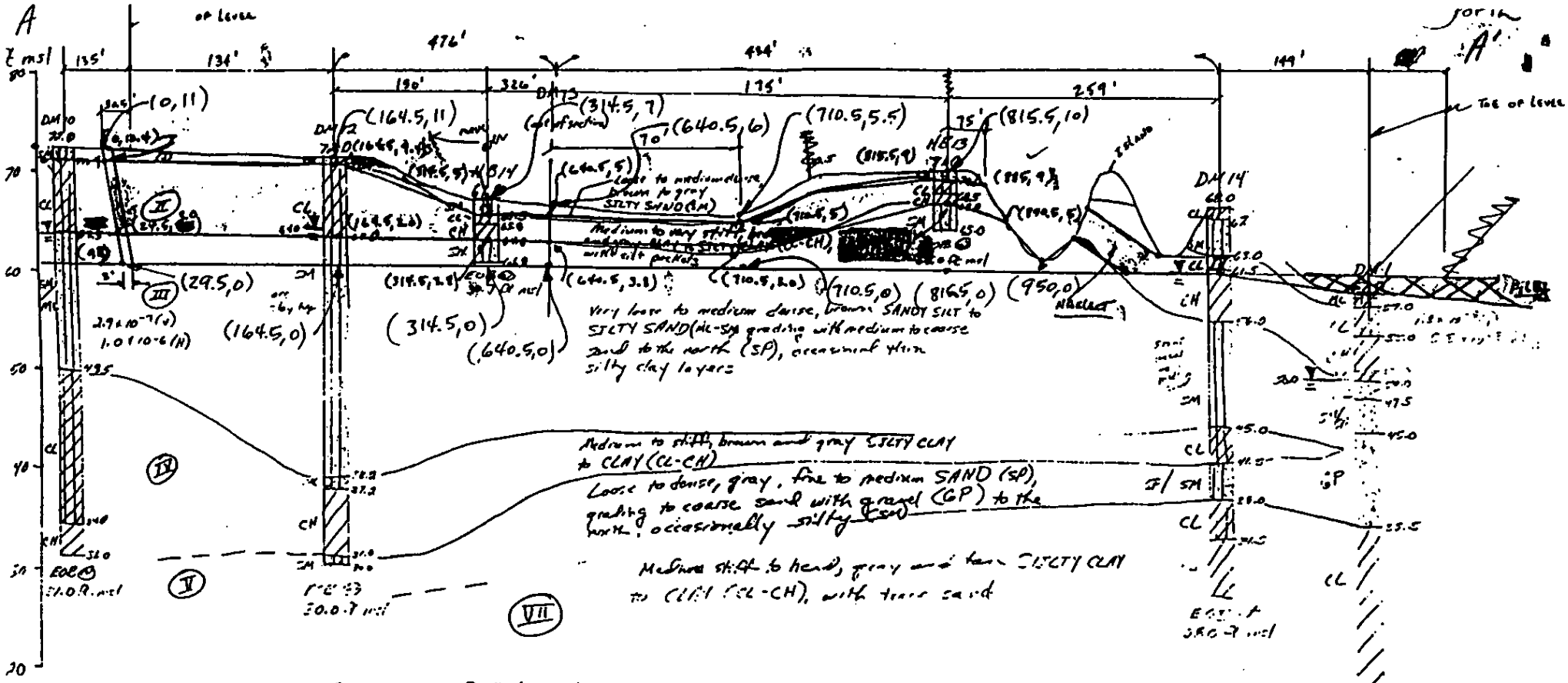
SUMMARY OF CLAY LEVEE QUANTITY

32,213
60,476
17,277
24,000
24,319
19,120
177,405 CY



* USE SAME CROSS SECTION AS D-D' FOR SOIL DESCRIPTION.

FIGURE 4-2



Average Permeability of Soil Strata

Strata No.	Description	Horizontal Perm. (cm/sec)	Vertical Permeability (cm/sec)
I	silty sand	—	—
II	clay to silty clay	2.5×10^{-8}	2.0×10^{-7}
III	silty sand to silty clay	1.5×10^{-4}	1.5×10^{-7}
IV	silty clay to clay	2.3×10^{-8}	1.1×10^{-7}
V	sand and silty sand	—	—
VI	clay with silt pockets	1.5×10^{-7}	8.1×10^{-8}
VII	silty sand	2.1×10^{-4}	2.1×10^{-4}
VII	clay and [illegible]	7.5×10^{-4}	$6.9 \times 10^{-}$

Notes:

1) Permeabilities given were determined through laboratory testing of undisturbed samples.

2) Groundwater levels were represent water levels measured on July 23-31, 1985.

Figure 4-4

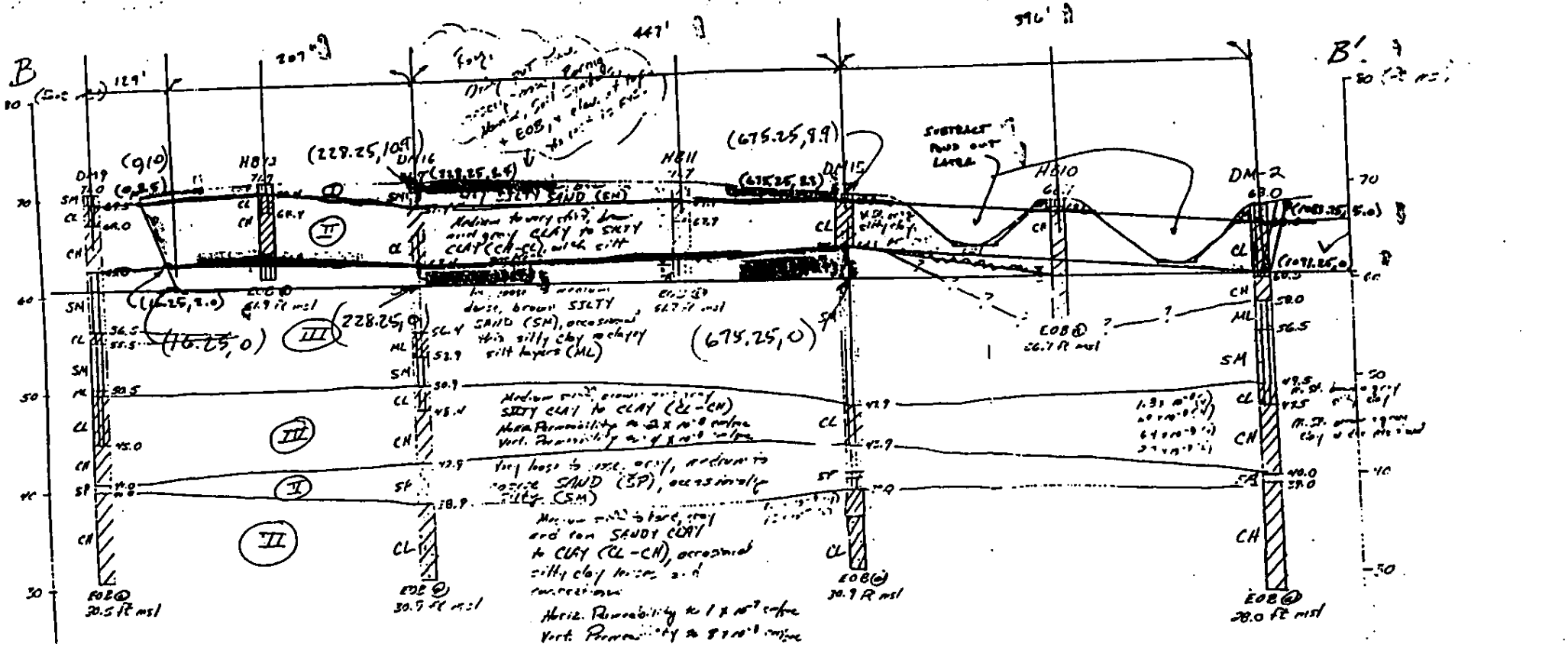
Geologic Cross Section A-A'

[illegible] NSA/LUDOE TAPPINGER AT

RIVERWOOD INTERNATIONAL USA, INC.

WEST ALGIERS, LOUISIANA

A-A'

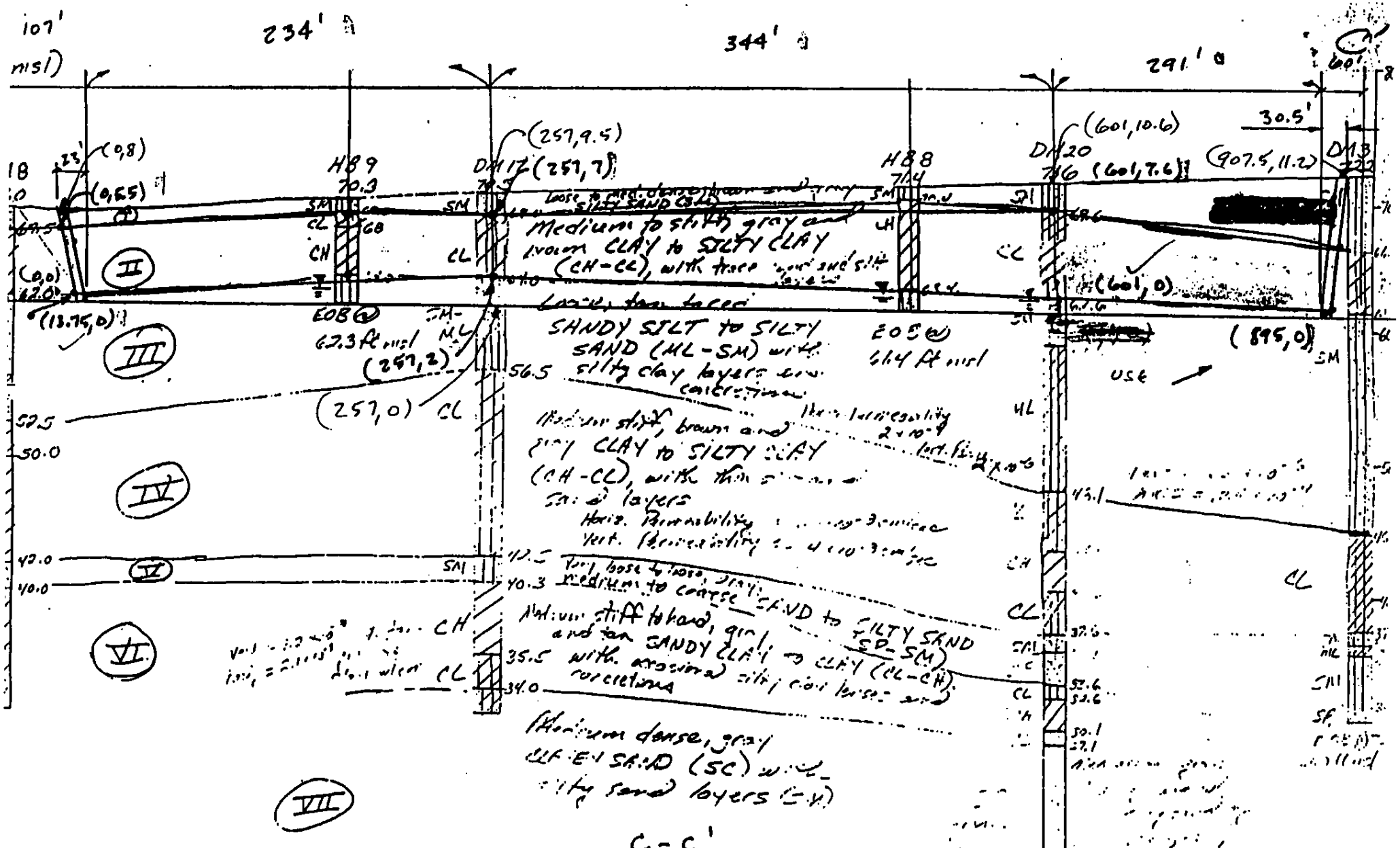


~~GEOLOGIC CROSS SECTION B-B'~~

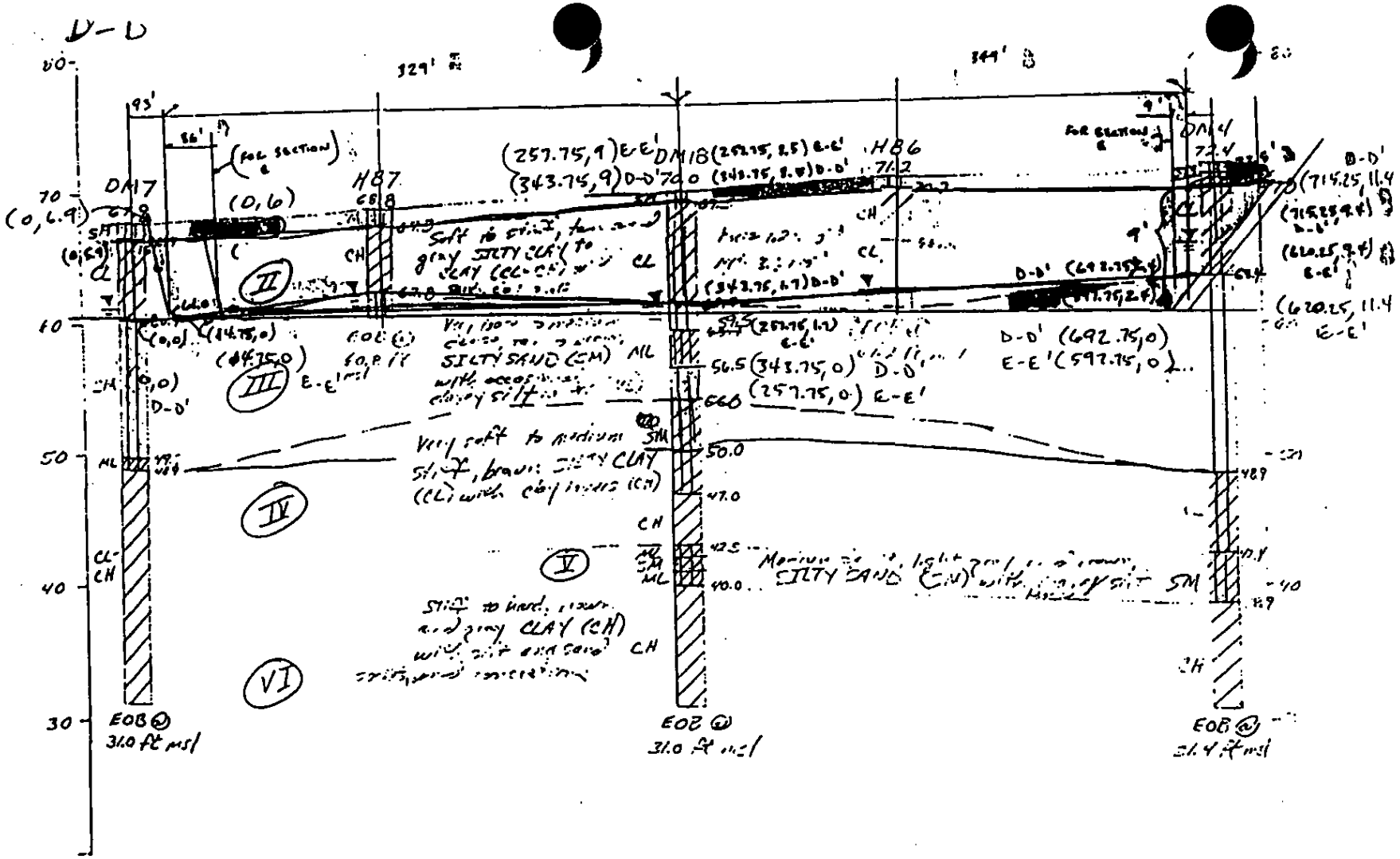
B-B'

FIGURE
GEOLOGIC C
RIVERW
WEST

PROPOSED ASH/SLURRY IMPOUNDMENT



107'
234'
344'
291'
60'
30.5'
(0,8)
(0,5.5)
(0,0)
(13.75,0)
HB9
70.3
EOB @
62.3 ft msl
(257,9.5)
(257,7)
(257,2)
(257,0)
HB8
71.4
EOB @
61.4 ft msl
(601,10.6)
(601,7.6)
(601,0)
(907.5,11.2)
(895,0)
Loose to med. dense brown and gray silty SAND (SM)
Medium to stiff gray and brown CLAY to SILTY CLAY (CH-CL), with trace sand and silt layers
Loose, tan to red SANDY SILT to SILTY SAND (ML-SM) with silty clay layers and concretions
Medium stiff, brown and gray CLAY to SILTY CLAY (CH-CL), with thin silt and sand layers
Horiz. Permeability
Vert. Permeability
Very loose to loose, gray, medium to coarse SAND to SILTY SAND (SP-SM)
Medium stiff to hard, gray and tan SANDY CLAY to CLAY (CL-CH), with occasional silty clay lenses and concretions
Medium dense, gray CLAYEY SAND (SC) with silty sand layers (SM)
USE
II
III
IV
V
VI
VII
C - C'


D-D
DM7
HB7
DM18
HB6
DM4
(0,6.9)
(0,6)
(257.75,9) E-E'
(343.75,9) D-D'
(343.75,0) D-D'
(257.75,0) E-E'
(692.75,0)
E-E' (597.75,0)
(715.25,11.4)
(620.25,11.4)
(14.75,0)
(0,0)
Soft to stiff, tan and gray SILTY CLAY to CLAY (CL-CH)
SILTY SAND (SM)
Very soft to medium stiff, brown SILTY CLAY (CL) with clay layers (CH)
Stiff to hard, brown and gray CLAY (CH) with silt and sand
Medium to light gray and brown SILTY SAND (SM) with clayey silt
EOB @ 31.0 ft msl
EOB @ 31.0 ft msl
EOB @ 31.4 ft msl
I
II
III
IV
V
VI
CL
CH
ML
SM
CL-CH
D-D'
E-E'
329'
349'
93'
86'
70
60
50
40
30

D-D'

FIGURE 4-7

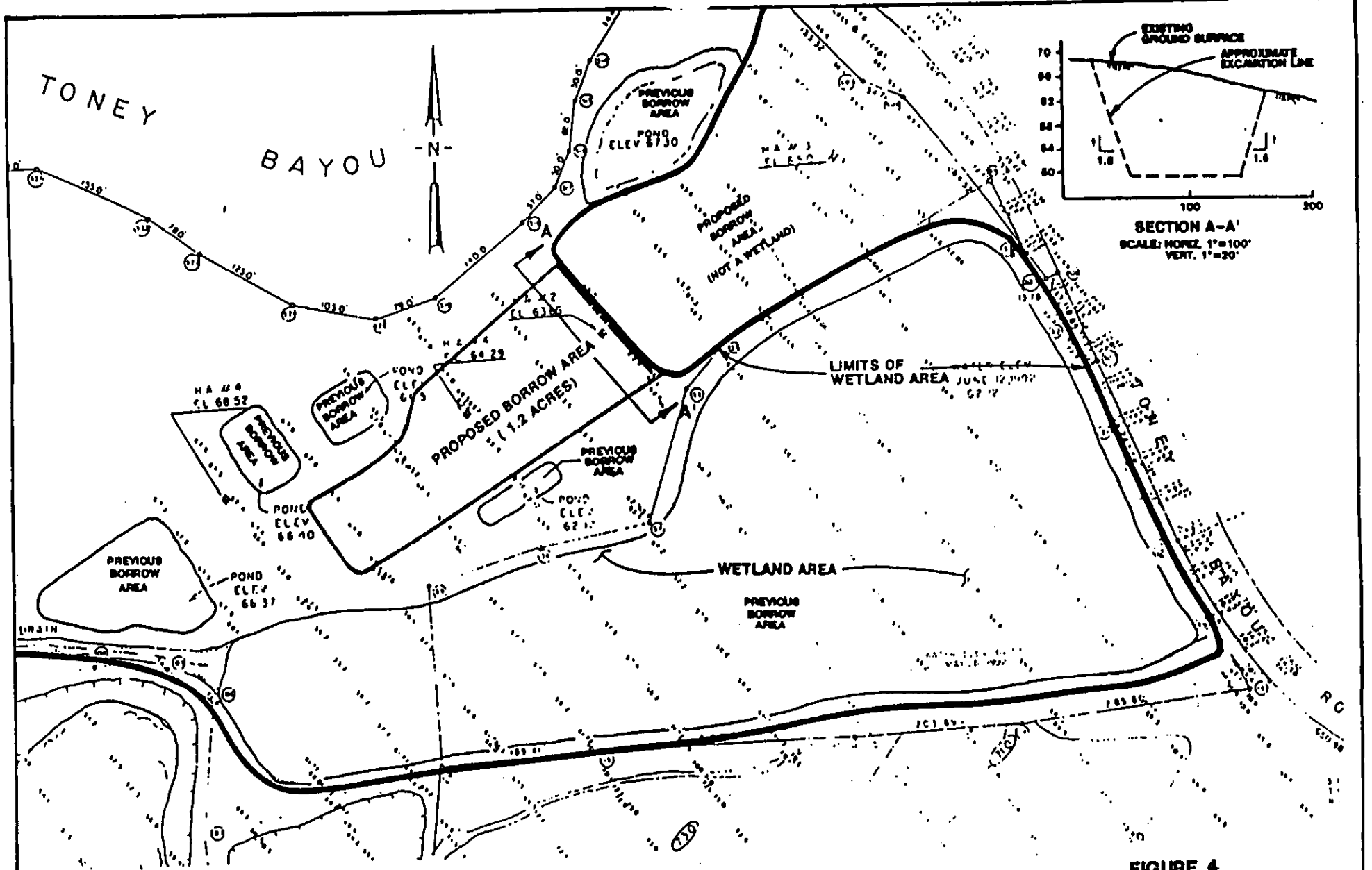


FIGURE 4
PROPOSED BORROW LOCATION
WITHIN WETLAND AREA
RIVERWOOD INTERNATIONAL USA, INC.
WEST MONROE, LOUISIANA

SOIL STRATUM	DESCRIPTION	SOIL STRENGTH PARAMETERS							
		SHORT TERM				LONG TERM			
		w	sat	c	o	w	sat	o'	o'
I									
II	CL FILL	120	125	750	0	120	125	200	20
III	SM/ML	110	115	0	35	110	115	0	35
IV	CL/CH	120	125	800	0	120	125	200	20
V	SM/ML	110	115	0	35	110	115	0	35
VI	CL/CH	120	125	760	0	120	125	200	20
VII	SM/ML	110	115	0	35	110	115	0	35
VIII	CL/CH	120	125	1200	0	120	125	400	20

END OF CONSTRUCTION

LONG TERM CASE - F.S.= 1.63
SHORT TERM CASE - F.S.= 1.93

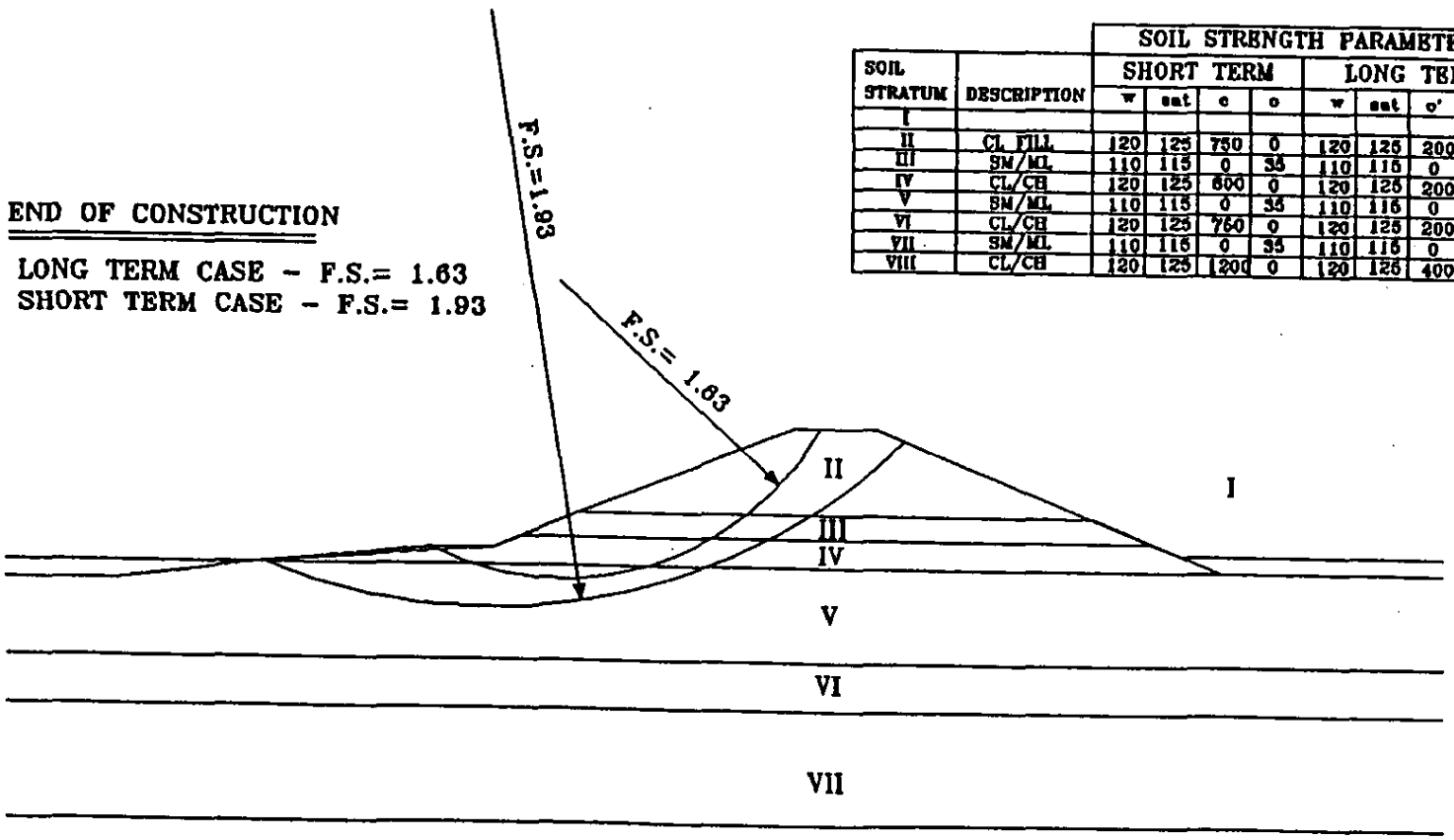


FIGURE 1

DAMES & MOORE

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date:	11-01-92
Time of Run:	7:55 PM
Run By:	SMM
Input Data Filename:	RWB3-1A.IN
Output Filename:	RWB3-1A.R2

PROBLEM DESCRIPTION RIVERWOOD @ POND: SHORT TERM CASE - IMPO
UNDMENT EMPTY

BOUNDARY COORDINATES

8 Top Boundaries
16 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	58.00	150.00	58.00	5
2	150.00	58.00	174.00	61.00	5
3	174.00	61.00	205.00	64.00	4
4	205.00	64.00	215.00	64.00	4
5	215.00	64.00	267.50	85.00	2
6	267.50	85.00	281.50	85.00	2
7	281.50	85.00	286.50	83.00	2
8	286.50	83.00	475.00	83.00	1
9	286.50	83.00	334.00	64.00	2
10	334.00	64.00	475.00	64.00	4
11	230.00	70.00	319.00	70.00	3
12	220.00	66.00	329.00	66.00	4
13	174.00	61.00	475.00	61.00	5
14	.00	45.00	475.00	45.00	6
15	.00	37.00	475.00	37.00	7
16	.00	18.00	475.00	18.00	8

ISOTROPIC SOIL PARAMETERS

8 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	.1	.1	.0	.0	.00	.0	1
2	120.0	125.0	750.0	.0	.00	.0	1
3	110.0	115.0	.0	35.0	.00	.0	1
4	120.0	125.0	600.0	.0	.00	.0	1
5	110.0	115.0	.0	35.0	.00	.0	1
6	120.0	125.0	750.0	.0	.00	.0	1
7	110.0	115.0	.0	35.0	.00	.0	1
8	120.0	125.0	1200.0	.0	.00	.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 7 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	61.00
2	174.00	61.00
3	215.00	64.00
4	230.00	70.00
5	319.00	70.00
6	341.50	61.00
7	475.00	61.00

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of200 Points Equally Spaced Along The Ground Surface Between X = 170.00 ft.
and X = 205.00 ft.

Each Surface Terminates Between X = 260.00 ft.
and X = 475.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 1.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	170.00	60.50
2	177.27	53.63
3	184.89	47.16
4	192.84	41.09
5	201.10	35.46
6	209.65	30.27
7	218.46	25.53
8	227.50	21.27
9	236.76	17.49
10	246.21	14.20
11	255.81	11.42
12	265.55	9.15
13	275.39	7.39
14	285.32	6.16
15	295.29	5.45
16	305.29	5.26
17	315.28	5.61
18	325.25	6.48
19	335.15	7.88
20	344.96	9.80
21	354.66	12.23
22	364.22	15.17
23	373.61	18.61
24	382.81	22.54
25	391.78	26.95
26	400.51	31.83
27	408.97	37.16
28	417.14	42.93
29	424.99	49.12

28	468.90	82.88
29	469.15	83.00

Factor Of Safety For The Preceding Specified Surface =-12.237

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method *

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	175.98	61.19
2	185.42	57.90
3	195.14	55.54
4	205.04	54.14
5	215.03	53.71
6	225.02	54.25
7	234.90	55.76
8	244.60	58.22
9	254.00	61.62
10	263.04	65.91
11	271.61	71.06
12	279.64	77.01
13	286.33	83.07

Circle Center At X = 214.5 ; Y = 156.5 and Radius, 102.8

*** 1.929 ***

Individual data on the 23 slices

ice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surchar Loa Lbs(
1	.1	.3	.0	.0	.0	.0	.0	.0	

2	.4	8.0	.0	2.7	.0	.0	.0	.0	.
3	8.9	2327.6	.0	1207.3	.0	.0	.0	.0	
4	9.7	6675.2	.0	3403.4	.0	.0	.0	.0	
5	9.9	10054.1	.0	4995.0	.0	.0	.0	.0	.
6	.0	49.7	.0	24.6	.0	.0	.0	.0	.
7	10.0	11813.1	.0	6021.6	.0	.0	.0	.0	.
8	.0	40.6	.0	20.1	.0	.0	.0	.0	.
9	5.0	6554.7	.0	3225.2	.0	.0	.0	.0	.
10	5.0	7717.7	.0	3763.4	.0	.0	.0	.0	.
11	5.0	8606.7	.0	4207.2	.0	.0	.0	.0	.
12	4.9	9064.7	.0	4524.1	.0	.0	.0	.0	.
13	9.7	19519.2	.0	8117.1	.0	.0	.0	.0	.
14	7.7	16396.9	.0	5304.8	.0	.0	.0	.0	.
15	1.7	3686.9	.0	985.3	.0	.0	.0	.0	.
16	9.0	19046.2	.0	3892.4	.0	.0	.0	.0	.
17	.2	315.5	.0	45.2	.0	.0	.0	.0	.
18	4.3	8655.0	.0	848.9	.0	.0	.0	.0	.
19	2.3	4417.7	.0	120.6	.0	.0	.0	.0	.
20	1.8	3055.6	.0	.0	.0	.0	.0	.0	.
21	8.0	10566.9	.0	.0	.0	.0	.0	.0	.
22	1.9	1594.9	.0	.0	.0	.0	.0	.0	.
23	4.8	1825.5	.0	.0	.0	.0	.0	.0	.

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	174.92	61.09
2	184.11	57.13
3	193.68	54.24
4	203.52	52.46
5	213.50	51.81
6	223.49	52.30
7	233.35	53.93
8	242.97	56.68
9	252.21	60.50
10	260.95	65.35
11	269.09	71.17
12	276.51	77.87
13	282.45	84.62

Circle Center At X = 214.2 ; Y = 139.4 and Radius, 87.6

*** 1.932 ***

1

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	176.33	61.23
2	185.64	57.57
3	195.28	54.91
4	205.14	53.27
5	215.13	52.67
6	225.12	53.12
7	235.00	54.60
8	244.68	57.12
9	254.05	60.63
10	262.99	65.10
11	271.42	70.48
12	279.24	76.71
13	285.88	83.25

Circle Center At X = 215.9 ; Y = 148.2 and Radius, 95.6

*** 1.933 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	180.90	61.67
2	190.16	57.87
3	199.80	55.22
4	209.69	53.75
5	219.69	53.48
6	229.64	54.42
7	239.41	56.55
8	248.86	59.84
9	257.83	64.25
10	266.22	69.70
11	273.88	76.13
12	280.71	83.43
13	281.78	84.89

Circle Center At X = 216.9 ; Y = 136.3 and Radius, 82.9

*** 1.937 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	174.40	61.04
2	183.56	57.04
3	193.11	54.06
4	202.92	52.13
5	212.88	51.27
6	222.88	51.49
7	232.80	52.79
8	242.51	55.16
9	251.91	58.57
10	260.89	62.97
11	269.34	68.32
12	277.16	74.55
13	284.27	81.59
14	285.68	83.33

Circle Center At X = 215.8 ; Y = 143.3 and Radius, 92.1

*** 1.938 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	171.23	60.65
2	180.52	56.95
3	190.13	54.19
4	199.97	52.39
5	209.94	51.57
6	219.93	51.75
7	229.87	52.91
8	239.63	55.05
9	249.14	58.15
10	258.30	62.17
11	267.01	67.08
12	275.19	72.83
13	282.77	79.36
14	286.30	83.08

Circle Center At X = 213.1 ; Y = 152.1 and Radius, 100.6

*** 1.941 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	170.70	60.59
2	177.81	53.55
3	185.88	47.64
4	194.73	42.99
5	204.17	39.70
6	214.00	37.84
7	223.99	37.46
8	233.93	38.55
9	243.60	41.10
10	252.79	45.05
11	261.29	50.32
12	268.92	56.79
13	275.51	64.31
14	280.91	72.72
15	285.02	81.84
16	285.46	83.42

Circle Center At X = 221.6 ; Y = 104.8 and Radius, 67.4

*** 1.941 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	179.15	61.50
2	188.18	57.21
3	197.69	54.11
4	207.51	52.25
5	217.50	51.65
6	227.47	52.34
7	237.28	54.29
8	246.76	57.47
9	255.76	61.83
10	264.12	67.31
11	271.72	73.81
12	278.43	81.23
13	281.06	85.00

Circle Center At X = 217.2 ; Y = 129.9 and Radius, 78.3

*** 1.946 ***

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Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	175.10	61.11
2	184.22	57.01
3	193.78	54.07
4	203.63	52.32
5	213.61	51.80
6	223.59	52.51
7	233.40	54.44
8	242.90	57.56
9	251.95	61.82
10	260.40	67.16
11	268.14	73.50
12	275.03	80.75
13	278.18	85.00

Circle Center At X = 212.9 ; Y = 133.0 and Radius, 81.2

*** 1.947 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	173.34	60.92
2	182.96	58.18
3	192.77	56.26
4	202.71	55.17
5	212.71	54.93
6	222.69	55.53
7	232.59	56.96
8	242.33	59.23
9	251.84	62.30
10	261.07	66.17
11	269.93	70.80

12	278.37	76.17
13	286.33	82.22
14	287.20	83.00

Circle Center At X = 210.6 ; Y = 173.4 and Radius, 118.4

*** 1.949 ***

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            Y            A     X     I     S            F     T

             .00     59.38    118.75    178.13    237.50    296.88

X        .00 +--*--*-*-*---------+---------+---------+---------+
             -
             -
             -
             -
             -
       59.38 +
             -
             -
             -
             -
             -
A     118.75 +
             -
             -
             -         *
             -
             -         6
X     178.13 +        7*
             -      .761.
             -     .7.1..
             -    ..7.1.*
             -   ..7..1.*
             -  ...7..1..*
I     237.50 +  ...7..14..
             - .....7.51...
             - ......7.12...
             -.........711.*
             -..........761*
             -............6*
S     296.88 ...............
             ...............
             ............*..
             ...........*...
             -..........*...
             -.........W....
```

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        356.25 +...............
               -...............
               - ..............
               - ..............
               -  .............
               -   ............
F       415.63 +    ...........
               -     ..........
               -      .........
               -       ........
               -        .......
               -
T       475.00 +  *  * * ** .*
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** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date:	11-01-92
Time of Run:	4:58 PM
Run By:	SMM
Input Data Filename:	RWB3-2A.IN
Output Filename:	RWB3-2A.R8

PROBLEM DESCRIPTION RIVERWOOD @ POND: LONG TERM CASE - IMPOUNDMENT EMPTY

BOUNDARY COORDINATES

8 Top Boundaries
16 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	58.00	150.00	58.00	5
2	150.00	58.00	174.00	61.00	5
3	174.00	61.00	205.00	64.00	4
4	205.00	64.00	215.00	64.00	4
5	215.00	64.00	267.50	85.00	2
6	267.50	85.00	281.50	85.00	2
7	281.50	85.00	286.50	83.00	2
8	286.50	83.00	475.00	83.00	1
9	286.50	83.00	334.00	64.00	2
10	334.00	64.00	475.00	64.00	4
11	230.00	70.00	319.00	70.00	3
12	220.00	66.00	329.00	66.00	4
13	174.00	61.00	475.00	61.00	5
14	.00	45.00	475.00	45.00	6
15	.00	37.00	475.00	37.00	7
16	.00	18.00	475.00	18.00	8

ISOTROPIC SOIL PARAMETERS

8 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	.1	.1	.0	.0	.00	.0	1
2	120.0	125.0	200.0	20.0	.00	.0	1
3	110.0	115.0	.0	35.0	.00	.0	1
4	120.0	125.0	200.0	20.0	.00	.0	1
5	110.0	115.0	.0	35.0	.00	.0	1
6	120.0	125.0	200.0	20.0	.00	.0	1
7	110.0	115.0	.0	35.0	.00	.0	1
8	120.0	125.0	400.0	20.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 7 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	61.00
2	174.00	61.00
3	215.00	64.00
4	230.00	70.00
5	319.00	70.00
6	341.50	61.00
7	475.00	61.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of200 Points Equally Spaced Along The Ground Surface Between X = 180.00 ft.
and X = 220.00 ft.

Each Surface Terminates Between X = 260.00 ft.
and X = 400.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 1.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	180.00	61.58
2	187.26	54.71
3	195.01	48.39
4	203.21	42.66
5	211.80	37.55
6	220.75	33.08
7	230.01	29.29
8	239.52	26.20
9	249.23	23.81
10	259.09	22.15
11	269.04	21.22
12	279.04	21.03
13	289.03	21.58
14	298.95	22.86
15	308.74	24.87
16	318.36	27.60
17	327.76	31.03
18	336.87	35.14
19	345.66	39.92
20	354.07	45.33
21	362.05	51.34
22	369.57	57.93
23	376.59	65.06
24	383.06	72.69
25	388.95	80.77
26	390.33	83.00

18	375.79	60.78
19	383.28	67.41
20	390.18	74.65
21	396.45	82.44
22	396.82	83.00

Factor Of Safety For The Preceding Specified Surface = -5.556

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	204.32	63.93
2	213.70	60.46
3	223.57	58.86
4	233.57	59.20
5	243.31	61.46
6	252.43	65.56
7	260.59	71.35
8	267.48	78.59
9	271.54	85.00

Circle Center At X = 226.8 ; Y = 110.3 and Radius, 51.6

*** 1.631 ***

Individual data on the 18 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(k
1	.7	12.9	.0	.0	.0	.0	.0	.0	.0
2	.9	55.0	.0	.0	.0	.0	.0	.0	.0

3	6.3	1431.0	.0	586.0	.0	.0	.0	.0
4	1.5	588.9	.0	301.0	.0	.0	.0	.0
5	1.3	583.5	.0	294.8	.0	.0	.0	.0
6	5.0	3154.1	.0	1516.4	.0	.0	.0	.0
7	3.6	3299.9	.0	1589.1	.0	.0	.0	.0
8	6.4	7675.7	.0	3640.1	.0	.0	.0	.0
9	3.6	4935.3	.0	2417.0	.0	.0	.0	.0
10	7.7	11961.2	.0	4908.3	.0	.0	.0	.0
11	2.0	3293.9	.0	1123.5	.0	.0	.0	.0
12	9.1	14853.0	.0	4047.3	.0	.0	.0	.0
13	.6	972.3	.0	198.7	.0	.0	.0	.0
14	5.6	8304.5	.0	863.3	.0	.0	.0	.0
15	1.9	2548.3	.0	.0	.0	.0	.0	.0
16	6.9	7143.8	.0	.0	.0	.0	.0	.0
17	.0	19.1	.0	.0	.0	.0	.0	.0
18	4.0	1543.7	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	207.34	64.00
2	216.90	61.07
3	226.84	59.98
4	236.81	60.77
5	246.45	63.42
6	255.42	67.83
7	263.41	73.85
8	270.13	81.25
9	272.43	85.00

Circle Center At X = 227.6 ; Y = 113.1 and Radius, 53.1

*** 1.634 ***

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Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	201.31	63.64
2	210.90	60.82
3	220.82	59.55
4	230.81	59.87
5	240.63	61.77
6	250.03	65.19

7	258.76	70.07
8	266.61	76.26
9	273.38	83.62
10	274.30	85.00

Circle Center At X = 223.8 ; Y = 122.2 and Radius, 62.7

*** 1.635 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	207.34	64.00
2	216.77	60.67
3	226.66	59.19
4	236.65	59.60
5	246.38	61.90
6	255.50	66.01
7	263.68	71.76
8	270.62	78.96
9	274.54	85.00

Circle Center At X = 229.5 ; Y = 111.7 and Radius, 52.6

*** 1.641 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	196.48	63.18
2	206.06	60.31
3	215.95	58.79
4	225.95	58.64
5	235.87	59.86
6	245.54	62.43
7	254.75	66.31
8	263.36	71.41
9	271.17	77.64
10	278.07	84.89

11	278.15	85.00

Circle Center At X = 222.0 ; Y = 131.2 and Radius, 72.7

*** 1.658 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	198.09	63.33
2	207.59	60.20
3	217.48	58.75
4	227.48	59.03
5	237.27	61.04
6	246.58	64.71
7	255.11	69.93
8	262.61	76.54
9	268.85	84.35
10	269.21	85.00

Circle Center At X = 220.8 ; Y = 116.2 and Radius, 57.6

*** 1.659 ***

1

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	207.14	64.00
2	216.66	60.96
3	226.62	59.99
4	236.55	61.14
5	246.02	64.36
6	254.60	69.50
7	261.90	76.33
8	267.60	84.55
9	267.79	85.00

Circle Center At X = 226.2 ; Y = 107.2 and Radius, 47.2

*** 1.659 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	192.86	62.83
2	202.33	59.61
3	212.17	57.79
4	222.16	57.40
5	232.10	58.45
6	241.80	60.91
7	251.03	64.74
8	259.63	69.86
9	267.40	76.15
10	274.18	83.50
11	275.22	85.00

Circle Center At X = 219.9 ; Y = 126.9 and Radius, 69.5

*** 1.660 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	208.74	64.00
2	218.05	60.33
3	227.91	58.66
4	237.90	59.06
5	247.59	61.51
6	256.57	65.90
7	264.46	72.06
8	270.90	79.71
9	273.74	85.00

Circle Center At X = 231.0 ; Y = 106.8 and Radius, 48.2

*** 1.666 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	211.56	64.00
2	221.30	61.72
3	231.29	61.27
4	241.19	62.64
5	250.68	65.80
6	259.43	70.65
7	267.14	77.01
8	273.57	84.67
9	273.75	85.00

Circle Center At X = 228.8 ; Y = 115.7 and Radius, 54.5

*** 1.667 ***

1

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            Y            A     X     I     S            F     T

             .00     59.38    118.75    178.13    237.50    296.88

X        .00 +--*--*-*-*---------+---------+---------+---------+
             -
             -
             -
             -
             -
      59.38 +
             -
             -
             -
             -
             -
A    118.75 +
             -
             -
             -         *
             -
             -
X    178.13 +         *
             -        ..8
             -       ..83
             -     ....3*
             -    .....1*
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     .....1.*
    ......10.
    ......12..
   ........117.
   .........21*
   ............*
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SUDDEN DRAWDOWN

LONG TERM SUDDEN DRAWDOWN - F.S.= 1.43
SHORT TERM SUDDEN DRAWDOWN - F.S.= 1.71

SOIL STRATUM	DESCRIPTION	SOIL STRENGTH PARAMETERS							
		SHORT TERM				LONG TERM			
		w	sat	c	o	w	sat	c'	o'
I	SLUDGE	80	80	0	0	80	80	0	0
II	CL FILL	120	125	750	0	120	125	200	20
III	SM/ML	110	115	0	35	110	115	0	35
IV	CL/CH	120	125	600	0	120	125	200	20
V	SM/ML	110	115	0	35	110	115	0	35
VI	CL/CH	120	125	750	0	120	125	200	20
VII	SM/ML	110	115	0	35	110	115	0	35
VIII	CL/CH	120	125	1200	0	120	125	400	20

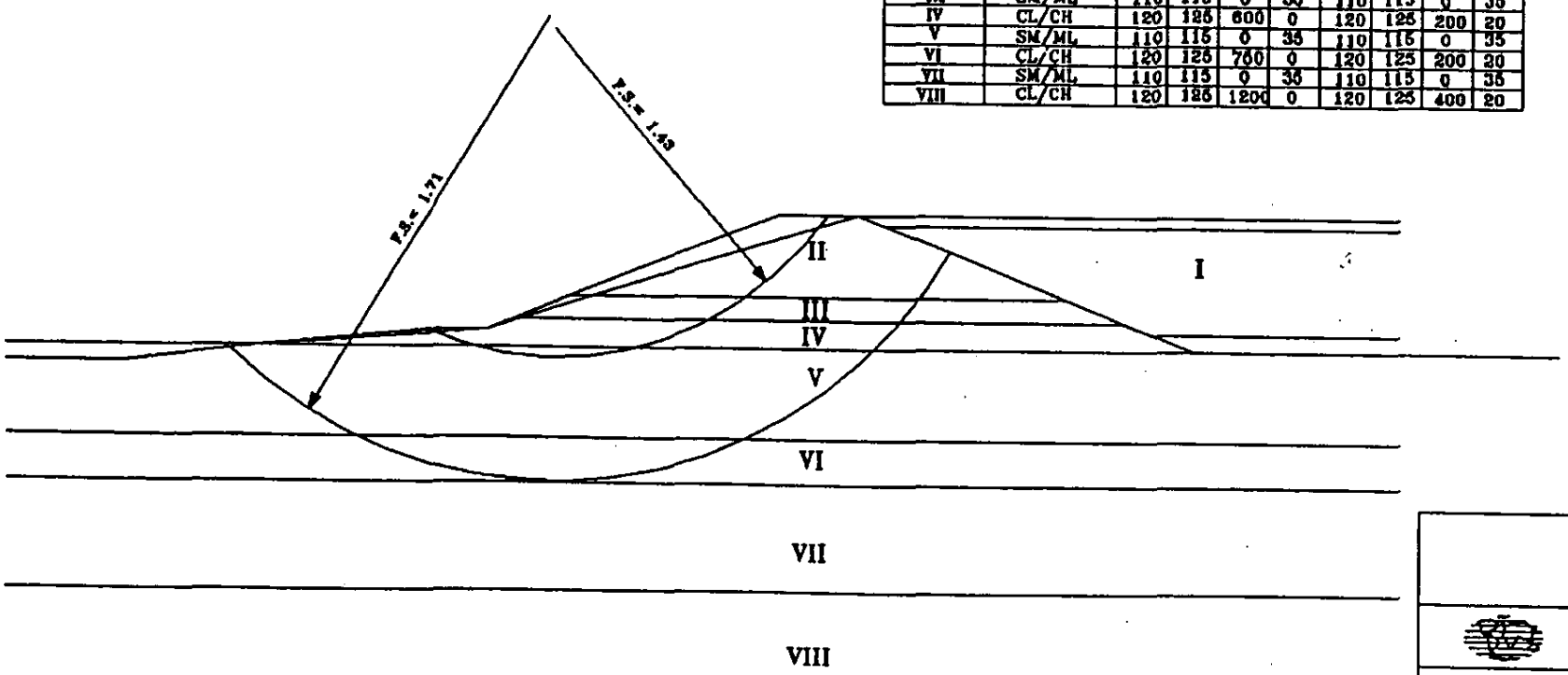

FIGURE 2

DAMES & MOORE

RIVERWOOD INTERNATIONAL USA, INC.

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date:	11-01-92
Time of Run:	7:37 PM
Run By:	SMM
Input Data Filename:	RWB3-3A.IN
Output Filename:	RWB3-3A.R2

PROBLEM DESCRIPTION RIVERWOOD @ POND: SHORT TERM SUDDEN DRAW DOWN CASE - IMPOUNDMENT FULL

BOUNDARY COORDINATES

8 Top Boundaries
16 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	58.00	150.00	58.00	5
2	150.00	58.00	174.00	61.00	5
3	174.00	61.00	205.00	64.00	4
4	205.00	64.00	215.00	64.00	4
5	215.00	64.00	267.50	85.00	2
6	267.50	85.00	281.50	85.00	2
7	281.50	85.00	286.50	83.00	2
8	286.50	83.00	475.00	83.00	1
9	286.50	83.00	334.00	64.00	2
10	334.00	64.00	475.00	64.00	4
11	230.00	70.00	319.00	70.00	3
12	220.00	66.00	329.00	66.00	4
13	174.00	61.00	475.00	61.00	5
14	.00	45.00	475.00	45.00	6
15	.00	37.00	475.00	37.00	7
16	.00	18.00	475.00	18.00	8

ISOTROPIC SOIL PARAMETERS

8 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	80.0	80.0	.0	.0	.00	.0	1
2	125.0	125.0	750.0	.0	.00	.0	1

3	115.0	115.0	.0	35.0	.00	.0	1
4	125.0	125.0	600.0	.0	.00	.0	1
5	115.0	115.0	.0	35.0	.00	.0	1
6	125.0	125.0	750.0	.0	.00	.0	1
7	115.0	115.0	.0	35.0	.00	.0	1
8	125.0	125.0	1200.0	.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	61.00
2	174.00	61.00
3	215.00	64.00
4	281.50	85.00
5	341.50	61.00
6	475.00	61.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of200 Points Equally Spaced Along The Ground Surface Between X = 145.00 ft.
and X = 185.00 ft.

Each Surface Terminates Between X = 260.00 ft.
and X = 475.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 1.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	168.92	60.36
2	176.54	53.89
3	184.88	48.38
4	193.83	43.91
5	203.25	40.55
6	213.00	38.35
7	222.95	37.33
8	232.95	37.53
9	242.85	38.92
10	252.52	41.49
11	261.80	45.21
12	270.57	50.01
13	278.70	55.84
14	286.06	62.60
15	292.56	70.20
16	298.10	78.53
17	300.36	83.00

Circle Center At X = 226.4 ; Y = 120.3 and Radius, 83.0

*** 1.705 ***

Individual data on the 32 slices

ice lo.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	5.1	1446.4	101.4	1162.0	.0	.0	.0	.0	.0
2	2.5	1800.9	.0	1270.5	.0	.0	.0	.0	.0
3	8.3	10144.7	.0	6445.8	.0	.0	.0	.0	.0
4	6.8	12297.6	.0	7224.0	.0	.0	.0	.0	.0
5	2.2	4660.8	.0	2721.0	.0	.0	.0	.0	.0
6	9.4	23387.9	.0	12798.9	.0	.0	.0	.0	.0
7	1.8	4876.8	.0	2552.7	.0	.0	.0	.0	.0
8	8.0	23479.5	.0	12413.5	.0	.0	.0	.0	.0
9	2.0	6107.4	.0	3207.2	.0	.0	.0	.0	.0
0	5.0	16143.9	.0	8053.6	.0	.0	.0	.0	.0
1	1.3	4569.9	.0	2253.2	.0	.0	.0	.0	.0
2	1.6	5698.3	.0	2795.4	.0	.0	.0	.0	.0
3	7.0	26348.7	.0	12690.9	.0	.0	.0	.0	.0
4	3.0	11614.3	.0	5573.4	.0	.0	.0	.0	.0
5	1.0	4223.7	.0	2035.5	.0	.0	.0	.0	.0
6	8.9	37044.2	.0	17629.1	.0	.0	.0	.0	.0
7	9.7	42602.3	.0	20323.8	.0	.0	.0	.0	.0
8	8.8	39346.2	.0	19113.6	.0	.0	.0	.0	.0
9	.5	2330.5	.0	1118.8	.0	.0	.0	.0	.0
0	5.7	25388.2	.0	12743.2	.0	.0	.0	.0	.0
1	3.1	13258.0	.0	6648.5	.0	.0	.0	.0	.0
[illegible]	8.1	31601.6	.0	17813.9	.0	.0	.0	.0	.0
[illegible]	2.8	9547.8	.0	6218.5	.0	.0	.0	.0	.0
[illegible]	2.8	8560.9	.0	5494.7	.0	.0	.0	.0	.0
5	1.7	4671.0	.0	2990.7	.0	.0	.0	.0	.0
6	.4	1085.9	.0	788.8	.0	.0	.0	.0	.0
7	2.5	5541.5	.0	3962.8	.0	.0	.0	.0	.0
8	3.4	6090.2	.0	4075.8	.0	.0	.0	.0	.0

29	.2	259.0	.0	161.6	.0	.0	.0	.0	.0
30	5.5	5067.3	.0	2965.1	.0	.0	.0	.0	.0
31	.1	32.1	.0	.0	.0	.0	.0	.0	.0
[illegible]	2.3	403.1	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	176.96	61.29
2	184.25	54.45
3	192.38	48.61
4	201.19	43.88
5	210.54	40.34
6	220.27	38.05
7	230.22	37.04
8	240.22	37.33
9	250.09	38.93
10	259.67	41.79
11	268.80	45.87
12	277.32	51.11
13	285.08	57.41
14	291.96	64.67
15	297.84	72.76
16	302.61	81.55
17	303.17	83.00

Circle Center At X = 233.0 ; Y = 113.7 and Radius, 76.7

*** 1.711 ***

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Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	174.35	61.03
2	181.69	54.24
3	189.86	48.47
4	198.71	43.83
5	208.10	40.39
6	217.86	38.22
7	227.83	37.35
8	237.82	37.79
9	247.66	39.54
10	257.19	42.58
11	266.24	46.84
12	274.64	52.25
13	282.27	58.72
14	288.97	66.14
15	294.65	74.38
16	299.04	83.00

Circle Center At X = 229.4 ; Y = 113.2 and Radius, 75.9

*** 1.711 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	167.91	60.24
2	175.63	53.87
3	184.05	48.48
4	193.05	44.13
5	202.51	40.89
6	212.29	38.81
7	222.25	37.91
8	232.25	38.22
9	242.14	39.72
10	251.77	42.39
11	261.02	46.20
12	269.74	51.09
13	277.82	56.98
14	285.13	63.81
15	291.57	71.45
16	297.05	79.82
17	298.62	83.00

Circle Center At X = 224.7 ; Y = 121.2 and Radius, 83.3

*** 1.724 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	171.94	60.74
2	179.50	54.20
3	187.83	48.67
4	196.78	44.22
5	206.23	40.93
6	216.01	38.85
7	225.98	38.02
8	235.97	38.44
9	245.82	40.12
10	255.40	43.02
11	264.53	47.10
12	273.07	52.29
13	280.90	58.52
14	287.88	65.67
15	293.91	73.65
16	298.89	82.32
17	299.18	83.00

Circle Center At X = 227.6 ; Y = 117.5 and Radius, 79.5

*** 1.724 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	178.57	61.44
2	185.67	54.40
3	193.68	48.42
4	202.45	43.62
5	211.81	40.10
6	221.57	37.93
7	231.54	37.14
8	241.52	37.76
9	251.32	39.78
10	260.74	43.15
11	269.59	47.80
12	277.70	53.65
13	284.91	60.58
14	291.07	68.45
15	296.08	77.11
16	298.45	83.00

Circle Center At X = 232.1 ; Y = 108.1 and Radius, 71.0

*** 1.724 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	170.13	60.52
2	177.89	54.21
3	186.32	48.84
4	195.32	44.48
5	204.77	41.20
6	214.53	39.03
7	224.48	38.00
8	234.48	38.13
9	244.39	39.41
10	254.10	41.84
11	263.45	45.37
12	272.34	49.95
13	280.63	55.54
14	288.23	62.04
15	295.02	69.38
16	300.92	77.46
17	304.05	83.00

Circle Center At X = 228.4 ; Y = 124.2 and Radius, 86.3

*** 1.725 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	172.94	60.87
2	180.15	53.94
3	188.27	48.10
4	197.12	43.44
5	206.53	40.07
6	216.33	38.06
7	226.31	37.43
8	236.28	38.21
9	246.04	40.37
10	255.41	43.88
11	264.19	48.67
12	272.21	54.64
13	279.32	61.67
14	285.37	69.63
15	290.26	78.35
16	292.06	83.00

Circle Center At X = 225.7 ; Y = 108.5 and Radius, 71.1

*** 1.726 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	168.92	60.36
2	176.44	53.78
3	184.75	48.21
4	193.71	43.77
5	203.16	40.51
6	212.96	38.49
7	222.93	37.75
8	232.92	38.30
9	242.75	40.12
10	252.26	43.20
11	261.30	47.48
12	269.72	52.88
13	277.37	59.32
14	284.13	66.69
15	289.88	74.87
16	294.16	83.00

Circle Center At X = 223.7 ; Y = 115.3 and Radius, 77.5

*** 1.726 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	178.77	61.46
2	185.84	54.39
3	193.85	48.41
4	202.64	43.63
5	212.01	40.15
6	221.79	38.05
7	231.77	37.37
8	241.74	38.12
9	251.50	40.29
10	260.85	43.84
11	269.60	48.68
12	277.57	54.72
13	284.59	61.84
14	290.52	69.89
15	295.25	78.71
16	296.80	83.00

Circle Center At X = 231.4 ; Y = 107.0 and Radius, 69.6

*** 1.729 ***

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          Y           A     X     I     S           F     T

          .00     59.38    118.75    178.13    237.50    296.88

X       .00 +--*--*-*-*---------+---------+---------+---------+
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      59.38 +
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A    118.75 +
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            -      ....
            -     ....1
X    178.13 +    ....1*
            -    ...12.
            -   ...16..
            - .....1...*
            - ....15...*
            -.....1.....*
I    237.50 +.....14.....
            -......1......
            -......11......
            ........14....*
            ........714...*
            ..........2148*
S    296.88 ...........2111
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            -..........W....
      356.25 +...............
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F     415.63 +    ...........
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T     475.00 +  *  * * ** .*
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** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date:	11-01-92
Time of Run:	2:49 PM
Run By:	SMM
Input Data Filename:	RWB3-4A.IN
Output Filename:	RWB3-4A.R2

PROBLEM DESCRIPTION RIVERWOOD @ POND: LONG TERM SUDDEN DRAWDOWN CASE - IMPOUNDMENT FULL

BOUNDARY COORDINATES

8 Top Boundaries
16 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	58.00	150.00	58.00	5
2	150.00	58.00	174.00	61.00	5
3	174.00	61.00	205.00	64.00	4
4	205.00	64.00	215.00	64.00	4
5	215.00	64.00	267.50	85.00	2
6	267.50	85.00	281.50	85.00	2
7	281.50	85.00	286.50	83.00	2
8	286.50	83.00	475.00	83.00	1
9	286.50	83.00	334.00	64.00	2
10	334.00	64.00	475.00	64.00	4
11	230.00	70.00	319.00	70.00	3
12	220.00	66.00	329.00	66.00	4
13	174.00	61.00	475.00	61.00	5
14	.00	45.00	475.00	45.00	6
15	.00	37.00	475.00	37.00	7
16	.00	18.00	475.00	18.00	8

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ISOTROPIC SOIL PARAMETERS

8 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	80.0	80.0	.0	.0	.00	.0	1
2	125.0	125.0	200.0	20.0	.00	.0	1

3	115.0	115.0	.0	35.0	.00	.0	1
4	125.0	125.0	200.0	20.0	.00	.0	1
5	115.0	115.0	.0	35.0	.00	.0	1
6	125.0	125.0	200.0	20.0	.00	.0	1
7	115.0	115.0	.0	35.0	.00	.0	1
8	125.0	125.0	400.0	20.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	61.00
2	174.00	61.00
3	215.00	64.00
4	281.50	85.00
5	341.50	61.00
6	475.00	61.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of200 Points Equally Spaced Along The Ground Surface Between X = 100.00 ft.
and X = 250.00 ft.

Each Surface Terminates Between X = 260.00 ft.
and X = 475.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 1.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	222.11	66.84
2	229.23	59.83
3	236.78	53.27
4	244.72	47.19
5	253.03	41.62
6	261.67	36.58
7	270.61	32.10
8	279.81	28.18
9	289.23	24.84
10	298.85	22.10
11	308.62	19.96
12	318.50	18.44
13	328.46	17.54
14	338.46	17.26
15	348.45	17.61
16	358.40	18.58
17	368.28	20.18
18	378.03	22.38
19	387.63	25.20
20	397.03	28.60
21	406.20	32.59
22	415.10	37.14
23	423.70	42.24
24	431.97	47.87
25	439.87	54.00
26	447.37	60.62
27	454.44	67.69
28	461.06	75.19
29	467.13	83.00

Factor Of Safety For The Preceding Specified Surface =*******

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	223.62	67.45
2	230.69	60.38
3	238.18	53.75
4	246.06	47.60
5	254.31	41.94
6	262.89	36.80
7	271.76	32.19
8	280.90	28.14
9	290.27	24.65
10	299.84	21.74
11	309.57	19.43
12	319.42	17.71
13	329.36	16.60
14	339.35	16.11
15	349.35	16.22
16	359.32	16.95
17	369.23	18.29
18	379.04	20.23

1	250.00	78.00
2	257.50	71.39
3	265.48	65.36
4	273.88	59.93
5	282.66	55.15
6	291.78	51.03
7	301.17	47.60
8	310.79	44.88
9	320.59	42.89
10	330.51	41.63
11	340.50	41.11
12	350.50	41.33
13	360.45	42.30
14	370.30	44.00
15	380.00	46.44
16	389.49	49.58
17	398.72	53.43
18	407.64	57.95
19	416.20	63.12
20	424.35	68.92
21	432.05	75.30
22	439.25	82.24
23	439.93	83.00

Factor Of Safety For The Preceding Specified Surface =-12.652

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	204.02	63.91
2	213.52	60.77
3	223.40	59.27
4	233.40	59.47
5	243.22	61.34
6	252.59	64.84
7	261.24	69.87
8	268.91	76.28
9	275.40	83.89
10	276.06	85.00

Circle Center At X = 227.3 ; Y = 118.1 and Radius, 59.0

*** 1.427 ***

Individual data on the 22 slices

ce	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	1.0	25.6	.0	.0	.0	.0	.0	.0	.0
2	.8	53.1	.0	.0	.0	.0	.0	.0	.0
3	7.0	1616.4	.0	655.0	.0	.0	.0	.0	.0
4	.7	272.5	.0	137.1	.0	.0	.0	.0	.0
5	1.5	615.3	.0	307.3	.0	.0	.0	.0	.0
6	5.0	2979.4	.0	1392.7	.0	.0	.0	.0	.0
7	1.3	1079.0	.0	490.1	.0	.0	.0	.0	.0
8	2.1	1912.7	.0	860.1	.0	.0	.0	.0	.0
9	6.6	7594.1	.0	3284.7	.0	.0	.0	.0	.0
10	3.4	4592.9	.0	1994.4	.0	.0	.0	.0	.0
11	.6	861.4	.0	376.7	.0	.0	.0	.0	.0
12	7.4	11561.3	.0	4915.1	.0	.0	.0	.0	.0
13	1.8	2990.1	.0	1236.8	.0	.0	.0	.0	.0
14	9.4	16105.9	.0	6733.4	.0	.0	.0	.0	.0
15	2.0	3419.1	.0	1481.7	.0	.0	.0	.0	.0
16	6.6	10858.5	.0	4406.4	.0	.0	.0	.0	.0
17	.2	253.3	.0	108.6	.0	.0	.0	.0	.0
18	6.1	8566.5	.0	3347.0	.0	.0	.0	.0	.0
19	1.4	1644.4	.0	560.8	.0	.0	.0	.0	.0
20	5.5	3790.0	.0	1207.6	.0	.0	.0	.0	.0
21	.9	198.0	.0	.0	.0	.0	.0	.0	.0
22	.7	46.1	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	198.74	63.39
2	208.36	60.65
3	218.27	59.28
4	228.27	59.32
5	238.16	60.75
6	247.76	63.56
7	256.87	67.69
8	265.31	73.05
9	272.92	79.54
10	277.74	85.00

Circle Center At X = 223.0 ; Y = 129.9 and Radius, 70.8

*** 1.436 ***

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Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	210.80	64.00
2	220.36	61.06
3	230.29	59.83
4	240.27	60.32
5	250.03	62.54

6	259.25	66.41
7	267.66	71.82
8	275.01	78.60
9	279.90	85.00

Circle Center At X = 232.4 ; Y = 117.4 and Radius, 57.6

*** 1.437 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	213.07	64.00
2	222.68	61.25
3	232.63	60.26
4	242.60	61.07
5	252.26	63.64
6	261.31	67.89
7	269.46	73.69
8	276.44	80.85
9	279.24	85.00

Circle Center At X = 233.1 ; Y = 116.1 and Radius, 55.8

*** 1.438 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	207.04	64.00
2	216.50	60.77
3	226.36	59.10
4	236.36	59.03
5	246.24	60.55
6	255.76	63.63
7	264.66	68.19
8	272.71	74.12
9	279.72	81.25
10	282.17	84.73

Circle Center At X = 231.8 ; Y = 120.8 and Radius, 62.0

*** 1.456 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	203.27	63.83
2	212.42	59.80
3	222.17	57.59
4	232.17	57.27
5	242.04	58.86
6	251.43	62.30
7	260.00	67.46
8	267.42	74.15
9	273.44	82.14
10	274.84	85.00

Circle Center At X = 228.8 ; Y = 109.1 and Radius, 52.0

*** 1.459 ***

1

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	196.48	63.18
2	205.95	59.96
3	215.76	58.00
4	225.74	57.33
5	235.72	57.97
6	245.53	59.89
7	255.01	63.07
8	263.99	67.46
9	272.34	72.98
10	279.89	79.53
11	283.89	84.04

Circle Center At X = 225.9 ; Y = 134.2 and Radius, 76.8

*** 1.469 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	198.74	63.39
2	208.48	61.11
3	218.44	60.18
4	228.43	60.60
5	238.27	62.38
6	247.78	65.48
7	256.77	69.84
8	265.10	75.38
9	272.59	82.00
10	275.17	85.00

Circle Center At X = 220.3 ; Y = 133.1 and Radius, 72.9

*** 1.476 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	219.10	65.64
2	228.49	62.22
3	238.44	61.22
4	248.34	62.68
5	257.57	66.53
6	265.57	72.52
7	271.86	80.29
8	274.04	85.00

Circle Center At X = 237.5 ; Y = 101.2 and Radius, 40.0

*** 1.477 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	197.24	63.25
2	206.57	59.66
3	216.32	57.43
4	226.28	56.58
5	236.27	57.14
6	246.07	59.10
7	255.51	62.41
8	264.39	67.01
9	272.53	72.82
10	279.77	79.71
11	283.37	84.25

Circle Center At X = 227.3 ; Y = 127.6 and Radius, 71.1

*** 1.478 ***

```
          Y           A     X     I     S           F     T

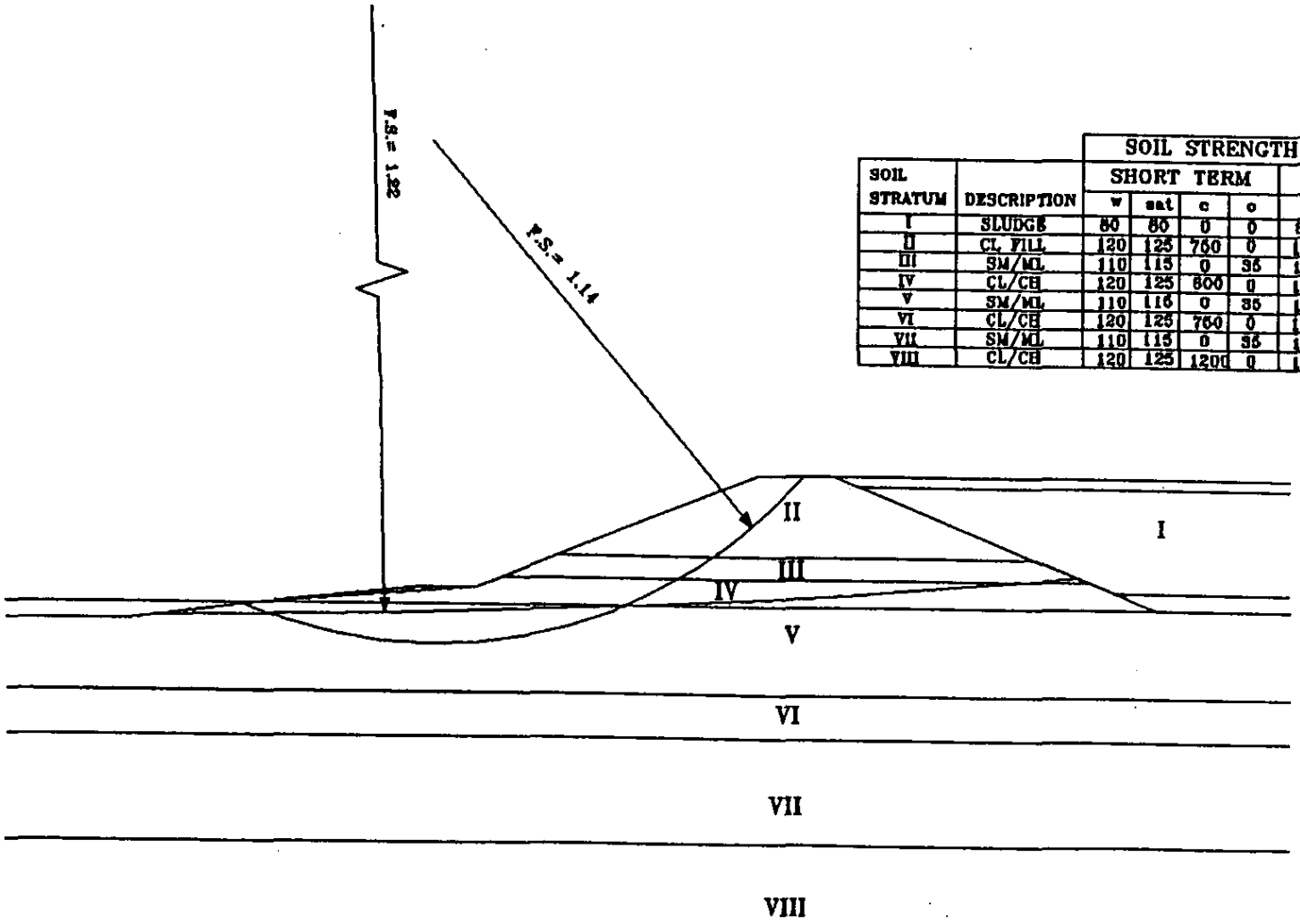
          .00     59.38    118.75    178.13    237.50    296.88

X       .00 +--*--*-*-*---------+---------+---------+---------+
```

```
                -
                -
                -
                -
        59.38 +
                -
                -
                -
                -
                -          .
                -         ..
A      118.75 +     .....
                -    ......
                -    ......
                -   ......*
                -  ........
                -  ........
X      178.13 + ........*
                - ..........
                -..........2
                -.........2*
                -.........1*
                ..........1.*
I      237.50 ..........18..
                ..........12..
                ...........11..
                ...........521*
                ............52*
                ..............*
S      296.88 ...............
                ...............
                ............*..
                ...........*...
                -..........*...
                -.........W....
       356.25 +..............
                -..............
                - .............
                -  ............
                -  ............
                -   ...........
F      415.63 +    ..........
                -     .........
                -      ........
                -       .......
                -         .....
                -          ....
T      475.00 +  *  * * ** .*
```

EARTHQUAKE

LONG TERM EARTHQUAKE - F.S.= 1.14
SHORT TERM EARTHQUAKE - F.S.= 1.22



SOIL STRATUM	DESCRIPTION	SOIL STRENGTH PARAMETERS							
		SHORT TERM				LONG TERM			
		w	sat	c	o	w	sat	c'	o'
I	SLUDGE	80	80	0	0	80	80	0	0
II	CL FILL	120	125	750	0	120	125	200	20
III	SM/ML	110	115	0	35	110	115	0	35
IV	CL/CH	120	125	800	0	120	125	200	20
V	SM/ML	110	115	0	35	110	115	0	35
VI	CL/CH	120	125	750	0	120	125	200	20
VII	SM/ML	110	115	0	35	110	115	0	35
VIII	CL/CH	120	125	1200	0	120	125	400	20

FIGURE 3

DAMES & MOORE

RIVERWOOD INTER[illegible]AL USA, INC.
WEST MONR[illegible]ISIANA

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date:	11-01-92
Time of Run:	5:21 PM
Run By:	SMM
Input Data Filename:	RWB3-5A.IN
Output Filename:	RWB3-5A.R2

PROBLEM DESCRIPTION RIVERWOOD @ POND: SHORT TERM EARTHQUAKE
CASE - IMPOUNDMENT FULL

BOUNDARY COORDINATES

8 Top Boundaries
16 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	58.00	150.00	58.00	5
2	150.00	58.00	174.00	61.00	5
3	174.00	61.00	205.00	64.00	4
4	205.00	64.00	215.00	64.00	4
5	215.00	64.00	267.50	85.00	2
6	267.50	85.00	281.50	85.00	2
7	281.50	85.00	286.50	83.00	2
8	286.50	83.00	475.00	83.00	1
9	286.50	83.00	334.00	64.00	2
10	334.00	64.00	475.00	64.00	4
11	230.00	70.00	319.00	70.00	3
12	220.00	66.00	329.00	66.00	4
13	174.00	61.00	475.00	61.00	5
14	.00	45.00	475.00	45.00	6
15	.00	37.00	475.00	37.00	7
16	.00	18.00	475.00	18.00	8

1

ISOTROPIC SOIL PARAMETERS

8 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	80.0	80.0	.0	.0	.00	.0	2
2	120.0	125.0	750.0	.0	.00	.0	1

3	110.0	115.0	.0	35.0	.00	.0	1
4	120.0	125.0	600.0	.0	.00	.0	1
5	110.0	115.0	.0	35.0	.00	.0	1
6	120.0	125.0	750.0	.0	.00	.0	1
7	110.0	115.0	.0	35.0	.00	.0	1
8	120.0	125.0	1200.0	.0	.00	.0	1

2 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 7 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	61.00
2	174.00	61.00
3	215.00	64.00
4	230.00	70.00
5	319.00	70.00
6	341.50	61.00
7	475.00	61.00

Piezometric Surface No. 2 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	281.50	85.00
2	475.00	85.00

A Horizontal Earthquake Loading Coefficient
Of .100 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of .100 Has Been Assigned

Cavitation Pressure = .0 psf

A Critical Failure Surface Searching Method, Using A Random
Technique for Generating Circular Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of200 Points Equally Spaced
Along The Ground Surface Between X = 145.00 ft.
and X = 185.00 ft.

Each Surface Terminates Between X = 260.00 ft.

and X = 475.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 1.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	154.85	58.61
2	164.85	58.65
3	174.85	58.74
4	184.85	58.89
5	194.85	59.08
6	204.84	59.34
7	214.84	59.64
8	224.83	60.00
9	234.82	60.41
10	244.81	60.88
11	254.80	61.39
12	264.78	61.96
13	274.76	62.59
14	284.74	63.26
15	294.71	63.99
16	304.68	64.78
17	314.65	65.61
18	324.61	66.50
19	334.56	67.44
20	344.51	68.43
21	354.46	69.48
22	364.40	70.58
23	374.33	71.73
24	384.26	72.94
25	394.18	74.20
26	404.09	75.51
27	414.00	76.87
28	423.90	78.28
29	433.79	79.75
30	443.68	81.27
31	453.55	82.85
32	454.69	83.00

Circle Center At X = 152.3 ; Y = 1941.9 and Radius, 1883.3

*** 1.217 ***

Individual data on the 43 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	10.0	695.8	1112.3	1481.3	.0	.0	69.6	69.6	.0
2	9.2	1830.3	329.1	1319.8	.0	.0	183.0	183.0	.0
3	.8	225.5	.0	121.3	.0	.0	22.5	22.5	.0
4	10.0	3215.8	.0	1627.8	.0	.0	321.6	321.6	.0
5	10.0	4214.4	.0	1975.7	.0	.0	421.4	421.4	.0
6	10.0	5151.5	.0	2290.5	.0	.0	515.1	515.1	.0
7	.2	88.2	.0	38.4	.0	.0	8.8	8.8	.0
8	9.8	5376.9	.0	2533.8	.0	.0	537.7	537.7	.0
9	.2	85.8	.0	43.8	.0	.0	8.6	8.6	.0
10	5.0	3216.8	.0	1529.6	.0	.0	321.7	321.7	.0
11	4.8	4195.4	.0	1981.0	.0	.0	419.5	419.5	.0
12	5.2	5661.4	.0	2662.3	.0	.0	566.1	566.1	.0
13	4.8	6173.0	.0	2918.2	.0	.0	617.3	617.3	.0
14	10.0	15954.6	.0	5838.0	.0	.0	1595.5	1595.5	.0
15	2.4	4436.1	.0	1350.2	.0	.0	443.6	443.6	.0
16	7.6	15723.3	.0	4181.5	.0	.0	1572.3	1572.3	.0
17	10.0	24261.2	.0	5192.2	.0	.0	2426.1	2426.1	.0
18	2.7	7305.2	.0	1350.6	.0	.0	730.5	730.5	.0
19	7.3	19719.3	.0	3469.0	.0	.0	1971.9	1971.9	.0
20	6.7	17905.4	.0	3026.7	.0	.0	1790.5	1790.5	.0
21	3.2	8224.2	.0	1387.4	.0	.0	822.4	822.4	.0
22	1.8	4215.9	.0	734.4	.0	.0	421.6	421.6	.0
[illegible]	8.2	18420.5	1025.1	3241.0	.0	.0	1842.0	1842.0	.0
[illegible]	10.0	20045.3	1244.2	3503.7	.0	.0	2004.5	2004.5	.0
[illegible]	10.0	17439.9	1243.6	2999.0	.0	.0	1744.0	1744.0	.0
26	4.4	6784.8	543.1	1143.5	.0	.0	678.5	678.5	.0
27	.0	7.1	.6	1.1	.0	.0	.7	.7	.0
28	5.6	8167.2	699.4	858.9	.0	.0	816.7	816.7	.0
29	2.5	3401.5	317.2	93.2	.0	.0	340.2	340.2	.0
30	7.4	9436.7	925.3	8322.8	.0	.0	943.7	943.7	.0
31	10.0	11990.2	1241.8	10646.9	.0	.0	1199.0	1199.0	.0
32	9.9	11171.9	1241.1	10010.2	.0	.0	1117.2	1117.2	.0
33	9.9	10312.2	1240.4	9340.6	.0	.0	1031.2	1031.2	.0
34	9.9	9411.4	1239.7	8638.1	.0	.0	941.1	941.1	.0
35	9.9	8469.4	1238.9	7902.7	.0	.0	846.9	846.9	.0
36	9.9	7486.6	1238.1	7134.3	.0	.0	748.7	748.7	.0
37	9.9	6463.2	1237.2	6333.1	.0	.0	646.3	646.3	.0
38	9.9	5399.3	1236.4	5499.1	.0	.0	539.9	539.9	.0
39	9.9	4295.1	1235.4	4632.3	.0	.0	429.5	429.5	.0
40	9.9	3150.9	1234.5	3732.6	.0	.0	315.1	315.1	.0
41	9.9	1966.9	1233.5	2800.2	.0	.0	196.7	196.7	.0
42	9.9	743.3	1232.5	1835.1	.0	.0	74.3	74.3	.0
43	.9	5.8	117.0	123.1	.0	.0	.6	.6	.0

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	164.10	59.76
2	172.87	54.97
3	181.92	50.72
4	191.22	47.03
5	200.72	43.92
6	210.40	41.39
7	220.21	39.47

8	230.12	38.15
9	240.10	37.44
10	250.10	37.34
11	260.08	37.85
12	270.02	38.98
13	279.87	40.71
14	289.59	43.04
15	299.16	45.96
16	308.52	49.46
17	317.66	53.53
18	326.53	58.15
19	335.09	63.31
20	343.33	68.98
21	351.20	75.15
22	358.68	81.78
23	359.90	83.00

Circle Center At X = 246.7 ; Y = 200.5 and Radius, 163.2

*** 1.220 ***

1

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	152.44	58.30
2	161.26	53.60
3	170.36	49.46
4	179.71	45.91
5	189.27	42.97
6	199.00	40.64
7	208.85	38.94
8	218.79	37.87
9	228.78	37.43
10	238.78	37.63
11	248.75	38.47
12	258.64	39.94
13	268.41	42.04
14	278.04	44.76
15	287.47	48.09
16	296.67	52.01
17	305.59	56.51
18	314.22	61.58
19	322.50	67.18
20	330.41	73.29
21	337.92	79.90
22	341.01	83.00

Circle Center At X = 230.6 ; Y = 194.0 and Radius, 156.6

*** 1.221 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	158.07	59.01
2	166.84	54.21
3	175.92	50.01
4	185.25	46.42
5	194.80	43.45
6	204.52	41.11
7	214.38	39.43
8	224.32	38.40
9	234.32	38.03
10	244.31	38.32
11	254.27	39.27
12	264.14	40.88
13	273.88	43.14
14	283.45	46.03
15	292.81	49.56
16	301.92	53.69
17	310.73	58.42
18	319.21	63.71
19	327.32	69.56
20	335.03	75.93
21	342.30	82.80
22	342.49	83.00

Circle Center At X = 234.9 ; Y = 189.2 and Radius, 151.2

*** 1.230 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	173.54	60.94
2	181.43	54.79
3	189.90	49.49
4	198.88	45.08
5	208.27	41.62
6	217.95	39.15
7	227.85	37.69
8	237.84	37.25
9	247.82	37.85
10	257.69	39.47
11	267.34	42.09
12	276.66	45.70
13	285.57	50.25
14	293.96	55.69
15	301.75	61.96
16	308.85	69.00
17	315.18	76.74
18	319.31	83.00

Circle Center At X = 237.0 ; Y = 134.1 and Radius, 96.9

*** 1.239 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	170.33	60.54
2	178.25	54.44
3	186.75	49.18
4	195.75	44.80
5	205.13	41.36
6	214.82	38.89
7	224.71	37.41
8	234.70	36.94
9	244.69	37.49
10	254.57	39.05
11	264.24	41.60
12	273.60	45.12
13	282.55	49.57
14	291.01	54.91
15	298.88	61.07
16	306.09	68.00
17	312.56	75.63
18	317.63	83.00

Circle Center At X = 234.3 ; Y = 135.4 and Radius, 98.4

*** 1.241 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	151.83	58.23
2	160.57	53.35
3	169.62	49.10
4	178.94	45.50
5	188.50	42.56
6	198.24	40.29
7	208.12	38.72
8	218.08	37.84
9	228.08	37.67
10	238.06	38.20
11	247.99	39.43
12	257.80	41.35
13	267.46	43.96
14	276.90	47.23
15	286.10	51.17
16	294.99	55.74
17	303.54	60.92
18	311.71	66.69
19	319.45	73.02
20	326.73	79.88
21	329.60	83.00

Circle Center At X = 225.6 ; Y = 180.0 and Radius, 142.3

*** 1.242 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.22	58.00
2	158.16	53.53
3	167.34	49.56
4	176.73	46.11
5	186.30	43.20
6	196.01	40.82
7	205.84	38.99
8	215.76	37.72
9	225.73	37.00
10	235.73	36.84
11	245.73	37.24
12	255.68	38.20
13	265.56	39.71
14	275.35	41.78
15	285.00	44.39
16	294.49	47.53
17	303.80	51.20
18	312.88	55.39
19	321.71	60.08
20	330.27	65.25
21	338.52	70.90
22	346.45	77.00
23	353.40	83.00

Circle Center At X = 233.6 ; Y = 215.5 and Radius, 178.6

*** 1.249 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	145.40	58.00
2	154.15	53.15
3	163.21	48.91
4	172.53	45.30
5	182.08	42.34
6	191.81	40.04
7	201.68	38.40
8	211.63	37.45
9	221.63	37.18
10	231.62	37.59
11	241.56	38.68
12	251.40	40.45
13	261.10	42.89
14	270.61	45.99
15	279.89	49.73

16	288.88	54.09
17	297.56	59.06
18	305.88	64.61
19	313.80	70.72
20	321.28	77.35
21	326.84	83.00

Circle Center At X = 220.6 ; Y = 183.4 and Radius, 146.2

*** 1.251 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	156.86	58.86
2	165.89	54.57
3	175.14	50.75
4	184.56	47.42
5	194.15	44.57
6	203.87	42.22
7	213.70	40.38
8	223.61	39.04
9	233.57	38.21
10	243.57	37.90
11	253.57	38.10
12	263.54	38.81
13	273.47	40.04
14	283.32	41.78
15	293.06	44.02
16	302.68	46.75
17	312.14	49.98
18	321.43	53.70
19	330.51	57.88
20	339.37	62.53
21	347.97	67.62
22	356.30	73.15
23	364.34	79.11
24	369.06	83.00

Circle Center At X = 244.6 ; Y = 232.1 and Radius, 194.2

*** 1.251 ***

1

```
          Y           A     X     I     S           F     T

          .00     59.38    118.75    178.13    237.50    296.88

X       .00 +--*--*-*-*---------+---------+---------+---------+
            -
            -
            -
            -
            -
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```
        59.38 +
              -
              -
              -
              -
              -
A    118.75 +
              -
              -
              -        .*
              -      .931
              -     ..321
X    178.13 +    ..932*
              -    ..32.1
              -   ..925.1
              - ....92..1*
              - ....32..1*
              -.....20..1.*
I    237.50 +.....29..1..
              -.....27..1...
              -.....23..1....
              .......29.1...*
              .......23..1..*
              .......236.1..*
S    296.88 .......02351...
              ........24315..
              ........0231*55
              ..........2*377
              ...........*833
              -.........W0124
     356.25 +...........1.2
              -...........100
              - ..........1..
              - ..........1..
              -  .........1..
              -   .........1.
F    415.63 +    ........1.
              -     .......1.
              -      ......1.
              -       ......1
              -        .....1
              -          ....
T    475.00 +  *  * * ** .*
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** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date:	11-01-92
Time of Run:	3:09 PM
Run By:	SMM
Input Data Filename:	RWB3-6AR.I
Output Filename:	RWB3-6AR.O

PROBLEM DESCRIPTION RIVERWOOD @ POND: LONG TERM EARTHQUAKE
CASE - IMPOUNDMENT FULL High Water Table

BOUNDARY COORDINATES

8 Top Boundaries
16 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	58.00	150.00	58.00	5
2	150.00	58.00	174.00	61.00	5
3	174.00	61.00	205.00	64.00	4
4	205.00	64.00	215.00	64.00	4
5	215.00	64.00	267.50	85.00	2
6	267.50	85.00	281.50	85.00	2
7	281.50	85.00	286.50	83.00	2
8	286.50	83.00	475.00	83.00	1
9	286.50	83.00	334.00	64.00	2
10	334.00	64.00	475.00	64.00	4
11	230.00	70.00	319.00	70.00	3
12	220.00	66.00	329.00	66.00	4
13	174.00	61.00	475.00	61.00	5
14	.00	45.00	475.00	45.00	6
15	.00	37.00	475.00	37.00	7
16	.00	18.00	475.00	18.00	8

1

ISOTROPIC SOIL PARAMETERS

8 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	80.0	80.0	.0	.0	.00	.0	2
2	120.0	125.0	200.0	20.0	.00	.0	1

3	110.0	115.0	.0	35.0	.00	.0	1
4	120.0	125.0	200.0	20.0	.00	.0	1
5	110.0	115.0	.0	35.0	.00	.0	1
6	120.0	125.0	200.0	20.0	.00	.0	1
7	110.0	115.0	.0	35.0	.00	.0	1
8	120.0	125.0	400.0	20.0	.00	.0	1

2 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 7 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	61.00
2	174.00	61.00
3	215.00	64.00
4	230.00	70.00
5	319.00	70.00
6	341.50	61.00
7	475.00	61.00

Piezometric Surface No. 2 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	281.50	85.00
2	475.00	85.00

A Horizontal Earthquake Loading Coefficient
Of .100 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of .100 Has Been Assigned

Cavitation Pressure = .0 psf

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of200 Points Equally Spaced
Along The Ground Surface Between X = 160.00 ft.
and X = 190.00 ft.

Each Surface Terminates Between X = 270.00 ft.

and X = 300.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 40.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	171.31	60.66
2	180.74	57.33
3	190.47	55.04
4	200.39	53.81
5	210.39	53.67
6	220.35	54.60
7	230.15	56.61
8	239.67	59.66
9	248.81	63.72
10	257.45	68.75
11	265.50	74.68
12	272.87	81.44
13	275.98	85.00

Circle Center At X = 206.8 ; Y = 146.0 and Radius, 92.4

*** 1.140 ***

Individual data on the 21 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	2.7	199.4	28.5	144.7	.0	.0	19.9	19.9	.0
2	6.7	2190.7	.0	1211.1	.0	.0	219.1	219.1	.0
3	9.7	6739.9	.0	3523.8	.0	.0	674.0	674.0	.0
[illegible]	9.9	10048.2	.0	5066.3	.0	.0	1004.8	1004.8	.0
[illegible]	4.6	5406.3	.0	2671.4	.0	.0	540.6	540.6	.0
[illegible]	5.4	6531.2	.0	3276.0	.0	.0	653.1	653.1	.0
7	4.6	5493.1	.0	2864.5	.0	.0	549.3	549.3	.0
8	5.0	6314.7	.0	3112.0	.0	.0	631.5	631.5	.0
9	.3	478.3	.0	234.4	.0	.0	47.8	47.8	.0
10	9.7	14492.3	.0	7142.6	.0	.0	1449.2	1449.2	.0

11	.1	234.2	.0	125.4	.0	.0	23.4	23.4	.0
12	9.5	15717.1	.0	7405.7	.0	.0	1571.7	1571.7	.0
13	3.0	5128.5	.0	1993.9	.0	.0	512.9	512.9	.0
14	6.1	10223.2	.0	3192.1	.0	.0	1022.3	1022.3	.0
	3.9	6269.7	.0	1454.4	.0	.0	627.0	627.0	.0
	4.7	7116.9	.0	895.7	.0	.0	711.7	711.7	.0
17	1.7	2432.9	.0	82.6	.0	.0	243.3	243.3	.0
18	6.4	8071.6	.0	.0	.0	.0	807.2	807.2	.0
19	2.0	2157.8	.0	.0	.0	.0	215.8	215.8	.0
20	5.4	3876.9	.0	.0	.0	.0	387.7	387.7	.0
21	3.1	664.1	.0	.0	.0	.0	66.4	66.4	.0

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	171.16	60.64
2	180.60	57.35
3	190.33	55.06
4	200.25	53.80
5	210.25	53.58
6	220.22	54.41
7	230.04	56.28
8	239.62	59.16
9	248.84	63.02
10	257.61	67.83
11	265.83	73.53
12	273.40	80.05
13	278.06	85.00

Circle Center At X = 207.3 ; Y = 149.1 and Radius, 95.6

*** 1.140 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	175.23	61.12
2	184.68	57.87
3	194.45	55.72
4	204.40	54.69
5	214.40	54.80
6	224.32	56.04
7	234.04	58.40
8	243.42	61.85
9	252.35	66.35
10	260.72	71.83
11	268.40	78.23
12	274.87	85.00

Circle Center At X = 208.4 ; Y = 142.4 and Radius, 87.8

*** 1.141 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	173.57	60.95
2	182.90	57.36
3	192.59	54.88
4	202.50	53.56
5	212.50	53.40
6	222.45	54.41
7	232.21	56.57
8	241.66	59.87
9	250.65	64.24
10	259.07	69.63
11	266.80	75.97
12	273.74	83.17
13	275.13	85.00

Circle Center At X = 208.9 ; Y = 138.8 and Radius, 85.4

*** 1.141 ***

1

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	176.13	61.21
2	185.65	58.15
3	195.44	56.11
4	205.40	55.14
5	215.39	55.22
6	225.33	56.37
7	235.08	58.56
8	244.55	61.79
9	253.62	66.00
10	262.19	71.15
11	270.17	77.18
12	277.46	84.02
13	278.30	85.00

Circle Center At X = 209.6 ; Y = 149.0 and Radius, 93.9

*** 1.143 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	175.38	61.13

2	184.92	58.15
3	194.73	56.22
4	204.70	55.35
5	214.69	55.56
6	224.61	56.85
7	234.33	59.19
8	243.74	62.57
9	252.74	66.94
10	261.21	72.26
11	269.06	78.45
12	275.73	85.00

Circle Center At X = 207.7 ; Y = 148.0 and Radius, 92.7

*** 1.144 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	173.57	60.95
2	182.82	57.14
3	192.45	54.46
4	202.33	52.94
5	212.33	52.61
6	222.29	53.47
7	232.08	55.50
8	241.56	58.68
9	250.60	62.97
10	259.06	68.30
11	266.83	74.59
12	273.80	81.77
13	276.27	85.00

Circle Center At X = 210.1 ; Y = 136.6 and Radius, 84.1

*** 1.144 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	169.65	60.46
2	178.97	56.83
3	188.63	54.25
4	198.52	52.76
5	208.51	52.36
6	218.48	53.08
7	228.32	54.88
8	237.90	57.77
9	247.09	61.69
10	255.80	66.60
11	263.92	72.45

12	271.34	79.15
13	276.52	85.00

Circle Center At X = 207.1 ; Y = 142.8 and Radius, 90.5

*** 1.144 ***

1

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	176.89	61.28
2	186.20	57.63
3	195.89	55.20
4	205.82	54.02
5	215.82	54.11
6	225.73	55.48
7	235.38	58.10
8	244.62	61.92
9	253.30	66.89
10	261.27	72.93
11	268.41	79.93
12	272.41	85.00

Circle Center At X = 210.0 ; Y = 131.9 and Radius, 78.1

*** 1.147 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	175.38	61.13
2	184.80	57.77
3	194.55	55.57
4	204.50	54.56
5	214.50	54.76
6	224.40	56.15
7	234.06	58.73
8	243.34	62.45
9	252.11	67.27
10	260.23	73.10
11	267.59	79.87
12	271.98	85.00

Circle Center At X = 207.9 ; Y = 137.1 and Radius, 82.6

*** 1.148 ***

1

```
          Y          A    X    I    S          F    T

          .00     59.38   118.75   178.13   237.50   296.88

X       .00 +--*--*-*-*---------+---------+---------+---------+
            -
            -
            -
            -
            -
      59.38 +
            -
            -
            -
            -
            -
A    118.75 +
            -
            -
            -         *
            -         .
            -        .1
X    178.13 +       ..*
            -      ..13.
            -      ..1..
            -      ..1.*
            -      ..1.*
            -      ..21.*
I    237.50 +      ...1..
            -      ...31.
            -      ....21.
            -       ....21*
            -       .....2*
            -         ....*
S    296.88 +           ...
            -
            -           *
            -          *
            -          *
            -         W
     356.25 +
            -
            -
            -
            -
            -
F    415.63 +
            -
            -
            -
            -
            -
T    475.00 +  *  * * **  *
```

END OF CONSTRUCTION

LONG TERM CASE - F.S.= 1.86
SHORT TERM CASE - F.S.= 1.93

SOIL STRATUM	DESCRIPTION	SOIL STRENGTH PARAMETERS							
		SHORT TERM				LONG TERM			
		w	γ_{sat}	c	ϕ	w	γ_{sat}	c'	ϕ'
I	SLUDGE					60	60		
II	CL FILL	120	125	760	0	120	125	200	20
III	SM/ML	110	115	0	28	110	115	0	28
IV	CL/CH	120	125	600	0	120	125	200	20
V	SM/ML	110	115	0	28	110	115	0	28
VI	CL/CH	120	125	1600	0	120	125	300	20

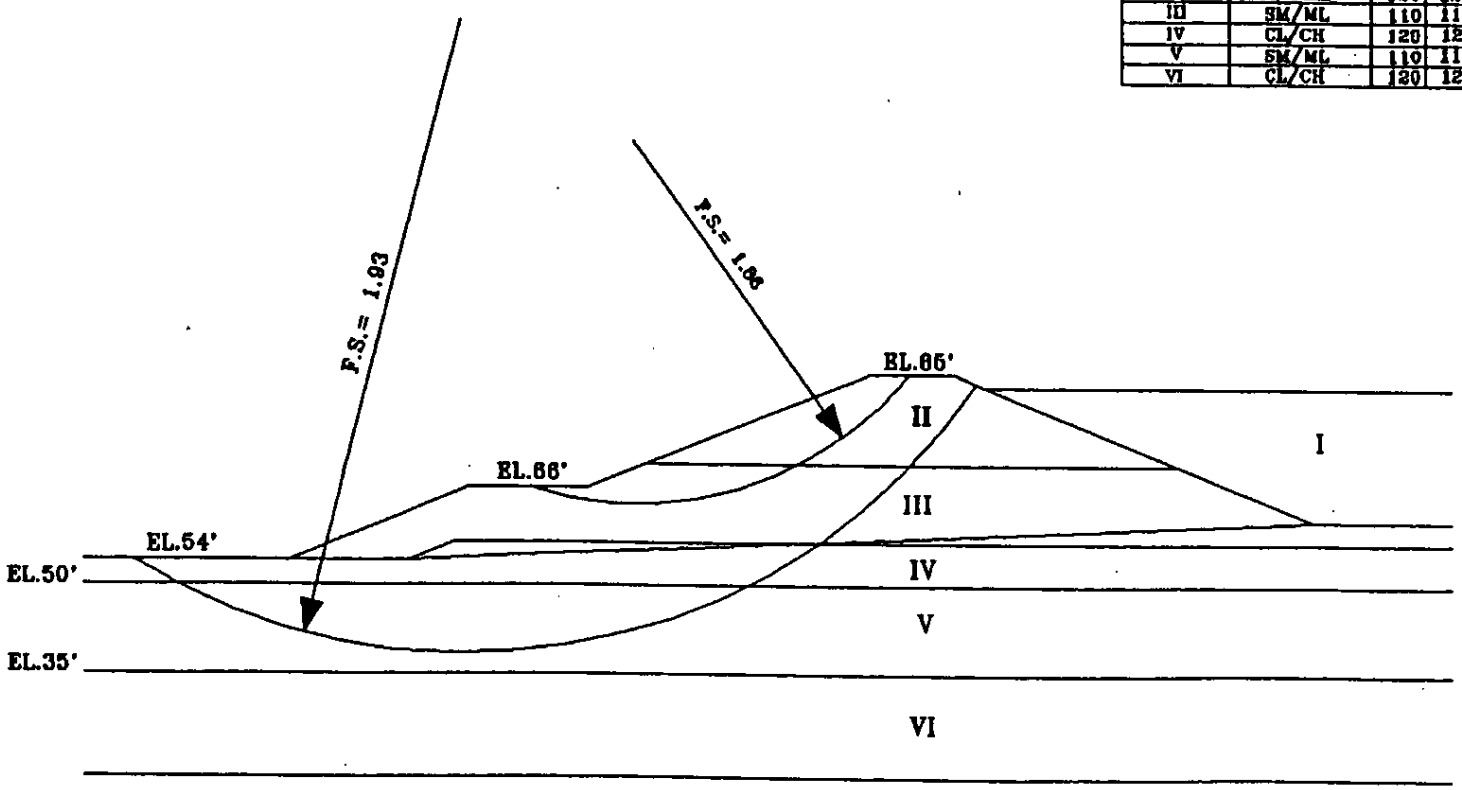

FIGURE 4

DAMES & MOORE

RIVERWOOD INTERNATIONAL USA INC

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date:	11-20-92
Time of Run:	11:16 AM
Run By:	SMM
Input Data Filename:	RWDM1-1A.IN
Output Filename:	RWDM1-1A.R1

PROBLEM DESCRIPTION RIVERWOOD @ DM-1: SHORT TERM END OF CONS TRUCTION CASE

BOUNDARY COORDINATES

7 Top Boundaries
15 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	54.00	102.50	54.00	4
2	102.50	54.00	132.50	66.00	3
3	132.50	66.00	152.50	66.00	3
4	152.50	66.00	200.00	85.00	2
5	200.00	85.00	214.00	85.00	2
6	214.00	85.00	219.00	83.00	2
7	219.00	83.00	450.00	83.00	1
8	219.00	83.00	274.00	61.00	2
9	274.00	61.00	450.00	61.00	3
10	162.50	70.00	251.50	70.00	3
11	102.50	54.00	122.50	54.00	4
12	122.50	54.00	130.00	57.00	4
13	130.00	57.00	450.00	57.00	4
14	.00	50.00	450.00	50.00	5
15	.00	35.00	450.00	35.00	6

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez Surfac No.
1	.1	.1	.0	.0	.00	.0	1
2	120.0	125.0	750.0	.0	.00	.0	1
3	110.0	115.0	.0	28.0	.00	.0	1
4	120.0	125.0	600.0	.0	.00	.0	1
5	110.0	115.0	.0	28.0	.00	.0	1
6	120.0	125.0	1500.0	.0	.00	.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	54.00
2	122.50	54.00
3	274.00	61.00
4	450.00	61.00

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of200 Points Equally Spaced Along The Ground Surface Between X = .00 ft.
and X = 190.00 ft.

Each Surface Terminates Between X = 200.00 ft.
and X = 450.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation

At Which A Surface Extends Is Y = .00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 41 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	68.74	54.00
2	77.30	48.82
3	86.01	43.92
4	94.88	39.30
5	103.90	34.97
6	113.04	30.92
7	122.31	27.18
8	131.70	23.73
9	141.19	20.59
10	150.78	17.75
11	160.46	15.22
12	170.21	13.00
13	180.03	11.10
14	189.90	9.51
15	199.82	8.24
16	209.77	7.28
17	219.75	6.65
18	229.75	6.34
19	239.75	6.35
20	249.74	6.68
21	259.72	7.32
22	269.67	8.29
23	279.59	9.58
24	289.46	11.19
25	299.28	13.11
26	309.02	15.34
27	318.69	17.89
28	328.28	20.74
29	337.76	23.90
30	347.15	27.36
31	356.41	31.12
32	365.55	35.18
33	374.56	39.53
34	383.42	44.16
35	392.13	49.08

27	444.26	80.77
28	449.88	83.00

Factor Of Safety For The Preceding Specified Surface = -3.512

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method *

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	76.38	54.00
2	85.15	49.18
3	94.33	45.22
4	103.84	42.15
5	113.61	39.99
6	123.53	38.77
7	133.53	38.49
8	143.51	39.16
9	153.37	40.78
10	163.05	43.32
11	172.43	46.77
12	181.45	51.09
13	190.02	56.25
14	198.05	62.20
15	205.49	68.88
16	212.26	76.24
17	217.77	83.49

Circle Center At X = 131.4 ; Y = 143.8 and Radius, 105.4

*** 1.930 ***

Individual data on the 30 slices

Water	Water	Tie	Tie	Earthquake

lice No.	Width Ft(m)	Weight Lbs(kg)	Force Top Lbs(kg)	Force Bot Lbs(kg)	Force Norm Lbs(kg)	Force Tan Lbs(kg)	Force Hor Lbs(kg)	Force Ver Lbs(kg)	Surchar Loa Lbs(kg)
1	7.3	1820.0	.0	1036.7	.0	.0	.0	.0	.0
2	1.5	811.7	.0	465.8	.0	.0	.0	.0	.0
3	9.2	7543.8	.0	4241.3	.0	.0	.0	.0	.0
4	8.2	9817.6	.0	5411.9	.0	.0	.0	.0	.0
5	1.3	1891.1	.0	1025.1	.0	.0	.0	.0	.0
6	9.8	17586.7	.0	8069.7	.0	.0	.0	.0	.0
7	8.9	21330.0	.0	8139.8	.0	.0	.0	.0	.0
8	1.0	2777.2	.0	985.4	.0	.0	.0	.0	.0
9	6.5	18677.5	.0	6259.5	.0	.0	.0	.0	.0
10	2.5	7783.7	.0	2471.3	.0	.0	.0	.0	.0
11	1.0	3265.9	.0	1025.3	.0	.0	.0	.0	.0
12	10.0	31316.3	.0	9920.4	.0	.0	.0	.0	.0
13	9.0	27139.9	.0	8680.8	.0	.0	.0	.0	.0
14	.9	2656.8	.0	812.4	.0	.0	.0	.0	.0
15	9.1	28578.1	.0	8034.5	.0	.0	.0	.0	.0
16	.5	1686.1	.0	443.8	.0	.0	.0	.0	.0
17	9.4	29301.3	.0	6884.9	.0	.0	.0	.0	.0
18	6.7	21064.4	.0	3762.3	.0	.0	.0	.0	.0
19	2.3	7043.7	.0	965.1	.0	.0	.0	.0	.0
20	6.0	17911.9	.0	1726.6	.0	.0	.0	.0	.0
21	2.6	7450.9	.0	298.7	.0	.0	.0	.0	.0
22	1.0	2853.4	.0	40.5	.0	.0	.0	.0	.0
23	.2	670.0	.0	1.5	.0	.0	.0	.0	
24	6.8	18178.5	.0	.0	.0	.0	.0	.0	
25	1.9	4893.1	.0	.0	.0	.0	.0	.0	.0
26	5.5	12053.9	.0	.0	.0	.0	.0	.0	.0
27	1.0	1913.1	.0	.0	.0	.0	.0	.0	.0
28	5.7	8187.8	.0	.0	.0	.0	.0	.0	.0
29	1.7	1585.5	.0	.0	.0	.0	.0	.0	.0
30	3.8	1462.0	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	69.70	54.00
2	78.76	49.77
3	88.15	46.32
4	97.79	43.68
5	107.63	41.87
6	117.58	40.90
7	127.58	40.77
8	137.55	41.50
9	147.43	43.06
10	157.14	45.46
11	166.61	48.68
12	175.77	52.68
13	184.56	57.45
14	192.91	62.95

15	200.77	69.13
16	208.08	75.96
17	214.77	83.38
18	215.53	84.39

Circle Center At X = 124.0 ; Y = 158.4 and Radius, 117.7

*** 1.942 ***

1

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	135.58	66.00
2	143.04	59.34
3	151.71	54.36
4	161.22	51.26
5	171.16	50.19
6	181.11	51.19
7	190.64	54.22
8	199.34	59.14
9	206.85	65.75
10	212.83	73.77
11	217.04	82.84
12	217.24	83.70

Circle Center At X = 171.3 ; Y = 98.4 and Radius, 48.2

*** 1.944 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	70.65	54.00
2	79.78	49.92
3	89.22	46.61
4	98.90	44.11
5	108.76	42.42
6	118.72	41.56
7	128.72	41.53

8	138.69	42.34
9	148.55	43.97
10	158.25	46.42
11	167.70	49.68
12	176.86	53.71
13	185.64	58.49
14	193.99	63.98
15	201.86	70.16
16	209.18	76.97
17	215.83	84.27

Circle Center At X = 124.0 ; Y = 161.2 and Radius, 119.8

*** 1.947 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	69.70	54.00
2	78.59	49.42
3	87.83	45.59
4	97.35	42.53
5	107.09	40.26
6	116.98	38.80
7	126.96	38.15
8	136.96	38.32
9	146.91	39.31
10	156.74	41.12
11	166.40	43.72
12	175.81	47.11
13	184.90	51.26
14	193.63	56.14
15	201.93	61.72
16	209.74	67.96
17	217.02	74.82
18	223.71	82.25
19	224.28	83.00

Circle Center At X = 129.9 ; Y = 160.0 and Radius, 121.8

*** 1.950 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	81.16	54.00
2	89.94	49.21
3	99.16	45.36
4	108.74	42.48
5	118.56	40.61
6	128.53	39.76
7	138.53	39.96
8	148.45	41.18
9	158.19	43.43
10	167.65	46.67
11	176.73	50.88
12	185.31	56.00
13	193.33	61.98
14	200.68	68.76
15	207.28	76.27
16	213.08	84.42
17	213.41	85.00

Circle Center At X = 131.7 ; Y = 136.2 and Radius, 96.5

*** 1.952 ***

1

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	126.99	63.79
2	135.22	58.12
3	144.28	53.88
4	153.91	51.21
5	163.86	50.16
6	173.84	50.78
7	183.58	53.04
8	192.81	56.89
9	201.28	62.20
10	208.75	68.85
11	215.02	76.64
12	218.66	83.14

Circle Center At X = 165.1 ; Y = 110.1 and Radius, 60.0

*** 1.952 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	85.93	54.00
2	95.25	50.36
3	104.84	47.55
4	114.64	45.56
5	124.58	44.43
6	134.57	44.17
7	144.56	44.76
8	154.45	46.21
9	164.18	48.51
10	173.68	51.64
11	182.87	55.57
12	191.69	60.28
13	200.07	65.74
14	207.95	71.90
15	215.27	78.71
16	219.15	83.00

Circle Center At X = 132.7 ; Y = 159.8 and Radius, 115.7

*** 1.958 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	72.56	54.00
2	81.87	50.33
3	91.44	47.43
4	101.21	45.31
5	111.12	43.99
6	121.11	43.48
7	131.10	43.77
8	141.04	44.88
9	150.86	46.78
10	160.49	49.47
11	169.87	52.93

12	178.94	57.14
13	187.64	62.07
14	195.92	67.69
15	203.71	73.96
16	210.97	80.84
17	214.52	84.79

Circle Center At X = 122.5 ; Y = 167.0 and Radius, 123.5

*** 1.982 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	86.88	54.00
2	96.29	50.60
3	105.94	47.98
4	115.77	46.15
5	125.72	45.14
6	135.72	44.93
7	145.70	45.54
8	155.60	46.96
9	165.35	49.19
10	174.88	52.20
11	184.14	55.97
12	193.06	60.49
13	201.59	65.73
14	209.65	71.63
15	217.21	78.18
16	221.94	83.00

Circle Center At X = 133.2 ; Y = 167.3 and Radius, 122.4

*** 1.983 ***

1

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            Y            A     X     I     S            F     T

             .00     56.25    112.50    168.75    225.00    281.25

X        .00 +-----*--**---------+---------+---------+---------+
             -        ...
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                -      .....
                -     ......
                -    .......
                -   ........
         56.25 +   ........
                - .........2
                -.........21
                -.......216
                -.......16.
                .......140*
A       112.50 .......14...
                .......18.*.
                .......18.*7*
                .......14.73.
                .......1273.*
                .......513..*
X       168.75 ........12....
                ........514....
                .........518...
                ..........512..*
                ...........5182.
                ..............31*
I       225.00 ...............5
                ................
                ................
                ............*...
                ................
                ............*....
S       281.25 ................
                ................
                ................
                ................
                -...............
                -...............
        337.50 +...............
                - ..............
                - ..............
                -  .............
                -   ............
                -    ...........
F       393.75 +    ...........
                -     ..........
                -       ........
                -        .......
                -          .....
                -           ....
T       450.00 +     *  ***  .*
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** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date:	11-20-92
Time of Run:	1:04 PM
Run By:	SNM
Input Data Filename:	RWDM1-2A.IN
Output Filename:	RWDM1-2A.R4

PROBLEM DESCRIPTION RIVERWOOD @ DM-1: LONG TERM END OF CONSTRUCTION

BOUNDARY COORDINATES

7 Top Boundaries
15 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	54.00	102.50	54.00	4
2	102.50	54.00	132.50	66.00	3
3	132.50	66.00	152.50	66.00	3
4	152.50	66.00	200.00	85.00	2
5	200.00	85.00	214.00	85.00	2
6	214.00	85.00	219.00	83.00	2
7	219.00	83.00	450.00	83.00	1
8	219.00	83.00	274.00	61.00	2
9	274.00	61.00	450.00	61.00	3
10	162.50	70.00	251.50	70.00	3
11	102.50	54.00	122.50	54.00	4
12	122.50	54.00	130.00	57.00	4
13	130.00	57.00	450.00	57.00	4
14	.00	50.00	450.00	50.00	5
15	.00	35.00	450.00	35.00	6

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	80.0	80.0	.0	.0	.00	.0	1
2	120.0	125.0	200.0	20.0	.00	.0	1
3	110.0	115.0	.0	28.0	.00	.0	1

4	120.0	125.0	200.0	20.0	.00	.0	1
5	110.0	115.0	.0	28.0	.00	.0	1
6	120.0	125.0	300.0	20.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	54.00
2	122.50	54.00
3	274.00	61.00
4	450.00	61.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of200 Points Equally Spaced Along The Ground Surface Between X = 140.00 ft.
and X = 150.00 ft.

Each Surface Terminates Between X = 200.00 ft.
and X = 450.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = .00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	142.46	66.00
2	152.23	63.85
3	162.22	63.34
4	172.15	64.47
5	181.76	67.23
6	190.79	71.53
7	198.99	77.26
8	206.13	84.26
9	206.67	85.00

Circle Center At X = 160.3 ; Y = 123.9 and Radius, 60.5

*** 1.857 ***

Individual data on the 12 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	9.8	1155.0	.0	.0	.0	.0	.0	.0	.0
2	.3	64.4	.0	.0	.0	.0	.0	.0	.0
3	9.7	5079.9	.0	.0	.0	.0	.0	.0	.0
4	.3	225.0	.0	.0	.0	.0	.0	.0	.0
5	9.7	8688.5	.0	.0	.0	.0	.0	.0	.0
6	9.6	11056.4	.0	.0	.0	.0	.0	.0	.0
7	5.8	7070.2	.0	.0	.0	.0	.0	.0	.0
	3.2	3822.5	.0	.0	.0	.0	.0	.0	.0
9	8.2	8418.1	.0	.0	.0	.0	.0	.0	.0
10	1.0	855.9	.0	.0	.0	.0	.0	.0	.0
11	6.1	2752.1	.0	.0	.0	.0	.0	.0	.0
12	.5	23.9	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	144.87	66.00
2	154.68	64.02
3	164.67	63.88
4	174.53	65.59
5	183.89	69.10
6	192.45	74.28
7	199.90	80.95
8	203.00	85.00

Circle Center At X = 160.4 ; Y = 116.9 and Radius, 53.2

*** 1.858 ***

Failure Surface Specified By 8 Coordinate Points

Point	X-Surf	Y-Surf

No.	(ft)	(ft)
1	146.63	66.00
2	156.51	64.44
3	166.51	64.68
4	176.30	66.69
5	185.58	70.43
6	194.03	75.77
7	201.40	82.53
8	203.27	85.00

Circle Center At X = 160.2 ; Y = 119.4 and Radius, 55.1

*** 1.859 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	142.56	66.00
2	152.41	64.27
3	162.41	64.05
4	172.32	65.35
5	181.93	68.15
6	190.99	72.36
7	199.31	77.91
8	206.70	84.66
9	206.97	85.00

Circle Center At X = 158.8 ; Y = 129.6 and Radius, 65.7

*** 1.860 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	147.64	66.00
2	157.56	64.75
3	167.55	65.18
4	177.33	67.29
5	186.61	71.01
6	195.13	76.24
7	202.66	82.83
8	204.42	85.00

Circle Center At X = 160.0 ; Y = 123.4 and Radius, 58.7

*** 1.862 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	141.21	66.00
2	151.00	63.97
3	160.99	63.54
4	170.92	64.71
5	180.54	67.46
6	189.59	71.71
7	197.84	77.35
8	205.09	84.25
9	205.66	85.00

Circle Center At X = 158.7 ; Y = 125.8 and Radius, 62.3

*** 1.862 ***

1

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	142.97	66.00
2	152.82	64.31
3	162.82	64.23
4	172.70	65.76
5	182.21	68.87
6	191.09	73.46
7	199.12	79.43
8	204.52	85.00

Circle Center At X = 158.3 ; Y = 125.5 and Radius, 61.5

*** 1.862 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	144.77	66.00
2	154.67	64.57
3	164.67	64.61
4	174.56	66.12
5	184.11	69.06
6	193.13	73.38
7	201.42	78.97
8	208.01	85.00

Circle Center At X = 159.4 ; Y = 132.0 and Radius, 67.7

*** 1.864 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.70	66.00
2	159.53	64.18
3	169.53	64.31
4	179.31	66.38
5	188.51	70.32
6	196.76	75.96
7	203.76	83.10
8	205.01	85.00

Circle Center At X = 163.9 ; Y = 114.7 and Radius, 50.7

*** 1.864 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	146.98	66.00
2	156.91	64.79
3	166.91	65.08
4	176.75	66.86
5	186.21	70.08
6	195.09	74.69
7	203.18	80.56
8	207.69	85.00

Circle Center At X = 160.0 ; Y = 130.9 and Radius, 66.1

*** 1.865 ***

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          Y           A     X     I     S           F     T

          .00     56.25    112.50    168.75    225.00    281.25

X       .00 +-----*--**---------+---------+---------+---------+
            -
            -
            -
            -
            -
     56.25 +
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                -
                -
                -
                -
                -          *
A     112.50 +
                -          *
                -          * *
                -            1
                -          .1*
                -        ...1*
X     168.75 +       ....14
                -      ......1.
                -     .......21.
                -    .........21*
                -    ..........01
                -   ............*
I     225.00 + ..............
                - ..............
                -...............
                -...........*...
                -...............
                -..........*....
S     281.25 +...............
                -...............
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                -...............
                -...............
                -...............
      337.50 + ..............
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                -   ............
F     393.75 +    ...........
                -     ..........
                -       ........
                -        .......
                -         ......
                -           ....
T     450.00 +     *  ***  .*
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SUDDEN DRAWDOWN

LONG TERM CASE - F.S.= 1.25
SHORT TERM CASE - F.S.=1.44

SOIL STRATUM	DESCRIPTION	SOIL STRENGTH PARAMETERS							
		SHORT TERM				LONG TERM			
		w	γ_{sat}	c	ϕ	w	γ_{sat}	c'	ϕ'
I	SLUDGE	80	80						
II	CL FILL	120	125	760	0	120	125	200	20
III	SM/ML	110	115	0	28	110	115	0	28
IV	CL/CH	120	125	600	0	120	125	200	20
V	SM/ML	110	115	0	28	110	115	0	28
VI	CL/CH	120	125	1500	0	120	125	300	20

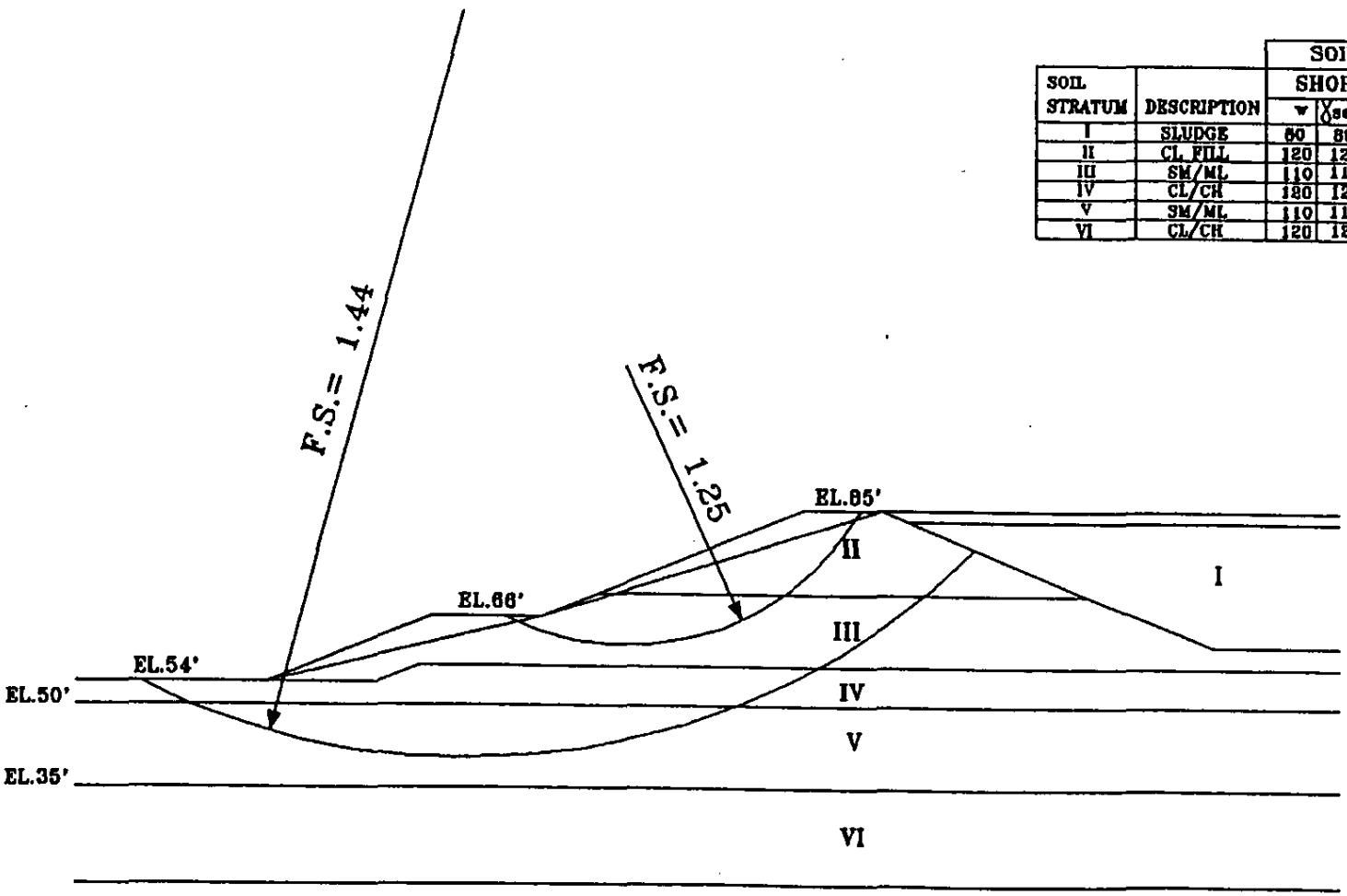

FIGURE 5

DAMES & MOORE

RIVERWOOD INTERNATIONAL USA, INC.
WEST MONROE, LOUISIANA

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date:	11-20-92
Time of Run:	10:31 AM
Run By:	SMM
Input Data Filename:	RWDM1-3A.IN
Output Filename:	RWDM1-3A.R2

PROBLEM DESCRIPTION RIVERWOOD @ DM-1: SHORT TERM SUDDEN DRAW DOWN CASE

BOUNDARY COORDINATES

7 Top Boundaries
15 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	54.00	102.50	54.00	4
2	102.50	54.00	132.50	66.00	3
3	132.50	66.00	152.50	66.00	3
4	152.50	66.00	200.00	85.00	2
5	200.00	85.00	214.00	85.00	2
6	214.00	85.00	219.00	83.00	2
7	219.00	83.00	450.00	83.00	1
8	219.00	83.00	274.00	61.00	2
9	274.00	61.00	450.00	61.00	3
10	162.50	70.00	251.50	70.00	3
11	102.50	54.00	122.50	54.00	4
12	122.50	54.00	130.00	57.00	4
13	130.00	57.00	450.00	57.00	4
14	.00	50.00	450.00	50.00	5
15	.00	35.00	450.00	35.00	6

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	80.0	80.0	.0	.0	.00	.0	1
2	120.0	125.0	750.0	.0	.00	.0	1
3	110.0	115.0	.0	28.0	.00	.0	1

4	120.0	125.0	600.0	.0	.00	.0	1
5	110.0	115.0	.0	28.0	.00	.0	1
6	120.0	125.0	1500.0	.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 5 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	54.00
2	102.50	54.00
3	152.50	66.00
4	214.00	85.00
5	450.00	85.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of200 Points Equally Spaced Along The Ground Surface Between X = 50.00 ft.
and X = 100.00 ft.

Each Surface Terminates Between X = 200.00 ft.
and X = 450.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = .00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	79.65	54.00
2	88.79	49.95
3	98.21	46.59
4	107.85	43.95
5	117.67	42.04
6	127.60	40.87
7	137.59	40.45
8	147.59	40.78
9	157.53	41.85
10	167.36	43.67
11	177.03	46.23
12	186.48	49.50
13	195.66	53.47
14	204.51	58.11
15	213.00	63.41
16	221.06	69.33
17	228.65	75.84
18	235.73	82.89
19	235.83	83.00

Circle Center At X = 138.2 ; Y = 173.7 and Radius, 133.3

*** 1.437 ***

Individual data on the 33 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	9.0	2254.9	.0	1231.4	.0	.0	.0	.0	.0
2	.1	61.3	.0	33.5	.0	.0	.0	.0	.0
3	9.4	6586.6	.0	3577.1	.0	.0	.0	.0	.0
4	4.3	4117.8	.0	2220.1	.0	.0	.0	.0	.0
5	5.4	6593.7	.0	3357.2	.0	.0	.0	.0	.0
6	9.8	17353.6	.0	8176.8	.0	.0	.0	.0	.0
7	4.8	10823.1	.0	4860.9	.0	.0	.0	.0	.0
8	5.1	12972.7	.0	5689.1	.0	.0	.0	.0	.0
9	2.4	6636.3	.0	2840.3	.0	.0	.0	.0	.0
10	2.5	7236.6	.0	3066.0	.0	.0	.0	.0	.0
11	5.1	15138.9	.0	6577.6	.0	.0	.0	.0	.0
12	10.0	29730.8	.0	13967.5	.0	.0	.0	.0	.0
13	4.9	14412.3	.0	7308.8	.0	.0	.0	.0	.0
14	5.0	15527.2	.0	7607.2	.0	.0	.0	.0	.0
15	5.0	16157.3	.0	7846.4	.0	.0	.0	.0	.0
16	2.9	9526.9	.0	4740.3	.0	.0	.0	.0	.0
17	1.9	6321.3	.0	3114.9	.0	.0	.0	.0	.0
18	9.7	33074.1	.0	16194.7	.0	.0	.0	.0	.0
19	9.5	33638.0	.0	16219.8	.0	.0	.0	.0	.0
20	1.2	4197.7	.0	2038.7	.0	.0	.0	.0	.0
21	8.0	28749.9	.0	13738.0	.0	.0	.0	.0	.0
22	4.3	15342.0	.0	7430.4	.0	.0	.0	.0	.0
23	2.4	8194.2	.0	3980.4	.0	.0	.0	.0	.0
24	2.1	6965.6	.0	3457.1	.0	.0	.0	.0	.0
	8.5	24802.8	.0	13498.7	.0	.0	.0	.0	.0
26	1.0	2595.8	.0	1566.3	.0	.0	.0	.0	.0
27	5.0	11059.3	336.0	7360.9	.0	.0	.0	.0	.0
28	2.1	3640.2	256.6	2614.6	.0	.0	.0	.0	.0
29	.8	1267.6	97.7	986.3	.0	.0	.0	.0	.0
30	6.8	7818.2	850.0	6762.1	.0	.0	.0	.0	.0

31	2.4	1309.1	295.3	1664.5	.0	.0	.0	.0	.0
32	4.7	927.2	588.8	1851.9	.0	.0	.0	.0	.0
33	.1	.4	11.5	18.0	.0	.0	.0	.0	.0

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	79.65	54.00
2	88.92	50.26
3	98.44	47.19
4	108.15	44.81
5	118.01	43.11
6	127.96	42.12
7	137.95	41.84
8	147.95	42.27
9	157.88	43.40
10	167.71	45.24
11	177.39	47.77
12	186.86	50.98
13	196.08	54.85
14	205.00	59.36
15	213.58	64.50
16	221.77	70.23
17	229.54	76.53
18	236.46	83.00

Circle Center At X = 136.9 ; Y = 182.7 and Radius, 140.9

*** 1.438 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	75.88	54.00
2	84.95	49.79
3	94.31	46.27
4	103.91	43.46
5	113.69	41.36
6	123.59	40.00
7	133.57	39.38
8	143.57	39.50
9	153.54	40.36
10	163.41	41.96
11	173.13	44.29
12	182.66	47.33
13	191.93	51.08
14	200.90	55.50
15	209.52	60.57
16	217.73	66.27
17	225.50	72.57
18	232.78	79.42
19	236.05	83.00

Circle Center At X = 137.0 ; Y = 173.9 and Radius, 134.6

*** 1.443 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	76.88	54.00
2	86.08	50.07
3	95.55	46.86
4	105.24	44.39
5	115.09	42.67
6	125.05	41.71
7	135.04	41.51
8	145.03	42.09
9	154.94	43.43
10	164.71	45.53
11	174.30	48.37
12	183.64	51.94
13	192.68	56.22
14	201.37	61.18
15	209.64	66.79
16	217.46	73.02
17	224.78	79.83
18	227.70	83.00

Circle Center At X = 132.5 ; Y = 171.3 and Radius, 129.9

*** 1.445 ***

1

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	73.37	54.00
2	82.38	49.68
3	91.71	46.07
4	101.29	43.19
5	111.06	41.07
6	120.97	39.71
7	130.95	39.13
8	140.95	39.32
9	150.90	40.29
10	160.75	42.02
11	170.43	44.52
12	179.89	47.76
13	189.07	51.73
14	197.92	56.39
15	206.38	61.73
16	214.39	67.71
17	221.92	74.29
18	228.91	81.44
19	230.22	83.00

Circle Center At X = 133.5 ; Y = 167.8 and Radius, 128.7

*** 1.445 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	75.88	54.00
2	85.22	50.43
3	94.78	47.48
4	104.51	45.18
5	114.37	43.53
6	124.32	42.53
7	134.31	42.19
8	144.31	42.52
9	154.26	43.51
10	164.12	45.16
11	173.86	47.46
12	183.41	50.40
13	192.76	53.96
14	201.84	58.14
15	210.63	62.91
16	219.09	68.25
17	227.17	74.14
18	234.84	80.55
19	237.40	83.00

Circle Center At X = 134.4 ; Y = 193.0 and Radius, 150.8

*** 1.446 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	81.66	54.00
2	90.62	49.56
3	99.94	45.95
4	109.56	43.19
5	119.38	41.30
6	129.33	40.30
7	139.32	40.19
8	149.29	40.99
9	159.15	42.68
10	168.82	45.24
11	178.21	48.66
12	187.26	52.91
13	195.90	57.96
14	204.04	63.76
15	211.63	70.27
16	218.61	77.44
17	223.13	83.00

Circle Center At X = 135.5 ; Y = 151.4 and Radius, 111.3

*** 1.447 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	81.16	54.00
2	90.35	50.07
3	99.80	46.80
4	109.46	44.21
5	119.28	42.31
6	129.21	41.11
7	139.19	40.62
8	149.19	40.83
9	159.15	41.76
10	169.02	43.38
11	178.74	45.71
12	188.28	48.71
13	197.58	52.39
14	206.60	56.71
15	215.29	61.66
16	223.60	67.22
17	231.50	73.35
18	238.95	80.02
19	241.83	83.00

Circle Center At X = 141.1 ; Y = 181.6 and Radius, 141.0

*** 1.449 ***

1

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	82.16	54.00
2	91.17	49.65
3	100.53	46.14
4	110.17	43.49
5	120.02	41.74
6	129.98	40.89
7	139.98	40.95
8	149.93	41.92
9	159.76	43.80
10	169.37	46.56
11	178.69	50.18
12	187.64	54.64
13	196.15	59.90
14	204.14	65.91
15	211.55	72.62
16	218.32	79.98

17	220.63	83.00

Circle Center At X = 134.3 ; Y = 150.5 and Radius, 109.7

*** 1.455 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	94.22	54.00
2	103.38	49.98
3	112.86	46.81
4	122.60	44.52
5	132.50	43.12
6	142.49	42.64
7	152.48	43.07
8	162.39	44.41
9	172.13	46.65
10	181.63	49.77
11	190.81	53.75
12	199.59	58.54
13	207.89	64.12
14	215.64	70.43
15	222.79	77.42
16	227.54	83.00

Circle Center At X = 142.7 ; Y = 151.9 and Radius, 109.2

*** 1.456 ***

```
          Y            A     X     I     S            F     T

           .00     56.25    112.50    168.75    225.00    281.25

X       .00 +-----*--**---------+---------+---------+---------+
            -
            -
            -
            -
            -         .
     56.25 +       ...
            -      ....
            -     ....1
            -    ....17
            -   ....170
            -  .....20*
A    112.50 +  ....31.
            - .....12.*
            -......16.* *
            -......16..
            -......12...*
            .......12...*
X    168.75 ........1....
```

```
                .........14....
                ..........19....
                ..........814...*
                ...........124...
                ............1347*
I     225.00    .............1124
                ..............831
                ................8
                .............*...
                .................
                ............*....
S     281.25    .................
                -................
                -................
                -................
                -................
                - ...............
      337.50  + ...............
                -  ..............
                -   .............
                -   .............
                -    ............
                -     ...........
F     393.75  +      ..........
                -       .........
                -        ........
                -         .......
                -          ......
                -           .....
                -              ...
T     450.00  +     *  ***  .*
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** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date:	11-20-92
Time of Run:	8:53 AM
Run By:	SMM
Input Data Filename:	RWDM1-4A.IN
Output Filename:	RWDM1-4A.R6

PROBLEM DESCRIPTION RIVERWOOD @ DM-1: LONG TERM SUDDEN DRAWD OWN CASE

BOUNDARY COORDINATES

7 Top Boundaries
15 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	54.00	102.50	54.00	4
2	102.50	54.00	132.50	66.00	3
3	132.50	66.00	152.50	66.00	3
4	152.50	66.00	200.00	85.00	2
5	200.00	85.00	214.00	85.00	2
6	214.00	85.00	219.00	83.00	2
7	219.00	83.00	450.00	83.00	1
8	219.00	83.00	274.00	61.00	2
9	274.00	61.00	450.00	61.00	3
10	162.50	70.00	251.50	70.00	3
11	102.50	54.00	122.50	54.00	4
12	122.50	54.00	130.00	57.00	4
13	130.00	57.00	450.00	57.00	4
14	.00	50.00	450.00	50.00	5
15	.00	35.00	450.00	35.00	6

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez Surfac No.
1	80.0	80.0	.0	.0	.00	.0	1
2	120.0	125.0	200.0	20.0	.00	.0	1
3	110.0	115.0	.0	28.0	.00	.0	1
4	120.0	125.0	200.0	20.0	.00	.0	1
5	110.0	115.0	.0	28.0	.00	.0	1
6	120.0	125.0	300.0	20.0	.00	.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 5 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	54.00
2	102.50	54.00
3	152.50	66.00
4	214.00	85.00
5	450.00	85.00

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of200 Points Equally Spaced Along The Ground Surface Between X = 100.00 ft.
and X = 160.00 ft.

Each Surface Terminates Between X = 200.00 ft.
and X = 450.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = .00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	154.27	66.71
2	161.36	59.65
3	168.80	52.98
4	176.59	46.70
5	184.69	40.83
6	193.08	35.40
7	201.75	30.41
8	210.66	25.87
9	219.80	21.81
10	229.13	18.23
11	238.65	15.14
12	248.30	12.55
13	258.09	10.47
14	267.96	8.90
15	277.91	7.85
16	287.89	7.31
17	297.89	7.30
18	307.88	7.81
19	317.83	8.84
20	327.71	10.38
21	337.49	12.44
22	347.16	15.00
23	356.68	18.07
24	366.02	21.62
25	375.17	25.66
26	384.10	30.17
27	392.78	35.14
28	401.18	40.55
29	409.30	46.39
30	417.10	52.65
31	424.56	59.31
32	431.67	66.35
33	438.39	73.74
34	444.73	81.48

Factor Of Safety For The Preceding Specified Surface =-81.595

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method *

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	145.53	66.00
2	154.88	62.47
3	164.76	60.87
4	174.75	61.28
5	184.45	63.68
6	193.49	67.98
7	201.48	73.99
8	208.11	81.47
9	210.14	85.00

Circle Center At X = 167.7 ; Y = 110.6 and Radius, 49.8

*** 1.253 ***

Individual data on the 15 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surchar Loa Lbs(
1	2.7	152.4	.0	.0	.0	.0	.0	.0	
2	4.3	884.8	.0	364.3	.0	.0	.0	.0	
3	2.4	1057.5	.0	524.8	.0	.0	.0	.0	
4	7.6	6276.7	.0	2791.2	.0	.0	.0	.0	
5	2.3	2431.7	.0	1143.0	.0	.0	.0	.0	
6	.7	810.0	.0	372.3	.0	.0	.0	.0	
7	9.3	12962.8	.0	5745.7	.0	.0	.0	.0	
8	9.7	16545.6	.0	7095.0	.0	.0	.0	.0	
9	9.0	16112.4	.0	6825.6	.0	.0	.0	.0	
10	2.7	4604.6	.0	2027.2	.0	.0	.0	.0	
11	3.8	6029.2	.0	2468.5	.0	.0	.0	.0	

12	1.5	2105.6	.0	825.1	.0	.0	.0	.0	
13	6.6	5923.8	.0	2641.1	.0	.0	.0	.0	
14	1.2	362.8	.0	122.1	.0	.0	.0	.0	.0
15	.8	72.8	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	146.13	66.00
2	155.47	62.43
3	165.37	61.03
4	175.34	61.85
5	184.88	64.86
6	193.51	69.91
7	200.80	76.75
8	206.38	85.00

Circle Center At X = 166.7 ; Y = 105.8 and Radius, 44.8

*** 1.254 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	145.23	66.00
2	154.45	62.14
3	164.28	60.28
4	174.27	60.51
5	184.00	62.81
6	193.04	67.09
7	200.99	73.16
8	207.50	80.75
9	209.82	85.00

Circle Center At X = 168.2 ; Y = 107.9 and Radius, 47.8

*** 1.258 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	141.01	66.00
2	150.64	63.33
3	160.59	62.34
4	170.57	63.05
5	180.28	65.45
6	189.44	69.46
7	197.79	74.96
8	205.08	81.80
9	207.50	85.00

Circle Center At X = 161.4 ; Y = 121.0 and Radius, 58.7

*** 1.267 ***

1

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	140.70	66.00
2	150.01	62.33
3	159.79	60.27
4	169.79	59.89
5	179.70	61.18
6	189.26	64.12
7	198.19	68.62
8	206.24	74.56
9	213.17	81.76
10	215.09	84.57

Circle Center At X = 167.0 ; Y = 118.8 and Radius, 59.0

*** 1.267 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	144.32	66.00
2	154.03	63.61
3	164.01	62.90
4	173.96	63.91
5	183.59	66.60
6	192.62	70.90
7	200.79	76.67
8	207.85	83.75
9	208.73	85.00

Circle Center At X = 163.1 ; Y = 121.3 and Radius, 58.4

*** 1.267 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	138.29	66.00
2	147.82	62.96
3	157.72	61.58
4	167.72	61.92
5	177.51	63.94
6	186.81	67.61
7	195.36	72.80
8	202.90	79.38
9	207.47	85.00

Circle Center At X = 160.8 ; Y = 120.0 and Radius, 58.5

*** 1.269 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	143.72	66.00
2	153.36	63.33
3	163.29	62.20
4	173.28	62.65
5	183.08	64.65

6	192.44	68.17
7	201.14	73.11
8	208.95	79.35
9	214.08	84.97

Circle Center At X = 165.5 ; Y = 125.8 and Radius, 63.6

*** 1.269 ***

1

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	138.59	66.00
2	148.15	63.07
3	158.05	61.60
4	168.05	61.64
5	177.93	63.18
6	187.47	66.18
7	196.45	70.58
8	204.66	76.28
9	211.93	83.15
10	213.38	85.00

Circle Center At X = 162.8 ; Y = 127.5 and Radius, 66.1

*** 1.270 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	138.59	66.00
2	148.02	62.67
3	157.85	60.81
4	167.84	60.46
5	177.77	61.63
6	187.41	64.29
7	196.54	68.39
8	204.93	73.82
9	212.41	80.46

```
    10          215.63        84.35
 Circle Center At X =  165.1 ; Y =  125.7  and Radius,   65.3

       ***     1.271   ***


                Y            A     X     I     S            F     T

                .00     56.25    112.50    168.75    225.00    281.25
 X          .00 +-----*--**---------+---------+---------+---------+
                -
                -
                -
                -
                -
         56.25 +
                -
                -
                -
                -
                -        . *
 A      112.50 +      .....
                -     ....*.
                -    .....*.*
                -   ........3
                -  ........3*
                -  ........1*
 X      168.75 + .........1..
                - .........14..
                -..........12..
                -...........112*
                ..............511
                ...............0*
 I      225.00 ................
                ................
                ................
                ............*...
                ................
                ............*....
 S      281.25 ................
                ................
                ................
                ................
                -...............
                -...............
        337.50 + ..............
                - ..............
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                 - ..............
                 -  .............
                 -   ............
                 -    ...........
F      393.75 +     ...........
                 -      .........
                 -       ........
                 -        .......
                 -         ......
                 -           ....
T      450.00 +      *  ***  .*
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EARTHQUAKE

LONG TERM CASE – F.S.= 1.23
SHORT TERM CASE – F.S.= 1.14

SOIL STRATUM	DESCRIPTION	SOIL STRENGTH PARAMETERS							
		SHORT TERM				LONG TERM			
		w	γ_{sat}	c	ϕ	w	γ_{sat}	c'	ϕ'
I	SLUDGE	60	60			60	60		
II	CL FILL	120	125	750	0	120	125	200	20
III	SM/ML	110	115	0	28	110	115	0	28
IV	CL/CH	120	125	600	0	120	125	200	20
V	SM/ML	110	115	0	28	110	115	0	28
VI	CL/CH	120	125	1500	0	120	125	300	20

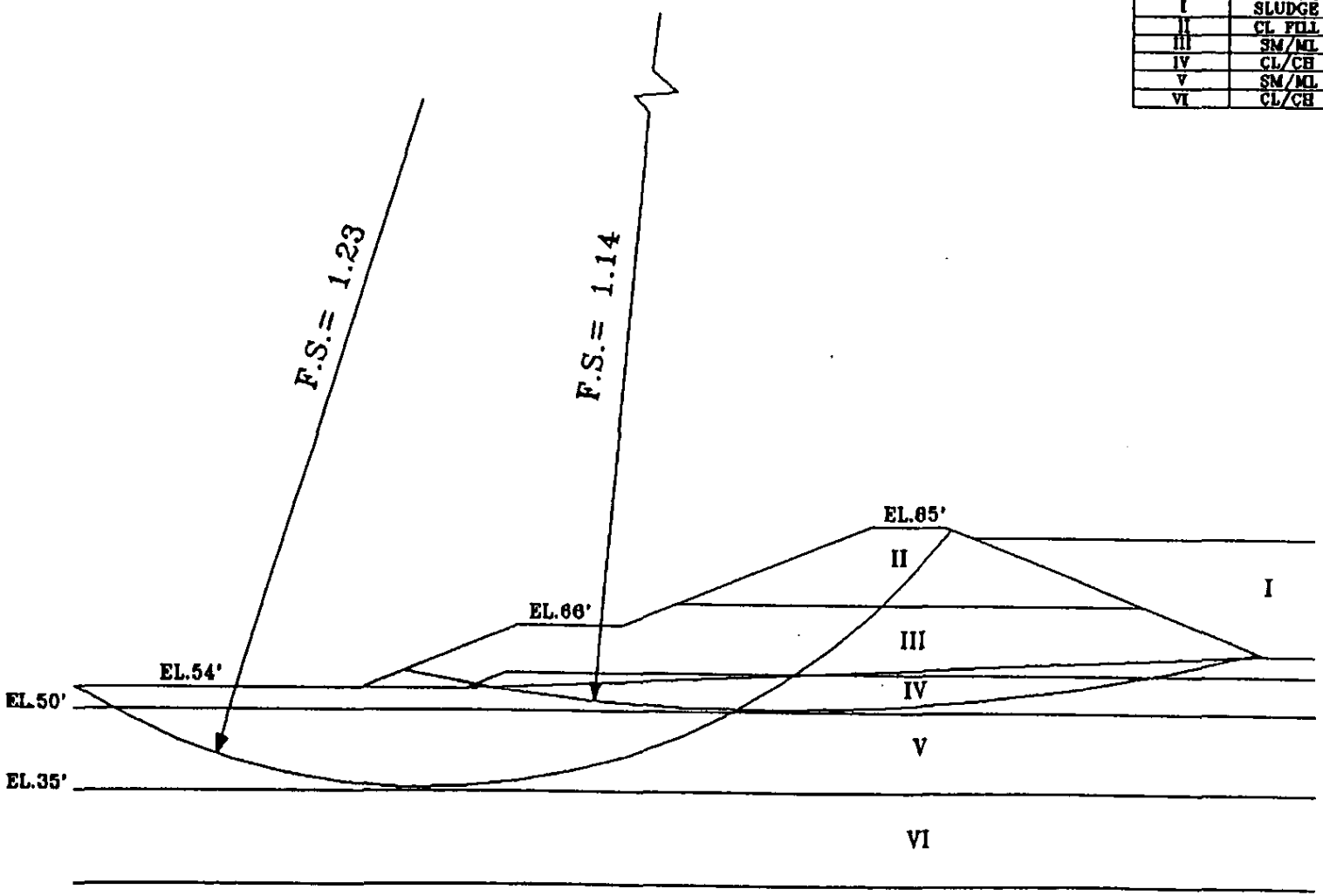

FIGURE 6

DAMES & MOORE

RIVERWOOD INTE[illegible]AL USA, INC.
WEST MON[illegible]ISIANA

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date:	11-20-92
Time of Run:	11;08 AM
Run By:	SMM
Input Data Filename:	RWDM1-5A.IN
Output Filename:	RWDM1-5A.R4

PROBLEM DESCRIPTION RIVERWOOD @ DM-1: SHORT TERM EARTHQUAKE
CASE - IMPOUNDMENT FULL

BOUNDARY COORDINATES

7 Top Boundaries
15 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	54.00	102.50	54.00	4
2	102.50	54.00	132.50	66.00	3
3	132.50	66.00	152.50	66.00	3
4	152.50	66.00	200.00	85.00	2
5	200.00	85.00	214.00	85.00	2
6	214.00	85.00	219.00	83.00	2
7	219.00	83.00	450.00	83.00	1
8	219.00	83.00	274.00	61.00	2
9	274.00	61.00	450.00	61.00	3
10	162.50	70.00	251.50	70.00	3
11	102.50	54.00	122.50	54.00	4
12	122.50	54.00	130.00	57.00	4
13	130.00	57.00	450.00	57.00	4
14	.00	50.00	450.00	50.00	5
15	.00	35.00	450.00	35.00	6

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	80.0	80.0	.0	.0	.00	.0	2
2	120.0	125.0	750.0	.0	.00	.0	1
3	110.0	115.0	.0	28.0	.00	.0	1

4	120.0	125.0	600.0	.0	.00	.0	1
5	110.0	115.0	.0	28.0	.00	.0	1
6	120.0	125.0	1500.0	.0	.00	.0	1

2 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	54.00
2	122.50	54.00
3	274.00	61.00
4	450.00	61.00

Piezometric Surface No. 2 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	214.00	85.00
2	450.00	85.00

A Horizontal Earthquake Loading Coefficient
Of .100 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of .100 Has Been Assigned

Cavitation Pressure = .0 psf

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of200 Points Equally Spaced
Along The Ground Surface Between X = 100.00 ft.
and X = 125.00 ft.

Each Surface Terminates Between X = 200.00 ft.
and X = 450.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	110.43	57.17
2	120.27	55.39
3	130.15	53.87
4	140.07	52.62
5	150.02	51.63
6	160.00	50.91
7	169.99	50.45
8	179.99	50.26
9	189.99	50.33
10	199.98	50.67
11	209.96	51.28
12	219.92	52.15
13	229.86	53.29
14	239.76	54.69
15	249.62	56.35
16	259.43	58.28
17	269.19	60.46
18	278.89	62.91
19	288.52	65.61
20	298.07	68.57
21	307.54	71.78
22	316.92	75.24
23	326.21	78.95
24	335.39	82.91
25	335.59	83.00

Circle Center At X = 182.2 ; Y = 425.9 and Radius, 375.6

*** 1.137 ***

Individual data on the 38 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	9.8	3093.6	.0	.0	.0	.0	309.4	309.4	.0
2	4.1	3112.9	.0	.0	.0	.0	311.3	311.3	.0
3	3.4	3327.0	.0	.0	.0	.0	332.7	332.7	.0
4	2.3	2652.3	.0	31.9	.0	.0	265.2	265.2	.0

5	.2	191.4	.0	4.5	.0	.0	19.1	19.1	.0
6	2.3	3133.9	.0	100.7	.0	.0	313.4	313.4	.0
7	7.6	11101.0	.0	732.0	.0	.0	1110.1	1110.1	.0
8	10.0	15816.9	.0	1817.8	.0	.0	1581.7	1581.7	.0
	2.5	4119.9	.0	586.1	.0	.0	412.0	412.0	.0
	7.5	14848.0	.0	2052.4	.0	.0	1484.8	1484.8	.0
11	2.5	5661.5	.0	771.4	.0	.0	566.1	566.1	.0
12	7.5	17985.8	.0	2523.0	.0	.0	1798.6	1798.6	.0
13	10.0	28567.6	.0	3784.8	.0	.0	2856.8	2856.8	.0
14	7.4	24461.1	.0	3035.8	.0	.0	2446.1	2446.1	.0
15	2.6	9007.0	.0	1073.7	.0	.0	900.7	900.7	.0
16	10.0	38009.5	.0	4268.2	.0	.0	3800.9	3800.9	.0
17	.0	82.8	.0	8.9	.0	.0	8.3	8.3	.0
18	10.0	39715.2	.0	4251.9	.0	.0	3971.5	3971.5	.0
19	4.0	15868.3	.0	1688.1	.0	.0	1586.8	1586.8	.0
20	5.0	18801.9	.0	2031.3	.0	.0	1880.2	1880.2	.0
21	.9	3323.8	115.2	367.9	.0	.0	332.4	332.4	.0
22	9.9	34172.9	1239.9	3747.8	.0	.0	3417.3	3417.3	.0
23	9.9	30937.9	1235.7	3242.7	.0	.0	3093.8	3093.8	.0
24	9.9	27385.4	1230.6	2572.1	.0	.0	2738.5	2738.5	.0
25	1.9	4808.0	234.6	403.8	.0	.0	480.8	480.8	.0
26	1.4	3736.8	177.9	283.8	.0	.0	373.7	373.7	.0
27	6.5	16015.6	812.1	1049.1	.0	.0	1601.6	1601.6	.0
28	9.8	20652.9	1217.8	736.9	.0	.0	2065.3	2065.3	.0
29	1.5	2850.3	190.5	15.4	.0	.0	285.0	285.0	.0
30	2.2	3994.3	280.2	.0	.0	.0	399.4	399.4	.0
31	5.9	9875.9	739.3	8706.8	.0	.0	987.6	987.6	.0
32	9.6	14434.3	1201.6	12941.9	.0	.0	1443.4	1443.4	.0
33	9.6	12158.5	1192.2	11175.8	.0	.0	1215.8	1215.8	.0
34	9.5	9717.1	1181.9	9251.1	.0	.0	971.7	971.7	.0
35	9.4	7121.7	1170.8	7169.1	.0	.0	712.2	712.2	.0
[illegible]	9.3	4385.0	1158.9	4931.2	.0	.0	438.5	438.5	.0
	9.2	1520.2	1146.2	2539.1	.0	.0	152.0	152.0	.0
	.2	.7	24.5	27.6	.0	.0	.1	.1	.0

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	105.78	55.31
2	115.71	54.15
3	125.66	53.18
4	135.63	52.39
5	145.61	51.78
6	155.61	51.37
7	165.60	51.14
8	175.60	51.10
9	185.60	51.25
10	195.60	51.59
11	205.58	52.11
12	215.56	52.82
13	225.52	53.71
14	235.46	54.80
15	245.38	56.07
16	255.27	57.52
17	265.14	59.16
18	274.97	60.98
19	284.77	62.99
20	294.52	65.18
21	304.24	67.56
22	313.90	70.11
23	323.52	72.85
24	333.09	75.76
25	342.60	78.86

26	352.05	82.13
27	354.42	83.00

Circle Center At X = 172.7 ; Y = 584.7 and Radius, 533.6

*** 1.144 ***

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Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	101.76	54.00
2	111.70	52.90
3	121.66	51.99
4	131.63	51.26
5	141.62	50.71
6	151.61	50.34
7	161.61	50.16
8	171.61	50.17
9	181.61	50.35
10	191.60	50.72
11	201.58	51.28
12	211.56	52.02
13	221.51	52.94
14	231.45	54.04
15	241.37	55.33
16	251.26	56.80
17	261.12	58.45
18	270.95	60.28
19	280.75	62.29
20	290.51	64.48
21	300.22	66.85
22	309.89	69.40
23	319.51	72.13
24	329.08	75.03
25	338.60	78.11
26	348.05	81.36
27	352.55	83.00

Circle Center At X = 166.4 ; Y = 594.0 and Radius, 543.9

*** 1.159 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	117.71	60.09
2	127.38	57.52
3	137.14	55.33
4	146.97	53.51
5	156.87	52.08
6	166.81	51.04

7	176.79	50.37
8	186.79	50.10
9	196.79	50.21
10	206.77	50.70
11	216.73	51.59
12	226.65	52.85
13	236.52	54.50
14	246.31	56.53
15	256.01	58.94
16	265.62	61.72
17	275.11	64.87
18	284.47	68.38
19	293.69	72.26
20	302.76	76.48
21	311.65	81.06
22	315.10	83.00

Circle Center At X = 188.9 ; Y = 308.4 and Radius, 258.4

*** 1.206 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.21	59.48
2	125.98	57.36
3	135.81	55.55
4	145.70	54.05
5	155.63	52.86
6	165.59	51.99
7	175.58	51.44
8	185.57	51.20
9	195.57	51.27
10	205.57	51.66
11	215.54	52.37
12	225.49	53.40
13	235.40	54.73
14	245.26	56.38
15	255.07	58.34
16	264.81	60.61
17	274.47	63.19
18	284.04	66.07
19	293.52	69.25
20	302.90	72.74
21	312.16	76.51
22	321.29	80.58
23	326.30	83.00

Circle Center At X = 188.2 ; Y = 367.4 and Radius, 316.2

*** 1.221 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	124.62	62.85
2	134.16	59.86
3	143.82	57.25
4	153.57	55.04
5	163.41	53.23
6	173.31	51.82
7	183.26	50.80
8	193.24	50.20
9	203.23	49.99
10	213.23	50.19
11	223.21	50.80
12	233.16	51.81
13	243.06	53.22
14	252.90	55.03
15	262.65	57.24
16	272.31	59.84
17	281.85	62.83
18	291.26	66.20
19	300.53	69.95
20	309.64	74.08
21	318.58	78.57
22	326.58	83.00

Circle Center At X = 203.3 ; Y = 296.9 and Radius, 246.9

*** 1.250 ***

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Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	104.77	54.91
2	114.66	53.42
3	124.59	52.22
4	134.55	51.29
5	144.53	50.64
6	154.52	50.28
7	164.52	50.20
8	174.52	50.40
9	184.51	50.88
10	194.48	51.64
11	204.42	52.69
12	214.33	54.01
13	224.20	55.62
14	234.03	57.50
15	243.79	59.65
16	253.49	62.09
17	263.12	64.79
18	272.67	67.77
19	282.12	71.01
20	291.49	74.52
21	300.75	78.29
22	309.90	82.32
23	311.34	83.00

Circle Center At X = 162.4 ; Y = 404.8 and Radius, 354.6

*** 1.254 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.71	59.68
2	126.39	57.17
3	136.16	55.05
4	146.01	53.32
5	155.92	52.00
6	165.88	51.09
7	175.87	50.58
8	185.87	50.47
9	195.86	50.78
10	205.84	51.49
11	215.77	52.60
12	225.66	54.12
13	235.47	56.04
14	245.20	58.36
15	254.83	61.07
16	264.33	64.17
17	273.71	67.65
18	282.93	71.52
19	291.99	75.75
20	300.87	80.35
21	305.51	83.00

Circle Center At X = 183.4 ; Y = 296.2 and Radius, 245.8

*** 1.255 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	114.95	58.98
2	124.82	57.38
3	134.73	56.00
4	144.66	54.84
5	154.61	53.89
6	164.59	53.16
7	174.57	52.65
8	184.57	52.35
9	194.57	52.27
10	204.57	52.41
11	214.56	52.77
12	224.54	53.35
13	234.51	54.14
14	244.46	55.15
15	254.39	56.37

16	264.28	57.81
17	274.14	59.47
18	283.97	61.34
19	293.75	63.42
20	303.48	65.72
21	313.16	68.22
22	322.79	70.94
23	332.35	73.87
24	341.84	77.00
25	351.27	80.34
26	358.29	83.00

Circle Center At X = 193.2 ; Y = 511.4 and Radius, 459.1

*** 1.262 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	113.32	58.33
2	122.93	55.57
3	132.68	53.35
4	142.54	51.70
5	152.48	50.61
6	162.47	50.08
7	172.47	50.12
8	182.45	50.72
9	192.38	51.89
10	202.23	53.62
11	211.97	55.91
12	221.56	58.74
13	230.97	62.11
14	240.18	66.02
15	249.15	70.43
16	257.86	75.35
17	266.27	80.76
18	269.36	83.00

Circle Center At X = 166.8 ; Y = 226.1 and Radius, 176.1

*** 1.270 ***

1

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          Y           A     X     I     S           F     T

          .00     56.25    112.50    168.75    225.00    281.25

X       .00 +-----*--**---------+---------+---------+---------+
            -
            -
            -
            -
            -
      56.25 +
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                -
                -
                -
                -
                -        . *
A     112.50 +      ..315
                -     ...2*4
                -    ....2*6*
                -   .....14..
                -  ......14.*
                -  ......1..*
X     168.75 + .......1....
                -........1....
                -........1.....
                -........1.....*
                .........10.....
                .........17....*
I     225.00 .........32.....
                .........120....
                .........6170...
                ..........17*0..
                ..........12700.
                ...........*4..0
S     281.25 ...........147..
                ...........314..
                ............154.
                -...........2147
                -............154
                -............215
      337.50 + ...........231
                - ............2.
                -  ............2
                -   ............
                -   ............
                -    ...........
F     393.75 +     ..........
                -      .........
                -        .......
                -         ......
                -          .....
                -           ....
T     450.00 +     *  ***  .*
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** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date:	11-20-92
Time of Run:	10:46 AM
Run By:	SMM
Input Data Filename:	RWDM1-6A.IN
Output Filename:	RWDM1-6A.R2

PROBLEM DESCRIPTION RIVERWOOD @ DM-1: LONG TERM EARTHQUAKE CASE - IMPOUNDMENT FULL

BOUNDARY COORDINATES

7 Top Boundaries
15 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	54.00	102.50	54.00	4
2	102.50	54.00	132.50	66.00	3
3	132.50	66.00	152.50	66.00	3
4	152.50	66.00	200.00	85.00	2
5	200.00	85.00	214.00	85.00	2
6	214.00	85.00	219.00	83.00	2
7	219.00	83.00	450.00	83.00	1
8	219.00	83.00	274.00	61.00	2
9	274.00	61.00	450.00	61.00	3
10	162.50	70.00	251.50	70.00	3
11	102.50	54.00	122.50	54.00	4
12	122.50	54.00	130.00	57.00	4
13	130.00	57.00	450.00	57.00	4
14	.00	50.00	450.00	50.00	5
15	.00	35.00	450.00	35.00	6

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ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	80.0	80.0	.0	.0	.00	.0	2
2	120.0	125.0	200.0	20.0	.00	.0	1
3	110.0	115.0	.0	28.0	.00	.0	1

4	120.0	125.0	200.0	20.0	.00	.0	1
5	110.0	115.0	.0	28.0	.00	.0	1
6	120.0	125.0	300.0	20.0	.00	.0	1

2 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	54.00
2	122.50	54.00
3	274.00	61.00
4	450.00	61.00

Piezometric Surface No. 2 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	214.00	85.00
2	450.00	85.00

A Horizontal Earthquake Loading Coefficient
Of .100 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of .100 Has Been Assigned

Cavitation Pressure = .0 psf

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of200 Points Equally Spaced
Along The Ground Surface Between X = 25.00 ft.
and X = 80.00 ft.

Each Surface Terminates Between X = 200.00 ft.
and X = 450.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	48.22	54.00
2	57.00	49.21
3	66.12	45.12
4	75.53	41.74
5	85.18	39.10
6	95.00	37.22
7	104.94	36.10
8	114.93	35.76
9	124.92	36.19
10	134.85	37.39
11	144.65	39.36
12	154.28	42.08
13	163.66	45.54
14	172.75	49.71
15	181.48	54.58
16	189.82	60.10
17	197.70	66.26
18	205.08	73.00
19	211.92	80.30
20	215.27	84.49

Circle Center At X = 114.3 ; Y = 164.6 and Radius, 128.9

*** 1.232 ***

Individual data on the 32 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	7.3	1833.2	.0	1042.4	.0	.0	183.3	183.3	.0
2	1.4	788.6	.0	451.7	.0	.0	78.9	78.9	.0
	9.1	7537.2	.0	4265.8	.0	.0	753.7	753.7	.0
	9.4	11820.1	.0	6596.7	.0	.0	1182.0	1182.0	.0
5	9.6	15448.3	.0	8473.0	.0	.0	1544.8	1544.8	.0
6	9.8	18281.5	.0	9883.3	.0	.0	1828.2	1828.2	.0
7	7.5	15139.3	.0	8102.6	.0	.0	1513.9	1513.9	.0
8	2.4	5203.2	.0	2716.6	.0	.0	520.3	520.3	.0
9	10.0	24435.3	.0	11275.0	.0	.0	2443.5	2443.5	.0

10	7.6	21441.3	.0	8547.3	.0	.0	2144.1	2144.1	.0
11	2.4	7341.0	.0	2706.3	.0	.0	734.1	734.1	.0
12	5.1	16111.2	.0	5655.1	.0	.0	1611.1	1611.1	.0
13	2.5	8242.4	.0	2738.9	.0	.0	824.2	824.2	.0
14	2.3	7793.1	.0	2545.8	.0	.0	779.3	779.3	.0
15	9.8	31282.9	.0	10235.9	.0	.0	3128.3	3128.3	.0
16	7.8	23165.2	.0	7490.6	.0	.0	2316.5	2316.5	.0
17	1.8	5200.9	.0	1563.9	.0	.0	520.1	520.1	.0
18	8.2	24404.9	.0	6590.5	.0	.0	2440.5	2440.5	.0
19	1.2	3319.7	.0	812.2	.0	.0	332.0	332.0	.0
20	9.1	25875.7	.0	5290.3	.0	.0	2587.6	2587.6	.0
21	.5	1463.3	.0	239.6	.0	.0	146.3	146.3	.0
22	8.2	22442.0	.0	2490.5	.0	.0	2244.2	2244.2	.0
23	3.5	8998.8	.0	280.1	.0	.0	899.9	899.9	.0
24	.2	432.0	.0	.0	.0	.0	43.2	43.2	.0
25	4.7	11500.9	.0	.0	.0	.0	1150.1	1150.1	.0
26	7.9	17738.6	.0	.0	.0	.0	1773.9	1773.9	.0
27	2.3	4695.8	.0	.0	.0	.0	469.6	469.6	.0
28	1.8	3392.0	.0	.0	.0	.0	339.2	339.2	.0
29	3.3	5322.6	.0	.0	.0	.0	532.3	532.3	.0
30	6.8	6848.8	.0	.0	.0	.0	684.9	684.9	.0
31	2.1	849.4	.0	.0	.0	.0	84.9	84.9	.0
32	1.3	160.3	.0	.0	.0	.0	16.0	16.0	.0

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	52.36	54.00
2	61.31	49.54
3	70.57	45.75
4	80.08	42.66
5	89.79	40.28
6	99.65	38.63
7	109.61	37.72
8	119.61	37.55
9	129.59	38.12
10	139.51	39.43
11	149.30	41.47
12	158.91	44.24
13	168.29	47.71
14	177.38	51.86
15	186.14	56.68
16	194.53	62.14
17	202.48	68.20
18	209.96	74.83
19	216.93	82.01
20	218.07	83.37

Circle Center At X = 116.9 ; Y = 172.1 and Radius, 134.6

*** 1.233 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	42.97	54.00
2	51.77	49.26
3	60.90	45.18
4	70.30	41.76
5	79.92	39.03
6	89.71	37.00
7	99.62	35.68
8	109.60	35.08
9	119.60	35.21
10	129.57	36.06
11	139.44	37.62
12	149.18	39.90
13	158.73	42.87
14	168.04	46.52
15	177.06	50.84
16	185.74	55.79
17	194.05	61.37
18	201.93	67.52
19	209.34	74.23
20	216.26	81.46
21	217.90	83.44

Circle Center At X = 112.9 ; Y = 173.4 and Radius, 138.4

*** 1.235 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	58.17	54.00
2	66.86	49.06
3	75.93	44.85
4	85.32	41.40
5	94.96	38.74
6	104.78	36.88
7	114.73	35.83
8	124.72	35.61
9	134.71	36.21
10	144.60	37.64
11	154.35	39.87
12	163.88	42.90
13	173.13	46.70
14	182.03	51.25
15	190.53	56.52
16	198.57	62.48
17	206.09	69.07
18	213.03	76.26
19	218.66	83.14

Circle Center At X = 122.4 ; Y = 156.9 and Radius, 121.3

*** 1.236 ***

1

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	54.02	54.00
2	62.81	49.24
3	71.98	45.23
4	81.44	42.01
5	91.15	39.60
6	101.02	38.02
7	111.00	37.27
8	121.00	37.36
9	130.95	38.30
10	140.79	40.07
11	150.45	42.66
12	159.86	46.06
13	168.94	50.23
14	177.65	55.16
15	185.90	60.80
16	193.66	67.12
17	200.85	74.06
18	207.43	81.59
19	209.94	85.00

Circle Center At X = 114.9 ; Y = 155.9 and Radius, 118.7

*** 1.237 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	59.00	54.00
2	67.79	49.24
3	76.93	45.18
4	86.36	41.86
5	96.03	39.29
6	105.86	37.49
7	115.81	36.48
8	125.81	36.25
9	135.79	36.81
10	145.70	38.15
11	155.47	40.28
12	165.05	43.16
13	174.36	46.80
14	183.37	51.15
15	192.00	56.20
16	200.20	61.92
17	207.93	68.27
18	215.13	75.21
19	221.76	82.69
20	222.00	83.00

Circle Center At X = 123.7 ; Y = 162.9 and Radius, 126.7

*** 1.240 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	58.72	54.00
2	67.81	49.83
3	77.18	46.34
4	86.79	43.57
5	96.57	41.51
6	106.49	40.19
7	116.47	39.61
8	126.47	39.77
9	136.43	40.68
10	146.29	42.33
11	156.00	44.71
12	165.51	47.80
13	174.77	51.59
14	183.71	56.06
15	192.30	61.18
16	200.48	66.93
17	208.22	73.27
18	215.46	80.17
19	218.28	83.29

Circle Center At X = 119.3 ; Y = 173.9 and Radius, 134.3

*** 1.240 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	36.33	54.00
2	45.25	49.48
3	54.46	45.58
4	63.91	42.30
5	73.56	39.67
6	83.36	37.71
7	93.28	36.41
8	103.26	35.78
9	113.26	35.83
10	123.23	36.56
11	133.13	37.96
12	142.92	40.02
13	152.54	42.75
14	161.95	46.12
15	171.12	50.11
16	179.99	54.72
17	188.54	59.92
18	196.71	65.69
19	204.47	71.99
20	211.79	78.80
21	216.62	83.95

Circle Center At X = 107.5 ; Y = 183.4 and Radius, 147.7

*** 1.241 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	53.47	54.00
2	62.05	48.86
3	71.05	44.51
4	80.41	40.98
5	90.04	38.29
6	99.87	36.47
7	109.83	35.53
8	119.83	35.48
9	129.79	36.31
10	139.64	38.03
11	149.30	40.62
12	158.69	44.06
13	167.74	48.32
14	176.37	53.37
15	184.52	59.16
16	192.12	65.66
17	199.12	72.81
18	205.45	80.55
19	208.47	85.00

Circle Center At X = 115.4 ; Y = 147.7 and Radius, 112.4

*** 1.242 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	45.45	54.00
2	54.58	49.92
3	63.96	46.46
4	73.56	43.64
5	83.32	41.47
6	93.20	39.95
7	103.17	39.11
8	113.17	38.93
9	123.15	39.43
10	133.09	40.59
11	142.92	42.42
12	152.60	44.90
13	162.10	48.03
14	171.37	51.79
15	180.36	56.16
16	189.04	61.12
17	197.37	66.66
18	205.31	72.74

```
   19        212.82        79.34
   20        217.18        83.73

Circle Center At X =  110.8 ; Y =  187.7  and Radius,  148.8

      ***     1.243   ***

1

            Y            A     X     I     S            F     T

            .00     56.25    112.50    168.75    225.00    281.25

X        .00 +-----*--**---------+---------+---------+---------+
             -
             -
             -        . .
             -       ...8
             -      ...81
       56.25 +     ...312
             -    ...312.
             -   ....12..
             -   ....12..
             - ....81..
             -.....12..*
A     112.50 +.....12...
             -.....12..*
             ......31..* *
             .......10...
             .......15...*
             .......610..*
X     168.75 ........21...
             ........621...
             .........6219..
             ...........215.*
             ............2195
             .............61*
I     225.00 ...............6
             ................
             ................
             ............*...
             ................
             ...........*....
S     281.25 +...............
             -...............
             -...............
             -...............
             - ..............
             - ..............
      337.50 +  .............
             -  .............
             -   ............
             -    ...........
             -    ...........
             -     ..........
F     393.75 +      .........
             -       ........
             -        .......
             -         ......
             -           ....
             -            ...
T     450.00 +     *  ***  .*
```

END OF CONSTRUCTION

LONG TERM CASE – F.S.= 1.51
SHORT TERM CASE – F.S.= 1.49

SOIL STRATUM	DESCRIPTION	SOIL STRENGTH PARAMETERS							
		SHORT TERM				LONG TERM			
		w	γ_{sat}	c	ϕ	w	γ_{sat}	c'	ϕ'
I	SLUDGE	60	60			60	60		
II	CL FILL	125	125	800	0	125	125	200	20
III	SM/ML	125	125	800	0	125	125	200	20
IV	CL/CH	125	125	800	0	125	125	200	20
V	SM/ML	120	120	150	18	120	120	0	32
VI	CL/CH	125	125	1000	0	125	125	200	20

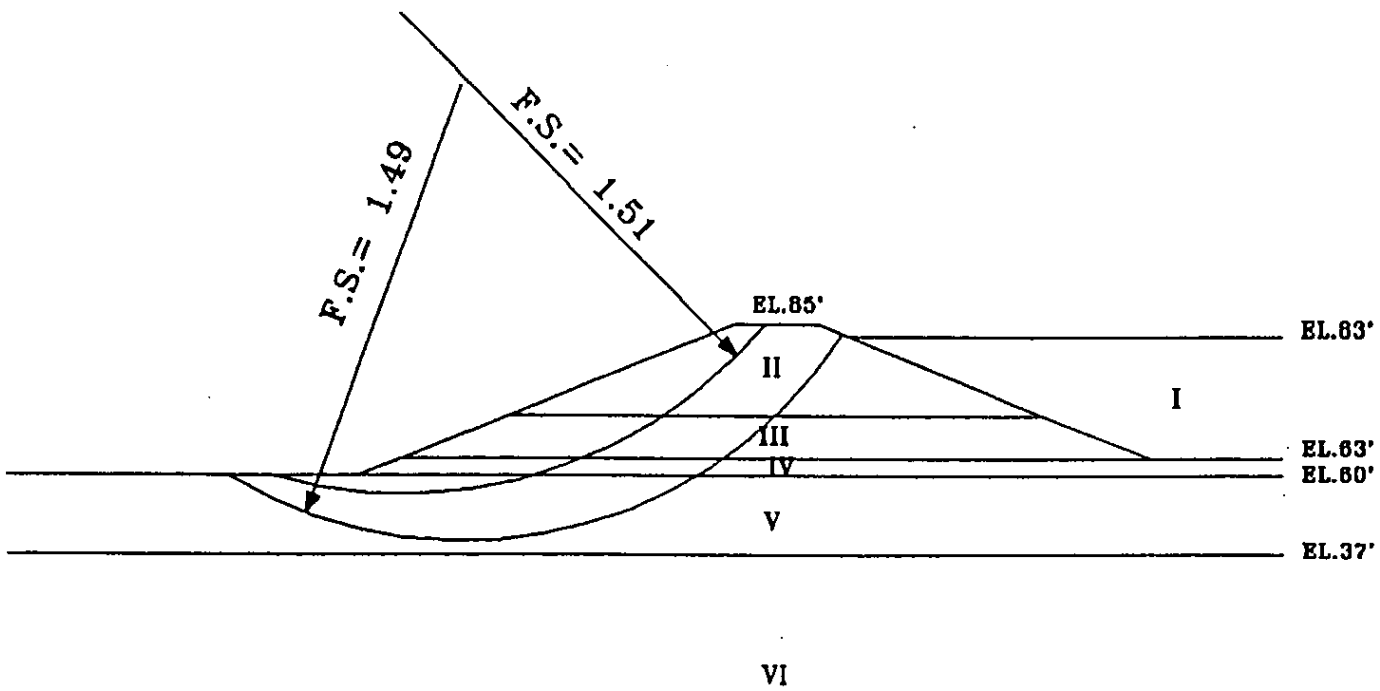

FIGURE 7

DAMES & MOORE

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 11-16-92
Time of Run: 3:55 PM
Run By: SMM
Input Data Filename: RWS3-1A.IN
Output Filename: RWS3-1A.R4

PROBLEM DESCRIPTION RIVERWOOD @ PREVIOUS SECTION III: SHORT TERM END OF CONSTRUCTION CASE

BOUNDARY COORDINATES

5 Top Boundaries
10 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	60.00	137.50	60.00	5
2	137.50	60.00	200.00	85.00	2
3	200.00	85.00	214.00	85.00	2
4	214.00	85.00	219.00	83.00	2
5	219.00	83.00	450.00	83.00	1
6	219.00	83.00	269.00	63.00	2
7	162.50	70.00	251.50	70.00	3
8	145.00	63.00	450.00	63.00	4
9	.00	60.00	450.00	60.00	5
10	.00	47.00	450.00	47.00	6

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	80.0	80.0	.0	.0	.00	.0	2
2	125.0	125.0	800.0	.0	.00	.0	1
3	125.0	125.0	800.0	.0	.00	.0	1
4	125.0	125.0	800.0	.0	.00	.0	1
5	120.0	120.0	150.0	18.0	.00	.0	1
6	125.0	125.0	1000.0	.0	.00	.0	1

2 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	60.00
2	137.50	60.00
3	145.00	63.00
4	450.00	63.00

Piezometric Surface No. 2 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	214.00	85.00
2	450.00	85.00

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of200 Points Equally Spaced Along The Ground Surface Between X = 70.00 ft.
and X = 150.00 ft.

Each Surface Terminates Between X = 190.00 ft.
and X = 400.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = .00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.23	60.00
2	125.12	55.42
3	134.54	52.07
4	144.33	50.00
5	154.30	49.24
6	164.28	49.83
7	174.10	51.73
8	183.57	54.92
9	192.54	59.35
10	200.84	64.93
11	208.32	71.56
12	214.85	79.13
13	217.71	83.51

Circle Center At X = 154.9 ; Y = 124.2 and Radius, 75.0

*** 1.486 ***

Individual data on the 20 slices

e	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	8.9	2442.2	.0	1428.4	.0	.0	.0	.0	.0
2	9.4	7071.8	.0	3903.6	.0	.0	.0	.0	.0
3	3.0	2926.8	.0	1555.7	.0	.0	.0	.0	.0
4	6.8	8767.1	.0	4315.5	.0	.0	.0	.0	.0
5	.7	1053.6	.0	506.9	.0	.0	.0	.0	.0
6	9.3	17256.7	.0	7799.4	.0	.0	.0	.0	.0
7	8.2	18924.3	.0	6930.8	.0	.0	.0	.0	.0
8	1.8	4489.0	.0	1471.7	.0	.0	.0	.0	.0
9	9.8	26418.5	.0	7626.8	.0	.0	.0	.0	.0
10	9.5	27173.5	.0	6036.0	.0	.0	.0	.0	.0
11	9.0	25748.3	.0	3658.6	.0	.0	.0	.0	.0
12	1.0	2721.4	.0	241.7	.0	.0	.0	.0	.0
13	4.5	12155.4	.0	503.2	.0	.0	.0	.0	.0
14	2.0	5309.3	.0	.0	.0	.0	.0	.0	.0
15	.8	2134.3	.0	.0	.0	.0	.0	.0	.0
16	5.7	12533.7	.0	.0	.0	.0	.0	.0	.0
17	1.8	3135.3	.0	.0	.0	.0	.0	.0	.0
18	5.7	7201.7	.0	.0	.0	.0	.0	.0	.0
19	.9	661.1	.0	.0	.0	.0	.0	.0	.0
20	2.9	987.2	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.65	60.00
2	129.19	54.79
3	138.44	50.98
4	148.17	48.67

5	158.14	47.91
6	168.10	48.72
7	177.82	51.09
8	187.05	54.94
9	195.55	60.20
10	203.13	66.72
11	209.60	74.35
12	214.79	82.90
13	215.41	84.43

Circle Center At X = 158.0 ; Y = 111.5 and Radius, 63.6

*** 1.489 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	114.22	60.00
2	123.24	55.68
3	132.70	52.44
4	142.48	50.33
5	152.43	49.39
6	162.43	49.63
7	172.33	51.03
8	182.00	53.59
9	191.30	57.26
10	200.10	62.00
11	208.29	67.74
12	215.75	74.40
13	222.37	81.89
14	223.14	83.00

Circle Center At X = 155.4 ; Y = 134.3 and Radius, 84.9

*** 1.495 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.25	60.00
2	128.90	54.98
3	138.15	51.18
4	147.83	48.67
5	157.76	47.50
6	167.76	47.69
7	177.64	49.23
8	187.22	52.10
9	196.32	56.25
10	204.77	61.59
11	212.42	68.03
12	219.12	75.45

13	224.27	83.00

Circle Center At X = 161.4 ; Y = 120.9 and Radius, 73.5

*** 1.500 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	118.24	60.00
2	126.86	54.93
3	136.17	51.27
4	145.93	49.10
5	155.91	48.48
6	165.87	49.42
7	175.55	51.90
8	184.74	55.86
9	193.19	61.20
10	200.71	67.79
11	207.11	75.47
12	212.24	84.06
13	212.62	85.00

Circle Center At X = 154.9 ; Y = 112.5 and Radius, 64.0

*** 1.501 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	118.24	60.00
2	126.79	54.81
3	136.06	51.05
4	145.80	48.80
5	155.78	48.12
6	165.73	49.03
7	175.42	51.51
8	184.60	55.49
9	193.02	60.87
10	200.49	67.52
11	206.81	75.27
12	211.82	83.93
13	212.24	85.00

Circle Center At X = 155.0 ; Y = 111.0 and Radius, 62.9

*** 1.502 ***

1

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	125.88	60.00
2	135.07	56.07
3	144.72	53.44
4	154.64	52.17
5	164.64	52.28
6	174.53	53.76
7	184.12	56.59
8	193.23	60.72
9	201.69	66.06
10	209.32	72.51
11	216.00	79.96
12	218.25	83.30

Circle Center At X = 158.8 ; Y = 124.1 and Radius, 72.1

*** 1.513 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	123.47	60.00
2	132.61	55.95
3	142.23	53.23
4	152.15	51.92
5	162.15	52.03
6	172.03	53.56
7	181.59	56.48
8	190.64	60.74
9	199.00	66.24
10	206.48	72.87
11	212.95	80.50
12	215.42	84.43

Circle Center At X = 156.3 ; Y = 121.5 and Radius, 69.8

*** 1.514 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.23	60.00
2	125.30	55.79
3	134.79	52.63

4	144.57	50.55
5	154.53	49.59
6	164.52	49.75
7	174.44	51.03
8	184.15	53.41
9	193.53	56.88
10	202.47	61.37
11	210.84	66.84
12	218.55	73.21
13	225.49	80.41
14	227.47	83.00

Circle Center At X = 158.1 ; Y = 138.1 and Radius, 88.6

*** 1.515 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	130.30	60.00
2	139.18	55.39
3	148.68	52.27
4	158.56	50.72
5	168.56	50.77
6	178.42	52.43
7	187.88	55.66
8	196.71	60.36
9	204.66	66.42
10	211.54	73.68
11	217.16	81.95
12	217.86	83.45

Circle Center At X = 163.2 ; Y = 112.4 and Radius, 61.9

*** 1.522 ***

```
          Y           A     X     I     S           F     T

          .00     56.25    112.50    168.75    225.00    281.25

X       .00 +-------*-+*--------+---------+---------+---------+
            -
            -
            -
            -
            -
      56.25 +
            -          .
            -        ...
            -       ....
            -      .....
            -     ......
A    112.50 +    ......1
```

```
                -   ......12
                -  ......120
                -  ......17*
                - .......1...
                - ......42..*
X     168.75 +.......418...
                -........13....
                .........418....
                ..........411..*
                ...........421..
                ............431*
I     225.00 ..............93
                ................
                ................
                ............*...
                ................
                -..........*....
S     281.25 +...............
                +...............
                - ..............
                - ..............
                -  .............
                -  .............
      337.50 +    ...........
                -    ...........
                -     ..........
                -       ........
                -        .......
                -         ......
F     393.75 +            ...
                -             .
                -
                -
                -
                -
T     450.00 +       *  *   *
```

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 11-16-92
Time of Run: 2:56 PM
Run By: SMM
Input Data Filename: RWS3-2A.IN
Output Filename: RWS3-2A.R1

PROBLEM DESCRIPTION RIVERWOOD @ PREVIOUS SECTION III: LONG T
ERM END OF CONSTRUCTION CASE

BOUNDARY COORDINATES

5 Top Boundaries
10 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	60.00	137.50	60.00	5
2	137.50	60.00	200.00	85.00	2
3	200.00	85.00	214.00	85.00	2
4	214.00	85.00	219.00	83.00	2
5	219.00	83.00	450.00	83.00	1
6	219.00	83.00	269.00	63.00	2
7	162.50	70.00	251.50	70.00	3
8	145.00	63.00	450.00	63.00	4
9	.00	60.00	450.00	60.00	5
10	.00	47.00	450.00	47.00	6

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez Surfac No.
1	80.0	80.0	.0	.0	.00	.0	2
2	125.0	125.0	200.0	20.0	.00	.0	1
3	125.0	125.0	200.0	20.0	.00	.0	1
4	125.0	125.0	200.0	20.0	.00	.0	1
5	120.0	120.0	.0	32.0	.00	.0	1
6	125.0	125.0	200.0	20.0	.00	.0	1

1

2 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	60.00
2	137.50	60.00
3	145.00	63.00
4	450.00	63.00

Piezometric Surface No. 2 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	214.00	85.00
2	450.00	85.00

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of200 Points Equally Spaced Along The Ground Surface Between X = 10.00 ft.
and X = 170.00 ft.

Each Surface Terminates Between X = 190.00 ft.
and X = 400.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 1.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	157.14	67.85
2	164.49	61.08
3	172.25	54.77
4	180.38	48.94
5	188.85	43.63
6	197.63	38.84
7	206.68	34.60
8	215.98	30.92
9	225.49	27.82
10	235.17	25.31
11	244.98	23.39
12	254.90	22.08
13	264.87	21.37
14	274.87	21.28
15	284.86	21.81
16	294.79	22.94
17	304.64	24.68
18	314.36	27.01
19	323.92	29.94
20	333.29	33.45
21	342.42	37.53
22	351.29	42.16
23	359.85	47.32
24	368.08	52.99
25	375.95	59.16
26	383.43	65.80
27	390.49	72.89
28	397.10	80.39
29	399.12	83.00

6	210.83	44.72
7	220.19	41.18
8	229.79	38.41
9	239.60	36.43
10	249.53	35.25
11	259.52	34.88
12	269.51	35.33
13	279.43	36.58
14	289.22	38.64
15	298.81	41.48
16	308.13	45.10
17	317.13	49.45
18	325.75	54.53
19	333.92	60.29
20	341.61	66.69
21	348.74	73.69
22	355.29	81.25
23	356.57	83.00

Factor Of Safety For The Preceding Specified Surface =-24.002

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	123.37	60.00
2	133.14	57.89
3	143.11	57.03
4	153.10	57.43
5	162.96	59.09
6	172.53	61.99
7	181.66	66.06
8	190.20	71.26
9	198.02	77.50
10	204.99	84.67
11	205.24	85.00

Circle Center At X = 144.9 ; Y = 136.1 and Radius, 79.1

*** 1.513 ***

Individual data on the 17 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	9.8	1238.2	.0	658.7	.0	.0	.0	.0	.0
2	4.4	1202.5	.0	627.6	.0	.0	.0	.0	.0
3	5.6	2621.5	.0	1258.6	.0	.0	.0	.0	.0
4	1.9	1287.9	.0	612.0	.0	.0	.0	.0	.0
5	8.1	7329.5	.0	2898.3	.0	.0	.0	.0	.0
6	9.4	11547.1	.0	2841.7	.0	.0	.0	.0	.0
7	.5	629.5	.0	114.3	.0	.0	.0	.0	.0
8	3.0	4205.1	.0	675.0	.0	.0	.0	.0	.0
9	6.6	9617.1	.0	859.9	.0	.0	.0	.0	.0
10	2.3	3395.1	.0	78.5	.0	.0	.0	.0	.0
11	6.9	10086.8	.0	.0	.0	.0	.0	.0	.0
12	6.5	8832.2	.0	.0	.0	.0	.0	.0	.0
13	2.1	2603.6	.0	.0	.0	.0	.0	.0	.0
14	7.8	8077.4	.0	.0	.0	.0	.0	.0	.0
5	2.0	1505.4	.0	.0	.0	.0	.0	.0	
6	5.0	1808.6	.0	.0	.0	.0	.0	.0	
17	.2	5.1	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.96	60.00
2	130.59	57.33
3	140.51	56.05
4	150.51	56.19
5	160.39	57.73
6	169.95	60.65
7	179.01	64.89
8	187.38	70.37
9	194.89	76.97
10	201.39	84.57
11	201.67	85.00

Circle Center At X = 144.6 ; Y = 126.6 and Radius, 70.7

*** 1.524 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	133.02	60.00
2	142.85	58.18
3	152.84	57.81
4	162.78	58.90
5	172.46	61.42
6	181.67	65.32
7	190.21	70.52
8	197.90	76.91
9	204.59	84.35
10	205.02	85.00

Circle Center At X = 150.4 ; Y = 126.2 and Radius, 68.4

*** 1.526 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	131.41	60.00
2	141.15	57.72
3	151.11	56.87
4	161.09	57.46
5	170.89	59.47
6	180.29	62.87
7	189.11	67.59
8	197.16	73.52
9	204.27	80.55
10	207.64	85.00

Circle Center At X = 152.0 ; Y = 125.8 and Radius, 69.0

*** 1.539 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	114.52	60.00
2	124.08	57.07
3	133.92	55.28
4	143.90	54.67
5	153.89	55.24
6	163.73	56.99
7	173.31	59.88
8	182.47	63.89
9	191.10	68.95
10	199.07	74.99
11	206.27	81.92
12	208.79	85.00

Circle Center At X = 144.0 ; Y = 138.9 and Radius, 84.2

*** 1.549 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	130.60	60.00
2	140.38	57.89
3	150.37	57.49
4	160.28	58.80
5	169.83	61.79
6	178.72	66.37
7	186.69	72.41
8	193.51	79.72
9	195.89	83.36

Circle Center At X = 147.7 ; Y = 115.6 and Radius, 58.2

*** 1.549 ***

Failure Surface Specified By 9 Coordinate Points

Point	X-Surf	Y-Surf

No.	(ft)	(ft)
1	127.39	60.00
2	137.10	57.61
3	147.07	56.92
4	157.02	57.95
5	166.64	60.66
6	175.66	64.99
7	183.80	70.80
8	190.83	77.91
9	194.11	82.64

Circle Center At X = 146.1 ; Y = 115.1 and Radius, 58.1

*** 1.551 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	113.72	60.00
2	123.25	56.96
3	133.09	55.20
4	143.08	54.75
5	153.04	55.63
6	162.80	57.80
7	172.19	61.25
8	181.04	65.90
9	189.20	71.68
10	196.53	78.48
11	201.92	85.00

Circle Center At X = 141.5 ; Y = 130.5 and Radius, 75.7

*** 1.556 ***

1

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.13	60.00

2	125.98	58.26
3	135.95	57.47
4	145.95	57.61
5	155.89	58.70
6	165.68	60.72
7	175.24	63.65
8	184.48	67.48
9	193.32	72.16
10	201.68	77.65
11	209.48	83.90
12	210.61	85.00

Circle Center At X = 139.4 ; Y = 163.0 and Radius, 105.6

*** 1.568 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	137.84	60.14
2	147.74	58.73
3	157.74	58.76
4	167.63	60.25
5	177.20	63.14
6	186.25	67.40
7	194.59	72.91
8	202.05	79.58
9	206.57	85.00

Circle Center At X = 152.5 ; Y = 127.5 and Radius, 68.9

*** 1.569 ***

```
          Y            A     X     I     S            F     T

           .00     56.25    112.50    168.75    225.00    281.25
X        .00 +-------*-+*--------+---------+---------+---------+
            -           .
            -         ...
            -       .....
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                -      ......
                -     .......
         56.25 +    ........
                -    ........
                -   .........
                - ..........
                - ..........
                -...........
A       112.50 +..........5
                -.........51
                ..........13
                ..........1*
                ..........1..
                ..........21*.
X       168.75 ...........1..
                ...........41.
                ............417.
                ..............41*
                ..............41
                ...............*
I       225.00 ................
                ................
                ................
                ............*...
                ................
                -..........*....
S       281.25 +...............
                -...............
                - ..............
                - ..............
                -   ............
                -    ...........
        337.50 +    ...........
                -      ..........
                -      ..........
                -        ........
                -         .......
                -           .....
F       393.75 +             ....
                -               .
                -
                -
                -
                -
T       450.00 +        *  *   *
```

SUDDEN DRAWDOWN

LONG TERM CASE – F.S.= 1.18
SHORT TERM CASE – F.S.=1.32

SOIL STRATUM	DESCRIPTION	SOIL STRENGTH PARAMETERS							
		SHORT TERM				LONG TERM			
		w	γ_{sat}	c	ϕ	w	γ_{sat}	c'	ϕ'
I	SLUDGE	80	80			80	80		
II	CL FILL	125	125	800	0	125	125	200	20
III	SM/ML	125	125	800	0	125	125	200	20
IV	CL/CH	125	125	800	0	125	125	200	20
V	SM/ML	120	120	150	18	120	120	0	32
VI	CL/CH	125	125	1000	0	125	125	200	20

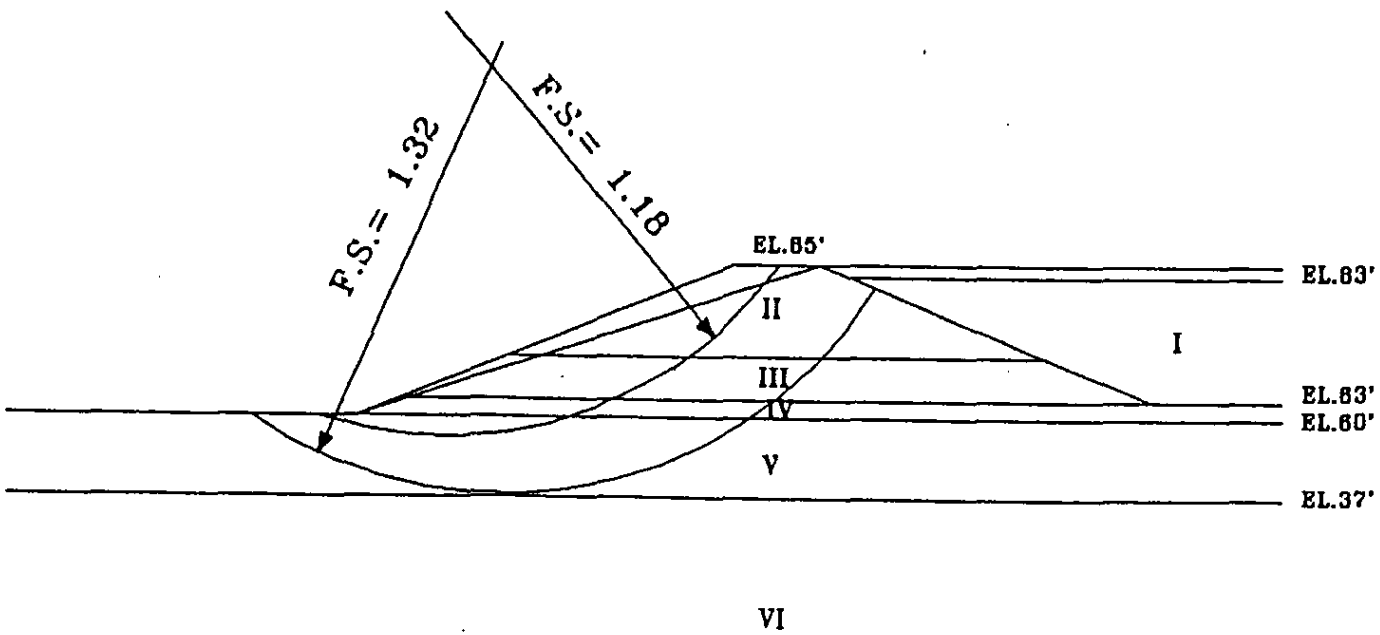

FIGURE 8

DAMES & MOORE

RIVERWOOD INTERI USA, INC.
WEST MONRO DANA

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 11-17-92
Time of Run: 12:41 PM
Run By: SMM
Input Data Filename: RWS3-3A.IN
Output Filename: RWS3-3A.R3

PROBLEM DESCRIPTION RIVERWOOD @ PREVIOUS SECTION III: SHORT-TERM SUDDEN DRAWDOWN CASE

BOUNDARY COORDINATES

5 Top Boundaries
10 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	60.00	137.50	60.00	5
2	137.50	60.00	200.00	85.00	2
3	200.00	85.00	214.00	85.00	2
4	214.00	85.00	219.00	83.00	2
5	219.00	83.00	450.00	83.00	1
6	219.00	83.00	269.00	63.00	2
7	162.50	70.00	251.50	70.00	3
8	145.00	63.00	450.00	63.00	4
9	.00	60.00	450.00	60.00	5
10	.00	47.00	450.00	47.00	6

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	80.0	80.0	.0	.0	.00	.0	1
2	125.0	125.0	800.0	.0	.00	.0	1
3	125.0	125.0	800.0	.0	.00	.0	1
4	125.0	125.0	800.0	.0	.00	.0	1
5	120.0	120.0	150.0	18.0	.00	.0	1
6	125.0	125.0	1000.0	.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	60.00
2	137.50	60.00
3	214.00	85.00
4	450.00	85.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of200 Points Equally Spaced Along The Ground Surface Between X = 70.00 ft.
and X = 150.00 ft.

Each Surface Terminates Between X = 190.00 ft.
and X = 400.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = .00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.25	60.00
2	128.90	54.98
3	138.15	51.18
4	147.83	48.67
5	157.76	47.50

6	167.76	47.69
7	177.64	49.23
8	187.22	52.10
9	196.32	56.25
10	204.77	61.59
11	212.42	68.03
12	219.12	75.45
13	224.27	83.00

Circle Center At X = 161.4 ; Y = 120.9 and Radius, 73.5

*** 1.324 ***

Individual data on the 24 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	8.6	2605.2	.0	1566.5	.0	.0	.0	.0	.0
2	8.6	7004.7	.0	3937.8	.0	.0	.0	.0	.0
3	.6	687.8	.0	366.8	.0	.0	.0	.0	.0
4	6.9	9376.5	.0	4639.9	.0	.0	.0	.0	.0
5	1.7	2880.6	.0	1395.5	.0	.0	.0	.0	.0
6	1.1	2103.5	.0	1013.6	.0	.0	.0	.0	.0
7	9.9	21794.8	.0	10044.9	.0	.0	.0	.0	.0
8	4.7	12445.8	.0	5588.2	.0	.0	.0	.0	.0
	5.3	15067.2	.0	6682.5	.0	.0	.0	.0	.0
	.3	1020.9	.0	455.4	.0	.0	.0	.0	.0
11	9.5	30049.9	.0	13229.9	.0	.0	.0	.0	.0
12	9.6	32245.8	.0	14262.4	.0	.0	.0	.0	.0
13	9.1	31052.9	.0	13991.4	.0	.0	.0	.0	.0
14	3.7	12309.3	.0	5796.8	.0	.0	.0	.0	.0
15	2.3	7235.0	.0	3404.9	.0	.0	.0	.0	.0
16	2.5	7618.1	.0	3675.6	.0	.0	.0	.0	.0
17	1.7	4747.3	.0	2592.5	.0	.0	.0	.0	.0
18	6.0	14555.8	.0	8348.3	.0	.0	.0	.0	.0
19	1.6	3176.8	.0	2215.3	.0	.0	.0	.0	.0
20	.2	373.6	.5	278.9	.0	.0	.0	.0	.0
21	4.8	6784.2	335.5	5516.5	.0	.0	.0	.0	.0
22	.1	118.6	15.6	111.6	.0	.0	.0	.0	.0
23	4.0	2156.6	501.3	2937.3	.0	.0	.0	.0	.0
24	1.1	74.9	141.0	353.9	.0	.0	.0	.0	.0

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	124.67	60.00
2	133.35	55.03
3	142.64	51.33
4	152.36	48.97
5	162.31	48.00
6	172.30	48.44
7	182.13	50.28
8	191.60	53.49
9	200.53	58.00
10	208.73	63.71
11	216.05	70.53

12	222.34	78.30
13	225.14	83.00

Circle Center At X = 164.2 ; Y = 118.9 and Radius, 70.9

*** 1.335 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	127.09	60.00
2	135.69	54.91
3	144.96	51.15
4	154.68	48.82
5	164.65	47.97
6	174.63	48.61
7	184.40	50.73
8	193.75	54.28
9	202.46	59.18
10	210.35	65.33
11	217.23	72.59
12	222.95	80.79
13	224.04	83.00

Circle Center At X = 165.4 ; Y = 114.9 and Radius, 66.9

*** 1.343 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	114.22	60.00
2	123.24	55.68
3	132.70	52.44
4	142.48	50.33
5	152.43	49.39
6	162.43	49.63
7	172.33	51.03
8	182.00	53.59
9	191.30	57.26
10	200.10	62.00
11	208.29	67.74
12	215.75	74.40
13	222.37	81.89
14	223.14	83.00

Circle Center At X = 155.4 ; Y = 134.3 and Radius, 84.9

*** 1.345 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.23	60.00
2	125.30	55.79
3	134.79	52.63
4	144.57	50.55
5	154.53	49.59
6	164.52	49.75
7	174.44	51.03
8	184.15	53.41
9	193.53	56.88
10	202.47	61.37
11	210.84	66.84
12	218.55	73.21
13	225.49	80.41
14	227.47	83.00

Circle Center At X = 158.1 ; Y = 138.1 and Radius, 88.6

*** 1.347 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.65	60.00
2	129.19	54.79
3	138.44	50.98
4	148.17	48.67
5	158.14	47.91
6	168.10	48.72
7	177.82	51.09
8	187.05	54.94
9	195.55	60.20
10	203.13	66.72
11	209.60	74.35
12	214.79	82.90
13	215.41	84.43

Circle Center At X = 158.0 ; Y = 111.5 and Radius, 63.6

*** 1.348 ***

Failure Surface Specified By 13 Coordinate Points

Point	X-Surf	Y-Surf

No.	(ft)	(ft)
1	116.23	60.00
2	125.12	55.42
3	134.54	52.07
4	144.33	50.00
5	154.30	49.24
6	164.28	49.83
7	174.10	51.73
8	183.57	54.92
9	192.54	59.35
10	200.84	64.93
11	208.32	71.56
12	214.85	79.13
13	217.71	83.51

Circle Center At X = 154.9 ; Y = 124.2 and Radius, 75.0

*** 1.350 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	129.50	60.00
2	138.39	55.42
3	147.84	52.17
4	157.67	50.32
5	167.66	49.91
6	177.61	50.94
7	187.30	53.40
8	196.54	57.23
9	205.13	62.36
10	212.88	68.67
11	219.65	76.03
12	224.40	83.00

Circle Center At X = 165.5 ; Y = 118.8 and Radius, 68.9

*** 1.352 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	113.82	60.00
2	122.81	55.62
3	132.21	52.20
4	141.91	49.80
5	151.82	48.44
6	161.82	48.13
7	171.79	48.87
8	181.63	50.66

9	191.22	53.48
10	200.46	57.29
11	209.25	62.06
12	217.49	67.73
13	225.09	74.24
14	231.95	81.51
15	233.09	83.00

Circle Center At X = 159.8 ; Y = 142.8 and Radius, 94.7

*** 1.356 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	130.30	60.00
2	139.18	55.39
3	148.68	52.27
4	158.56	50.72
5	168.56	50.77
6	178.42	52.43
7	187.88	55.66
8	196.71	60.36
9	204.66	66.42
10	211.54	73.68
11	217.16	81.95
12	217.86	83.45

Circle Center At X = 163.2 ; Y = 112.4 and Radius, 61.9

*** 1.358 ***

1

```
          Y           A     X     I     S           F     T

           .00     56.25    112.50    168.75    225.00    281.25

X       .00 +-------*-+*--------+---------+---------+---------+
            -
            -
            -
            -
            -
      56.25 +
            -          .
            -        ...
            -       ....
            -      .....
            -     ......
A    112.50 +    ......4
            -   ......41
            -  ......413
            -  ......18*
            - .......1...
```

```
            - ......12..*
X    168.75 +.......12....
            -........14....
            .........12.....
            ..........147..*
            ...........136..
            ............117*
I    225.00 .............921
            ..............99
            ................
            ............*...
            ................
            -..........*....
S    281.25 +...............
            -...............
            - ..............
            - ..............
            -  .............
            -  .............
     337.50 +    ...........
            -    ...........
            -     ..........
            -       ........
            -        .......
            -         ......
F    393.75 +            ...
            -              .
            -
            -
            -
            -
T    450.00 +       *  *   *
```

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date:	11-16-92
Time of Run:	10:08 AM
Run By:	SMM
Input Data Filename:	RWS3-4A.IN
Output Filename:	RWS3-4A.R3

PROBLEM DESCRIPTION RIVERWOOD @ PREVIOUS SECTION III: SUDDEN DRAWDOWN CASE

BOUNDARY COORDINATES

5 Top Boundaries
10 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	60.00	137.50	60.00	5
2	137.50	60.00	200.00	85.00	2
3	200.00	85.00	214.00	85.00	2
4	214.00	85.00	219.00	83.00	2
5	219.00	83.00	450.00	83.00	1
6	219.00	83.00	269.00	63.00	2
7	162.50	70.00	251.50	70.00	3
8	145.00	63.00	450.00	63.00	4
9	.00	60.00	450.00	60.00	5
10	.00	47.00	450.00	47.00	6

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	80.0	80.0	.0	.0	.00	.0	1
2	125.0	125.0	200.0	20.0	.00	.0	1
3	125.0	125.0	200.0	20.0	.00	.0	1
4	125.0	125.0	200.0	20.0	.00	.0	1
5	120.0	120.0	.0	32.0	.00	.0	1
6	125.0	125.0	200.0	20.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	60.00
2	137.50	60.00
3	214.00	85.00
4	450.00	85.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of200 Points Equally Spaced Along The Ground Surface Between X = 10.00 ft.
and X = 170.00 ft.

Each Surface Terminates Between X = 190.00 ft.
and X = 400.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 1.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	157.14	67.85
2	164.49	61.08
3	172.25	54.77
4	180.38	48.94
5	188.85	43.63
6	197.63	38.84
7	206.68	34.60
8	215.98	30.92
9	225.49	27.82

10	235.17	25.31
11	244.98	23.39
12	254.90	22.08
13	264.87	21.37
14	274.87	21.28
15	284.86	21.81
16	294.79	22.94
17	304.64	24.68
18	314.36	27.01
19	323.92	29.94
20	333.29	33.45
21	342.42	37.53
22	351.29	42.16
23	359.85	47.32
24	368.08	52.99
25	375.95	59.16
26	383.43	65.80
27	390.49	72.89
28	397.10	80.39
29	399.12	83.00

Factor Of Safety For The Preceding Specified Surface =*******

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	158.74	68.50
2	165.98	61.60
3	173.65	55.18
4	181.71	49.26
5	190.13	43.87
6	198.89	39.03
7	207.93	34.77
8	217.23	31.09
9	226.74	28.01
10	236.44	25.56
11	246.27	23.73
12	256.20	22.53
13	266.18	21.97
14	276.18	22.05
15	286.15	22.78
16	296.06	24.14
17	305.86	26.13
18	315.51	28.75
19	324.98	31.98
20	334.21	35.81
21	343.19	40.22
22	351.86	45.21
23	360.19	50.73
24	368.15	56.78
25	375.71	63.33
26	382.83	70.35
27	389.49	77.81
28	393.56	83.00

Factor Of Safety For The Preceding Specified Surface =-83.574

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	160.35	69.14
2	167.46	62.11
3	175.12	55.67
4	183.27	49.88
5	191.86	44.77
6	200.84	40.37
7	210.15	36.71
8	219.72	33.83
9	229.50	31.72
10	239.42	30.42
11	249.40	29.93
12	259.40	30.25
13	269.33	31.37
14	279.15	33.30
15	288.77	36.02
16	298.14	39.51
17	307.20	43.75
18	315.88	48.71
19	324.13	54.36
20	331.90	60.66
21	339.13	67.57
22	345.78	75.04
23	351.77	83.00

Factor Of Safety For The Preceding Specified Surface =*******

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	163.57	70.43
2	170.78	63.50
3	178.56	57.22
4	186.85	51.63
5	195.60	46.79
6	204.74	42.72
7	214.19	39.45

8	223.89	37.02
9	233.76	35.43
10	243.73	34.70
11	253.73	34.84
12	263.68	35.85
13	273.51	37.71
14	283.13	40.42
15	292.49	43.94
16	301.51	48.27
17	310.12	53.36
18	318.25	59.17
19	325.86	65.67
20	332.87	72.80
21	339.24	80.51
22	340.96	83.00

Factor Of Safety For The Preceding Specified Surface =-52.538

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	163.57	70.43
2	170.68	63.40
3	178.28	56.89
4	186.31	50.94
5	194.75	45.57
6	203.54	40.81
7	212.65	36.69
8	222.03	33.22
9	231.63	30.42
10	241.41	28.31
11	251.31	26.89
12	261.28	26.18
13	271.28	26.18
14	281.26	26.88
15	291.16	28.29
16	300.93	30.40
17	310.53	33.19
18	319.91	36.65
19	329.03	40.77
20	337.82	45.53
21	346.26	50.89
22	354.30	56.84
23	361.90	63.34
24	369.02	70.37
25	375.62	77.87
26	379.52	83.00

Factor Of Safety For The Preceding Specified Surface =-28.905

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	163.57	70.43
2	170.81	63.53
3	178.48	57.11
4	186.54	51.19
5	194.95	45.79
6	203.70	40.93
7	212.73	36.64
8	222.01	32.93
9	231.51	29.81
10	241.19	27.30
11	251.01	25.40
12	260.93	24.13
13	270.91	23.50
14	280.91	23.49
15	290.89	24.12
16	300.81	25.37
17	310.63	27.26
18	320.31	29.76
19	329.82	32.87
20	339.11	36.57
21	348.14	40.85
22	356.89	45.70
23	365.31	51.09
24	373.38	57.00
25	381.05	63.42
26	388.30	70.30
27	395.11	77.63
28	399.49	83.00

Factor Of Safety For The Preceding Specified Surface =-28.038

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	163.57	70.43
2	170.88	63.60
3	178.60	57.25
4	186.70	51.39
5	195.16	46.05
6	203.93	41.25
7	212.99	37.01
8	222.29	33.35
9	231.81	30.27

10	241.50	27.80
11	251.32	25.94
12	261.24	24.69
13	271.23	24.08
14	281.23	24.08
15	291.20	24.72
16	301.13	25.98
17	310.95	27.85
18	320.63	30.34
19	330.14	33.43
20	339.44	37.11
21	348.49	41.36
22	357.26	46.18
23	365.70	51.53
24	373.80	57.40
25	381.51	63.77
26	388.81	70.61
27	395.66	77.89
28	399.91	83.00

Factor Of Safety For The Preceding Specified Surface =-28.376

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	164.37	70.75
2	171.44	63.68
3	179.02	57.15
4	187.06	51.21
5	195.53	45.88
6	204.36	41.20
7	213.52	37.18
8	222.95	33.86
9	232.60	31.24
10	242.42	29.36
11	252.36	28.20
12	262.35	27.79
13	272.34	28.13
14	282.28	29.20
15	292.12	31.02
16	301.79	33.56
17	311.25	36.81
18	320.44	40.75
19	329.31	45.37
20	337.81	50.63
21	345.90	56.51
22	353.52	62.98
23	360.65	70.00
24	367.23	77.52
25	371.35	83.00

Factor Of Safety For The Preceding Specified Surface =-26.482

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	165.18	71.07
2	172.78	64.57
3	180.77	58.56
4	189.13	53.08
5	197.82	48.13
6	206.81	43.75
7	216.06	39.94
8	225.53	36.73
9	235.19	34.13
10	244.99	32.14
11	254.89	30.78
12	264.87	30.05
13	274.87	29.96
14	284.85	30.50
15	294.78	31.67
16	304.62	33.47
17	314.32	35.88
18	323.85	38.91
19	333.17	42.54
20	342.24	46.75
21	351.03	51.53
22	359.49	56.85
23	367.60	62.70
24	375.32	69.06
25	382.63	75.89
26	389.32	83.00

Factor Of Safety For The Preceding Specified Surface =-25.268

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	165.98	71.39
2	173.35	64.63
3	181.19	58.43
4	189.47	52.82
5	198.14	47.83
6	207.15	43.49
7	216.45	39.83
8	226.00	36.86

9	235.74	34.61
10	245.63	33.07
11	255.59	32.26
12	265.59	32.19
13	275.57	32.86
14	285.47	34.25
15	295.25	36.37
16	304.84	39.20
17	314.19	42.73
18	323.26	46.94
19	332.00	51.80
20	340.36	57.29
21	348.29	63.38
22	355.75	70.04
23	362.70	77.23
24	367.52	83.00

Factor Of Safety For The Preceding Specified Surface =-23.168

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	165.98	71.39
2	173.58	64.89
3	181.64	58.98
4	190.13	53.68
5	198.98	49.04
6	208.16	45.06
7	217.61	41.78
8	227.27	39.22
9	237.10	37.38
10	247.04	36.29
11	257.03	35.94
12	267.03	36.33
13	276.96	37.47
14	286.78	39.35
15	296.44	41.96
16	305.87	45.28
17	315.03	49.29
18	323.86	53.98
19	332.32	59.31
20	340.36	65.26
21	347.93	71.79
22	354.99	78.87
23	358.54	83.00

Factor Of Safety For The Preceding Specified Surface =-26.340

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	165.98	71.39
2	174.41	66.01
3	183.18	61.21
4	192.26	57.01
5	201.60	53.44
6	211.16	50.52
7	220.90	48.25
8	230.77	46.65
9	240.73	45.72
10	250.73	45.47
11	260.72	45.90
12	270.65	47.01
13	280.49	48.79
14	290.19	51.24
15	299.70	54.34
16	308.97	58.08
17	317.97	62.44
18	326.66	67.40
19	334.98	72.93
20	342.91	79.02
21	347.42	83.00

Factor Of Safety For The Preceding Specified Surface =-64.917

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	166.78	71.71
2	174.53	65.39
3	182.75	59.69
4	191.39	54.65
5	200.39	50.31
6	209.71	46.69
7	219.29	43.80
8	229.06	41.68
9	238.97	40.33
10	248.95	39.76
11	258.95	39.98
12	268.90	40.98
13	278.74	42.75
14	288.41	45.30
15	297.86	48.59
16	307.01	52.61
17	315.82	57.34
18	324.24	62.75

19	332.20	68.80
20	339.66	75.45
21	346.58	82.67
22	346.85	83.00

Factor Of Safety For The Preceding Specified Surface =-27.995

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	167.59	72.04
2	175.36	65.74
3	183.61	60.09
4	192.29	55.12
5	201.34	50.87
6	210.70	47.36
7	220.32	44.62
8	230.13	42.66
9	240.06	41.49
10	250.05	41.13
11	260.04	41.58
12	269.96	42.82
13	279.75	44.87
14	289.35	47.69
15	298.68	51.27
16	307.70	55.60
17	316.34	60.64
18	324.54	66.36
19	332.26	72.72
20	339.44	79.67
21	342.36	83.00

Factor Of Safety For The Preceding Specified Surface =-26.145

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	167.59	72.04
2	175.08	65.41
3	182.97	59.27
4	191.23	53.63
5	199.82	48.51

6	208.71	43.94
7	217.88	39.93
8	227.27	36.50
9	236.86	33.67
10	246.61	31.44
11	256.47	29.81
12	266.42	28.81
13	276.42	28.43
14	286.41	28.67
15	296.38	29.54
16	306.27	31.02
17	316.04	33.12
18	325.67	35.82
19	335.11	39.12
20	344.33	43.00
21	353.29	47.44
22	361.95	52.44
23	370.28	57.96
24	378.26	64.00
25	385.84	70.52
26	393.00	77.50
27	397.99	83.00

Factor Of Safety For The Preceding Specified Surface =-19.222

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	168.39	72.36
2	175.52	65.34
3	183.37	59.14
4	191.84	53.83
5	200.84	49.47
6	210.26	46.11
7	219.98	43.79
8	229.90	42.54
9	239.90	42.37
10	249.86	43.29
11	259.66	45.28
12	269.19	48.33
13	278.33	52.39
14	286.97	57.41
15	295.02	63.34
16	302.38	70.12
17	308.96	77.65
18	312.70	83.00

Factor Of Safety For The Preceding Specified Surface =-34.701

The Factor Of Safety For The Trial Failure Surface Defined

By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	168.39	72.36
2	175.86	65.71
3	183.89	59.75
4	192.42	54.52
5	201.37	50.06
6	210.68	46.41
7	220.27	43.60
8	230.08	41.65
9	240.02	40.57
10	250.02	40.37
11	260.00	41.05
12	269.87	42.62
13	279.57	45.05
14	289.02	48.32
15	298.14	52.42
16	306.87	57.31
17	315.13	62.95
18	322.85	69.30
19	329.99	76.30
20	335.71	83.00

Factor Of Safety For The Preceding Specified Surface =-22.320

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	168.39	72.36
2	176.00	65.87
3	184.04	59.91
4	192.45	54.51
5	201.21	49.69
6	210.27	45.46
7	219.60	41.86
8	229.15	38.89
9	238.88	36.57
10	248.74	34.91
11	258.69	33.92
12	268.69	33.61
13	278.68	33.96
14	288.63	34.99
15	298.48	36.69
16	308.20	39.04
17	317.74	42.05
18	327.05	45.69

19	336.10	49.95
20	344.84	54.81
21	353.23	60.24
22	361.24	66.23
23	368.83	72.75
24	375.96	79.76
25	378.84	83.00

Factor Of Safety For The Preceding Specified Surface =-18.213

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 2 8 229.15 38.89

9	238.88	36.57
10	248.74	34.91
11	258.69	33.92
12	268.69	33.61
13	278.68	33.96
14	288.63	34.99
15	298.48	36.69
16	308.20	39.04
17 .35	42.25	
8	229.97	39.52
9	239.76	37.50
10	249.68	36.22
11	259.67	35.68
12	269.67	35.88
13	279.62	36.82
14	289.48	38.50
15	299.19	40.90
16	308.69	44.02
17	317.93	47.83
18	326.87	52.32
19	335.45	57.45
20	343.62	63.21
21	351.35	69.56
22	358.58	76.47
23	364.48	83.00

Factor Of Safety For The Preceding Specified Surface =-16.906

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	170.00	73.00
2	177.17	66.03
3	184.93	59.72
4	193.22	54.13

5	201.97	49.29
6	211.12	45.26
7	220.59	42.05
8	230.31	39.70
9	240.20	38.23
10	250.19	37.64
11	260.18	37.94
12	270.11	39.13
13	279.90	41.20
14	289.46	44.13
15	298.72	47.89
16	307.61	52.47
17	316.06	57.82
18	324.00	63.90
19	331.36	70.67
20	338.10	78.06
21	341.85	83.00

Factor Of Safety For The Preceding Specified Surface =-15.960

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	170.00	73.00
2	177.19	66.05
3	184.92	59.71
4	193.14	54.02
5	201.80	49.01
6	210.83	44.72
7	220.19	41.18
8	229.79	38.41
9	239.60	36.43
10	249.53	35.25
11	259.52	34.88
12	269.51	35.33
13	279.43	36.58
14	289.22	38.64
15	298.81	41.48
16	308.13	45.10
17	317.13	49.45
18	325.75	54.53
19	333.92	60.29
20	341.61	66.69
21	348.74	73.69
22	355.29	81.25
23	356.57	83.00

Factor Of Safety For The Preceding Specified Surface =-15.207

1

Following Are Displayed The Ten Most Critical Of The Trial

Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	131.41	60.00
2	141.15	57.72
3	151.11	56.87
4	161.09	57.46
5	170.89	59.47
6	180.29	62.87
7	189.11	67.59
8	197.16	73.52
9	204.27	80.55
10	207.64	85.00

Circle Center At X = 152.0 ; Y = 125.8 and Radius, 69.0

*** 1.184 ***

Individual data on the 19 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	6.1	520.4	.0	277.9	.0	.0	.0	.0	.0
2	3.6	1141.4	.0	543.7	.0	.0	.0	.0	.0
3	3.9	2203.0	.0	979.2	.0	.0	.0	.0	.0
4	1.7	1240.4	.0	541.1	.0	.0	.0	.0	.0
5	4.4	4085.5	.0	1759.0	.0	.0	.0	.0	.0
6	10.0	12681.6	.0	5294.3	.0	.0	.0	.0	.0
7	1.4	2116.0	.0	882.7	.0	.0	.0	.0	.0
8	5.6	8911.4	.0	3654.3	.0	.0	.0	.0	.0
9	2.8	4730.7	.0	1904.4	.0	.0	.0	.0	.0
10	1.5	2542.1	.0	1054.5	.0	.0	.0	.0	.0
11	7.9	13989.3	.0	5642.4	.0	.0	.0	.0	.0
12	.2	429.0	.0	180.1	.0	.0	.0	.0	.0
13	8.6	14619.1	.0	5875.4	.0	.0	.0	.0	.0
14	3.3	5119.1	.0	2079.7	.0	.0	.0	.0	.0
15	4.8	6654.7	.0	2450.7	.0	.0	.0	.0	.0
16	2.8	3376.6	.0	1194.8	.0	.0	.0	.0	.0
17	4.3	3506.3	.0	958.6	.0	.0	.0	.0	.0
18	1.3	577.0	.0	80.3	.0	.0	.0	.0	.0
19	2.1	360.1	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	133.02	60.00
2	142.85	58.18
3	152.84	57.81
4	162.78	58.90
5	172.46	61.42
6	181.67	65.32
7	190.21	70.52
8	197.90	76.91
9	204.59	84.35
10	205.02	85.00

Circle Center At X = 150.4 ; Y = 126.2 and Radius, 68.4

*** 1.197 ***

1

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	135.43	60.00
2	145.31	58.48
3	155.31	58.16
4	165.27	59.06
5	175.04	61.15
6	184.50	64.42
7	193.48	68.80
8	201.87	74.24
9	209.54	80.66
10	213.61	85.00

Circle Center At X = 152.9 ; Y = 140.0 and Radius, 81.9

*** 1.204 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	129.80	60.00
2	139.41	57.25
3	149.31	55.82
4	159.31	55.72
5	169.23	56.95
6	178.90	59.51
7	188.14	63.34
8	196.79	68.36
9	204.68	74.50
10	211.68	81.64
11	214.15	84.94

Circle Center At X = 155.1 ; Y = 130.2 and Radius, 74.6

*** 1.206 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	123.37	60.00
2	133.14	57.89
3	143.11	57.03
4	153.10	57.43
5	162.96	59.09
6	172.53	61.99
7	181.66	66.06
8	190.20	71.26
9	198.02	77.50
10	204.99	84.67
11	205.24	85.00

Circle Center At X = 144.9 ; Y = 136.1 and Radius, 79.1

*** 1.209 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	137.84	60.14
2	147.74	58.73
3	157.74	58.76
4	167.63	60.25
5	177.20	63.14
6	186.25	67.40
7	194.59	72.91
8	202.05	79.58
9	206.57	85.00

Circle Center At X = 152.5 ; Y = 127.5 and Radius, 68.9

*** 1.222 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	121.76	60.00
2	131.62	58.35
3	141.59	57.56

4	151.59	57.64
5	161.55	58.59
6	171.38	60.40
7	181.02	63.06
8	190.39	66.54
9	199.43	70.83
10	208.05	75.89
11	216.21	81.68
12	218.16	83.34

Circle Center At X = 145.7 ; Y = 172.0 and Radius, 114.5

*** 1.222 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	114.52	60.00
2	124.08	57.07
3	133.92	55.28
4	143.90	54.67
5	153.89	55.24
6	163.73	56.99
7	173.31	59.88
8	182.47	63.89
9	191.10	68.95
10	199.07	74.99
11	206.27	81.92
12	208.79	85.00

Circle Center At X = 144.0 ; Y = 138.9 and Radius, 84.2

*** 1.225 ***

1

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	119.35	60.00
2	128.65	56.33
3	138.37	53.99
4	148.32	53.02
5	158.32	53.44
6	168.15	55.24
7	177.64	58.39
8	186.61	62.82
9	194.87	68.46
10	202.26	75.19
11	208.66	82.88
12	209.97	85.00

Circle Center At X = 150.3 ; Y = 124.6 and Radius, 71.6

*** 1.227 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	122.56	60.00
2	132.03	56.77
3	141.82	54.73
4	151.78	53.89
5	161.77	54.28
6	171.65	55.88
7	181.25	58.68
8	190.44	62.62
9	199.07	67.66
10	207.03	73.72
11	214.19	80.70
12	216.76	83.90

Circle Center At X = 153.6 ; Y = 135.3 and Radius, 81.4

*** 1.229 ***

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          Y           A     X     I     S           F     T

          .00     56.25    112.50    168.75    225.00    281.25

X       .00 +-------*-+*--------+---------+---------+---------+
            -          .
            -        ...
            -      .....
            -     ......
            -    .......
      56.25 +   ........
            -   ........
            -  .........
            - ..........
            - ..........
            -...........
A    112.50 +..........8
            -.........85
            ..........51
            ..........1*
            .........91..
            .........915*.
X    168.75 ..........31..
            ..........912.
            ...........312..
            ............312*
            ............311
            ..............0*
I    225.00 ................
            ................
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                ................
                ............*...
                ................
                -...........*....
S     281.25 +................
                -................
                - ...............
                - ...............
                -  ..............
                -   .............
      337.50 +   .............
                -     ..........
                -     ..........
                -       ........
                -        .......
                -          .....
F     393.75 +           ....
                -              .
                -
                -
                -
                -
T     450.00 +       *  *   *
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EARTHQUAKE

LONG TERM CASE – F.S.= 1.12
SHORT TERM CASE – F.S.= 1.11

SOIL STRATUM	DESCRIPTION	SOIL STRENGTH PARAMETERS							
		SHORT TERM				LONG TERM			
		γ	γ_{sat}	c	ϕ	γ	γ_{sat}	c'	ϕ'
I	SLUDGE	60	60			60	60		
II	CL FILL	125	125	600	0	125	125	200	20
III	SM/ML	125	125	800	0	125	125	200	20
IV	CL/CH	125	125	800	0	125	125	200	20
V	SM/ML	120	120	160	18	120	120	0	32
VI	CL/CH	125	125	1000	0	125	125	200	20

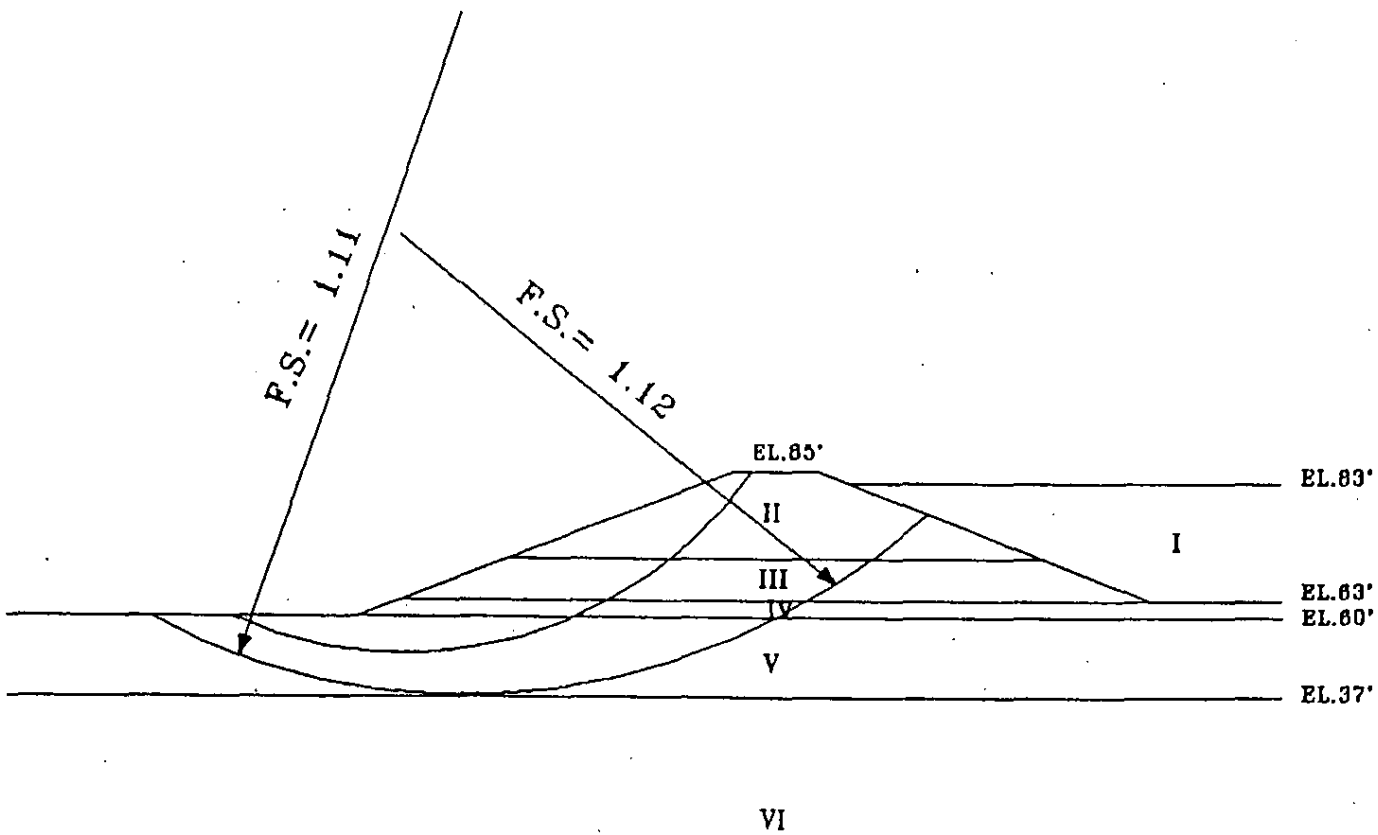


FIGURE 9

DAMES & MOORE

RIVERWOOD INTERN/ SA, INC
WEST MONRO NA

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 11-16-92
Time of Run: 3:17 PM
Run By: SMM
Input Data Filename: RWS3-5A1.IN
Output Filename: RWS3-5A2.R13

PROBLEM DESCRIPTION RIVERWOOD @ PREVIOUS SECTION III: SHORT TERM EARTHQUAKE CASE - IMPOUNDMENT FULL

BOUNDARY COORDINATES

5 Top Boundaries
10 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	60.00	137.50	60.00	5
2	137.50	60.00	200.00	85.00	2
3	200.00	85.00	214.00	85.00	2
4	214.00	85.00	219.00	83.00	2
5	219.00	83.00	450.00	83.00	1
6	219.00	83.00	269.00	63.00	2
7	162.50	70.00	251.50	70.00	3
8	145.00	63.00	450.00	63.00	4
9	.00	60.00	450.00	60.00	5
10	.00	47.00	450.00	47.00	6

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	80.0	80.0	.0	.0	.00	.0	2
2	125.0	125.0	800.0	.0	.00	.0	1
3	125.0	125.0	800.0	.0	.00	.0	1
4	125.0	125.0	800.0	.0	.00	.0	1
5	120.0	120.0	150.0	18.0	.00	.0	1
6	125.0	125.0	1000.0	.0	.00	.0	1

1

2 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	60.00
2	137.50	60.00
3	145.00	63.00
4	450.00	63.00

Piezometric Surface No. 2 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	214.00	85.00
2	450.00	85.00

A Horizontal Earthquake Loading Coefficient
Of .100 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of .100 Has Been Assigned

Cavitation Pressure = .0 psf

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of200 Points Equally Spaced
Along The Ground Surface Between X = 70.00 ft.
and X = 150.00 ft.

Each Surface Terminates Between X = 190.00 ft.
and X = 400.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	102.56	60.00
2	111.62	55.76
3	121.02	52.34
4	130.68	49.76
5	140.53	48.05
6	150.50	47.21
7	160.50	47.26
8	170.45	48.19
9	180.29	50.00
10	189.93	52.67
11	199.29	56.18
12	208.31	60.50
13	216.91	65.61
14	225.02	71.45
15	232.59	77.99
16	237.44	83.00

Circle Center At X = 154.9 ; Y = 160.0 and Radius, 112.8

*** 1.112 ***

Individual data on the 25 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	9.1	2303.3	.0	1322.4	.0	.0	230.3	230.3	.0
2	9.4	6708.0	.0	3712.2	.0	.0	670.8	670.8	.0
3	9.7	10375.3	.0	5583.8	.0	.0	1037.5	1037.5	.0
4	6.8	8864.8	.0	4678.9	.0	.0	886.5	886.5	.0
5	3.0	4481.0	.0	2197.5	.0	.0	448.1	448.1	.0
6	4.5	7685.9	.0	3711.3	.0	.0	768.6	768.6	.0
7	5.5	11098.0	.0	5354.1	.0	.0	1109.8	1109.8	.0
8	10.0	24314.3	.0	9836.6	.0	.0	2431.4	2431.4	.0
9	2.0	5445.6	.0	1965.0	.0	.0	544.6	544.6	.0
10	8.0	23146.4	.0	7566.3	.0	.0	2314.6	2314.6	.0
11	9.8	31494.6	.0	8677.1	.0	.0	3149.5	3149.5	.0
12	9.6	32963.3	.0	7280.5	.0	.0	3296.3	3296.3	.0
[illegible]	9.4	33003.8	.0	5352.5	.0	.0	3300.4	3300.4	.0
[illegible]	.7	2521.4	.0	327.4	.0	.0	252.1	252.1	.0
15	7.3	24203.7	.0	2381.8	.0	.0	2420.4	2420.4	.0
16	1.0	3235.2	.0	199.0	.0	.0	323.5	323.5	.0
17	4.2	12233.9	.0	381.6	.0	.0	1223.4	1223.4	.0
18	1.5	4001.2	.0	.0	.0	.0	400.1	400.1	.0

19	2.9	7144.9	.0	.0	.0	.0	714.5	714.5	.0
20	2.1	4467.2	.0	.0	.0	.0	446.7	446.7	.0
21	4.0	7090.3	500.1	.0	.0	.0	709.0	709.0	.0
22	2.0	2906.3	251.2	.0	.0	.0	290.6	290.6	.0
	7.2	6363.4	902.7	.0	.0	.0	636.3	636.3	.0
4	.3	137.7	41.7	197.0	.0	.0	13.8	13.8	.0
25	4.9	974.0	606.3	1962.8	.0	.0	97.4	97.4	.0

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	113.82	60.00
2	122.81	55.62
3	132.21	52.20
4	141.91	49.80
5	151.82	48.44
6	161.82	48.13
7	171.79	48.87
8	181.63	50.66
9	191.22	53.48
10	200.46	57.29
11	209.25	62.06
12	217.49	67.73
13	225.09	74.24
14	231.95	81.51
15	233.09	83.00

Circle Center At X = 159.8 ; Y = 142.8 and Radius, 94.7

*** 1.119 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	110.60	60.00
2	119.58	55.59
3	128.93	52.05
4	138.58	49.43
5	148.44	47.75
6	158.41	47.02
7	168.41	47.24
8	178.34	48.43
9	188.11	50.56
10	197.63	53.61
11	206.82	57.57
12	215.58	62.38
13	223.84	68.01
14	231.53	74.41
15	238.56	81.52
16	239.77	83.00

Circle Center At X = 161.0 ; Y = 151.1 and Radius, 104.1

*** 1.120 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	104.57	60.00
2	113.71	55.94
3	123.19	52.75
4	132.92	50.45
5	142.82	49.06
6	152.81	48.59
7	162.80	49.05
8	172.71	50.43
9	182.44	52.73
10	191.92	55.91
11	201.06	59.96
12	209.79	64.84
13	218.03	70.51
14	225.71	76.91
15	231.77	83.00

Circle Center At X = 152.9 ; Y = 156.5 and Radius, 107.9

*** 1.121 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	105.78	60.00
2	114.89	55.88
3	124.32	52.55
4	134.00	50.05
5	143.86	48.37
6	153.83	47.55
7	163.83	47.58
8	173.79	48.46
9	183.64	50.19
10	193.30	52.75
11	202.71	56.13
12	211.80	60.30
13	220.50	65.23
14	228.75	70.89
15	236.48	77.23
16	242.41	83.00

Circle Center At X = 158.5 ; Y = 164.3 and Radius, 116.9

*** 1.126 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.25	60.00
2	128.90	54.98
3	138.15	51.18
4	147.83	48.67
5	157.76	47.50
6	167.76	47.69
7	177.64	49.23
8	187.22	52.10
9	196.32	56.25
10	204.77	61.59
11	212.42	68.03
12	219.12	75.45
13	224.27	83.00

Circle Center At X = 161.4 ; Y = 120.9 and Radius, 73.5

*** 1.127 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.23	60.00
2	125.30	55.79
3	134.79	52.63
4	144.57	50.55
5	154.53	49.59
6	164.52	49.75
7	174.44	51.03
8	184.15	53.41
9	193.53	56.88
10	202.47	61.37
11	210.84	66.84
12	218.55	73.21
13	225.49	80.41
14	227.47	83.00

Circle Center At X = 158.1 ; Y = 138.1 and Radius, 88.6

*** 1.129 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	114.22	60.00
2	123.24	55.68

3	132.70	52.44
4	142.48	50.33
5	152.43	49.39
6	162.43	49.63
7	172.33	51.03
8	182.00	53.59
9	191.30	57.26
10	200.10	62.00
11	208.29	67.74
12	215.75	74.40
13	222.37	81.89
14	223.14	83.00

Circle Center At X = 155.4 ; Y = 134.3 and Radius, 84.9

*** 1.130 ***

1

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	101.76	60.00
2	111.02	56.23
3	120.55	53.21
4	130.30	50.97
5	140.19	49.52
6	150.17	48.86
7	160.17	49.01
8	170.13	49.97
9	179.97	51.71
10	189.65	54.25
11	199.08	57.55
12	208.23	61.60
13	217.02	66.37
14	225.39	71.83
15	233.31	77.95
16	238.86	83.00

Circle Center At X = 153.3 ; Y = 173.1 and Radius, 124.2

*** 1.135 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	96.13	60.00
2	105.38	56.19
3	114.87	53.06
4	124.57	50.61
5	134.42	48.87
6	144.36	47.83
7	154.36	47.50

8	164.35	47.90
9	174.29	49.00
10	184.12	50.82
11	193.80	53.33
12	203.28	56.53
13	212.50	60.40
14	221.42	64.92
15	229.99	70.07
16	238.17	75.81
17	245.93	82.13
18	246.85	83.00

Circle Center At X = 153.9 ; Y = 187.0 and Radius, 139.5

*** 1.138 ***

```
          Y            A     X     I     S            F     T

          .00     56.25    112.50    168.75    225.00    281.25

X       .00 +-------*-+*--------+---------+---------+---------+
            -
            -
            -
            -
            -
      56.25 +
            -          .
            -        ...
            -       ....
            -      ....0
            -     ....01
A    112.50 +    ....012
            -   .....126
            -  ......16.
            -  ......1.*
            - ......12...
            - ......12..*
X    168.75 +.......31....
            -........18....
            .........12.....
            .........514...*
            ..........314...
            ...........314.*
I    225.00 ............3146
            ............0311
            ...............3
            ............*...
            ................
            -..........*....
S    281.25 +...............
            -...............
            - ..............
            - ..............
            -  .............
            -  .............
     337.50 +    ...........
            -    ...........
            -     ..........
            -       ........
```

```
                -        .......
                -         ......
F     393.75 +             ...
                -              .
                -
                -
                -
                -
T     450.00 +        *  *   *
```

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date:	11-16-92
Time of Run:	9:18 AM
Run By:	SMM
Input Data Filename:	RWS3-6A.IN
Output Filename:	RWS3-6A.RB

PROBLEM DESCRIPTION RIVERWOOD @ PREVIOUS SECTION III: LONG T
ERM EARTHQUAKE CASE - IMPOUNDMENT FULL

BOUNDARY COORDINATES

5 Top Boundaries
10 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	60.00	137.50	60.00	5
2	137.50	60.00	200.00	85.00	2
3	200.00	85.00	214.00	85.00	2
4	214.00	85.00	219.00	83.00	2
5	219.00	83.00	450.00	83.00	1
6	219.00	83.00	269.00	63.00	2
7	162.50	70.00	251.50	70.00	3
8	145.00	63.00	450.00	63.00	4
9	.00	60.00	450.00	60.00	5
10	.00	47.00	450.00	47.00	6

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	80.0	80.0	.0	.0	.00	.0	2
2	125.0	125.0	200.0	20.0	.00	.0	1
3	125.0	125.0	200.0	20.0	.00	.0	1
4	125.0	125.0	200.0	20.0	.00	.0	1
5	120.0	120.0	.0	32.0	.00	.0	1
6	125.0	125.0	200.0	20.0	.00	.0	1

2 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	60.00
2	137.50	60.00
3	145.00	63.00
4	450.00	63.00

Piezometric Surface No. 2 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	214.00	85.00
2	450.00	85.00

A Horizontal Earthquake Loading Coefficient
Of .100 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of .100 Has Been Assigned

Cavitation Pressure = .0 psf

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

2000 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of200 Points Equally Spaced
Along The Ground Surface Between X = 80.00 ft.
and X = 170.00 ft.

Each Surface Terminates Between X = 202.00 ft.
and X = 450.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 1.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.63	60.00
2	126.04	56.61
3	135.83	54.59
4	145.82	53.98
5	155.78	54.81
6	165.53	57.05
7	174.86	60.65
8	183.58	65.54
9	191.51	71.63
10	198.50	78.78
11	203.04	85.00

Circle Center At X = 145.0 ; Y = 124.0 and Radius, 70.0

*** 1.121 ***

Individual data on the 17 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	9.4	1915.2	.0	1058.7	.0	.0	191.5	191.5	.0
2	9.8	5174.5	.0	2747.3	.0	.0	517.5	517.5	.0
3	1.7	1091.7	.0	568.7	.0	.0	109.2	109.2	.0
4	7.5	6571.6	.0	3160.1	.0	.0	657.2	657.2	.0
5	.8	909.6	.0	458.8	.0	.0	91.0	91.0	.0
6	10.0	13327.2	.0	5368.0	.0	.0	1332.7	1332.7	.0
7	6.7	10831.6	.0	3190.9	.0	.0	1083.2	1083.2	.0
8	3.0	5215.6	.0	1222.0	.0	.0	521.6	521.6	.0
9	7.7	13540.8	.0	2291.0	.0	.0	1354.1	1354.1	.0
10	1.7	2996.6	.0	300.4	.0	.0	299.7	299.7	.0
11	4.2	7311.8	.0	352.7	.0	.0	731.2	731.2	.0
12	4.5	7504.7	.0	.0	.0	.0	750.5	750.5	.0
13	5.8	8588.6	.0	.0	.0	.0	858.9	858.9	.0
14	2.1	2750.8	.0	.0	.0	.0	275.1	275.1	.0
15	7.0	6809.1	.0	.0	.0	.0	680.9	680.9	.0
16	1.5	917.0	.0	.0	.0	.0	91.7	91.7	.0
17	3.0	790.2	.0	.0	.0	.0	79.0	79.0	.0

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	113.02	60.00
2	122.37	56.47
3	132.10	54.16
4	142.05	53.13
5	152.05	53.37
6	161.93	54.89
7	171.54	57.67
8	180.71	61.65
9	189.29	66.78
10	197.15	72.96
11	204.15	80.10
12	207.85	85.00

Circle Center At X = 145.1 ; Y = 130.6 and Radius, 77.6

*** 1.123 ***

1

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	109.40	60.00
2	118.82	56.64
3	128.57	54.41
4	138.51	53.35
5	148.51	53.48
6	158.42	54.78
7	168.12	57.24
8	177.45	60.83
9	186.30	65.49
10	194.53	71.16
11	202.04	77.77
12	208.52	85.00

Circle Center At X = 142.5 ; Y = 137.8 and Radius, 84.6

*** 1.124 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	115.73	60.00
2	124.86	55.92
3	134.50	53.25
4	144.42	52.04
5	154.42	52.33
6	164.26	54.11
7	173.73	57.34
8	182.61	61.94
9	190.70	67.81
10	197.83	74.82

11	203.83	82.82
12	205.00	85.00

Circle Center At X = 147.5 ; Y = 118.6 and Radius, 66.6

*** 1.132 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	108.49	60.00
2	117.55	55.77
3	127.11	52.83
4	136.98	51.23
5	146.98	51.01
6	156.91	52.17
7	166.59	54.68
8	175.83	58.51
9	184.46	63.57
10	192.30	69.77
11	199.22	76.99
12	205.01	85.00

Circle Center At X = 143.6 ; Y = 123.3 and Radius, 72.4

*** 1.137 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	111.66	60.00
2	121.21	57.03
3	131.02	55.09
4	140.98	54.18
5	150.98	54.33
6	160.90	55.54
7	170.65	57.78
8	180.10	61.03
9	189.16	65.26
10	197.73	70.42
11	205.70	76.46
12	213.00	83.30
13	214.35	84.86

Circle Center At X = 144.5 ; Y = 149.0 and Radius, 94.9

*** 1.143 ***

1

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	124.77	60.00
2	134.08	56.34
3	143.86	54.26
4	153.85	53.84
5	163.78	55.08
6	173.36	57.94
7	182.33	62.35
8	190.45	68.19
9	197.49	75.29
10	203.26	83.46
11	204.00	85.00

Circle Center At X = 151.4 ; Y = 114.0 and Radius, 60.2

*** 1.143 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	122.51	60.00
2	131.89	56.54
3	141.67	54.45
4	151.65	53.79
5	161.62	54.57
6	171.38	56.76
7	180.72	60.34
8	189.45	65.21
9	197.39	71.28
10	204.38	78.43
11	209.18	85.00

Circle Center At X = 151.3 ; Y = 123.4 and Radius, 69.6

*** 1.144 ***

1

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	117.54	60.00
2	127.14	57.22
3	137.00	55.52
4	146.98	54.94
5	156.97	55.47

6	166.83	57.11
7	176.45	59.84
8	185.71	63.62
9	194.49	68.41
10	202.68	74.14
11	210.18	80.76
12	214.02	84.99

Circle Center At X = 147.2 ; Y = 144.2 and Radius, 89.3

*** 1.147 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	118.90	60.00
2	128.20	56.33
3	137.91	53.93
4	147.85	52.84
5	157.84	53.08
6	167.72	54.64
7	177.30	57.50
8	186.42	61.61
9	194.91	66.89
10	202.63	73.25
11	209.43	80.58
12	212.56	85.00

Circle Center At X = 151.0 ; Y = 127.6 and Radius, 74.9

*** 1.154 ***

```
          Y           A     X     I     S           F     T

           .00     56.25    112.50    168.75    225.00    281.25

X       .00 +-------*-+*--------+---------+---------+---------+
            -
            -
            -
            -
            -
     56.25 +
            -
            -
            -        ...
            -       ....
            -      .....
A    112.50 +     .....1
            -    .....17
            -   .....41.
            -  ......26*
            -  ......21..
```

```
            - .......51.*.
X     168.75 + .........1...
            -..........41..
            -...........511.
            -............521*
            .............921
            ................*
I     225.00 ................
            ................
            ................
            .............*...
            ................
            ............*....
S     281.25 ................
            ................
            ................
            ................
            -...............
            -...............
      337.50 +...............
            - ..............
            - ..............
            -  .............
            -   ............
            -    ...........
F     393.75 +     ...........
            -      ..........
            -       .........
            -        ........
            -         .......
            -           ....
T     450.00 +       *  *  .*
```

DAMES & MOORE

Sheet No. 11
Calc. No.
Rev. No.
By Date
Chk'd. Date

Job No. 24379-002-137 Job SURFACE IMPOUNDMENT
Client RIVERWOOD INT. Subject POTENTIOMETRIC HEAVE

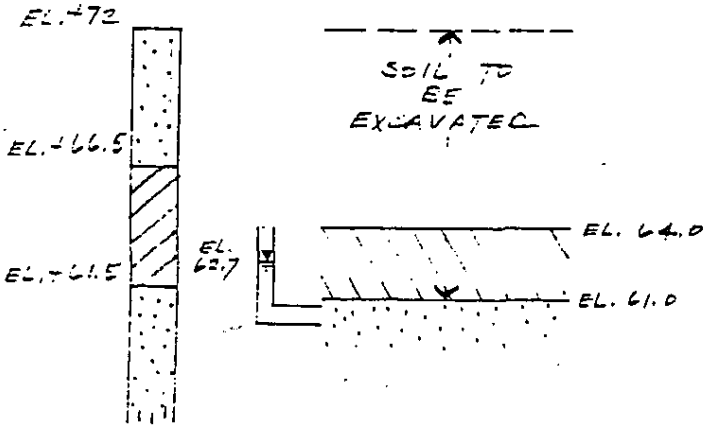
LOCATION AT BORING CM-1

ELEV. OF FINAL WATER LEVEL = +60.0 MSL < ELEV. +61.0 MSL

LOCATION AT BORING CM-2

ELEV. OF FINAL WATER LEVEL = +61.0 MSL < ELEV. +61.0 MSL

LOCATION AT BORING CM-3



F.S. (E.O.C.) = 0.0

$$F.S.\ (E.O.C.) = \frac{3 \times 120}{1.7 \times 62.4} = \underline{5.4}$$

DAMES & MOORE

Sheet No.	21
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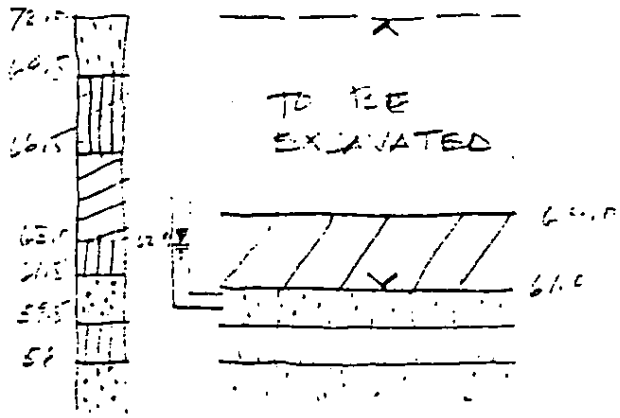
Rev. No.	
By	Date
Chk'd.	Date

Job No. [illegible] Job SURFACE IMPOUNDMENT

Client RIVERWOOD INT. Subject POTENTIOMETRIC HEAVE

DM-4

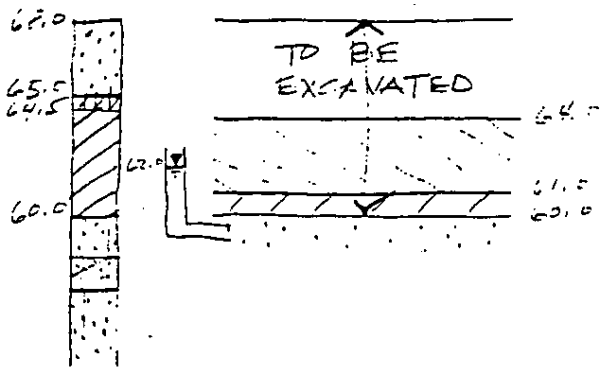


F.S. (B.O.C.) = 0.0

F.S. (E.O.C.) = $\frac{3 \times 120}{1.9 \times 62.4}$ = 3.0

DM-5 SAME AS DM-4

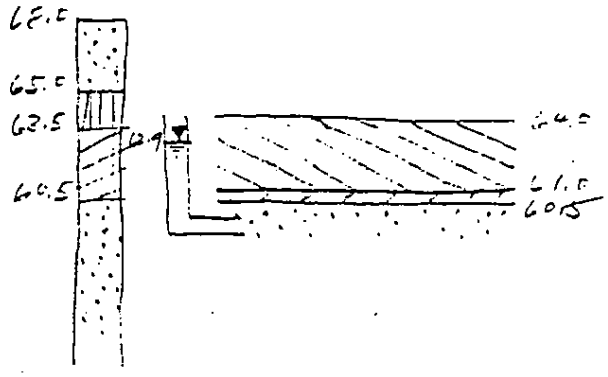
DM-6



F.S. (B.O.C.) = $\frac{1 \times 120}{1 \times 62.4}$ = 1.9

F.S. (E.O.C.) = $\frac{4 \times 120}{1 \times 62.4}$ = 7.7

DM-7



F.S. (B.O.C.) = $\frac{0.5 \times 120}{1.9 \times 62.4}$ = 0.5

F.S. (E.O.C.) = $\frac{3.5 \times 120}{1.9 \times 62.4}$ = 3.5

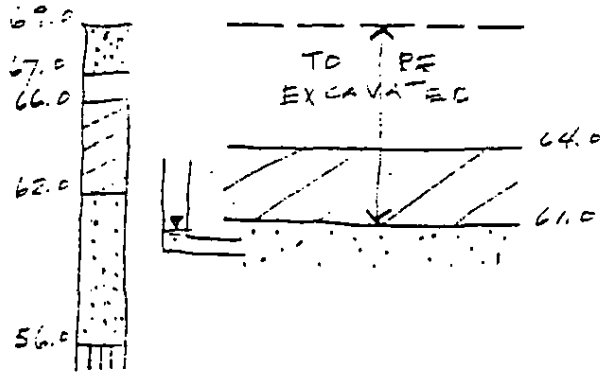
DAMES & MOORE

Sheet No.	3
Calc. No.	
Rev. No.	
By	Date
Chk'd.	Date

Job No. [illegible] Job SURFACE IMPOUNDMENT

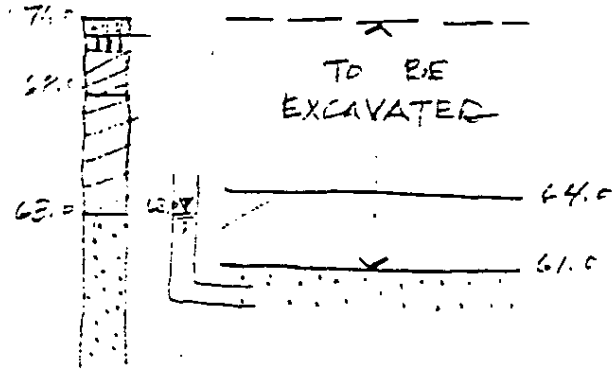
Client RIVERWOOD INT. Subject POTENTIOMETRIC HEAVE

DM-8



WATER LEVEL BELOW BOTTOM OF EXCAVATION

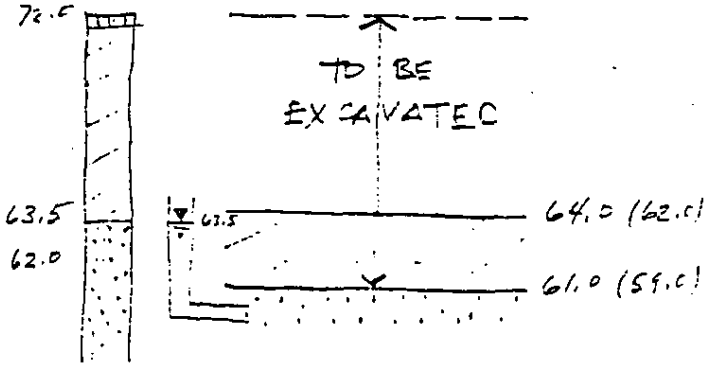
DM-9



F.S. (B.O.C.) = 0.0

$$F.S.\ (E.O.C.) = \frac{3 \times 120}{2 \times 62.4} = \underline{2.9}$$

DM-10



F.S. (B.O.C.) = 0.0

$$F.S.\ (E.O.C.) = \frac{3 \times 120}{2.5 \times 62.4} = \underline{2.3}$$

$$* \quad F.S.\left(\begin{matrix}E.O.C.\\ @EL.59.0\end{matrix}\right) = \frac{3 \times 120}{4.5 \times 62.4} = \underline{1.2}$$

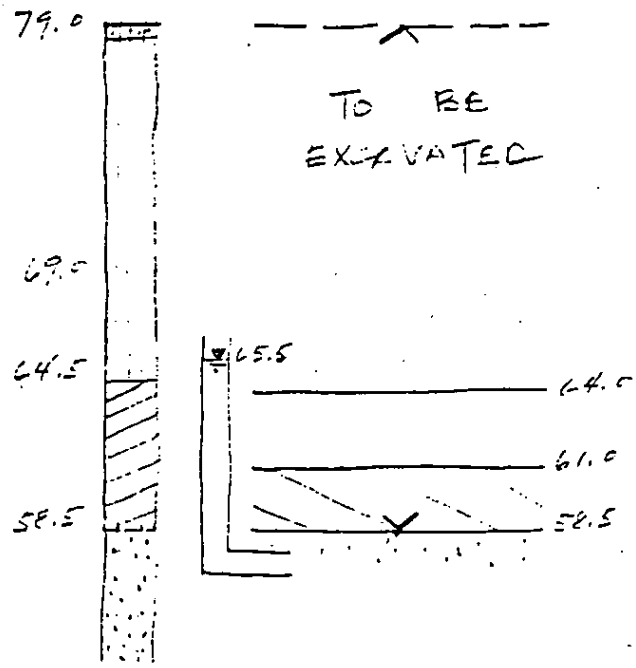
DAMES & MOORE

Sheet No.	4
Calc. No.	
Rev. No.	
By	Date
Chk'd.	Date

Job No. 24379-002-137 Job SURFACE IMPOUNDMENT

Client RIVERWOOD INT. Subject POTENTIOMETRIC HEAVE

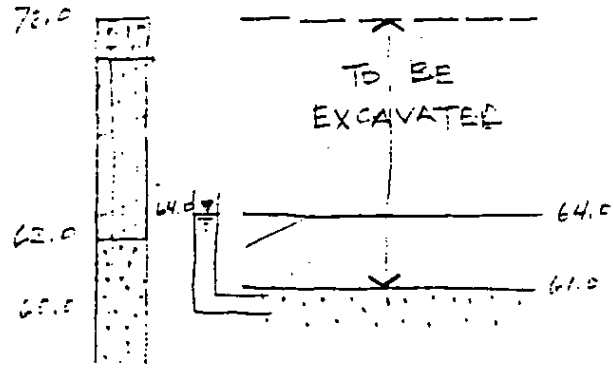
DM-11



$$F.S.\ (B.O.C.) = \frac{2.5 \times 120}{4.5 \times 62.4} = \underline{1.1}$$

$$F.S.\ (E.O.C.) = \frac{5.5 \times 120}{4.5 \times 62.4} = \underline{2.3}$$

DM-12



$$F.S.\ (B.O.C.) = \underline{0.0}$$

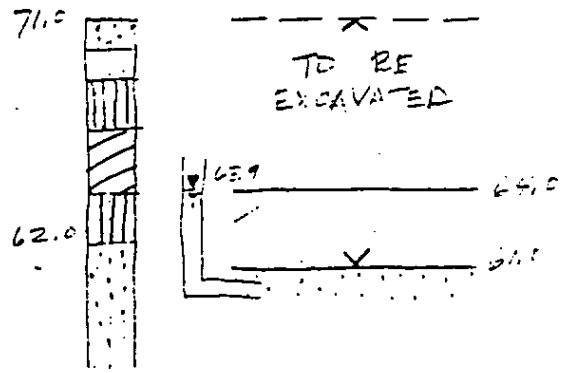
$$F.S.\ (E.O.C.) = \frac{3 \times 120}{3 \times 62.4} = \underline{1.9}$$

DAMES & MOORE

Sheet No. 51
Calc. No.
Rev. No.
By Date
Chk'd. Date

Job No. 26579-[illegible]-137 Job SURFACE IMPOUNDMENT
Client RIVERWOOD INT. Subject POTENTIOMETRIC HEAVE

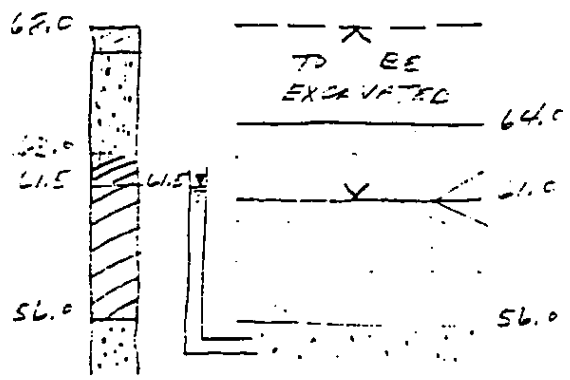
DM-13



F.S. (E.O.C.) = 0.0

F.S. (E.O.C.) = $\frac{5 \times 120}{2.5 \times 62.4}$ = 2.0

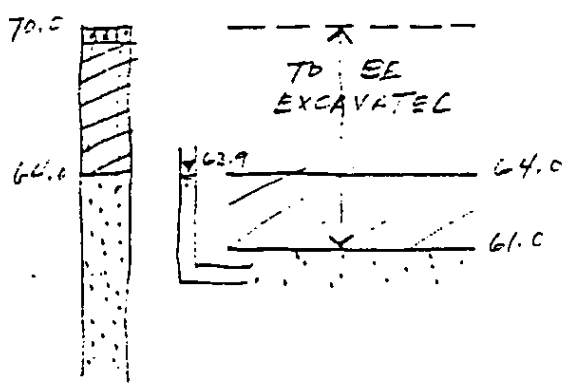
DM-14



F.S. (E.O.C.) = $\frac{5 \times 120}{2.5 \times 62.4}$ = 19.0

F.S. (E.O.C.) = $\frac{8 \times 120}{0.5 \times 62.4}$ = 30.8

DM-15



F.S. (E.O.C.) = 0.0

F.S. (E.O.C.) = $\frac{3 \times 120}{2.9 \times 62.4}$ = 2.0

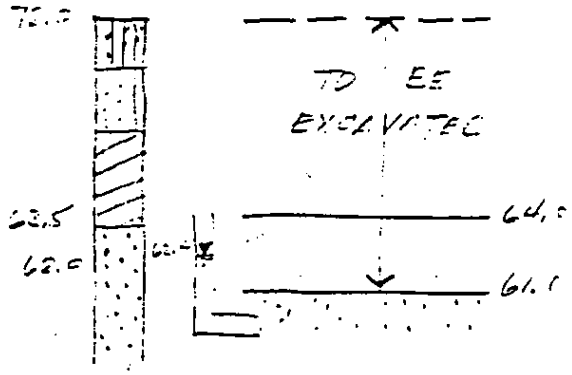
DAMES & MOORE

Sheet No.	61
Calc. No.	
Rev. No.	
By	Date
Chk'd.	Date

Job No. 24379-002-137 Job SURFACE IMPOUNDMENT

Client RIVERWOOD INT. Subject POTENTIOMETRIC HEAVE

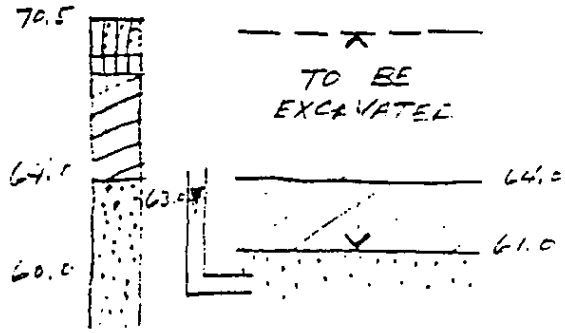
DM-16



F.S. (S.O.C.) = 0.0

F.S. (S.O.C.) = $\frac{3 \times 120}{1.4 \times 62.4}$ = 4.1

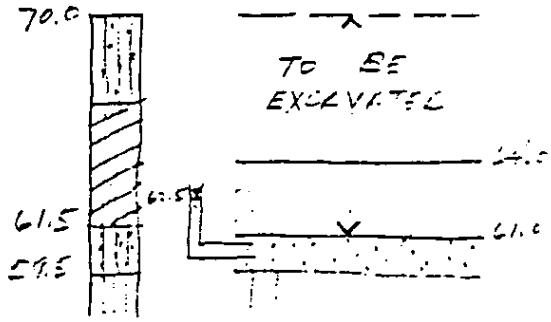
DM-17



F.S. (S.O.C.) = 0.0

F.S. (S.O.C.) = $\frac{3 \times 120}{3 \times 62.4}$ = 2.9

DM-18



F.S. (S.O.C.) = 0.0

F.S. (S.O.C.) = $\frac{3 \times 120}{1.5 \times 62.4}$ = 3.8

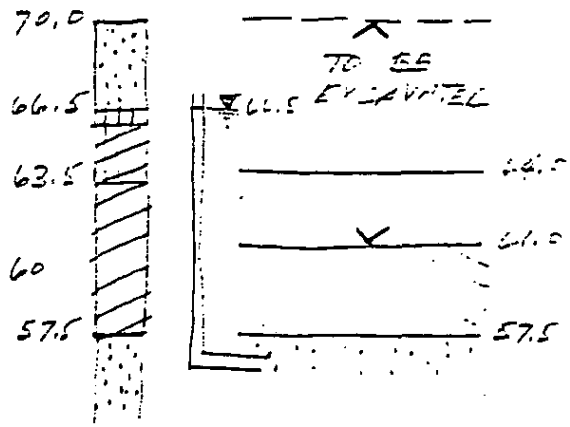
DAMES & MOORE

Sheet No.	71
Calc. No.	
Rev. No.	
By	Date
Chk'd.	Date

Job No. 24375-002-137 Job SURFACE IMPOUNDMENT

Client RIVERWOOD INT. Subject POTENTIOMETRIC HEAVE

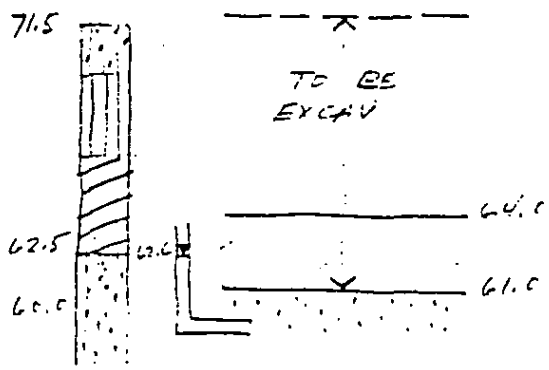
DM-19



$$F.S.(E.O.C.) = \frac{3.5 \times 120}{5.5 \times 62.4} = \underline{1.2}$$

$$F.S.(E.O.C.) = \frac{6.5 \times 120}{5.5 \times 62.4} = \underline{2.3}$$

DM-20



$$F.S.(E.O.C.) = \underline{0.0}$$

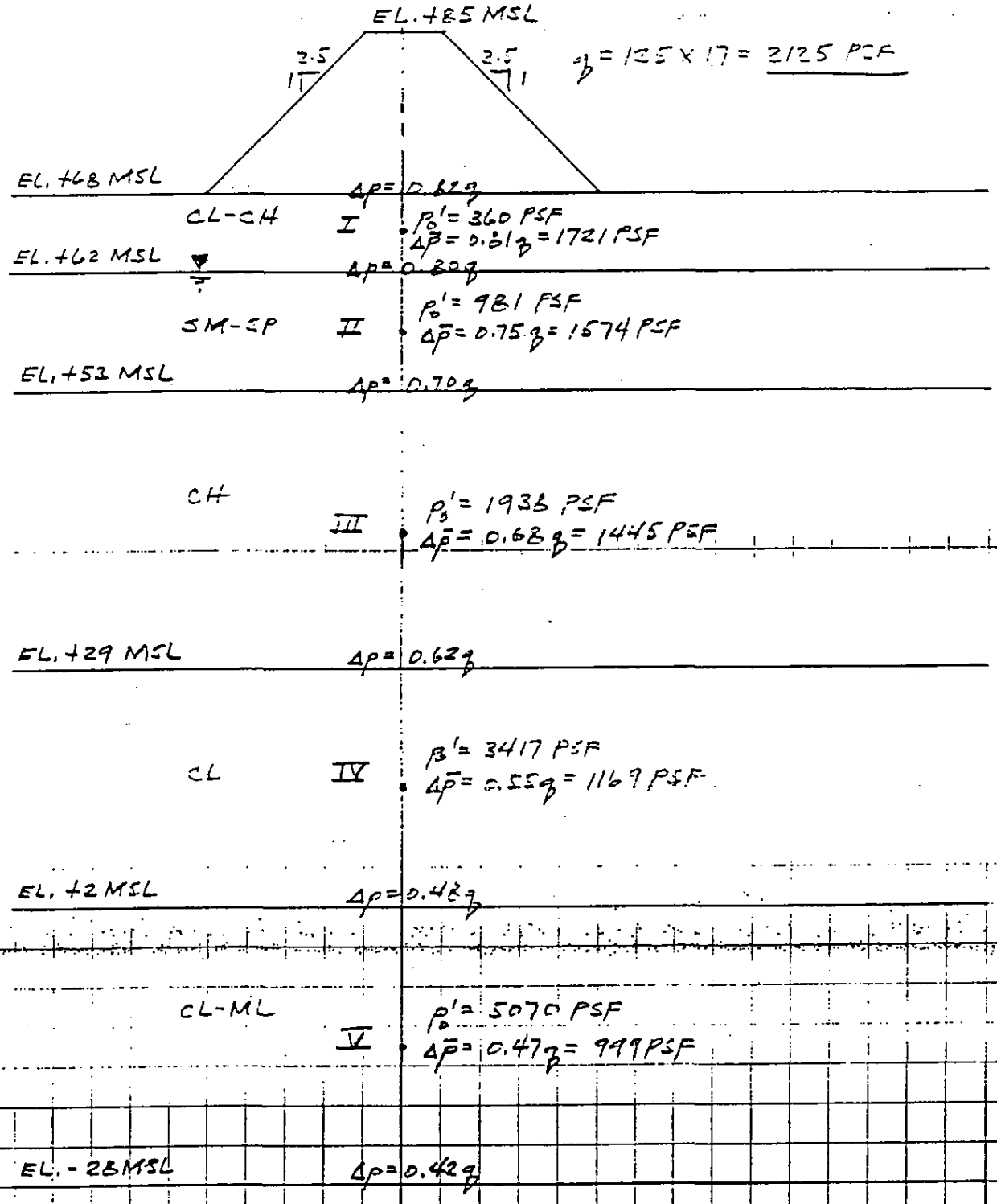
$$F.S.(E.O.C.) = \frac{3 \times 120}{1.6 \times 62.4} = \underline{3.6}$$

DAMES & MOORE

Sheet No.	
Calc. No.	
Rev. No.	
By	Date 11/93
Chk'd.	Date

Job No. 24379-002-137 Job SURFACE IMPOUNDMENT

Client RIVERWOOD INT. USA Subject CONSOLIDATION SETTLEMENTS

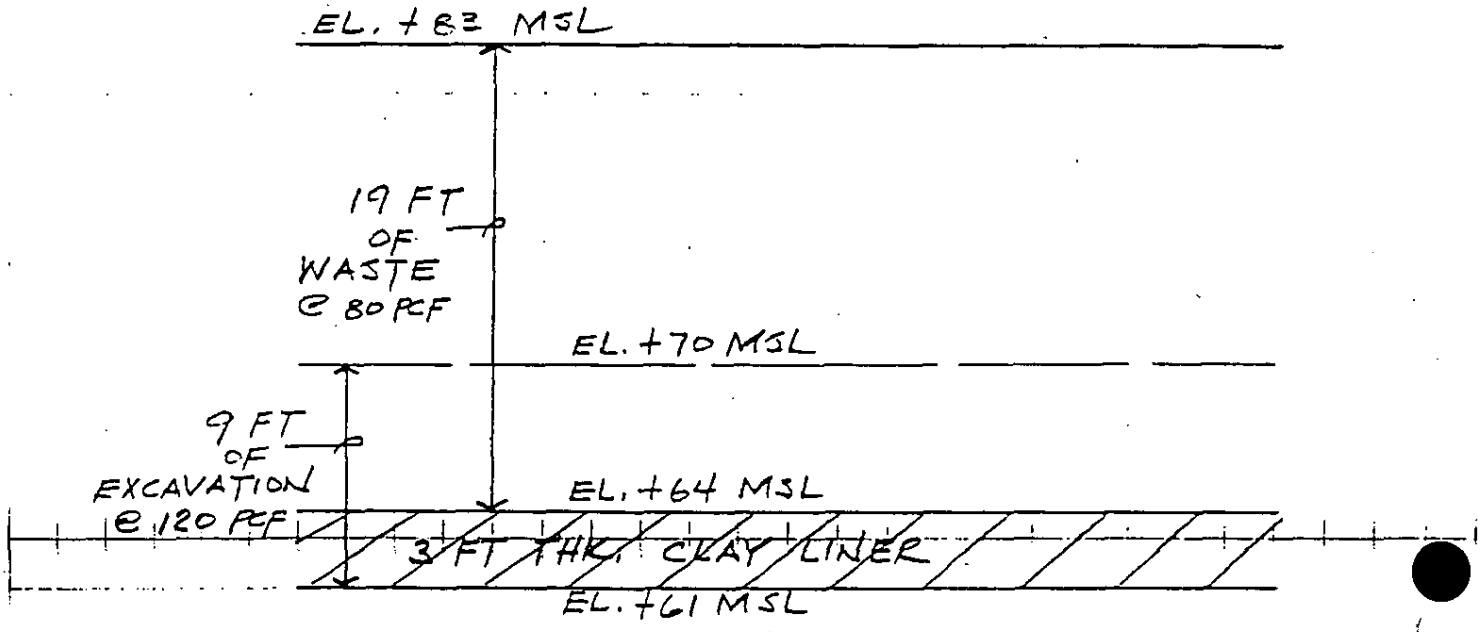


DAMES & MOORE

Sheet No.
Calc. No.
Rev. No.
By Date
Chk'd. Date

Job No. 24379-002-137 Job SURFACE IMPOUNDMENT
Client RIVERWOOD INT. USA Subject CONSOLIDATION SETTLEMENTS

IMPOUNDMENT SKETCH



TAKE GROUNDWATER LEVEL AT EL. +61 MSL, WHICH WILL PROVIDE GREATEST NET PRESSURE:

$+\uparrow \Sigma F_y = 0$; $19 \times 80 + 3 \times 120 - 9 \times 120 =$ 800 PSF NET PRESSURE

DAMES & MOORE

Sheet No.
Calc. No.
Rev. No.
By Date 11/9
Chk'd. Date

Job No. 24379-002-137 Job SURFACE IMPOUNDMENT
Client RIVERWOOD INT. USA Subject CONSOLIDATION SETTLEMENTS

℄ LEVEE SETTLEMENT

STRATUM	p_o'	p_c'	$\Delta\bar{p}$	H	C_c'	C_R'	ΔH
I	360	2500	1721	6	0.08	0.016	0
II	981	2500	1574	9	—	—	0
III	1938	2500	1445	24	0.06	0.012	2.65"
IV	3417	4000	1169	27	0.10	0.02	2.37"
V	5070	5500	999	30	0.06	0.012	1.08"
							*6.10"

*USE 5 TO 6 INCHES DUE TO VARIABILITY IN GEOLOGY AND COMPRESSIBILITIES OF SOILS.

IMPOUNDMENT SETTLEMENT

STRATUM	p_o'	p_c'	$\Delta\bar{p}$	H	C_c'	C_R'	ΔH
I	360	2500	800	6	0.08	0.016	0
II	981	2500	800	9	—	—	0
III	1938	2500	800	24	0.06	0.012	1.07"
IV	3417	4000	800	27	0.10	0.02	1.19"
V	5070	5500	800	30	0.06	0.012	0.76"
							**3.02"

**USE 3 TO 4 INCHES DUE TO ABOVE NOTE.

p_c' = PRECONSOLIDATION PRESSURES ESTIMATED FROM NAVFAC DM-7 FIGURE FOR CONSOLIDATION PRESSURES VS LIQUIDITY INDEX

$C_c' = \frac{C_c}{1+e_o}$ ESTIMATED FROM LAMBE & WHITMAN FIG 22.1(c), p.32 FOR NORMALLY CONSOLIDATED CLAYS.

$C_R' = \frac{C_R}{1+e_o}$ ESTIMATED AS 20% OF C_c' VALUE, WHICH IS AT THE UPPER RANGE OF 5 TO 20 PERCENT OF C_c' NORMALLY USED

FOR $\Delta\bar{p} > (p_c' - p_o')$ $\quad \Delta H = \Sigma H\left[C_R' \log \frac{p_o'}{p_o'} + C_c' \log\left(\frac{p_o' + \Delta p}{p_c'}\right)\right]$

FOR $\Delta\bar{p} < (p_c' - p_o')$ $\quad \Delta H = C_R' H \log\left(\frac{p_o' + \Delta p}{p_o'}\right)$

LOG OF BORING DM-1

Location: Monroe, Louisiana N 263.0 W 28.0
Elevation: 59.0 msl
Job No: 24379-002-137
Date: 07-30-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0				1.75						(SC) Medium dense / stiff, coarse, brown to brownish yellow sand with clay and gravel.
		1		1.5						(ML) Stiff, brownish yellow clayey silt with gravel.
5.0		2		2.5	.59	98	23	37	19	(CL) Medium stiff to hard, brown, clay to silty clay, with gray mottling. Kv = 1.8 x 10(-8) cm/sec Kh = 5.3 x 10(-8) cm/sec
		3		1.75 2.5 3.25						... becoming very stiff.
10.0		4		>4.5 >4.5						(SP-SM) Dense, coarse, gray sand with some clay near top 12" of sample.
		5		8/12/20						
		6		9/16/18						... with gravel.
15.0		7		9/16/16						(SP) Dense, gray, coarse to medium sand, with gravel.
		8		9/15/17						
20.0		9		5/7/9						... becoming medium dense.
		10		8/16/18						(SP) Dense, gray and brown sand, with gravel.
25.0		11		>4.5 >4.5 >4.5			32	89	64	(CH) Hard, dark gray silty clay.
		12		4.0 4.5 4.0						
30.0		13		>4.5 >4.5 >4.5						
35.0		14		2.0 2.5 3.0 3.0 3.0						(CH) Very stiff, dark gray silty clay.
		15		4.0 4.5						(CL) Very stiff to hard, dark gray silty clay to clayey silt, moderate plasticity.
40.0										Teminated boring at a depth of 40 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.7 ppg.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-2

Location: Monroe, Louisiana N 355.0 E 492.0
Elevation: 68.0 msl
Job No: 24379-002-137

Date: 07-30-9:
Approved:

DEPTH IN FEET	SAMPLE NUMBER	BLOW COUNT OR PENETROMETER (tsf)	COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		4.5						(SM) Dense, brown to light brown silty sand.
		2.5						(ML) Very stiff, brown to light brown clayey sand.
	1	.5						(CL) Soft, brown silty clay, with gray mottling.
		.5						
	2	1.0						... with sand
5.0		1.0						
		.5						
	3	1.75						... becoming stiff.
		2.25						
		2.0						(CH) Stiff, brown clay, with gray mottling.
10.0	4	1.5						(ML) Medium stiff, gray to brown sandy silt, with trace of clay.
		.75						
		.5						(SM) Soft, brown silty sand.
	5	.25						
		.5						
15.0		.25						
	6	.5						
		.5						
		.75						
	7	1.0	.92	90	32	48	28	(CL) Medium stiff to stiff, brown silty clay.
20.0		1.75						Kv = 1.8 x 10(-8) cm/sec
		1.0						Kh = 1.0 x 10(-8) cm/sec
	8	1.25	.73	90	32	49	28	... becoming gray
		1.25						(CL) Medium stiff to stiff, gray silty clay.
		1.75						Kv = 6.4 x 10(-8) cm/sec
25.0	9	1.0						Kh = 2.7 x 10(-8) cm/sec
		1.25						
		.5						
	10	1.0						(SP) Loose, coarse, gray sand, with trace of clayey silt.
30.0		3.75						(CH) Very stiff to hard, gray clay, with trace of silt.
		3.0						
	11	3.0						
		3.0						
	12	3.0						
		3.25						
35.0	13	3.5						
		1.75						
		4.5						
	14	3.25						
40.0		3.25						
								Teminated boring at a depth of 40 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 14.1 ppg.
45.0								
50.0								

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-3

Location: Monroe, Louisiana N 439.0 E 869.0
Elevation: 72.2 msl
Job No: 24379-002-137

Date: 07-20-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	X	1		9/9/11						(ML) Medium stiff, tan clayey silt.
	X	2		4/4/4			18	26	7	
5.0	X	3A 3B		2/4/5						
	X	4		1/6/7						(CL) Stiff, light brown silty clay, with reddish brown mottling.
	X	5		3/4/6						... turning to clay
10.0	X	6		5/4/4						(SM) Loose, light brown silty sand.
	X	7		4/6/6						... becoming medium dense.
15.0	X	8		2/3/3						... becoming loose.
	X	9		1/1/2						... becoming very loose.
	X	10		2/3/4						... becoming loose.
20.0	X	11		3/3/5						
	X	12		1/1/2						... becoming very loose.
25.0		13		.25						
		14		<.25						(ML) Very soft, gray clayey silt.
30.0	X	15		1/0/0			24	31	14	
	X	16		1/1/1						
35.0	X	17		1/3/6						(SM) Loose, gray silty sand.
	X	18		3/9/10						(ML) Medium dense, light gray clayey silt, with trace of sand.
	X	19		5/9/6						(SM-SP) Medium dense, light gray silty sand to sand.
40.0	X	20		4/12/15						Teminated boring at a depth of 41 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 14.0 ppg.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-4

Location: Monroe, Louisiana N 457.0 E 1,246.0
Elevation: 72.4 msl
Job No: 24379-002-137

Date: 07-21-9
Approved:

DEPTH IN FEET	SAMPLE NUMBER	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	1	7/12/15			15	26	7	(SM) Medium dense, brown to brownish yellow silty sand.
	2	2/3/4						(ML) Loose, brown clayey silt.
5.0	3	2/4/6						
	4	2/3/6						(CL) Stiff, brown silty clay.
	5	1/3/5						(ML) Medium stiff, brown to reddish brown clayey silt.
10.0	6	3/4/4						(SM) Loose, brown to reddish brown silty sand.
	7	1/2/3						(ML) Very loose, brown clayey silt.
15.0	8	.5						(SM) Loose, brown silty sand.
	9	1/2/3						... with clay lenses.
20.0	10	1/3/4						
	11	1/2/3						(SM) Very loose, brown silty sand, with trace of clayey silt, and interbedded clay lenses.
	12	1/1/2						(CL) Very soft, brown silty clay.
25.0	13	1/2/4			44	38	20	... becoming medium stiff, with gray mottling.
	14	1/1/3						... becoming soft.
30.0	15	3/7/10						(SM) Medium dense, fine, light gray silty sand, trace of clay.
	16	5/9/12						
	17	2/4/5						(CL) Stiff, reddish brown silty clay.
35.0	18	2/7/12			31	64	42	(CH) Stiff, reddish-brown clay. ... becoming gray.
	19	3/5/7						
40.0	20	2/6/7						
45.0								Teminated boring at a depth of 41 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.9 ppg.
50.0								

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-5

Location: Monroe, Louisiana N 477.0 E 1,500.0
Elevation: 70.4 msl
Job No: 24379-002-137
Date: 07-21-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	X	1		4/8/6						(SM) Medium dense, brown silty sand, roots, organic material.
	X	2		2/3/4						(ML) Loose, brown clayey silt.
5.0		3		1.5						(CL) Stiff, brown to reddish brown silty clay. (CH) Stiff, reddish brown clay.
		4		1.5		98	23	39	21	Stiff, reddish brown clay. friction angle = 43 degrees; c = 0 psf consolidated-drained direct shear test
10.0	X	5		2/4/6			24	24	6	(SM) Medium dense, brown silty sand.
	X	6		1/2/4						... becoming loose.
15.0	X	7		1/2/3						
	X	8		0/1/0						(ML) Very loose, brown clayey silt.
	X	9		1/1/1						(CL) Soft, brown silty clay.
20.0		10		2.0						(CL) Stiff, brown silty clay with fissures.
25.0		11								... turning to gray, with brown mottling.
	X	12		1/3/7						(SM) Medium dense, fine, gray sand.
30.0	X	13		4/7/7						... becoming tan to gray
	X	14		1/2/4						... becoming gray to brown
		15		1.75						(CH) Stiff, gray clay, with reddish brown mottling.
35.0		16		2.0						... becoming very stiff and gray
		17		2.25						
		18		2.25						
40.0										Teminated boring at a depth of 39 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and an approved slurry weight.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-6

Location: Monroe, Louisiana S 150.0 E 1,583.0
Elevation: 68.0 msl
Job No: 24379-002-137

Date: 07-22-9
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	X	1		2/7/5						(SM) Medium dense, brown, silty sand.
										(CL) Stiff, brown clay with gray mottling.
5.0		2		1.75	.96	91	30			(CH) Stiff, brown clay with trace of silt, wet.
		3		1.75		80	41	79	54	Kv = 1.7 x 10(-9) cm/sec
		4		2.0						Kh = 9.6 x 10(-9) cm/sec
10.0		5								(SM) Loose, brown, silty sand with trace of silty clay.
		6								
		7		<.25						(CL) Very soft, brown, silty clay with trace of silty sand.
		8		<.25						
15.0		9		.5						... becoming soft
		10		1.5						
		11		1.5						... becoming stiff.
20.0		12		2.0						
		13		2.0	1.21		28	48	27	(CL) Stiff brown clay.
		14		2.5						
25.0		15		2.5						... becoming very stiff.
		16		2.5						
		17		1.5						
		18		1.25						(SM) Loose, gray, silty sand.
30.0		19		2.0						(CL) Stiff, gray clay with brown mottling; grading clayey silt.
		20		2.5						
		21								
		22								
35.0		23								
		24								
40.0										Teminated boring at a depth of 37 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.8 ppg.
45.0										
50.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-7

Location: Monroe, Louisiana S 357.0 E 1,253.0
Elevation: 67.9 msl
Job No: 24379-002-137
Date: 07-23-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	X	1		1/9/5						(SM) Medium dense, brown, silty sand; grading to brown clayey silt.
				<.25						(ML) Very soft, brown clayey silt.
		2								
5.0		3		1.75	1.12		30	71	48	(CL) Stiff, brown, silty clay.
		4		1.75						
		5		1.5						(SM) Loose, brown, silty sand.
10.0		6		<.25						
		7		<.25						
		8		<.25						
		9		<.25						
15.0		10		<.25						
		11		<.25						
		12								
		13								... becoming more clayey.
20.0										(CL) Soft, brown, silty clay.
		14		1.75						(CH) Stiff, brown clay with brown to yellowish mottling.
		15		1.50						
25.0		16		2.0						
		17		2.0						
		18		1.5				66	46	... becoming gray with vertical partings and decaying roots. Kv = 3.6 x 10(-7) cm/sec Kh = 3.5 x 10(-8) cm/sec
		19		1.5						
30.0		20		2.0						... becoming gray clay with yellowish red mottling.
		21		2.0						
		22		2.25						
		23		2.0						
35.0		24								
		25								Teminated boring at a depth of 37 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.8 ppg.
40.0										
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-8

Location: Monroe, Louisiana S 597.0 E 872.0
Elevation: 69.0 msl
Job No: 24379-002-137

Date: 07-29-9
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	X	1		5/8/4						(SM) Medium dense, brown, silty sand with gray mottling; grading to clayey silt.
				2.0						(ML) Stiff, brown, clayey silt with gray mottling.
		2		1.5						(CL) Medium stiff, brown to gray silty clay.
5.0				2.0						
		3		2.0	.77	100	24	33	14	
		4		1.0						(SM) Loose to medium dense, brown, silty sand.
				1.0						
		5		.5						
10.0				1.0						
				1.0						
		6		1.25						(ML) Medium stiff, clayey silt.
				1.0						(SM) Loose to medium dense, silty sand.
15.0		7								
				1.0						(CL) Medium stiff, brown, silty clay.
		8		1.0						
20.0				2.0						
		9		2.5						... becoming stiff.
				1.5						
				1.5						
		10		1.25						... becoming gray.
25.0				1.5						
				1.5						
		11		1.5						(ML) Medium stiff, gray, clayey silt; grading to silty sand.
				.75						
				1.5						(CL) Stiff, brown clay.
30.0		12		1.5						
				2.5						
				1.5						... becoming gray
		13								
				1.75						
35.0				1.75						
		14		1.0	1.24		21	36	18	
				1.75						
										Teminated boring at a depth of 38 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.8 ppg.
40.0										
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-9

Location: Monroe, Louisiana S 836.0 E 491.0
Elevation: 71.0 msl
Job No: 24379-002-137

Date: 07-28-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0				<.25						(SM) Loose, brown silty sand.
		1		1.5						(ML) Soft, brown clayey silt.
										(CL) Stiff, brown silty clay, stiff.
5.0		2		3.0						(CH) Medium stiff, brown with light brown mottling silty clay.
				2.0						
		3		2.5	.61		30	58	39	▼
		4		1.5						(SM) Dense, brown silty sand.
10.0		5		<.25						... becoming loose.
				<.25						
		6		<.25						
15.0				<.25						(ML) Medium stiff, brown clayey silt.
				.5						
		7		.75						(SM) Medium dense, brown, silty sand.
				1.0						
		8								
20.0										(ML) Medium stiff, brown clayey silt.
				1.5						
		9		1.5			30	41	23	(CL) Medium stiff, gray to brown silty clay.
				1.0						
25.0		10		1.5						
				2.5						(CH) Stiff, gray clay.
				1.5						
		11								
				1.0						
30.0				.25						(SP) Loose, coarse, gray sand.
		12								(CH) Very stiff, brown clay.
				2.5						
				2.5						
		13		3.5						... becoming stiff.
35.0				2.0						
				1.5						
		14		2.0						
				2.5						... becoming very stiff.
				2.5						
40.0										Teminated boring at a depth of 39.5 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.9 ppg.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-10

Location: Monroe, Louisiana S 1,076.0 E 110.0
Elevation: 72.0 msl
Job No: 24379-002-137

Date: 07-28-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0										(SM) Loose, brown, silty sand.
		1		1.5	1.08	103	21	27	9	(CL) Stiff, brown, silty clay.
5.0		2		2.0 3.0 4.0						... becoming very stiff with gray mottling.
		3 4		<.25						(ML) Loose, reddish brown, sandy silt with clay lenses and silty sand layers
10.0		5		<.25						
	X	6		2/2/2						
15.0		7		<.25 <.25		101	25	26	7	Kv = 2.9 x 10(-7) cm/sec Kh = 1.0 x 10(-6) cm/sec (90% finer than No. 200 sieve)
20.0		8 9		<.25 <..25						
25.0		10		1.5 1.75						(CL) Stiff, tan and gray, silty clay with traces of sand.
30.0		11 12		2.0						
35.0		13 14		2.0 2.0	1.63		24	45	26	
40.0		15								(CH) Very stiff, gray clay.
45.0										Teminated boring at a depth of 41 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.8 ppg.
50.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-11

Location: Monroe, Louisiana S 1,276.0 W 256.0
Elevation: 79.0 msl
Job No: 24379-002-137
Date: 07-31-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0				2.0						(SM) Stiff, brown, silty sand.
		1		1.75						(ML) Medium stiff to stiff, brown clayey fine sand, with gray mottling.
				.75						
		2		1.5						
5.0				1.75						
				1.0						
		3		3.5						
				2.0						
				.75						
10.0		4		.75						
				1.0						
				.5						... with yellowish red mottling.
		5		2.5						
				1.5						
15.0				.75						(CL) Medium stiff to stiff, gray, silty clay with yellowish red mottling.
		6		1.5						
				1.5						
				.75						
		7		1.0						... becoming soft to very soft, gray, sandy, silty clay.
20.0				.25						
				.5						
		8		.25						
				<.25						
				<.25						(SM) Very loose to loose, gray, silty sand.
25.0		9		.25						
				.25						
				.25						
		10		.5						
				.5						
30.0				.5						
		11		.25						(CL) Soft, gray, silty clay.
				.25						
				.25						(SM) Soft, gray, silty sand.
		12		.5						(CL) Soft to medium stiff, gray silty clay, with trace of rootlets.
35.0				1.25						
				.75						
		13		.5						
				1.0						(SP) Loose, gray, coarse to fine sand.
40.0										
				.25						
		14		.5						
				.75						
				2.5						(CH) Very stiff, brown clay, with trace of silt.
		15		2.5						
45.0				2.5						... becoming greenish gray clay, silt pockets.
				3.0						
		16		2.5						
				2.5						(SM) Dense, greenish gray silty sand with rootlets.
50.0		17		2.5						

NOTES: Terminated boring at a depth of 51 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.9 ppg.

PROJECT: Riverwood International Surface Impoundment Monroe, LA

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-12

Location: Monroe, Louisiana S 802.0 E 76.0
Elevation: 72.0 msl
Job No: 24379-002-137

Date: 07-28-9
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0				1.5						(SM) Medium dense, brown, silty sand.
				2.0						(ML) Very stiff, brown, clayey silt.
		1		3.5						(CL) Very stiff to hard, brown silty clay
				1.5						
5.0		2		>4.5						
				4.0						
				1.5						
		3		2.0						
				1.5						(SM) Dense, brown, silty sand.
10.0		4								
		5		2/3/3						... with clayey lenses
				<.25						(CL) Very soft, brown silty clay.
15.0		6		1.5						(SM) Loose, brown, silty sand.
		7		2/4/4						
		8		1/2/3						
20.0		9		4/6/8						(SM) Medium dense, brown silty sand.
		10		1/1/1						
25.0										... becoming very loose and wet.
		11		<.25						
		12		<.25						
30.0				<.25						
		13								
				1.5						(CH) Stiff, gray clay.
35.0		14		2.0						
				1.5						
				1.5						
		15		2.0						
40.0		16		.75						...becoming softer.
				<.25						(SM) Very loose to loose, gray, fine, silty sand.
45.0										Teminated boring at a depth of 41 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 14.0 ppg.
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-13

Location: Monroe, Louisiana S 324.0 E 302.0
Elevation: 71.4 msl
Job No: 24379-002-137

Date: 07-27-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0				<.25						(SM) Loose, brown, silty sand.
				.5						(ML) Soft, brown, sandy silt.
		1		2.0						... becoming stiff, brown, clayey silt.
				1.75			22	30	13	
5.0		2		2.0						(CL) Stiff, brown, silty clay.
				2.0						
				<.25						(ML) Very soft, brown, clayey silt.
		3		<.25						
10.0										(SM) Very loose to loose, brown silty sand.
		4		<.25						
		5		<.25						
15.0										
		6		<.25						
		7		<.25						
20.0										
				<.25	.96	98	25			... becoming more clayey.
		8		<.25						(CL) Very soft, gray silty clay.
				<.25						(SM) Very loose, gray, silty sand.
25.0										
		9		<.25						(CL) Very stiff to stiff, gray, silty clay.
				2.5						
				2.0			32	47	28	
		10		2.0						
30.0										(SM) Loose, gray, silty sand.
		11		<.25						
										... becoming coarse sand.
				<.25						... becoming silty sand.
35.0		12		<.25						
		13		<.25						
40.0										Teminated boring at a depth of 40 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 14.0 ppg.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-14

Location: Monroe, Louisiana N 114.0 E 82.0
Elevation: 68.0 msl
Job No: 24379-002-137

Date: 07-29-9
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1		1.0						(CL) Stiff, brown clay with trace of silt.
				2.0						... becoming gray.
		2		2.5						(SM) Medium dense to loose, gray, silty sand.
		3		5/4/5						
5.0				1.5						(CL) Stiff, gray silty clay with brown mottling.
		4		1.75						
				1.25						
				1.75						
		5		1.5						
10.0				1.75						
				1.25						
		6		.75						(SM) Loose to medium dense, brown, silty sand.
		7		2.0						
				.75						
15.0		8								
		9								... with coarse to medium sand layers.
20.0		10		2/4/6						
		11		5/2/4						... with medium to fine sand.
		12		.5						(CL) Medium stiff, gray silty clay.
25.0				.75						
				1.0						
		13		<.25						(SM) Loose, gray, silty sand.
				<.25						
				.5						
30.0		14		2.25						(ML) Very stiff to stiff, gray clayey silt with coarse sand lenses.
				2.5						
				2.0						
		15		1.5						(CH) Very stiff, brown clay with trace of silt.
				2.5						
35.0				2.5						
				2.5						... with gray mottling.
				3.0						
		16		3.5						
				2.5						
40.0										Teminated boring at a depth of 40 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.7 ppg.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-15

Location: Monroe, Louisiana S 51.0 E 489.0
Elevation: 69.9 msl
Job No: 24379-002-137

Date: 07-27-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0				.75						(SM) Medium stiff, brown, silty sand.
		1		2.0						(CL) Stiff, brown, silty clay.
				2.0						(ML) Stiff, brown, clayey silt to silty clay.
		2		1.75			22	40	22	(CL) Stiff, brown silty clay.
5.0				1.5						
		3		<.25						(SM) Loose, brown, silty sand.
10.0		4		<.25						(ML) Very soft, brown clayey silt.
		5		<.25						(SM) Loose, brown, silty sand.
15.0		6		<.25						
		7		<.25						
20.0				<.25						(SM) Loose, brown, silty sand.
		8		.75						(CL) Medium stiff, brown and gray silty clay to clayey silt.
				.75						
25.0		9		.25						
				1.25						
		10		.5						(SM) Loose, gray, silty sand.
30.0				.50						
		11		.5		89	35	53	32	(CH) Medium stiff, gray clay with trace of roots, silt pockets and concretions. Kv = 8.1 x 10(-8) cm/sec Kh = 1.3 x 10(-7) cm/sec
				.75						
35.0		12		.5						(SP-SM) Medium dense, gray silty sand; grading to coarse gray sand.
		13		6/7/8						(ML) Medium dense, clayey sand with sand layers.
40.0										Teminated boring at a depth of 39 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 14.0 ppg.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-16

Location: Monroe, Louisiana S 501.0 E 490.0
Elevation: 71.9 msl
Job No: 24379-002-137

Date: 07-29-9
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	X	1		2/2/4						(SM) Loose, brown, silty sand.
		2		1.5 2.0						(ML) Stiff, clayey silt.
5.0		3		2.25 2.75			40	72	49	(CH) Stiff, brown silty clay.
		4		1.75 .25 .25 .25						(SM) Loose, brown, silty sand.
10.0		5		.50 .25 <.25						
15.0		6		<.25 1.0 1.5						(ML) Stiff, brown, clayey silt.
		7		1.25 1.0 <.25						(SM)Medium dense, brown silty sand. ... becoming loose.
20.0		8		.75 1.0 1.5						(CL) Medium stiff, brown, silty clay.
25.0		9		1.0 .5 1.0						(CH) Medium stiff to stiff, gray, silty clay.
		10		1.5 1.75 <.25						
30.0		11		<.25 2.5						(SP) Loose, coarse to medium, gray sand, very wet.
		12		2.0 1.5						(CL) Stiff, gray, silty clay.
35.0		13		1.25 1.0 1.0			22	31	14	... with trace of medium sand.
40.0		14		1.5						
45.0										Teminated boring at a depth of 41 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 14.0 ppg.
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-17

Location: Monroe, Louisiana S 252.0 E 871.0
Elevation: 70.5 msl
Job No: 24379-002-137

Date: 07-27-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	X	1		6/4/4						(ML) Loose, brown, sandy silt.
	X	2		6/4/5						... becoming clayey silt.
										(CL) Medium stiff, brown, silty clay.
				.75						
5.0		3		2.5						... becoming very stiff.
				2.5						
		4		.5						(ML) Soft, brown sandy silt.
				<.25						
10.0		5			.39	96	27			... becoming clayey silt.
		6		<.25						
15.0										(CH) Very soft to soft, brown silty clay.
		7		<.25						
		8								
20.0										
		9		1.5	.55	91	30	52	31	... becoming medium stiff.
25.0		10		1.5						... becoming gray.
		11		<.25						(SM) Loose, light brown to gray, silty fine sand.
30.0				.5						(CH) Stiff, gray clay.
		12		2.0						
		13		2.0		72	44	77	57	... becoming silty clay with pea size gravel. Kv = 1.2 x 10(-8) cm/sec
35.0				2.0						Kh = 2.1 x 10(-8) cm/sec
		14		.5						(ML) Medium stiff, clayey silt with thumb size gravel.
40.0										Teminated boring at a depth of 39 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 14.0 ppg.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-18

Location: Monroe, Louisiana N 68.0 E 1,252.0
Elevation: 70.0 msl
Job No: 24379-002-137
Date: 07-23-9
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	X	1		2/4/5			23	27	9	(CL) Soft, tan and gray, silty clay with clayey silt layers.
										(SM) Medium dense, brown and yellow silty sand.
5.0		2		1.25		94	29	46	27	(CL) Stiff, brown and gray, silty clay with sandy clay layers. Kv = 3.6 x 10(-9) cm/sec Kh = 1.2 x 10(-8) cm/sec
		3		2.25						
				2.0						... becoming stiff brown clay.
10.0		4		<.25						(SM) Medium dense to loose, silty sand.
				<.25						(ML) Very soft, brown clayey silt, very wet.
		5		<.25						
		6		<.25						
15.0		7		<.25	.26	92	30	26	7	
		8		<.25						
										(CL) Medium stiff, brown and gray, silty clay.
		9		.5						
				1.0						
20.0										
				.5						
		10		.75						
										(CH) Stiff, brown and gray clay.
		11		2.0						
25.0		12		.5						... becoming medium stiff. ... becoming gray with brown silty clay.
		13		1.0						
		14		1.5						(ML) Stiff, gray, clayey silt.
30.0		15		1.0						(CH) Stiff to very stiff, brown clay with lenses of gray sand.
		16		2.75	1.51	87	32	66	44	
		17		2.5						... becoming gray with brown mottling.
		18		2.5						
35.0										
		19		1.5						... becoming gray clay.
		12		3.5						
40.0										Teminated boring at a depth of 39 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.9 ppg.
45.0										
50.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International Surface Impoundment Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-19

Location: Monroe, Louisiana N 119.0 E 1,871.0
Elevation: 70.0 msl
Job No: 24379-002-137

Date: 07-22-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	X	1		1/5/5						(SM) Loose to medium dense, brown silty sand.
	X	2		4/6/6						▼ (CL) Stiff, brown silty clay with very fine silty sand.
5.0										... with gray mottling and sand pockets.
		3		1.5						(CH) Very stiff, brown clay with some organics, black streaks.
10.0		4		2.5						... becoming brown without organics.
		5		2.0						
		6								(SP-SM) Loose, brown, silty sand grading to medium fine sand.
15.0										
	X	7		1/2/2						(ML) Loose, brown silt with trace of silty clay.
	X	8		1/1/1						(CL) Soft, brown, silty clay, very wet.
20.0										(CH) Medium stiff, brown clay with dark brown to reddish mottling.
		9		1.5						
25.0		10		1.5						... becoming brown clay.
		11		1.5						... becoming gray with brown mottling.
		12		1.25						
		13		1.5						
30.0		14		2.25						... becoming very stiff with brown mottling.
		15								
		16		2.0						
35.0		17		1.75						... becoming gray with brown and yellowish mottling.
		18								
		19		2.75						
		20		3.75						
40.0										Teminated boring at a depth of 39 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 14.0 ppg.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-20

Location: Monroe, Louisiana N 93.0 E 870.0
Elevation: 71.6 msl
Job No: 24379-002-137

Date: 07-24-9
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	X	1		2/9/15						(SM) Medium dense, brown silty sand grading to clayey silt.
	X	2		3/5/5						(ML) Medium dense, brown, clayey silt.
							27			
5.0		3		<.25						... becoming loose.
		4		2.25						(CL) Stiff, brown, silty clay.
		5		.5	1.30	96	25			▼
10.0		6		.75						(SM) Loose, brown, silty sand.
		7		.25						
		8		.5						(ML) Very soft, brown, clayey silt with clay lenses and pockets.
15.0		9		<.25						
		10		<.25						
		11		<.25		104	23	23	6	Kv = 1.5 x 10(-6) cm/sec
		12		<.25						Kh = 2.4 x 10(-4) cm/sec
20.0		13								
		14								
		15								(CL) Medium stiff, brown, silty clay.
25.0		16								
		17								... becoming gray.
		18								
		19								(CH) Stiff, gray clay with yellowish brown mottling.
30.0		20								
		21								(ML) Stiff, gray, clayey silt with yellowish brown mottling.
		22								
35.0	X	23		4/16/14						(SP-SM) Medium dense, gray, silty sand.
	X	24		2/5/7						... becoming brownish yellow medium sand.
	X	25		2/2/3						(CL) Soft, gray silty clay; grading to clay.
40.0										(CH) Very stiff, gray clay.
				2.0						(ML) Loose, gray, clayey silt.
				.5						(SP-SM) Medium dense gray clayey sand with silty sand layers.
45.0		26		1.0		106	21	26	7	Kv = 5.1 x 10(-6) cm/sec
										Kh = 2.1 x 10(-4) cm/sec
		27		<.25						
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-20

Location: Monroe, Louisiana N 93.0 E 870.0
Elevation: 71.6 msl
Job No: 24379-002-137

Date: 07-24-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
		28		<.25		102	25	28	9	Kv = 6.4 x 10(-6) cm/sec
				1.75						Kh = 7.5 x 10(-4) cm/sec
55.0										(CL) Stiff, gray to reddish brown, silty clay.
60.0		29		1.75	1.25	84	36			... with pockets of sandy silt.
65.0		30		2.0						... becoming stiff, gray, silty clay.
										... becoming hard.
70.0		31		>4.5						(ML) Hard, dark gray silt.
75.0		32		>4.5						... becoming clayey silt.
80.0		33								(CL) Hard, dark gray silty clay.
85.0		34		>4.5						... with small sandstones and gravel lenses.
90.0		35		>4.5						... with coarse sand lenses.
95.0		36		>4.5						
		>4.5								
100.0										Teminated boring at a depth of 100 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.5 ppg.
105.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING BOR-1

Location: Monroe, Louisiana
Elevation: 67.7 msl
Job No: 24379-002-137

Date: 07-31-9
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1		<.25						(SM) Loose, light brown to brownish yellow, silty sand.
		2		9/20/22						(ML) Dense, light brown to brownish yellow, sandy silt.
		3		9/9/10						... becoming medium dense.
5.0										... becoming gray.
										... no return.
				1.5						(CH) Medium stiff to stiff, gray and brown clay.
				2.0						
		4		2.5						... same.
10.0				2.5						
				1.75						
		5		2.5						... same.
				2.0						
				2.5						
15.0		6		<.25						(SM) Loose, brown, silty sand.
				<.25						
				1.75						(CL) Stiff, brown, silty clay.
										(ML) Stiff, brown, clayey silt.
		7		1.5						(SM) Stiff, brown to gray, silty sand
										(CL) Stiff, gray, silty clay.
				2.0						(SM) Stiff to medium stiff, silty sand.
20.0				2.0						(CL) Very stiff, gray with brown mottling, silty clay to clay.
				2.5						
				2.0						
		8		1.5						... same.
				1.5						
25.0				2.75						

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING BOR-2

Location: Monroe, Louisiana
Elevation: 65.5 msl
Job No: 24379-002-137

Date: 07-31-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0				<.25						(SM) Loose to dense, brown to light brown, silty sand.
		1								
				2.5						
				.25						... with traces of clay.
										(CL) Brown to light brown, silty clay.
		2		<.25						(SM) Soft, gray, silty sand.
5.0				<.25						
				.25						
										(ML) Medium stiff, gray, clayey silt.
		3		.50						(CL) Stiff, gray, silty clay.
				2.0						
				1.75						(CH) Very stiff, brown with gray mottling, clay with traces of silt.
10.0		4		2.0						
				2.0						
				2.25						
		5		2.5						... same.
				2.75						
15.0				2.0						
		6		2.25						... turning gray.
				2.75						
				1.75						
		7		1.25						... turning brown.
20.0				1.75						
				1.25						
				1.5						
		8		1.5						... same.
				1.5						
25.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-1

Location: Monroe, Louisiana N 849.0 E 497.0
Elevation: msl
Job No: 24379-002-137

Date: 06-17-9
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0										(SM) Gray and brown silty sand.
										∇ ... with trace of clay.
										... lost sample; too wet.
										... lost sample; too wet.
		1								(ML) Very soft, gray, slighty sandy, silty clay to clayey silt, wet.
5.0										... lost sample; too wet.
										Boring terminated at a depth of 6 feet and backfilled full depth.
10.0										
15.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-2

Location: Monroe, Louisiana N 1,036.0 E 947.0
Elevation: msl
Job No: 24379-002-137
Date: 06-17-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1								(SM) Gray with brown streaks, clayey and sandy silt.
							24	32	19	(CL) Gray with brown streaks, silty clay, with trace of sand.
										... same, soft to medium stiff, dry.
										... same, moist near bottom of sample.
		2					24	34	22	... sand, medium stiff, turning to gray.
		3					40	81	52	(CH) Stiff, brown silty clay, dry, grading to gray clay.
										... becoming gray.
5.0										Stiff, red to brown clay.
										... same, slightly moist.
										Stiff, reddish-brown clay, with gray mottling, dry, several small cobbles on bottom of sample.
										Stiff, dark gray to brown clay, dry.
										... same.
10.0										
										Soft to medium stiff, gray clay, dry.
										Stiff, brown to gray clay.
										... same, water in borehole.
										Boring terminated at a depth of 13 feet and backfilled full depth.
15.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-3

Location: Monroe, Louisiana N 1,266.0 E 1,258.0
Elevation: . msl
Job No: 24379-002-137
Date: 06-17-9
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0										(SM) Silty sand, with roots.
										(ML) Very fine sandy silt, with roots.
										... same.
										(CL) Brown and gray mottled, silty clay to clayey silt.
										(ML) Very fine, sandy silt.
										Brown and gray mottled, clayey silt.
5.0		1					35	60	44	(CH) Medium stiff, brown, silty clay.
										Stiff, gray with brown staining, silty clay.
										Very stiff, reddish brown clay, slickensided, dry.
		2					35	78	49	... same, trace of silt.
										Gray to brown, clay, trace of silt, dry.
		3					42	95	68	... becoming very stiff, gray.
										... becoming dark gray.
10.0										... same.
										... same.
										Boring terminated at a depth of 12 feet and backfilled full depth.
15.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-4

Location: Monroe, Louisiana N 938.0 E 743.0
Elevation: msl
Job No: 24379-002-137
Date: 06-18-[illegible]
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0										(SM) Brown, silty sand.
										(ML) Gray to brown, sandy silty, with trace of clay.
										... same, grading to clay.
										(CH) Soft to medium stiff, gray to brown, silty clay.
		1					33	62	42	... becoming more clayey, moist.
5.0										Medium stiff, reddish brown to gray clay.
										... same.
		2					43	74	51	Reddish brown clay with nodules, blocky.
										... same.
										Stiff, brown to gray clay.
										... same.
10.0										... same.
		3					46	81	58	Stiff, brown clay, with nodules.
										Very stiff, gray to brown clay.
										Boring terminated at a depth of 13 feet and backfilled full depth.
15.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-5

Location: Monroe, Louisiana N 154.0 E 1,542.0
Elevation: msl
Job No: 24379-002-137

Date: 06-18-9
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1					28	63	42	(ML) Brown, sandy silt.
										(CH) Brown, silty clay.
		2					37	65	45	Brown, silty clay.
		3								Brown, silty clay.
5.0										
		4								(SM) Brown, silty sand, wet.
										Boring terminated at a depth of 8 feet and backfilled full depth.
10.0										
15.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-6

Location: Monroe, Louisiana N 219.0 E 1,237.0
Elevation: msl
Job No: 24379-002-137
Date: 06-18-[illegible]
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1								(SM) Brown, silty sand.
										(ML) Brown silt. Brown, clayey silt.
		2					26	56	40	(CH) Brown silty clay, highly plastic.
		3								Brown clay.
5.0										
		4					25	45	28	(CL) Brown clay.
										(ML) Brown, sandy silt.
10.0										Boring terminated at a depth of 10 feet and backfilled full depth.
15.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-7

Location: Monroe, Louisiana S 168.0 E 1,257.0
Elevation: msl
Job No: 24379-002-137

Date: 06-18-
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1								(SP) Brown sand.
										(ML) Brown, sandy silt.
		2					31	67	53	(CH) Brown, silty clay. Brown, silty clay.
		3								Brown, silty clay.
5.0		4								(ML) Brown, sandy silt
										Boring terminated at a depth of 8 feet and backfilled full depth.
10.0										
15.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-8

Location: Monroe, Louisiana N 44.0 E 870.0
Elevation: msl
Job No: 24379-002-137

Date: 06-18
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1								(SM) Brown, silty sand.
										(CL) Brown, sandy, silty clay.
										Brown, silty clay.
		2								(CH) Brown clay.
		3					35	67	47	Brown clay.
5.0										
		4					28	42	26	Brown clay.
		5								(SM) Brown, silty sand.
10.0										Boring terminated at a depth of 10 feet and backfilled full depth.
15.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-9

Location: Monroe, Louisiana S 315.0 E 873.0
Elevation: msl
Job No: 24379-002-137

Date: 06-18-9
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1								(ML) Brown, sand silt.
										(SM) Brown, silty sand.
										(ML) Brown, clayey silt.
		2					31			(CL) Brown, silty clay.
										(CH) Brown, silty clay, highly plastic.
		3								
5.0										
										(SM) Brown, silty sand.
										Boring terminated at a depth of 8 feet and backfilled full depth.
10.0										
15.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-10

Location: Monroe, Louisiana N 145.0 E 489.0
Elevation: msl
Job No: 24379-002-137

Date: 06-1[illegible]
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1								(SP) Brown sand.
										(CH) Gray clay.
		2					40	59	44	Gray clay.
		3								Gray clay.
5.0										
		4								Brown clay.
		5								Brown clay.
10.0		6					34	58	36	Brown to gray clay.
										Boring terminated at a depth of 12 feet and backfilled full depth.
15.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-11

Location: Monroe, Louisiana S 230.0 E 486.0
Elevation: msl
Job No: 24379-002-137

Date: 06-19-9
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1								(SP) Brown sand.
										(SM) Brown, silty sand.
										(ML) Brown, sandy silt.
		2					22	30	15	(CL) Brown, silty clay.
		3					36	64	45	(CH) Brown clay.
5.0										
		4								Brown clay.
		5								(SM) Brown, silty sand.
10.0										Boring terminated at a depth of 10 feet and backfilled full depth.
15.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-12

Location: Monroe, Louisiana S 660.0 E 490.0
Elevation: msl
Job No: 24379-002-137

Date: 06-19-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1								(ML) Brown, sandy silt.
										(SM) Brown, silty sand.
										(ML) Brown, clayey silt.
		2								Brown, clayey silt.
										(CL) Brown, silty clay.
		3					37	71	48	(CH) Brown clay.
5.0										
		4								Brown clay.
		5								(SM) Brown silty sand.
10.0										Boring terminated at a depth of 10 feet and backfilled full depth.
15.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-13

Location: Monroe, Louisiana S 192.0 E 72.0
Elevation: msl
Job No: 24379-002-137

Date: 06-19-
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1								(SM) Brown, silty sand.
										(ML) Brown, sandy silt.
		2					24	23	6	Gray, clayey silt.
		3								(SM) Gray, silty sand.
5.0										
										Boring terminated at a depth of 6 feet and backfilled full depth.
10.0										
15.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-14

Location: Monroe, Louisiana S 665.0 E 75.0
Elevation: msl
Job No: 24379-002-137

Date: 06-19-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1								(SM) Brown, silty sand.
										(ML) Brown, sandy silt.
		2					24			(CH) Brown clay.
		3								(SM) Brown, silty sand.
		4								(SP) Fine, brown sand.
5.0										
										Boring terminated at a depth of 6 feet and backfilled full depth.
10.0										
15.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG AND PIEZOMETER CONSTRUCTION DETAILS OF BORING PZ-1

Location: Monroe, Louisiana
LS Elev: 68.50 msl

Approved:

DEPTH IN FEET bls	SAMPLE NUMBER	PENETROMETER (tsf)	USCS SYMBOL	LITHOLOGY	PIEZ.	CONSTRUCTION (bls)
0.0		<.25		(ML) Very soft, brown, sandy silt.		
				(CL) Very stiff, brown, silty clay.		
		2.25				Cement Grout 0.0'- 5.5'
	1	3.25		Very stiff, brown, silty clay.		
		1.75		(CH) Stiff, brown clay, with dark brown mottling.		2" Diameter Sch 40 PVC Blank Casing 0.0'- 10.0'
	2	1.75				
5.0		2.75				
				(SM) Dense, brown, silty sand, with traces of clay.		Bentonite Seal 5.5'- 8.0'
		2.0				
	3	1.75				
		2.0		... same.		Filter Sand Pack 8.0'- 20.0'
		<.25				
10.0	4			... becoming medium dense, sandy silt to silty sand.		
		.25		... same.		
	5					2" Diameter Slotted PVC Screen 10.0'- 20.0'
		.50		... becoming more clayey.		
15.0						
	6	<.25		... same.		
	7	.5		(CL) Soft to stiff, brown, silty clay.		
		1.75				
20.0						Bottom of Borehole 20.0'

NOTES:

PROJECT: Riverwood International
FOR: Surface Impoundment
JOB #: 24379-002-137

Date: 07-31-92

DAMES & MOORE
Baton Rouge, Louisiana

GEOSCIENCE REPORT

PROPOSED SW SURFACE IMPOUNDMENT

MANVILLE FOREST PRODUCTS CORP.

WEST MONROE, LOUISIANA

for

ERM-SOUTHWEST, INC.

METAIRIE, LOUISIANA

SOIL TESTING ENGINEERS, INC.

GEOTECHNICAL, ENVIRONMENTAL, & MATERIAL CONSULTANTS

316 HIGHLANDIA DRIVE • P O BOX 80379 • BATON ROUGE, LOUISIANA 70898 • PHONE (504) 292-4790

GORDON P. BOUTWELL, JR., Ph.D.
CHARLES W. McCUMSEY
RONALD H. JONES, ME
CHARLES S. HEDGES, MS

REGISTERED PROFESSIONAL ENGINEERS

June 7, 1989

ERM - Southwest, Inc.
3501 North Causeway Blvd., Suite 200
Metairie, Louisiana 70002

Attention: Ms. Elaine T. Harmon

Re: Geoscience Support
Proposed SW Surface Impoundment
Manville Forest Products Corp.
West Monroe, Louisiana
File: 89-037R

Gentlemen:

We have completed this investigation and our findings, together with the analyses and conclusions based on them, are submitted in the attached report.

We will be pleased to discuss any questions you may have concerning this report. It has been a pleasure to work with you on this project and we look forward to serving ERM Southwest and Manville in the future.

Sincerely,

SOIL TESTING ENGINEERS, INC.

Charles S. Hedges, P.E.
Chief Engineer

Gordon P. Boutwell, Jr., P.E.
Principal Engineer

CSH/GPB/stp
Copies Submitted: (4)

SOIL TESTING ENGINEERS, INC.

REPORT OF GEOSCIENCES SUPPORT PROPOSED SOLID WASTE SURFACE IMPOUNDMENT WEST MONROE, LOUISIANA

This report contains the site evaluation and development recommendations for a surface impoundment facility to be located near West Monroe, Louisiana. The findings, conclusions, and recommendations are covered in the main body of this report.

I. INTRODUCTION

1.1 Nature of Project. The Manville Forest Products Corporation requires additional storage/disposal capacity for primary clarifier sludge and sluiced ash generated from its pulp and paper mill in West Monroe, Louisiana. An approximate 21 acre facility is currently planned as an addition to the existing impoundment. The proposed location has been approved by the Army Corps of Engineers; and, a Louisiana Department of Environmental Quality (DEQ) Solid Waste Permit is needed prior to construction of the proposed facility. ERM-Southwest, Inc. is developing a solid waste permit application for the new Ash/Sludge Pond.

1.2 Scope of Work. This work was authorized by Ms. Elaine Harmon. All detailed permitting responses will be prepared by ERM/SW. Soil Testing Engineers will provide certifications plus some input into the responses. The primary items will be the following, based on the soils investigations furnished:

1.2.A. Slope Stability. Analyses were made for the stability of the levee slopes using the accepted Modified Bishop procedure. The conditions analyzed include undrained (short-term), and drained (long-term: estimated soil parameters) cases. The results are presented graphically, as a series of figures illustrating the cross-section(s) analyzed, the soil parameters, the critical arc(s), and the resulting factors of safety against failure.

1.2.B. Settlement. The weight of the levee will cause some consolidation of the underlying soils and thus settlement. This was evaluated using consolidation test data from geologically similar materials. The results were presented as crest and toe settlements at appropriate locations. Potential settlement under waste load was also evaluated.

1.2.C. Clay Liner. The suitability of the on-site material is discussed.

1.2.D. Stratification. The site stratification was taken from the boring logs and entered into a computerized data base. Contours of stratum thickness, and base or top elevation were made.

1.2.E. Seepage Control and Heave. The potential problems for bottom heave and seepage control are discussed. The criteria of groundwater conditions for safe excavation are also prescribed.

II. SITE CONDITIONS

2.1 Location. The site is located in the southwest corner of Section 30, T17N, R3E, about 1 1/2 miles south of West Monroe. The Ouachita River is 3/4 of a mile to the NE. The site location is shown on Figure 1.

2.2 Topography and Geology. The site lies within the Mississippi Alluvial Plain west of the Ouachita River. Ground elevation is from +66 to +80 feet MSL, and is fairly irregular. One gradual slough is present across the south end of the site and is covered with woods.

Holocene (Recent) alluvial sediments underlie the site to depths of 60 to 100+ feet below land surface. These sediments consist of clays, silts and dense sands. Underlying the Holocene alluvium is the Claiborne Group, of Eocene age. The formations of this Group consist of interbedded clays and sands which are overconsolidated. Due to low sea level stages during the last Ice Age, a valley was eroded into the Claiborne, which is now exposed some 4 miles west of Monroe. Pleistocene age terraces with abundant sand and gravel are found on the west bank of the Ouachita, between the river and the Cockfield (upper Claiborne) exposures. East of the current Ouachita River, the Pleistocene formations were removed during the last Ice Age, Holocene alluvium was deposited.

No surface faulting is indicated within the Ouachita Parish (Wang, 1952). Few subsurface faults were noted in the Sparta Formation at depths of 600 to 800 feet. The displacement of beds is approximately 60 to 70 feet. These faults do not come to the surface which indicates no movement in recent geologic time.

2.3 Site Stratigraphy. The site stratigraphy was determined by reviewing geotechnical investigations by Woodward Clyde Consultants and Southwestern Laboratories. A total of 43 borings have been installed in the vicinity of the proposed impoundment as shown on Figure 2. Borings designated 1 through 25 were hand augered by Southwestern Laboratories to depths varying from 5 to 14 feet below the surface. Borings B-1 through B-3, B-5 through B-15 and SW-1 through SW-4 were drilled by Woodward Clyde to a depth of 12 to 38 feet below the surface. The boring logs by Woodward Clyde and Southwestern Laboratories are presented in Appendix B of this report.

Based on the logs of these borings, the subsurface condition can be generalized as follows.

Stratum	Material	Typical Depth (feet)
IA	Clayey Silt (ML)	0 - 4
I	Clay (CH-CL)	1 - 9
II	Silty Sand (SM-SP)	9 - 20
III	Clay (CH-CL)	20+

It is important to note that Stratum IA exists primarily at the south side of the slough. Some amount of fill was found at the southwest side of the site close to the canal. It probably is the spoil from the dredging of the canal. A more detailed description of various strata is given below.

1. Stratum I. This is basically a clay (CL-CH) stratum. It is found from the surface to depths of 7 to 20 feet. The material is more silty near the surface.

Stratum IA is basically clayey silt which was found just south of the slough to depths of 4 to 6 feet. Underlying the Stratum IA silt, Stratum I clays were found. The thickness and presence of Stratum I is shown on Figure 3 which was prepared by computer and hand plot from the boring logs. The plot is approximate but it shows the effect of deposition and subsequent erosion in the slough area.

The Stratum I material typically has liquid limits of 27 to 82 and is suitable for liner and levee embankment. The vertical permeability for this stratum is on the order of about 1x10(-8) cm/sec.

2. Stratum II. The upper and lower bounds of this stratum are quite variable, ranging between 6 and 20 feet for the upper and 20 to 26 feet on the lower bound. The material is basically silty sand with gravel and clay traces. The permeability for this stratum is estimated on the order of 1x10(-5) cm/sec. The estimated top of the Stratum II soil layer is shown on Figure 4 (this is also the estimated bottom of Stratum I). The thickness and presence of Stratum II is shown on Figure 5. This figure shows the deposition and subsequent erosion in the slough area.

3. Stratum III. This is a hard clay stratum with silt and sand layers it is found below the Stratum II to the maximum depths drilled. The permeability of this strata varies from on the order of 1x10(-6) to 1x10(-8) cm/sec. The estimated top of Stratum III soil layer (clay, CH-CL) is shown on Figure 6.

Groundwater Level. Groundwater observations were made during the drilling operation conducted in March, 1985. No long-term groundwater elevations were obtained at that time. The observed groundwater elevations varied from about +55 to +71 feet MSL as shown below.

Boring	Approximate Elevation (ft. MSL) March, 1985 First Encountered	Approximate Elevation (ft. MSL) March, 1985 15-Minute Reading
B-1	61.5	69.7
B-2	65.0	65.0
B-3	60.0	66.5
B-5	62.0	63.0
B-6	64.0	68.0
B-7	67.0	70.5
B-8	56.0	63.5
B-9	65.0	67.0
B-10	62.5	65.5
B-11	56.0	60.0
B-12	55.0	65.9
B-13	57.0	61.7
B-14	57.0	60.5
B-15	63.0	67.7

The variation in groundwater level depends on the water level in the Ouachita River and levels in the existing ash pond and canals. Several observation wells should be set on the upgradient and downgradient side of the excavation prior to excavation in order to determine the actual groundwater levels immediately prior to excavation operations.

III. PROJECT CONSIDERATIONS

3.1 Description of Project. The site for the proposed pond covers about a 21 acre area in a triangular shape (see Figure 2). The excavations will be made to a nominal depth of +61 feet using side slopes of 1(V):2.5(H). A side and bottom liner will then be installed, consisting of 3 feet of recompacted clay soil with a permeability of 1x10(-7) cm/sec or less. A perimeter levee will be built to an elevation of +85 MSL. The levee will be constructed using earthen dam construction technology and the levee shall have a maximum permeability of 1x10(-7) cm/sec. The project will include groundwater monitoring wells for the detection of potential leaks. The project will be constructed over two construction seasons. The first construction year will consist of site clearing, excavation, complete bottom and side liner placement, and initiation of levee construction. The second construction year will consist of completion of levees and other control structures. The facility will be backflooded to protect the liner after the initial construction season.

3.2 Limitations. The analyses and recommendations presented in this report are based on information obtained from the literature and the geotechnical investigations performed by Woodward Clyde and Southwestern Laboratories. It is possible that conditions may vary between or away from those observed in the borings. However, due to the nature of this project and the proposed method of construction, any variations within the upper 10 feet should become apparent during construction. If it becomes apparent during construction that soil conditions differing significantly from those discussed in Paragraph (2.3) are being encountered, this office should be notified at once so that their effects can be determined and any remedial measures necessary be prescribed. Also, should the nature of the project as described in Paragraphs (1.1) and (3.1) change, these recommendations may have to be re-evaluated. Reevaluation would also be in order if there is a change in either the written regulations or their unwritten interpretations by LDEQ.

3.3 Geoscience Considerations. The geoscience analyses provide a basis for design of the facility (as described above) with respect to the site subsurface conditions and the applicable regulations. The primary concern for a surface impoundment is escape of the contents. However, construction must also be addressed so that there are no mass movements, etc., which can affect the integrity of the leakage control system. Analyses, conclusions, and recommendations are presented in the following sections for:

* Slope Stability
* Settlement
* Heave and Seepage Control

IV. GEOTECHNICAL EVALUATION

4.1 Slope Stability. The stability analyses were performed for the excavation slope as well as the levee slope.

4.1.A. Inside Slope. Analyses were made for the stability of the pond excavations and inside slope before the waste is placed, using the Spencer-Morgenstern's method. This method is a modified Bishop procedure and is a theoretically more rigorous method. The method is explained in more detail in Appendix A. Both long-term and short-term conditions were analyzed. The results indicated that with a levee elevation of +85 feet to bottom of slope at 61 feet on a 2.5(H):1(V) slope would have a safety factor of 1.8 in the undrained (short-term) case and 1.5 in the drained (long-term) case. The most critical circles and the soil parameters are illustrated on Figure 7.

4.1.B. Levee Slope. The stability is analyzed for the levee after the pond reaches maximum height. The top of the levee will be at elevation +85 feet and the maximum waste elevation +83 feet MSL. Due to the variation in elevation of the existing ground surface, analyses were made on three different section areas (see Figure 8).

i. Section I. The bottom elevation of the outside slope is at about +70 feet. The bottom of the inside slope is about +64 feet MSL. This section makes up about 80% of the total levee. The results indicated that a side slope of 2.5(H):1(V) would be stable for both long-term and short-term cases with factors of safety of 1.9 and 1.5, respectively. The most critical circles and the soil parameter used are illustrated on Figure 9.

ii. Section II. The bottom elevation of the slope is at +61 feet. This section includes the vicinity of Boring B-15 (Woodward Clyde) to the slough at the south end of the site. Due to the presence of silt stratum at this section, some difficulties arose in determining a stable slope for the levee with an acceptable factor of safety.

Considerable effort was made to find a stable slope with different slope configurations. No satisfactory results were obtained by varying the slope from 2.5(H):1(V) to 4.0(H):1(V) with the presence of the silt stratum. We recommend undercutting the silt stratum and replacing it with compacted cohesive soil at this section to increase the strength of the foundation soil. The undercutting should be in the location of Section II and beneath the levee which is an area approximatley 200 feet by 120 feet. The depth of undercutting should be approximately 4 feet. It is estimated that excavating 2800 to 3800 cubic yards of silt at this area may be required. Any clay material in this excavation can be used for liner material if properly segregated.

During the stripping and excavation in the Section II area, inspection should be performed to determine the actual extent of the silt stratum. Where the silt is not present the material need not be removed. Also, the area and depth need not be greater than stated if the silt is present.

In addition to replacement of the silt, a berm 10 feet wide to an elevation of 70 feet is used to stabilize the slope. The factor of safety for long-term and short-term stability are 1.3 and 1.3, respectively. Details of the stable slope configuration and the most critical circles are illustrated on Figure 10.

iii. Section III. This is the section where the local slough is present (see Figure 8). A satisfactory slope between 2.5(H):1(V) to 4.0(H):1(V) could not be obtained because of the silt, sand and silty sand (ML,SC) in the foundation. Therefore, a berm 20 feet wide is used to stabilize the slope. A stable slope for both long and short-term conditions were developed, the safety factors are 1.3 and 1.6, respectively. Details of the analysis and the slope configuration are presented on Figure 11.

4.2 Settlement. As the weight of the sludge begins to exceed the weight of the excavated earth, it squeezes water from the underlying soils. Consolidation settlement then occurs. Consolidation leads not only to the strength gain but also to settlement. This is a time-dependent process; the settlement proceeds at ever and ever decreasing rates until the ultimate settlements are achieved. The settlement process depends on:

* Compressibility characteristics of each stratum
* Thickness of each stratum
* Load applied

4.2.A. Amount of Settlement. Analyses were made for the amount of settlement to be expected under the proposed levee and the surface impoundment. These calculations were made for numerous points. The amount of silt and sands are significant factors since both are less compressible than the clays. The results are presented in graphical form as profiles through the landfill area and as contours of equal settlement on Figures 12 and 13. Experience with other large area loads (such as 100-200 foot diameter storage tanks, surcharging of several acres, etc.) indicates that the settlements are usually within about 25% of the predicted values. Hence, the true settlement at the point where the maximum value (4 inches) was predicted could be 3 to 5 inches.

4.2.B. Time Rate of Settlement. This depends not only on the geotechnical factors, but also on the rate of load application. Calculations showed that consolidation would be virtually (90%) complete within about 5 years after application of a load increment. Therefore, all movement due to soil consolidation should be virtually complete within 5 years after closure. Predictions of the time-rate of settlement are known to be less accurate than those for the amount. Usually, settlement occurs at a faster rate than predicted.

4.2.C. Effect on Liner. Settlement will cause the recompacted liner to "dish" slightly, which tends to produce tensile stresses in the liner. Excessive tensile stresses can lead to liner cracking. Since the settlement and loading of the pond are small, no net tensile stress was induced by the sludge mass. Therefore, the liner's integrity can be assured.

4.3 Excavation Depths. The allowable depth of excavation is governed by several factors. Primary among these are the potential for bottom heave. Another consideration is control of seepage into the excavation during construction. These factors are examined in the following paragraphs.

4.3.A. Bottom Heave. When an excavation is made, the bottom can rise from two different phenomena: elastic swell and potentiometric heave.

i. Elastic Swell. The excavation itself reduces the pressure on the remaining soils below. Like any other material, the remaining soil expands elastically in response to this reduced stress condition. For these overconsolidated deposits, a 10± foot excavation would result in only about 1/2 inch of upward elastic movement.

ii. Potentiometric Heave. The clays beneath the excavation are often underlain by more permeable materials, in which the potentiometric level is above the top of the permeable zone. A positive upwards water pressure is thus exerted against the base of the clay. It must be overcome by resisting forces, primarily the weight of the overlying clay. The potential for heave thus depends on the potentiometric level in the permeable zone and the weight of clay remaining after excavation. The most critical situation occurs when the excavation is at its deepest: just before the clay liner is placed.

The contour plot of potentiometric level occurring in March, 1985 in the Stratum II sand is illustrated on Figure 14. The potentiometric levels were derived from the short-term groundwater observations (15-minute readings) during boring installation. The long-term condition probably will be somewhat higher. The calculated safety factor based on the potentiometric levels for March, 1985 are presented on Figure 15. During the construction season, the river stage is generally lower which may result in lower groundwater

level. Based on Manville's experience the groundwater level is at approximately +58 feet MSL at most times during the construction season. Construction of the proposed impoundment will be scheduled to correspond to low groundwater conditions (less than +58 feet MSL). The construction with the groundwater less flow +58 feet MSL will alleviate the potentiometric heave problems. Other considerations regarding heave are discussed in sections 4.3.C and 4.3.D.

4.3.B. Lateral Heave. This phenomenon can occur when side liner is placed over a water-bearing permeable zone penetrated by the excavation. When the excavation is made, the potentiometric level in the permeable zone is depressed by drainage at the open face. Constructing the liner blocks this drainage, and the potentiometric level in the permeable zone rises towards its original level (absent any other barrier or drainage features). If the water pressure then exceeds the weight of the liner, a lateral heave failure is likely to occur.

The proposed excavation depth cuts through the Stratum II sand at several locations. It will be difficult for liner placement with the existing groundwater condition. However, as mentioned in paragraph 4.3.A., if the construction is held during the said low groundwater period (below +58 feet MSL), the lateral heave should not be a problem.

It should be noted, that the liner may fail or move even after construction but before the waste sludge or effluent is placed in the event that the groundwater elevation is higher than +67 feet MSL (± 2 feet) or in the event that surface water runoff infiltrates the excavation side liner. Should groundwater approach the critical elevation (+67 feet MSL or greater), backflooding will be required to maintain the integrity of the liner. We recommend a contingency plan be developed for backflooding.

4.3.C. Seepage Control. The proposed bottom of the excavation (elev. +61 MSL), in many locations is in the Stratum II sand. A substantial amount of seepage may occur if the excavation penetrates the groundwater table. The data available to date indicates the groundwater is high (elev. +65 to +70 ft. MSL) during periods of high river stages. The construction activity should not commence until the groundwater elevation drops below approximately elevation +58 feet MSL. As previously stated, we recommend that several piezometers be placed around the proposed pond a considerable time period prior to initial excavation so the areal groundwater levels and variations are known prior to construction.

If the recompacted clay liner is placed with a high groundwater level, the placement and compaction to achieve the proper density and permeability may be very difficult. A high groundwater level could cause erratic compaction, rutting, "mud" waving and pumping because of capillary rise from the groundwater source. We recommend continuous field inspection by an independent qualified geotechnical technician during construction of the liner to assure proper placement of the liner without "mud" waving or rutting conditions.

Interim local sumping by using sump-pits, sump trenches and/or wells may be sufficient to control the groundwater level during excavation and subsequent liner earthwork, as necessary.

4.3.D. Seepage Cutoff. As previously stated, the potentiometric heave of the bottom and the lateral heave of the excavation sidewall liner are effected by the groundwater conditions at the site during construction and after construction. The potentiometric heave safety factor when the groundwater is at elevations reported by the March, 1985 borehole 15 minute readings is not adequate at many locations. This is shown on Figure 15. The figure can be equated to an "average " groundwater level of about elevation +60 to +62 feet MSL. In the areas where the boring shows the safety factor to be zero (0) the indication is that the clay has been removed by excavation and seepage is occurring. If the groundwater level were lowered to elevation +58 feet MSL the safety factors against heave will increase 10 to 20%. The placement of the recompacted liner will raise the safety factors; however, high rises or sudden rises in the groundwater levels will reduce the safety factors. Marginally low safety factors could occur until adequate waste weight or other liquid such as controlled backflooding is added to the pond.

The lateral heave of the facility is dependent on the groundwater levels adjacent to the rear of the sidewall recompacted soil liner. High groundwater levels will tend to cause sloughing of the excavation sidewall liner until such time as the weight of the waste can restrain the potential sidewall movement.

Controlled backflooding may reduce the potential for bottom potentiometric heave or lateral heave if the groundwater rises during the first year's construction. Also, controlled backflooding may reduce the potential of lateral heave of the sidewall liner during the first season's construction if there is a rapid rise of the groundwater.

4.4 Groundwater Protection. The natural clays remaining below the excavation were present at most parts of the site. A recompacted clay liner will also be provided.

4.4.A. Natural Clays. As discussed in Paragraph 2.3, the clayey soil is present at the surface. After excavation, much of the pond bottom will remain in the natural clays. The clays are low permeability materials and can be an effective migration barrier. However, the Stratum II sand will be exposed at the northwest and center part of the site. The contour plot of clay remaining after excavation is presented on Figure 16.

4.4.B. Recompacted Liner. The recompacted clay soil liner will form the primary barrier against migration of leachate. It will cover the bottoms and sides and therefore is effective against both vertical and horizontal migration. The major considerations for construction of the liner are:

* Adequate and proper raw material
* Compaction procedures
* Quality control
* Protection after construction

Each of these is discussed below.

i. Material. The on-site clays of Stratum I is suitable for use as material for the recompacted clay soil liner and will constitute the materials removed during excavation. The mean Liquid Limit of Stratum I is over 45, indicating a high clay content.

ii. Permeability. The permeability of a compacted clay soil depends on several factors, the most significant of which are:

* Clay content and/or activity
* Structure
* Density

The clay content/activity determines whether or not low permeability can be achieved at all under normal compaction. The normal measure is the Atterberg Limits test. The higher the Liquid Limit, the lower the permeability (all other factors being equal). Structure is determined by the moisture content at the time of compaction, best expressed as the degree of saturation. When the soil is compacted at a low degree

of saturation (so-called "dry-side" compaction), the structure is such that the void spaces between particles are conductive to flow, i.e., the permeability is higher. Wet-side compaction (high degrees of saturation) produces a structure with a lower permeability. Increasing the dry density reduces the sizes of the void spaces, again tending towards the lower permeability.

The initial specifications can be based on 90% Standard Proctor with a moisture content at least 2 percentage points above optimum. Once a few permeability tests (6 minimum) are available on undisturbed samples taken from the first lift of the in-place liner, these requirements should be re-evaluated and the specification may be broadened.

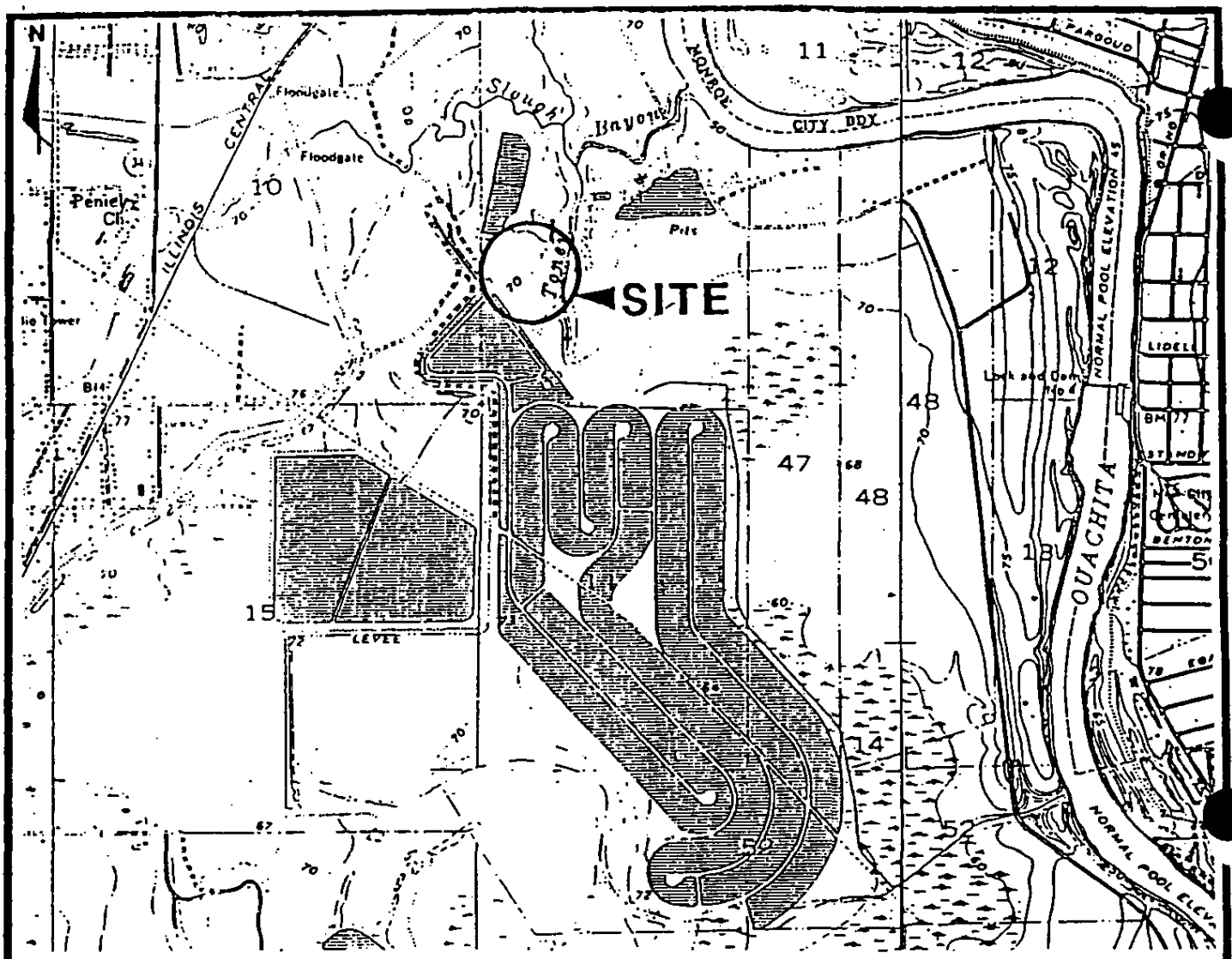
iii. Compaction. Experience on other projects indicates that the moisture should be held to less than 5 to 6 points over optimum for the side slopes, since strength as well as permeability are considerations. On the pond floor, contents up to 8-9 points over optimum can be allowed.

The material should be placed in loose lifts so the compacted thickness is 6 inches or less. Each lift should be compacted prior to placing additional lifts. Clay liner material should be compacted to a dry density and degree of saturation that will yield a permeability of 1x10(-7) cm/sec or less. A sheepsfoot roller or other "toothed" or "lug" foot equipment is recommended for construction in lieu of the smooth-wheeled rollers. Vibratory compaction should not be permitted in that they probably will cause "waving" and/or "pumping" which means erratic density and construction.

Horizontal lifts, similar to dam or levee construction, are permissible in the sidewall liner construction.

iv. Liner Protection. The liner will be composed of high-plasticity clay, necessarily placed in a relatively wet condition. Such a fill is subject to desiccation cracking. The completed and inspected liner should be protected against drying.

FIGURES



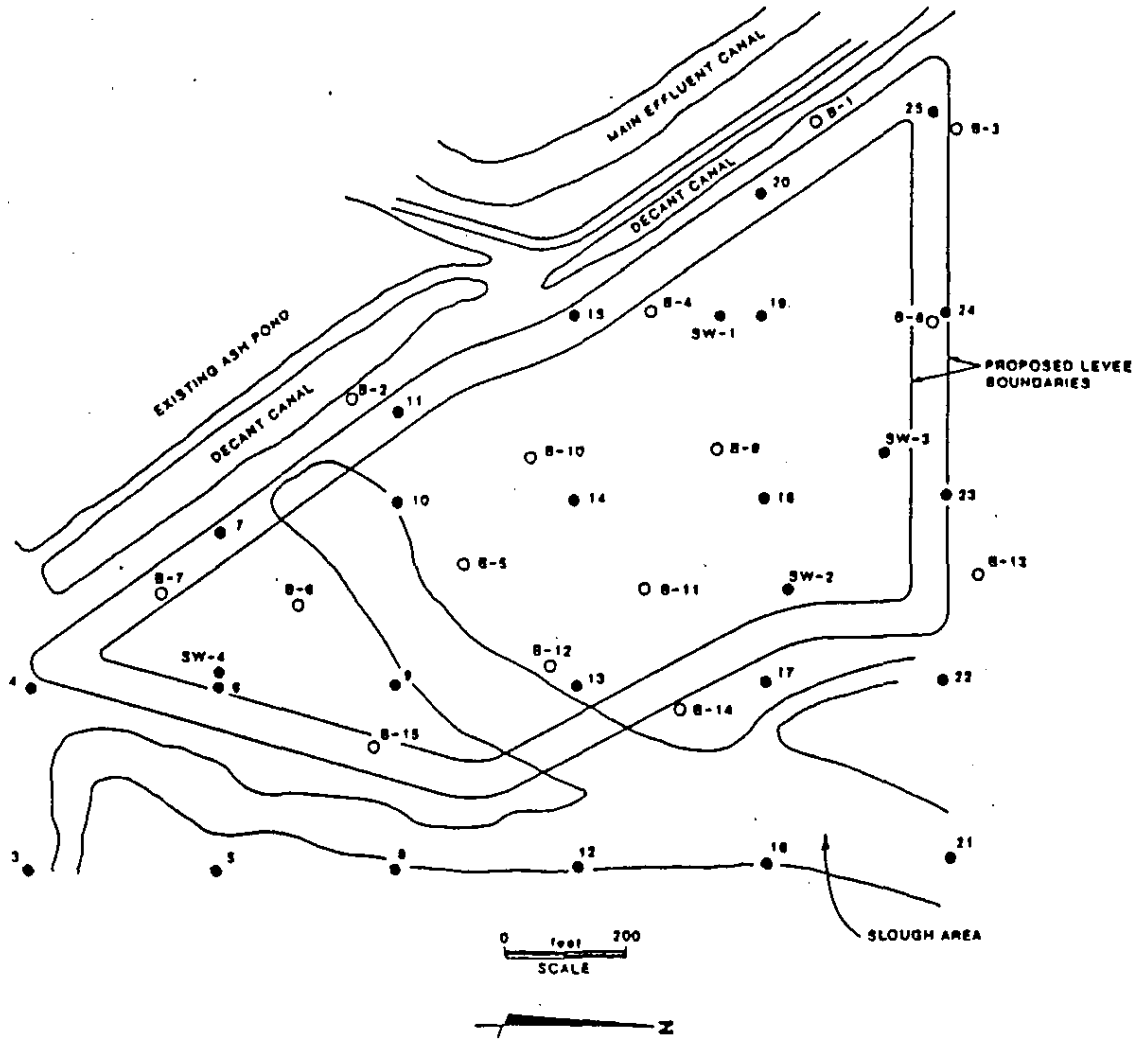
VICINITY MAP

0 feet 2000

REFERENCE: USGS Quadrangle Maps West Monroe South and Monroe South, Louisiana, 1957 edition, photorevised 1969 and 1975

SOIL TESTING ENGINEERS, INC.

FIGURE NO.: 1
FILE NO.: 89-037



○ Borings drilled by Woodward-Clyde Consultants

● Borings drilled by Southwestern Laboratories

REFERENCE: ERM-Southwest, Inc. Boring Locations Map.

PROPOSED SW SURFACE IMPOUNDMENT

for

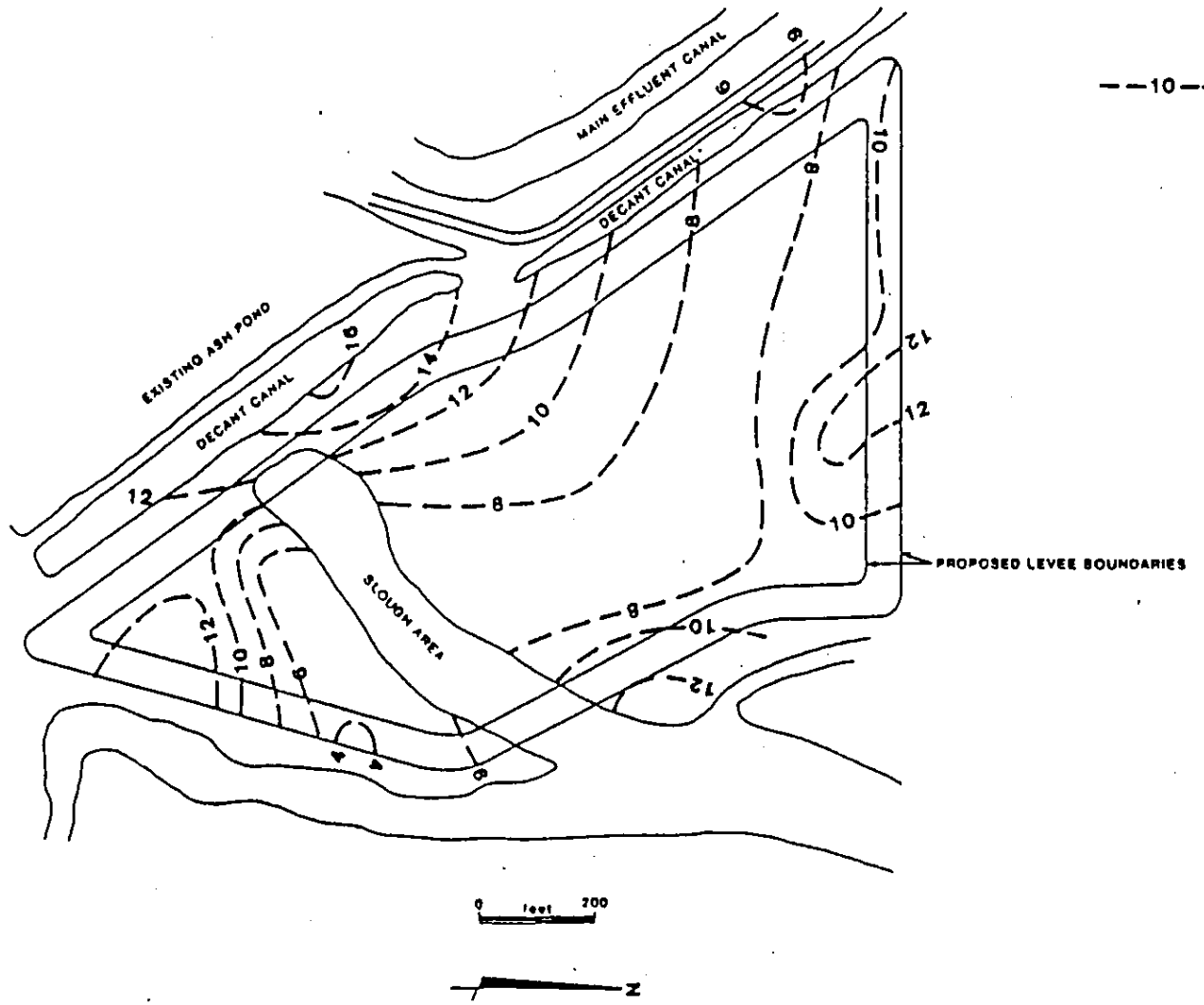
MANVILLE FOREST PRODUCTS CORP.
WEST MONROE, LOUISIANA

ERM-SOUTHWEST, INC.
METAIRIE, LOUISIANA

SOIL INVESTIGATION BY
SOIL TESTING ENGINEERS, INC.
Baton Rouge, LA. Lake Charles, LA.

Project Engineer: CHT	Drawn by: RTL	Checked by:
File No.: 89-037	Date: 9-02-89	Figure No.: 2

Title: BORING LOCATIONS



—10— Estimated thickness of isopach lines of Stratum I Clay (CL-CH). In slough area stratum has been completely eroded.

REFERENCE: ERM-Southwest, Inc. Boring Locations Map.

PROPOSED SW SURFACE IMPOUNDMENT

for

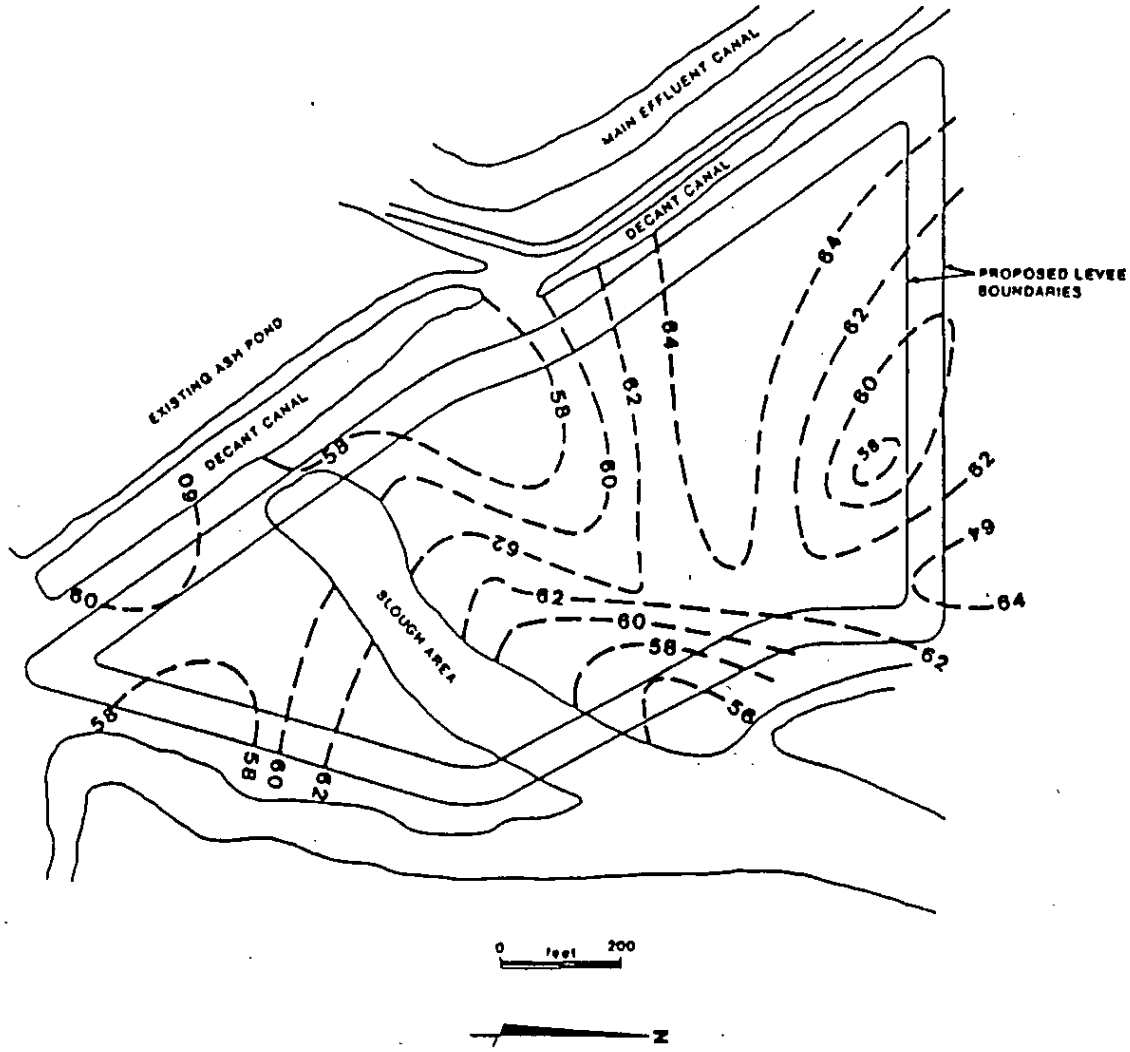
MANVILLE FOREST PRODUCTS CORP.
WEST MONROE, LOUISIANA

ERM-SOUTHWEST, INC.
METAIRIE, LOUISIANA

SOIL INVESTIGATION BY
SOIL TESTING ENGINEERS, INC.
Baton Rouge, LA. Lake Charles, LA.

Project Engineer:	Drawn by:	Checked by:
CHT	RTL/DAM	
File No.: 89-037	Date: 5-17-89	Figure No.: 3

Title: STRATUM I ISOPACH



—60— Elevation Contour (+feet MSL) of Top of Stratum II Silty Sand (SM-SP).

REFERENCE: ERM-Southwest, Inc. Boring Locations Map.

PROPOSED SW SURFACE IMPOUNDMENT

for

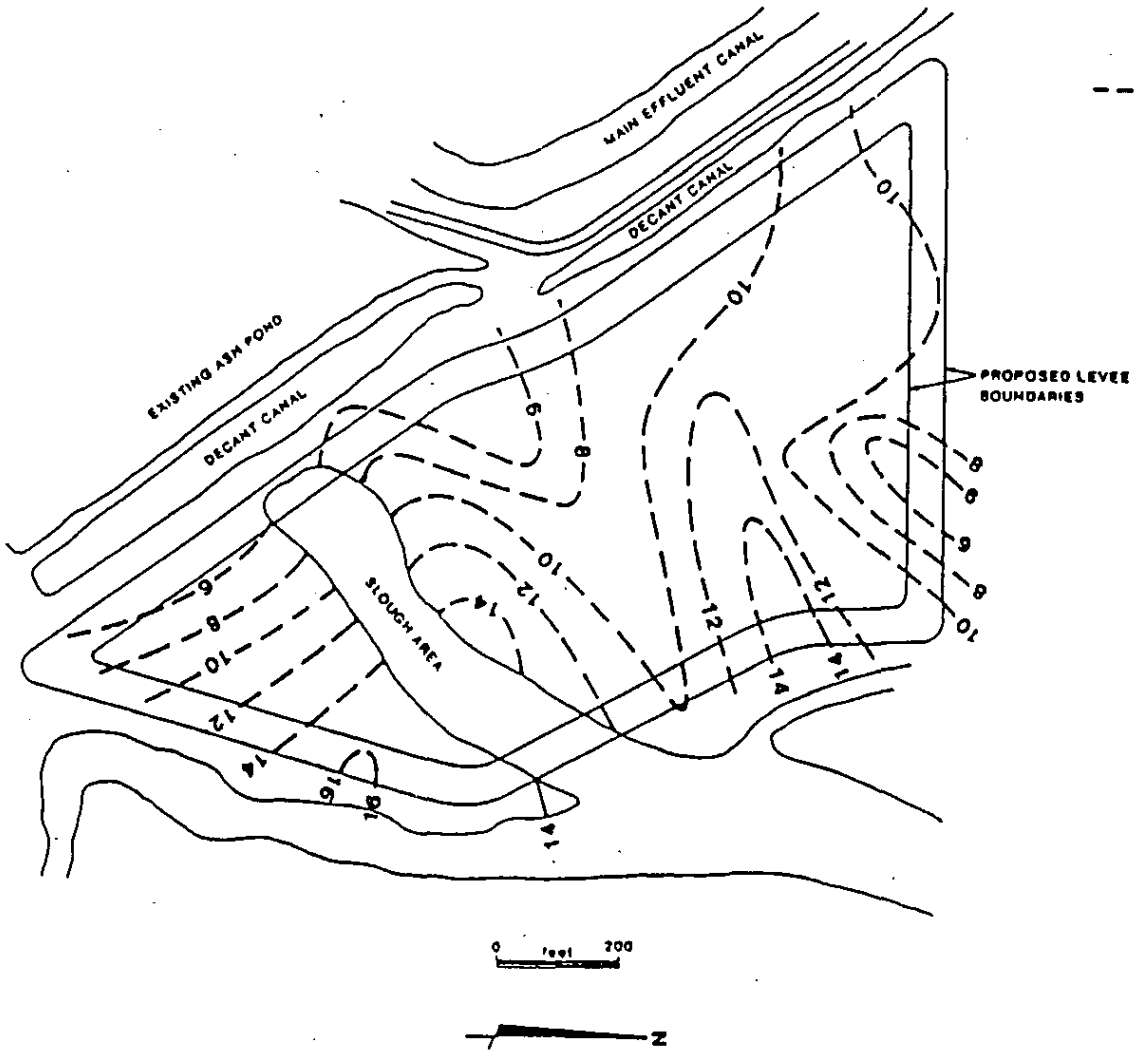
MANVILLE FOREST PRODUCTS CORP.
WEST MONROE, LOUISIANA

ERM-SOUTHWEST, INC.
METAIRIE, LOUISIANA

SOIL INVESTIGATION BY
SOIL TESTING ENGINEERS, INC.
Baton Rouge, LA. Lake Charles, LA.

Project Engineer:	Drawn By:	Checked By:
CMT	RTL/DAM	
File No.: 88-037	Date: 9-17-89	Figure No.: 4

Title: TOP OF STRATUM II ELEVATIONS



— — 10 — — Estimated thickness isopach lines of Stratum II Silty Sand (SM-SP). In slough area stratum has been completely eroded.

REFERENCE: ERM-Southwest, Inc. Boring Locations Map.

PROPOSED SW SURFACE IMPOUNDMENT

for

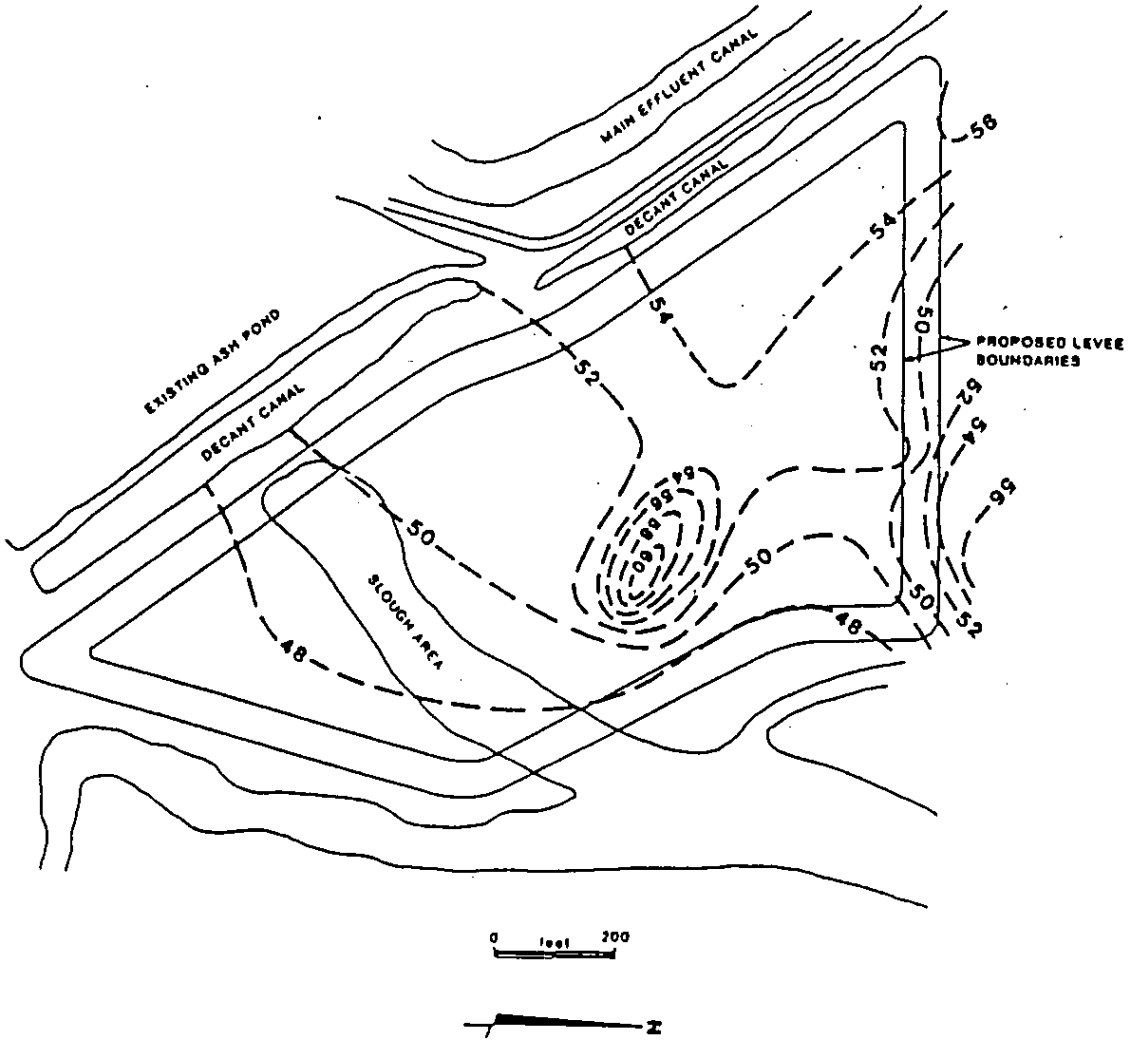
MANVILLE FOREST PRODUCTS CORP.
WEST MONROE, LOUISIANA

ERM-SOUTHWEST, INC.
METAIRIE, LOUISIANA

SOIL INVESTIGATION BY
SOIL TESTING ENGINEERS, INC.
Baton Rouge, LA. Lake Charles, LA.

Project Engineer: CNT	Drawn by: RTL/DAM	Checked by:
File No.: 89-037	Date: 3-17-89	Figure No.: 5

Title: STRATUM II ISOPACH



--54-- Elevation Contour (+feet MSL) of Top of Stratum III Clay (CH-CL).

NOTE: Top of Stratum III is also bottom of Stratum II.

REFERENCE: ERM-Southwest, Inc. Boring Locations Map.

PROPOSED SW SURFACE IMPOUNDMENT

for

MANVILLE FOREST PRODUCTS CORP.
WEST MONROE, LOUISIANA

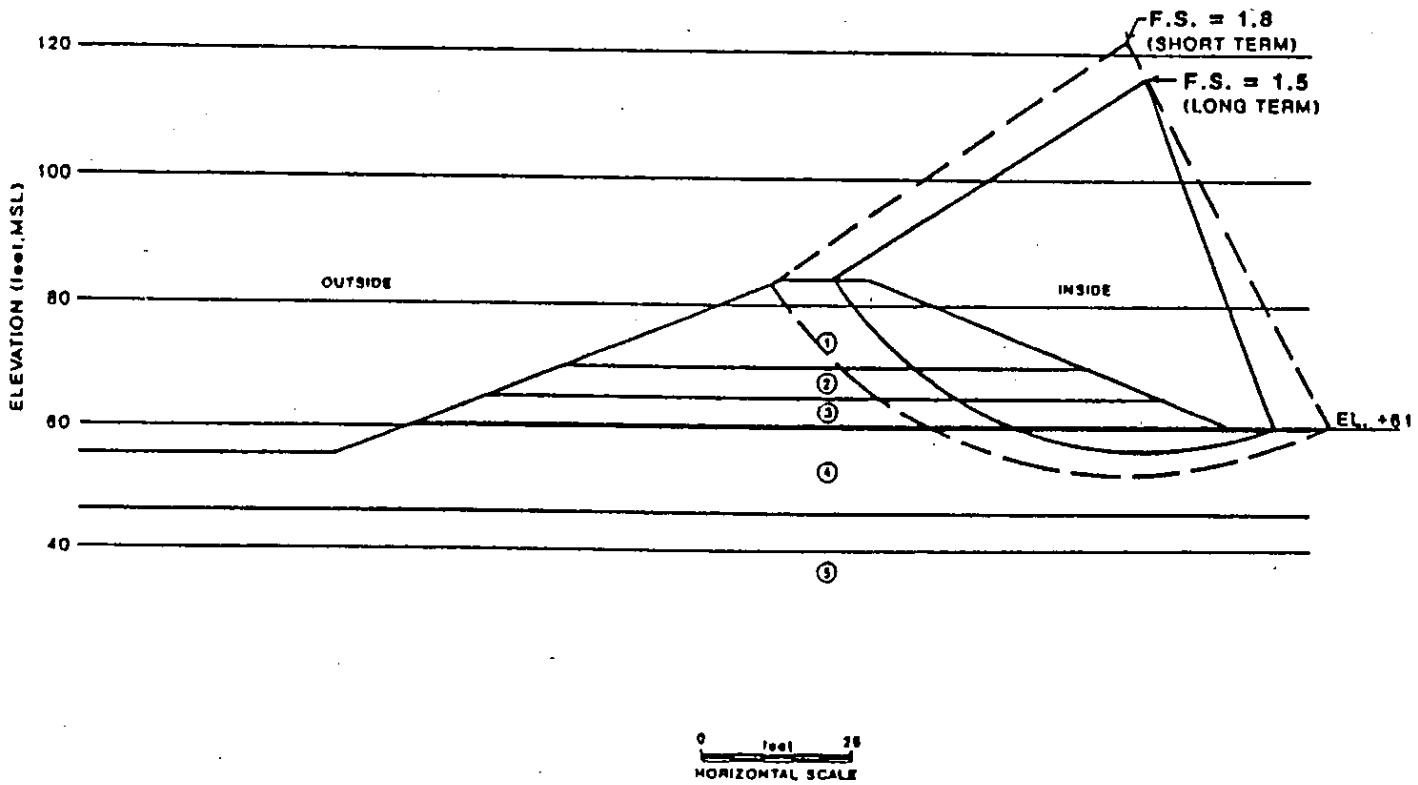
ERM-SOUTHWEST, INC.
METAIRIE, LOUISIANA

SOIL INVESTIGATION BY
SOIL TESTING ENGINEERS, INC.
Baton Rouge, LA. Lake Charles, LA.

Project Engineer:	Drawn by:	Checked by:
CHT	RTL/DAM	
File No.: 88-037	Date: 5-17-88	Figure No.: 6

Title: TOP OF STRATUM III ELEVATIONS

STRATUM	MATERIAL	SHORT TERM			LONG TERM		
		C	Φ	γ	C	Φ	γ
①	FILL	800	0	125	180	18	125
②	CL-CH	800	0	125	180	18	125
③	CH-CL	800	0	125	180	18	125
④	ML, SC	50	18	120	50	18	120
⑤	CH, CL	1000	0	125	200	18	125



PROPOSED SW SURFACE IMPOUNDMENT

for

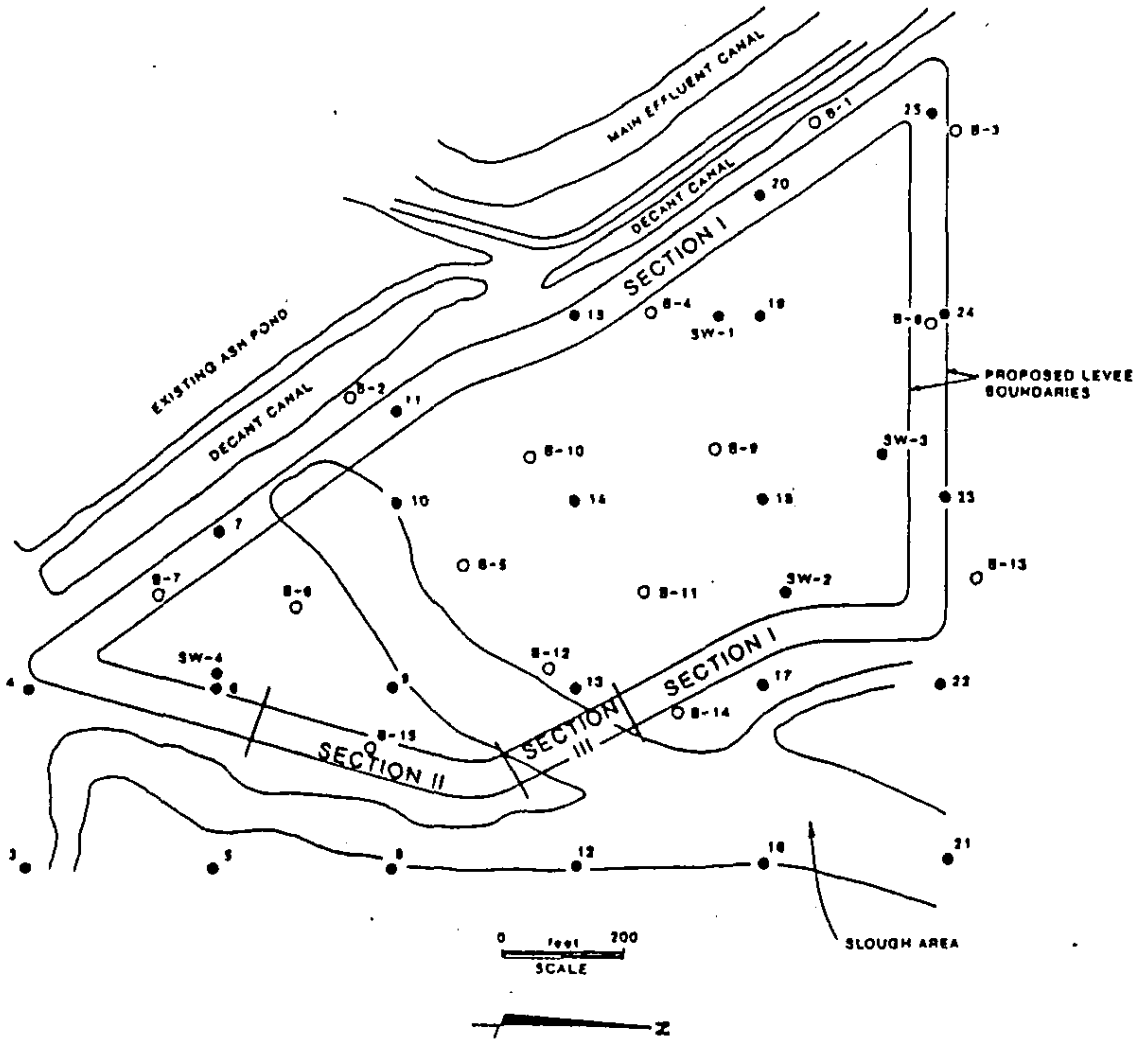
MANVILLE FOREST PRODUCTS CORP.
WEST MONROE, LOUISIANA

ERM-SOUTHWEST, INC.
METAIRIE, LOUISIANA

SOIL INVESTIGATION BY
SOIL TESTING ENGINEERS, INC.
Baton Rouge, LA. Lake Charles, LA.

Project Engineer: CNT	Drawn by: RTL/DAM	Checked by:
File No.: 89-037	Date: 9-02-89	Figure No.: 7

Title: EXCAVATION STABILITY



○ Borings drilled by Woodward-Clyde Consultants

● Borings drilled by Southwestern Laboratories

REFERENCE: ERM-Southwest, Inc. Boring Locations Map.

PROPOSED SW SURFACE IMPOUNDMENT

for

MANVILLE FOREST PRODUCTS CORP.
WEST MONROE, LOUISIANA

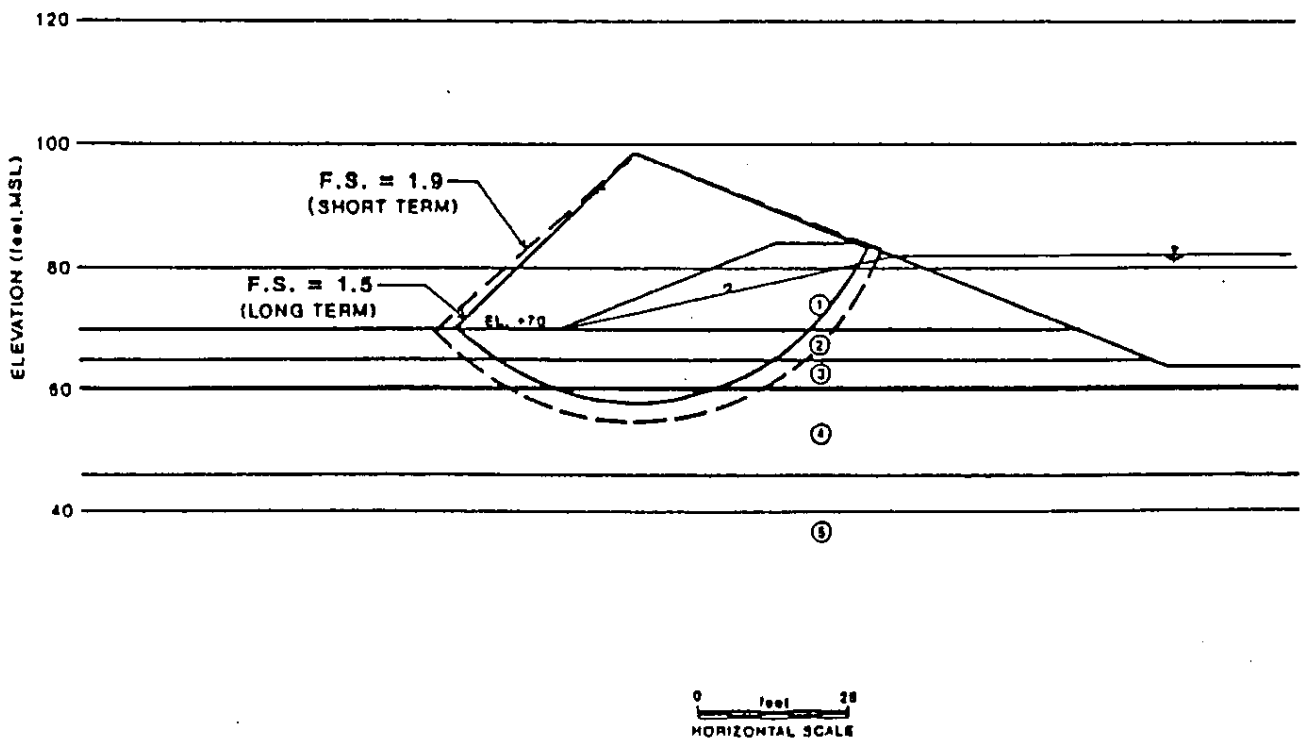
ERM-SOUTHWEST, INC.
METAIRIE, LOUISIANA

SOIL INVESTIGATION BY
SOIL TESTING ENGINEERS, INC.
Baton Rouge, LA. Lake Charles, LA.

Project Engineer: CHT	Drawn by: RTL	Checked by:
File No.: 88-037	Date: 9-02-88	Figure No.: 8

Title: SECTION AREAS FOR SLOPE STABILITY ANALYSES

STRATUM	MATERIAL	SHORT TERM			LONG TERM		
		C	φ	γ	C	φ	γ
①	FILL	800	0	125	180	18	125
②	CL-CH	800	0	125	180	18	125
③	CH-CL	800	0	125	180	18	125
④	ML, SC	50	18	120	50	18	120
⑤	CH, CL	1000	0	125	200	18	125



PROPOSED SW SURFACE IMPOUNDMENT

for

MANVILLE FOREST PRODUCTS CORP.
WEST MONROE, LOUISIANA

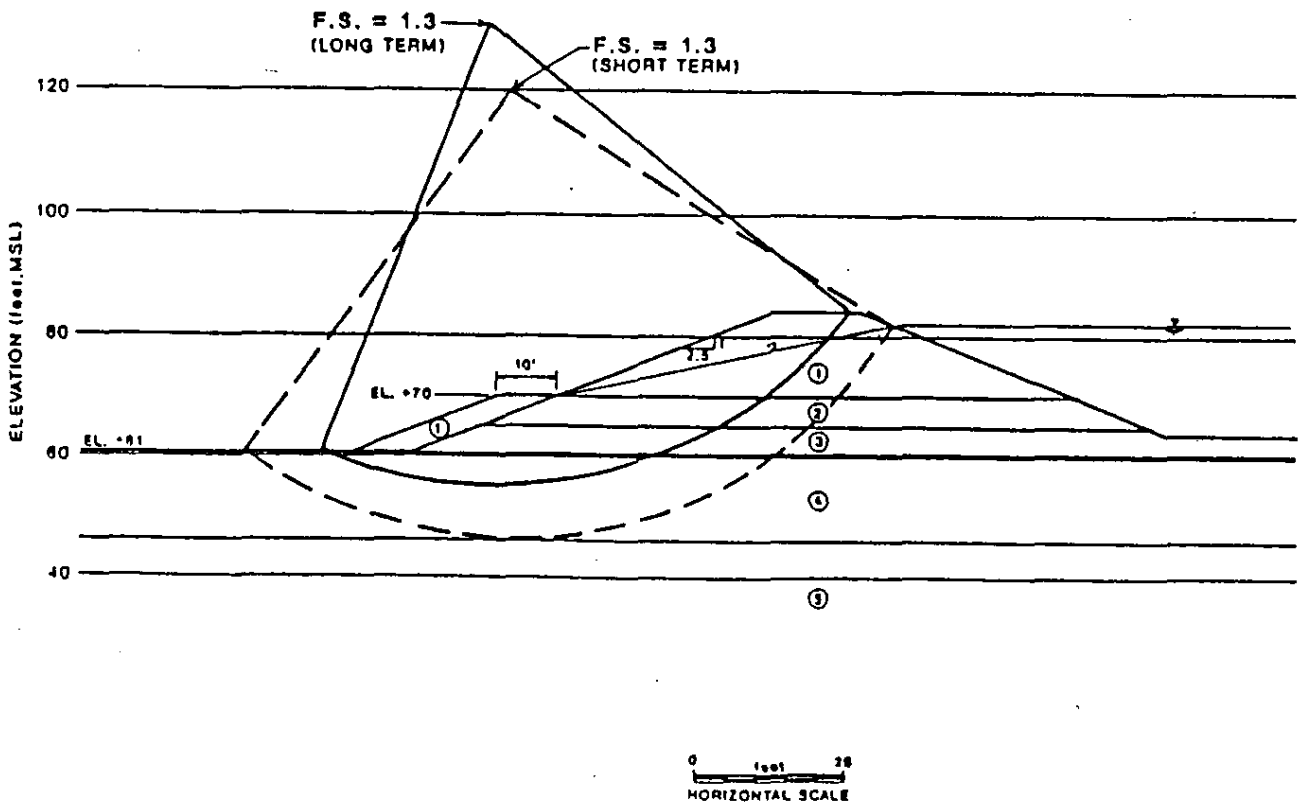
ERM-SOUTHWEST, INC.
METAIRIE, LOUISIANA

SOIL INVESTIGATION BY
SOIL TESTING ENGINEERS, INC.
Baton Rouge, LA. Lake Charles, LA.

Project Engineer: CNT	Drawn by: RTL/DAM	Checked by:
File No.: 89-037	Date: 5-02-89	Figure No.: 9

Title: SLOPE STABILITY SECTION I

STRATUM	MATERIAL	SHORT TERM			LONG TERM		
		C	Φ	γ	C	Φ	γ
①	FILL	800	0	125	180	18	125
②	CL-CH	800	0	125	180	18	125
③	CH-CL	800	0	125	180	18	125
④	ML, SC	50	18	120	50	18	120
⑤	CH, CL	1000	0	125	200	18	125



PROPOSED SW SURFACE IMPOUNDMENT

for

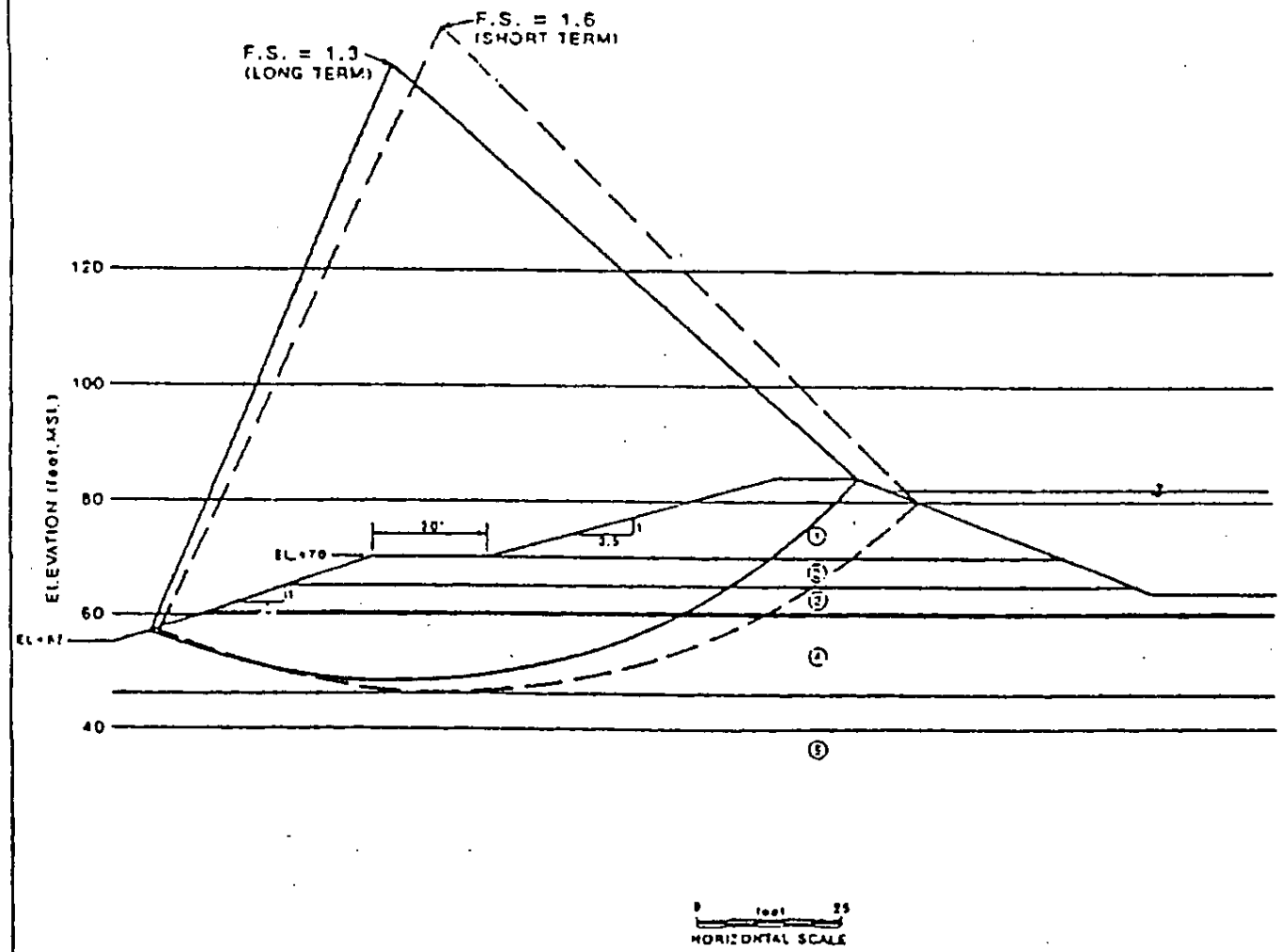
MANVILLE FOREST PRODUCTS CORP.
WEST MONROE, LOUISIANA

ERM-SOUTHWEST, INC.
METAIRIE, LOUISIANA

SOIL INVESTIGATION BY
SOIL TESTING ENGINEERS, INC.
Baton Rouge, LA. Lake Charles, LA.

Project Engineer: CHT	Drawn by: RTL/DAM	Checked by:
File No.: 89-037	Date: 5-16-89	Figure No.: 10

Title: SLOPE STABILITY SECTION II



STRATUM	MATERIAL	SHORT TERM			LONG TERM		
		C	φ	γ	C	φ	γ
1	FILL	800	0	125	180	18	125
2	CL-CH	800	0	125	180	18	125
3	CH-CL	800	0	125	180	18	125
4	ML, SC	50	18	120	50	18	120
5	CH, CL	1000	0	125	200	18	125

PROPOSED SW SURFACE IMPOUNDMENT

for

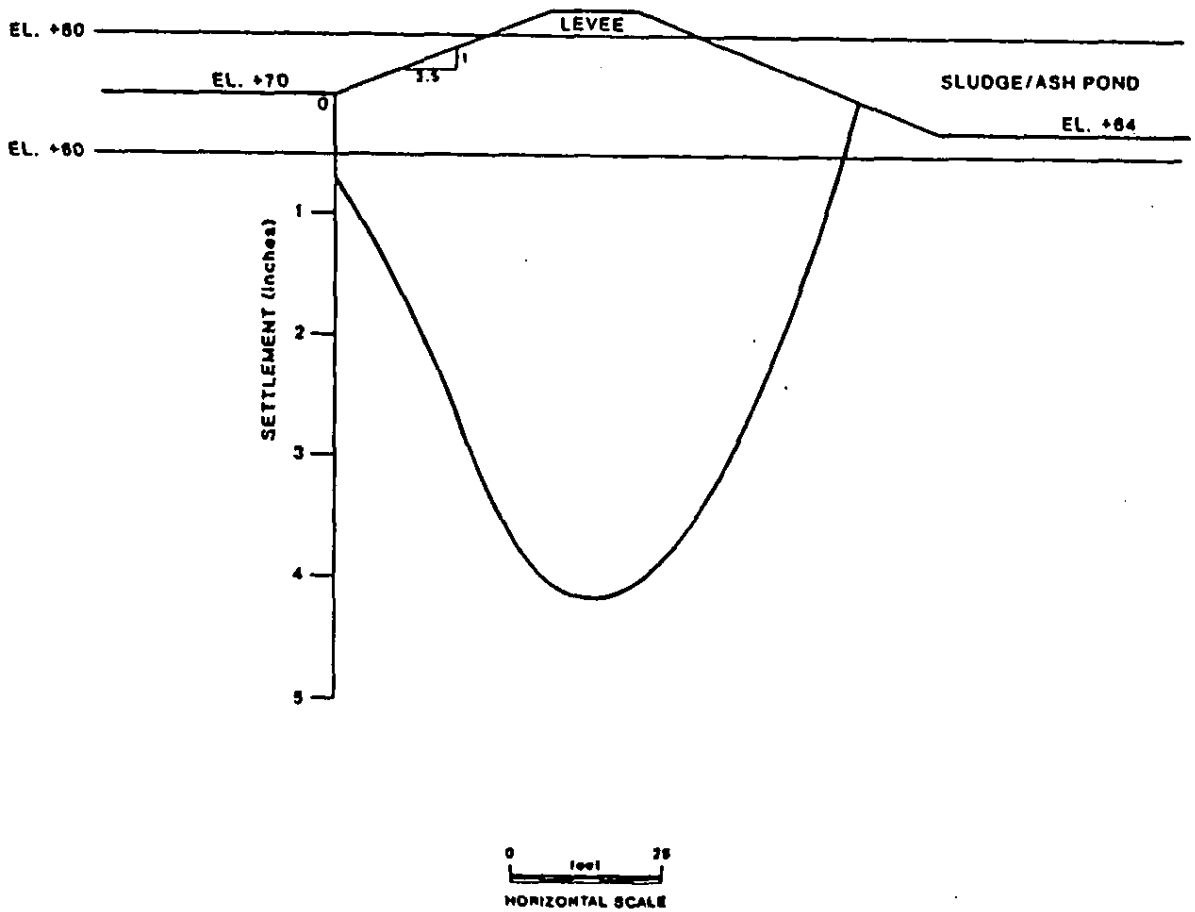
MANVILLE FOREST PRODUCTS CORP.
WEST MONROE, LOUISIANA

ERM-SOUTHWEST, INC.
METAIRIE, LOUISIANA

SOIL INVESTIGATION BY
SOIL TESTING ENGINEERS, INC.
Baton Rouge, LA. Lake Charles, LA.

Project Engineer: CHT	Drawn by: RTL/DAM	Checked by:
File No.: 89-037	Date: 6-02-89	Figure No.: 11

Title: SLOPE STABILITY
SECTION III



PROPOSED SW SURFACE IMPOUNDMENT

for

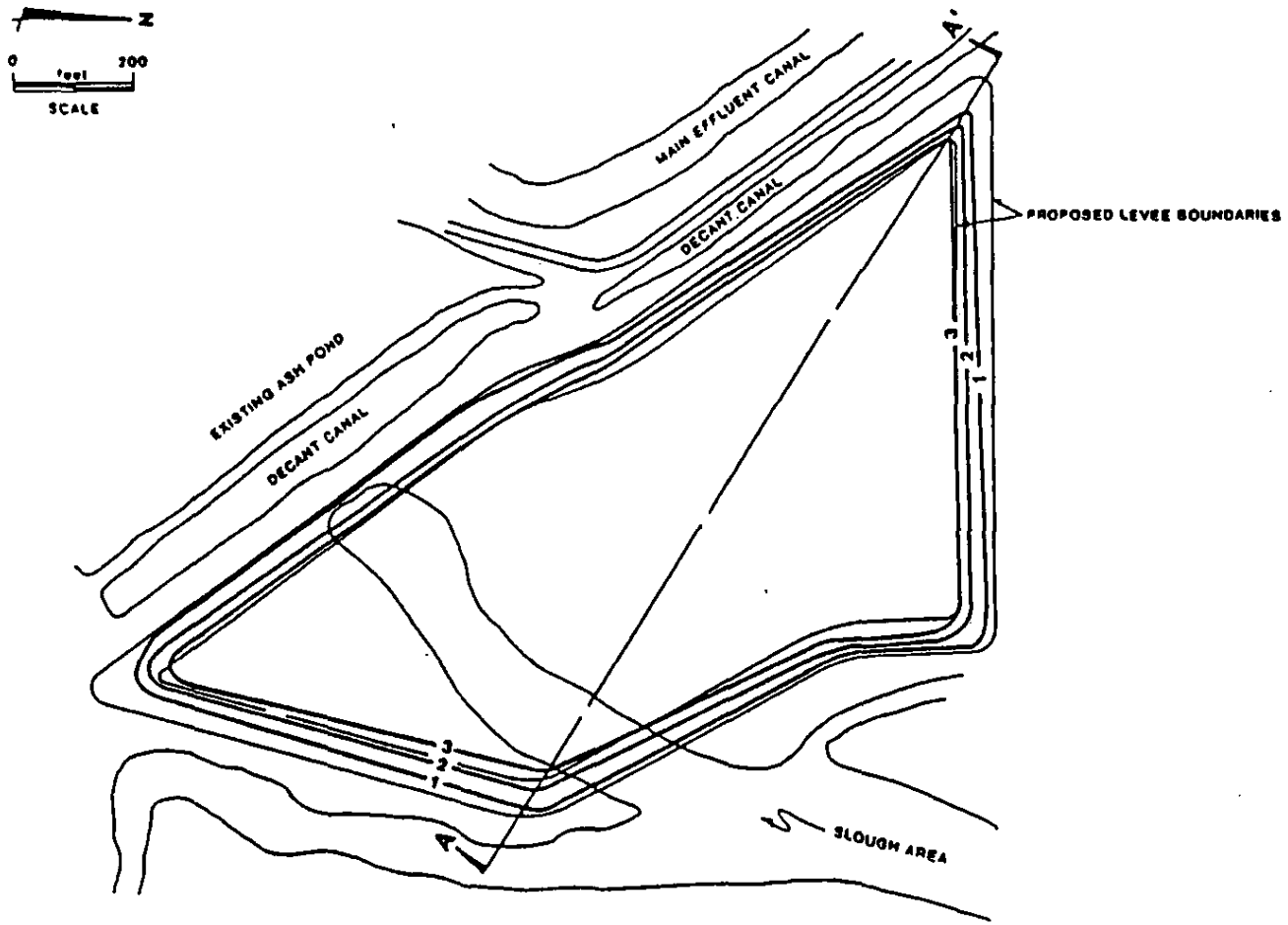
MANVILLE FOREST PRODUCTS CORP.
WEST MONROE, LOUISIANA

ERM-SOUTHWEST, INC.
METAIRIE, LOUISIANA

SOIL INVESTIGATION BY
SOIL TESTING ENGINEERS, INC.
Baton Rouge, LA. Lake Charles, LA.

Project Engineer: CNT	Drawn by: DAM	Checked by:
File No.: 88-037	Date: 5-02-89	Figure No.: 12

Title: LEVEE SETTLEMENT



PROFILE A–A'

PROPOSED SW SURFACE IMPOUNDMENT

for

MANVILLE FOREST PRODUCTS CORP.
WEST MONROE, LOUISIANA

ERM–SOUTHWEST, INC.
METAIRIE, LOUISIANA

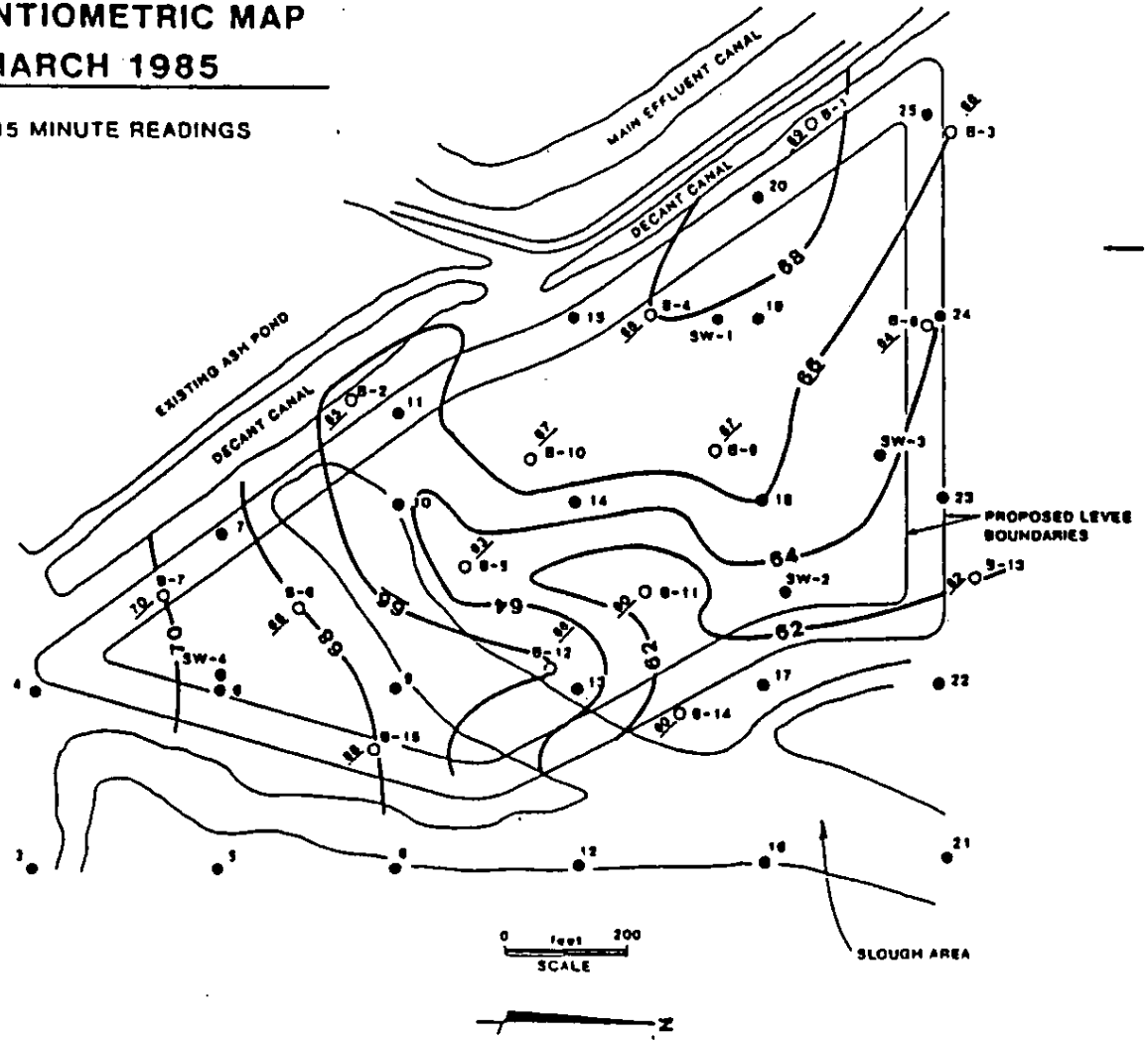
SOIL INVESTIGATION BY
SOIL TESTING ENGINEERS, INC.
Baton Rouge, LA. Lake Charles, LA.

Project Engineer: CHT	Drawn by: RTL/DAM	Checked by:
File No.: 88-037	Date: 9-02-88	Figure No.: 13

Title: APPROXIMATE SETTLEMENT PROFILE

POTENTIOMETRIC MAP
MARCH 1985

ON 15 MINUTE READINGS



○ Borings drilled by Woodward-Clyde Consultants

● Borings drilled by Southwestern Laboratories

Potentiometric Value at Boring* (feet MSL)

—64— Contour of Potentiometric Surface (feet MSL)

*Based on 15 minute water level reading at boring.

REFERENCE: ERM-Southwest, Inc. Boring Locations Map.

PROPOSED SW SURFACE IMPOUNDMENT

for

MANVILLE FOREST PRODUCTS CORP.
WEST MONROE, LOUISIANA

ERM-SOUTHWEST, INC.
METAIRIE, LOUISIANA

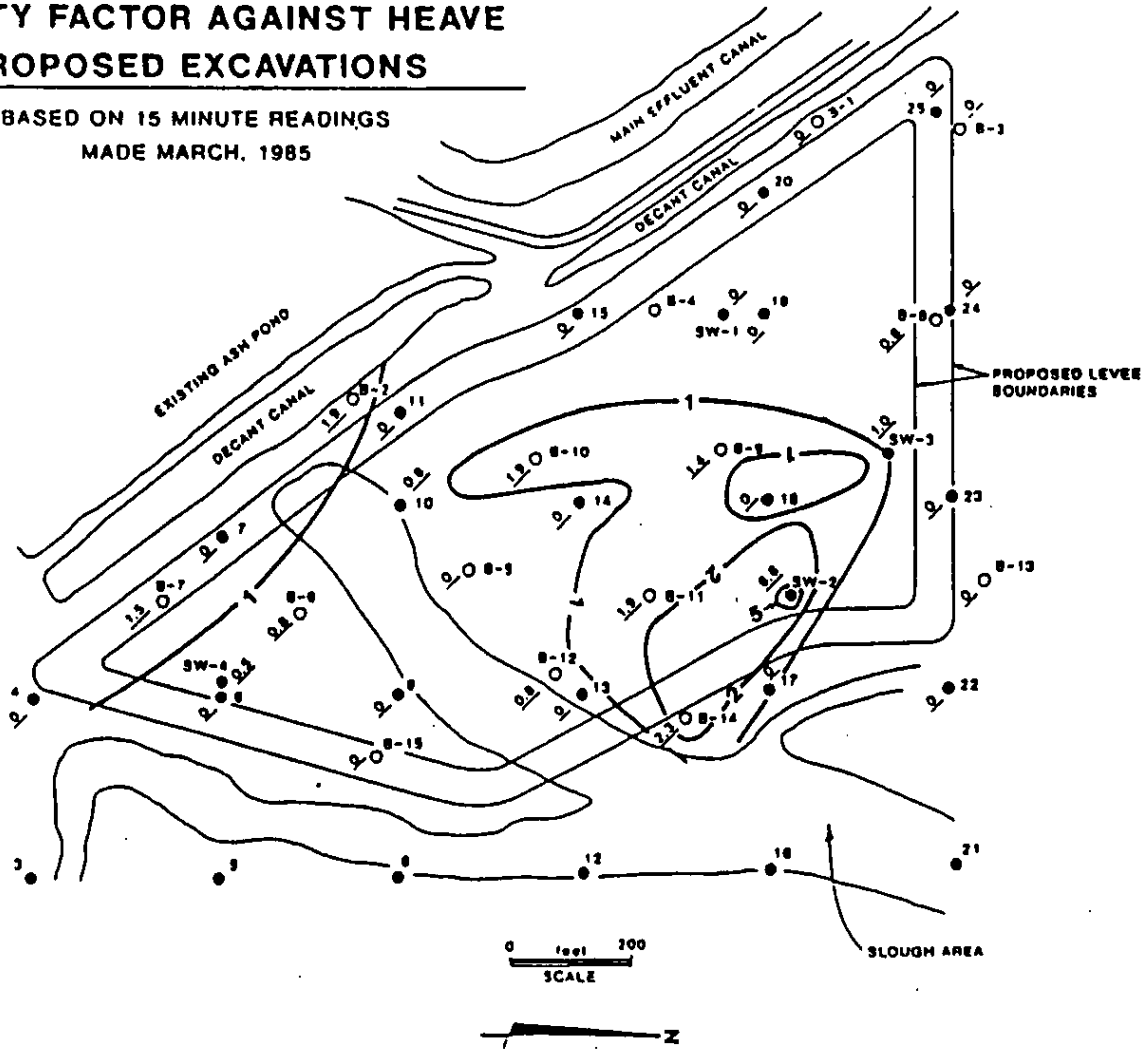
SOIL INVESTIGATION BY
SOIL TESTING ENGINEERS, INC.
Baton Rouge, LA. Lake Charles, LA.

Project Engineer: CHT	Drawn by: RTL	Checked by:
File No.: 89-037	Date: 5-02-89	Figure No.: 14

Title: POTENTIOMETRIC MAP MARCH 1985

SAFETY FACTOR AGAINST HEAVE
PROPOSED EXCAVATIONS

BASED ON 15 MINUTE READINGS
MADE MARCH, 1985



○ Borings drilled by Woodward-Clyde Consultants

● Borings drilled by Southwestern Laboratories

NOTES:

1. Borings show factor of safety used to prepare contour plat. At locations where factor of safety is less than 1.0, heave is incipient for groundwater level used in analyses. At locations with zero (0), the clay has been removed by excavation and seepage occurs.

2. If groundwater level were reduced to elevation +56 ft. MSL, the factors of safety will increase 10 to 20 percent except where clay has been removed.

REFERENCE: ERM-Southwest, Inc. Boring Locations Map.

PROPOSED SW SURFACE IMPOUNDMENT

for

MANVILLE FOREST PRODUCTS CORP.
WEST MONROE, LOUISIANA

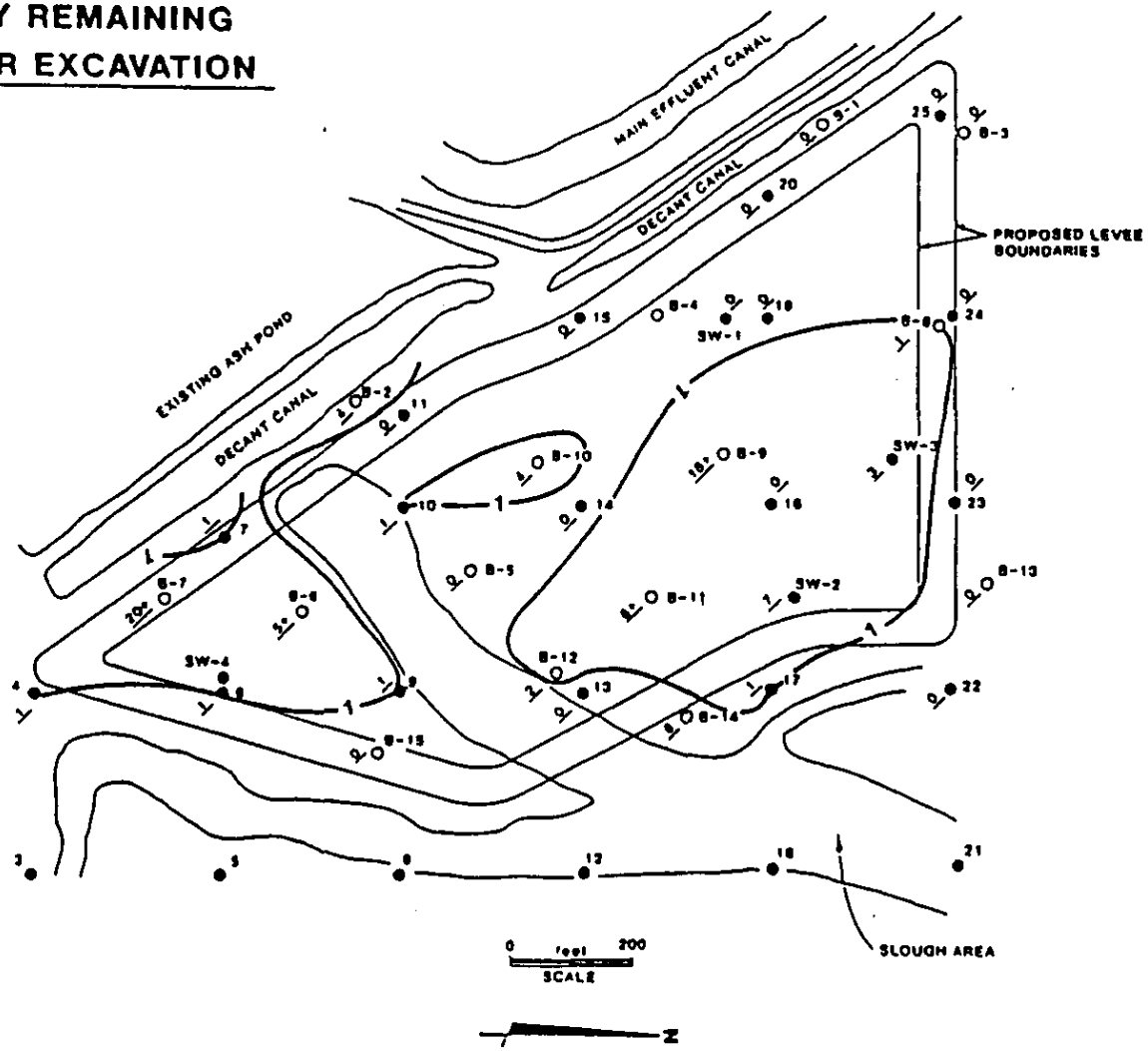
ERM-SOUTHWEST, INC.
METAIRIE, LOUISIANA

SOIL INVESTIGATION BY
SOIL TESTING ENGINEERS, INC.
Baton Rouge, LA. Lake Charles, LA.

Project Engineer: CHT	Drawn by: RTL	Checked by:
File No.: 89-037	Date: 9-02-89	Figure No.: 15

Title: SAFETY FACTOR AGAINST HEAVE PROPOSED EXCAVATIONS

CLAY REMAINING AFTER EXCAVATION



○ Borings drilled by Woodward-Clyde Consultants

● Borings drilled by Southwestern Laboratories

NOTES:

1. Borings showing zero (0) indicate clay removed during excavation to elevation +61 ft. MSL.

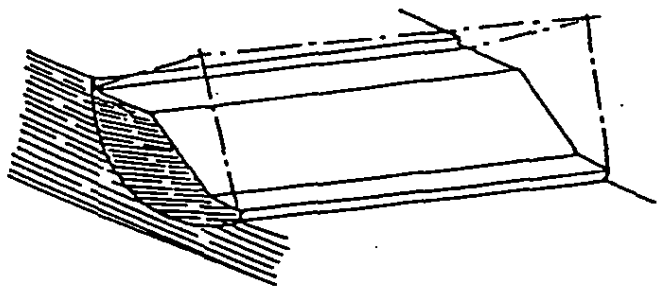
REFERENCE: ERM-Southwest, Inc. Boring Locations Map.

PROPOSED SW SURFACE IMPOUNDMENT for MANVILLE FOREST PRODUCTS CORP. WEST MONROE, LOUISIANA		
ERM-SOUTHWEST, INC. METAIRIE, LOUISIANA		
SOIL INVESTIGATION BY SOIL TESTING ENGINEERS, INC. Baton Rouge, LA. Lake Charles, LA.		
Project Engineer: CNT	Drawn by: RTL	Checked by:
File No.: 88-037	Date: 9-02-88	Figure No.: 16
Title: CLAY REMAINING AFTER EXCAVATION		

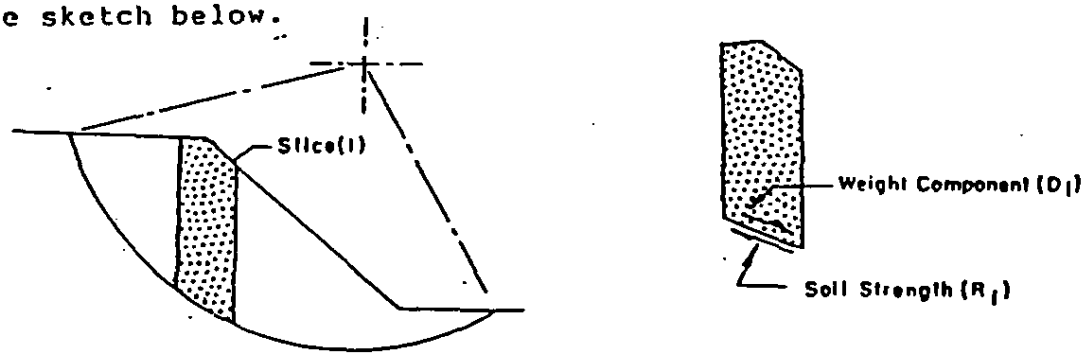
APPENDIX A

SLOPE STABILITY COMPUTATIONS USING SSTAB1

All stability analyses were performed using SSTAB1, a computer code developed and supported by the Geotechnical Engineering Center of The University of Texas at Austin. This code uses a procedure which is both accurate and versatile and can be used to analyze circular and non-circular shear surfaces. SSTAB1 uses a method of slices which includes interslice forces using an assumption attributed to Spencer (1967). In general, this procedure has been found to be more accurate than other limit equilibrium procedures which ignore inter-slice forces (Wright, Kulhawy, and Duncan, 1973). For the typical assumption of failure along a circular arc in two dimensions, the soil mass attempts to fail by rotating along a cylindrical surface whose axis is parallel to the crest of the dam, as illustrated below:



Overturning forces are developed by the weight of the (potentially) rotating mass uphill of the center of the cylinder. The weight of this mass downhill from the center of the cylinder produces a counterweight against this movement. The resulting imbalance of forces must be resisted by the soil's shear strength along the perimeter of the cylinder. In the computations, an arc is assumed to be made of a number of sections (slices) as shown in the sketch below.



The ratio of the soil strength (R_i) to the unbalanced weight forces (D_i) is the safety factor against failure of the slope along the arc (cylinder) being analyzed. Numerous trial arcs are analyzed until the one with the minimum safety factor is found; this is assumed to govern. Often, there are several possible failure modes with their own minima; each of these must be considered. These slope stability computations are performed on Soil Testing Engineer's in-house computer facilities.

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundment
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: SW-1

DATE: 11-14-85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.: Ayman Chamaa

DRY AUGER

DRILL RIG --

WASH BORING

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	COMPRESSIVE STRENGTH (TSF)	M C (%)	D D (PCF)	L L (%)	P I (%)	K	DESCRIPTION OF STRATA
										Brown & gray silty clay (CL)
					17.9		33	12		Brown & gray silty clay (CL)
	5								H .10	Brown & gray silty clay (CL)
				1.5	16.7	105	32	11		Tan & gray sandy clay (CL)
	10									Tan & gray silty sand w/gravel (GM)
	15									Silty sand gravel (GM)
	20				33.4		42	17	V 1.04	Brown, tan & gray sandy clay layers (CL)
	25				30.9					Brown sandy silty clay (CL)[1]
	30				30.8		41	25	V .71	Brown sandy silty clay (CL)
	35									Bottom of boring at 30 feet.

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

1. 61% passing No. 200 sieve
Ground Elevation 73.2
V - Vertical Permeability
H - Horizontal Permeability

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundment
Manville Forest Products Corporation
LOCATION (PARISH): Ouachita Parish
BORING NO.: SW-2
JOB NO.: 853474
DATE: 11-14-85
DRILLING CONTRACTOR: Southwestern Laboratories
TECH./ENGR.: Ayman Chamaa

DRY AUGER
WASH BORING
DRILL RIG: --

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	LABORATORY DATA: COMPRESSIVE STRENGTH (TSF)	MC (%)	DD (PCF)	LL (%)	PI (%)	K	DESCRIPTION OF STRATA
					19.0		26	8		Brown silty sandy clay (CL)
				3.0	17.0	102				Gray silty sandy clay (CL)
	5				16.1		25	8	H 3.15	Gray sandy clay (CL)
				4.2	11.5	112			V .05	Gray sandy clay (CL)
					10.4		22	8		Gray clayey sand (SC)
	10									
	15	X	30 B/F							Stiff brown sandy clay w/gravel(CL)
	20	X	50 B/F							Silty sand w/gravel (GM)
	25									Gray sandy clay (CL)
	30				32.7		41	21	V .10	
	35									Bottom of boring at 30 feet.

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

Ground Elevation 71.85
V - Vertical Permeability
H - Horizontal Permeability

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: SW-3

DATE: 11-14-85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.: Ayman Chamaa

DRY AUGER DRILL RIG
WASH BORING

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	LABORATORY DATA: COMPRESSIVE STRENGTH (TSF)	MC (%)	DD (PCF)	LL (%)	PI (%)	K	DESCRIPTION OF STRATA
										Gray sandy clay (CL)
				4.5	12.7	111				Gray sandy clay (CL)
	5				12.7		29	11		Gray sandy clay (CL)
				1.0	16.0	105	28	8		Gray sandy clay (CL)
									H 2.61	Gray sandy clay (CL)
	10									
	15									Gray sandy silt w/gravel (GM)
	20				30.9		45	20		Gray silty clay w/sand layers (CL)
	25									Gray silty clay w/sand layers (CL)
					31.3		46	30	V .07	Gray silty clay (CL)
	30									Bottom of boring at 30 feet.
	35									

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

Ground Elevation - 70.7
V - Vertical Permeability
H - Horizontal Permeability

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: SW-4

DATE: 11-14-85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.: Ayman Chamaa

DRY AUGER DRILL RIG
WASH BORING

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	LABORATORY DATA: COMPRESSIVE STRENGTH (TSF)	M C (%)	D D (PCF)	L L (%)	P I (%)	K	DESCRIPTION OF STRATA
										Brown & gray sandy clay (CL)
					39.8		25	8	H .23	Brown & gray sandy clay (CL)
	5									Tan & gray sandy clay (CL)
				0.9	38.4	75	40	19		Tan & gray sandy clay (CL)
	10								V .19	Tan silty clay (CL)
	15					97	27	5		Tan & brown clayey sand (SC)
	20									Tan clayey silty sand (SC)
	25		1B/F18'		31.1		33	13		Tan sandy clay (CL)
	30									Tan sandy clay (CL)
	35									Bottom of boring at 30 feet.

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

Ground Elevation 70.6
V - Vertical Permeability
H - Horizontal Permeability

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-1
FILE 84C5221
DATE 03/06/85
TECHNICIAN JOH
APPROVED adp
PAGE 1 of 1

DRY AUGERED 0' to 20' WASH BORED 20' to 38'

Water entered the borehole at 18.5' during dry augering; rose to 10'8" after 15-minute observation period.

Approx. Surface Elev. = 80'

DEPTH (FEET)	SAMPLE	S.P.T. (BLOWS) OR PST. PEN. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0								Stiff dark gray, brown and reddish-tan Sandy Lean CLAYS (FILL)
				29	92			
5								---becoming more sandy
				20	102			---becoming medium
				18	109			Stiff tan and light gray Fat CLAYS with sand streaks and pockets and traces of fine gravel
10		3.7						
				13	120			
15				14				Very stiff tan, brown, and light gray SANDS/CLAYS/GRAVELS with clay pockets
	X	21 b/f					(1)	Firm tan and light gray fine Silty SANDS with traces of coarse sands and gravels
20	X	27 b/f						
	X	22 b/f						---with clay layer
25	X	30 b/f		34		49	26	Hard tan, brown and reddish-tan Lean CLAYS with laminated clayey silt lenses
	X	45 b/f						
	X	33 b/f		34		51	31	Laminated lenses of hard gray CLAYS, Lean CLAYS, and Clayey SILTS with traces of fine sands
30	X	34 b/f						
	X	39 b/f						
35	X	30 b/f						
	X	34 b/f						
								Bottom of boring at 38'. Borehole grouted full depth
40								

Notes:

(1) 12.6% passing No. 200 sieve

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-2
FILE 84C5221
DATE 03/07/85
TECHNICIAN JOH
APPROVED
PAGE 1 of 1

DRY AUGERED 0' to 14'. WASH BORED 14' to 34'

Water entered the borehole at 12' during dry augering; remained at 12' after 15-minute observation period.

Approx. Surface Elev. = 77'

DEPTH (FEET)	SAMPLE	S.P.T. (BLOWS) OR PEN. RES. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0				16	111			Stiff tan, light gray, and reddish-tan Sandy Lean CLAYS with sand lenses, streaks, and pockets and traces of fine gravel (FILL)
5				27	98			Stiff tan and light gray Fat CLAYS ---with sand pockets, 4-6'
				27	91			---with organics
10								---with sand pockets
				36	84			---with traces of sands and silts
15		2.0		42		96	69	---becoming very stiff with calcareous nodules
				24		40	20	Medium tan and light gray Sandy Lean CLAYS with sand lenses, streaks, and pockets
20							(1)	Firm tan and light gray fine Silty SANDS with clay pockets
		26 b/f						
25		50/10"						---becoming very dense
		33 b/f		37		60	37*	Laminated layers of gray Fat CLAYS and SILTS with traces of fine sands
		27 b/f						
30		31 b/f						
		28 b/f						
35								Bottom of boring at 34' Borehole grouted full depth

Notes:

(1) 61.1% passing No. 200 sieve
* Limits performed on clayey portion of sample

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-6
FILE 84C5221
DATE 03/11/85
TECHNICIAN JOH
APPROVED [signature]
PAGE 1 of 1

DRY AUGERED 0' to 6' WASH BORED 6' to 14' --

Water entered the borehole at 6' during dry augering; rose to 2' after 15-minute observation period.

Approx. Surface Elev. = 70'

DEPTH (FEET)	SAMPLE	S.P.T. (BPT) OR PST. PEN. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0								Loose light gray and tan SILTS with roots and organics
				26	97			---with clay pockets
5				25	98		(1)	
		1.5		27		61	41	Stiff to very stiff brown, tan and light gray Fat CLAYS
		1.5					(2)	---with silt streaks and pockets, 6'-8'
10								
								Laminated lenses and seams of tan, brown and reddish-tan Lean CLAYS and Sandy SILTS
15								Bottom of boring at 14' Borehole grouted full depth

Notes:

(1) 84.1% passing No. 200 sieve
(2) $k = 1.8 \times 10^{-8}$ cm/sec

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-3
FILE 84C5221
DATE 03/14/85
TECHNICIAN JOH
APPROVED [signature]
PAGE 1 of 1

DRY AUGERED 0' to 16' WASH BORED 16' to 30'

Water entered the borehole at 16' during dry augering; rose to 9'6" after 10-minute observation period.

Approx. Surface Elev. = 76'

DEPTH (FEET)	SAMPLE	S.P.T. (BLOWS) OR PST. PEN. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0				14	118			Stiff brown and gray Sandy Lean CLAYS with sand and silt pockets
5				16		31	16	Stiff reddish-tan and light gray Sandy Lean CLAYS with sand streaks and pockets
		4.5		16	115			---becoming very stiff to hard
		3.5		14		41	29	
10								
15		PS					(1)	Tan and light gray fine Silty SANDS with traces of medium and coarse sands ---with clay, 12'-14' ---with gravel below 16'
		NR						
20								Hard tan, brown and reddish-tan Lean CLAYS with laminated clayey silt lenses and seams
25								Hard gray CLAYS with laminated silt lenses
30								Bottom of boring at 30' Borehole grouted full depth

Notes:

PS = Pushed split spoon sampler
NR = No recovery
(1) 16.9% passing No. 200 sieve

WOODWARD-CLYDE CONSULTANTS

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-5
FILE 84C5221
DATE 84C5221
TECHNICIAN JQH
APPROVED adp
PAGE 1 of 1

DRY AUGERED 0' to 10' WASH BORED 10' to 26'

Water entered the borehole at 8' during dry augering; rose to 7' after 15-minute observation period.

Approx. Surface Elev. = 70'

Depth (feet)	S.P.T. (b/ft) or Pen. Res. (TSF)	Compressive Strength (TSF)	Moisture Content (%)	Dry Density (pcf)	L.L. (%)	P.I. (%)	Description of Stratum
0			15	113	40	26	Very stiff tan, light gray and reddish-tan Lean CLAYS with sand streaks and pockets
5			16	115	31	(1) 17	Very stiff tan and light gray Sandy Lean CLAYS with clay pockets and traces of fine gravel
10	41 b/f					(2)	Dense tan and light gray fine Silty SANDS with traces of clays, medium sands, and fine gravels
	34 b/f						
15	32 b/f						
	38 b/f						
	39 b/f		37			NP	Laminated lenses of tan, brown, and light gra SILTS, Clayey SILTS and Sandy SILTS with clay pockets
20	30 b/f						Laminated layers of hard gray CLAYS and Sandy SILTS
	34 b/f						
25	43 b/f						
30							Bottom of boring at 26' Borehole grouted full depth

Notes:
NP = Non plastic
(1) $k = 5.8 \times 10^{-8}$ cm/sec
(2) 16.9% passing No. 200 sieve

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-7
FILE 84C5221
DATE 03/10, 11/85
TECHNICIAN JQH
APPROVED [signature]
PAGE 1 of 1

DRY AUGERED 0' to 4' WASH BORED 4' to 30'

Water entered the borehole at 4' during dry augering; rose to 6" after 15-minute observation period.

Approx. Surface Elev. = 71'

DEPTH (FEET)	SAMPLE	S.P.T. (BLOWS) OR PEN. PRES. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0								Very soft tan and light gray Lean CLAYS with clay pockets, large roots, and organics
				26	88			
								---becoming medium to stiff
5		1.7		24		59	40	Very stiff gray and reddish-brown Fat CLAYS with traces of silts
		2.5		33	87			
		2.5		35		86	59	
10				24		28	11*	Alternating layers of reddish-tan Sandy SILTS with traces of clays and Lean CLAYS
		0.5						
15								
		PS						
20								
25								Stiff gray Lean CLAYS
								Stiff gray Fat CLAYS
		1.5						
30								Bottom of boring at 30' Borehole grouted full depth

Notes:

PS = Pushed split spoon sampler
* Limits performed on Lean Clay portion of sample

WOODWARD-CLYDE CONSULTANTS

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-8
FILE 84C5221
DATE 03/13/85
TECHNICIAN JQH
APPROVED [illegible]
PAGE 1 of 1

DRY AUGERED 0' to 14' WASH BORED 14' to 30'

Water entered the borehole at 14' during dry augering; rose to 6'6" after 15-minute observation period.

Approx. Surface Elev. = 70'

DEPTH (FEET)	SAMPLE	S.P.T. (SPT) OR PET. PEN. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0								Medium tan and light gray Sandy Lean CLAYS
				28	92	67	46	Medium to stiff tan and light gray Fat CLAYS with sand streaks and pockets
5				17	114			---becoming very stiff
				18	115	43	(1) 31	---becoming sandy with traces of gravel
				16		27	14	Stiff to very stiff light gray and tan Sandy Lean CLAYS
10		PS					(2)	Brown and light gray Fine SANDS with traces of medium and coarse sands and fine gravel
15							(3)	Laminated lenses of tan, light gray, and reddish-tan fine Silty SANDS, Sandy SILTS, and SILTS
				30		47	24	---with lean clay lenses
20				34		79	52*	Laminated lenses of gray Sandy SILTS, SILTS and Fat CLAYS
25								
30								Bottom of boring at 30' Borehole grouted full depth

Notes:
PS = Pushed split spoon sampler
(1) k = 2.9×10^{-7} cm/sec
(2) 10.1% passing No. 200 sieve
(3) 52.5% passing No. 200 sieve
* Limits performed on clayey portion of sample

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-9
FILE 84C5221
DATE 03/12/85
TECHNICIAN JOH
APPROVED [illegible]
PAGE 1 of 1

DRY AUGERED 0' to 8' WASH BORED 8' to 30'

Water entered the borehole at 8' during dry augering; rose to 6' after 15-minute observation period.

Approx. Surface Elev. = 73'

DEPTH (FEET)	SAMPLE	S.P.T. (BLOWS PER FOOT) OR PEN. PER. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LL (%)	PI (%)	DESCRIPTION OF STRATUM
0								Very soft tan and light gray Fat CLAYS to Lean CLAYS with fine sand streaks and traces of fine gravel
				19		52	35	
5		3.7		17	108	45	31	
		3.5		15	113			Reddish-tan and light gray SAND/CLAY/GRAVEL
10							(1)	Reddish-tan and light gray fine Silty SANDS
15							NP	Laminated lenses and layers of tan, light gray and reddish-tan Lean CLAYS, Sandy SILTS, and fine Silty SANDS
20							(2)	Laminated lenses and layers of gray CLAYS and Sandy SILTS
25								
30								Bottom of boring at 30' Borehole grouted full depth

Notes:

NP = Non plastic
(1) 13.3% passing No. 200 sieve
(2) $k = 5.6 \times 10^{-6}$ cm/sec

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-10
FILE 84C5221
DATE 03/09/85
TECHNICIAN JQH
APPROVED adp
PAGE 1 of 1

DRY AUGERED 0' to 14' WASH BORED 14' to 30'

Water entered the borehole at 4' during dry augering; borehole caved in at 1'.

Approx. Surface Elev. = 66.5'

DEPTH (FEET)	SAMPLE	S.P.T. (BLVT) OR PKT. PEN. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0								Very soft tan and light gray Fat CLAYS
				36	90	73	51 (1)	---with silt pockets, 0'-4'
5				37		82	58	---becoming very stiff
				25		79	54	---with traces of silts and sands
				27	97			Very stiff tan and light gray Sandy Lean CLAY! with silts
10								Tan and light gray fine Silty SANDS with clay lenses and pockets
15								
								Hard gray CLAYS with laminated silt lenses
		PS						
20		PS						
		PS						
25		PS						
		PS						
		PS						
30								Bottom of borehole at 30' Borehole grouted full depth

Notes:

PS = Pushed split spoon sampler
(1) k = 1.1 x 10^{-8} cm/sec

WOODWARD-CLYDE CONSULTANTS

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-11
FILE 84C5221
DATE 03/12/85
TECHNICIAN JOH
APPROVED [illegible]
PAGE 1 of 1

DRY AUGERED 0' to 14'

Water entered the borehole at 12' during dry augering; rose to 8' after 15-minute observation period.

Approx. Surface Elev. = 68'

DEPTH (FEET)	S.P.T. (BLOWS) or PEN. RES. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LL (%)	PI (%)	DESCRIPTION OF STRATUM
0							Medium tan and light gray Lean CLAYS
			18	108		(1)	Very stiff light gray and reddish-tan Sandy Lean CLAYS
5			17		44	30	
			15	117	24	(2) 13 (3)	Very stiff reddish-tan and light gray Sandy Lean CLAYS, Clayey SILTS, and Silty Fine SANDS with traces of fine gravel
10						(4)	Laminated lenses and layers of tan and light gray Sandy SILTS, SILTS, and hard Fat CLAYS
15							Bottom of boring at 14' Borehole grouted full depth

Notes:
(1) $k = 8.4 \times 10^{-9}$ cm/sec
(2) $k = 1.6 \times 10^{-6}$ cm/sec
(3) 15.6% passing No. 200 sieve
(4) 88.3% passing No. 200 sieve

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-12
FILE 84C5221
DATE 03/09/85
TECHNICIAN JOH
APPROVED [illegible]
PAGE 1 of 1

DRY AUGERED 0' to 12' WASH BORED 12' to 20'

Water entered the borehole at 12' during dry augering; rose to 1'2" after 20-minute observation period.

Approx. Surface Elev. = 67'

DEPTH (FEET)	SAMPLE	S.P.T. (BLOWS) OR PEN. RES. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0								Soft to stiff tan and light gray Fat CLAYS with traces of fine sands
				29	93	54	37	
5			1.75	34	87			---becoming stiff
				40		92	63	---with sand pockets
10								Light gray and brown Fine SANDS with clay pockets, sandy silts, and fine to medium gravel
15								Laminated lenses of brown, tan and light gray Lean CLAYS and Sandy SILTS
20								Bottom of boring at 20' Borehole grouted full depth

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-13
FILE 84C5221
DATE 03/13/85
TECHNICIAN JOH
APPROVED adp
PAGE 1 of 1

DRY AUGERED 0' to 16' WASH BORED 16' to 30'

Water entered the borehole at 16' during dry augering; rose to 11'4" after 10-minute observation period.

Approx. Surface Elev. = 73'

DEPTH (FEET)	SAMPLE	S.P.T. (BLOWS) OR PEN. RES. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0				23	97			Soft tan and light gray Sandy Lean CLAYS with roots ---becoming more clayey
5		4.5		13		45	32	Very stiff to hard tan and light gray Fat CLAYS with sands
		4.5		15	115	53	40	---with traces of gravel
10				8		21	(1) 2	Tan and light gray Silty SANDS with traces of clays
							(2)	---with traces of medium to coarse sands and fine gravel
		PS						
15		PS						
20		PS						Alternating layers of tan and light gray Fat CLAYS and Sandy SILTS ---becoming gray below 20'
25								
30								Bottom of borehole at 30' Borehole grouted full depth

Notes:

PS = Pushed split spoon sampler
(1) $k = 1.4 \times 10^{-6}$ cm/sec
(2) 13.5% passing No. 200 sieve

WOODWARD-CLYDE CONSULTANTS

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-14
FILE 84C5221
DATE 03/10/85
TECHNICIAN JQH
APPROVED [signature]
PAGE 1 of 1

DRY AUGERED 0' to 12' WASH BORED 12' to 30'

Water entered the borehole at 10' during dry augering; rose to 6'6" after 20-minute observation period.

Approx. Surface Elev. = 67'

DEPTH (FEET)	S.P.T. (BLVT) OR PKT. PEN. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0							Soft tan and light gray Sandy Lean CLAYS with roots
			34	86			Stiff tan and light gray Fat CLAYS with fine sand streaks and pockets
5	2.0	1.67	27	98	49	34	
	2.0	1.25	34	89	83	58	
			21	103			Very stiff Sandy Lean CLAYS with sand pockets and traces of fine gravel
10	2.5	2.64	16	115			
							Tan and light gray Fine SANDS with clays becoming sandy lean clays
15			36		56	36	Laminated lenses and layers of tan, brown, and light gray SILTS, Clayey SILTS, Lean CLAYS, and Sandy SILTS
	PS						
	33 b/f						
20							
	PS		33		92	62	Hard gray Fat CLAYS with silt streaks and pockets and traces of fine sands
25	PS						
	PS						
	PS						
30							Bottom of borehole at 30' Borehole grouted at full depth

Notes:

PS = Pushed split spoon sampler

WOODWARD-CLYDE CONSULTANTS

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-15
FILE 84C5221
DATE 03/11, 12/85
TECHNICIAN JOH
APPROVED [illegible]
PAGE 1 of 1

DRY AUGERED 0' to 8' WASH BORED 8' to 30'

Water entered the borehole at 8' during dry augering; rose to 3'3" after 15-minute observation period.

Approx. Surface Elev. = 71'

DEPTH (FEET)	S.P.T. (BLOWS) OR PEN. RES. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0			26	93			Loose to firm tan and brown Sandy SILTS with traces of clays
5	1.0	(1) 0.81	20 30	106 94	30	10	Medium tan and light gray Lean CLAYS with silt streaks and pockets
10	PS	(3) 0.46	24	98		(2) NP	Loose to firm reddish-brown Sandy SILTS with traces of clays
15		(4) 0.50 (5) 0.42	25 27	100 98		NP	---with clayey silt layer, 14'-15'
20	PS PS PS					(6)	
25	PS 1.2 2.5		34				Stiff gray CLAYS with traces of silt pockets
30							Bottom of boring at 30' Borehole grouted full depth

Notes: PS = Pushed split spoon sampler
(1) Unconsolidated undrained triaxial compression test at 2.8 psi confining pressure
(2) 56.4% passing No. 200 sieve
(3) UU test at 4.4 psi confining pressure
(4) Same at 6.0 psi confining pressure
(5) Same at 6.6 psi confining pressure
(6) 57.0% passing No. 200 sieve

WOODWARD-CLYDE CONSULTANTS

Lab # 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #1
LOCATION:

Date: 1-10-85 Type: Hand Auger Ground Elevation: 70.5

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Clayey Silt
			Tan & Gray Stiff Sandy Clay
10			Stiff Brown Clay
15			
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 10, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#1	0-1	Topsoil with Organics										
G.E. 70.5	1-4	Tan & Gray Clayey Silt	25.7		30	22	8				A-4(8)	
64 = 6.5'	4-6½	Tan & Gray Stiff Sandy Clay	26.4		63	28	35				A-7-6(20)	
	6½-10½	Stiff Brown Clay	36.1		77	33	44				A-7-6(20)	10^{-7}

Lab # 10390

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #2
LOCATION:

Date: 1-10-85 Type: Hand Auger Ground Elevation: 72.8

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
5			Tan & Gray Clayey Silt
			Tan & Gray Silty Clay
			Tan & Gray Slightly Silty Clay
10			Brown Clay
15			
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

LAB # 10396

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 10, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE pcf	TYPE	OTHER TESTS
#2	0-6"	Topsoil with Organics										
G.E. 72.8	6"-6'	Tan & Gray Clayey Silt	25.6		25	20	5				A-4(8)	Perched water 4'6"
	6-7½	Tan & Gray Silty Clay	30.4		37	17	20				A-6(12)	
	7½-9	Tan & Gray Slightly Silty Clay	37.3		59	22	37				A-7-6(20)	
	9-11	Brown Clay	38.2		62	24	38				A-7-6(20)	

File# 85001
Lab # 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #3
LOCATION:

Date: 1-10-85 Type: Hand Auger Ground Elevation: 72.9

Legend: ■ Sample × Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Clayey Silt
5			Tan & Gray Sandy Clay
			Brown Clay
10			Tan Silty Sand
15			
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 10, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE pcf	TYPE	OTHER TESTS
#3,	0-6"	Topsoil with Organics										
G.E. 72.9	6"-4'	Tan & Gray Clayey Silt	27.2		27	22	5				A-4(8)	
	4-6	Tan & Gray Sandy Clay	27.1		36	19	17				A-6(11)	
	6-8	Brown Clay	29.3		71	30	41				A-7-5(20)	
	8-11	Tan Silty Sand	22.2		26	22	4				A-4(5)	Water at 11.0'

File# 85001
Lab # 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products

BORING NO.: #4
LOCATION:

Date: 1-11-85 Type: Hand Auger Ground Elevation: 67.6

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Clayey Silt
5			Tan & Gray Clay
10			
15			
20			
25			
30			
35			
40			
45			
50			

Lab # 10390

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 11, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#4	0-6"	Topsoil with Organics										
G.E. 67.6	6"-4'	Tan & Gray Clayey Silt	23.0		25	20	5				A-4(8)	
	4-8	Tan & Gray Clay	42.4		70	32	38				A-7-6(20)	

SOUTHWESTERN LABORATORIES

File# 85001
Lab # 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #5
LOCATION:

Date: 1-11-85 Type: Hand Auger Ground Elevation: 72.5

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Clayey Silt
			Tan & Gray Silty Clay
			Brown Clay
10			Tan Clayey Silty Sand
15			
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

File# 0,JUI
Lab # 10398

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE 1-11-85

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE pd	TYPE	OTHER TESTS
#5	0-6"	Topsoil with Organics										
G.E. 72.5	6"-4'	Tan & Gray Clayey Silt	27.1		22	21	1				A-4(8)	Perched water at 3'
	4-6	Tan & Gray Silty Clay	26.5		30	19	11				A-6(8)	
	6-8	Brown Clay	34.6		55	24	31				A-7-5(19)	
	8-11	Tan Clayey Silty Sand	28.1		26	16	10				A-4(8)	

Lab # 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #6
LOCATION:

Date: 1-15-85 Type: Hand Auger Ground Elevation: 70.6

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
5			Tan & Gray Clayey Silt
			Tan & Gray Sandy Clay
10			Stiff Brown Clay
15			
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 15, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#6	0-1	Topsoil with Organics										
G.E. 70.6	1-5	Tan & Gray Clayey Silt	30.1		24	23	1				A-4(8)	
	5-7	Tan & Gray Sandy Clay	30.6		39	18	21				A-6(4)	
	7-11	Stiff Brown Clay	38.6		62	27	35				A-7-6(20)	

Lab # 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #7
LOCATION:

Date: 1-15-85 Type: Hand Auger Ground Elevation: 73.0

Legend: ■ Sample × Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Sandy Clay
5			
			Tan & Gray Sandy Silt
10			
			Gray Sandy Clay
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 15, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#7	0-1	Topsoil with Organics										
G.E. 73.0	1-3	Tan & Gray Sandy Clay	25.9		32	20	12				A-6(9)	
	3-9	Tan & Gray Sandy Silt	22.3		22	20	1				A-4(8)	
	9-13	Gray Sandy Clay	30.2		51	20	31				A-7-6(18)	

File#85001
Lab # 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #8
LOCATION:

Date: 1-14-85 Type: Hand Auger Ground Elevation: 71.60

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
5			Tan Silty Sand
			Tan & Gray Sandy Clay
10			Tan Clayey Silty Sand
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 14, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psi	TYPE	OTHER TESTS
#8	0-½	Topsoil with Organics										
G.E. 71.60	½-8	Tan Silty Sand	19.8		22	21	1				A-4(8)	
	8-10	Tan & Gray Sandy Clay	20.3		48	21	27				A-7-6(16)	
	10-12	Tan Clayey Silty Sand	17.7		29	18	11				A-6(8)	

File# 85001
Lab # 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #9
LOCATION:

Date: 1-15-85
Type: Hand Auger
Ground Elevation: 70.6

Legend:
■ Sample
X Penetration
▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
5			
			Tan & Gray Sandy Silt
			Tan & Gray Sandy Clay
10			Stiff Brown Clay
15			
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

Lab# 10398

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 15, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#9	0'-½'	Topsoil with Organics										
G.E. 70.6	½'-7'	Tan & Gray Sandy Silt	23.9		21	19	2				A-4(8)	
	7-9	Tan & Gray Sandy Clay	31.1		49	23	26				A-7-5(16)	
	9-11	Stiff Brown Clay	38.3		69	34	35				A-7-6(20)	

File#85001
Lab# 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #10
LOCATION:

Date: 1-17-85
Type: Hand Auger
Ground Elevation: 65.0

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
5			Gray Clay
10			
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 17, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psi	TYPE	OTHER TESTS
#10	0-1	Topsoil with Organics										Perched water a 1'
G.E. 65.0	1-5	Gray Clay	43.6		66	32	34				A-7-6(20)	

Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #11
LOCATION:

Date: 1-17-85 Type: Hand Auger Ground Elevation: 71.5

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Sandy Clay
10			Gray & Tan Clayey Sand with Small Gravel
15			
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 17, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#11	0-1	Topsoil with Organics										
G.E. 71.5	1-7	Tan & Gray Sandy Clay	22.9		37	15	22				A-6(12)	Perched Water at 2'
	7-10	Gray & Tan Clayey Sand With Small Gravel	20.5		28	14	14				A-6(2)	
	10	Gravel-Unable to go deeper with hand auger.										

File# 05001
Lab# 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #12
LOCATION:

Date: 1-18-85 Type: Hand Auger Ground Elevation: 60.0

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Clayey Silt
5			
			Tan Silty Sand
10			
15			
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 18, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#12	0-1	Organics										Water at 1'
G.E. 60.0	1-3	Tan Clayey Silt	29.6		23	20	3				A-4(8)	
	3-7	Tan Silty Sand	25.8				N.P.				A-4(4)	

File#85001
Lab# 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #13
LOCATION:

Date: 1-18-85
Type: Hand Auger
Ground Elevation: 67.0

Legend: ■ Sample × Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Clayey Silt
5			Gray Clay
			Tan Sand with Gravel
10			
15			
20			
25			
30			
35			
40			
45			
50			

File#6,001
Lab#10398

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 18, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE pd	TYPE	OTHER TESTS
#13	0-1	Topsoil with Organics										
G.E. 67.0	1-3	Tan & Gray Clayey Silt	25.8		25	23	2				A-4(8)	Perched water at 3'
	3-6	Gray Clay	40.6		63	31	32				A-7-6(20)	
	6-8	Tan Sand with Gravel	----		--	--	--					

File#85001
Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #14
LOCATION:

Date: 1-17-85 Type: Hand Auger Ground Elevation: 68.8

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Silty Clay
			Gray & Tan Sandy Clay
			Gray & Tan Clayey Sand with Gravel
10			
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 17, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#14	0-1	Topsoil with Organics										Perched water ½'
G.E. 68.8	1-3	Tan & Gray Silty Clay	37.6		53	28	25				A-7-5(16)	
	3-5	Gray & Tan Sandy Clay	25.0		41	17	24				A-7-5(10)	
	5-6	Gray & Tan Clayey Sand with Gravel	20.5		31	13	18				A-6(4)	
	6'	Sand - Unable to get return due to water										

SOUTHWESTERN LABORATORIES

File#65001
Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #15
LOCATION:

Date: 1-18-85
Type: Hand Auger
Ground Elevation: 73.1

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
5			
			Tan & Gray Sandy Clay
10			
15			
20			
25			
30			
35			
40			
45			
50			

Lab# 10396

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 18, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE pcf	TYPE	OTHER TESTS
#15	0-1	Topsoil with Organics										
G.E. 73.1	1-9	Tan & Gray Sandy Clay	20.8		27	13	14				A-6(7)	Perched water at 1'
	9'	Sand & Gravel-Unable to get return due to water										

SOUTHWESTER[illegible]ORATORIES

File#85001
Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #16
LOCATION:

Date: 1-22-85 Type: Hand Auger Ground Elevation: 73.0

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan Clayey Silt
			Tan Clayey Sandy Silt
			Tan & Gray Silty Clay
			Brown Clay
15			
20			
25			
30			
35			
40			
45			
50			

File#0300?
Lab#10398

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 22, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#16	0-1	Topsoil with Organics										
G.E. 73.0	1-4	Tan Clayey Silt	18.3		--	--	N.P.				A-4(8)	
	4-9	Tan Clayey Sandy Silt	13.6		--	--	N.P.				A-4(8)	
	9-10	Tan & Gray Silty Clay	26.6		82	35	47				A-7-6(20)	
	10-12	Brown Clay	36.7		72	22	50				A-7-6(20)	

File#05001
Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #17
LOCATION:

Date: 1-22-85
Type: Hand Auger
Ground Elevation: 68.1

Legend:
■ Sample
X Penetration
▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Clayey Silt
5			Tan & Gray Silty Clay
			Tan & Gray Clayey Sand with Small Gravel
10			
15			
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 22, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#17	0-1	Topsoil with Organics										
G.E. 68.1	1-3	Tan & Gray Clayey Silt	17.6		26	20	6				A-4(8)	
	3-5	Tan & Gray Silty Clay	24.9		61	27	34				A-7-6(20)	
	5-8	Tan & Gray Clayey Sand with Small Gravel	15.7		32	14	18				A-6(4)	

File#85001
Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #18
LOCATION:

Date: 1-22-85 Type: Hand Auger Ground Elevation: 73.2

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Slightly Sandy Silty Clay
5			Tan & Gray Sandy Clay
10			
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 22, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE pcf	TYPE	OTHER TESTS
#18	0-1	Topsoil with Organics										Perched water at 1½'
G.E. 73.2	1-4	Tan & Gray Slightly Sandy Silty Clay	26.5		56	24	32				A-7-5(16)	
	4-8	Tan & Gray Sandy Clay	22.4		28	15	13				A-6(7)	
	8'	Gravel at 8' Unable to go deeper.										

File#85001
Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #19
LOCATION:

Date: 1-23-85 Type: Hand Auger Ground Elevation: 73.3

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Sandy Silty Clay
			Tan & Gray Stiff Sandy Clay
			Tan & Gray Clayey Sand
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond
DATE January 23, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#19	0-1	Topsoil with Organics										Perched water at 2'.
G.E. 73.3	1-3	Tan & Gray Sandy Silty Clay	29.3		52	22	30				A-7-5(16)	
	3-9	Tan & Gray Stiff Sandy Clay	22.9		29	15	14				A-6(7)	
	9-10½	Tan & Gray Clayey Sand	23.0		20	14	6				A-2-4	
	10½	Gravel Unable to go deeper										

File#09001
Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #20
LOCATION:

Date: 1-22-85 Type: Hand Auger Ground Elevation: 77.2

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Black Organics
5			Tan Slightly Sandy Silty Clay
10			Tan & Gray Sandy Clay
15			
20			
25			
30			
35			
40			
45			
50			

Lab# 10398

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 22, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#20	0-3	Topsoil with Black Organics										Perched water at 1½'.
G.E. 77.2	3-8	Tan Slightly Sandy Silty Clay	27.0		27	22	5				A-4(8)	
	8-10½	Tan & Gray Sandy Clay	17.3		30	14	16				A-6(7)	
	10½'	Hit Gravel at 10½' Unable to go Deeper										

File#85001
Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #21
LOCATION:

Date: 1-22-85 Type: Hand Auger Ground Elevation: 61.4

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Sandy Silt
5			
10			
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 22, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#21	0-1	Topsoil with Organics										
G.E. 61.4	1-3	Tan & Gray Sandy Silt	26.9		25	21	4				A-4(4)	

File#85001
Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #22
LOCATION:

Date: 1-22-85 Type: Hand Auger Ground Elevation: 70.8

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Gray & Tan Sandy Clay
5			
			Dense Tan & Gray Sandy Clay with Gravel
10			Gray Clayey Sand with Gravel
15			
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

Lab#10398

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 22, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#22	0-½'	Topsoil with Organics										
G.E. 70.8	½-4	Gray & Tan Sandy Clay	18.8		28	14	14				A-6(7)	
	4-7½	Dense Tan & Gray Sandy Clay with Gravel	13.8		39	16	23				A-6(7)	
	7½-10	Gray Clayey Sand with Gravel	13.8		27	15	12				A-6(1)	
	10'	Gravel Unable to go deeper.										

File#85001
Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #23
LOCATION:

Date: 1-22-85 Type: Hand Auger Ground Elevation: 72.2

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan Sandy Clay
5			
			Tan & Gray Sandy Clay
10			Tan & Gray Sandy Silty Clay Brown Slightly Clayey Sand
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 22, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psi	TYPE	OTHER TESTS
#23	0-1	Topsoil with Organics										
G.E. 72.2	1-4	Tan Sandy Clay	21.3		30	14	16				A-6(7)	
	4-8	Tan & Gray Sandy Clay	19.1		27	15	12				A-6(7)	
	8-10	Tan & Gray Sandy Silty Clay	19.2		37	18	19				A-6(11)	
	10-11	Brown Slightly Clayey Sand	12.6		21	19	2				A-2-4	
	11'	Brown Sand (no return)										

File#85001
Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #24
LOCATION:

Date: 1-22-85 Type: Hand Auger Ground Elevation: 71.1

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
5			Tan & Gray Sandy Clay
10			Gray Clayey Sand Brown Slightly Clayey Sand
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 22, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#24	0-1	Topsoil with Organics										
G.E. 71.1	1-5	Tan & Gray Sandy Clay	28.5		30	18	12				A-4(9)	
	5-10	Gray Clayey Sand	23.2		20	17	3				A-2-4	
	10-11	Brown Slightly Clayey Sand	20.2		21	19	2				A-2-4	

File#85001
Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #25
LOCATION:

Date: 1-24-85 Type: Hand Auger Ground Elevation: 73.6

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Black Organics
5			
			Tan & Gray Stiff Sandy Clay
			Tan & Gray Clayey Sand with Gravel
10			
15			
20			
25			
30			
35			
40			
45			
50			

Lab#10390

SUMMARY OF LABORATORY TEST DATA

ROJECT Manville Ash Pond

ATE January 24, 1985

RING O.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
5	0-1	Topsoil with Black Organics										Perched water at 1'
E. .6	1-7½	Tan & Gray Stiff Sandy Clay	31.8		27	18	9				A-4(7)	
	7½-9	Tan & Gray Clayey Sand	24.0		19	16	3				A-2-4	
	9	Gravel at 9' Unable to go Deeper										

GEOTECHNICAL EVALUATION
SURFACE IMPOUNDMENTS
MANVILLE FOREST PRODUCTS CORPORATION
WEST MONROE, LOUISIANA

PREPARED FOR

MANVILLE FOREST PRODUCTS CORPORATION
P. O. BOX 488
WEST MONROE, LOUISIANA 71291

DECEMBER, 1985

REVISED JANUARY, 1986

SWL FILE NO. 853474

SOUTHWESTERN LABORATORIES

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

7222 Greenwood Rd. • P.O. Box 37577 • Shreveport, LA 71133-7577 • 318/636-3673

December, 1985

Revised January, 1985

Manville Forest Products
P. O. Box 488
West Monroe, LA 71291

Reference: Subsurface Exploration
Geotechnical Evaluation
Surface Improvements
West Monroe, Louisiana

Gentlemen:

Attached is our Subsurface Exploration Report for the above referenced project.

Southwestern Laboratories will be happy to assist you further on this project by furnishing any Construction Materials Testing Services you may require. We are a full service laboratory and can supply the full range of testing services, such as soils, concrete, asphalt, steel, roofing, etc.

It has been a pleasure to perform this work for you. If we can be of any further assistance, please do not hesitate to call on us.

Very truly yours,

SOUTHWESTERN LABORATORIES

STATE OF LOUISIANA
ROY D. JONES
REG. No. 15915
REGISTERED
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING

Ayman Chamaa

Ayman Chamaa, MSCE, E.I.T.
Geotechnical Engineer

Roy D. Jones, P.E.
Geotechnical Manager

AC/RDJ:kw
Attachment
cc: (2) Manville Forest Products Corporation
(2) S. E. Huey Company

GENERAL INFORMATION

I. LOUISIANA SOLID WASTE RULES AND REGULATIONS

A. AUTHORITY

Act 449 of the 1979 Louisiana Legislature mandated a waste management program. The regulations are authorized by:

1. Louisiana Environmental Affairs Act, LA R.S. 30:1051;

2. Louisiana Resource Recovery and Development Act, LA R.S. 30:1050.1;

3. Louisiana Solid Waste Management and Resource Law, LA R.S. 30:1121.

II. SUBSURFACE EXPLORATION

A. AUTHORIZATION

This study was authorized by Mr. Charles B. Welch of Manville Forest Products Corporation.

B. SCOPE

The purpose of this work is to provide Manville Forest Products Corporation with a minimum amount of subsurface data to satisfy the Louisiana Department of Environmental

Quality for permitting the surface impoundments as solid waste disposal facilities. The soil exploration will be used to determine if an adequate thickness of low permeability soil exists beneath the existing ponds.

III. SUMMARY AND RECOMMENDATIONS

Through a drilling and soil testing program, Southwestern Laboratories, Inc. has developed data to locate any seepage potential. A set of monitoring wells was designed to detect any seepage.

SITE INFORMATION

I. DESCRIPTION

The following existing facilities are considered in our exploration.

1) Effluent Ponds (Pond 1 through 4)
2) Primary Sludge Pond
3) High Intensity Aeration Pond
4) Effluent Canal

These ponds are in operation now. The ponds are shown in Figure 1.

Tne number and location of the borings shown on Figure 1 have been examined by the DEQ, Office of Solid and Hazardous Waste. It has been agreed by Manville Forest Products Corporation and the DEQ that this represents a minimum testing program. Twenty borings (B-1 through B-20) were drilled around the ponds.

The soil condition varies between three distinct soils. These soils are identified according to their permeability coefficients.

SOIL I

Soil Description: silty or sandy clay to clayey

soils.

Unified Soil Classification: CL or CH

Average Vertical Permeability Coefficient:
4.9 x 10E-8 cm/sec.

Average Horizontal Permeability Coefficient:
5.9 x 10E-8 cm/sec.

SOIL II

Soil Description: clayey sand to clayey silty sand.

Unified Soil Classification: SC

Average Permeability Coefficient:
2.52 x 10E-7 cm/sec.

SOIL III

Soil Description: sand to silty sand

Unified Soil Classification:
SW to SM

Permeability Coefficient: very permeable soil.

GEOTECHNICAL RECOMMENDATIONS

I. POND SUITABILITY

Six soil profiles are provided in this report. The soil profiles show three distinct soils. These soil profiles are drawn to help in the evaluation of the existing ponds suitability.

Pond 1

The bottom and effluent elevation of the pond is shown in Figure 3, Section III-III. The soil profile shows that this pond is lined at the bottom with suitable natural clay barrier. This barrier extends to the bottom soil encountered in Borings 10, 11, 12, 13, 14 and 20. The clay barrier should be adequate to control vertical fluid migration from the pond. Silty sand pockets or strata are encountered in Borings B-18 and B-20. Clayey silty sand stratum or pockets are encountered in Borings 11, 12, 14 and 20.

Pond 2

The soil profile in Figure 4, Section V-V shows that Pond 2 is lined with a suitable natural clay barrier. If this liner exists over the entire pond, it should be able to control pond fluid seepage.

Pond 3

The conditions that exist at Borings 5 and 10 indicate an adequate clay liner exists beneath this pond. The upper two (2) feet of the soil in Boring 5 is silty sand. This material is very permeable, but it should not be a problem. If a migration occurs through this material, it will be from one pond to another. The upper eight (8) feet of soil encountered in Boring 8 is clayey silty sand. This material has a permeability coefficient of 1.9 x 10E-8 and extends approximately three (3) feet beneath pond 3 bottom. This material performs a good natural barrier and controls effluent migration to the silty sand pocket that exists below.

Pond 4

A clay natural liner exists below Pond 4 as shown in Figure 2, Section I-I. This liner is virtually impermeable. The upper two (2) feet of soil encountered in Borings 1, 2, 3 and 6 are permeable silty sand or sandy silt material.

Primary Sludge Pond and High Intensity Aeration Pond

Borings B-17 and B-16 were drilled adjacent to Primary Sludge Pond and High Intensity Aeration Pond, respectively. The upper ten (10) to twelve

(12) feet of the soil encountered in Borings B-16 and B-17 was sandy clay. Several permeability tests were done in this clay stratum. The permeability test values were between .16 x 10E-7 and .29 x 10E-7 cm/sec. However, this stratum was underlaid by sand and silty sand with gravel to the bottom of the soil encountered in the borings. If any seepage occurs from the ponds, it would occur through this silty sand soil. Southwestern Laboratories recommends that a set of monitoring wells be installed to monitor this permeable stratum.

Effluent Canal

Boring B-14 was drilled on the west side of the Effluent Canal. The upper fourteen (14) feet of the soil encountered in this boring was sandy clay to clay (CL to CH). A horizontal permeability test was performed at a depth of eight (8) to ten (10) feet and had a permeability coefficient of 2.6 x 10E-8 cm/sec. This stratum was underlaid by approximately nine (9) feet of clayey sand stratum. The clayey sand stratum had an average permeability coefficient of 2.52 x 10E-7 cm/sec. A sandy clay to clay stratum was encountered at the bottom of the boring and had an average permeability coefficient of 4.9 x 10E-8 cm/sec.

II. GROUND WATER

Ground water readings were made in some of the borings. The water table varied between elevations of 53 and 67 feet. A table of the ground water readings is presented in this report.

The variation in ground water level observations indicates that the ground water flow is influenced by the Ouachita River.

To monitor the entire project area as one waste facility rather than individual waste units the area can be monitored by twelve (12) monitoring wells. The location of these wells is shown on Figure 7. However, to monitor the waste facilities individually more monitoring wells will be needed.

A typical monitoring well installation is illustrated in Figure 6.

TABLE

GROUND WATER

BORING NUMBER	GROUND ELEVATION (ft.)	*GROUND WATER ELEVATION (ft.)
B-15	74.0	59.0
B-16	66.2	57.2
B-17	75.5	64.2
B-18	74.2	65.2
B-19	77.0	68.0
B-5	70.4	53.4
B-8	71.5	55.5
B-10	72.0	57.0
B-11	75.5	67.0
B-12	76.1	60.1
B-13	75.0	62.0
B-14	75.0	57.0

* The phreatic surface will fluctuate with seasonal variations in moisture.

LIMITATIONS

It must be recognized that the conclusions reached in this report are based on conditions which exist at the boring locations and are assumed to exist over the entire site. In any subsoil exploration, it is necessary to assume that the subsoil conditions between the borings do not change significantly. Consequently, careful observations must be made during construction to detect significant deviations of actual conditions encountered throughout the construction area from those inferred from the exploratory borings.

Should any unusual conditions be encountered during construction, this office should be notified immediately so that further exploration and supplemental recommendations can be made.

Analyses by: Ayman Chamaa, MSCE, E.I.T.

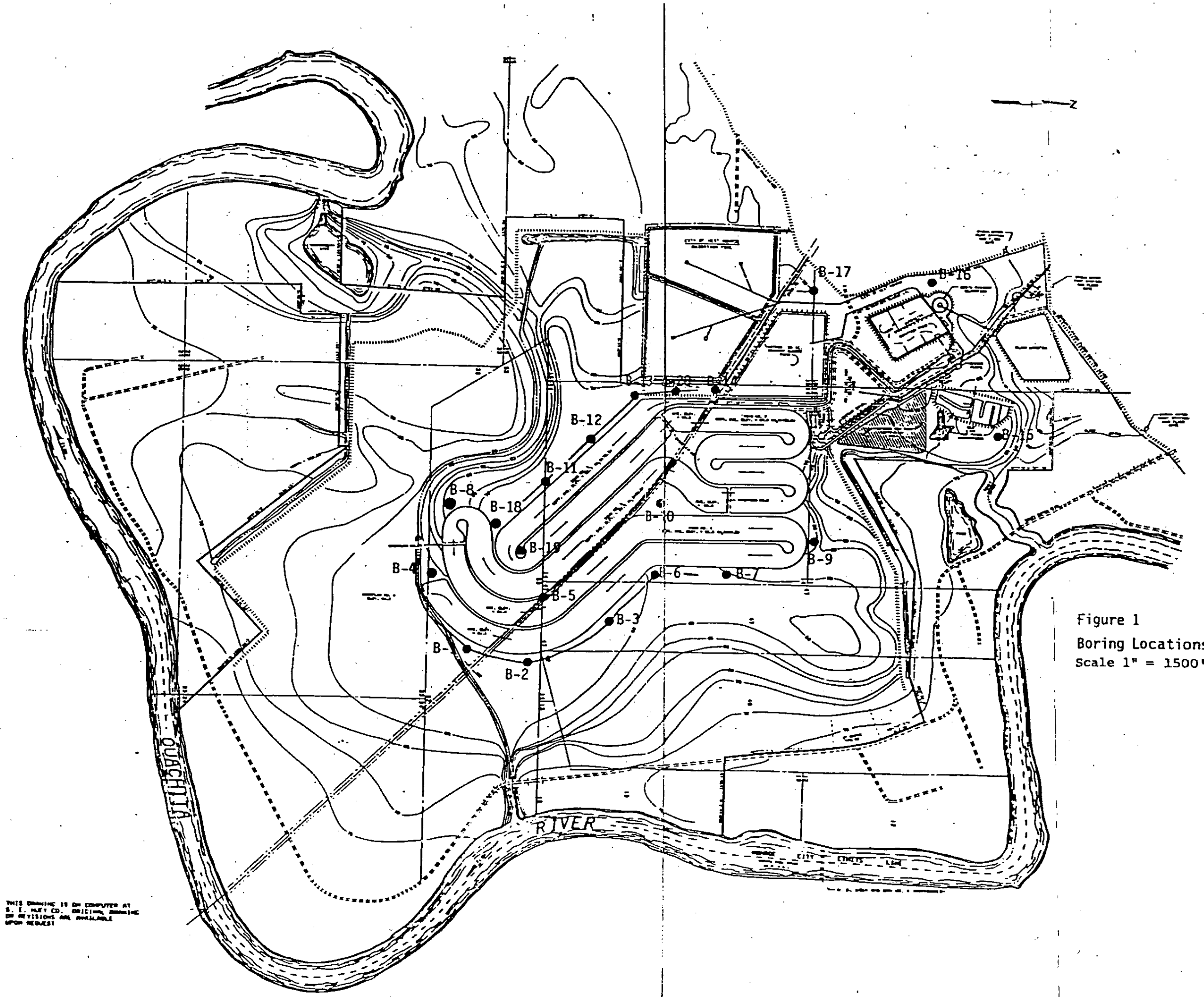


Figure 1

Boring Locations

Scale 1" = 1500'

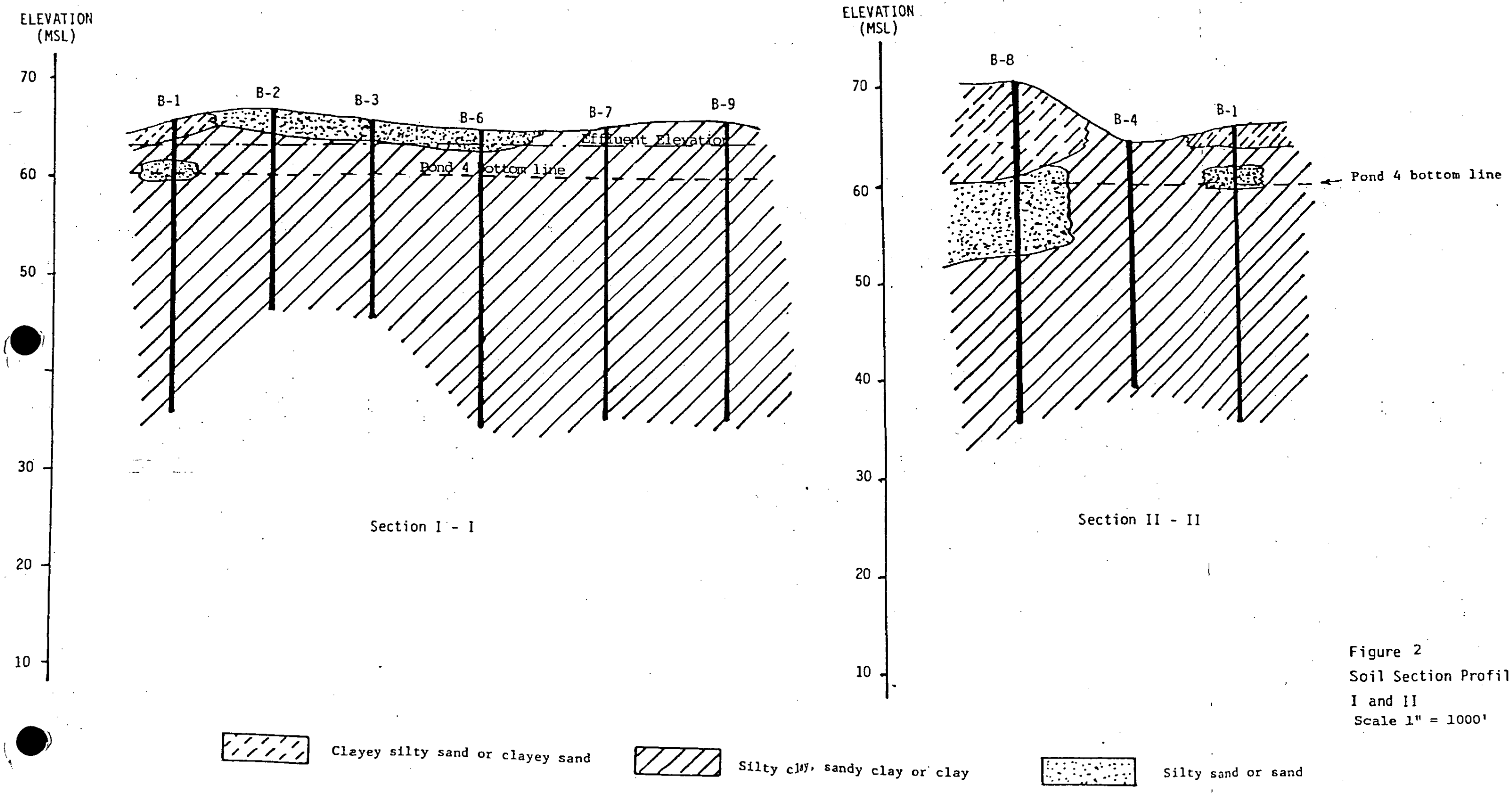


Figure 2
Soil Section Profile
I and II
Scale 1" = 1000'

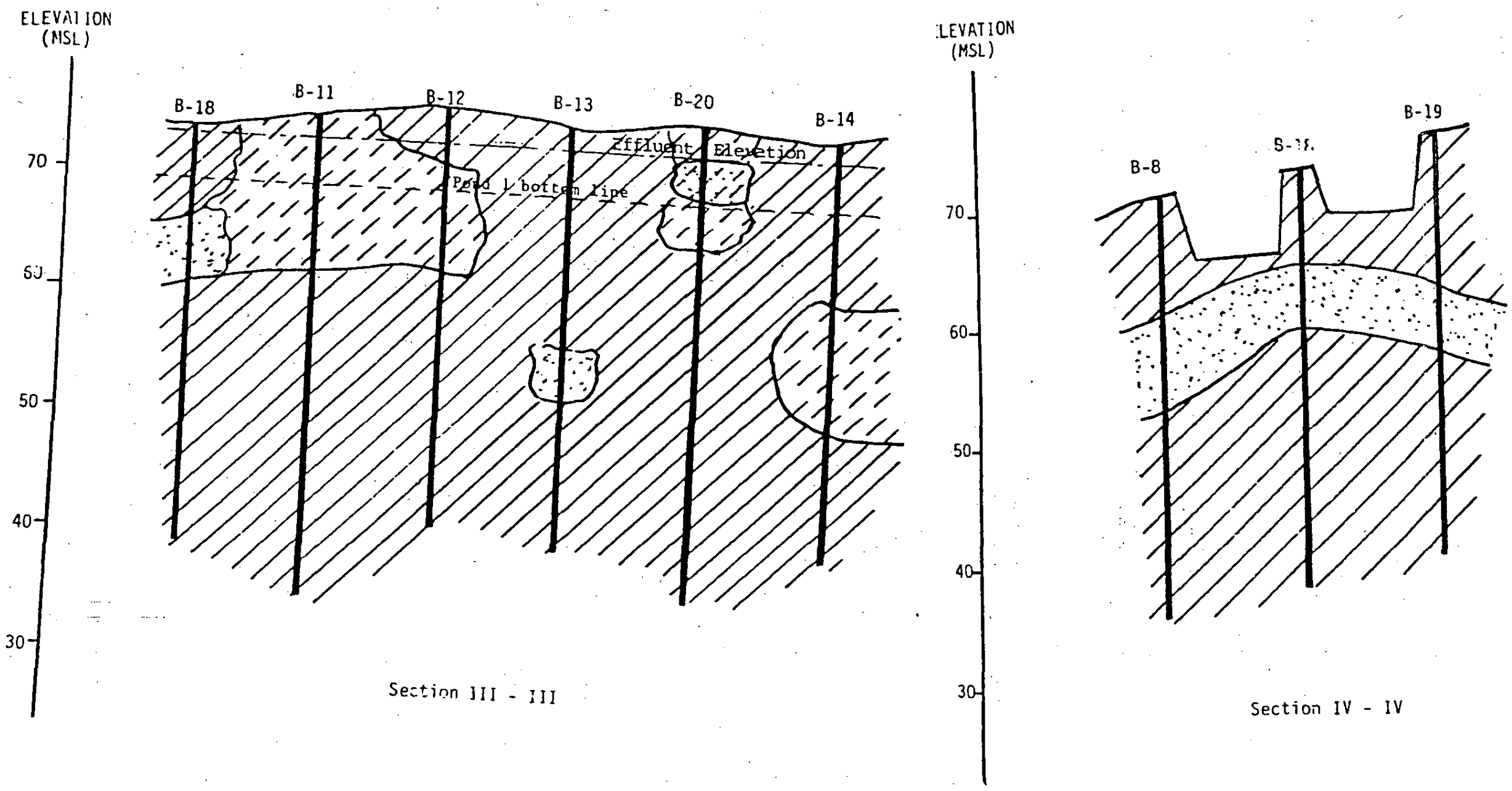


Figure 3
Soil Section Profile
III and IV
Scale 1" = 1000'

Clayey silty sand or clayey sand

Silty clay, sandy clay or clay

Silty sand or sand

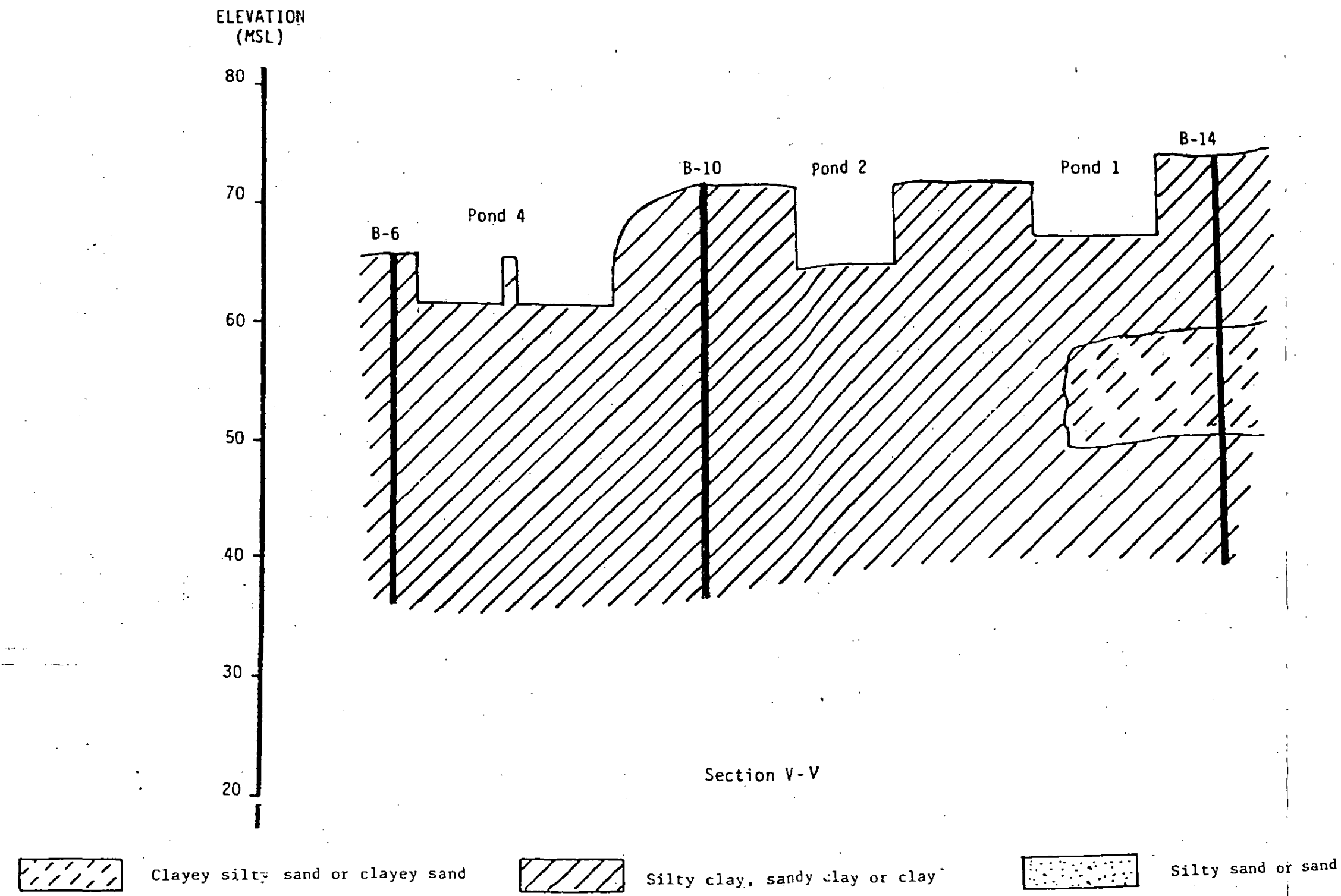
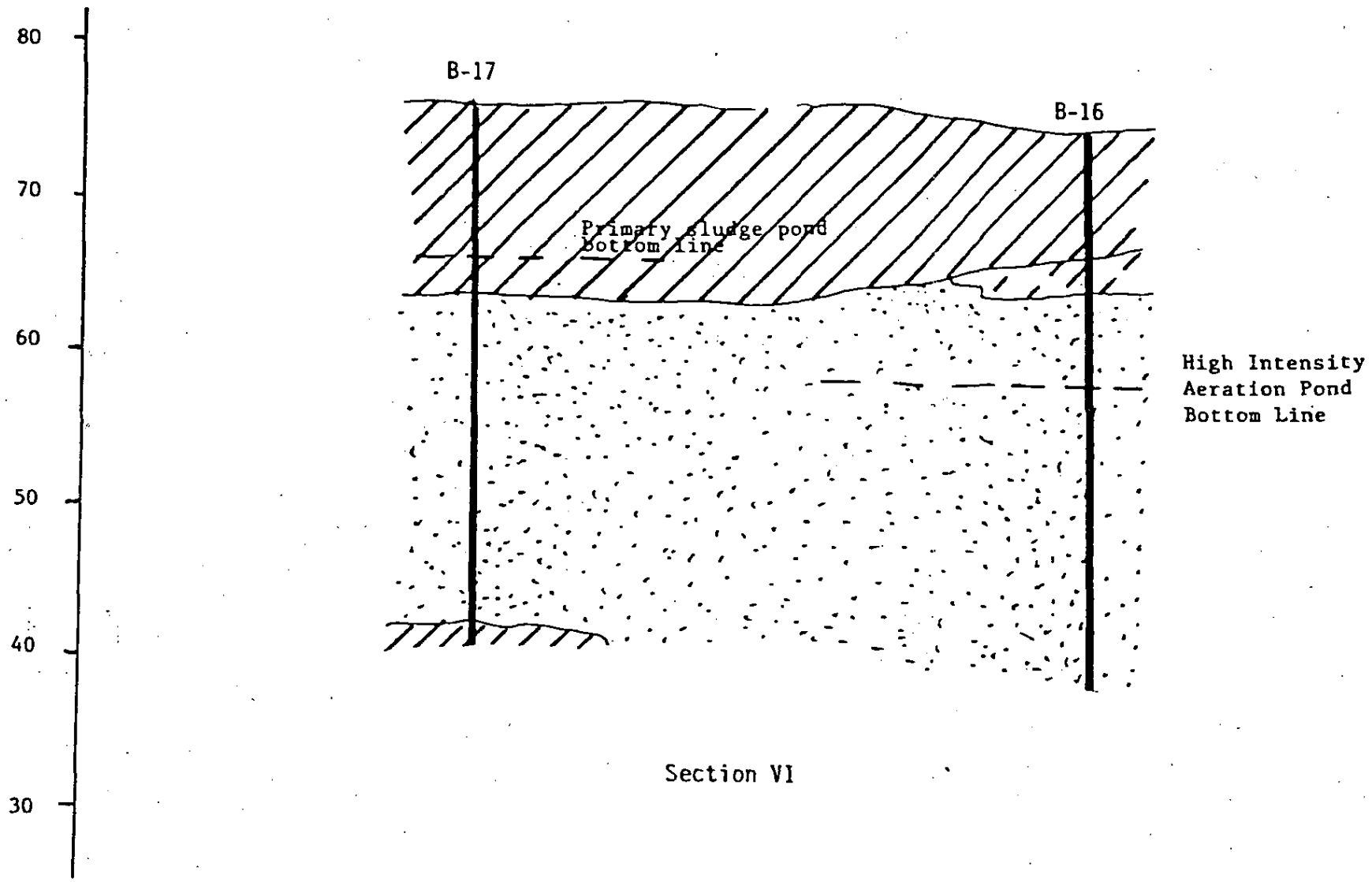


Figure 4
Soil Section Profile
V and VI
Scale 1" = 1000'



Clayey silty sand or clayey sand

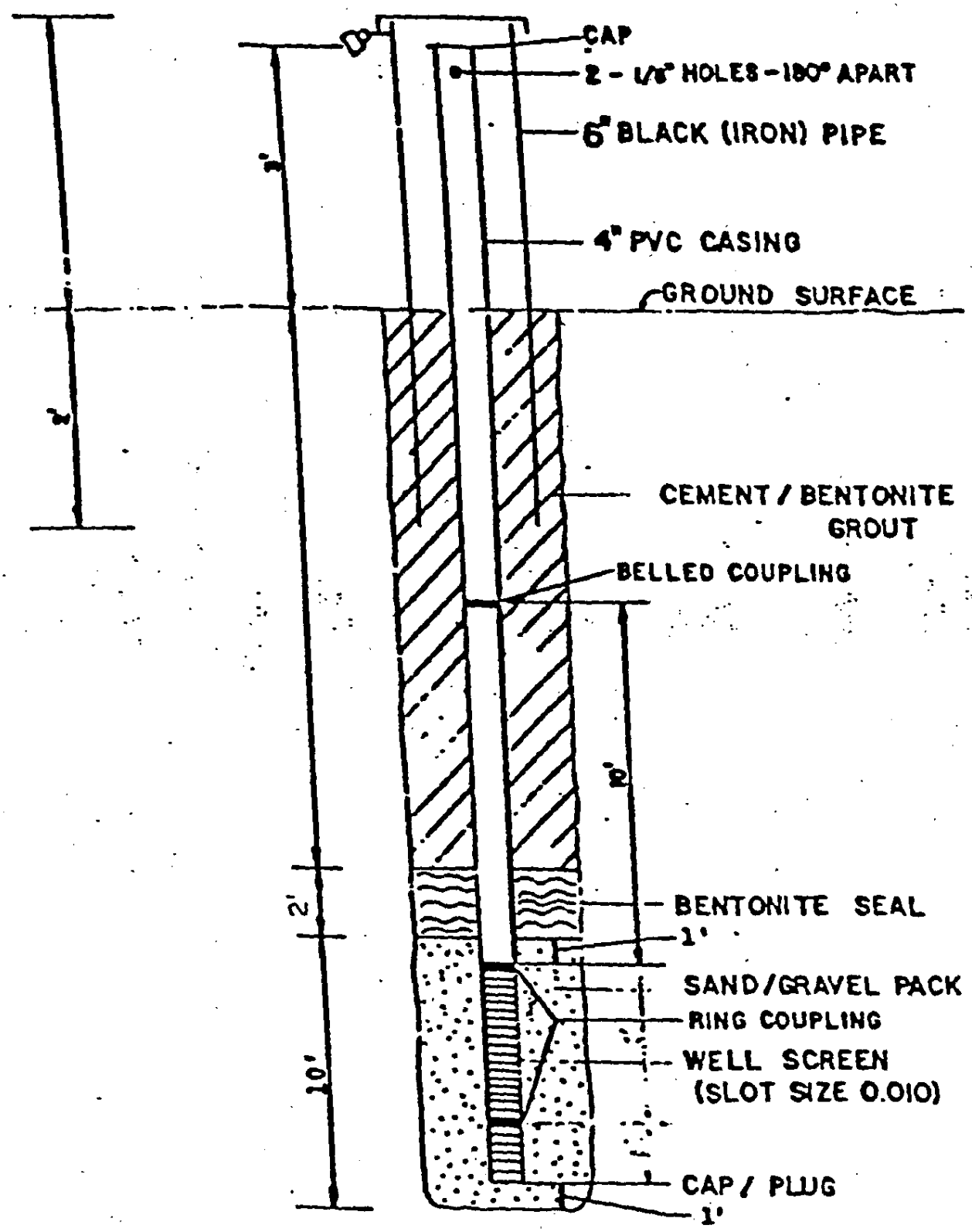
Silty clay, sandy clay or clay

Silty sand or sand

FIGURE 5
SOIL SECTION
PROFILE
SECTION VI
Scale 1" = 1000'

MONITOR WELL INSTALLATION

Figure 6



OVERALL LENGTH OF 4" P.V.C.

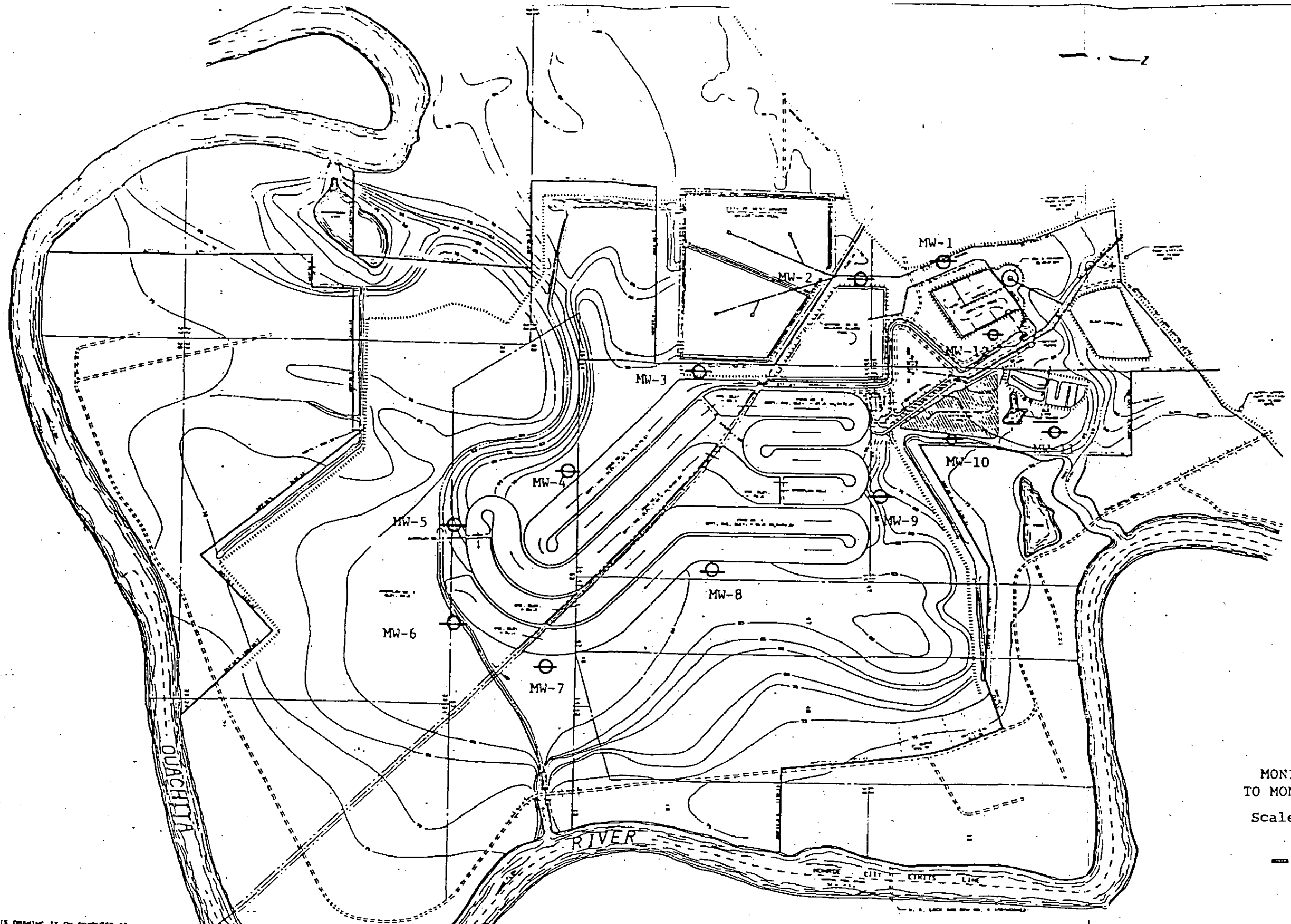


FIGURE 7
MONITOR WELL LOCATIONS
TO MONITOR THE ENTIRE SITE

Scale 1" = 1500'

THIS DRAWING IS ON COMPUTER AT S. E. HUEY CO. ORIGINAL DRAWING OR REVISIONS ARE AVAILABLE UPON REQUEST

MANVILLE

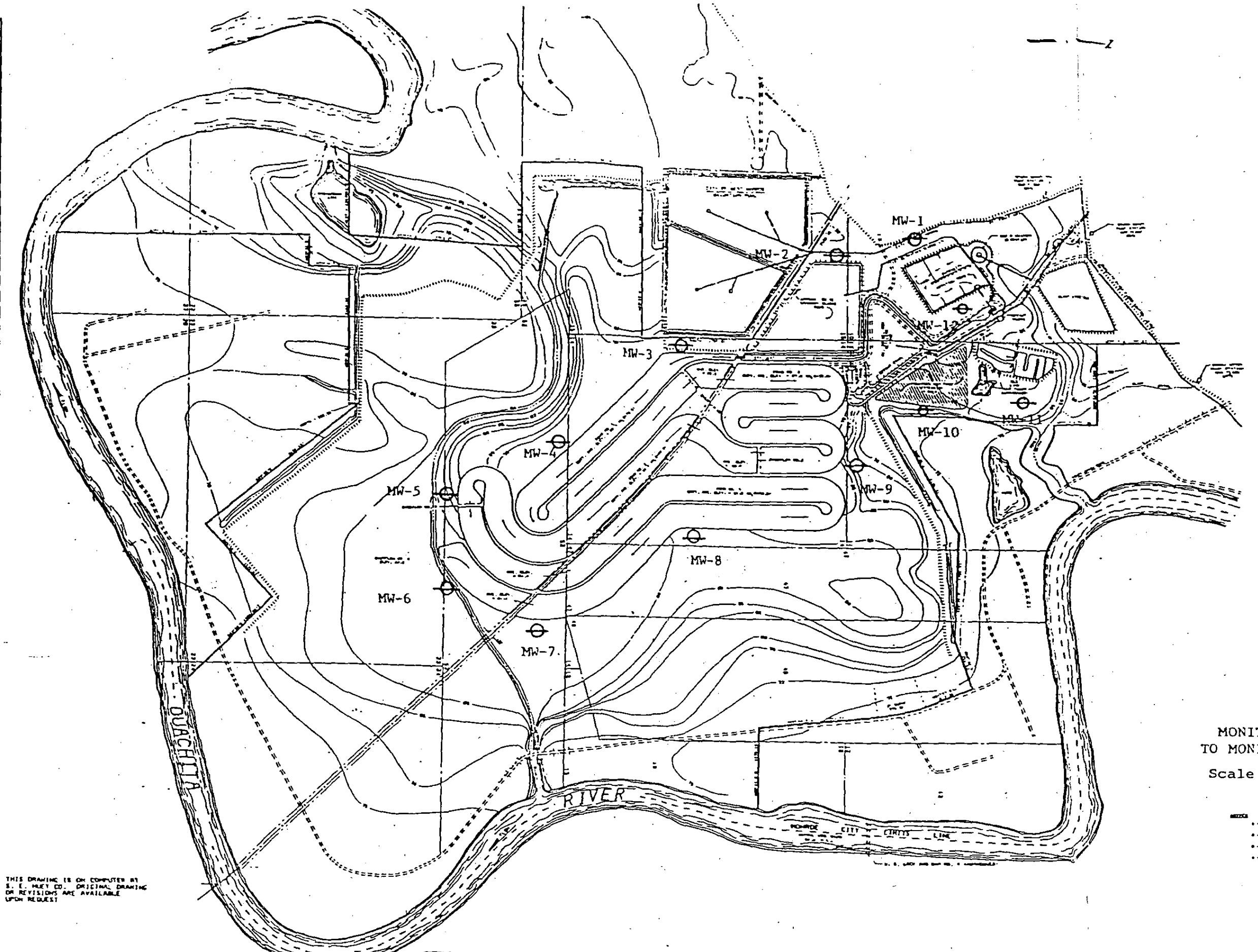


FIGURE 7
MONITOR WELL LOCATIONS
TO MONITOR THE ENTIRE SITE

Scale 1" = 1500'

APPENDIX

SOIL BORING INFORMATION

FIELD AND LABORATORY PROCEDURES

FIELD EXPLORATION

General

Twenty (20) borings were drilled for this investigation. The boring depths varied between twenty (20) and forty (40) feet.

The borings were made with ATV drilling equipment. The boring locations are shown on the Boring Plan (Figure 1). Detailed logs of the borings are in the Appendix.

Sampling Procedures

In the cohesive and semi-cohesive soils, relatively undisturbed samples were secured using a three (3) inch diameter, thin-wall Shelby tube sampler. In this sampling procedure, the borehole is advanced to the desired level, and the tube is lowered to the bottom of the boring. It is then forced about two (2) feet into the undisturbed soil in one continuous stroke. The tube is retrieved and the sample extruded by a hydraulic piston. The sample is then visually classified. Any disturbed portions are discarded, and the samples protected for transportationto the laboratory.

LABORATORY PROCEDURES

General

Certain samples from the various strata were tested in the laboratory to determine their pertinent physical characteristics. The samples and types of tests performed were selected by a geotechnical engineer to develop information necessary for appropriate analyses. The testing program conducted is described in the following:

Classification Tests

In order to classify the soils more definitely than can be done by field methods, Atterberg Limit Determinations, Particle Size Analyses and Unit Weight Tests were performed.

Permeability

Permeability analyses were performed on representative samples of the two (2) clay strata. The permeability tests were performed in the vertical and horizontal directions.

The results of the laboratory tests are presented in the Soil Boring Logs which are in this Appendix.

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish BORING NO.: B-1 DATE: 10/16/85

DRILLING CONTRACTOR: Southwestern Laboratories TECH./ENGR.: Ayman Chamaa

DRY AUGER DRILL RIG
WASH BORING

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	LABORATORY DATA: COMPRESSIVE STRENGTH (TSF)	M C (%)	D D (PCF)	L L (%)	P I (%)	K	DESCRIPTION OF STRATA
					14.6					Brown & tan clayey sand (SC)
					22.0		38	20		Tan sandy clay (CL)
	5				11.6					Tan sandy silt[1] (SM)
					31.0					Tan & gray sandy clay (CL)
	10				29.2					Brown & gray sandy clay (CL)
	15				45.2		70	41	V .01	Brown & dark gray clay (CH)
	20				66.5				H .18	Dark gray clay (CH)
	25				49.4		84	61		Dark gray clay (CH)
	30				44.8		74	45	V .71	Dark gray clay (CH)
	35									Bottom of Boring at 30 feet.

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY

REMARKS

1 89% Passing #200 Sieve
V Vertical Permeability
H Horizontal Permeability

Ground Elevation 66.2

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: B-2

DATE: 11-5-85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.: Ayman Chamaa

DRY AUGER ☐ DRILL RIG ☐ WASH BORING ☐

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	LABORATORY DATA: COMPRESSIVE STRENGTH (TSF)	MC (%)	DD (PCF)	LL (%)	PI (%)	K	DESCRIPTION OF STRATA
		■								Brown silty sand (SM)
		■			11.2		27	8		Brown silty sandy clay (CL)
	5	■			19.1				H 0.9	Brown silty clay (CL) 1.
		■								Gray silty clay (CL)
	10	■			40.4		40	20	V 0.31	Gray silty clay (CL)
	15	■								Dark gray clay (CH)
	20	■			18.4		70	40		Dark gray clay (CH)
	25									Bottom of boring at 30 feet.
	30									
	35									

KEY

- ■ SHELBY TUBE
- ☒ STANDARD PENETRATION TEST
- ▼ GROUND WATER FIRST ENCOUNTERED
- ▽ STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

1. 92% passsing No. 200 sieve

Ground Elevation 67.2

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation
LOCATION (PARISH): Ouachita Parish
BORING NO.: B-3
JOB NO.: 853474
DATE: 11-5-85
DRILLING CONTRACTOR: Southwestern Laboratories
TECH./ENGR.: Ayman Chamaa

DRY AUGER
WASH BORING
DRILL RIG

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	LABORATORY DATA: COMPRESSIVE STRENGTH (TSF)	MC (%)	DD (PCF)	LL (%)	PI (%)	K	DESCRIPTION OF STRATA
					5.7					Brown silty sand w/gravel (SM) 1.
					5.6		51	26		Tan & gray sandy clay (CL)
	5								H .55	Tan & gray clay (CH)
										Brown & gray clay (CH)
	10				39.9		57	32		Brown & gray clay (CH)
									V .11	Dark gray clay (CH)
	15									
					44.4		58	30	V .39	Dark gray clay (CH)
	20									Bottom of boring at 20 feet.
	25									
	30									
	35									

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

1. 21% passing No. 200 sieve

Ground Elevation 66.3

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish BORING NO.: B-4

DATE: 11-5-85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.: Ayman Chamaa

DRY AUGER DRILL RIG
WASH BORING

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	LABORATORY DATA: COMPRESSIVE STRENGTH (TSF)	MC (%)	DD (PCF)	LL (%)	PI (%)	K	DESCRIPTION OF STRATA
										Brown silty caly (CL)
					9.7		28	10		Brown & tan sandy clay (CL)
	5									Tan & gray clay (CH)
									H .04	Dark gray clay (CH)
					32.0		55	31		Gray & brown clay (CH)
	10									
										Dark gray clay (CH)
	15									
					50.6		64	37	V .25	Dark gray clay (CH)
	20									
					48.9		67	32	V .12	Dark gray clay (CH)
	25									Bottom of boring at 25 feet.
	30									
	35									

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

Ground Elevation 65.5

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: B-5

DATE: 10/16/85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.: Ayman Chamaa

DRY AUGER DRILL RIG
WASH BORING

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	COMPRESSIVE STRENGTH (TSF)	MC (%)	DD (PCF)	LL (%)	PI (%)	K	DESCRIPTION OF STRATA
					9.3					Brown & gray silty sand (SM)
					16.3					Brown & gray clayey sand (SC)
	5				20.8		24	5	V .65	Brown & gray clayey sand (SC)
					22.9					Gray clayey sand w/silt (SC)
					29.6					Gray sandy clay (CH)
	10				27.6		53	33		Gray clay (CH)
					24.0					Gray & brown clay (CH)
	15				26.4					Brown clay (CH)
	20				43.8		62	38	H .58	Brown & gray clay (CH)
	25				56.1					Dark gray clay (CH)
	30				41.2		62	35		Brown & dark gray clay (CH)
	35				42.3				V .20	Brown & gray clay (CH)
										Bottom of Boring at 35 feet. Water encountered at 17 feet.

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

V Vertical Permeability
H Horizontal Permeability

Ground Elevation 70.4

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: B-6

DATE: 11-5-85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.: Ayman Chamaa

DRY AUGER

DRILL RIG

WASH BORING

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	LABORATORY DATA: COMPRESSIVE STRENGTH (TSF)	MC (%)	DD (PCF)	LL (%)	PI (%)	K	DESCRIPTION OF STRATA
										Brown & tan silty sand w/gravel (SW)
					51.9		54	27		Tan clay (CH)
	5									Tan & brown clay (CH)
										Gray clay (CH)
					14.4		57	32	H .07	Gray & brown clay (CH)
	10									
										Brown clay (CH)
	15									
					11.4		60	35		Gray & brown clay (CH)
	20									
									V .20	Dark gray clay (CH)
	25									
					16.8		58	35		Dark gray clay (CH)
	30									Bottom of boring at 30 feet.
	35									

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- MC MOISTURE CONTENT
- DD DRY DENSITY
- LL LIQUID LIMIT
- PI PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

Ground Elevation 65.7

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: B-7

DATE: 10/17/85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.: Ayman Chamaa

DRY AUGER ☐ DRILL RIG ☐
WASH BORING ☐

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	COMPRESSIVE STRENGTH (TSF)	M C (%)	D D (PCF)	L L (%)	P I (%)	K	DESCRIPTION OF STRATA
					22.1					Tan & gray clay (CH)
					26.9		49	30		Tan sandy clay (CL)
	5				24.6				H 1.25	Tan & gray sandy clay w/wood pockets (CL)
					35.1					Grayish brown clay (CH)
	10				32.8		54	20		Grayish brown clay (CH)
	15				39.3		65	36		Grayish brown clay (CH)
	20				33.1				V .12	Grayish brown clay w/iron ore (CH)
	25				35.2		47	23		Grayish brown to tannish gray clay (CH)
	30				22.8				V .01	Tannish gray clay (CH)
	35									Bottom of Boring at 30 feet.

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

V Vertical Permeability
H Horizontal Permeability

Ground Elevation 66.8

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: B-8

DATE: 10/18/85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.: Ayman Chamaa

DRY AUGER DRILL RIG
WASH BORING

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	COMPRESSIVE STRENGTH (TSF)	MC (%)	DD (PCF)	LL (%)	PI (%)	K	DESCRIPTION OF STRATA
					18.2					Tan clayey sand (SC-CL)
					10.8		25	7		Tan clayey sand (SC-CL)
	5				14.5				V .19	Tan clayey silty sand[1] (SC-CL)
					17.9					Tan clayey silty sand (SC-CL)
					19.4				H 18.6	Tan silty sand w/clay[2] (SM-CL)
	10				18.4					Tan silty sand (SM)
	15	X	8 B/F		27.8					Brown silty sand (SM)
	20	X	2 B/F		29.9					Brown sandy clay (CH)
	25				30.9		40	20		Brown sandy clay (CL)
	30				50.0		74	50	V .34	Brown & gray clay (CH)
	35				35.8		52	26		Brown & gray clay (CH)
										Bottom of Boring at 35 feet. Water encountered at 16 feet.

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

1 70% Passing #200 Sieve
2 32% Passing #200 Sieve
H Horizontal Permeability

Ground Elevation 71.5

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853424

LOCATION (PARISH): Ouachita Parish BORING NO.: B-9

DATE: 10/17/85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.: Ayman Chamaa

DRY AUGER DRILL RIG
WASH BORING

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	COMPRESSIVE STRENGTH (TSF)	MC (%)	DD (PCF)	LL (%)	PI (%)	K	DESCRIPTION OF STRATA
					16.8		50	27		Tan & gray sandy clay (CL)
					20.2					Tannish gray clay (CH)
	5				19.8				H .32	Tannish gray clay (CH)
					32.1		60	26		Gray clay (CH)
	10				25.2		73	50		Brownish gray clay (CH)
					39.9					Brownish gray clay (CH)
	15				36.8		58	23		Brownish gray clay (CH)
	20				32.2				V .15	Brown clay (CH)
	25				34.5		46	15		Brown silty clay (CL)
	30				24.0				V 2.38	Gray silty clay (CL)
										Bottom of Boring at 30 feet.
	35									

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

V Vertical Permeability
H Horizontal Permeability

Ground Elevation 66.2

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish BORING NO.: B-10 DATE: 10/16/85

DRILLING CONTRACTOR: Southwestern Laboratories TECH./ENGR.: Ayman Chamaa

DRY AUGER DRILL RIG
WASH BORING

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	COMPRESSIVE STRENGTH (TSF)	M C (%)	D D (PCF)	L L (%)	P I (%)	K	DESCRIPTION OF STRATA
					34.9		58	38		Brown & dark gray clay (CH)
					26.6					Gray sandy clay (CL)
	5				23.7		36	16		Gray sandy clay (CL)
					26.9					Gray sandy clay (CL)
	10				24.6		46	28	V .1	Gray & brown sandy clay (CL)
					25.5					Gray & brown sandy clay (CL)
					24.1					Brown sandy clay (CL)
	15				25.2		47	26		Brown sandy clay (CL)
	20				44.0					Brown clay (CH)
	25				36.7		42	19	H .04	Brown & gray sandy clay (CL)
	30					40.5				Brown & gray sandy clay (CL)
	35					34.7	64	42	V .31	Brown & gray clay (CH)
										Bottom of Boring at 35 feet. Water encountered at 15 feet

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)

- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

V Vertical Permeability
H Horizontal Permeability

Ground Elevation 72.0

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: B-11

DATE: 10/17/84

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.: Ayman Chamaa

DRY AUGER

DRILL RIG

WASH BORING

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	COMPRESSIVE STRENGTH (TSF)	M C (%)	D D (PCF)	L L (%)	P I (%)	K	DESCRIPTION OF STRATA
					13.8					Tan clayey sand (SC)
					22.4		22	4		Tan clayey sand (SC)
	5				20.6					Tan & brown clayey sand (SC)
					23.4		23	6	H 4.39	Tan & brown clayey sand (SC)
			2 B/F		27.1					Brown clayey silty sand (SC)
	10		8 B/F		25.3					Brown & tan clayey silty sand (SC)
			7 B/F		38.7		45	20		Brown & gray sandy clay (CL)
	15									
			6 B/F		34.6					Gray sandy clay (CH)
	20									
			6 B/F		44.1		70	52	V .12	Brown & dark gray clay (CH)
	25									
					47.0					Dark gray clay (CH)
	30									
					48.7		65	33		Dark gray clay (CH)
	35									
					36.2				V 1.68	Gray & brown clay (CH)

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

Bottom of Boring at 40 feet.
Water encountered at 8½ feet.

V Vertical Permeability
H Horizontal Permeability

Ground Elevation 75.5

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: B-12

DATE: 10/21/85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.: Ayman Chamaa

DRY AUGER

DRILL RIG

WASH BORING

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	COMPRESSIVE STRENGTH (TSF)	M C (%)	D D (PCF)	L L (%)	P I (%)	K	DESCRIPTION OF STRATA
					16.4					Tan silty sandy clay (CL)
					15.6					Tan sandy clay[1] (CL)
	5				19.7		24	4		Tan clayey sand (SC)
					20.0					Tan silty sand (SM)
	10				21.1					Tan clayey silty sand[2] (SC)
	15	X	8 B/F		29.2					Tan & brown sandy clay (CL)
	20	X	8 B/F		49.3		47	29	H .31	Brown & gray sandy clay (CL)
	25				43.1					Dark gray sandy clay (CL)
	30				48.3				V .37	Dark gray clay (CH)
	35				41.8				V .08	Dark gray clay (CH)
										Bottom of Boring at 35 feet. Water encountered at 16 feet.

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

V Vertical Permeability
H Horizontal Permeability
1 89% Passing #200 Sieve
2 76% Passing #200 Sieve

Ground Elevation 76.1

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: B-13

DATE: 10/21/85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.: Ayman Chamaa

DRY AUGER ☐ WASH BORING ☐ DRILL RIG ☐

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	LABORATORY DATA: COMPRESSIVE STRENGTH (TSF)	MC (%)	DD (PCF)	LL (%)	PI (%)	K	DESCRIPTION OF STRATA
					14.3					Gray & tan sandy clay (CL)
					15.2					Tannish gray sandy clay[1] (CL)
	5				20.3					Tannish gray sandy clay (CL)
					22.2		29	10		Gray sandy clay (CL)
	10				25.9				V .14	Gray & brown sandy clay (CL)
	15				23.9					Brown sandy clay (CL)
	20				32.3					Brown silty sand (SM)
	25				44.0		64	38	H .21	Dark gray clay (CH)
	30				40.4		58	28		Dark gray clay (CH)
	35				37.5		61	39	V .32	Dark gray clay (CH)

Ground Elevation 75

Bottom of Boring at 35 feet.
Water encountered at 14 feet.

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

1 89% Passing #200 Sieve
V Vertical Permeability
H Horizontal Permeability

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: B-14

DATE: 10/14/85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.: Ayman Chamaa

DRY AUGER DRILL RIG
WASH BORING

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) W P (TSF)	COMPRESSIVE STRENGTH (TSF)	MC (%)	DD (PCF)	LL (%)	PI (%)	K	DESCRIPTION OF STRATA
					20.6					Brown sandy clay (CL)
					19.7		27	10		Gray & brown sandy clay w/gravel (CL)
	5				17.3					Gray & brown sandy clay (CL)
					19.4					Gray clay (CH)
	10				32.1		61	39	H .26	Brown clay (CH)
					27.1					Brown clay (CH)
					25.6					Brown clay (CH)
	15				23.3		22	5		Brown clayey sand (SC)
	20	X	7 B/F		27.3					Brown clayey sand (SC)
	25	X	8 B/F		31.4		38	18		Gray & brown sandy clay (CL)
	30	X	11 B/F		36.4					Dark gray clay (CH)
	35	X	10 B/F		39.5		54	26		Gray clay (CH)
										Bottom of Boring at 35 feet. Water encountered at 18 feet

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

H Horizontal Permeability

Ground Elevation 75.0

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: B-15

DATE: 11-7-85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.: Ayman Chamaa

DRY AUGER

DRILL RIG

WASH BORING

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	LABORATORY DATA: COMPRESSIVE STRENGTH (TSF)	MC (%)	DD (PCF)	LL (%)	PI (%)	K	DESCRIPTION OF STRATA
										Brown clayey silty sand (SC)
					12.9		26	7		Brown silty sandy clay (CL)
	5									Tan & gray silty sandy clay (CL)
									H .20	Tan & gray silty sandy clay (CL)
										Tan & gray sandy clay w/gravel (CL)
	10									
										Gray clayey silty sand (SC)
					14.0		20	4		Gray clayey silty sand (SC)
	15				12.1		20	N/P		Gray silty sand (SM)
	20	X	25B/F							Brown sand (SM)
	25	X	27B/F		15.5					Tan sand (SW) 1.
	30	X	29B/F							Tan & gray sand (SW)
					27.2					Brown & gray sandy clay w/gravel(CL)
	35									
										Bottom of boring at 35 feet. Water encountered at 15'.

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

1. 2% Passing No. 200 Sieve

Ground Elevation 74.0

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: B-16

DATE: 11/7/85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.:

DRY AUGER ☐ WASH BORING ☐ DRILL RIG ☐

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	LABORATORY DATA: COMPRESSIVE STRENGTH (TSF)	MC (%)	DD (PCF)	LL (%)	PI (%)	K	DESCRIPTION OF STRATA
		■								Tan sandy clay (CL)
		■			14.2		32	14		Tan sandy clay (CL)
	5	■							H	Tan sandy clay (CL)
		■							.20	Tan sandy clay (CL)
		■							V	Tan sandy clay (CL)
		■			11.3		22	6	23	Tan clayey sand (SC)
	10	■								
		☒	18 B/F		20.3					Gray silty sand (SW)[1]
		☒	22 B/F							Tan and gray sand (SW)
	15	☒	26 B/F							Tan and gray sand (SW)
	20	☒	32 B/F							Gray sand (SW)
	25	☒	30 B/F		15.3					Gray sand[2] (SW)
	30	☒	20 B/F							Gray sand w/gravel (SW)
	35	☒	50 B/F		10.1					Gray sand with gravel[3] (SW)
										Bottom of boring at 35 feet.
										Water encountered at 9'.

KEY

- ■ SHELBY TUBE
- ☒ STANDARD PENETRATION TEST
- ▼ GROUND WATER FIRST ENCOUNTERED
- ▽ STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

1. 30% passing No. 200 Sieve
2. 1% passing No. 200 Sieve
3. 4% passing No. 200 Sieve

Ground Elevation 74.0

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: B-17

DATE: 11/7/85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.:

DRY AUGER

DRILL RIG

WASH BORING

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	LABORATORY DATA: COMPRESSIVE STRENGTH (TSF)	MC (%)	DD (PCF)	LL (%)	PI (%)	K	DESCRIPTION OF STRATA
										Brown sandy clay (CL)
									V .16	Brown sandy clay (CL)
	5				34.9		28	8		Tan & gray sandy clay (CL)
									H .29	Tan & gray sandy clay (CL)
	10				18.5		30	11		Tan & gray sandy clay (CL)
									V 3.2	Gray sandy clay (CL)
		X	50 B/F							Gray sand (SW)
	15	X	31 B/F							Gray sand (SW)
	20	X	34 B/F							Brown & gray sand (SW)
	25	X	32 B/F		19.3					Brown silty sand w/gravel (SM)[1]
	30	X	46 B/F							Brown silty sand w/gravel (SM)
	35				16.8					Brown & gray clay w/gravel (CH)
										Bottom of boring at 35 feet. Water encountered at 11.3'.

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

1. 2% passing No. 200 Sieve
   Ground Elevation 75.5

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: B-18

DATE: 11/6/85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.:

DRY AUGER ☐ DRILL RIG ☐ WASH BORING ☐

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	LABORATORY DATA: COMPRESSIVE STRENGTH (TSF)	MC (%)	DD (PCF)	LL (%)	PI (%)	K	DESCRIPTION OF STRATA
										Brown silty clay (CL)
					18.2		49	28		Brown to tan silty clay (CL)
	5								H .32	Tan silty clay (CL)
					24.3		28	10		Brown sandy clay (CL)
	10									Brown & gray silty sand (SM)
	15	X	12 B/F							Brown & gray silty clay (CL)
	20				31.6		46	25		Dark gray to Brown silty clay (CL)
	25				44.0		52	28		Dark gray clay (CH)
	30				36.8		62	37	V .19	Dark gray clay (CH)
					55.3		69	42	V .12	Dark gray clay (CH)
	35									Bottom of boring at 35 feet. Water encountered at 9'.

KEY

- ■ SHELBY TUBE
- ⊠ STANDARD PENETRATION TEST
- ▼ GROUND WATER FIRST ENCOUNTERED
- ▽ STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

Ground Elevation 74.2

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: B-19

DATE: 11/7/85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.:

DRY AUGER DRILL RIG
WASH BORING

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	LABORATORY DATA: COMPRESSIVE STRENGTH (TSF)	MC (%)	DD (PCF)	LL (%)	PI (%)	K	DESCRIPTION OF STRATA
										Brown silty sand clay (CL)
					16.0		22		H	Brown silty sandy clay (CL)
	5								.55	Brown silty sandy clay (CL)
					29.7		23	8		Gray silty sandy clay (CL)
	10									Tan silty sandy clay (CL)
		X	11 B/F		25.0		15	NP		Brown sand (SW)
	15									
		X	7 B/F		31.0					Brown silty clay (CL)[1]
	20								V	
									.22	Brown & gray clay (CH)
	25									
	30				49.2		57	31		Dark gray clay (CH)
									V .19	Dark gray clay (CH)
	35									
										Bottom of boring at 35 feet. Water encountered at 9'.

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

NP - Not Plastic
1 - 95% passing No. 200 Sieve
Ground Elevation 77.0

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products

JOB NO.: 853474

LOCATION (PARISH): Ouachita

BORING NO.: B-20

DATE: 11/6/85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.: Ayman Chamaa

DRY AUGER DRILL RIG
WASH BORING

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	COMPRESSIVE STRENGTH (TSF)	MC (%)	DD (PCF)	LL (%)	PI (%)	K	DESCRIPTION OF STRATA
					19.1					Brown clayey sand (SC)[1]
					16.7		25	7		Brown clayey silty sand (SC)
	5									Tan clayey silty sand (SC)
					21.1		25	7		Tan to light gray clayey sand (SC)
					14.8		23	6	*	Light gray to brown clayey silty sand (SC)
	10									Brown silty sandy clay (CL)
					31.1		29	10		Brown sandy clay (CL)
	15									
	20									Brown sandy clay (CL)
	25				29.5					Brown sandy clay (CL)[2]
	30				27.8		36	16	V .39	Brwon silty clay (CL)
	35									Brown and gray silty clay (CL)
					21.6		37	18	V .63	Dark gray silty clay (CL)

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY

REMARKS

* Very Permeable
1 56% Passing No. 200 Sieve
2 88% Passing No. 200 Sieve

Ground Elevation 26.1 feet

Bottom of Boring at 40 feet.

APPENDIX L

SOIL BORING LOGS

LOG OF BORING DM-1

Location: Monroe, Louisiana N 263.0 W 28.0
Elevation: 59.0 msl
Job No: 24379-002-137

Date: 07-30-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0				1.75						(SC) Medium dense / stiff, coarse, brown to brownish yellow sand with clay and gravel.
		1		1.5						(ML) Stiff, brownish yellow clayey silt with gravel.
5.0		2		2.5	.59	98	23	37	19	(CL) Medium stiff to hard, brown, clay to silty clay, with gray mottling. Kv = 1.8 x 10(-8) cm/sec Kh = 5.3 x 10(-8) cm/sec
		3		1.75 2.5 3.25						... becoming very stiff.
10.0		4		>4.5 >4.5						(SP-SM) Dense, coarse, gray sand with some clay near top 12" of sample.
		5		8/12/20						
		6		9/16/18						... with gravel.
15.0		7		9/16/16						(SP) Dense, gray, coarse to medium sand, with gravel.
		8		9/15/17						
20.0		9		5/7/9						... becoming medium dense.
		10		8/16/18						(SP) Dense, gray and brown sand, with gravel.
25.0		11		>4.5 >4.5 >4.5			32	89	64	(CH) Hard, dark gray silty clay.
		12		4.0 4.5 4.0						
30.0		13		>4.5 >4.5 >4.5						
		14		2.0 2.5 3.0						(CH) Very stiff, dark gray silty clay.
35.0		15		3.0 3.0 4.0 4.5						(CL) Very stiff to hard, dark gray silty clay to clayey silt, moderate plasticity.
40.0										Teminated boring at a depth of 40 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.7 ppg.
45.0										
50.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-2

Location: Monroe, Louisiana N 355.0 E 492.0
Elevation: 68.0 msl
Job No: 24379-002-137

Date: 07-30-9?
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0				4.5						(SM) Dense, brown to light brown silty sand.
				2.5						(ML) Very stiff, brown to light brown clayey sand.
		1		.5						(CL) Soft, brown silty clay, with gray mottling.
				.5						
5.0		2		1.0						... with sand
				1.0						
				.5						
		3		1.75						... becoming stiff.
				2.25						
10.0				2.0						(CH) Stiff, brown clay, with gray mottling.
		4		1.5						(ML) Medium stiff, gray to brown sandy silt, with trace of clay.
				.75						
				.5						(SM) Soft, brown silty sand.
		5		.25						
15.0				.5						
				.25						
		6		.5						
				.5						
				.75						
20.0		7		1.0	.92	90	32	48	28	(CL) Medium stiff to stiff, brown silty clay. Kv = 1.8 x 10(-8) cm/sec Kh = 1.0 x 10(-8) cm/sec
				1.75						
				1.0						
		8		1.25	.73	90	32	49	28	... becoming gray (CL) Medium stiff to stiff, gray silty clay. Kv = 6.4 x 10(-8) cm/sec Kh = 2.7 x 10(-8) cm/sec
				1.25						
				1.75						
25.0		9		1.0						
				1.25						
				.5						
		10		1.0						(SP) Loose, coarse, gray sand, with trace of clayey silt.
30.0				3.75						(CH) Very stiff to hard, gray clay, with trace of silt.
				3.0						
		11		3.0						
				3.0						
		12		3.0						
				3.25						
35.0		13		3.5						
				1.75						
				4.5						
		14		3.25						
				3.25						
40.0										Teminated boring at a depth of 40 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 14.1 ppg.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-3

Location: Monroe, Louisiana N 439.0 E 869.0
Elevation: 72.2 msl
Job No: 24379-002-137

Date: 07-20-92
Approved:

DEPTH IN FEET	SAMPLE NUMBER	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	1	9/9/11						(ML) Medium stiff, tan clayey silt.
	2	4/4/4			18	26	7	
5.0	3A 3B	2/4/5						
	4	1/6/7						(CL) Stiff, light brown silty clay, with reddish brown mottling.
	5	3/4/6						... turning to clay
10.0	6	5/4/4						(SM) Loose, light brown silty sand.
	7	4/6/6						... becoming medium dense.
15.0	8	2/3/3						... becoming loose.
	9	1/1/2						... becoming very loose.
	10	2/3/4						... becoming loose.
20.0	11	3/3/5						
	12	1/1/2						... becoming very loose.
25.0	13	.25						
	14	<.25						(ML) Very soft, gray clayey silt.
30.0	15	1/0/0			24	31	14	
	16	1/1/1						
35.0	17	1/3/6						(SM) Loose, gray silty sand.
	18	3/9/10						(ML) Medium dense, light gray clayey silt, with trace of sand.
	19	5/9/6						(SM-SP) Medium dense, light gray silty sand to sand.
40.0	20	4/12/15						Teminated boring at a depth of 41 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 14.0 ppg.
45.0								
50.0								

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-4

Location: Monroe, Louisiana N 457.0 E 1,246.0
Elevation: 72.4 msl
Job No: 24379-002-137

Date: 07-21-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1		7/12/15			15	26	7	(SM) Medium dense, brown to brownish yellow silty sand.
		2		2/3/4						(ML) Loose, brown clayey silt.
5.0		3		2/4/6						
		4		2/3/6						(CL) Stiff, brown silty clay.
		5		1/3/5						(ML) Medium stiff, brown to reddish brown clayey silt.
10.0		6		3/4/4						(SM) Loose, brown to reddish brown silty sand.
		7		1/2/3						(ML) Very loose, brown clayey silt.
15.0		8		.5						(SM) Loose, brown silty sand.
		9		1/2/3						... with clay lenses.
20.0		10		1/3/4						
		11		1/2/3						(SM) Very loose, brown silty sand, with trace of clayey silt, and interbedded clay lenses.
		12		1/1/2						(CL) Very soft, brown silty clay.
25.0		13		1/2/4			44	38	20	... becoming medium stiff, with gray mottling.
		14		1/1/3						... becoming soft.
30.0		15		3/7/10						(SM) Medium dense, fine, light gray silty sand, trace of clay.
		16		5/9/12						
		17		2/4/5						(CL) Stiff, reddish brown silty clay.
35.0		18		2/7/12			31	64	42	(CH) Stiff, reddish-brown clay. ... becoming gray.
		19		3/5/7						
40.0		20		2/6/7						
45.0										Teminated boring at a depth of 41 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.9 ppg.
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-5

Location: Monroe, Louisiana N 477.0 E 1,500.0
Elevation: 70.4 msl
Job No: 24379-002-137

Date: 07-21-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	X	1		4/8/6						(SM) Medium dense, brown silty sand, roots, organic material.
	X	2		2/3/4						(ML) Loose, brown clayey silt.
5.0		3		1.5						(CL) Stiff, brown to reddish brown silty clay. (CH) Stiff, reddish brown clay.
		4		1.5		98	23	39	21	Stiff, reddish brown clay. friction angle = 43 degrees; c = 0 psf consolidated-drained direct shear test
10.0	X	5		2/4/6			24	24	6	(SM) Medium dense, brown silty sand.
	X	6		1/2/4						... becoming loose.
15.0	X	7		1/2/3						
	X	8		0/1/0						(ML) Very loose, brown clayey silt.
	X	9		1/1/1						(CL) Soft, brown silty clay.
20.0		10		2.0						(CL) Stiff, brown silty clay with fissures.
25.0		11								... turning to gray, with brown mottling.
	X	12		1/3/7						(SM) Medium dense, fine, gray sand.
30.0	X	13		4/7/7						... becoming tan to gray
	X	14		1/2/4						... becoming gray to brown
		15		1.75						(CH) Stiff, gray clay, with reddish brown mottling.
35.0		16		2.0						... becoming very stiff and gray
		17		2.25						
		18		2.25						
40.0										Teminated boring at a depth of 39 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and an approved slurry weight.
45.0										
50.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-6

Location: Monroe, Louisiana S 150.0 E 1,583.0
Elevation: 68.0 msl
Job No: 24379-002-137

Date: 07-22-9
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	X	1		2/7/5						(SM) Medium dense, brown, silty sand.
										(CL) Stiff, brown clay with gray mottling.
5.0		2		1.75	.96	91	30			(CH) Stiff, brown clay with trace of silt, wet.
		3		1.75		80	41	79	54	Kv = 1.7 x 10(-9) cm/sec
		4		2.0						Kh = 9.6 x 10(-9) cm/sec
		5								(SM) Loose, brown, silty sand with trace of silty clay.
10.0		6								
		7		<.25						(CL) Very soft, brown, silty clay with trace of silty sand.
		8		<.25						
15.0		9		.5						... becoming soft
		10		1.5						
		11		1.5						... becoming stiff.
20.0		12		2.0						
		13		2.0	1.21		28	48	27	(CL) Stiff brown clay.
		14		2.5						
25.0		15		2.5						... becoming very stiff.
		16		2.5						
		17		1.5						
		18		1.25						(SM) Loose, gray, silty sand.
30.0		19		2.0						(CL) Stiff, gray clay with brown mottling; grading clayey silt.
		20		2.5						
		21								
		22								
35.0		23								
		24								
40.0										Teminated boring at a depth of 37 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.8 ppg.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-7

Location: Monroe, Louisiana S 357.0 E 1,253.0
Elevation: 67.9 msl
Job No: 24379-002-137
Date: 07-23-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	X	1		1/9/5						(SM) Medium dense, brown, silty sand; grading to brown clayey silt.
		2		<.25						(ML) Very soft, brown clayey silt.
5.0		3		1.75	1.12		30	71	48	(CL) Stiff, brown, silty clay.
		4		1.75						
		5		1.5						(SM) Loose, brown, silty sand.
10.0		6		<.25						
		7		<.25						
		8		<.25						
		9		<.25						
15.0		10		<.25						
		11		<.25						
		12								
		13								... becoming more clayey.
20.0										(CL) Soft, brown, silty clay.
		14		1.75						(CH) Stiff, brown clay with brown to yellowish mottling.
		15		1.50						
		16		2.0						
25.0		17		2.0						
		18		1.5				66	46	... becoming gray with vertical partings and decaying roots.
		19		1.5						Kv = 3.6 x 10(-7) cm/sec Kh = 3.5 x 10(-8) cm/sec
30.0		20		2.0						... becoming gray clay with yellowish red mottling.
		21		2.0						
		22		2.25						
35.0		23		2.0						
		24								
		25								Terminated boring at a depth of 37 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.8 ppg.
40.0										
45.0										
50.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-8

Location: Monroe, Louisiana S 597.0 E 872.0
Elevation: 69.0 msl
Job No: 24379-002-137
Date: 07-29-
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	X	1		5/8/4						(SM) Medium dense, brown, silty sand with gray mottling; grading to clayey silt.
				2.0						(ML) Stiff, brown, clayey silt with gray mottling.
		2		1.5						(CL) Medium stiff, brown to gray silty clay.
5.0				2.0						
		3		2.0	.77	100	24	33	14	
		4		1.0						(SM) Loose to medium dense, brown, silty sand.
				1.0						
		5		.5						
10.0				1.0						
				1.0						
		6								
				1.25						(ML) Medium stiff, clayey silt.
				1.0						(SM) Loose to medium dense, silty sand.
15.0		7								
				1.0						(CL) Medium stiff, brown, silty clay.
		8		1.0						
20.0										
				2.0						
		9		2.5						... becoming stiff.
				1.5						
				1.5						
		10		1.25						... becoming gray.
25.0				1.5						
				1.5						
		11		1.5						(ML) Medium stiff, gray, clayey silt; grading to silty sand.
				.75						
				1.5						(CL) Stiff, brown clay.
30.0		12		1.5						
				2.5						
				1.5						... becoming gray
		13								
				1.75						
35.0				1.75						
		14		1.0	1.24		21	36	18	
				1.75						
40.0										Teminated boring at a depth of 38 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.8 ppg.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-9

Location: Monroe, Louisiana S 836.0 E 491.0
Elevation: 71.0 msl
Job No: 24379-002-137
Date: 07-28-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0				<.25						(SM) Loose, brown silty sand.
		1		1.5						(ML) Soft, brown clayey silt.
										(CL) Stiff, brown silty clay, stiff.
5.0		2		3.0						(CH) Medium stiff, brown with light brown mottling silty clay.
				2.0						
		3		2.5	.61		30	58	39	▼
		4		1.5						(SM) Dense, brown silty sand.
				<.25						... becoming loose.
10.0		5		<.25						
		6		<.25						
				<.25						
15.0				.5						(ML) Medium stiff, brown clayey silt.
		7		.75						(SM) Medium dense, brown, silty sand.
				1.0						
20.0		8								
				1.5						(ML) Medium stiff, brown clayey silt.
		9		1.5			30	41	23	(CL) Medium stiff, gray to brown silty clay.
				1.0						
25.0		10		1.5						
				2.5						(CH) Stiff, gray clay.
				1.5						
		11								
				1.0						
30.0				.25						(SP) Loose, coarse, gray sand.
		12								(CH) Very stiff, brown clay.
				2.5						
				2.5						
		13		3.5						... becoming stiff.
35.0				2.0						
				1.5						
		14		2.0						
				2.5						... becoming very stiff.
				2.5						
40.0										Teminated boring at a depth of 39.5 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.9 ppg.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-10

Location: Monroe, Louisiana S 1,076.0 E 110.0
Elevation: 72.0 msl
Job No: 24379-002-137
Date: 07-28-
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0										(SM) Loose, brown, silty sand.
		1		1.5	1.08	103	21	27	9	(CL) Stiff, brown, silty clay.
5.0		2		2.0 3.0 4.0						... becoming very stiff with gray mottling.
		3 4		<.25						(ML) Loose, reddish brown, sandy silt with clay lenses and silty sand layers
10.0		5		<.25						
	X	6		2/2/2						
15.0		7		<.25 <.25		101	25	26	7	Kv = 2.9 x 10(-7) cm/sec Kh = 1.0 x 10(-6) cm/sec (90% finer than No. 200 sieve)
20.0		8 9		<.25 <..25						
25.0		10		1.5						(CL) Stiff, tan and gray, silty clay with traces of sand.
		11		1.75 2.0						
30.0		12								
		13								
35.0		14		2.0 2.0	1.63		24	45	26	
40.0		15								(CH) Very stiff, gray clay.
45.0										Teminated boring at a depth of 41 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.8 ppg.
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-11

Location: Monroe, Louisiana S 1,276.0 W 256.0
Elevation: 79.0 msl
Job No: 24379-002-137
Date: 07-31-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0				2.0						(SM) Stiff, brown, silty sand.
		1		1.75						(ML) Medium stiff to stiff, brown clayey fine sand, with gray mottling.
				.75						
		2		1.5						
5.0				1.75						
				1.0						
		3		3.5						
				2.0						
				.75						
10.0		4		.75						
				1.0						
				.5						... with yellowish red mottling.
		5		2.5						
				1.5						
15.0				.75						(CL) Medium stiff to stiff, gray, silty clay with yellowish red mottling.
		6		1.5						
				1.5						
				.75						
		7		1.0						... becoming soft to very soft, gray, sandy, silty clay.
20.0				.25						
				.5						
		8		.25						
				<.25						
				<.25						(SM) Very loose to loose, gray, silty sand.
25.0		9		.25						
				.25						
				.25						
		10		.5						
30.0				.5						
				.5						
		11		.25						(CL) Soft, gray, silty clay.
				.25						
				.25						(SM) Soft, gray, silty sand.
		12		.5						(CL) Soft to medium stiff, gray silty clay, with trace of rootlets.
35.0				1.25						
				.75						
		13		.5						
				1.0						(SP) Loose, gray, coarse to fine sand.
40.0				.25						
		14		.5						
				.75						
				2.5						(CH) Very stiff, brown clay, with trace of silt.
		15		2.5						
45.0				2.5						... becoming greenish gray clay, silt pockets.
				3.0						
		16		2.5						
				2.5						(SM) Dense, greenish gray silty sand with rootlets.
50.0		17		2.5						

NOTES: Terminated boring at a depth of 51 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.9 ppg.

PROJECT: Riverwood International Surface Impoundment Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

LOG OF BORING DM-12

Location: Monroe, Louisiana S 802.0 E 76.0
Elevation: 72.0 msl
Job No: 24379-002-137
Date: 07-28-
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0				1.5						(SM) Medium dense, brown, silty sand.
				2.0						(ML) Very stiff, brown, clayey silt.
		1		3.5						(CL) Very stiff to hard, brown silty clay
				1.5						
5.0		2		>4.5						
				4.0						
				1.5						
		3		2.0						
				1.5						(SM) Dense, brown, silty sand.
10.0		4								
	X	5		2/3/3						... with clayey lenses
				<.25						(CL) Very soft, brown silty clay.
15.0		6		1.5						(SM) Loose, brown, silty sand.
	X	7		2/4/4						
	X	8		1/2/3						
20.0	X	9		4/6/8						(SM) Medium dense, brown silty sand.
	X	10		1/1/1						... becoming very loose and wet.
25.0		11		<.25						
		12		<.25						
30.0				<.25						
		13								
				1.5						(CH) Stiff, gray clay.
				2.0						
35.0		14		1.5						
				1.5						
				2.0						
		15		2.0						
40.0		16		.75						...becoming softer.
				<.25						(SM) Very loose to loose, gray, fine, silty sand.
										Teminated boring at a depth of 41 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 14.0 ppg.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-13

Location: Monroe, Louisiana S 324.0 E 302.0
Elevation: 71.4 msl
Job No: 24379-002-137

Date: 07-27-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0				<.25						(SM) Loose, brown, silty sand.
				.5						(ML) Soft, brown, sandy silt.
		1		2.0						... becoming stiff, brown, clayey silt.
				1.75			22	30	13	
5.0		2		2.0						(CL) Stiff, brown, silty clay.
				2.0						
				<.25						(ML) Very soft, brown, clayey silt.
		3		<.25						
10.0										(SM) Very loose to loose, brown silty sand.
		4		<.25						
		5		<.25						
15.0										
		6		<.25						
		7		<.25						
20.0										
				<.25	.96	98	25			... becoming more clayey.
		8		<.25						(CL) Very soft, gray silty clay.
				<.25						(SM) Very loose, gray, silty sand.
25.0										
		9		<.25						(CL) Very stiff to stiff, gray, silty clay.
				2.5						
				2.0			32	47	28	
30.0		10		2.0						
										(SM) Loose, gray, silty sand.
		11		<.25						
										... becoming coarse sand.
				<.25						... becoming silty sand.
35.0		12		<.25						
		13		<.25						
40.0										Teminated boring at a depth of 40 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 14.0 ppg.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-14

Location: Monroe, Louisiana N 114.0 E 82.0
Elevation: 68.0 msl
Job No: 24379-002-137
Date: 07-29-9
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1		1.0						(CL) Stiff, brown clay with trace of silt.
				2.0						... becoming gray.
		2		2.5						(SM) Medium dense to loose, gray, silty sand.
		3		5/4/5						
5.0				1.5						(CL) Stiff, gray silty clay with brown mottling.
		4		1.75						
				1.25						
				1.75						
		5		1.5						
10.0				1.75						
				1.25						
		6		.75						(SM) Loose to medium dense, brown, silty sand.
		7		2.0						
				.75						
15.0		8								
		9								... with coarse to medium sand layers.
20.0		10		2/4/6						
		11		5/2/4						... with medium to fine sand.
										(CL) Medium stiff, gray silty clay.
		12		.5						
25.0				.75						
				1.0						
		13		<.25						(SM) Loose, gray, silty sand.
				<.25						
				.5						
30.0		14		2.25						(ML) Very stiff to stiff, gray clayey silt with coarse sand lenses.
				2.5						
				2.0						
		15		1.5						(CH) Very stiff, brown clay with trace of silt.
				2.5						
35.0				2.5						
				2.5						... with gray mottling.
				3.0						
		16		3.5						
				2.5						
40.0										Teminated boring at a depth of 40 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.7 ppg.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-15

Location: Monroe, Louisiana S 51.0 E 489.0
Elevation: 69.9 msl
Job No: 24379-002-137

Date: 07-27-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0				.75						(SM) Medium stiff, brown, silty sand.
		1		2.0						(CL) Stiff, brown, silty clay.
				2.0						(ML) Stiff, brown, clayey silt to silty clay.
		2		1.75			22	40	22	(CL) Stiff, brown silty clay.
5.0				1.5						
		3		<.25						(SM) Loose, brown, silty sand.
10.0		4		<.25						(ML) Very soft, brown clayey silt.
		5		<.25						(SM) Loose, brown, silty sand.
15.0		6		<.25						
		7		<.25						
20.0				<.25						(SM) Loose, brown, silty sand.
		8		.75						(CL) Medium stiff, brown and gray silty clay to clayey silt.
				.75						
25.0		9		.25						
				1.25						
		10		.5						(SM) Loose, gray, silty sand.
30.0				.50						
		11		.5		89	35	53	32	(CH) Medium stiff, gray clay with trace of roots, silt pockets and concretions. Kv = 8.1 x 10(-8) cm/sec Kh = 1.3 x 10(-7) cm/sec
				.75						
35.0		12		.5						(SP-SM) Medium dense, gray silty sand; grading to coarse gray sand.
		13		6/7/8						(ML) Medium dense, clayey sand with sand layers.
40.0										Teminated boring at a depth of 39 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 14.0 ppg.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-16

Location: Monroe, Louisiana S 501.0 E 490.0
Elevation: 71.9 msl
Job No: 24379-002-137
Date: 07-29-(
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	X	1		2/2/4						(SM) Loose, brown, silty sand.
		2		1.5 2.0						(ML) Stiff, clayey silt.
5.0		3		2.25 2.75			40	72	49	(CH) Stiff, brown silty clay.
		4		1.75 .25 .25 .25						(SM) Loose, brown, silty sand.
10.0		5		.50 .25 <.25						
15.0		6		<.25 1.0 1.5						(ML) Stiff, brown, clayey silt.
		7		1.25 1.0 <.25						(SM)Medium dense, brown silty sand. ... becoming loose.
20.0		8		.75 1.0 1.5						(CL) Medium stiff, brown, silty clay.
25.0		9		1.0 .5 1.0						(CH) Medium stiff to stiff, gray, silty clay.
		10		1.5 1.75 <.25						
30.0		11		<.25 2.5						(SP) Loose, coarse to medium, gray sand, very wet.
		12		2.0 1.5						(CL) Stiff, gray, silty clay.
35.0		13		1.25 1.0 1.0			22	31	14	... with trace of medium sand.
40.0		14		1.5						
45.0										Teminated boring at a depth of 41 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 14.0 ppg.
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-17

Location: Monroe, Louisiana S 252.0 E 871.0
Elevation: 70.5 msl
Job No: 24379-002-137

Date: 07-27-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	X	1		6/4/4						(ML) Loose, brown, sandy silt.
	X	2		6/4/5						... becoming clayey silt.
										(CL) Medium stiff, brown, silty clay.
				.75						
5.0		3		2.5						... becoming very stiff.
				2.5						
		4		.5						(ML) Soft, brown sandy silt.
				<.25						
10.0		5			.39	96	27			... becoming clayey silt.
		6		<.25						
15.0										(CH) Very soft to soft, brown silty clay.
		7		<.25						
		8								
20.0										
		9		1.5	.55	91	30	52	31	... becoming medium stiff.
25.0		10		1.5						... becoming gray.
		11		<.25						(SM) Loose, light brown to gray, silty fine sand.
30.0				.5						(CH) Stiff, gray clay.
		12		2.0						
		13		2.0		72	44	77	57	... becoming silty clay with pea size gravel.
35.0										Kv = 1.2 x 10(-8) cm/sec
				2.0						Kh = 2.1 x 10(-8) cm/sec
		14		.5						(ML) Medium stiff, clayey silt with thumb size gravel.
40.0										Teminated boring at a depth of 39 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 14.0 ppg.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-18

Location: Monroe, Louisiana N 68.0 E 1,252.0
Elevation: 70.0 msl
Job No: 24379-002-137

Date: 07-23-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1		2/4/5			23	27	9	(CL) Soft, tan and gray, silty clay with clayey silt layers.
										(SM) Medium dense, brown and yellow silty sand.
5.0		2		1.25		94	29	46	27	(CL) Stiff, brown and gray, silty clay with sandy clay layers. Kv = 3.6 x 10(-9) cm/sec Kh = 1.2 x 10(-8) cm/sec
		3		2.25						
				2.0						... becoming stiff brown clay.
10.0		4		<.25						(SM) Medium dense to loose, silty sand.
				<.25						(ML) Very soft, brown clayey silt, very wet.
		5		<.25						
		6		<.25						
15.0		7		<.25	.26	92	30	26	7	
		8		<.25						
		9		.5						(CL) Medium stiff, brown and gray, silty clay.
				1.0						
20.0				.5						
		10		.75						
		11		2.0						(CH) Stiff, brown and gray clay.
25.0		12		.5						... becoming medium stiff. ... becoming gray with brown silty clay.
		13		1.0						
		14		1.5						(ML) Stiff, gray, clayey silt.
30.0		15		1.0						(CH) Stiff to very stiff, brown clay with lenses of gray sand.
		16		2.75	1.51	87	32	66	44	
		17		2.5						... becoming gray with brown mottling.
35.0		18		2.5						
		19		1.5						... becoming gray clay.
		12		3.5						
40.0										Teminated boring at a depth of 39 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.9 ppg.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International Surface Impoundment Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-19

Location: Monroe, Louisiana N 119.0 E 1,871.0
Elevation: 70.0 msl
Job No: 24379-002-137

Date: 07-22-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	X	1		1/5/5						(SM) Loose to medium dense, brown silty sand.
	X	2		4/6/6						(CL) Stiff, brown silty clay with very fine silty sand.
5.0										... with gray mottling and sand pockets.
		3		1.5						(CH) Very stiff, brown clay with some organics, black streaks.
		4		2.5						
10.0		5		2.0						... becoming brown without organics.
		6								(SP-SM) Loose, brown, silty sand grading to medium fine sand.
15.0	X	7		1/2/2						(ML) Loose, brown silt with trace of silty clay.
	X	8		1/1/1						(CL) Soft, brown, silty clay, very wet.
20.0										(CH) Medium stiff, brown clay with dark brown to reddish mottling.
		9		1.5						
		10		1.5						... becoming brown clay.
25.0		11		1.5						... becoming gray with brown mottling.
		12		1.25						
		13		1.5						
30.0		14		2.25						... becoming very stiff with brown mottling.
		15								
		16		2.0						
		17		1.75						
35.0										... becoming gray with brown and yellowish mottling.
		18								
		19		2.75						
		20		3.75						
40.0										Teminated boring at a depth of 39 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 14.0 ppg.
45.0										
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-20

Location: Monroe, Louisiana N 93.0 E 870.0
Elevation: 71.6 msl
Job No: 24379-002-137

Date: 07-24
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0	X	1		2/9/15						(SM) Medium dense, brown silty sand grading to clayey silt.
	X	2		3/5/5						(ML) Medium dense, brown, clayey silt.
5.0		3		<.25			27			
		4		2.25						... becoming loose.
										(CL) Stiff, brown, silty clay.
		5		.5	1.30	96	25			
10.0		6		.75						(SM) Loose, brown, silty sand.
		7		.25						
		8		.5						(ML) Very soft, brown, clayey silt with clay lenses and pockets.
15.0		9		<.25						
		10		<.25						
		11		<.25		104	23	23	6	Kv = 1.5 x 10(-6) cm/sec
		12		<.25						Kh = 2.4 x 10(-4) cm/sec
20.0		13								
		14								
		15								
25.0		16								(CL) Medium stiff, brown, silty clay.
		17								... becoming gray.
		18								
										(CH) Stiff, gray clay with yellowish brown mottling.
30.0		19								
		20								
										(ML) Stiff, gray, clayey silt with yellowish brown mottling.
		21								
		22								
35.0	X	23		4/16/14						(SP-SM) Medium dense, gray, silty sand.
	X	24		2/5/7						... becoming brownish yellow medium sand.
	X	25		2/2/3						(CL) Soft, gray silty clay; grading to clay.
40.0										(CH) Very stiff, gray clay.
				2.0						
										(ML) Loose, gray, clayey silt.
				.5						(SP-SM) Medium dense gray clayey sand with silty sand layers.
45.0		26		1.0		106	21	26	7	Kv = 5.1 x 10(-6) cm/sec
										Kh = 2.1 x 10(-4) cm/sec
		27		<.25						
50.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING DM-20

Location: Monroe, Louisiana N 93.0 E 870.0
Elevation: 71.6 msl
Job No: 24379-002-137
Date: 07-24-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
		28		<.25		102	25	28	9	Kv = 6.4 x 10(-6) cm/sec
				1.75						Kh = 7.5 x 10(-4) cm/sec
55.0										(CL) Stiff, gray to reddish brown, silty clay.
60.0		29		1.75	1.25	84	36			... with pockets of sandy silt.
65.0		30		2.0						... becoming stiff, gray, silty clay.
										... becoming hard.
70.0		31		>4.5						(ML) Hard, dark gray silt.
75.0		32		>4.5						... becoming clayey silt.
80.0		33								(CL) Hard, dark gray silty clay.
85.0		34		>4.5						... with small sandstones and gravel lenses.
90.0		35		>4.5						... with coarse sand lenses.
95.0		36		>4.5						
		>4.5								
100.0										Teminated boring at a depth of 100 feet. Grouted borehole full depth with a grout mix of 5% Bentonite and a slurry weight of 13.5 ppg.
105.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING BOR-1

Location: Monroe, Louisiana
Elevation: 67.7 msl
Job No: 24379-002-137

Date: 07-31
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1		<.25						(SM) Loose, light brown to brownish yellow, silty sand.
		2		9/20/22						(ML) Dense, light brown to brownish yellow, sandy silt.
		3		9/9/10						... becoming medium dense.
5.0										... becoming gray.
										... no return.
				1.5						(CH) Medium stiff to stiff, gray and brown clay.
				2.0						
		4		2.5						... same.
10.0				2.5						
				1.75						
		5		2.5						... same.
				2.0						
				2.5						
15.0		6		<.25						(SM) Loose, brown, silty sand.
				<.25						
				1.75						(CL) Stiff, brown, silty clay.
										(ML) Stiff, brown, clayey silt.
		7		1.5						(SM) Stiff, brown to gray, silty sand
										(CL) Stiff, gray, silty clay.
				2.0						(SM) Stiff to medium stiff, silty sand.
20.0				2.0						(CL) Very stiff, gray with brown mottling, silty clay to clay.
				2.5						
				2.0						
		8		1.5						... same.
				1.5						
25.0				2.75						

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING BOR-2

Location: Monroe, Louisiana
Elevation: 65.5 msl
Job No: 24379-002-137

Date: 07-31-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0				<.25						(SM) Loose to dense, brown to light brown, silty sand.
		1								
				2.5						
				.25						... with traces of clay.
										(CL) Brown to light brown, silty clay.
		2		<.25						(SM) Soft, gray, silty sand.
5.0				<.25						
				.25						
										(ML) Medium stiff, gray, clayey silt.
		3		.50						(CL) Stiff, gray, silty clay.
				2.0						
				1.75						(CH) Very stiff, brown with gray mottling, clay with traces of silt.
10.0		4		2.0						
				2.0						
				2.25						
		5		2.5						... same.
				2.75						
15.0				2.0						
		6		2.25						... turning gray.
				2.75						
				1.75						
		7		1.25						... turning brown.
20.0				1.75						
				1.25						
				1.5						
		8		1.5						... same.
				1.5						
25.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-1

Location: Monroe, Louisiana N 849.0 E 497.0
Elevation: msl
Job No: 24379-002-137

Date: 06-17
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0										(SM) Gray and brown silty sand.
										▽ ... with trace of clay.
										... lost sample; too wet.
										... lost sample; too wet.
		1								(ML) Very soft, gray, slighty sandy, silty clay to clayey silt, wet.
5.0										... lost sample; too wet.
										Boring terminated at a depth of 6 feet and backfilled full depth.
10.0										
15.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-2

Location: Monroe, Louisiana N 1,036.0 E 947.0
Elevation: msl
Job No: 24379-002-137
Date: 06-17-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1					24	32	19	(SM) Gray with brown streaks, clayey and sandy silt.
										(CL) Gray with brown streaks, silty clay, with trace of sand.
										... same, soft to medium stiff, dry.
										... same, moist near bottom of sample.
		2					24	34	22	... sand, medium stiff, turning to gray.
										(CH) Stiff, brown silty clay, dry, grading to gray clay.
		3					40	81	52	... becoming gray.
5.0										Stiff, red to brown clay.
										... same, slightly moist.
										Stiff, reddish-brown clay, with gray mottling, dry, several small cobbles on bottom of sample.
										Stiff, dark gray to brown clay, dry.
										... same.
10.0										
										Soft to medium stiff, gray clay, dry.
										Stiff, brown to gray clay.
										... same, water in borehole.
										Boring terminated at a depth of 13 feet and backfilled full depth.
15.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-3

Location: Monroe, Louisiana N 1,266.0 E 1,258.0
Elevation: . msl
Job No: 24379-002-137
Date: 06-17-
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0										(SM) Silty sand, with roots.
										(ML) Very fine sandy silt, with roots.
										... same.
										(CL) Brown and gray mottled, silty clay to clayey silt.
										(ML) Very fine, sandy silt.
										Brown and gray mottled, clayey silt.
										(CH) Medium stiff, brown, silty clay.
5.0		1					35	60	44	
										Stiff, gray with brown staining, silty clay.
										Very stiff, reddish brown clay, slickensided, dry.
		2					35	78	49	... same, trace of silt.
										Gray to brown, clay, trace of silt, dry.
		3					42	95	68	... becoming very stiff, gray.
										... becoming dark gray.
10.0										... same.
										... same.
										Boring terminated at a depth of 12 feet and backfilled full depth.
15.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-4

Location: Monroe, Louisiana N 938.0 E 743.0
Elevation: msl
Job No: 24379-002-137
Date: 06-18-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0										(SM) Brown, silty sand.
										(ML) Gray to brown, sandy silty, with trace of clay.
										... same, grading to clay.
										(CH) Soft to medium stiff, gray to brown, silty clay.
		1					33	62	42	... becoming more clayey, moist.
5.0										Medium stiff, reddish brown to gray clay.
										... same.
		2					43	74	51	Reddish brown clay with nodules, blocky.
										... same.
										Stiff, brown to gray clay.
										... same.
10.0										... same.
		3					46	81	58	Stiff, brown clay, with nodules.
										Very stiff, gray to brown clay.
										Boring terminated at a depth of 13 feet and backfilled full depth.
15.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International Surface Impoundment Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-5

Location: Monroe, Louisiana N 154.0 E 1,542.0
Elevation: msl
Job No: 24379-002-137
Date: 06-18-
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1					28	63	42	(ML) Brown, sandy silt.
										(CH) Brown, silty clay.
		2					37	65	45	Brown, silty clay.
		3								Brown, silty clay.
5.0										
		4								(SM) Brown, silty sand, wet.
										Boring terminated at a depth of 8 feet and backfilled full depth.
10.0										
15.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-6

Location: Monroe, Louisiana N 219.0 E 1,237.0
Elevation: msl
Job No: 24379-002-137
Date: 06-18-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1								(SM) Brown, silty sand.
										(ML) Brown silt. Brown, clayey silt.
		2					26	56	40	(CH) Brown silty clay, highly plastic.
		3								Brown clay.
5.0										
		4					25	45	28	(CL) Brown clay.
										(ML) Brown, sandy silt.
10.0										Boring terminated at a depth of 10 feet and backfilled full depth.
15.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-7

Location: Monroe, Louisiana S 168.0 E 1,257.0
Elevation: msl
Job No: 24379-002-137

Date: 06-18-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1								(SP) Brown sand.
										(ML) Brown, sandy silt.
		2					31	67	53	(CH) Brown, silty clay. Brown, silty clay.
		3								Brown, silty clay.
5.0										
		4								(ML) Brown, sandy silt
										Boring terminated at a depth of 8 feet and backfilled full depth.
10.0										
15.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-8

Location: Monroe, Louisiana N 44.0 E 870.0
Elevation: msl
Job No: 24379-002-137
Date: 06-18-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1								(SM) Brown, silty sand.
										(CL) Brown, sandy, silty clay.
										Brown, silty clay.
		2								(CH) Brown clay.
		3					35	67	47	Brown clay.
5.0										
		4					28	42	26	Brown clay.
		5								(SM) Brown, silty sand.
10.0										Boring terminated at a depth of 10 feet and backfilled full depth.
15.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-9

Location: Monroe, Louisiana S 315.0 E 873.0
Elevation: msl
Job No: 24379-002-137

Date: 06-18
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1								(ML) Brown, sand silt.
										(SM) Brown, silty sand.
										(ML) Brown, clayey silt.
		2					31			(CL) Brown, silty clay.
										(CH) Brown, silty clay, highly plastic.
		3								
5.0										
										(SM) Brown, silty sand.
										Boring terminated at a depth of 8 feet and backfilled full depth.
10.0										
15.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-10

Location: Monroe, Louisiana N 145.0 E 489.0
Elevation: msl
Job No: 24379-002-137
Date: 06-19-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1								(SP) Brown sand.
										(CH) Gray clay.
		2					40	59	44	Gray clay.
		3								Gray clay.
5.0										
		4								Brown clay.
		5								Brown clay.
10.0		6					34	58	36	Brown to gray clay.
										Boring terminated at a depth of 12 feet and backfilled full depth.
15.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-11

Location: Monroe, Louisiana S 230.0 E 486.0
Elevation: msl
Job No: 24379-002-137

Date: 06-19-
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1								(SP) Brown sand.
										(SM) Brown, silty sand.
										(ML) Brown, sandy silt.
		2					22	30	15	(CL) Brown, silty clay.
		3					36	64	45	(CH) Brown clay.
5.0										
		4								Brown clay.
		5								(SM) Brown, silty sand.
10.0										Boring terminated at a depth of 10 feet and backfilled full depth.
15.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-12

Location: Monroe, Louisiana S 660.0 E 490.0
Elevation: msl
Job No: 24379-002-137
Date: 06-19-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1								(ML) Brown, sandy silt.
										(SM) Brown, silty sand.
										(ML) Brown, clayey silt.
		2								Brown, clayey silt.
										(CL) Brown, silty clay.
		3					37	71	48	(CH) Brown clay.
5.0										
		4								Brown clay.
		5								(SM) Brown silty sand.
10.0										Boring terminated at a depth of 10 feet and backfilled full depth.
15.0										

NOTES:

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-13

Location: Monroe, Louisiana S 192.0 E 72.0
Elevation: msl
Job No: 24379-002-137

Date: 06-19-(
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1								(SM) Brown, silty sand.
										(ML) Brown, sandy silt.
		2					24	23	6	Gray, clayey silt.
		3								(SM) Gray, silty sand.
5.0										
										Boring terminated at a depth of 6 feet and backfilled full depth.
10.0										
15.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG OF BORING HB-14

Location: Monroe, Louisiana S 665.0 E 75.0
Elevation: msl
Job No: 24379-002-137

Date: 06-19-92
Approved:

DEPTH IN FEET	SAMPLE	SAMPLE NUMBER	SYMBOL	BLOW COUNT OR PENETROMETER (tsf)	LABORATORY TESTS: COMPRESSIVE STRENGTH (tsf)	DRY DENSITY (pcf)	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX	DESCRIPTION OF STRATUM
0.0		1								(SM) Brown, silty sand.
										(ML) Brown, sandy silt.
		2					24			(CH) Brown clay.
		3								(SM) Brown, silty sand.
		4								(SP) Fine, brown sand.
5.0										
										Boring terminated at a depth of 6 feet and backfilled full depth.
10.0										
15.0										

NOTES:

PROJECT: Riverwood International
Surface Impoundment
Monroe, LA

NR = NO RECOVERY; N = BLOWS PER FOOT

UNIFIED SOIL CLASSIFICATIONS BASED ON FIELD VISUAL OBSERVATIONS AND LIMITED LABORATORY TESTING

DAMES & MOORE
Baton Rouge, Louisiana

LOG AND PIEZOMETER CONSTRUCTION DETAILS OF BORING PZ-1

Location: Monroe, Louisiana
LS Elev: 68.50 msl

Approved:

DEPTH IN FEET bls	SAMPLE	SAMPLE NUMBER	PENETROMETER (tsf)	USCS SYMBOL	LITHOLOGY	PIEZ.	CONSTRUCTION (bls)
0.0			<.25		(ML) Very soft, brown, sandy silt.		
					(CL) Very stiff, brown, silty clay.		
			2.25				Cement Grout 0.0'- 5.5'
		1	3.25		Very stiff, brown, silty clay.		
			1.75		(CH) Stiff, brown clay, with dark brown mottling.		2" Diameter Sch 40 PVC Blank Casing 0.0'- 10.0'
		2	1.75				
5.0			2.75				
					(SM) Dense, brown, silty sand, with traces of clay.		Bentonite Seal 5.5'- 8.0'
			2.0				
		3	1.75				
			2.0		... same.		Filter Sand Pack 8.0'- 20.0'
			<.25				
10.0		4			... becoming medium dense, sandy silt to silty sand.		
			.25		... same.		
		5					2" Diameter Slotted PVC Screen 10.0'- 20.0'
			.50		... becoming more clayey.		
15.0							
		6	<.25		... same.		
		7	.5		(CL) Soft to stiff, brown, silty clay.		
			1.75				
20.0							Bottom of Borehole 20.0'

NOTES:

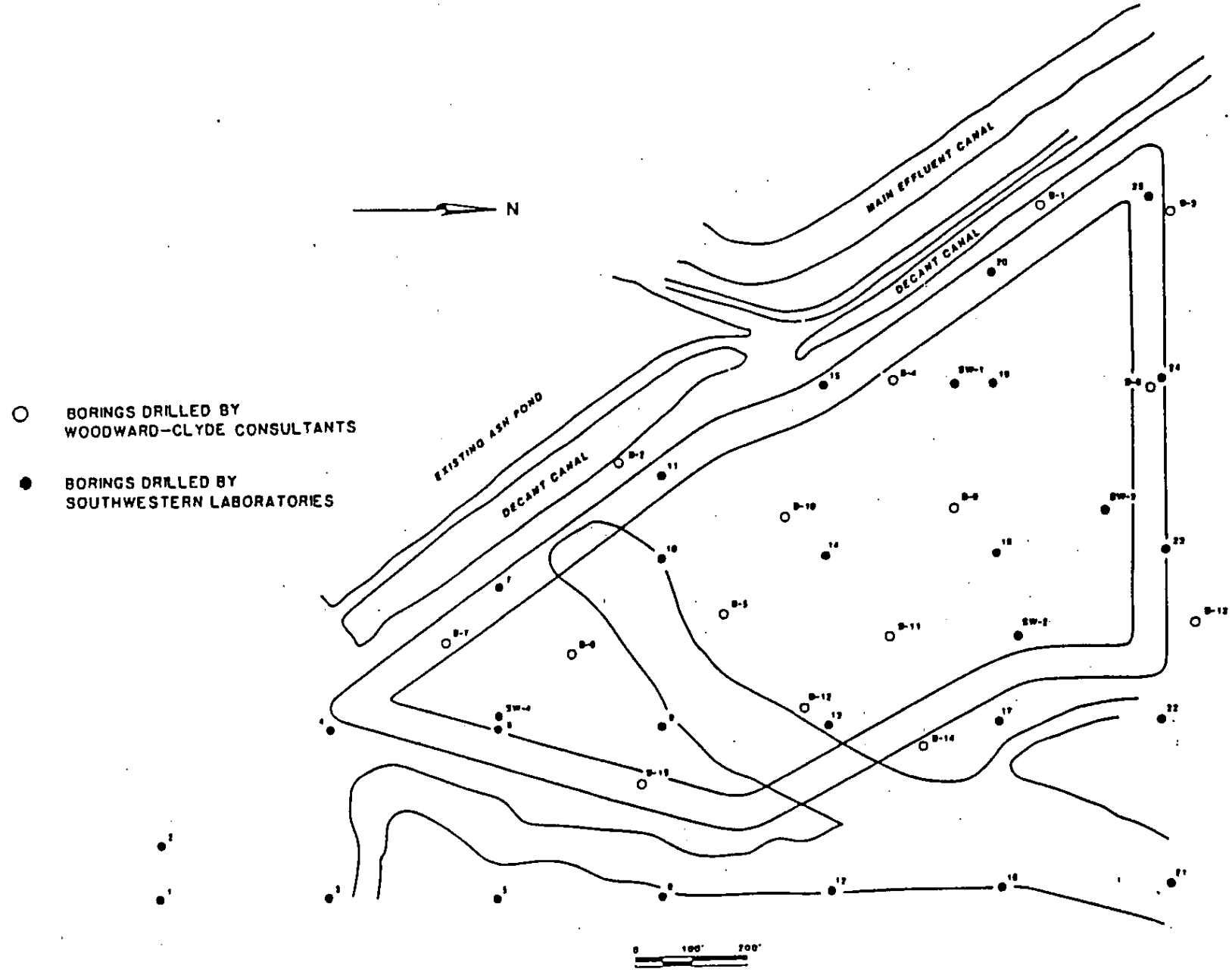
PROJECT: Riverwood International
FOR: Surface Impoundment
JOB #: 24379-002-137

DAMES & MOORE
Baton Rouge, Louisiana

Date: 07-31-92

BORING LOGS

EXISTING 21-ACRE ASH/SLUDGE IMPOUNDMENT



ERM-Southwest, inc.

NEW ORLEANS, LOUISIANA HOUSTON, TEXAS

DATE W.O.NO.

BORING LOCATIONS
PROPOSED SURFACE IMPOUNDMEMT
MANVILLE

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundment
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: SW-1

DATE: 11-14-85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.: Ayman Chamaa

DRY AUGER ☐ DRILL RIG ☐
WASH BORING ☐

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	LABORATORY DATA: COMPRESSIVE STRENGTH (TSF)	M C (%)	D D (PCF)	L L (%)	P I (%)	K	DESCRIPTION OF STRATA
										Brown & gray silty clay (CL)
					17.9		33	12		Brown & gray silty clay (CL)
	5								H .10	Brown & gray silty clay (CL)
				1.5	16.7	105	32	11		Tan & gray sandy clay (CL)
	10									Tan & gray silty sand w/gravel (GM)
	15									Silty sand gravel (GM)
	20				33.4		42	17	V 1.04	Brown, tan & gray sandy clay layers (CL)
	25				30.9					Brown sandy silty clay (CL)[1]
	30				30.8		41	25	V .71	Brown sandy silty clay (CL)
	35									Bottom of boring at 30 feet.

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

1. 61% passing No. 200 sieve
Ground Elevation 73.2
V - Vertical Permeability
H - Horizontal Permeability

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundment
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: SW-2

DATE: 11-14-85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.: Ayman Chamaa

DRY AUGER | DRILL RIG
WASH BORING

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	LABORATORY DATA: COMPRESSIVE STRENGTH (TSF)	MC (%)	DD (PCF)	LL (%)	PI (%)	K	DESCRIPTION OF STRATA
					19.0		26	8		Brown silty sandy clay (CL)
				3.0	17.0	102				Gray silty sandy clay (CL)
	5				16.1		25	8	H 3.15	Gray sandy clay (CL)
				4.2	11.5	112			V .05	Gray sandy clay (CL)
					10.4		22	8		Gray clayey sand (SC)
	10									
	15	X	30 B/F							Stiff brown sandy clay w/gravel(CL)
	20	X	50 B/F							Silty sand w/gravel (GM)
	25									Gray sandy clay (CL)
	30				32.7		41	21	V .10	
	35									Bottom of boring at 30 feet.

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

Ground Elevation 71.85
V - Vertical Permeability
H - Horizontal Permeability

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation

JOB NO.: 853474

LOCATION (PARISH): Ouachita Parish

BORING NO.: SW-3

DATE: 11-14-85

DRILLING CONTRACTOR: Southwestern Laboratories

TECH./ENGR.: Ayman Chamaa

DRY AUGER DRILL RIG
WASH BORING

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	LABORATORY DATA: COMPRESSIVE STRENGTH (TSF)	M C (%)	D D (PCF)	L L (%)	P I (%)	K	DESCRIPTION OF STRATA
										Gray sandy clay (CL)
				4.5	12.7	111				Gray sandy clay (CL)
	5				12.7		29	11		Gray sandy clay (CL)
				1.0	16.0	105	28	8		Gray sandy clay (CL)
									H 2.61	Gray sandy clay (CL)
	10									
	15									Gray sandy silt w/gravel (GM)
	20				30.9		45	20		Gray silty clay w/sand layers (CL)
	25									Gray silty clay w/sand layers (CL)
					31.3		46	30	V .07	Gray silty clay (CL)
	30									
	35									Bottom of boring at 30 feet.

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

Ground Elevation - 70.7
V - Vertical Permeability
H - Horizontal Permeability

LOG OF SOIL BORING

PROJECT: Geotechnical Evaluation Surface Impoundments
Manville Forest Products Corporation
LOCATION (PARISH): Ouachita Parish
BORING NO.: SW-4
JOB NO.: 853474
DATE: 11-14-85
DRILLING CONTRACTOR: Southwestern Laboratories
TECH./ENGR.: Ayman Chamaa

DRY AUGER ☐ WASH BORING ☐ DRILL RIG ☐

GROUND WATER LEVELS	DEPTH (feet)	SAMPLING	SPT (blows/foot) or P (TSF)	LABORATORY DATA: COMPRESSIVE STRENGTH (TSF)	MC (%)	DD (PCF)	LL (%)	PI (%)	K	DESCRIPTION OF STRATA
										Brown & gray sandy clay (CL)
					39.8		25	8	H .23	Brown & gray sandy clay (CL)
	5									Tan & gray sandy clay (CL)
				0.9	38.4	75	40	19		Tan & gray sandy clay (CL)
	10								V .19	Tan silty clay (CL)
	15					97	27	5		Tan & brown clayey sand (SC)
	20									Tan clayey silty sand (SC)
	25		1B/F18'		31.1		33	13		Tan sandy clay (CL)
	30									Tan sandy clay (CL)
	35									Bottom of boring at 30 feet.

KEY

- SHELBY TUBE
- STANDARD PENETRATION TEST
- GROUND WATER FIRST ENCOUNTERED
- STATIC GROUND WATER LEVEL (AFTER _____ HOURS)
- P POCKET PENETROMETER
- M C MOISTURE CONTENT
- D D DRY DENSITY
- L L LIQUID LIMIT
- P I PLASTICITY INDEX
- K PERMEABILITY 10^{-7} cm/sec

REMARKS

Ground Elevation 70.6
V - Vertical Permeability
H - Horizontal Permeability

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-1
FILE 84C5221
DATE 03/06/85
TECHNICIAN JOH
APPROVED adp
PAGE 1 of 1

DRY AUGERED 0' to 20' WASH BORED 20' to 38'

Water entered the borehole at 18.5' during dry augering; rose to 10'8" after 15-minute observation period.

Approx. Surface Elev. = 80'

Depth (feet)	S.P.T. (b/ft) or Pen. Res. (TSF)	Compressive Strength (TSF)	Moisture Content (%)	Dry Density (PCF)	L.L. (%)	P.I. (%)	Description of Stratum
0							Stiff dark gray, brown and reddish-tan Sandy Lean CLAYS (FILL)
			29	92			
5							---becoming more sandy
			20	102			---becoming medium
			18	109			Stiff tan and light gray Fat CLAYS with sand streaks and pockets and traces of fine gravel
10	3.7						
			13	120			
15			14				Very stiff tan, brown, and light gray SANDS/ CLAYS/GRAVELS with clay pockets
20	21 b/f					(1)	Firm tan and light gray fine Silty SANDS with traces of coarse sands and gravels
	27 b/f						
	22 b/f						---with clay layer
25	30 b/f		34		49	26	Hard tan, brown and reddish-tan Lean CLAYS with laminated clayey silt lenses
	45 b/f						
30	33 b/f		34		51	31	Laminated lenses of hard gray CLAYS, Lean CLAYS, and Clayey SILTS with traces of fine sands
	34 b/f						
	39 b/f						
35	30 b/f						
	34 b/f						
40							Bottom of boring at 38' Borehole grouted full depth

Notes:

(1) 12.6% passing No. 200 sieve

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-2
FILE 84C5221
DATE 03/07/85
TECHNICIAN JOH
APPROVED [illegible]
PAGE 1 of 1

DRY AUGERED 0' to 14'. WASH BORED 14' to 34'

Water entered the borehole at 12' during dry augering; remained at 12' after 15-minute observation period.

Approx. Surface Elev. = 77'

DEPTH (FEET)	SAMPLE	S.P.T. (BPF) OR PEN. RES. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LL (%)	PI (%)	DESCRIPTION OF STRATUM
0				16	111			Stiff tan, light gray, and reddish-tan Sandy Lean CLAYS with sand lenses, streaks, and pockets and traces of fine gravel (FILL)
5				27	98			Stiff tan and light gray Fat CLAYS ---with sand pockets, 4-6'
				27	91			---with organics
10								---with sand pockets
				36	84			---with traces of sands and silts
15		2.0		42		96	69	---becoming very stiff with calcareous nodules
				24		40	20	Medium tan and light gray Sandy Lean CLAYS with sand lenses, streaks, and pockets
20							(1)	Firm tan and light gray fine Silty SANDS with clay pockets
	X	26 b/f						
25	X	50/10"						---becoming very dense
	X	33 b/f		37		60	37*	Laminated layers of gray Fat CLAYS and SILTS with traces of fine sands
	X	27 b/f						
30	X	31 b/f						
	X	28 b/f						
35								Bottom of boring at 34' Borehole grouted full depth

Notes:

(1) 61.1% passing No. 200 sieve
* Limits performed on clayey portion of sample

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-6
FILE 84C5221
DATE 03/11/85
TECHNICIAN JOH
APPROVED
PAGE 1 of 1

DRY AUGERED 0' to 6' WASH BORED 6' to 14'

Water entered the borehole at 6' during dry augering; rose to 2' after 15-minute observation period.

Approx. Surface Elev. = 70'

DEPTH (FEET)	SAMPLE	S.P.T. (BLOWS/FT) or PEN. RES. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LL (%)	PI (%)	DESCRIPTION OF STRATUM
0								Loose light gray and tan SILTS with roots and organics
				26	97			---with clay pockets
5				25	98		(1)	
		1.5		27		61	41	Stiff to very stiff brown, tan and light gray Fat CLAYS
		1.5					(2)	---with silt streaks and pockets, 6'-8'
10								
								Laminated lenses and seams of tan, brown and reddish-tan Lean CLAYS and Sandy SILTS
15								Bottom of boring at 14' Borehole grouted full depth

Notes:

(1) 84.1% passing No. 200 sieve
(2) $k = 1.8 \times 10^{-8}$ cm/sec

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-3
FILE 84C5221
DATE 03/14/85
TECHNICIAN JOH
APPROVED [signature]
PAGE 1 of 1

DRY AUGERED 0' to 16' WASH BORED 16' to 30'

Water entered the borehole at 16' during dry augering; rose to 9'6" after 10-minute observation period.

Approx. Surface Elev. = 76'

DEPTH (FEET)	SAMPLE	B.P.T. (BLOWS) OR PST. PEN. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0				14	118			Stiff brown and gray Sandy Lean CLAYS with sand and silt pockets
5				16		31	16	Stiff reddish-tan and light gray Sandy Lean CLAYS with sand streaks and pockets
		4.5		16	115			
								---becoming very stiff to hard
		3.5		14		41	29	
10								
								Tan and light gray fine Silty SANDS with traces of medium and coarse sands
15		PS					(1)	---with clay, 12'-14'
								---with gravel below 16'
		NR						
20								Hard tan, brown and reddish-tan Lean CLAYS with laminated clayey silt lenses and seams
25								Hard gray CLAYS with laminated silt lenses
30								Bottom of boring at 30' Borehole grouted full depth

Notes:

PS = Pushed split spoon sampler
NR = No recovery
(1) 16.9% passing No. 200 sieve

WOODWARD-CLYDE CONSULTANTS

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-5
FILE 84C5221
DATE 84C5221
TECHNICIAN JQH
APPROVED adp
PAGE 1 of 1

DRY AUGERED 0' to 10' WASH BORED 10' to 26'

Water entered the borehole at 8' during dry augering; rose to 7' after 15-minute observation period.

Approx. Surface Elev. = 70'

DEPTH (FEET)	SAMPLE	S.P.T. (BLOWS) OR PET. PEN. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0				15	113	40	26	Very stiff tan, light gray and reddish-tan Lean CLAYS with sand streaks and pockets
5				16	115	31	(1) 17	Very stiff tan and light gray Sandy Lean CLAYS with clay pockets and traces of fine gravel
10		41 b/f					(2)	Dense tan and light gray fine Silty SANDS with traces of clays, medium sands, and fine gravels
		34 b/f						
15		32 b/f						
		38 b/f						
		39 b/f		37			NP	Laminated lenses of tan, brown, and light gray SILTS, Clayey SILTS and Sandy SILTS with clay pockets
20		30 b/f						Laminated layers of hard gray CLAYS and Sandy SILTS
		34 b/f						
25		43 b/f						
								Bottom of boring at 26' Borehole grouted full depth
30								

Notes:
NP = Non plastic
(1) $k = 5.8 \times 10^{-8}$ cm/sec
(2) 16.9% passing No. 200 sieve

WOODWARD-CLYDE CONSULTANTS

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-7
FILE 84C5221
DATE 03/10, 11/85
TECHNICIAN JOH
APPROVED [signature]
PAGE 1 of 1

DRY AUGERED 0' to 4' WASH BORED 4' to 30'

Water entered the borehole at 4' during dry augering; rose to 6" after 15-minute observation period.

Approx. Surface Elev. = 71'

DEPTH (FEET)	SAMPLE	S.P.T. (BLOWS) OR PKT. PEN. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0				26	88			Very soft tan and light gray Lean CLAYS with clay pockets, large roots, and organics ---becoming medium to stiff
5		1.7		24		59	40	Very stiff gray and reddish-brown Fat CLAYS with traces of silts
		2.5		33	87			
		2.5		35		86	59	
10				24		28	11*	Alternating layers of reddish-tan Sandy SILTS with traces of clays and Lean CLAYS
		0.5						
15								
		PS						
20								
25								Stiff gray Lean CLAYS
		1.5						Stiff gray Fat CLAYS
30								Bottom of boring at 30' Borehole grouted full depth

Notes:

PS = Pushed split spoon sampler
* Limits performed on Lean Clay portion of sample

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-8
FILE 84C5221
DATE 03/13/85
TECHNICIAN JOB
APPROVED adp
PAGE 1 of 1

DRY AUGERED 0' to 14' WASH BORED 14' to 30'

Water entered the borehole at 14' during dry augering; rose to 6'6" after 15-minute observation period.

Approx. Surface Elev. = 70'

DEPTH (FEET)	SAMPLE	S.P.T. (B.T.) OR PET. PEN. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0								Medium tan and light gray Sandy Lean CLAYS
				28	92	67	46	Medium to stiff tan and light gray Fat CLAYS with sand streaks and pockets
5				17	114		(1)	---becoming very stiff
				18	115	43	31	---becoming sandy with traces of gravel
				16		27	14	Stiff to very stiff light gray and tan Sandy Lean CLAYS
10		PS					(2)	Brown and light gray Fine SANDS with traces of medium and coarse sands and fine gravel
15							(3)	Laminated lenses of tan, light gray, and reddish-tan fine Silty SANDS, Sandy SILTS, and SILTS
				30		47	24	---with lean clay lenses
20				34		79	52*	Laminated lenses of gray Sandy SILTS, SILTS and Fat CLAYS
25								
30								Bottom of boring at 30' Borehole grouted full depth

Notes:
PS = Pushed split spoon sampler
(1) k = 2.9×10^{-7} cm/sec
(2) 10.1% passing No. 200 sieve
(3) 52.5% passing No. 200 sieve
* Limits performed on clayey portion of sample

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-9
FILE 84C5221
DATE 03/12/85
TECHNICIAN JQH
APPROVED [illegible]
PAGE 1 of 1

DRY AUGERED 0' to 8' WASH BORED 8' to 30'

Water entered the borehole at 8' during dry augering; rose to 6' after 15-minute observation period.

Approx. Surface Elev. = 73'

DEPTH (FEET)	SAMPLE	B.P.T. (BLOWS) OR PST. PEN. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0				19		52	35	Very soft tan and light gray Fat CLAYS to Lean CLAYS with fine sand streaks and traces of fine gravel
5		3.7		17	108	45	31	
		3.5		15	113			Reddish-tan and light gray SAND/CLAY/GRAVEL
10							(1)	Reddish-tan and light gray fine Silty SANDS
15							NP	Laminated lenses and layers of tan, light gray and reddish-tan Lean CLAYS, Sandy SILTS, and fine Silty SANDS
20							(2)	Laminated lenses and layers of gray CLAYS and Sandy SILTS
25								
30								Bottom of boring at 30' Borehole grouted full depth

Notes:

NP = Non plastic
(1) 13.3% passing No. 200 sieve
(2) k = 5.6 x 10^{-6} cm/sec

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-10
FILE 84C5221
DATE 03/09/85
TECHNICIAN JQH
APPROVED [illegible]
PAGE 1 of 1

DRY AUGERED 0' to 14' WASH BORED 14' to 30'

Water entered the borehole at 4' during dry augering; borehole caved in at 1'.

Approx. Surface Elev. = 66.5'

DEPTH (FEET)	SAMPLE	S.P.T. (BLOWS) OR PEN. RES. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LL (%)	PI (%)	DESCRIPTION OF STRATUM
0								Very soft tan and light gray Fat CLAYS
				36	90	73	51 (1)	---with silt pockets, 0'-4'
5				37		82	58	---becoming very stiff
				25		79	54	---with traces of silts and sands
				27	97			Very stiff tan and light gray Sandy Lean CLAYS with silts
10								Tan and light gray fine Silty SANDS with clay lenses and pockets
15								
		PS						Hard gray CLAYS with laminated silt lenses
20		PS						
		PS						
25		PS						
		PS						
		PS						
30								Bottom of borehole at 30' Borehole grouted full depth

Notes:

PS = Pushed split spoon sampler
(1) k = 1.1 x 10^{-8} cm/sec

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-11
FILE 84C5221
DATE 03/12/85
TECHNICIAN JOH
APPROVED adp
PAGE 1 of 1

DRY AUGERED 0' to 14'

Water entered the borehole at 12' during dry augering; rose to 8' after 15-minute observation period.

Approx. Surface Elev. = 68'

DEPTH (FEET)	SAMPLE	S.P.T. (BLOWS) OR PEN. RES. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0								Medium tan and light gray Lean CLAYS
				18	108		(1)	Very stiff light gray and reddish-tan Sandy Lean CLAYS
5				17		44	30	
				15	117	24	(2) 13	Very stiff reddish-tan and light gray Sandy Lean CLAYS, Clayey SILTS, and Silty Fine SANDS with traces of fine gravel
							(3)	
10							(4)	Laminated lenses and layers of tan and light gray Sandy SILTS, SILTS, and hard Fat CLAYS
15								Bottom of boring at 14' Borehole grouted full depth

Notes:
(1) $k = 8.4 \times 10^{-9}$ cm/sec
(2) $k = 1.6 \times 10^{-6}$ cm/sec
(3) 15.6% passing No. 200 sieve
(4) 88.3% passing No. 200 sieve

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-12
FILE 84C5221
DATE 03/09/85
TECHNICIAN JOH
APPROVED [illegible]
PAGE 1 of 1

DRY AUGERED 0' to 12' WASH BORED 12' to 20'

Water entered the borehole at 12' during dry augering; rose to 1'2" after 20-minute observation period.

Approx. Surface Elev. = 67'

DEPTH (FEET)	SAMPLE	S.P.T. (b/ft) OR PEN. RES. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0								Soft to stiff tan and light gray Fat CLAYS with traces of fine sands
				29	93	54	37	
5			1.75	34	87			---becoming stiff
				40		92	63	---with sand pockets
10								Light gray and brown Fine SANDS with clay pockets, sandy silts, and fine to medium gravel
15								Laminated lenses of brown, tan and light gray Lean CLAYS and Sandy SILTS
20								Bottom of boring at 20' Borehole grouted full depth

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-13
FILE 84C5221
DATE 03/13/85
TECHNICIAN JOH
APPROVED adp
PAGE 1 of 1

DRY AUGERED 0' to 16' WASH BORED 16' to 30'

Water entered the borehole at 16' during dry augering; rose to 11'4" after 10-minute observation period.

Approx. Surface Elev. = 73'

DEPTH (FEET)	SAMPLE	S.P.T. (BLT) OR PKT. PEN. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	L.L. (%)	P.I. (%)	DESCRIPTION OF STRATUM
0								Soft tan and light gray Sandy Lean CLAYS with roots
				23	97			---becoming more clayey
5		4.5		13		45	32	Very stiff to hard tan and light gray Fat CLAYS with sands
		4.5		15	115	53	40	---with traces of gravel
				8		21	(1) 2	Tan and light gray Silty SANDS with traces of clays
10							(2)	---with traces of medium to coarse sands and fine gravel
		PS						
15		PS						
		PS						Alternating layers of tan and light gray Fat CLAYS and Sandy SILTS
20								---becoming gray below 20'
25								
30								Bottom of borehole at 30' Borehole grouted full depth

Notes:

PS = Pushed split spoon sampler
(1) k = 1.4 x 10^{-6} cm/sec
(2) 13.5% passing No. 200 sieve

WOODWARD-CLYDE CONSULTANTS

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-14
FILE 84C5221
DATE 03/10/85
TECHNICIAN JQH
APPROVED [illegible]
PAGE 1 of 1

DRY AUGERED 0' to 12' WASH BORED 12' to 30'

Water entered the borehole at 10' during dry augering; rose to 6'6" after 20-minute observation period.

Approx. Surface Elev. = 67'

DEPTH (FEET)	SAMPLE	S.P.T. (BLOWS) OR PEN. PER. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LL (%)	PI (%)	DESCRIPTION OF STRATUM
0								Soft tan and light gray Sandy Lean CLAYS with roots
5		2.0	1.67	34 27	86 98	49	34	Stiff tan and light gray Fat CLAYS with fine sand streaks and pockets
		2.0	1.25	34	89	83	58	
10		2.5	2.64	21 16	103 115			Very stiff Sandy Lean CLAYS with sand pockets and traces of fine gravel
								Tan and light gray Fine SANDS with clays becoming sandy lean clays
15		PS		36		56	36	Laminated lenses and layers of tan, brown, and light gray SILTS, Clayey SILTS, Lean CLAYS, and Sandy SILTS
20	X	33 b/f						
25		PS PS PS PS		33		92	62	Hard gray Fat CLAYS with silt streaks and pockets and traces of fine sands
30								Bottom of borehole at 30' Borehole grouted at full depth

Notes:

PS = Pushed split spoon sampler

LOG OF BORING

PROJECT New Ash Pond

LOCATION West Monroe, Louisiana

CLIENT Manville Forest Products Corporation

BORING B-15
FILE 84C5221
DATE 03/11, 12/85
TECHNICIAN JOH
APPROVED [illegible]
PAGE 1 of 1

DRY AUGERED 0' to 8' WASH BORED 8' to 30'

Water entered the borehole at 8' during dry augering; rose to 3'3" after 15-minute observation period.

Approx. Surface Elev. = 71'

DEPTH (FEET)	SAMPLE	S.P.T. (N/FT) OR PEN. RES. (TSF)	COMPRESSIVE STRENGTH (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LL (%)	P.I. (%)	DESCRIPTION OF STRATUM
0				26	93			Loose to firm tan and brown Sandy SILTS with traces of clays
5		1.0	(1) 0.81	20 30	106 94	30	10	Medium tan and light gray Lean CLAYS with silt streaks and pockets
10		PS	(3) 0.46	24	98		(2) NP	Loose to firm reddish-brown Sandy SILTS with traces of clays
15		PS	(4) 0.50 (5) 0.42	25 27	100 98		NP	---with clayey silt layer, 14'-15'
20		PS PS PS					(6)	
25		PS 1.2 2.5		34				Stiff gray CLAYS with traces of silt pockets
30								Bottom of boring at 30' Borehole grouted full depth

Notes: PS = Pushed split spoon sampler
(1) Unconsolidated undrained triaxial compression test at 2.8 psi confining pressure
(2) 56.4% passing No. 200 sieve
(3) UU test at 4.4 psi confining pressure
(4) Same at 6.0 psi confining pressure
(5) Same at 6.6 psi confining pressure
(6) 57.0% passing No. 200 sieve

SUBSURFACE INVESTIGATION

ASH POND

WEST MONROE, LOUISIANA

Reported to
Manville Forest Products Corporation
West Monroe, Louisiana

Prepared by
Southwestern Laboratories
Monroe, Louisiana

File No. 85001

January, 1985

File# 05001
Lab # 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #1
LOCATION:

Date: 1-10-85 Type: Hand Auger Ground Elevation: 70.5

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Clayey Silt
			Tan & Gray Stiff Sandy Clay
10			Stiff Brown Clay
15			
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

Lab# 10

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 10, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psi	TYPE	OTHER TESTS
#1	0-1	Topsoil with Organics										
G.E. 70.5	1-4	Tan & Gray Clayey Silt	25.7		30	22	8				A-4(8)	
64 = 6.5'	4-6½	Tan & Gray Stiff Sandy Clay	26.4		63	28	35				A-7-6(20)	
	6½-10½	Stiff Brown Clay	36.1		77	33	44				A-7-6(20)	10-7

Lab # 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #2
LOCATION:

Date: 1-10-85 Type: Hand Auger Ground Elevation: 72.8

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
5			Tan & Gray Clayey Silt
			Tan & Gray Silty Clay
			Tan & Gray Slightly Silty Clay
10			Brown Clay
15			
20			
25			
30			
35			
40			
45			
50			

Lab # 10396

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 10, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#2	0-6"	Topsoil with Organics										
G.E. 72.8	6"-6'	Tan & Gray Clayey Silt	25.6		25	20	5				A-4(8)	Perched water 4'6"
	6-7½	Tan & Gray Silty Clay	30.4		37	17	20				A-6(12)	
	7½-9	Tan & Gray Slightly Silty Clay	37.3		59	22	37				A-7-6(20)	
	9-11	Brown Clay	38.2		62	24	38				A-7-6(20)	

SOUTHWESTERN LABORATORIES

File# 85001
Lab # 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #3
LOCATION:

Date: 1-10-85 Type: Hand Auger Ground Elevation: 72.9

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Clayey Silt
5			Tan & Gray Sandy Clay
			Brown Clay
10			Tan Silty Sand
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 10, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE pcf	TYPE	OTHER TESTS
#3	0-6"	Topsoil with Organics										
G.E. 72.9	6"-4'	Tan & Gray Clayey Silt	27.2		27	22	5				A-4(8)	
	4-6	Tan & Gray Sandy Clay	27.1		36	19	17				A-6(11)	
	6-8	Brown Clay	29.3		71	30	41				A-7-5(20)	
	8-11	Tan Silty Sand	22.2		26	22	4				A-4(5)	Water at 11.0'

File# 05001
Lab # 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products

BORING NO.: #4
LOCATION:

Date: 1-11-85 Type: Hand Auger Ground Elevation: 67.6

Legend: ■ Sample × Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Clayey Silt
5			Tan & Gray Clay
10			
15			
20			
25			
30			
35			
40			
45			
50			

Lab # 10396

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 11, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psi	TYPE	OTHER TESTS
#4	0-6"	Topsoil with Organics										
G.E. 67.6	6"-4'	Tan & Gray Clayey Silt	23.0		25	20	5				A-4(8)	
	4-8	Tan & Gray Clay	42.4		70	32	38				A-7-6(20)	

SOUTHWESTERN LABORATORIES

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #5
LOCATION:

Date: 1-11-85 Type: Hand Auger Ground Elevation: 72.5

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Clayey Silt
			Tan & Gray Silty Clay
			Brown Clay
10			Tan Clayey Silty Sand
15			
20			
25			
30			
35			
40			
45			
50			

File# 05001
Lab # 10398

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE 1-11-85

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psi	TYPE	OTHER TESTS
#5	0-6"	Topsoil with Organics										
G.E. 72.5	6"-4'	Tan & Gray Clayey Silt	27.1		22	21	1				A-4(8)	Perched water at 3'
	4-6	Tan & Gray Silty Clay	26.5		30	19	11				A-6(8)	
	6-8	Brown Clay	34.6		55	24	31				A-7-5(19)	
	8-11	Tan Clayey Silty Sand	28.1		26	16	10				A-4(8)	

SOUTHWESTERN LABORATORIES

Conley Printers, Monroe - 28844

Lab # 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #6
LOCATION:

Date: 1-15-85 Type: Hand Auger Ground Elevation: 70.6

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
5			Tan & Gray Clayey Silt
			Tan & Gray Sandy Clay
10			Stiff Brown Clay
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 15, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psi	TYPE	OTHER TESTS
#6	0-1	Topsoil with Organics										
G.E. 70.6	1-5	Tan & Gray Clayey Silt	30.1		24	23	1				A-4(8)	
	5-7	Tan & Gray Sandy Clay	30.6		39	18	21				A-6(4)	
	7-11	Stiff Brown Clay	38.6		62	27	35				A-7-6(20)	

Lab # 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #7
LOCATION:

Date: 1-15-85 Type: Hand Auger Ground Elevation: 73.0

Legend: ■ Sample × Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Sandy Clay
5			
			Tan & Gray Sandy Silt
10			
			Gray Sandy Clay
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 15, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psi	TYPE	OTHER TESTS
#7	0-1	Topsoil with Organics										
G.E. 73.0	1-3	Tan & Gray Sandy Clay	25.9		32	20	12				A-6(9)	
	3-9	Tan & Gray Sandy Silt	22.3		22	20	1				A-4(8)	
	9-13	Gray Sandy Clay	30.2		51	20	31				A-7-6(18)	

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #8
LOCATION:

Date: 1-14-85 Type: Hand Auger Ground Elevation: 71.60

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
5			
			Tan Silty Sand
			Tan & Gray Sandy Clay
10			Tan Clayey Silty Sand
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 14, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psi	TYPE	OTHER TESTS
#8	0-½	Topsoil with Organics										
G.E. 71.60	½-8	Tan Silty Sand	19.8		22	21	1				A-4(8)	
	8-10	Tan & Gray Sandy Clay	20.3		48	21	27				A-7-6(16)	
	10-12	Tan Clayey Silty Sand	17.7		29	18	11				A-6(8)	

Lab # 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #9
LOCATION:

Date: 1-15-85
Type: Hand Auger
Ground Elevation: 70.6

Legend:
■ Sample
X Penetration
▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
5			Tan & Gray Sandy Silt
			Tan & Gray Sandy Clay
10			Stiff Brown Clay
15			
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

Lab# 10[illegible]

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 15, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#9	0'-½'	Topsoil with Organics										
G.E. 70.6	½'-7'	Tan & Gray Sandy Silt	23.9		21	19	2				A-4(8)	
	7-9	Tan & Gray Sandy Clay	31.1		49	23	26				A-7-5(16)	
	9-11	Stiff Brown Clay	38.3		69	34	35				A-7-6(20)	

County Printers, Monroe - 28844

File#85001
Lab# 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #10
LOCATION:

Date: 1-17-85
Type: Hand Auger
Ground Elevation: 65.0

Legend:
■ Sample
X Penetration
▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
5			Gray Clay
10			
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 17, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psi	TYPE	OTHER TESTS
#10	0-1	Topsoil with Organics										Perched water at 1'
G.E. 65.0	1-5	Gray Clay	43.6		66	32	34				A-7-6(20)	

SOUTHWESTERN LABORATORIES

Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #11
LOCATION:

Date: 1-17-85 Type: Hand Auger Ground Elevation: 71.5

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
5			Tan & Gray Sandy Clay
10			Gray & Tan Clayey Sand with Small Gravel
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 17, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psi	TYPE	OTHER TESTS
#11	0-1	Topsoil with Organics										
G.E. 71.5	1-7	Tan & Gray Sandy Clay	22.9		37	15	22				A-6(12)	Perched Water at 2'
	7-10	Gray & Tan Clayey Sand With Small Gravel	20.5		28	14	14				A-6(2)	
	10	Gravel-Unable to go deeper with hand auger.										

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #12
LOCATION:

Date: 1-18-85
Type: Hand Auger
Ground Elevation: 60.0

Legend:
■ Sample
X Penetration
▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Clayey Silt
5			
			Tan Silty Sand
10			
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 18, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST COMPRESSION PSF.	STRAIN %.	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#12	0-1	Organics										Water at 1'
G.E. 60.0	1-3	Tan Clayey Silt	29.6		23	20	3				A-4(8)	
	3-7	Tan Silty Sand	25.8				N.P.				A-4(4)	

SOUTHWESTERN LABORATORIES

Copley Printers, Moline - 28844

File#85001
Lab# 10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #13
LOCATION:

Date: 1-18-85 Type: Hand Auger Ground Elevation: 67.0

Legend: ■ Sample × Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Clayey Silt
5			Gray Clay
			Tan Sand with Gravel
10			
15			
20			
25			
30			
35			
40			
45			
50			

File#6,0
Lab#10398

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond
DATE January 18, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE pcf	TYPE	OTHER TESTS
#13	0-1	Topsoil with Organics										
G.E. 67.0	1-3	Tan & Gray Clayey Silt	25.8		25	23	2				A-4(8)	Perched water at 3'
	3-6	Gray Clay	40.6		63	31	32				A-7-6(20)	
	6-8	Tan Sand with Gravel	----		--	--	--					

COMPRESSION TEST

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #14
LOCATION:

Date: 1-17-85 Type: Hand Auger Ground Elevation: 68.8

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Silty Clay
			Gray & Tan Sandy Clay
			Gray & Tan Clayey Sand with Gravel
10			
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 17, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#14	0-1	Topsoil with Organics										Perched water
G.E. 68.8	1-3	Tan & Gray Silty Clay	37.6		53	28	25				A-7-5(16)	
	3-5	Gray & Tan Sandy Clay	25.0		41	17	24				A-7-5(10)	
	5-6	Gray & Tan Clayey Sand with Gravel	20.5		31	13	18				A-6(4)	
	6'	Sand - Unable to get return due to water										

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #15
LOCATION:

Date: 1-18-85
Type: Hand Auger
Ground Elevation: 73.1

Legend:
■ Sample
X Penetration
▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
5			
			Tan & Gray Sandy Clay
10			
15			
20			
25			
30			
35			
40			
45			
50			

Lab# 15

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 18, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#15	0-1	Topsoil with Organics										
G.E. 73.1	1-9	Tan & Gray Sandy Clay	20.8		27	13	14				A-6(7)	Perched water at 1'
	9'	Sand & Gravel-Unable to get return due to water										

File#85001
Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #16
LOCATION:

Date: 1-22-85 Type: Hand Auger Ground Elevation: 73.0

Legend: ■ Sample × Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan Clayey Silt
5			
			Tan Clayey Sandy Silt
			Tan & Gray Silty Clay
10			Brown Clay
15			
20			
25			
30			
35			
40			
45			
50			

File#0
Lab#10396

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 22, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE pcf	TYPE	OTHER TESTS
#16	0-1	Topsoil with Organics										
G.E. 73.0	1-4	Tan Clayey Silt	18.3		--	--	N.P.				A-4(8)	
	4-9	Tan Clayey Sandy Silt	13.6		--	--	N.P.				A-4(8)	
	9-10	Tan & Gray Silty Clay	26.6		82	35	47				A-7-6(20)	
	10-12	Brown Clay	36.7		72	22	50				A-7-6(20)	

COMPRESSION TEST

SOUTHWESTERN LABORATORIES

File#09001
Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation
BORING NO.: #17
LOCATION:

Date: 1-22-85
Type: Hand Auger
Ground Elevation: 68.1

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Clayey Silt
			Tan & Gray Silty Clay
			Tan & Gray Clayey Sand with Small Gravel
10			
15			
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 22, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#17	0-1	Topsoil with Organics										
G.E. 68.1	1-3	Tan & Gray Clayey Silt	17.6		26	20	6				A-4(8)	
	3-5	Tan & Gray Silty Clay	24.9		61	27	34				A-7-6(20)	
	5-8	Tan & Gray Clayey Sand with Small Gravel	15.7		32	14	18				A-6(4)	

Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #18
LOCATION:

Date: 1-22-85
Type: Hand Auger
Ground Elevation: 73.2

Legend:
■ Sample
X Penetration
▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Slightly Sandy Silty Clay
5			
			Tan & Gray Sandy Clay
10			
15			
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 22, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#18	0-1	Topsoil with Organics										Perched water at 1½'
G.E. 73.2	1-4	Tan & Gray Slightly Sandy Silty Clay	26.5		56	24	32				A-7-5(16)	
	4-8	Tan & Gray Sandy Clay	22.4		28	15	13				A-6(7)	
	8'	Gravel at 8' Unable to go deeper.										

SOUTHWESTERN LABORATORIES

File#85001
Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #19
LOCATION:

Date: 1-23-85 Type: Hand Auger Ground Elevation: 73.3

Legend:
■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Sandy Silty Clay
			Tan & Gray Stiff Sandy Clay
			Tan & Gray Clayey Sand
15			
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 23, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#19	0-1	Topsoil with Organics										Perched water at 2'.
G.E. 73.3	1-3	Tan & Gray Sandy Silty Clay	29.3		52	22	30				A-7-5(16)	
	3-9	Tan & Gray Stiff Sandy Clay	22.9		29	15	14				A-6(7)	
	9-10½	Tan & Gray Clayey Sand	23.0		20	14	6				A-2-4	
	10½	Gravel Unable to go deeper										

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #20
LOCATION:

Date: 1-22-85 Type: Hand Auger Ground Elevation: 77.2

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Black Organics
5			Tan Slightly Sandy Silty Clay
10			Tan & Gray Sandy Clay
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 22, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psi	TYPE	OTHER TESTS
#20	0-3	Topsoil with Black Organics										Perched water at 1½'.
G.E. 77.2	3-8	Tan Slightly Sandy Silty Clay	27.0		27	22	5				A-4(8)	
	8-10½	Tan & Gray Sandy Clay	17.3		30	14	16				A-6(7)	
	10½'	Hit Gravel at 10½' Unable to go Deeper										

Lab#1039b

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #21
LOCATION:

Date: 1-22-85 Type: Hand Auger Ground Elevation: 61.4

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan & Gray Sandy Silt
5			
10			
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 22, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#21	0-1	Topsoil with Organics										
G.E. 61.4	1-3	Tan & Gray Sandy Silt	26.9		25	21	4				A-4(4)	

Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #22
LOCATION:

Date: 1-22-85 Type: Hand Auger Ground Elevation: 70.8

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Gray & Tan Sandy Clay
5			
			Dense Tan & Gray Sandy Clay with Gravel
10			Gray Clayey Sand with Gravel
15			
20			
25			
30			
35			
40			
45			
50			

SOUTHWESTERN LABORATORIES

Lab#10 35

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 22, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#22	0-½'	Topsoil with Organics										
G.E. 70.8	½-4	Gray & Tan Sandy Clay	18.8		28	14	14				A-6(7)	
	4-7½	Dense Tan & Gray Sandy Clay with Gravel	13.8		39	16	23				A-6(7)	
	7½-10	Gray Clayey Sand with Gravel	13.8		27	15	12				A-6(1)	
	10'	Gravel Unable to go deeper.										

Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #23
LOCATION:

Date: 1-22-85 Type: Hand Auger Ground Elevation: 72.2

Legend: ■ Sample X Penetration ▼ -Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
			Tan Sandy Clay
5			
			Tan & Gray Sandy Clay
			Tan & Gray Sandy Silty Clay
10			Brown Slightly Clayey Sand
15			
20			
25			
30			
35			
40			
45			
50			

Lab#103.

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 22, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#23	0-1	Topsoil with Organics										
G.E. 72.2	1-4	Tan Sandy Clay	21.3		30	14	16				A-6(7)	
	4-8	Tan & Gray Sandy Clay	19.1		27	15	12				A-6(7)	
	8-10	Tan & Gray Sandy Silty Clay	19.2		37	18	19				A-6(11)	
	10-11	Brown Slightly Clayey Sand	12.6		21	19	2				A-2-4	
	11'	Brown Sand (no return)										

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #24
LOCATION:

Date: 1-22-85 Type: Hand Auger Ground Elevation: 71.1

Legend: ■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Organics
5			Tan & Gray Sandy Clay
10			Gray Clayey Sand Brown Slightly Clayey Sand
15			
20			
25			
30			
35			
40			
45			
50			

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 22, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
#24	0-1	Topsoil with Organics										
G.E. 71.1	1-5	Tan & Gray Sandy Clay	28.5		30	18	12				A-4(9)	
	5-10	Gray Clayey Sand	23.2		20	17	3				A-2-4	
	10-11	Brown Slightly Clayey Sand	20.2		21	19	2				A-2-4	

File#05001
Lab#10398

LOG OF BORING

PROJECT: Manville Ash Pond
CLIENT: Manville Forest Products Corporation

BORING NO.: #25
LOCATION:

Date: 1-24-85 Type: Hand Auger Ground Elevation: 73.6

Legend:
■ Sample X Penetration ▼ Water

Depth, Feet	Symbol	Sample	Description of Stratum
			Topsoil with Black Organics
5			
			Tan & Gray Stiff Sandy Clay
			Tan & Gray Clayey Sand with Gravel
10			
15			
20			
25			
30			
35			
40			
45			
50			

F-- #85--
Lab#10398

SUMMARY OF LABORATORY TEST DATA

PROJECT Manville Ash Pond

DATE January 24, 1985

BORING NO.	DEPTH IN FEET	TYPE OF MATERIAL	MOISTURE CONTENT %	DRY DENSITY pcf	ATTERBERG LIMITS LL	PL	PI	COMPRESSION TEST: COMPRESSION PSF.	STRAIN %	LATERAL PRESSURE psf	TYPE	OTHER TESTS
25	0-1	Topsoil with Black Organics										Perched water at 1'
.E. 3.6	1-7½	Tan & Gray Stiff Sandy Clay	31.8		27	18	9				A-4(7)	
	7½-9	Tan & Gray Clayey Sand	24.0		19	16	3				A-2-4	
	9	Gravel at 9' Unable to go Deeper										

APPENDIX M

POTENTIOMETRIC MAPS OF AREA AQUIFERS

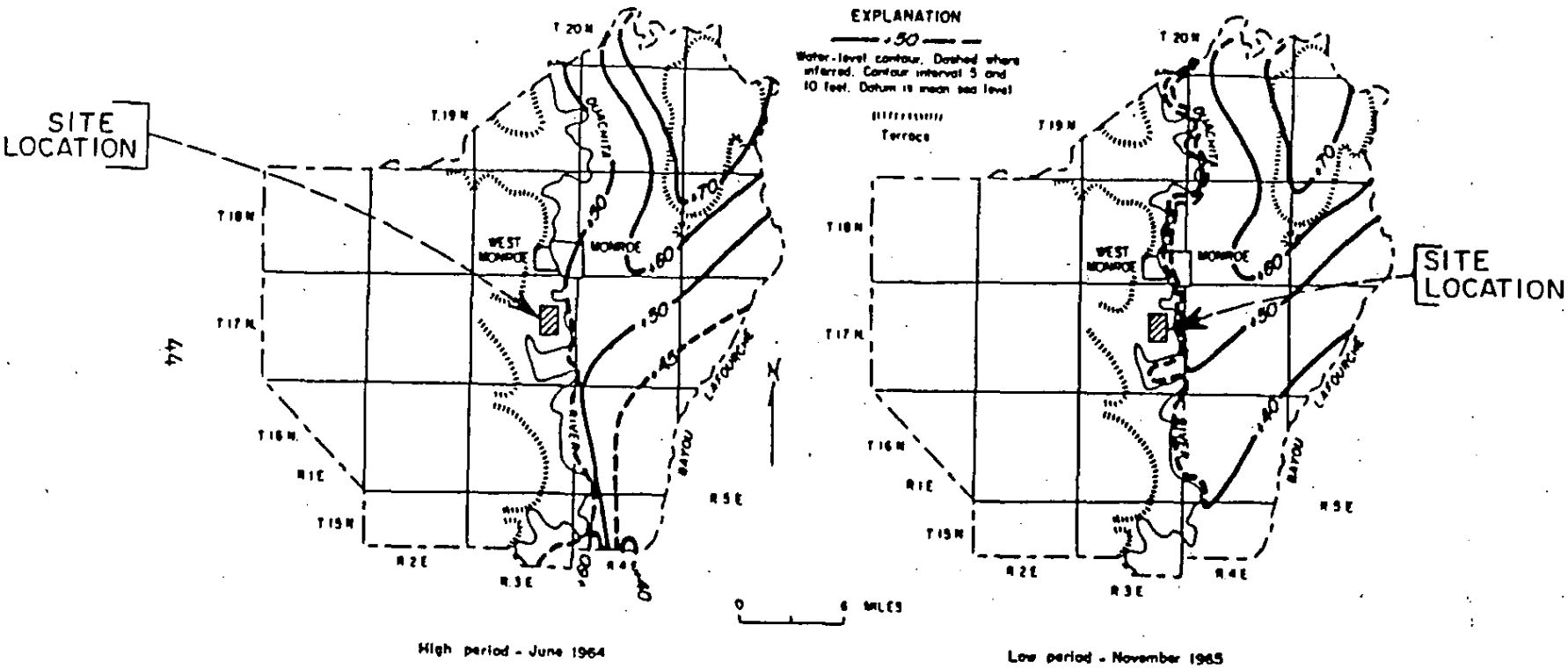


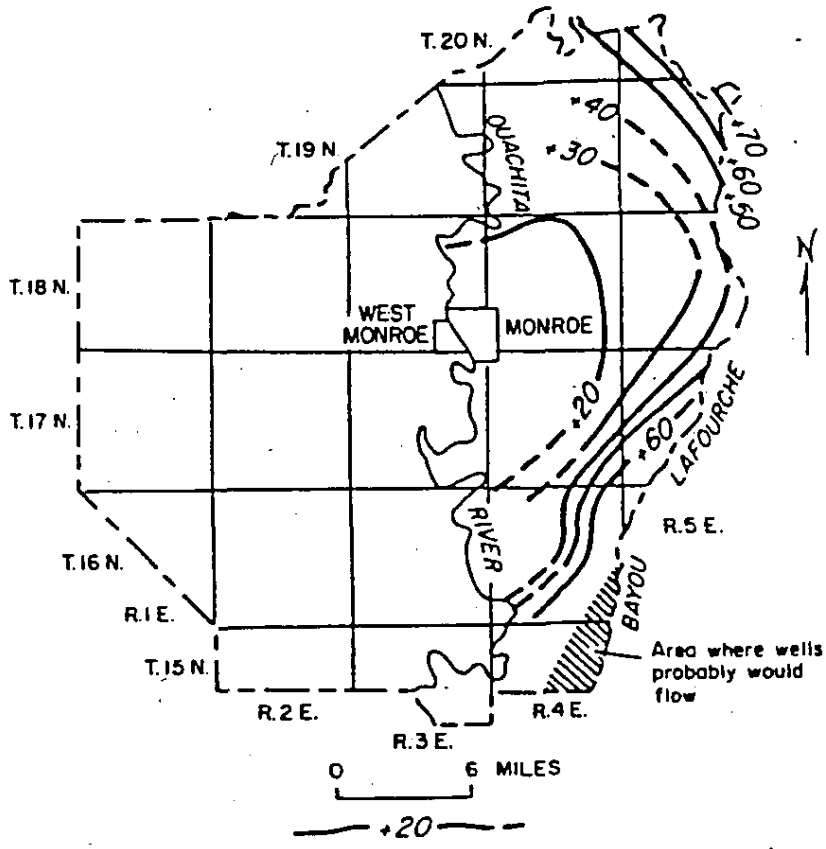
Figure 3. Water-level elevations in the alluvium and terrace deposits at low and high water level.

FROM: WATER RESOURCES OF OUACHITA PARISH, LA.
WATER RESOURCES BULLETIN NO. 14 1972

MANVILLE FOREST PRODUCTS CORP.
WEST MONROE, LOUISIANA
SURFACE IMPOUNDMENTS PERMIT APPLICATION

PAGE 1
CONTOUR MAP OF WATER TABLE

OFFICE OF S E HUEY CO. MONROE, LA.
ENGINEERS & SURVEYORS



Water-level contour for the Cook Mountain Formation. Dashed where inferred. Contour interval 10 feet. Datum is mean sea level

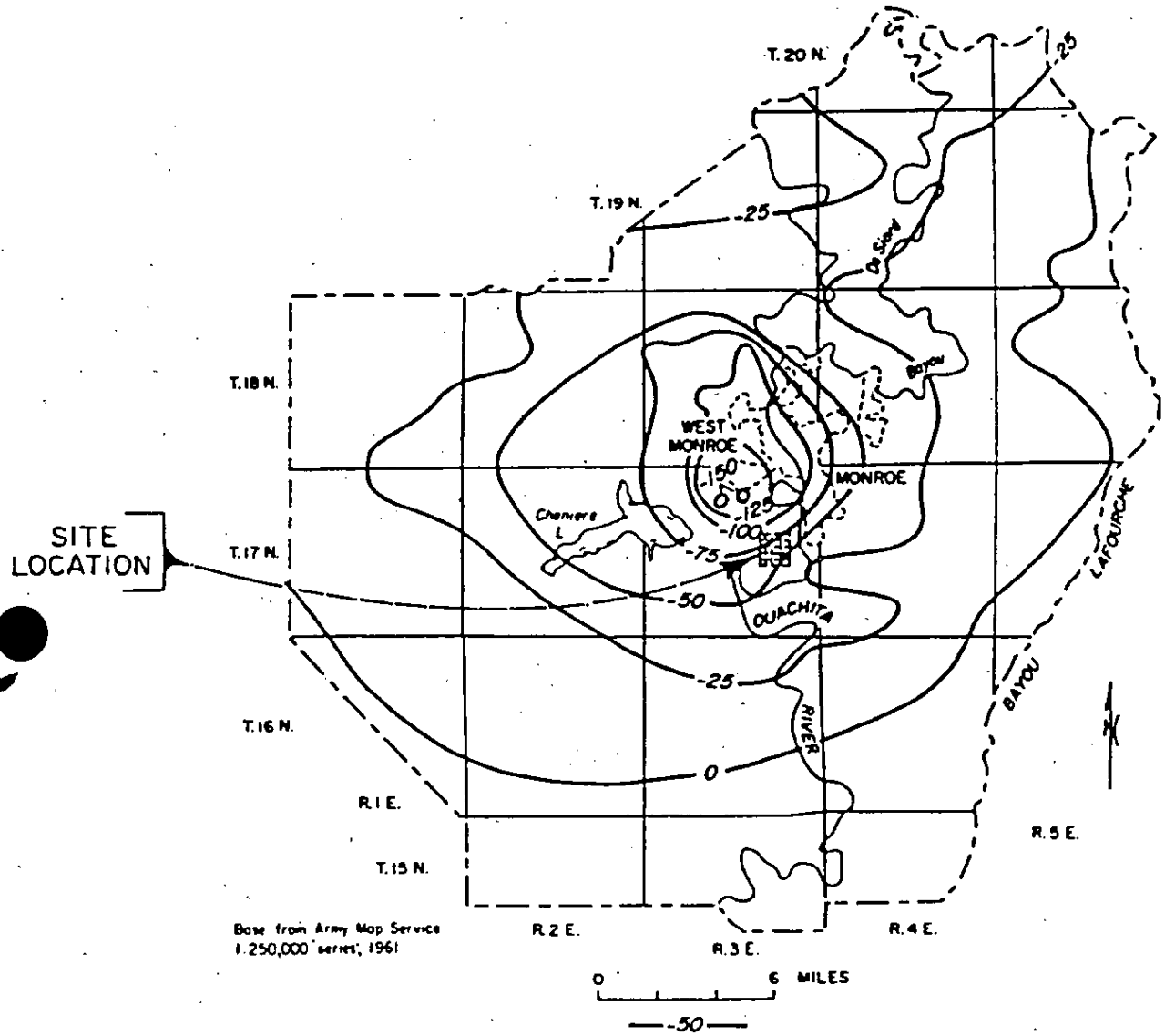
Figure 2. Water levels in the Cook Mountain Formation have been lowered by pumping from the Sparta Sand in the Monroe-West Monrue area.

FROM: WATER RESOURCES OF OUACHITA PARISH
WATER RESOURCES BULLETIN NO.14,1972.

MANVILLE FOREST PRODUCTS CORP.
WEST MONROE, LOUISIANA
SURFACE IMPOUNDMENTS PERMIT APPLICATION

PAGE 2
CONTOUR MAP OF COOK
MOUNTAIN FORMATION

OFFICE OF S E HUEY CO. MONROE, LA.
ENGINEERS & SURVEYORS



Water-level contour, 1960-65. Contour interval 25 feet. Datum is mean sea level

FROM: WATER RESOURCES OF OUACHITA PARISH
WATER RESOURCES BULLETIN NO.14, 1972.

MANVILLE FOREST PRODUCTS CORP.
WEST MONROE, LOUISIANA
SURFACE IMPOUNDMENTS PERMIT APPLICATION

PAGE 3
CONTOUR MAP IN THE SPARTA SAND-1960-65

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ENGINEERS & SURVEYORS

APPENDIX N

GROUNDWATER SAMPLING AND ANALYSIS PLAN

GRAPHIC PACKAGING INTERNATIONAL, INC.
WEST MONROE MILL
WEST MONROE, LOUISIANA

GROUNDWATER SAMPLING AND ANALYSIS PLAN

OCTOBER 2007

PREPARED BY:

PROVIDENCE

Providence Engineering & Environmental Group LLC
1201 Main Street
Baton Rouge, Louisiana 70802
(225) 766-7400

Providence Project No. 001-007

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Attachments

A Statistical Analysis Flow Diagram

1.0 INTRODUCTION

This Sampling and Analysis Plan is designed for the Graphic Packaging solid waste permit associated with the solid waste impoundments (NPDES impoundments and the 21-acre and 40-acre ash/sludge impoundments). LAC 33:VII.521.F.5.c and e and LAC 33:VII.709.E.2, 3, and 4 require that the facility maintain, as part of the groundwater monitoring program, "a Sampling and Analysis Plan (SAP) that includes consistent sampling and analysis procedures that ensure that monitor wells provide reliable indications of groundwater quality." This document also contains procedures to detect, report, and verify changes in the groundwater, and procedures for plugging and abandonment of groundwater monitor wells are also included herein.

This SAP is used as a stand-alone document and includes detailed descriptions of the sampling procedures. The SAP is to be used by the field technicians. The SAP is reviewed annually and any revisions required to stay abreast of changes in United States Environmental Protection Agency (USEPA) methods and/or state regulatory provisions are reported to the administrative authority in the annual report.

2.0 GROUNDWATER MONITORING SYSTEM

The locations of the monitor, recovery, and piezometer wells at the entire site are shown in **Figure 1**. Twelve monitoring wells (MW-7 through MW-15 and MW-17 through MW-19) are evaluated for the NPDES Impoundment System and six monitoring wells (MW-19 through MW-24) are evaluated for the 40-acre Ash Sludge Pond. Monitoring wells MW-17, MW-18, and MW-20 are located hydraulically downgradient of the 21-acre impoundment.

The monitored hydraulic regimes remain consistent with past observations with groundwater flow towards local surface water bodies.

Groundwater near the NPDES Impoundment System flows to the east toward the Ouachita River and associated bayous. Monitoring wells MW-8 through MW-12 remain hydraulically upgradient of the unit while MW-13, MW-14, MW-15 and MW-24 are downgradient.

Groundwater near the 40-acre and 21-acre Ash Sludge Pond flows primarily to the north, toward Judy Slough and Toney Bayou. Monitoring well MW-19 remains hydraulically upgradient of the unit while MW-17, MW-18, and Mw-20 are downgradient.

At least two downgradient wells are positioned to yield groundwater samples which have passed the relevant point of compliance. All monitoring wells are screened in the uppermost water-bearing zone. Specific data on these monitoring wells is included in **Table 1**.

3.0 DETECTION MONITORING PARAMETERS

As required in LAC 33:VII.709.E.3.g, the parameters selected for detection monitoring are indicator parameters, constituents, or reaction products at the facility. Monitoring these parameters provides a reliable indication of the presence of contaminants in the groundwater. The detection monitoring parameters are listed on **Table 2**.

4.0 SAMPLING AND ANALYSIS PLAN

The LDEQ and Graphic Packaging have an extensive history of migration patterns and rates at the mill. The data indicates a consistency that has not demonstrated significant change over a 20 year period. Sampling and analysis of the groundwater monitor wells associated with the solid waste facilities will be conducted semi-annually as required by LAC 33:VII.709.E.3.c and d. LAC 33:VII.709.E.3.d also requires detection monitoring for the period of post-closure care.

The sampling and analysis plan explains procedures and techniques for:

- sample collection, which ensures that collected samples are representative of the zone being monitored and prevents cross-contamination of or tampering with samples
- sample preservation and shipment, which ensures the integrity and reliability of the sample collected for analysis
- chain-of-custody control

4.1 Sample Collection Procedures

This plan provides sample collection procedures to facilitate the collection of samples that are representative of the zone being monitored and minimize the potential for cross-contamination of or tampering with the samples.

4.1.1 Preparation

Initial Observations

The general condition of each well and the environmental factors influencing it are important pieces of data. Field personnel will note the general conditions around the site in the appropriate field logs. Appropriate comments about the physical condition of each well site are then noted. Typical notations should include the presence of standing water around the well, the presence of cracks in the apron, damage to the casing, missing well locks or caps, *etc.* It is the field staff's responsibility to notify the Operations Supervisor or the

Environmental Coordinator of any damage to the well or compromising conditions near the well.

Site Preparation

Samplers should take several precautions before opening the well casing to take a sample or to measure fluid levels. **Do not open the well casing until these preparations have been completed.**

Make certain that there are no conditions in the immediate area that could interfere with the analytical results. Turn all vehicle motors off. Close any nearby open containers of fuel or chemicals.

Spread a new sheet of polyethylene (6 square feet should be sufficient) on the ground next to the well. Do not reuse this plastic between wells. Prepare the wash down supplies consisting of a five-gallon carboy of deionized (or distilled) water, a five-gallon carboy of a non-phosphate detergent solution, a stainless steel bucket, paper towels and brushes.

Complete all meter calibrations and container preparations. Calibrate the pH meter following manufacturers recommended procedures using pH 4.0 and pH 7.0 buffer solutions. Rinse the pH probe following calibration and place in a small container of de-ionized water. The conductivity meter is calibrated according to the manufacturer's recommendations, followed by a check of the probe in a 0.01 KCl solution. The conductivity of the standard solution should be approximately 1,413 uomhos/cm. Wash the electronic water level meter's probe with the detergent solution and rinse with deionized water. Begin completing the appropriate forms.

4.1.2 Water Elevation Data

Perform fluid level measurements and well depth measurements after completing the pre-sampling preparations but before purging and sampling the well. Measurements of the level of standing water in the casing and the total well depth will be made using either an electronic water level measuring device or a water sensitive measuring tape.

Unlock the well cover and remove the well cap. Lay the cap upside down on the plastic. Test the electronic water level meter before lowering the probe into the casing to make sure it is operating properly. Lower the probe downhole until the fluid level is detected, a medium pitched tone will sound from the

meter. Measure the depth to fluid with respect to the casing reference point (either a mark or a notch at the top of the casing). Record the depth to fluid to the nearest 0.01 feet in the field log.

Measure the total well depth with respect to the reference point using a weighted steel tape or an electronic interface probe by lowering the measuring device until the bottom is reached and the line goes slack. Record this measurement in the field log to the nearest 0.01 feet. The total well depth measurement is compared against the original well depth to ensure that no greater than 10 percent of the screened interval is blocked by sediments. If the screened interval is blocked, the well is redeveloped prior to the next required sampling event. Remove the probe from the well, wash it with the non-phosphate detergent solution, rinse it with distilled or deionized water, and dry it with a disposable paper. (Place the rinse water in the wastewater drums provided at each well. The water will later be emptied into the process sewer system for treatment in the wastewater system.)

4.1.3 Well Evacuation

Before sampling, purge the well of fluids standing in the casing. This is done by removing a minimum of three times the volume of measured fluids in the casing or until the well is dry.

Accurately measure the fluids purged from the well to assure that at least three standing volumes are removed. Collect the purged fluids in the dedicated wastewater drum next to each well.

Calculate the minimum volume of fluids to be removed using the following formula:

$$V = (\pi r^2 h)(7.48)(3)$$

Where:

V = volume to be removed in gallons
r = inside radius of casing in feet
h = height of the fluid column in casing in feet
h = well depth (ft) from TOC - fluid level (ft) from TOC
7.48 = conversion factor for cubic feet to gallons, and
3 = casing volumes to remove

All purging and sampling will be done with disposable, Teflon bailers. Use a new bailer for each well at each sampling event.

The bailer ropes will be of new, braided nylon for each sampling event. DO NOT attach polyethylene or polypropylene "ski rope" to the bailers or use these types of rope when doing any other measurement around an open well. (These materials may introduce interference into the organic analyses through the introduction of Phthalate esters.) Coil the bailer rope into a clean bucket during well purging and sampling. This will help prevent incidental contamination caused by the line coming in contact with the ground or apron.

Between each well, rinse the bucket with de-ionized or distilled water, swab it clean with the detergent solution and give it a final rinse with deionized water. Put the rinsate into the wastewater drum near the well. This water will be collected later for disposal in the wastewater treatment system.

4.1.4 Sample Collection

Use the following procedures when sampling:

- Apply the appropriate tags and labels to the sample bottles before collecting the sample.

- Use black, permanent ink to complete the sample labels, chain of custody, and field logs. Provide all of the information requested on the labels and forms. Complete the "Time" blank immediately before filling the bottles.

- Where possible, sample a well immediately after purging. Never sample a well purged for more than two hours without repurging. (Under normal aquifer conditions, all wells on the facility will recover before purging is completed.)

- Always wear new, disposable latex gloves while handling the bailer, while purging the well or while taking the samples. Before going to the next well, replace the gloves with new ones to prevent cross contamination.

- Slowly lower the bailer down the casing, being careful to avoid scraping the sides of the casing. This will help to prevent excessive aeration of the water column and possible contamination of the sample.

- When collecting a sample, lower the bailer to the bottom of the well to insure capture of the most recently infiltrated water.

- Allow sufficient time for the bailer to fill, usually thirty seconds. Raise the bailer gently to avoid sample aeration.

- Carefully fill the appropriate sample containers with water from the bailer using the bottom discharge spouts provided on the bailers. Fill as many of the sample bottles as possible with water from the first bailer. If necessary, collect another bailer of water to complete the sample collection. Do not use a bucket or any other container to mix the sample before filling the bottles. Fill the sample bottles completely, leaving as little headspace as possible before capping. Cap all bottles tightly.

- After the sample bottles have been filled and placed in the ice chest, collect another bailer of water to measure pH, temperature, conductivity, odor, and appearance. From the bailer, place 500 millimeters (ml) of sample into four unused, 1000 ml, polypropylene, disposable beakers (Tripour® or equivalent) that have previously labeled "A", "B", "C", and "D". These sub-samples will be immediately analyzed for pH, conductivity, and temperature.

Place the pH probe into beaker "A" and allow 30 - 45 seconds for the meter to reach equilibrium before recording the reading. (If the pH meter does not have an integrated temperature probe, place an ASTM SF thermometer in the beaker with the probe.) Before taking the pH reading, record the temperature of the sample and adjust the temperature slope accordingly on the pH meter. Remove the probe (and thermometer where appropriate) from beaker "A", rinse the probe(s) in distilled water taking care not to splash any of the water into the sub-samples. Repeat the above steps with beakers "B", "C", and "D".

Rinse the conductivity probe with deionized (or distilled) water before placing it in the sub-sample beaker. Allow 60-90 seconds for the probe to reach equilibrium then record the conductivity. (If the conductivity meter does not have automatic temperature compensation, follow the procedures listed above using the ASTM SF thermometer.) Repeat these procedures with the remaining beakers. Thoroughly rinse the probe and thermometer with de-ionized water after each measurement.
Discard the sub-samples in the well's wastewater drum for later disposal. Place the beakers in the garbage bag. DO NOT REUSE THE BEAKERS.

- No filtration of samples will be performed in the field.

- Preserve the samples according to the guidelines in **Table 2**. The preservatives should be added before the container is filled. Check the pH of the preserved samples by opening the container after mixing and wetting a pH test strip with the water on the inside of the container cap. DO NOT put the test strip in the sample itself. If more preservative is needed, add a drop or two at a time to prevent over acidification of the sample.

- Place the sample containers in an ice chest and keep them in a mixture of water (melted ice) and wet ice while completing the rest of the sampling and during transportation to the laboratory.

4.2 Sample Preservation, Containerization, and Shipment and Chain-of-Custody Control

This section provides procedures for sample preservation, shipment, and chain-of-custody control for samples collected for analysis.

4.2.1 Sample Preservation, Containerization, and Shipment

The bottle labels should be sealed with waterproof, transparent tape (where possible) prior to packing. In all cases, be certain to use a black, permanent ink marker to complete the labels.

Make certain that the sample bottles are securely capped before placing them in the ice chest. Loose caps could cause the bottles to leak and possibly contaminate the sample. Store all the filled sample bottles in an ice chest that has sufficient wet ice to chill the containers. A mix of approximately 50/50 water (melted ice) and wet ice will keep the filled containers at approximately 4° Celsius (C). Replenish the ice before it completely melts.

The sample containers should be tightly packed with wet ice before shipment to avoid breakage during shipment. This will help to prevent excessive movement of the containers. This will also maintain the samples at approximately $4^{o}C$ during shipment.

If the samples are to be shipped on a common carrier or by courier, the sample chests should be sealed with "duct" tape or its equivalent around the body of the chest at the juncture of the lid and chest. The person sealing the chest will initial this tape seal near the clasp of the chest with a permanent pen. A note stating who sealed the chest and when the chest was sealed will be made in the "Additional Comments" section of the chain-

of-custody form. The chain-of-custody form will then be placed in a resealable plastic bag (*e.g.*, "Ziploc ®", *etc.*) and taped to the top of the chest.

4.2.2 Chain-of-Custody Control

Field and laboratory personnel will follow strict chain-of-custody procedures as detailed in this Section to ensure preservation of the legal integrity of all samples. Graphic Packaging or laboratory-provided chain-of-custody forms (**Figure 3**), may be used to document sample handling. These chain-of-custody forms will be used from the time of collection, through all transfers of custody, through the receipt at the analytical laboratory and through final deposition (using the "Additional Remarks" column).

The sampling crew will act as sample and document custodians. They will seal the samples at the time of collection and will retain the samples in their control until the samples are transferred to a courier or to the laboratory.

5.0 ANALYTICAL PROCEDURES

Groundwater monitoring samples are analyzed using laboratory methods that conform to test methods outlined in USEPA Test Methods for Evaluating Solid Waste, Third Edition (SW-846) or Standard Methods for the Examination of Water and Wastewater, 17th Edition. The test method, holding times, preservative, *etc.* for each parameter monitored is included in **Table 2**.

6.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

This section describes the procedures utilized for quality assurance/quality control (QA/QC), including field blanks and laboratory spikes and blanks.

6.1 Field Quality Control

As part of the field QA/QC, an equipment blank sample and a duplicate sample are collected during each sampling event. Also, a trip blank is supplied by the laboratory. Split samples are submitted for analysis to a separate laboratory if deemed necessary by the Environmental Coordinator.

6.2 Laboratory Quality Control

The groundwater samples are submitted for analysis to a qualified laboratory, which performs testing according to documented and approved procedures by trained personnel using calibrated equipment. If analyses of the samples are performed by commercial environmental laboratories, only labs accredited by the LDEQ laboratory accreditation program will be

utilized. QA/QC procedures, including field blanks, laboratory spikes and blanks, precision and accuracy of analyses, and detection limits conform to those specified in USEPA Test Methods for Evaluating Solid Waste, Third Edition (SW-846).

Site personnel will evaluate a prospective contract laboratory's quality control program to ensure the reliability of the Site's groundwater monitoring data when selecting a contract laboratory. The laboratory will be evaluated using the following criteria:

- Adequacy of the calibration of laboratory instruments must be sufficient to discover unexplained drift and to prevent cumulative error. Calibrations of once per shift will not be considered adequate without long-term calibration records validating that scheduled. Without such records, the minimum acceptable routine would require that the instruments would be calibrated to the manufacturer's specifications before and after use.

- Periodic inspection, maintenance and servicing of all laboratory instruments must be at a frequency that will reduce error from defective power sources, probes, cables, columns, *etc.* Records of these activities should be routinely maintained for each instrument.

- The routine usage of reference standards before and during shifts is mandatory. Quality Control samples (*e.g.*, checks, spikes, laboratory blanks, duplicates) will be required to be done during each sample run to learn the accuracy and precision of procedures, instruments, and operators. The performance of one duplicate and one spike for every ten-facility samples of each parameter will be considered a minimally adequate program. Records of these analyses should be kept separately from other client records.

- The laboratory must use adequate statistical Quality Assurance procedures.

- Laboratory supervision and management must routinely review the performance of individual analysts. Problems discovered during statistical and hands-on reviews should be promptly and constructively addressed.

- Routine performance evaluations of equipment systems should be an integral portion of laboratory management. Discovered problems or inadequacies should be promptly addressed.

- Sample security and chain of custody procedures should be checked to determine how each sample is checked in and whether it is stored in a secure area before analysis. The laboratory should have an assigned sample custodian who records the disposition of

each sample, the identity of the analyst or technician, and final fate of the sample on the chain of custody form.

- The Environmental Coordinator and/or the Laboratory Supervisor will periodically visit the contract laboratory on a random basis to audit the laboratory's continued compliance with these quality control procedures.

7.0 STATISTICAL ANALYSIS

GPI has attached the statistical analysis flow diagram as Attachment D. The statistical analysis will be evaluated in accordance with the June 2007 revised solid waste regulations 805.B.6. The samples will be analyzed for 3005 Appendix C, Table 1 metals, pH, specific conductance, TDS, TOC, COD, sulfate, arsenic, barium, cadmium, chromium, lead and total aluminum. Samples will be collected on four consecutive quarters for statistical analyses, then semiannually thereafter. Any extreme or outlier values will be identified along with percent of non-detects. Poisson's Prediction Interval will be utilized for parameters with greater than 90% non-detects. The Nonparametric Prediction Interval will be utilized for parameters with greater than 15% non-detects but less than 90% non-detects. For parameters with less than 15% non-detects, those non-detects will be replaced with ½ the detection limit and analyzed to determine if the data is normally distributed utilizing either the original data, logarithmic transformed data, natural logarithmic transformed data, square root transformed data, or cube root transformed data (in order). Normalized data will be evaluated utilizing the parametric prediction interval method and non-normal data will be evaluated utilizing the non-parametric prediction interval.

8.0 REPORTING AND RECORDKEEPING

Within 90 days after each sampling event, a report will be submitted to LDEQ. Graphic Packaging will maintain on site a copy of each report for the life of the facility, as required by LAC 33:VII.711.C.1.b.

9.0 PLUGGING AND ABANDONMENT PLAN

This Plugging and Abandonment Plan has been developed to describe the procedures, which are implemented for plugging and abandonment of groundwater wells at Graphic Packaging. As mandated by LAC 33:VII.709.E.1.e.i, the plugging and abandonment of the Graphic Packaging wells is in accordance with "Water Well Rules, Regulations, and Standards, State of Louisiana" (LAC 70:XIII) as adopted by the DOTD Water Resources Section.

9.1 Pre-Abandonment Requirements

The abandonment activities of groundwater wells at Graphic Packaging are performed by a qualified water well contractor. The contractor prevents any known loss of grease, hydraulic fluids, oils, fuels, and/or transmission oil from equipment and uses only potable water in abandonment operations.

As required, the facility will notify the LDEQ in writing of the intent to abandon any of the groundwater wells and await approval from the LDEQ. After receiving approval from the LDEQ, the facility will then commence with well abandonment procedures.

9.2 Abandonment Procedures

Each well's protective concrete pad, guard posts, and protective casing are dismantled. Each monitor well casing and other components are removed from the borehole by pulling with the drilling rig or other means as deemed necessary. If the casing cannot be removed by pulling, it is overdrilled with hollow stem augers and extracted from the borehole. The steel, concrete, and other well components will be disposed of in an environmentally approved manner.

Each well is plugged with a cement/bentonite grout from the bottom of the well to the ground surface using the tremie method. Grouting continues until the unit weight of the grout exiting the borehole at the ground surface is equal to that of the original unit weight. Twenty-four hours after grouting, each borehole is inspected and, if necessary, additional grout is added. If overhead restrictions preclude the use of a drilling rig to remove the well casing and well packing material, the casing is cut off two feet below ground surface (bgs) and the remaining casing will be plugged with a cement/bentonite grout from the bottom of the well to ground surface, providing an adequate seal of the annular space.

9.3 Post-Abandonment Requirements

Upon completion of the plugging and abandonment of wells, the necessary reports including, but not limited to the DOTD Water Well Plugging and Abandonment Report, are completed and submitted to the appropriate agencies.

TABLE 1

GROUNDWATER MONITOR WELL INFORMATION

TABLE 1
MONITOR WELL CONSTRUCTION INFORMATION

Graphic Packaging International, Incorporated
West Monroe, Louisiana

	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15	MW-17	MW-18	MW-19	MW-20	MW-21	MW-22	MW-23	MW-24
Unit Monitored	Landfill	Landfill	Landfill	Landfill	Landfill	Landfill	NPDES Impoundment	NPDES Impoundment	NPDES Impoundment	NPDES Impoundment	NPDES Impoundment	NPDES Impoundment	NPDES Impoundment	NPDES Impoundment	NPDES Impoundment	NPDES Impoundment	NPDES Impoundment	NPDES Impoundment/ Ash Pond	Ash Pond	Ash Pond	Ash Pond	Ash Pond	Ash Pond
Well Construction	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC	4-inch Sch. 40 PVC
Casing Elevation	73.11	75.25	76.5	75.16	76.72	74.98	82.2	87.09	86.6	80	81.42	83.44	80.13	78.58	77.93	85.5	88.5	87.24	88.03	88.04	88.12	88.04	88.06
Well Depth	20.15	32.35	30.11	25.73	38.23	40.76	27.8	42.78	32.79	29.86	28.94	26.79	64.77	63.9	58.43	38.09	35.14	30.18	47.37	38.82	42.26	42.7	42.54
Screen Interval																							
- from	23.3	25.3	12.3	8.3	21.8	18.2	16	29	22	17	16	15	53	51	47	20	22.75	17	35.75	27	29.75	30.45	30.45
- to	27.8	29.6	21.8	12.8	35.9	27.8	25.5	38.5	31.5	26.5	25.5	24.5	62.5	60.5	56.5	29.5	32.25	26.5	45.5	36.75	39.5	40.2	40.2
Latititude (N)	30 28'42"	32 28'30"	32 28'43"	32 28'35"	32 28'34"	32 28'38"	32 28'25"	32 22'14"	32 27'57"	32 27'35"	32 27'26"	32 27'14"	32 26'57"	32 27'22"	32 27'40"	32 28'14"	32 28'18"	32 28'15"	32 28'30"	32 28'30"	32 28'22"	32 28'11"	32 28'06"
Longitude (W)	92 08'44"	92 08'41"	92 08'35"	92 08'36"	92 08'45"	92 08'31"	92 08'52"	92 20'25"	92 08'48"	92 08'31"	92 08'23"	92 08'10"	92 62'00"	92 07'41"	92 07'55"	92 08'21"	92 08'89"	92 08'30"	92 08'30"	92 08'17"	92 07'58"	92 08'12"	92 08'21"

TABLE 2

REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, HOLDING TIMES, AND ANALYSIS PARAMETERS

Table 2
Required Containers, Preservation Techniques, and Holding Times

Graphic Packaging International, Inc.
West Monroe, Louisiana

Parameter	Container [1]	Minimum Volume	Preservation [2, 3]	Maximum Holding Time [4]	Method	PQL
pH	P, G	100mL	None	Immediately	150.1	n/a
Specific Conductance	P, G	100mL	4°C	28 days	120.1	10 umhos/cm
Chemical Oxygen Demand	P, G	100mL	4°C, H_2SO_4 to pH <2	28 days	410.4	5mg/L
Total Organic Carbon	P, G	150mL	4°C, H_2SO_4 to pH <2	28 days	415.1	1mg/L
Total Dissolved Solids	P, G	100mL	4°C	7 days	160.1	10 mg/L
Total Arsenic	P, G	500mL	HNO_3 to pH <2	6 months	200.7	0.005 mg/L
Total Barium	P, G	500mL	HNO_3 to pH <2	6 months	200.7	0.05 mg/L
Total Cadmium	P, G	500mL	HNO_3 to pH <2	6 months	200.7	0.0001 mg/L
Total Chromium	P, G	500mL	HNO_3 to pH <2	6 months	200.7	0.005 mg/L
Total Lead	P, G	500mL	HNO_3 to pH <2	6 months	200.7	0.002 mg/L
Sulfate	P, G	200mL	4°C	28 days	375.4	5mg/L
Total Aluminum	P, G	500mL	HNO_3 to pH <2	6 months	200.7	0.1mg/L

Notes:

1 Polyethylene (P) or Glass (G).
2 Sample preservation should be performed immediately upon sample collection. For composite samples, the pH of the composite should be checked after the addition of each aliquot.
3 When any sample is to be shipped by common carrier or sent through the United States Mails, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR part 172). The person offering such material for transportation is responsible for ensuring such compliance. For the preservation requirements of Table II, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric acid (HCl) in water solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater); Nitric acid (HNO_3) in water solutions at concentrations of 0.15% by weight or less (pH about 1.62 or greater); Sulfuric acid (H_2SO_4) in water solutions at concentrations of 0.35% by weight or less (pH about 1.15 or greater); and sodium-hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH about 12.30 or less).
4 Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid.

FIGURE 1

MONITORING WELL LOCATION MAP

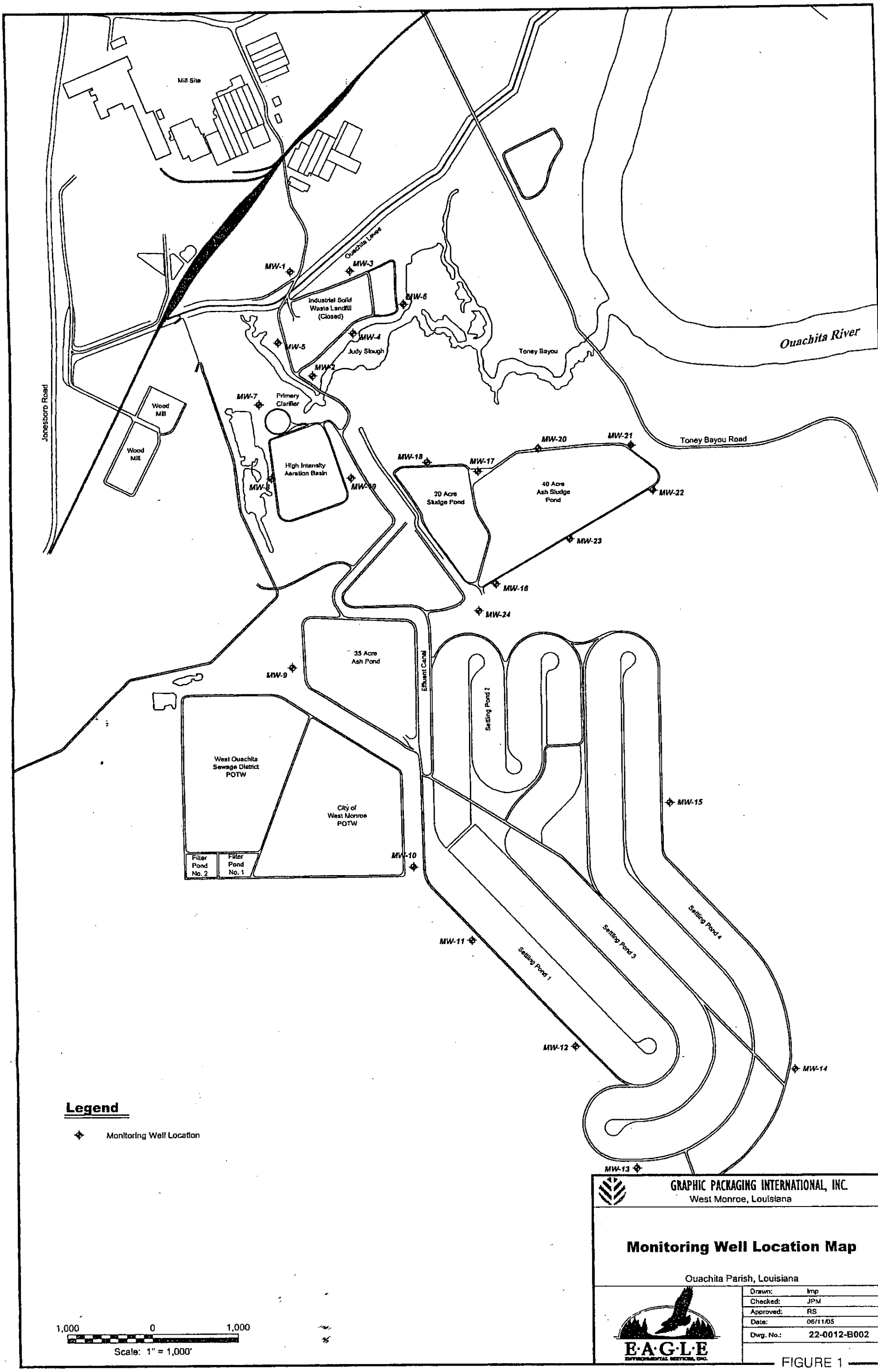

Mill Site
Ouachita Levee
MW-1
MW-3
MW-6
Industrial Solid Waste Landfill (Closed)
MW-4
MW-5
Judy Slough
MW-2
Toney Bayou
Ouachita River
Jonesboro Road
Wood Mill
Wood Mill
MW-7
Primary Clarifier
High Intensity Aeration Basin
MW-8
MW-19
MW-18
MW-17
MW-20
MW-21
Toney Bayou Road
20 Acre Sludge Pond
40 Acre Ash Sludge Pond
MW-22
MW-23
MW-16
MW-24
35 Acre Ash Pond
MW-9
Effluent Canal
Settling Pond 2
West Ouachita Sewage District POTW
City of West Monroe POTW
Filter Pond No. 2
Filter Pond No. 1
MW-10
MW-15
MW-11
Settling Pond 1
Settling Pond 3
Settling Pond 4
MW-12
MW-14
MW-13
Legend
Monitoring Well Location
1,000
0
1,000
Scale: 1" = 1,000'
GRAPHIC PACKAGING INTERNATIONAL, INC.
West Monroe, Louisiana
Monitoring Well Location Map
Ouachita Parish, Louisiana
Drawn: lmp
Checked: JPM
Approved: RS
Date: 06/11/05
Dwg. No.: 22-0012-B002
E·A·G·L·E
ENVIRONMENTAL SERVICES, INC.

FIGURE 1

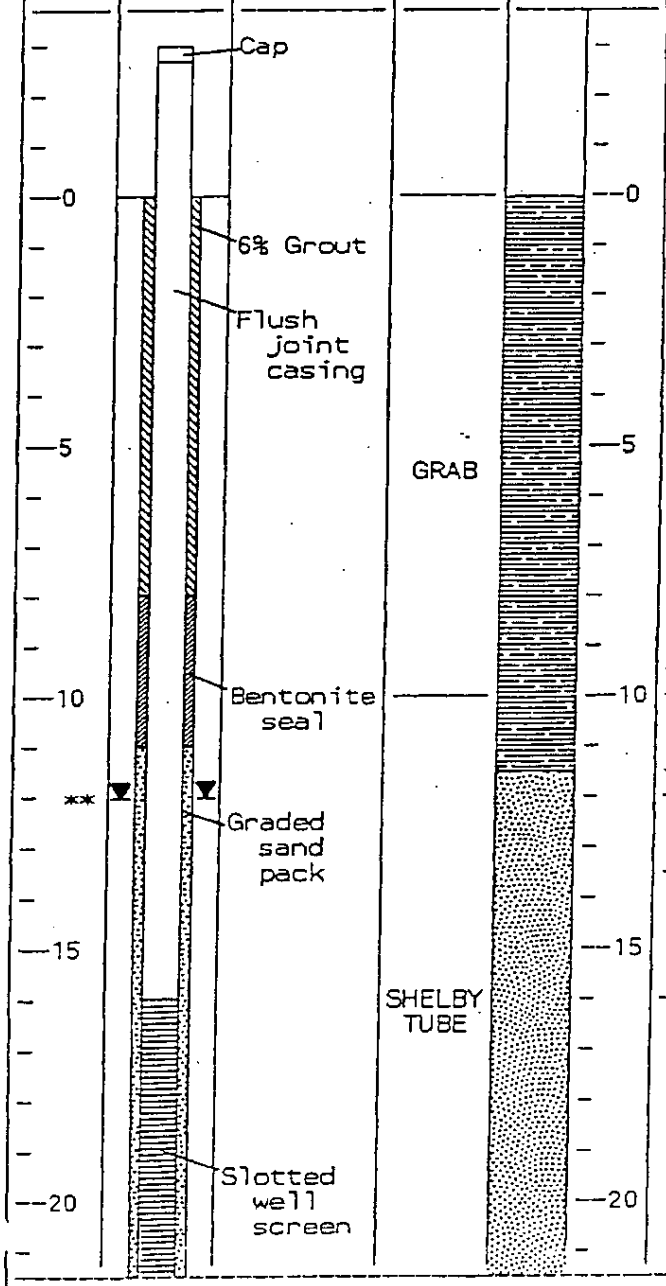
FIGURE 2

GROUNDWATER MONITOR WELL CONSTRUCTION LOGS

WELL LOG: MW-7

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 18-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 82.20'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 26.3'
DEPTH/HOLE: 36.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 19.8'
DIA/CASING: 4.0"
TYPE: PVC



SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)

0.0'-9.5': Brown, silty CLAY. (Pad fill material)

9.5'-10.0': Brown, silty, organic-rich CLAY

10.0'-11.5': Gray, silty, sandy CLAY with i stain mottling.

11.5'-12.0': Beige, coarse-grained SAND.

12.0'-13.5': Gray to beige, clayey SAND with iron staining and trace organics.

13.5'-16.0': Beige, medium to coarse-graine SAND with some gravel; iron stain mottling and trace organics; some gray clay streaks.

16.0'-36.0': White to beige, well-sorted, extremely coarse-grained SAND with some mic.

CONTINUED TO NEXT PAGE

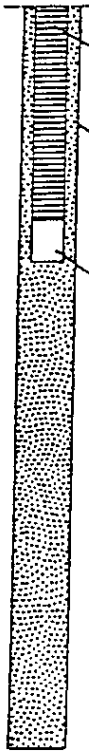
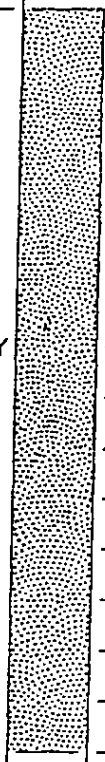
GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-7

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 18-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 82.20'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 26.3'
DEPTH/HOLE: 36.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 19.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Slotted well screen Graded sand pack End cap	SHELBY TUBE		16.0'-36.0': White to beige, well-sorted, extremely coarse-grained SAND with some mica

25 30 35 40 45

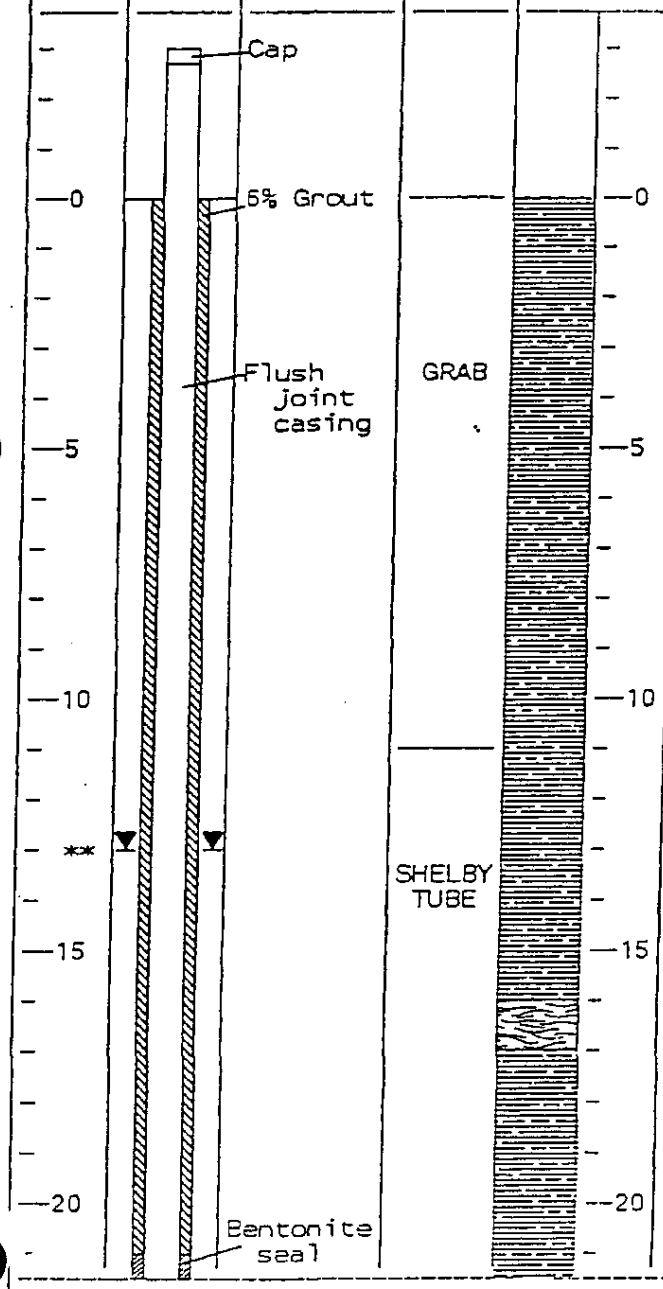
** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-8

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 14-DEC-89
LOCATION: West Monroe, LA.
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 87.09'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 39.3'
DEPTH/HOLE: 45.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 32.8'
DIA/CASING: 4.0"
TYPE: PVC



SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)

0.0'-11.0': Brown, silty CLAY. (Pad fill material)

11.0'-12.0': Black, silty CLAY with abundant organics.

12.0'-16.0': Gray to beige, silty, sandy CLA with iron stain mottling.

16.0'-17.0': Brown SILT.

17.0'-24.0': Gray, sandy CLAY with trace organics and iron stain mottling.

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GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-8

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 14-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 87.09'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 39.3'
DEPTH/HOLE: 45.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 32.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
					17.0'-24.0': Gray, sandy CLAY with trace organics and iron stain mottling.
		Bentonite seal			
25		Graded sand pack		25	24.0'-28.0': Gray, clayey, fine-grained SAN with iron staining.
		Flush joint casing			
					28.0'-29.0': Beige, medium-grained SAND.
30		Slotted well screen		30	29.0'-33.0': Beige to gray, clayey, silty, fine-grained SAND.
			SHELBY TUBE		
					33.0'-34.0': Beige, coarse-grained SAND.
					34.0'-35.0': Gray, silty, sandy CLAY.
35				35	35.0'-45.0': Beige to white, coarse-grained SAND.
40		End cap		40	
45				45	

** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-9

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 14-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
T.O.C.: 86.60'
DRILLING METHOD: Hollow-Stem Auger
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 32.3'
LENGTH/SCREEN: 9.5'
LENGTH/CASING: 25.8'
DEPTH/HOLE: 39.0'
DIA/SCREEN: 4.0"
DIA/CASING: 4.0"
DIA/HOLE: 10.0"
SLOT SIZE: 0.02"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Cap			
0		6% Grout	GRAB		0.0'-12.0': Brown, silty CLAY. (Pad fill material)
		Flush joint casing			
5					
10					
					12.0'-13.5': Black, silty CLAY with abundant organics.
					13.5'-19.5': Gray, silty, sandy CLAY with ir stain mottling and trace organics.
15		Bentonite seal	SHELBY TUBE		
20**		Graded sand pack			19.5'-21.0': Gray, clayey, fine-grained SAND with iron staining.

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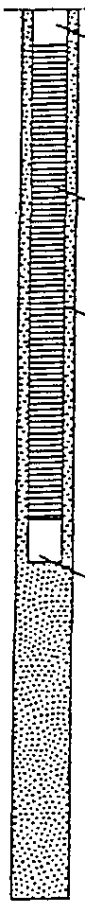
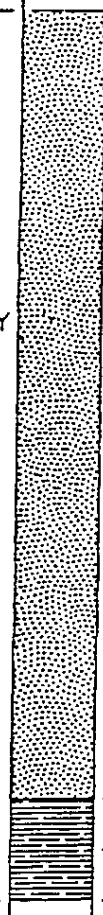
GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-9

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 14-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 86.60'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 32.3'
DEPTH/HOLE: 39.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 25.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Flush joint casing Slotted well screen Graded sand pack End cap	SHELBY TUBE		21.0'-26.0': Gray to white, medium to coarse-grained SAND; iron stain mottling. 26.0'-37.0': Tan and black, coarse-grained SAND. 37.0'-39.0': Gray, silty, sandy CLAY with iron staining.

25 30 35 40 45

** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-10

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 12-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: P.B. Lee
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 80.00'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 27.3' DEPTH/HOLE: 28.0' DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5' DIA/SCREEN: 4.0" SLOT SIZE: 0.02"
LENGTH/CASING: 20.8' DIA/CASING: 4.0" TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
0		Cap			
		6% Grout			0.0'-14.5': Brown, silty, sandy CLAY. (Pad fill material)
		Flush joint casing			
5			GRAB		
10		Bentonite seal			
**					
15		Graded sand pack	SHELBY TUBE		14.5'-17.0': Brown, silty CLAY with abundant organics.
					17.0'-17.5': Brown, silty SAND.
					17.5'-18.5': Brown CLAY.
		Slotted well screen			18.5'-19.0': Brown, silty SAND.
20					19.0'-20.0': Gray CLAY.

CONTINUED TO NEXT PAGE

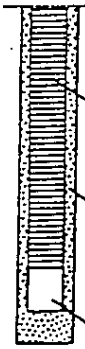
GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-10

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 12-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: P.B. Lee
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 80.00'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 27.3'
DEPTH/HOLE: 28.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 20.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Slotted well screen Graded sand pack End cap	SHELBY TUBE		20.0'-22.0': Brown, silty SAND. 22.0'-24.0': Brown, medium-grained SAND. 24.0'-28.0': Brown CLAY.
25				25	
30				30	
35				35	
40				40	
45				45	

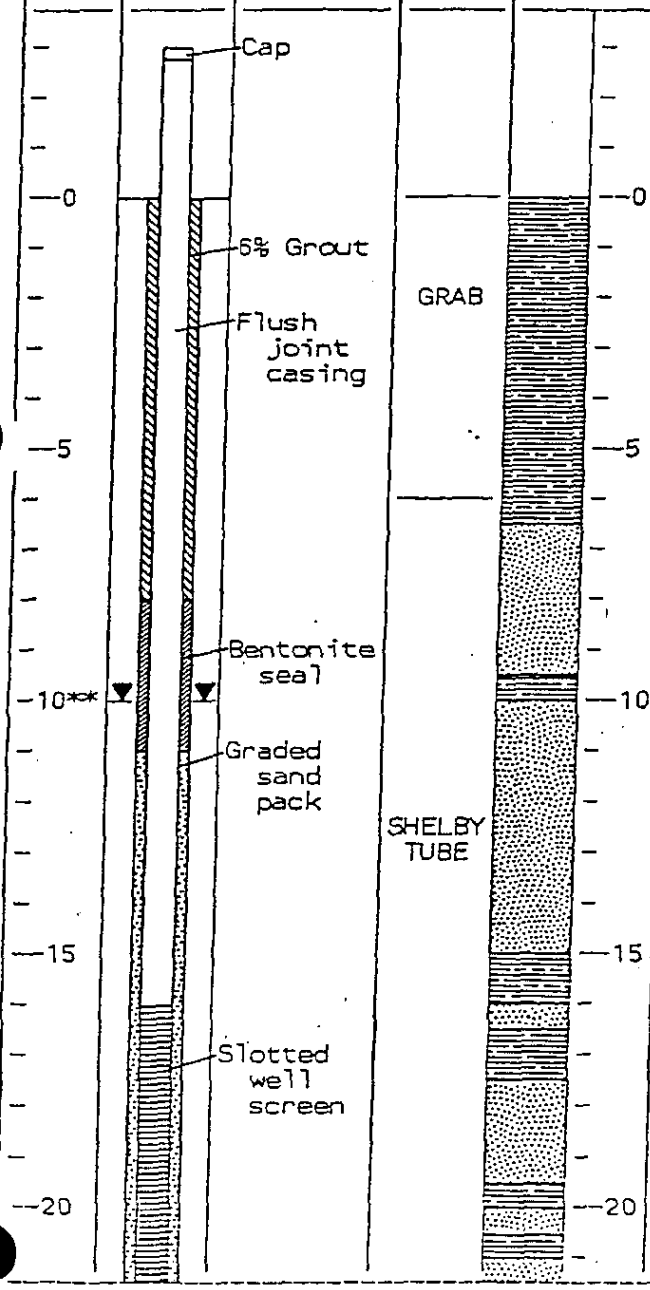
** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-11

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 12-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: P.B. Lee
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 81.42'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 26.3'
DEPTH/HOLE: 28.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 19.8'
DIA/CASING: 4.0"
TYPE: PVC



SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)

0.0'-6.5': Brown, silty CLAY. (Pad fill material)

6.5'-9.5': Tan, silty, fine-grained SAND.

9.5'-10.0': Tan, silty, sandy CLAY.

10.0'-15.0': Tan, clayey SAND.

15.0'-16.0': Tan, silty CLAY.

16.0'-16.5': Tan, clayey SAND.

16.5'-17.5': Tan, silty CLAY.

17.5'-19.5': Tan, silty SAND.

19.5'-20.0': Tan, silty CLAY.

20.0'-20.5': Tan, silty SAND.

20.5'-21.0': Tan, silty CLAY.

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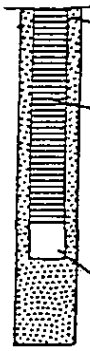
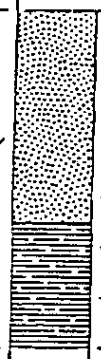
GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-11

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 12-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: P.B. Lee
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 81.42'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 26.3' DEPTH/HOLE: 28.0' DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5' DIA/SCREEN: 4.0" SLOT SIZE: 0.02"
LENGTH/CASING: 19.8' DIA/CASING: 4.0" TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Graded sand pack Slotted well screen End cap	SHELBY TUBE		21.0'-25.5': Tan, clayey SAND. 25.5'-26.0': Tan, silty CLAY. 26.0'-28.0': Brown CLAY.
25				25	
30				30	
35				35	
40				40	
45				45	

** Top of saturated zone as encountered during drilling.

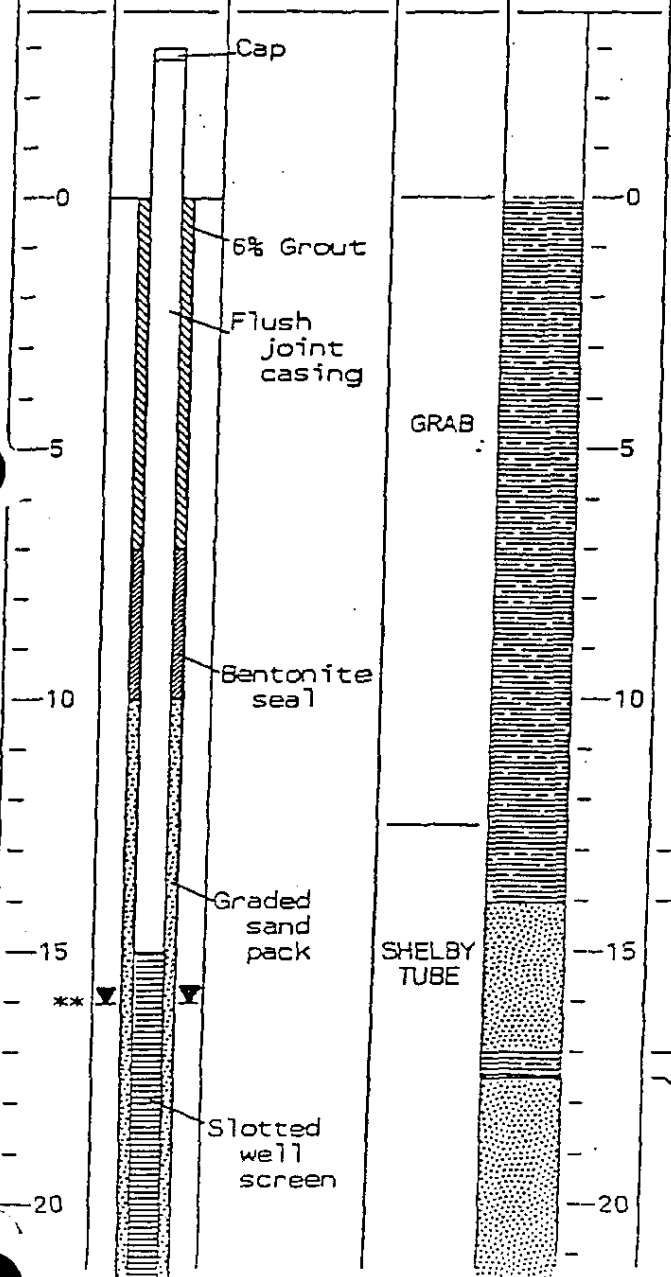
GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-12

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 13-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: P. B. Lee
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 83.44'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 25.3'
DEPTH/HOLE: 28.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 18.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)



0.0'-13.0': Brown, silty CLAY. (Pad fill material)

13.0'-14.0': Tan, silty CLAY.

14.0'-17.0': Brown, clayey SAND.

17.0'-17.5': Gray, sandy CLAY with ferrous nodules.

17.5'-24.5': Brown, clayey SAND.

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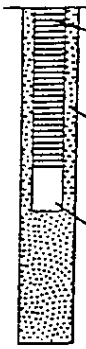
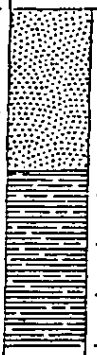
GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-12

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 13-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: P.B. Lee
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 83.44'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 25.3' DEPTH/HOLE: 28.0' DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5' DIA/SCREEN: 4.0" SLOT SIZE: 0.02"
LENGTH/CASING: 18.8' DIA/CASING: 4.0" TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Slotted well screen Graded sand pack End cap	SHELBY TUBE		17.5'-24.5': Brown, clayey SAND. 24.5'-25.5': Brown, silty CLAY. 25.5'-26.0': Brown and gray, silty CLAY. 26.0'-28.0': Gray CLAY.
25				25	
30				30	
35				35	
40				40	
45				45	

** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-13

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 18-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
T.O.C.: 80.13'
DRILLING METHOD: Hollow-Stem Auger
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 63.3'
LENGTH/SCREEN: 9.5'
LENGTH/CASING: 56.8'
DEPTH/HOLE: 65.0'
DIA/SCREEN: 4.0"
DIA/CASING: 4.0"
DIA/HOLE: 10.0"
SLOT SIZE: 0.02"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
0		Cap; 6% Grout; Flush joint casing	GRAB		0.0'-14.5': Brown, silty CLAY. (Pad fill material)
5					
10					
15			SHELBY TUBE		14.5'-16.0': Brown, organic-rich, silty CLA with some iron stain mottling.
					16.0'-23.0': Brown and gray, silty CLAY wit ferrous nodules.
** 20					

CONTINUED TO NEXT PAGE

** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-13

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 18-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 80.13'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 63.3' DEPTH/HOLE: 65.0' DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5' DIA/SCREEN: 4.0" SLOT SIZE: 0.02"
LENGTH/CASING: 56.8' DIA/CASING: 4.0" TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
					16.0'-23.0': Brown and gray, silty CLAY wit. ferrous nodules.
					23.0'-24.0': Brown CLAY.
25		6% Grout		25	24.0'-24.5': Brown, silty CLAY with ferrous nodules.
		Flush joint casing			24.5'-26.0': Brown CLAY.
					26.0'-36.0': Brown and gray, silty CLAY witl ferrous nodules.
30				30	
			SHELBY TUBE		
35				35	
					36.0'-46.0': Gray and brown CLAY with silty streaks.
40				40	
45		Bentonite seal		45	

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GROUNDWATER TECHNOLOGY, INC.

* Top of saturated zone as encountered during drilling.

WELL LOG: MW-13

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 18-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 80.13'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 63.3' DEPTH/HOLE: 65.0' DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5' DIA/SCREEN: 4.0" SLOT SIZE: 0.02"
LENGTH/CASING: 56.8' DIA/CASING: 4.0" TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Bentonite seal			36.0'-46.0': Gray and brown CLAY with silt streaks.
		Flush joint casing			46.0'-50.0': Gray, silty CLAY.
50		Graded sand pack			50.0'-53.0': Gray CLAY, with iron stain mottling.
55		Slotted well screen	SHELBY TUBE		53.0'-59.0': Beige, medium-grained SAND with some mica.
60					59.0'-65.0': Beige to white, medium to coarse-grained SAND with some mica.
65		End cap			

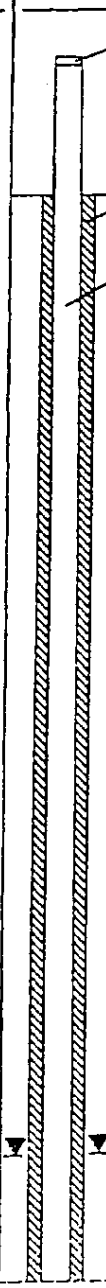
** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-14

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 19-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
T.O.C.: 78.58'
DRILLING METHOD: Hollow-Stem Auger
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 61.3'
LENGTH/SCREEN: 9.5'
LENGTH/CASING: 54.8'
DEPTH/HOLE: 65.0'
DIA/SCREEN: 4.0"
DIA/CASING: 4.0"
DIA/HOLE: 10.0"
SLOT SIZE: 0.02"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
0		Cap 6% Grout Flush joint casing			0.0'-15.0': Brown, silty CLAY. (Pad fill material)
5			GRAB		
10					
15			SHELBY TUBE		15.0'-19.0': Brown and gray, organic-rich, silty CLAY.
** 20					19.0'-20.5': Gray, silty CLAY with iron stai mottling and trace organics.

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GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-14

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 19-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 78.58'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 61.3'
DEPTH/HOLE: 65.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 54.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
					20.5'-23.0': Brown and gray, blocky CLAY trace organics.
					23.0'-28.5': Gray CLAY.
25		6% Grout			
		Flush joint casing			
					28.5'-29.5': Gray, silty CLAY.
30					29.5'-32.0': Gray, silty, organic-rich CLA
					32.0'-36.5': Gray and brown, blocky CLAY.
35			SHELBY TUBE		
					36.5'-45.0': Gray, silty CLAY with iron st mottling and trace organics.
40					
45		Bentonite seal			

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GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-14

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 19-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 78.58'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 61.3'
DEPTH/HOLE: 65.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 54.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Bentonite seal			45.0'-48.0': Gray, sandy SILT.
		Flush joint casing			48.0'-50.5': Beige, silty, fine-grained SAN
50				50	
		Graded sand pack			50.5'-51.0': Beige, fine-grained SAND.
					51.0'-56.0': Beige, medium-grained SAND.
55				55	
		Slotted well screen	SHELBY TUBE		56.0'-62.0': Beige and white, coarse-graine SAND.
60				60	
		End cap			62.0'-65.0': Gray, clayey, medium-grained SAND.
65				65	

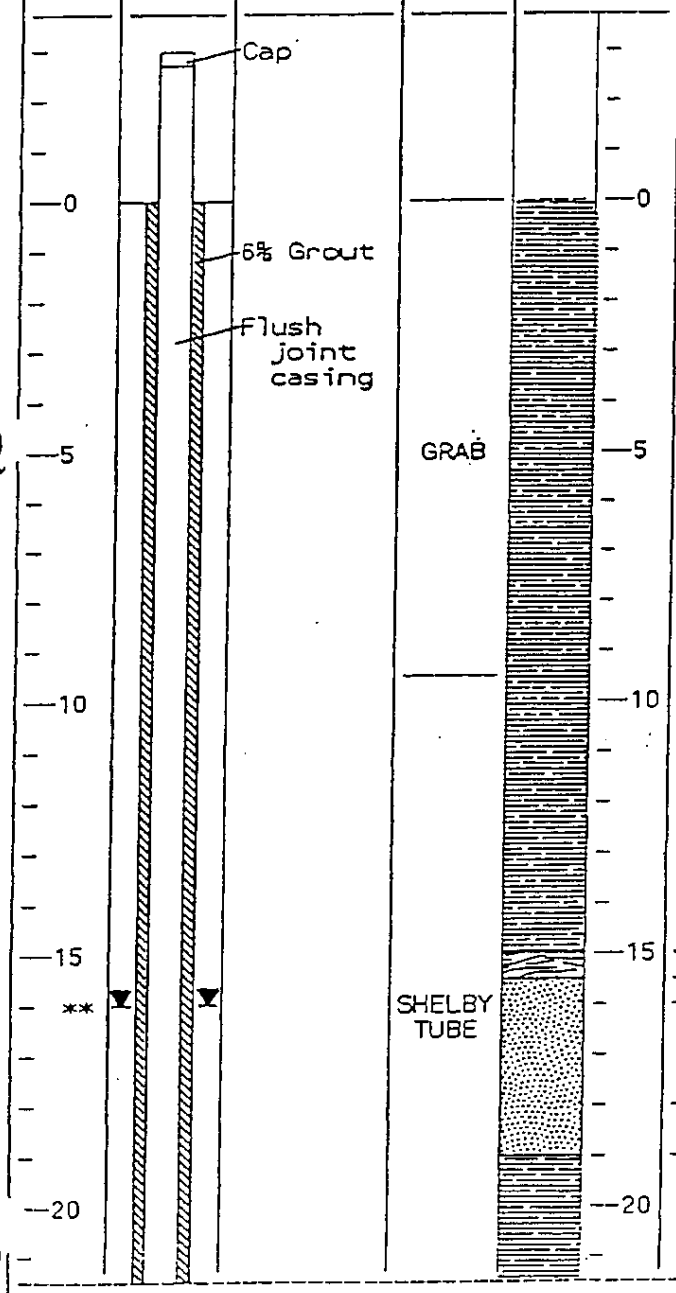
** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-15

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 20-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 77.93'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 57.3'
DEPTH/HOLE: 60.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 50.8'
DIA/CASING: 4.0"
TYPE: PVC



SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)

0.0'-10.5': Brown, silty CLAY. (Pad fill Material)

10.5'-15.0': Gray and white, silty, sandy CLAY with iron stain mottling.

15.0'-15.5': Brown, organic SILT.

15.5'-16.0': Brown, organic-rich, silty, fine-grained SAND.

16.0'-18.0': Brown, medium-grained SAND.

18.0'-19.0': Brown, silty, fine-grained SAND

19.0'-27.5': Brown to gray, silty, blocky CLAY; iron staining within organic nodules.

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GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-15

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 20-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 77.93'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 57.3'
DEPTH/HOLE: 60.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 50.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
25		6% Grout			19.0'-27.5': Brown to gray, silty, blocky CLAY; iron staining within organic nodules.
		Flush joint casing			
30			SHELBY TUBE		27.5'-35.5': Brown to beige, silty CLAY.
35					35.5'-37.5': Gray, silty CLAY with iron stai mottling and trace organics.
					37.5'-38.0': Brown SILT.
40		Bentonite seal			38.0'-43.5': Gray, silty, sandy CLAY with trace organics and iron stain mottling.
45		Graded sand pack			43.5'-47.0': Gray, clayey SAND with iron staining.

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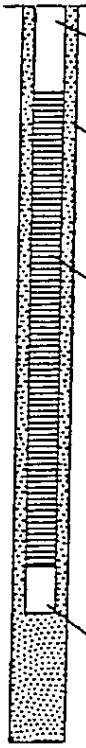
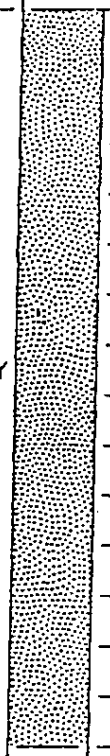
GROUNDWATER TECHNOLOGY, INC.

Top of saturated zone as encountered during drilling.

WELL LOG: MW-15

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 20-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 77.93'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 57.3'
DEPTH/HOLE: 60.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 50.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Flush joint casing			43.5'-47.0': Gray, clayey SAND with iron staining.
		Graded sand pack			47.0'-60.0': Beige, coarse-grained SAND wi some gravel.
50		Slotted well screen	SHELBY TUBE	50	
55				55	
		End cap			
60				60	
65				65	

** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-16

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 15-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 75.77'
SAMPLE METHOD: Shelby Tube

DEPTH OF WELL: 42.3'
DEPTH/HOLE: 50.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 2.0'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 43.3'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
0		Cap			
		6% Grout			0.0'-0.5': Brown, silty, organic-rich CLAY.
		Flush joint casing			0.5'-6.5': Beige, well-sorted SILT.
5					6.5'-9.0': Gray, silty CLAY with iron stain mottling, some fine-grained sand and organi nodules.
			SHELBY TUBE		9.0'-9.5': Beige, well-sorted SILT.
10					9.5'-10.0': Beige, silty, sandy CLAY with iron stain mottling.
					10.0'-22.0': Red SILT with some organic-rich, sandy nodules.
15					
**					
20					

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GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-16

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 15-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 75.77'
SAMPLE METHOD: Shelby Tube

DEPTH OF WELL: 42.3'
DEPTH/HOLE: 50.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 2.0'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 43.3'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
					10.0'-22.0': Red SILT with some organic-ric sandy nodules.
					22.0'-27.0': Red, clayey SILT with gray cla streaks.
25		6% Grout		25	
		Flush joint casing			27.0'-27.5': Red, silty, fine-grained SAND.
					27.5'-30.0': Gray to blue, clayey SILT.
30			SHELBY TUBE	30	30.0'-34.0': Gray to blue, silty CLAY with some fine-grained sand streaks.
		Bentonite seal			
					34.0'-38.0': Gray, clayey SILT.
35				35	
		Graded sand pack			
					38.0'-39.5': Gray, silty CLAY.
40		Slotted well screen		40	39.5'-41.5': Gray to white, coarse-grained SAND with some mica.
					41.5'-43.0': Gray, silty, medium-grained SAN
		End cap			43.0'-48.0': Gray, stiff CLAY.
45				45	

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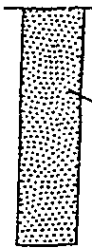
GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-16

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 15-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 75.77'
SAMPLE METHOD: Shelby Tube

DEPTH OF WELL: 42.3'
DEPTH/HOLE: 50.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 2.0'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 43.3'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Graded sand pack	SHELBY TUBE		43.0'-48.0': Gray, stiff CLAY.
					48.0'-49.0': Gray, coarse-grained SAND.
					49.0'-50.0': Gray, stiff CLAY.
50				50	
55				55	
60				60	
65				65	

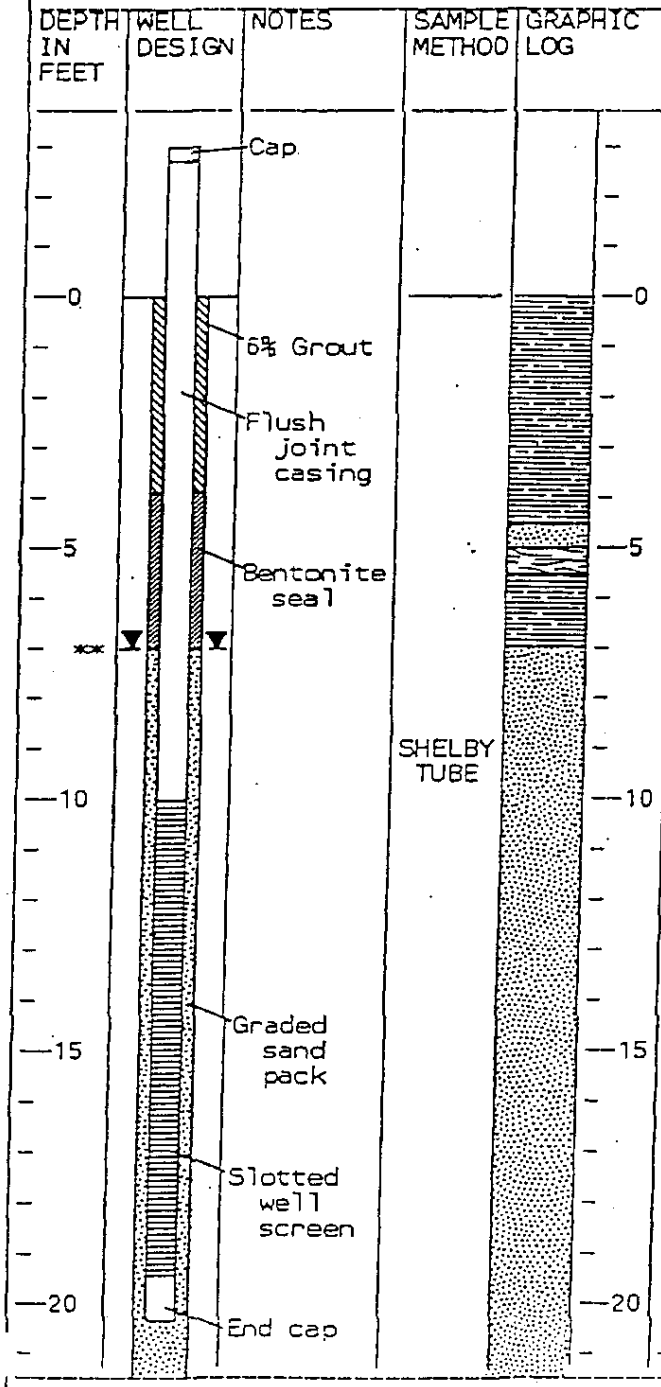
** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-17

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 15-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 75.54'
SAMPLE METHOD: Shelby Tube

DEPTH OF WELL: 20.3'
DEPTH/HOLE: 29.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 13.8'
DIA/CASING: 4.0"
TYPE: PVC



SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)

0.0'-0.8': Brown, silty CLAY.

0.8'-4.5': Gray, silty, sandy CLAY with iro stain mottling and organic streaks.

4.5'-5.0': Gray, clayey, medium-grained SAN

5.0'-5.5': Brown, organic SILT.

5.5'-7.0': Gray, sandy CLAY with iron staining.

7.0'-8.0': Gray, clayey, fine-grained SAND with iron staining.

8.0'-9.0': Gray, silty, medium-grained SAND with iron staining.

9.0'-11.0': Gray to beige, medium to coarse-grained SAND.

11.0'-21.0': Beige to white, medium to extremely coarse-grained SAND with some gravel and mica; iron stain mottling.

CONTINUED TO NEXT PAGE

** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-17

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 15-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 75.54'
SAMPLE METHOD: Shelby Tube

DEPTH OF WELL: 20.3'
DEPTH/HOLE: 29.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 13.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Graded sand pack	SHELBY TUBE		21.0'-27.5': White to beige, extremely coarse-grained SAND with some gravel.
					27.5'-29.0': Gray, stiff CLAY.

25, 30, 35, 40, 45

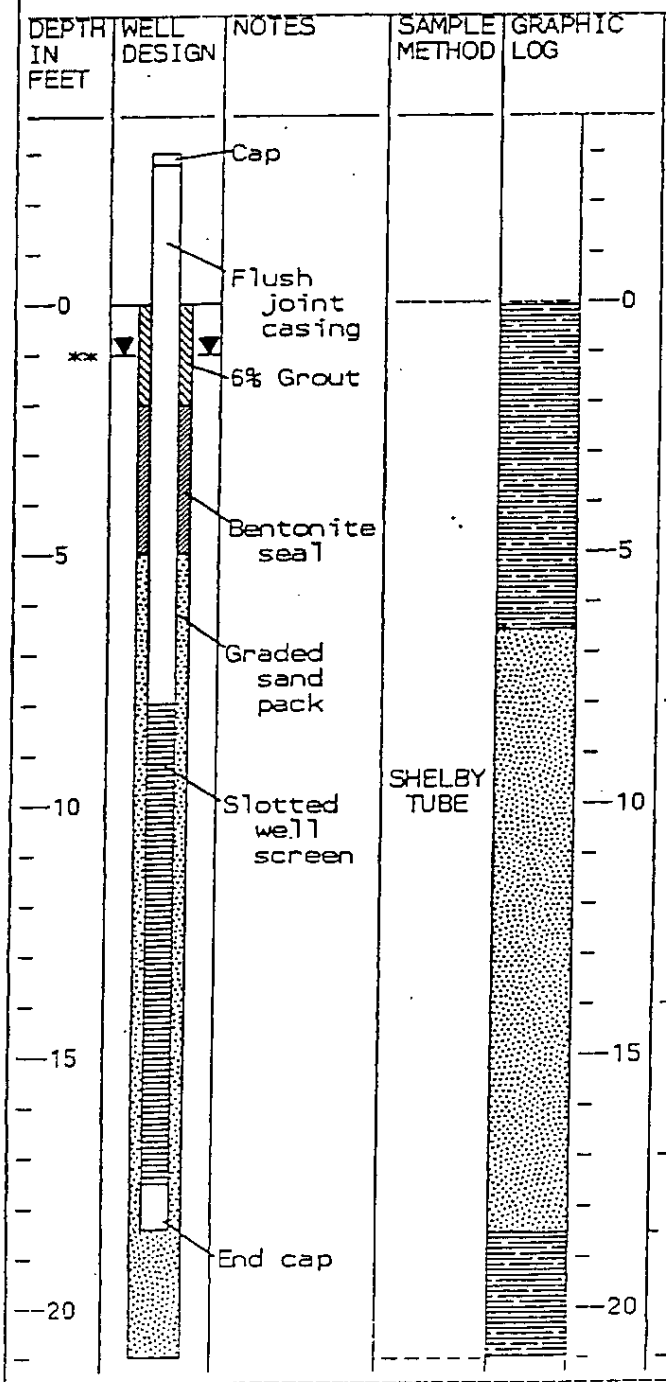
** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-18

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 15-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 73.74'
SAMPLE METHOD: Shelby Tube

DEPTH OF WELL: 18.3'
DEPTH/HOLE: 21.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 11.8'
DIA/CASING: 4.0"
TYPE: PVC



SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)

0.0'-1.0': Brown, silty, organic-rich CLAY

1.0'-3.5': Gray, silty , sandy CLAY with i stain mottling and trace organics.

3.5'-6.5': Gray, sandy CLAY with iron stai mottling.

6.5'-8.0': Beige, medium to coarse-grained SAND with iron staining and trace organics.

8.0'-14.0': White to beige, coarse-grained SAND with some gravel and iron staining.

14.0'-17.0': Beige, coarse-grained SAND wit some mica and iron staining.

17.0'-18.5': Gray, silty, medium-grained SAND.

18.5'-21.0': Gray, silty CLAY.

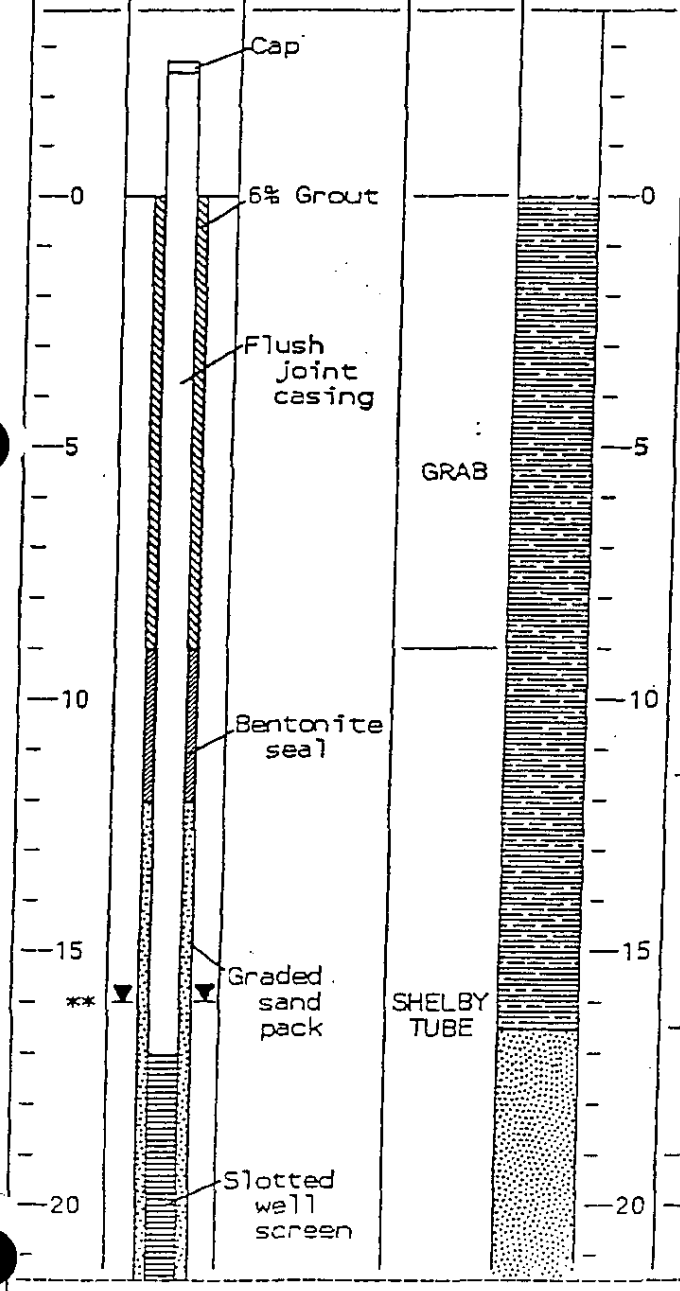
** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-19

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 18-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 87.24'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 27.3'
DEPTH/HOLE: 31.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 20.8'
DIA/CASING: 4.0"
TYPE: PVC



SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)

0.0'-11.5': Brown, silty CLAY. (Pad fill material)

11.5'-16.5': Gray, silty, sandy CLAY with iron stain mottling.

16.5'-19.0': Gray, clayey SAND with iron staining and trace organics.

19.0'-20.0': Beige, medium-grained SAND with iron staining.

CONTINUED TO NEXT PAGE

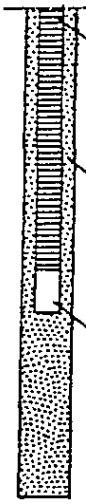
GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-19

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 18-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 87.24'
SAMPLE METHOD: Grab / Shelby Tube

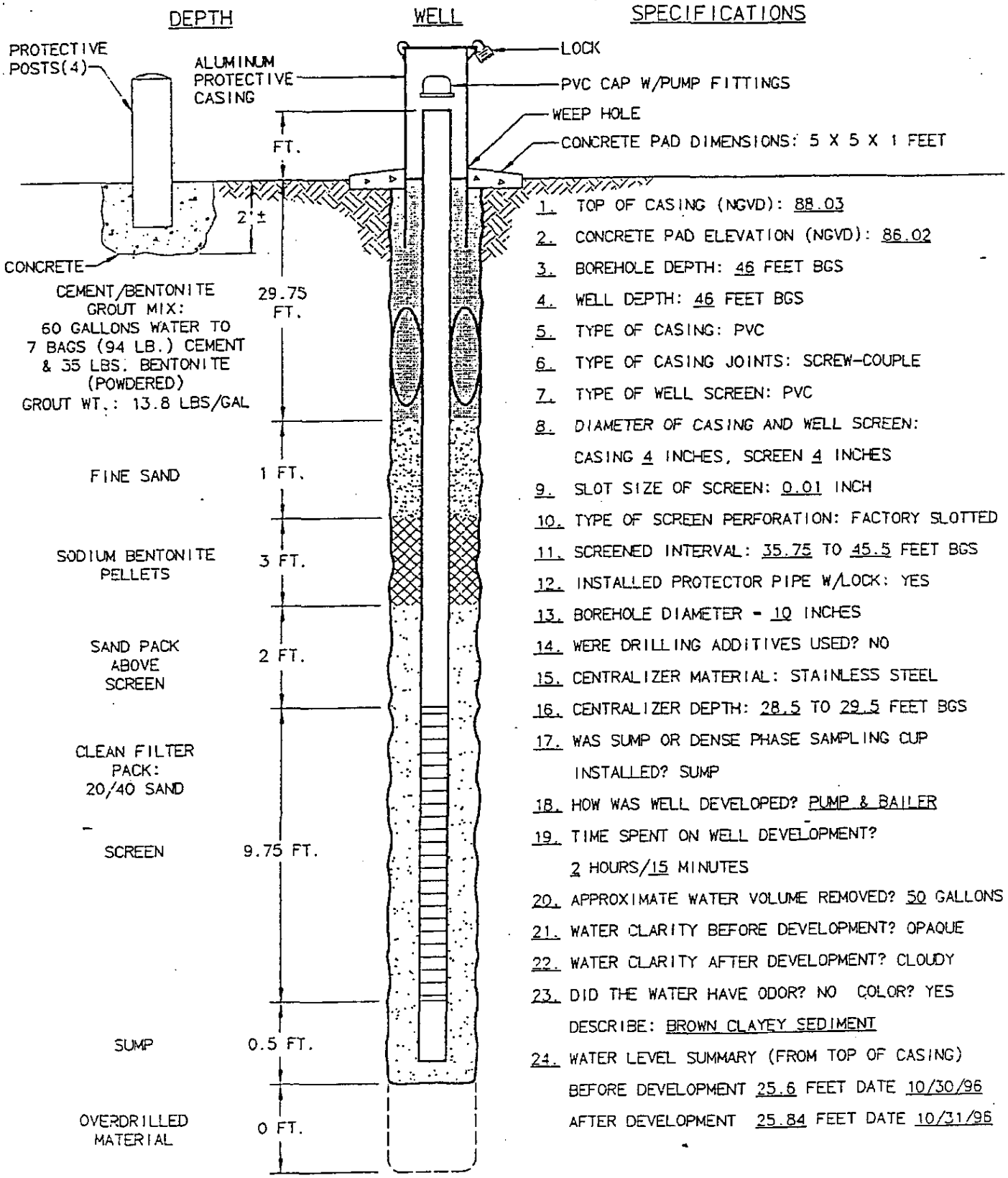
DEPTH OF WELL: 27.3'
DEPTH/HOLE: 31.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 20.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Slotted well screen			20.0'-21.5': Beige, coarse-grained SAND with iron staining.
					21.5'-25.0': Beige to white, medium to coarse-grained SAND with iron staining.
25		Graded sand pack	SHELBY TUBE	25	25.0'-26.5': Gray, silty, fine-grained SAND with iron staining.
					26.5'-27.5': Beige, medium-grained SAND wit iron staining.
		End cap			27.5'-31.0': Gray, silty CLAY with iron stain mottling.
30				30	
35				35	
40				40	
45				45	

** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

RIVERWOOD INTERNATIONAL, USA
MONITORING WELL INSTALLATION DIAGRAM



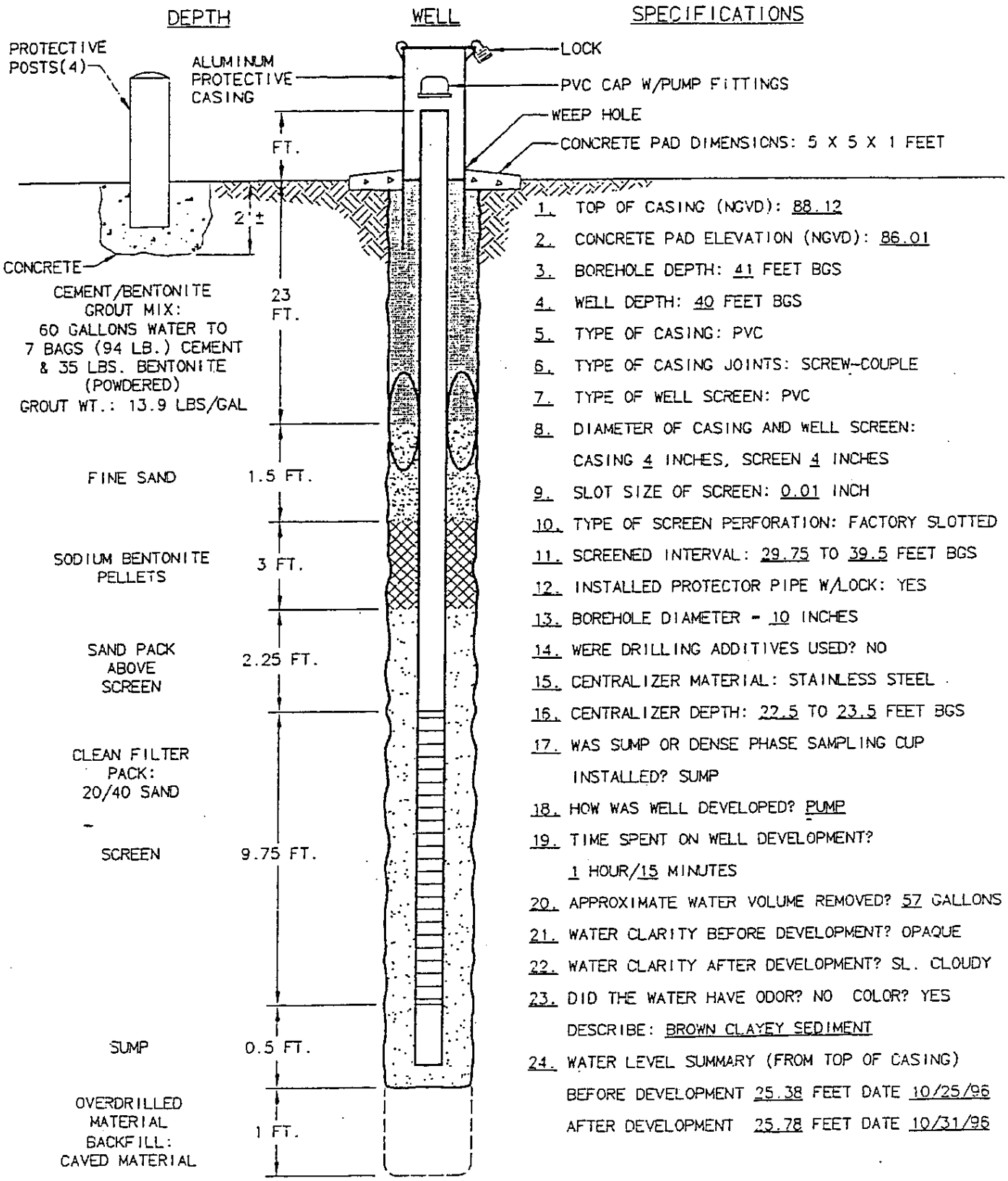
1. TOP OF CASING (NGVD): 88.03
2. CONCRETE PAD ELEVATION (NGVD): 86.02
3. BOREHOLE DEPTH: 46 FEET BGS
4. WELL DEPTH: 46 FEET BGS
5. TYPE OF CASING: PVC
6. TYPE OF CASING JOINTS: SCREW-COUPLE
7. TYPE OF WELL SCREEN: PVC
8. DIAMETER OF CASING AND WELL SCREEN: CASING 4 INCHES, SCREEN 4 INCHES
9. SLOT SIZE OF SCREEN: 0.01 INCH
10. TYPE OF SCREEN PERFORATION: FACTORY SLOTTED
11. SCREENED INTERVAL: 35.75 TO 45.5 FEET BGS
12. INSTALLED PROTECTOR PIPE W/LOCK: YES
13. BOREHOLE DIAMETER - 10 INCHES
14. WERE DRILLING ADDITIVES USED? NO
15. CENTRALIZER MATERIAL: STAINLESS STEEL
16. CENTRALIZER DEPTH: 28.5 TO 29.5 FEET BGS
17. WAS SUMP OR DENSE PHASE SAMPLING CUP INSTALLED? SUMP
18. HOW WAS WELL DEVELOPED? PUMP & BAILER
19. TIME SPENT ON WELL DEVELOPMENT? 2 HOURS/15 MINUTES
20. APPROXIMATE WATER VOLUME REMOVED? 50 GALLONS
21. WATER CLARITY BEFORE DEVELOPMENT? OPAQUE
22. WATER CLARITY AFTER DEVELOPMENT? CLOUDY
23. DID THE WATER HAVE ODOR? NO COLOR? YES
    DESCRIBE: BROWN CLAYEY SEDIMENT
24. WATER LEVEL SUMMARY (FROM TOP OF CASING)
    BEFORE DEVELOPMENT 25.6 FEET DATE 10/30/96
    AFTER DEVELOPMENT 25.84 FEET DATE 10/31/96

WELL NO. MW-20 DATE INSTALLED 10/30/96 DRILL RIG TYPE CME-75

DRILLER/FIRM MAXIM TECHNOLOGIES DRILLER C.R. HENRY GEOLOGIST J. SAMPOGNARO - PAC

13225W20 12-27-96

RIVERWOOD INTERNATIONAL, USA
MONITORING WELL INSTALLATION DIAGRAM

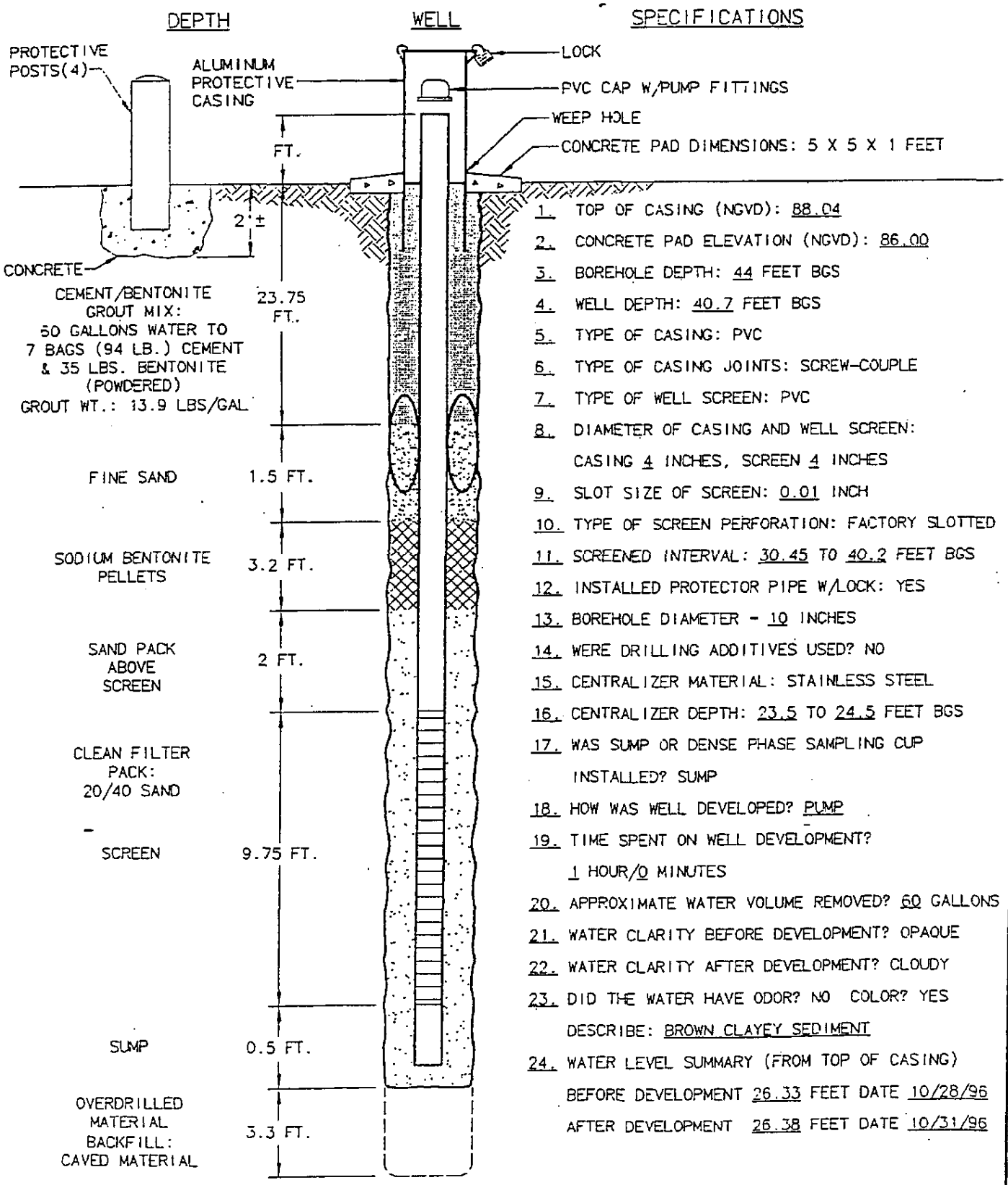


1. TOP OF CASING (NGVD): 88.12
2. CONCRETE PAD ELEVATION (NGVD): 86.01
3. BOREHOLE DEPTH: 41 FEET BGS
4. WELL DEPTH: 40 FEET BGS
5. TYPE OF CASING: PVC
6. TYPE OF CASING JOINTS: SCREW-COUPLE
7. TYPE OF WELL SCREEN: PVC
8. DIAMETER OF CASING AND WELL SCREEN: CASING 4 INCHES, SCREEN 4 INCHES
9. SLOT SIZE OF SCREEN: 0.01 INCH
10. TYPE OF SCREEN PERFORATION: FACTORY SLOTTED
11. SCREENED INTERVAL: 29.75 TO 39.5 FEET BGS
12. INSTALLED PROTECTOR PIPE W/LOCK: YES
13. BOREHOLE DIAMETER - 10 INCHES
14. WERE DRILLING ADDITIVES USED? NO
15. CENTRALIZER MATERIAL: STAINLESS STEEL
16. CENTRALIZER DEPTH: 22.5 TO 23.5 FEET BGS
17. WAS SUMP OR DENSE PHASE SAMPLING CUP INSTALLED? SUMP
18. HOW WAS WELL DEVELOPED? PUMP
19. TIME SPENT ON WELL DEVELOPMENT? 1 HOUR/15 MINUTES
20. APPROXIMATE WATER VOLUME REMOVED? 57 GALLONS
21. WATER CLARITY BEFORE DEVELOPMENT? OPAQUE
22. WATER CLARITY AFTER DEVELOPMENT? SL. CLOUDY
23. DID THE WATER HAVE ODOR? NO COLOR? YES
    DESCRIBE: BROWN CLAYEY SEDIMENT
24. WATER LEVEL SUMMARY (FROM TOP OF CASING)
    BEFORE DEVELOPMENT 25.38 FEET DATE 10/25/96
    AFTER DEVELOPMENT 25.78 FEET DATE 10/31/96

WELL NO. MW-22 DATE INSTALLED 10/24/96 DRILL RIG TYPE CME-75

DRILLER/FIRM MAXIM TECHNOLOGIES DRILLER C.R. HENRY GEOLOGIST S. MOORE - PAC

RIVERWOOD INTERNATIONAL, USA
MONITORING WELL INSTALLATION DIAGRAM



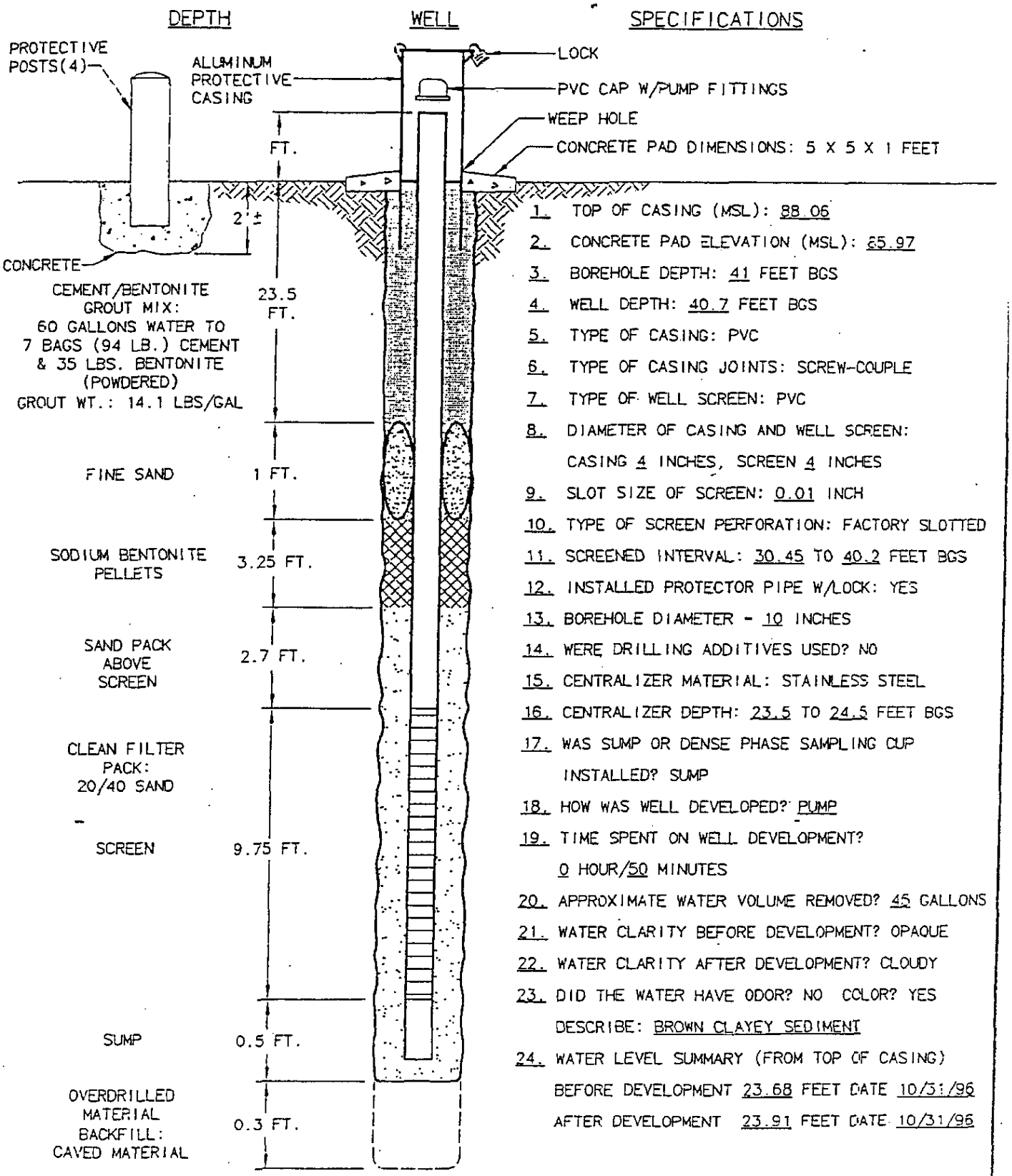
1. TOP OF CASING (NGVD): 88.04
2. CONCRETE PAD ELEVATION (NGVD): 86.00
3. BOREHOLE DEPTH: 44 FEET BGS
4. WELL DEPTH: 40.7 FEET BGS
5. TYPE OF CASING: PVC
6. TYPE OF CASING JOINTS: SCREW-COUPLE
7. TYPE OF WELL SCREEN: PVC
8. DIAMETER OF CASING AND WELL SCREEN: CASING 4 INCHES, SCREEN 4 INCHES
9. SLOT SIZE OF SCREEN: 0.01 INCH
10. TYPE OF SCREEN PERFORATION: FACTORY SLOTTED
11. SCREENED INTERVAL: 30.45 TO 40.2 FEET BGS
12. INSTALLED PROTECTOR PIPE W/LOCK: YES
13. BOREHOLE DIAMETER - 10 INCHES
14. WERE DRILLING ADDITIVES USED? NO
15. CENTRALIZER MATERIAL: STAINLESS STEEL
16. CENTRALIZER DEPTH: 23.5 TO 24.5 FEET BGS
17. WAS SUMP OR DENSE PHASE SAMPLING CUP INSTALLED? SUMP
18. HOW WAS WELL DEVELOPED? PUMP
19. TIME SPENT ON WELL DEVELOPMENT? 1 HOUR/0 MINUTES
20. APPROXIMATE WATER VOLUME REMOVED? 60 GALLONS
21. WATER CLARITY BEFORE DEVELOPMENT? OPAQUE
22. WATER CLARITY AFTER DEVELOPMENT? CLOUDY
23. DID THE WATER HAVE ODOR? NO COLOR? YES
    DESCRIBE: BROWN CLAYEY SEDIMENT
24. WATER LEVEL SUMMARY (FROM TOP OF CASING)
    BEFORE DEVELOPMENT 26.33 FEET DATE 10/28/96
    AFTER DEVELOPMENT 26.38 FEET DATE 10/31/96

WELL NO. MW-23 DATE INSTALLED 10/25/96 DRILL RIG TYPE CME-75

DRILLER/FIRM MAXIM TECHNOLOGIES DRILLER C.R. HENRY GEOLOGIST S. MOORE - PAC

13226W23 12-27-96

RIVERWOOD INTERNATIONAL, USA
MONITORING WELL INSTALLATION DIAGRAM



1. TOP OF CASING (MSL): 88.06
2. CONCRETE PAD ELEVATION (MSL): 85.97
3. BOREHOLE DEPTH: 41 FEET BGS
4. WELL DEPTH: 40.7 FEET BGS
5. TYPE OF CASING: PVC
6. TYPE OF CASING JOINTS: SCREW-COUPLE
7. TYPE OF WELL SCREEN: PVC
8. DIAMETER OF CASING AND WELL SCREEN: CASING 4 INCHES, SCREEN 4 INCHES
9. SLOT SIZE OF SCREEN: 0.01 INCH
10. TYPE OF SCREEN PERFORATION: FACTORY SLOTTED
11. SCREENED INTERVAL: 30.45 TO 40.2 FEET BGS
12. INSTALLED PROTECTOR PIPE W/LOCK: YES
13. BOREHOLE DIAMETER - 10 INCHES
14. WERE DRILLING ADDITIVES USED? NO
15. CENTRALIZER MATERIAL: STAINLESS STEEL
16. CENTRALIZER DEPTH: 23.5 TO 24.5 FEET BGS
17. WAS SUMP OR DENSE PHASE SAMPLING CUP INSTALLED? SUMP
18. HOW WAS WELL DEVELOPED? PUMP
19. TIME SPENT ON WELL DEVELOPMENT? 0 HOUR/50 MINUTES
20. APPROXIMATE WATER VOLUME REMOVED? 45 GALLONS
21. WATER CLARITY BEFORE DEVELOPMENT? OPAQUE
22. WATER CLARITY AFTER DEVELOPMENT? CLOUDY
23. DID THE WATER HAVE ODOR? NO COLOR? YES
    DESCRIBE: BROWN CLAYEY SEDIMENT
24. WATER LEVEL SUMMARY (FROM TOP OF CASING)
    BEFORE DEVELOPMENT 23.68 FEET DATE 10/31/96
    AFTER DEVELOPMENT 23.91 FEET DATE 10/31/96

WELL NO. MW-24 DATE INSTALLED 10/28/96 DRILL RIG TYPE CME-75

DRILLER/FIRM MAXIM TECHNOLOGIES DRILLER C.R. HENRY GEOLOGIST S. MOORE - PAC

13226W24 12-27-96

FIGURE 3

CHAIN-OF-CUSTODY FORM

CHAIN OF CUSTODY - ENVIRONMENTAL SAMPLES
Graphic Packaging International, Inc.
West Monroe, Louisiana

SAMPLING FIRM	LABORATORY	SAMPLE MEDIA
NAME:	NAME:	Water from Facility Monitoring and/or Recovery Wells
ADDRESS:	ADDRESS:	
SAMPLER:	TELEPHONE:	

SAMPLE NO.	LOCATION	DATE	TIME	ANALYSIS REQUIRED	CONTAINERS	SAMPLE TYPE	PRESERVATIVE	REMARKS

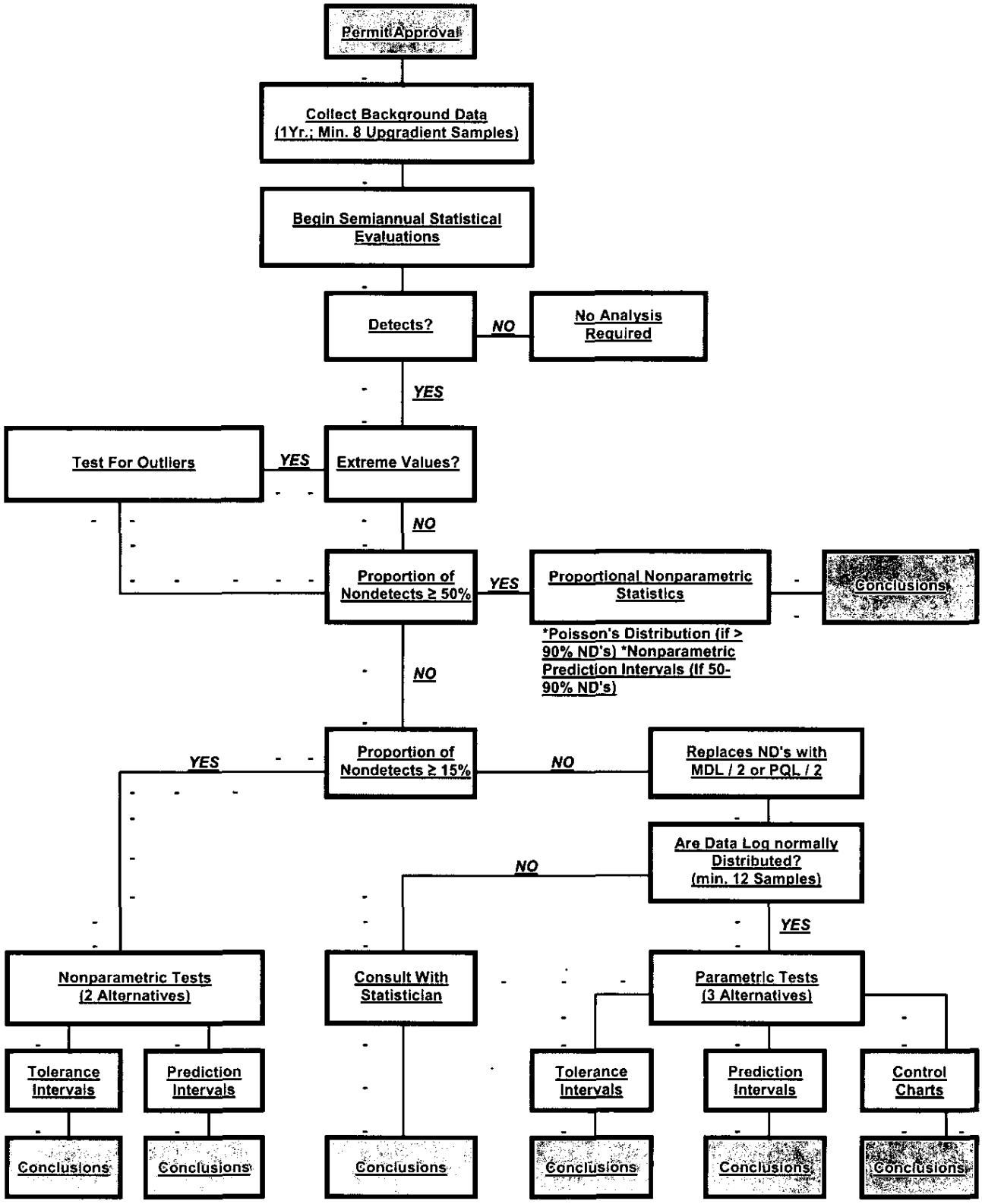
SAMPLED BY (SIGNATURE)	RECEIVED BY (SIGNATURE)	DATE	TIME	ADDITIONAL REMARKS:
RELINQUISHED BY (SIGNATURE)	RECEIVED BY (SIGNATURE)	DATE	TIME	
RELINQUISHED BY (SIGNATURE)	RECEIVED BY (SIGNATURE)	DATE	TIME	
RELINQUISHED BY (SIGNATURE)	RECEIVED BY (SIGNATURE)	DATE	TIME	
CARRIER	SHIPMENT METHOD	DATE	TIME	
ADDRESS	DISPATCHED BY (SIGNATURE)			

All samples will be collected and preserved according to the most current Graphic Packaging Groundwater Sampling and Analysis Plan

ATTACHMENT A

STATISTICAL ANALYSIS FLOW DIAGRAM

DECISION TREE DIAGRAM
(for Groundwater Data Statistical Procedure Selection)



APPENDIX O

WASTE ANALYSES AND CONSTRUCTION AND INSTALLATION DETAILS FOR MONITORING WELLS

ENVIRONMENTAL GULF STATES LABORATORIES, INC.
1521 SWAN LAKE ROAD
BOSSIER CITY, LOUISIANA 71111

(318) 742-0166 FAX (318) 747-4981

TEST ID: 91 DATE: 10/10/91
REPORT: 1273-3

RIVERWOOD INTERNATIONAL
P.O. BOX 35800
WEST MONROE LA 71294-5800

SAMPLE: SLUDGE LOCATION: CLAIRIFIER
DATE COLLECTED: 10/09/91 P/H ANALYSES DATE: HC
TIME COLLECTED: 1430 BNA ANALYSES DATE:1505 10/11/91
COLLECTED BY: JOE NEW PID ANALYSES DATE:1412 10/11/91
CUSTODY SEAL YES: X MATRIX: SLUDGE

TCLP REPORT FORM
REPORT DATE: 10/14/91 UNIT OF MEASURE: mg/L

PARAMETER	RESULTS	LIMITS	TIME/DATE ANALYSES		METHOD	TECH
METALS						
D004 Arsenic	<0.150	5.0	0940	10/11/91	206.3	SAK
D005 Barium	<0.010	100.0	1625	10/11/91	208.1	SAK
D006 Cadmium	<0.002	1.0	1550	10/11/91	213.1	SAK
D007 Chromium	0.17	5.0	1635	10/11/91	218.1	SAK
D008 Lead	<0.050	5.0	1640	10/11/91	239.1	SAK
D009 Mercury	<0.001	0.2	1250	10/11/91	245.1	SAK
D010 Selenium	<0.200	1.0	1431	10/11/91	270.3	SAK
D011 Silver	<0.010	5.0	1610	10/11/91	272.1	SAK

Volatile Organic Compound Parameter	Tech:SAK Results	Method 8240 Detection Limit	Regulatory Level
D018 Benzene	<0.01	0.01	0.500
D019 Carbon Tetrachloride	<0.01	0.01	0.500
D021 Chlorobenzene	<0.01	0.01	100.0
D022 Chloroform	<0.01	0.01	6.000
D027 1,4 Dichlorobenzene	<0.01	0.01	7.500
D028 1,2 Dichloroethane	<0.01	0.01	0.500
D029 1,1 Dichloroethylene	<0.01	0.01	0.700
D035 Methyl Ethyl Ketone	<0.01	0.01	200.0
D039 Tetrachloroethylene	<0.01	0.01	0.700
D040 Trichloroethylene	<0.01	0.01	0.500
D043 Vinyl Chloride	<0.01	0.01	0.200

Acid Phenols Parameter	Tech:SAK Results	Method 8270 Detection Limit	Regulatory Levels
D023 O- Cresol	<0.025	0.025	200
D024 M- Cresol	<0.025	0.025	200
D025 P- Cresol	<0.025	0.025	200
D026 Cresol	<0.025	0.025	200
D037 Pentachlorophenol	<0.025	0.025	100
D041 2,4,5 Trichlorophenol	<0.025	0.025	400

ENVIRONMENTAL GULF STATES LABORATORIES, INC.
1521 SWAN LAKE ROAD
BOSSIER CITY, LOUISIANA 71111

(318) 742-0166 FAX (318) 747-4981

D042 2.4.6 Trichlorophenol	<0.025	0.025	2.[illegible]

REPORT: 1973-3 SAMPLE: SLUDGE PAGE 2

Base Neutrals Parameter	SLUDGE Tech:SAK Results	Method 8270 Detection Limit	Regulatory Levels
D030 2.4 Dinitrotoluene	<0.01	0.010	0.13
D032 Hexachlorobenzene	<0.01	0.010	0.13
D033 Hexachlorobuatadiene	<0.01	0.010	0.50
D034 Hexachloroethane	<0.01	0.010	3.00
D036 Nitrobenzene	<0.01	0.010	2.00
D038 Pyridine	<0.01	0.010	5.00

D002 Corrosivity 7.68 D001 Ignitability >230 F
D003 Reactivity: NO REACTION WITH WATER, ACID OR BASE
Cyanide <10
Sulfide <100

Extraction 1311: Time/Date Begun: 1400 10/10/91
Time/Date Ended: 0800 10/11/91
Protocol : Extraction of TCLP leachate procedure is performed with Method 3520 from SW846. This is a liquid-liquid extraction using methylene chloride as the extracting solvent. CFR (JUNE 29,1991).

Alan A. [illegible], M.S.
Laboratory Manager

NA= NOT APPLICABLE
ND= NONE DETECTED
NC= NO CHARGE

ENVIRONMENTAL GULF STATES LABORATORIES. INC.
1521 SWAN LAKE ROAD
BOSSIER CITY. LOUISIANA 71111

(318) 742-0166 FAX (318) 747-4981

CUST ID: 92 DATE: 10/10/91
REPORT: 1973-1

RIVERWOOD INTERNATIONAL
P.O. BOX 35800
WEST MONROE LA 71294-5800

SAMPLE: SLUDGE LOCATION: CLAIRIFIER UNDER FLOW
DATE COLLECTED: 10/09/91 P/H ANALYSES DATE: NC
TIME COLLECTED: 1440 BNA ANALYSES DATE:1318 10/11/91
COLLECTED BY: JOE NEW PID ANALYSES DATE:1055 10/11/91
CUSTODY SEAL YES: X MATRIX: SLUDGE

TCLP REPORT FORM
REPORT DATE: 10/14/91 UNIT OF MEASURE: ppm (mg/kg)

PARAMETER	RESULTS	LIMITS	TIME/DATE ANALYSES	METHOD	TECH
METALS					
D004 Arsenic	<0.150	5.0	0925 10/11/91	206.3	SAK
D005 Barium	<0.010	100.0	1615 10/11/91	208.1	SAK
D006 Cadmium	<0.002	1.0	1540 10/11/91	213.1	SAK
D007 Chromium	<0.002	5.0	1645 10/11/91	218.1	SAK
D008 Lead	<0.050	5.0	1630 10/11/91	239.1	SAK
D009 Mercury	<0.001	0.2	1125 10/11/91	245.1	SAK
D010 Selenium	<0.200	1.0	1412 10/11/91	270.3	SAK
D011 Silver	<0.010	5.0	1600 10/11/91	272.1	SAK

Volatile Organic Compound Tech:SAK Method 8240

Parameter	Results	Detection Limit	Regulatory Level
D018 Benzene	<0.01	0.01	0.500
D019 Carbon Tetrachloride	<0.01	0.01	0.500
D021 Chlorobenzene	<0.01	0.01	100.0
D022 Chloroform	<0.01	0.01	6.000
D027 1,4 Dichlorobenzene	<0.01	0.01	7.500
D028 1,2 Dichloroethane	<0.01	0.01	0.500
D029 1,1 Dichloroethylene	<0.01	0.01	0.700
D035 Methyl Ethyl Ketone	<0.01	0.01	200.0
D039 Tetrachloroethylene	<0.01	0.01	0.700
D040 Trichloroethylene	<0.01	0.01	0.500
D043 Vinyl Chloride	<0.01	0.01	0.200

Acid Phenols Tech:SAK Method 8270

Parameter	Results	Detection Limit	Regulatory Levels
D023 O- Cresol	<0.025	0.025	200
D024 M- Cresol	<0.025	0.025	200
D025 P- Cresol	<0.025	0.025	200
D026 Cresol	<0.025	0.025	200
D037 Pentachlorophenol	<0.025	0.025	100
D041 2,4,5 Trichlorophenol	<0.025	0.025	400

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1521 SWAN LAKE ROAD
BOSSIER CITY. LOUISIANA 71111

(318) 742-0166 FAX (318) 747-4981

D042 2.4,6 Trichlorophenol	<0.025	0.025	2.0

REPORT: 1973-1 SAMPLE: SLUDGE

Base Neutrals Parameter	SLUDGE Tech:SAK Results	Method 8270 Detection Limit	Regulatory Levels
D030 2.4 Dinitrotoluene	<0.01	0.010	0.13
D032 Hexachlorobenzene	<0.01	0.010	0.13
D033 Hexachlorobuatadiene	<0.01	0.010	0.50
D034 Hexachloroethane	<0.01	0.010	3.00
D036 Nitrobenzene	<0.01	0.010	2.00
D038 Pyridine	<0.01	0.010	5.00

D002 Corrosivity 8.13 D001 Ignitability >230 F
D003 Reactivity: NO REACTION WITH WATER. ACID OR BASE
Cyanide <10
Sulfide <100

Extraction 1311: Time/Date Begun: 1400 10/10/91
Time/Date Ended: 0800 10/11/91
Protocol : Extraction of TCLP leachate procedure is performed with Method 3520 from SW846. This is a liquid-liquid extraction using methylene chloride as the extracting solvent. CFR (JUNE 29.1991).

Laboratory Manager

NA= NOT APPLICABLE
ND= NONE DETECTED
NC= NO CHARGE

ENVIRONMENTAL GULF STATES LABORATORIES. INC.
1521 SWAN LAKE ROAD
BOSSIER CITY, LOUISIANA 71111

(318) 742-0166 FAX (318) 747-4901

CUST ID: 92 DATE: 10/10/91
REPORT: 1973-2

RIVERWOOD INTERNATIONAL
P.O. BOX 35800
WEST MONROE LA 71294-5800

SAMPLE: SLUDGE LOCATION: SOUTH END NEW SLUDGE
DATE COLLECTED: 10/09/91 P/H ANALYSES DATE: NC
TIME COLLECTED: 1440 BNA ANALYSES DATE:1410 10/11/91
COLLECTED BY: JOE NEW PID ANALYSES DATE:1240 10/11/90
CUSTODY SEAL YES: X MATRIX: SLUDGE

TCLP REPORT FORM

REPORT DATE: 10/14/91 UNIT OF MEASURE: ppm (mg/kg)

PARAMETER	RESULTS	LIMITS	TIME/DATE ANALYSES	METHOD	TECH
METALS					
D004 Arsenic	<0.150	5.0	0935 10/11/91	206.3	SAK
D005 Barium	<0.010	100.0	1620 10/11/91	208.1	SAK
D006 Cadmium	<0.002	1.0	1545 10/11/91	213.1	SAK
D007 Chromium	<0.002	5.0	1650 10/11/91	218.1	SAK
D008 Lead	<0.050	5.0	1635 10/11/91	239.1	SAK
D009 Mercury	<0.001	0.2	1235 10/11/91	245.1	SAK
D010 Selenium	<0.200	1.0	1419 10/11/91	270.2	SAK
D011 Silver	<0.010	5.0	1605 10/11/91	272.1	SAK

Volatile Organic Compound Tech:SAK Method 8240

Parameter	Results	Detection Limit	Regulatory Level
D018 Benzene	<0.01	0.01	0.500
D019 Carbon Tetrachloride	<0.01	0.01	0.500
D021 Chlorobenzene	<0.01	0.01	100.0
D022 Chloroform	<0.01	0.01	6.000
D027 1,4 Dichlorobenzene	<0.01	0.01	7.500
D028 1,2 Dichloroethane	<0.01	0.01	0.500
D029 1,1 Dichloroethylene	<0.01	0.01	0.700
D035 Methyl Ethyl Ketone	<0.01	0.01	200.0
D039 Tetrachloroethylene	<0.01	0.01	0.700
D040 Trichloroethylene	<0.01	0.01	0.500
D043 Vinyl Chloride	<0.01	0.01	0.200

Acid Phenols Tech:SAK Method 8270

Parameter	Results	Detection Limit	Regulatory Levels
D023 O- Cresol	<0.025	0.025	200
D024 M- Cresol	<0.025	0.025	200
D025 P- Cresol	<0.025	0.025	200
D026 Cresol	<0.025	0.025	200
D037 Pentachlorophenol	<0.025	0.025	100
D041 2,4,5 Trichlorophenol	<0.025	0.025	400

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1521 SWAN LAKE ROAD
BOSSIER CITY, LOUISIANA 71111

(318) 742-0166 FAX (318) 747-4381

D042 2,4,6 Trichlorophenol	<0.025	0.025	2.0

REPORT: 1973-2 SAMPLE: SLUDGE

Base Neutrals Parameter	SLUDGE Tech:SAK Results	Method 8270 Detection Limit	Regulatory Levels
D030 2.4 Dinitrotoluene	<0.01	0.010	0.13
D032 Hexachlorobenzene	<0.01	0.010	0.13
D033 Hexachlorobuatadiene	<0.01	0.010	0.50
D034 Hexachloroethane	<0.01	0.010	3.00
D036 Nitrobenzene	<0.01	0.010	2.00
D038 Pyridine	<0.01	0.010	5.00

D002 Corrosivity 7.50 D001 Ignitability >230 F
D003 Reactivity: NO REACTION WITH WATER. ACID OR BASE
Cyanide <10
Sulfide <100

Extraction 1311: Time/Date Begun: 1400 10/10/91
Time/Date Ended: 0800 10/11/91
Protocol : Extraction of TCLP leachate procedure is performed with Method 3520 from SW846. This is a liquid-liquid extraction using methylene chloride as the extracting solvent. CFR (JUNE 29,1991).

Laboratory Manager

NA= NOT APPLICABLE
ND= NONE DETECTED
NC= NO CHARGE

ENVIRONMENTAL GULF STATES LABORATORIES, INC.
CHAIN OF CUSTODY FORM

CUST ID NEW CLIENT
SEAL NO. _____ Date Sealed: 10-10-91 EGSL JOB #: 1973-1,-2 Sealed By: RH

Company: RIVERWOOD INTERNATIONAL Attn: YANCE GARNER - (STATION 12)
Address: PO. BOX 35800
Address: _____
City : WEST MONROE State: LA Zip: 71294-5800

Facility/Site: WEST MONROE PLANT
Sample : Sludge
Collected By: JOE NOEL

IDe	DATE	TIME	GRAB	COMP	SAMPLE LOCATION	TCLP *				
1973-1	10-9-91		X	2:40	Clarifier Underflow	X				
2	10-9-91		X	2:50	Southend New Sludge	X				
3	10-9-91		X	2:30	Clarifier Overflow	X				

FIELD COMMENTS

Sample Appearance _____
Weather Condition Sunny & Cool Morning PICK-UP
Other * NO PESTICIDES / HERBICIDES

CHAIN OF CUSTODY CHRONICLE

Signature Yance Garner Date: 10-10-91 Time 8:05
Relinquished to: Kelly Holcomb Date: 10-10-91 Time 8:05
Relinquished to: _____ Date: _____ Time _____

EGSL USE ONLY Opened By: _____ Date _____ Time _____
Seal # _____ Condition _____

from sludge pond & ash pond)

ENVIRONMENTAL GULF STATES LABORATORIES, INC.
1521 SWAN LAKE ROAD
BOSSIER CITY, LOUISIANA 71111

(318) 742-0166 FAX (318) 747-4381

CUST ID: 92 DATE: 12/12/91
REPORT: *2391-12*

RIVERWOOD INTERNATIONAL
P.O. BOX 35800
WEST MONROE LA 71294-5800

SAMPLE: *DISCHARGE CANAL* LOCATION: *WEST MONROE PLANT*

DATE COLLECTED: 12/11/91 F/H ANALYSES DATE:1853 12/14/91
TIME COLLECTED: 1430 BNA ANALYSES DATE:1640 12/14/91
COLLECTED BY: RONNIE HOLCOMB PID ANALYSES DATE:1701 12/14/91
CUSTODY SEAL YES: X MATRIX: SLUDGE

TCLP REPORT FORM

REPORT DATE: 12/15/91 UNIT OF MEASURE: ppm (mg/kg)

PARAMETER	RESULTS	LIMITS	TIME/DATE ANALYSES	METHOD	TECH
METALS					
D004 Arsenic	<0.150	5.0	1640 12/13/91	206.3	SAK
D005 Barium	3.73	100.0	1417 12/13/91	208.1	SAK
D006 Cadmium	0.19	1.0	1530 12/13/91	213.1	SAK
D007 Chromium	3.24	5.0	1150 12/13/91	218.1	SAK
D008 Lead	0.33	5.0	1540 12/13/91	239.1	SAK
D009 Mercury	<0.001	0.2	1600 12/13/91	245.1	SAK
D010 Selenium	<0.200	1.0	1610 12/13/91	270.3	SAK
D011 Silver	<0.010	5.0	1620 12/13/91	272.1	SAK

Volatile Organic Compound Parameter	Tech:SAK Results	Method 8240 Detection Limit	Regulatory Level
D018 Benzene	<0.01	0.01	0.500
D019 Carbon Tetrachloride	<0.01	0.01	0.500
D021 Chlorobenzene	<0.01	0.01	100.0
D022 Chloroform	<0.01	0.01	6.000
D027 1,4 Dichlorobenzene	<0.01	0.01	7.500
D028 1,2 Dichloroethane	<0.01	0.01	0.500
D029 1,1 Dichloroethylene	<0.01	0.01	0.700
D035 Methyl Ethyl Ketone	<0.01	0.01	200.0
D039 Tetrachloroethylene	<0.01	0.01	0.700
D040 Trichloroethylene	<0.01	0.01	0.500
D043 Vinyl Chloride	<0.01	0.01	0.200

Acid Phenols Parameter	Tech:SAK Results	Method 8270 Detection Limit	Regulatory Levels
D023 O- Cresol	<0.025	0.025	200
D024 M- Cresol	<0.025	0.025	200
D025 P- Cresol	<0.025	0.025	200
D026 Cresol	<0.025	0.025	200
D037 Pentachlorophenol	<0.025	0.025	100
D041 2,4,5 Trichlorophenol	<0.025	0.025	400

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D042 2,4,6 Trichlorophenol	<0.025	0.025	2.0

REPORT: 2391-12 SAMPLE: DISCHARGE CANAL

Base Neutrals Parameter	Tech:SAK Results	Method 8270 Detection Limit	Regulatory Levels
D030 2,4 Dinitrotoluene	<0.01	0.010	0.13
D032 Hexachlorobenzene	<0.01	0.010	0.13
D033 Hexachlorobuatadiene	<0.01	0.010	0.50
D034 Hexachloroethane	<0.01	0.010	3.00
D036 Nitrobenzene	<0.01	0.010	2.00
D038 Pyridine	<0.01	0.010	5.00

PESTICIDES/HERBICIDES Parameter	TECH:SAK Results	METHOD 8080 Detection Limit	Regulatory Levels
D012 Endrin	ND	0.001	0.02
D013 Lindane	ND	0.001	0.40
D014 Methoxychlor	ND	0.001	10.0
D015 Toxaphene	ND	0.001	0.50
D016 2,4 D	ND	0.001	10.0
D017 2, 4, 5 (Silvex)	ND	0.001	1.0
D020 Chlordane	ND	0.001	0.030
D030 Heptachlor (and it's hydroxide)	ND	0.001	0.008

D002 Corrosivity 7.18 D001 Ignitability >230 F
D003 Reactivity: NO REACTION WITH WATER, ACID OR BASE
Cyanide <10
Sulfide <100
TCLP COPPER 1.52 1505 12/13/91 SAK
TOTAL COPPER 18.7 1255 12/13/91 SAK

Extraction 1311: Time/Date Begun: 1400 12/12/91
Time/Date Ended: 0800 12/13/91
Protocol : Extraction of TCLP leachate procedure is performed with Method 3520 from SW846. This is a liquid-liquid extraction using methylene chloride as the extracting solvent. CFR (JUNE 29,1991).

Laboratory Manager

NA= NOT APPLICABLE
ND= NONE DETECTED
NC= NO CHARGE

ENVIRONMENTAL GULF STATES LABORATORIES, INC.
1521 SWAN LAKE ROAD
BOSSIER CITY, LOUISIANA 71111

(318) 742-0166 FAX (318) 747-4981

CUST ID: 92

DATE: 12/12/91
REPORT: *2391-13*

RIVERWOOD INTERNATIONAL
P.O. BOX 35800
WEST MONROE LA 71294-5800

SAMPLE: *NEW SLUDGE POND* LOCATION: *WEST MONROE PLANT*

DATE COLLECTED: 12/11/91 P/H ANALYSES DATE:1935 12/14/91
TIME COLLECTED: 1440 BNA ANALYSES DATE:1723 12/14/91
COLLECTED BY: RONNIE HOLCOMB PID ANALYSES DATE:1841 12/14/91
CUSTODY SEAL YES: X MATRIX: SLUDGE

TCLP REPORT FORM

REPORT DATE: 12/15/91 UNIT OF MEASURE: ppm (mg/kg)

PARAMETER	RESULTS	LIMITS	TIME/DATE ANALYSES	METHOD	TECH
METALS					
D004 Arsenic	<0.150	5.0	1645 12/13/91	206.3	SAK
D005 Barium	3.23	100.0	1428 12/13/91	208.1	SAK
D006 Cadmium	0.23	1.0	1535 12/13/91	213.1	SAK
D007 Chromium	3.17	5.0	1155 12/13/91	218.1	SAK
D008 Lead	0.39	5.0	1545 12/13/91	239.1	SAK
D009 Mercury	<0.001	0.2	1605 12/13/91	245.1	SAK
D010 Selenium	<0.200	1.0	1615 12/13/91	270.3	SAK
D011 Silver	<0.010	5.0	1625 12/13/91	272.1	SAK

Volatile Organic Compound Parameter	Tech:SAK Results	Method 8240 Detection Limit	Regulatory Level
D018 Benzene	<0.01	0.01	0.500
D019 Carbon Tetrachloride	<0.01	0.01	0.500
D021 Chlorobenzene	<0.01	0.01	100.0
D022 Chloroform	<0.01	0.01	6.000
D027 1,4 Dichlorobenzene	<0.01	0.01	7.500
D028 1,2 Dichloroethane	<0.01	0.01	0.500
D029 1,1 Dichloroethylene	<0.01	0.01	0.700
D035 Methyl Ethyl Ketone	<0.01	0.01	200.0
D039 Tetrachloroethylene	<0.01	0.01	0.700
D040 Trichloroethylene	<0.01	0.01	0.500
D043 Vinyl Chloride	<0.01	0.01	0.200

Acid Phenols Parameter	Tech:SAK Results	Method 8270 Detection Limit	Regulatory Levels
D023 O- Cresol	<0.025	0.025	200
D024 M- Cresol	<0.025	0.025	200
D025 P- Cresol	<0.025	0.025	200
D026 Cresol	<0.025	0.025	200
D037 Pentachlorophenol	<0.025	0.025	100
D041 2,4,5 Trichlorophenol	<0.025	0.025	400

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D042 2,4,6 Trichlorophenol	<0.025	0.025	2.0

REPORT: 2391-13 SAMPLE: NEW SLUDGE POND

Base Neutrals Parameter	Tech:SAK Results	Method 8270 Detection Limit	Regulatory Levels
D030 2,4 Dinitrotoluene	<0.01	0.010	0.13
D032 Hexachlorobenzene	<0.01	0.010	0.13
D033 Hexachlorobuatadiene	<0.01	0.010	0.50
D034 Hexachloroethane	<0.01	0.010	3.00
D036 Nitrobenzene	<0.01	0.010	2.00
D038 Pyridine	<0.01	0.010	5.00

PESTICIDES/HERBICIDES Parameter	TECH:SAK Results	METHOD 8080 Detection Limit	Regulatory Levels
D012 Endrin	ND	0.001	0.02
D013 Lindane	ND	0.001	0.40
D014 Methoxychlor	ND	0.001	10.0
D015 Toxaphene	ND	0.001	0.50
D016 2,4 D	ND	0.001	10.0
D017 2, 4, 5 (Silvex)	ND	0.001	1.0
D020 Chlordane	ND	0.001	0.030
D030 Heptachlor (and it's hydroxide)	ND	0.001	0.008

D002 Corrosivity 7.11 D001 Ignitability >230 F
D003 Reactivity: NO REACTION WITH WATER, ACID OR BASE
Cyanide <10
Sulfide <100

TCLP COPPER	1.49	1505 12/13/91	SAK
TOTAL COPPER	16.5	1255 12/13/91	SAK

Extraction 1311: Time/Date Begun: 1400 12/12/91
Time/Date Ended: 0800 12/13/91

Protocol : Extraction of TCLP leachate procedure is performed with Method 3520 from SW846. This is a liquid-liquid extraction using methylene chloride as the extracting solvent. CFR (JUNE 29,1991).

Laboratory Manager

NA= NOT APPLICABLE
ND= NONE DETECTED
NC= NO CHARGE

ENVIRONMENTAL GULF STATES LABORATORIES, INC.
CHAIN OF CUSTODY FORM

CUST ID 92 EGSL JOB #: 2391 -2392
SEAL NO. _____ Date Sealed: 12-11-91 Sealed By: FRH

Company: Riverwood International Attn: Vance Garrison
Address: P.O.B 35800
Address:
City: Monroe State: LA Zip: 71294 - 5800

Facility/Site: Monroe Plant
Sample: Sediment
Collected By: Ronnie a Rick Holcomb

ID#	DATE	TIME	GRAB	COMP	SAMPLE LOCATION	TCLP Ba, Cr, Cu	T. Cu	TCLP		
2391-1	12-11-91	1101	X		Upgradient	X	X			
2391-2	12-11-91	1130	X		Point of discharge	X	X			
2391-3	12-11-91	1140	X		Collection Point	X	X			
2391-4	12-11-91	1150	X		Elutriante	X	X			
2391-5	12-11-91	1200	X		N-1	X	X			
2391-6	12-11-91	1210	X		N-2	X	X			
2391-7	12-11-91	1220	X		N-3	X	X			
2391-8	12-11-91	1230	X		S-1	X	X			
2391-9	12-11-91	1350	X		S-2	X	X			
2391-10	12-11-91	1300	X		Pool @ Pump	X	X			
2391-11	12-11-91	1410	X		Water - Black Bayou	X	X			
2391-12	12-11-91	1430	X		Discharge Canal			X		

FIELD COMMENTS

Sample Appearance
Weather Condition Sunny Warm
Other

CHAIN OF CUSTODY CHRONICLE

Signature Rick Holcomb Date: 12-11-91 Time 1115
Relinquished to: Date: Time
Relinquished to: Date: Time

EGSL USE ONLY Opened By: [signature] Date 12-12-91 Time 0800
Seal # Condition

ENVIRONMENTAL GULF STATES LABORATORIES, INC.
CHAIN OF CUSTODY FORM

CUST ID _____ EGSL JOB #: 2391-92
SEAL NO. _____ Date Sealed: 12-11-91 Sealed By: [illegible]

Company: Riverwood Int'l Attn: Vance Garrison
Address: _____
Address: _____
City : W. Monroe State: _____ Zip: 71294-5800

Facility/Site: W Monroe Plant
Sample : Sediment
Collected By: Ricci & Ronnie Holcomb

ID#	DATE	TIME	GRAB	COMP	SAMPLE LOCATION	TCLD	Methanol			
2391-13	12-11-91	1440	X		New Sludge Pond	X				
2392-1	12-11-91	1420	X		Mill Eff Pump Sump		X			
2392-2	12-11-91	1422	X		Claiefier Overflow		X			
2392-3	12-11-91	1425	X		HSTB STATION		X			

FIELD COMMENTS

Sample Appearance _____
Weather Condition _____
Other _____

CHAIN OF CUSTODY CHRONICLE

Signature Ricci Holcomb Date: 12-11-91 Time 1815
Relinquished to: _____ Date: _____ Time _____
Relinquished to: _____ Date: _____ Time _____

EGSL USE ONLY Opened By: [illegible] Date 12-12-91 Time 0800
Seal # _____ Condition _____

PAINE Laboratories INC.
7979 GSRI AVE • BATON ROUGE, LA 70808

SAMPLE ANALYSES

for

Manville Forest Products
1000 Jonesboro Road
West Monroe, LA 71291

ATTENTION: Mr. Charles Welch

May 2, 1989

drb

89-3174

W PAINE Laboratories INC.
7979 GSRI AVE • BATON ROUGE, LA 70806

Manville Forest Products
West Monroe, LA 71291
May 2, 1989

Sample receipt at West-Paine Laboratories, Inc. is documented for your designated sample(s). Chain-of-custody documentation, if provided, is included in this report. Sample analysis was in accordance with Environmental Protection Agency protyocol.

A. Standard Methods for the Examination of Water and Wastewater, 15th Ed, 1980

Parameter	Method
Sulfate (Turbidemetric)	426C

B. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, 1979

Parameter	Method
Aluminum	202.1
Arsenic	206.2
Barium	208.1
Cadmium	213.1
Chromium	218.1
Lead	239.1
Mercury	245.1
Selenium	270.2
Silver	272.1

C. Test Methods for Evaluating Solid Wastes, SW-846, July 1982

Parameter	Method
Arsenic	7060
Barium	7080
Cadmium	7130
Chromium	7190
Lead	7420
Mercury	7470
Selenium	7471
Silver	7760
Dioxin (2,3,7,8-TCDD)	8080

drb

89-3174

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70808

Manville Forest Products
West Monroe, LA 71291
May 2, 1989

D. Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, EP -600/4-82-057, July 1982

Parameter	Method
Dioxin (2,3,7,8,-TCDD)	608

E. Test Methods for Evaluating Solid Wastes, SW-846, July 1982

Parameter	Method
PCB's	8080
Acid Extractable Compounds	8270
Base-Neutral Compounds	8270
Pesticide/Herbicide Compounds	8080/8150
Volatile Compounds	8240

F. Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, EP -600/4-82-057, July 1982

Parameter	Method
PCB's	608

Documented results are shown on the following page(s).

Victor J. Blanchard, III
General Manager

drb

89-3174

PAINE Laboratories INC.
7979 GSRI AVE • BATON ROUGE, LA 70808

Manville Forest Products
West Monroe, LA 71291
May 2, 1989

Sample Source: ASH SLURRY COMPOSITE
Date Collected: 89/03/11
Date Received: 89/03/14 Time Received: 09:22

Parameter (Units)	Results	Percent Recovery	Quality Assurance Actual/Found	Date/Time Analyst
Aluminum (mg/L Al)	32	N/A	5.0/5.0	89/03/16 10:00 SJV
Sulfate (Turbidimetric) (mg/L SO_4)	101	N/A	10.0/9.85	89/03/15 18:15 KJD
Dioxin (2,3,7,8-TCDD) (ug/L)	< 1.0	N/A	N/A	89/03/17 08:00 RDC
Arsenic (mg/L As)	0.01	N/A/	0.025/0.024	89/03/19 21:30 JDT
Barium (mg/L Ba)	4.1	N/A	2.50/2.48	89/03/16 18:55 EJL
Cadmium (mg/L Cd)	< 0.01	N/A	0.250/0.253	89/03/17 17:20 EJL
Chromium (mg/L Cr)	0.06	N/A	2.50/2.54	89/03/16 20:40 EJL
Lead (mg/L Pb)	0.15	N/A	2.50/2.49	89/03/17 18:30 EJL

drb

89-3174

ST-PAINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

Manville Forest Products
West Monroe, LA 71291
May 2, 1989

Sample Source: ASH SLURRY COMPOSITE
Date Collected: 89/03/11
Date Received: 89/03/14 Time Received: 09:22

Parameter (Unit)	Result	Percent Recovery	Quality Assurance Actual/Found	Date/Time Analyst
Mercury (mg/L Hg)	< 0.0002	N/A	0.0100/0.0096	89/03/20 09:00 SJV
Selenium (mg/L Se)	< 0.01	N/A	0.025/0.025	89/03/19 17:30 JDT
Silver (mg/L Ag)	< 0.01	N/A	0.50/0.50	89/03/17 15:00 VLM

hal

89-3174

WE PAINE
Laboratories INC.
7979 GSRI AVE • BATON ROUGE, LA 70808

Manville Forest Products
West Monroe, LA 71291
May 2, 1989

Sample Source: PRIMARY CLARIFIER SLUDGE COMP.
Date Collected: 89/03/11
Date Received: 89/03/14 Time Received: 09:22

Parameter (Units)	Results	Percent Recovery	Quality Assurance Actual/Found	Date/Time Analyst
Sulfate (Turbidimetric) (mg/kg SO_4)	255	N/A	10.0/9.85	89/03/15 18:15 KJD
Dioxin (2,3,7,8-TCDD) (mg/kg)	< 1.0	N/A	N/A	89/03/17 08:00 RDC
Arsenic (mg/kg As)	< 0.5	N/A/	0.025/0.024	89/03/19 21:30 JDT
Barium (mg/kg Ba)	0.4	N/A	2.50/2.48	89/03/16 18:55 EJL
Cadmium (mg/kg Cd)	< 0.5	N/A	0.250/0.253	89/03/17 17:20 EJL
Chromium (mg/kg Cr)	< 1.0	N/A	2.50/2.54	89/03/16 20:40 EJL
Lead (mg/kg Pb)	< 5	N/A	2.50/2.49	89/03/17 18:30 EJL
Mercury (mg/kg Hg)	< 0.02	N/A	0.0100/0.0096	89/03/20 09:00 EJL

drb

89-3174

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70806

Manville Forest Products
West Monroe, LA 71291
May 2, 1989

Sample Source: PRIMARY CLARIFIER SLUDGE COMP
Date Collected: 89/03/11
Date Received: 89/03/14 Time Received: 09:22

Parameter (Units)	Results	Percent Recovery	Quality Assurance Actual/Found	Date/Time Analyst
Selenium (mg/kg Se)	<0.5	N/A	0.025/0.025	89/03/19 17:30 JDT
Silver (mg/kg Ag)	<0.5	N/A	0.50/0.50	89/0317 15:00 VLM
Aluminum (mg/kg Al)	140	N/A	5.0/5.0	89/03/16 10:00 SJV

nal

89-3174

WEST-PAINE Laboratories INC.
GSRI AVE. • BATON ROUGE, LA 70820

Manville Forest Products
West Monroe, LA 71291
SAMPLE #: 890314-0015

PRIORITY POLLUTANTS
PCB'S

All results in micrograms per liter

SAMPLE SOURCE: ASH SLURRY COMPOSITE
Sample Date: 89/03/11

Parameter	Result	Detection Limit
PCB-1242	< 5.0	5.0
PCB-1254	< 5.0	5.0
PCB-1221	< 5.0	5.0
PCB-1232	< 5.0	5.0
PCB-1248	< 5.0	5.0
PCB-1260	< 5.0	5.0
PCB-1016	< 5.0	5.0
PCB-1262	< 5.0	5.0
PCB-1268	< 5.0	5.0

Date of Analysis: 89/03/17 Analyst: RDC

hal

89-3174

WEST-PAINE Laboratories INC.
1979 GSRI AVE. • BATON ROUGE, LA 70820

Manville Forest Products
West Monroe, LA 71291
SAMPLE #: 890314-0015

The total weight of solid material filtered from the sample as received is listed below. The Extraction Procedure (EP Toxicity Test) was employed as specified in Test Methods for Evaluating Solid Waste, SW-846, July 1982, Method 1310. The results below represent the concentration in the final filtrate. For purposes of comparison the allowable concentration of each component is listed.

Sample ID: ASH SLURRY COMPOSITE 89/03/11

Parameter	Result	Maximum Allowable in Filtrate	Quality Assurance Actual/Found	Date/ Analyst	
Arsenic (mg/L As)	< 0.01	5.0	0.025/0.024	89/03/19	JDT
Barium (mg/L Ba)	1.9	100	2.50/2.52	89/03/18	EJL
Cadmium (mg/L Cd)	< 0.01	1.0	0.250/0.253	89/03/17	EJL
Chromium (mg/L Cr)	< 0.05	5.0	2.50/2.47	89/03/18	EJL
Lead (mg/L Pb)	< 0.1	5.0	2.50/2.49	89/03/17	EJL
Mercury (mg/L Hg)	< 0.0002	0.2	0.0100/0.0096	89/03/20	SJV
Selenium (mg/L Se)	< 0.01	1.0	0.025/0.025	89/03/19	JDT
Silver (mg/L Ag)	< 0.01	5.0	0.50/0.50	89/03/17	VLM

Liquid Sample < 0.5% solids

hal

89-3174

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70808

SAMPLE SOURCE: ASH SLURRY COMPOSITE

SAMPLE: :890314-15

WEIGHT : 8.60 GRAMS

ANALYTICAL METHOD NO. 8080/8150 (SW-846)

Parameter	Regulatory Limit in TCLP (1) Extract (mg/L)	Quantitation Limit (mg/L)	Results (mg/L)	Quality Assurance Extract Spike Recovery (%)
Pesticide/Herbicide Compounds:				
Chlordane	0.03	0.0025	<0.0025	
2,4-D	1.4	0.025	<0.025	
Endrin	0.003	0.0005	<0.0005	
Heptachlor epoxide	0.001	0.0005	<0.0005	
Heptachlor	0.001	0.0005	<0.0005	
Lindane	0.06	0.0005	<0.0005	
Methoxychlor	1.4	0.0025	<0.0025	
Toxaphene	0.07	0.025	<0.025	
2,4,5-TP Silvex	0.14	0.025	<0.025	

DATE/ANALYST: 03-17-89 RDC

(1) Toxicity Characteristic Leaching Procedure

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70806

SAMPLE SOURCE: ASH SLURRY COMPOSITE

SAMPLE : 890314-15

WEIGHT : 8.60 GRAMS

ANALYTICAL METHOD NO. 8270 (SW-846)

Parameter	Regulatory Limit in TCLP Extract (mg/L) (1)	Quantitation Limit (mg/L)	Results (mg/L)	Quality Assurance Extract Spike Recovery (%)
Acid(Phenol)Compounds:				
o-Cresol	10.0	0.50	<0.50	
m-Cresol	10.0	0.50	<0.50	
p-Cresol	10.0	0.50	<0.50	
Pentachlorophenol	3.6	0.05	<0.05	
Phenol	14.4	0.12	<0.12	
2,3,4,6-Tetrachlorophenol	1.5	0.50	<0.50	
2,4,6-Trichlorophenol	0.30	0.25	<0.25	
2,4,5-Trichlorophenol	5.8	0.25	<0.25	
Base-Neutral Compounds:				
Bis(2-chloroethyl)ether	0.05	0.05	<0.05	
1,2-Dichlorobenzene	4.3	0.12	<0.12	
1,4-Dichlorobenzene	10.8	0.12	<0.12	
2,4-Dinitrotoluene	0.13	0.12	<0.12	
Hexachlorobenzene	0.13	0.12	<0.12	
Hexachlorobutadiene	0.72	0.12	<0.12	
Hexachloroethane	4.3	0.12	<0.12	
Nitrobenzene	0.13	0.12	<0.12	
Pyridine	5.0	5.0	<5.0	

DATE/ANALYST: 03-17-89 CTN

(1) Toxicity Characteristic Leaching Procedure

QUALITY CONTROL DATA Surrogate Recovery (%)

1,2-Dichlorobenzene-d4 : ND Fluorene-d10 : 50

2,4,6-Trichlorophenol-d2: 41 2-Nitrophenol-d4: 54

ND = Not Detected

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70806

SAMPLE SOURCE: ASH SLURRY COMPOSITE

SAMPLE : 890314-14

WEIGHT : 20.00 GRAMS

ANALYTICAL METHOD NO. 8240 (SW-846)

Parameter	Regulatory Limit in TCLP Extract (mg/L) (1)	Quantitation Limit (mg/L)	Results (mg/L)	Quality Assurance Extract Spike Recovery (%)
Volatile Compounds:				
Acrylonitrile	5.0	5.0	<5.0	
Benzene	0.07	0.05	<0.05	
Carbon disulfide	14.4	0.05	<0.05	
Carbon tetrachloride	0.07	0.05	<0.05	
Chlorobenzene	1.4	0.05	<0.05	
Chloroform	0.07	0.05	<0.05	
1,2-Dichloroethane	0.40	0.05	<0.05	
1,1-Dichloroethylene	0.1	0.05	<0.05	
Isobutanol	36	5.0	<5.0	
Methylene chloride	8.6	0.125	<0.125	
Methyl ethyl ketone	7.2	0.05	<0.05	
1,1,1,2-Tetrachloroethane	10.0	0.05	<0.05	
1,1,2,2-Tetrachloroethane	1.3	0.05	<0.05	
Tetrachloroethylene	0.1	0.05	<0.05	
Toluene	14.4	0.05	<0.05	
1,1,1-Trichloroethane	30	0.05	<0.05	
1,1,2-Trichloroethane	1.2	0.05	<0.05	
Trichloroethylene	0.07	0.05	<0.05	
Vinyl chloride	0.05	0.05	<0.05	

DATE/ANALYST: 03-17-89 JAS

(1) Toxicity Characteristic Leaching Procedure, ZHE Protocol.

QUALITY CONTROL DATA Surrogate Recovery (%)

1,2-Dichloroethane-d4 : 87 Benzene-d6: 95

Ethylbenzene-d5 : 75

WEST-PAINE Laboratories INC.
79 GSRI AVE. • BATON ROUGE, LA 70820

Manville Forest Products
West Monroe, LA 71291
SAMPLE #: 890314-0026

PRIORITY POLLUTANTS
PCB'S

All results in milligrams per kilogram

SAMPLE SOURCE: PRIMARY CLARIFIER SLUDGE COMP.
Sample Date: 89/03/11

Parameter	Result	Detection Limit
PCB-1242	< 5.0	5.0
PCB-1254	< 5.0	5.0
PCB-1221	< 5.0	5.0
PCB-1232	< 5.0	5.0
PCB-1248	< 5.0	5.0
PCB-1260	< 5.0	5.0
PCB-1016	< 5.0	5.0
PCB-1262	< 5.0	5.0
PCB-1268	< 5.0	5.0

Date of Analysis: 89/03/17 Analyst: RDC

hal

89-3174

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70808

Manville Forest Products
West Monroe, LA 71291
May 2, 1989

The total weight of solid material filtered from the sample as received is listed below. The Toxicity Characteristic Leaching Procedure (TCLP) was employed as proposed in the Federal Register, Vol. 51, No. 114, Friday, June 13, 1986. The results below for sample extract in mg/L, represent the concentration in the final leachate. For purposes of comparison the regulatory limit in mg/L of each component is also listed.

Sample Source: PRIMARY CLARIFIER SLUDGE COMP.

Parameter	Results	Regulatory Limit In Extract	Quality Assurance Actual/Found	Date/ Analyst
Arsenic (mg/L As)	<0.01	5.0	0.025/0.024	89/03/19 JDT
Barium (mg/L Ba)	1.8	100	2.50/2.52	89/03/18 EJL
Cadmium (mg/L Cd)	<0.01	1.0	0.250/0.253	89/03/17 EJL
Chromium (mg/L Cr)	<0.05	5.0	2.50/2.47	89/03/18 EJL
Lead (mg/L Pb)	0.1	5.0	2.50/2.49	89/03/17 EJL
Mercury (mg/L Hg)	<0.0002	0.2	0.0100/0.0096	89/03/20 SJV
Selenium (mg/L Se)	<0.01	1.0	0.025/0.025	89/03/19 JDT
Silver (mg/L Ag)	<0.01	5.0	0.50/0.50	89/03/17 VLM

Sample Weight: 45.46 grams

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70806

SAMPLE SOURCE: PRIMARY CLARIFIER SLUDGE COMP.

SAMPLE: :890314-26

WEIGHT : 45.46 GRAMS

ANALYTICAL METHOD NO. 8080/8150 (SW-846)

Parameter	Regulatory Limit in TCLP (1) Extract (mg/L)	Quantitation Limit (mg/L)	Results (mg/L)	Quality Assurance Extract Spike Recovery (%)
Pesticide/Herbicide Compounds:				
Chlordane	0.03	0.0025	<0.0025	
2,4-D	1.4	0.025	<0.025	
Endrin	0.003	0.0005	<0.0005	
Heptachlor epoxide	0.001	0.0005	<0.0005	
Heptachlor	0.001	0.0005	<0.0005	
Lindane	0.06	0.0005	<0.0005	
Methoxychlor	1.4	0.0025	<0.0025	
Toxaphene	0.07	0.025	<0.025	
2,4,5-TP Silvex	0.14	0.025	<0.025	

DATE/ANALYST: 03-17-89 RDC

(1) Toxicity Characteristic Leaching Procedure

WE[illegible]PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70806

SAMPLE SOURCE: PRIMARY CLARIFIER SLUGDE COMP.

SAMPLE : 890314-26

WEIGHT : 45.46 GRAMS

ANALYTICAL METHOD NO. 8270 (SW-846)

Parameter	Regulatory Limit in TCLP (1) Extract (mg/L)	Quantitation Limit (mg/L)	Results (mg/L)	Quality Assurance Extract Spike Recovery (%)
Acid(Phenol)Compounds:				
o-Cresol	10.0	0.50	<0.50	
m-Cresol	10.0	0.50	<0.50	
p-Cresol	10.0	0.50	<0.50	
Pentachlorophenol	3.6	0.05	<0.05	
Phenol	14.4	0.12	<0.12	
2,3,4,6-Tetrachlorophenol	1.5	0.50	<0.50	
2,4,6-Trichlorophenol	0.30	0.25	<0.25	
2,4,5-Trichlorophenol	5.8	0.25	<0.25	
Base-Neutral Compounds:				
Bis(2-chloroethyl)ether	0.05	0.05	<0.05	
1,2-Dichlorobenzene	4.3	0.12	<0.12	
1,4-Dichlorobenzene	10.8	0.12	<0.12	
2,4-Dinitrotoluene	0.13	0.12	<0.12	
Hexachlorobenzene	0.13	0.12	<0.12	
Hexachlorobutadiene	0.72	0.12	<0.12	
Hexachloroethane	4.3	0.12	<0.12	
Nitrobenzene	0.13	0.12	<0.12	
Pyridine	5.0	5.0	<5.0	

DATE/ANALYST: 03-17-89 CTN

(1) Toxicity Characteristic Leaching Procedure

QUALITY CONTROL DATA Surrogate Recovery (%)

1,2-Dichlorobenzene-d4 : ND Fluorene-d10 : 53

2,4,6-Trichlorophenol-d2: 30 2-Nitrophenol-d4: 49

ND = Not Detected

WES. PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70806

SAMPLE SOURCE: PRIMARY CLARIFIER SLUDGE COMP.

SAMPLE : 890314-25

WEIGHT : 35.26 GRAMS

ANALYTICAL METHOD NO. 8240 (SW-846)

Parameter	Regulatory Limit in TCLP Extract (mg/L) (1)	Quantitation Limit (mg/L)	Results (mg/L)	Quality Assurance Extract Spike Recovery (%)
Volatile Compounds:				
Acrylonitrile	5.0	5.0	<5.0	
Benzene	0.07	0.05	<0.05	
Carbon disulfide	14.4	0.05	<0.05	
Carbon tetrachloride	0.07	0.05	<0.05	
Chlorobenzene	1.4	0.05	<0.05	
Chloroform	0.07	0.05	<0.05	
1,2-Dichloroethane	0.40	0.05	<0.05	
1,1-Dichloroethylene	0.1	0.05	<0.05	
Isobutanol	36	5.0	<5.0	
Methylene chloride	8.6	0.125	<0.125	
Methyl ethyl ketone	7.2	0.05	<0.05	
1,1,1,2-Tetrachloroethane	10.0	0.05	<0.05	
1,1,2,2-Tetrachloroethane	1.3	0.05	<0.05	
Tetrachloroethylene	0.1	0.05	<0.05	
Toluene	14.4	0.05	<0.05	
1,1,1-Trichloroethane	30	0.05	<0.05	
1,1,2-Trichloroethane	1.2	0.05	<0.05	
Trichloroethylene	0.07	0.05	<0.05	
Vinyl chloride	0.05	0.05	<0.05	

DATE/ANALYST: 03-17-89 JAS

(1) Toxicity Characteristic Leaching Procedure, ZHE Protocol.

QUALITY CONTROL DATA Surrogate Recovery (%)

1,2-Dichloroethane-d4 : 85 Benzene-d6: 95

Ethylbenzene-d5 : 72

W. PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70806

WATER MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Case No. EPA 624 Laboratory Name

FRACTION	COMPOUND	CONC. SPIKE ADDED (ug/L)	SAMPLE RESULT	CONC. MS	% REC	CONC. MSD	% REC	RPD	QC LIMITS* RPD	QC LIMITS* RECOVERY
VOA	1,1-Dichloroethene	20	<10	24.9	124				14	61-145
	Trichloroethene	20	<10	20.2	101				14	71-120
SAMPLE NO.	Chlorobenzene	20	<10	20.6	103				13	75-130
890308-55	Toluene	20	<10	21.5	108				13	76-125
	Benzene	20	<10	21.6	108				11	76-127
	1,2,4-Trichloronenzene								28	39-98
B/N	Acenaphthene								31	46-118
	2,4 Dinitrotoluene								38	24-96
SAMPLE NO.	Di-n-Butylphthalate								40	11-117
	Pyrene								31	26-127
	N-Nitroso-Di-n-Propylamine								38	41-116
	1,4-Dichlorobenzene								28	36-97
ACID	Pentachlorophenol								50	9-103
	Phenol								42	12-89
SAMPLE NO.	2-Chlorophenol								40	27-123
	4-Chloro-3-Methylphenol								42	23-97
	4-Nitrophenol								50	10-80
PEST	Lindane								15	56-123
	Heptachlor								20	40-131
SAMPLE NO.	Aldrin								22	40-120
	Dieldrin								18	52-126
	Endrin								21	56-121
	4,4'DDT								27	38-127

ADVISORY LIMITS

RPD: VOAs_____out of_____: outside QC limits
B/N _____out of_____: outside QC limits
ACID_____out of_____: outside QC limits
PEST_____out of_____: outside QC limits

RECOVERY: VOAs 0 out of 5 : outside QC limits
B/N _____out of_____: outside QC limits
ACID_____out of_____: outside QC limits
PEST_____out of_____: outside QC limits

COMMENTS: VOAW-019

*Contract Laboratory Protocol

These limits are for advisory purposes only. They are not to be used to determine if a sample should be reanalyzed. When sufficient multi-lab data are available, standard limits will be calculated.

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70806

WATER MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

FRACTION	COMPOUND	CONC. SPIKED (ug/L)	SAMPLE RESULT	CONC. MS	% RECOVERY	CONC MSD	% RECOVERY	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
(B/N)	1,2,4-Trichlorobenzene	100	<10	38.3	38				28	39-98
	Acenaphthene	100	<10	46.6	47				31	46-118
	2,4-Dinitrotoluene	100	<10	46.1	46				38	24-96
	Di-n-butyl phthalate	100	<10	48.7	49				40	11-117
	Pyrene	100	<10	28.2	28				31	26-127
	N-Nitrosodi-n-propylamine	N/A	N/A	N/A	N/A				38	41-116
	1,4-dichlorobenzene	100	<10	42.1	42				28	36-97
(A/E)	Pentachlorophenol	200	<10	199	100				50	9-103
	Phenol	200	<10	65.8	33				42	12-89
	2-Chlorophenol	200	<10	153	76				40	27-123
	4-Chloro-3-methylphenol	200	<10	105	52				42	23-97
	4-Nitrophenol	200	<40	156	78				50	10-80

Date/Analyst: 02-13-89/CTN

ADVISORY LIMITS

RPD:

B/N____ out of ____; Outside QC Limits
A/E____ out of ____; Outside QC Limits

B/N__1_ out of __6_; Outside QC Limits
A/E__0_ out of __5_; Outside QC Limits

SURROGATE RECOVERY:

1,2-Dichlorobenzene-d4: (a)__53 (b)____
RPD ____

Fluorene-d10 : (a)__54 ____
RPD ____

2,4,6-Trichlorophenol-d2: (a)__48 (b)____
RPD ____

2-Nitrophenol-d4 : (a)__81 (b)____
RPD ____

SAMPLE IDENTIFICATION: 890203-0018

MS REFERENCE NUMBER: BNALP-007AB

*Contract Laboratory Protocol

These limits are for advisory purposes only. They are not to be used to determine if a sample should be reanalyzed. When sufficient multi-lab data are available, standard limits will be calculated.

WES. AINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70806

WATER MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

RACTION	COMPOUND	CONC. SPIKE (ug/L)	SAMPLE RESULT	CONC. MS	% REC	CONC. MSD	% REC	RPD	QC LIMITS* RPD	QC LIMITS* RECOVERY
EST	Lindane								15	56-123
	Heptachlor								20	40-131
	Aldrin								22	40-120
	Dieldrin								18	52-126
	Endrin								21	56-121
	4,4'-DDT								27	38-127
ERB	2,4-D									
	2,4,5-TP									
	2,4,5-T									
EST	Methoxychlor									
	Chlordane									
	Toxaphene									
CB	Aroclor 1254									
CDD	2,3,7,8-TCDD	1.0	<1.0	1.05	105					

Date/Analyst: 01-11-89/RDC

DVISORY LIMITS

D: PEST_____out of_____: outside QC limits RECOVERY: PEST_____out of_____: outside QC limits

SAMPLE IDENTIFICATION: 120888-0061 MS REFERENCE NUMBER: DIOWC-011

Contract Laboratory Procotol
ese limits are for advisory purposes only. They are not to be used to determine if a sample should be reanalyzed. When ufficient multi-lab data are available, standard limits will be calculated.

W. [illegible] AINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70806

WATER MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

ACTION	COMPOUND	CONC. SPIKE (ug/L)	SAMPLE RESULT	CONC. MS	% REC	CONC. MSD	% REC	RPD	QC LIMITS* RPD	QC LIMITS* RECOVERY
ST	Lindane								15	56-123
	Heptachlor								20	40-131
	Aldrin								22	40-120
	Dieldrin								18	52-126
	Endrin								21	56-121
	4,4'-DDT								27	38-127
RB	2,4-D									
	2,4,5-TP									
	2,4,5-T									
ST	Methoxychlor									
	Chlordane									
	Toxaphene									
B	Aroclor 1254	50	<1.0	43	86					
DD	2,3,7,8-TCDD									

Date/Analyst: 01-13-89/DMM

VISORY LIMITS

D: PEST_____out of_____: outside QC limits RECOVERY: PEST_____out of_____: outside QC limits

SAMPLE IDENTIFICATION: 120888-0035 MS REFERENCE NUMBER: PCBWC-033

ontract Laboratory Procotol
ese limits are for advisory purposes only. They are not to be used to determine if a sample should be reanalyzed. When fficient multi-lab data are available, standard limits will be calculated.

W. [illegible]AINE
Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70806

WATER MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

TRACTION	COMPOUND	CONC. SPIKE (ug/L)	SAMPLE RESULT	CONC. MS	% REC	CONC. MSD	% REC	RPD	QC LIMITS* RPD	QC LIMITS* RECOVERY
'EST	Lindane								15	56-123
	Heptachlor								20	40-131
	Aldrin								22	40-120
	Dieldrin								18	52-126
	Endrin								21	56-121
	4,4'-DDT								27	38-127
IERB	2,4-D	2.0	<1.0	1.04	52					
	2,4,5-TP	1.0	<1.0	0.66	66					
	2,4,5-T	1.0	<1.0	0.69	69					
'EST	Methoxychlor									
	Chlordane									
	Toxaphene									
'CB	Aroclor 1254									
'CDD	2,3,7,8-TCDD									

Date/Analyst: 02-28-89/RDC

DVISORY LIMITS

PD: PEST_____out of_____: outside QC limits RECOVERY: PEST_____out of_____: outside QC limits

SAMPLE IDENTIFICATION: 021689-0035 MS REFERENCE NUMBER: HRBWC-035

Contract Laboratory Procotol
hese limits are for advisory purposes only. They are not to be used to determine if a sample should be reanalyzed. When ıfficient multi-lab data are available, standard limits will be calculated.

WEST-PAINE Laboratories INC.
1979 GSRI AVE. • BATON ROUGE, LA 70806

WATER MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

ACTION	COMPOUND	CONC. SPIKE (ug/L)	SAMPLE RESULT	CONC. MS	% REC	CONC. MSD	% REC	RPD	QC LIMITS* RPD	QC LIMITS* RECOVERY
ST	Lindane								15	56-123
	Heptachlor								20	40-131
	Aldrin								22	40-120
	Dieldrin								18	52-126
	Endrin								21	56-121
	4,4'-DDT								27	38-127
RB	2,4-D									
	2,4,5-TP									
	2,4,5-T									
ST	Methoxychlor									
	Chlordane	50	<1	48	96					
	Toxaphene									
B	Aroclor 1254									
DD	2,3,7,8-TCDD									

Date/Analyst: 022289/RDC

VISORY LIMITS

D: PEST_____out of_____: outside QC limits RECOVERY: PEST_____out of_____: outside QC limits

SAMPLE IDENTIFICATION: 012689-0033 MS REFERENCE NUMBER: CHLWC-018

ontract Laboratory Procotol
ese limits are for advisory purposes only. They are not to be used to determine if a sample should be reanalyzed. When fficient multi-lab data are available, standard limits will be calculated.

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70806

WATER MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

FRACTION	COMPOUND	CONC. SPIKE (ug/L)	SAMPLE RESULT	CONC. MS	% REC	CONC. MSD	% REC	RPD	QC LIMITS* RPD	QC LIMITS* RECOVERY
PEST	Lindane								15	56-123
	Heptachlor								20	40-131
	Aldrin								22	40-120
	Dieldrin								18	52-126
	Endrin								21	56-121
	4,4'-DDT								27	38-127
HERB	2,4-D									
	2,4,5-TP									
	2,4,5-T									
PEST	Methoxychlor									
	Chlordane									
	Toxaphene	50	<1	38.6	77.2					
PCB	Aroclor 1254									
TCDD	2,3,7,8-TCDD									

Date/Analyst: 02-22-89/RDC

ADVISORY LIMITS

RPD: PEST_____out of_____: outside QC limits RECOVERY: PEST_____out of_____: outside QC limits

SAMPLE IDENTIFICATION: 012689-0035 MS REFERENCE NUMBER: TOXWC-026

Contract Laboratory Procotol
These limits are for advisory purposes only. They are not to be used to determine if a sample should be reanalyzed. When sufficient multi-lab data are available, standard limits will be calculated.

W. PAINE Laboratories INC.
7878 GSRI AVE. • BATON ROUGE, LA 70806

WATER MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

RACTION	COMPOUND	CONC. SPIKE (ug/L)	SAMPLE RESULT	CONC. MS	% REC	CONC. MSD	% REC	RPD	QC LIMITS* RPD	QC LIMITS* RECOVERY
ST	Lindane	2.0	<1.0	1.50	75				15	56-123
	Heptachlor	2.0	<1.0	1.54	77				20	40-131
	Aldrin	2.0	<1.0	1.70	85				22	40-120
	Dieldrin	2.0	<1.0	1.79	90				18	52-126
	Endrin	2.0	<1.0	1.67	84				21	56-121
	4,4'-DDT	2.0	<1.0	1.49	74				27	38-127
RB	2,4-D									
	2,4,5-TP									
	2,4,5-T									
ST	Methoxychlor	2.0	<1.0	2.02	101					
	Chlordane									
	Toxaphene									
B	Aroclor 1254									
DD	2,3,7,8-TCDD									

Date/Analyst: 03-06-89/RDC

VISORY LIMITS

D: PEST_____out of_____: outside QC limits RECOVERY: PEST_____out of_____: outside QC limits

SAMPLE IDENTIFICATION: 030189-0074 MS REFERENCE NUMBER: SPCWC-056

ontract Laboratory Procotol
ese limits are for advisory purposes only. They are not to be used to determine if a sample should be reanalyzed. When fficient multi-lab data are available, standard limits will be calculated.

M 3245

Manville Internal Correspondence

To: Charlie Welch

Date: June 1, 1989

From: L.A. Risdal LTR

Copies: W.D. Tatum, W.W. Matthews, E. Harmon (ERM-Southwest)

Subject: pH Measurements of Primary Clarifier Underflow and Ash Sluice

A number of composite and grab samples on Primary Clarifier Underflow and Ash Sluice have been analyzed for [1]pH.

Ash Sluice

Date	Composite pH	Grab pH
5/15/89	11.71	
5/16/89	11.86	11.67
5/17/89	11.98	11.70
5/18/89	11.84	12.03
5/19/89	11.91	11.83
5/22/89	11.83	11.88
5/25/89	11.89	12.13
5/26/89		11.95
Average pH	11.86	Average pH 11.88

Primary Clarifier Underflow

Date	Composite pH	Grab pH
5/15/89	7.74	
5/16/89	7.39	7.61
5/17/89	7.87	7.72
5/18/89	8.10	7.50
5/19/89	7.25	7.38
5/22/89	7.13	7.94
5/25/89	10.94	9.19
5/26/89		11.63
Average pH	8.06	Average pH 8.42

[1] Reference: Std. Methods 16th Ed., Description: Electrode, Method No: 423

MONITOR WELL INSTALLATION REPORT MANVILLE FOREST PRODUCTS CORPORATION

West Monroe, Louisiana

November 1990

Prepared for:

MANVILLE FOREST PRODUCTS CORPORATION

P. O. Box 488 - Station 12
1000 Jonesboro Road
West Monroe, Louisiana 71294

Prepared by:

GROUNDWATER TECHNOLOGY, INC.

700 Mariner's Plaza Drive, Suite 720
Mandeville, Louisiana 70448

GROUNDWATER TECHNOLOGY, INC.

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1.0 Introduction

Groundwater Technology, Inc. was contracted by Manville Forest Products Corporation to install thirteen (13) monitor wells along the perimeter of the solid waste impoundments for the purpose of groundwater level monitoring, water sample collection, and characterization of the local geology at the site. The construction and the installation method of the thirteen (13) wells were based on Louisiana Department of Transportation and Development (DOTD), Water Resources Section, and Louisiana Department of Environmental Quality (DEQ) regulations, and upon DEQ review and approval of the Plans and Specifications for monitor well installation at this site (Appendix A).

Monitor well identification numbers were assigned by Manville Forest Products Corporation after the completion of drilling operations. The number designations represent a change from the numbering which was used in the proposal and during field operations (Table 1). The monitor well registration forms, which were field-generated prior to the new number assignments, still bear the original numbers (Appendix B).

This report is based on field operations records, the thirteen (13) lithologic logs generated from borehole sampling during the monitor well installations, and the survey data provided by Manville Forest Products Corporation.

2.0 Monitor Well Installation and Construction

During the month of December 1989, thirteen monitor wells were installed at the Manville Forest Products Corporation plant in West Monroe, Louisiana, under the supervision of Groundwater Technology, Inc. geologists. Manville Forest Products Corporation marked the well locations and prepared the drilling sites. The well locations are depicted on Figure 1. Preparation of ten of the sites consisted of the construction of pads, using native fill material, in order to achieve an artificial surface elevation at or above 75 feet NGVD. The height, or thickness, of each pad varied from approximately 6.5 feet to 15.0 feet above the natural surface. The remaining three well locations were prepared by clearing and leveling the area immediately around the well location to allow for equipment and personnel access to the sites. Monitor well installation operations commenced on December 11 and continued through December 23. Corresponding lithologic descriptions and construction details for each monitor well are presented in Appendix C. Prior to installation of the first well, the use of centralizers, included in the Plans and Specifications based on the recommendation by DEQ, was deemed unnecessary and a verbal variance was granted by DEQ. Written verification of this and other variances is included as Appendix D.

The thirteen monitor wells were installed using a truck-mounted, CME-55 rotary drill rig equipped with 6, 8, and 10-inch diameter hollow-stem augers. All borings were initially made with small diameter (6 or 8-inch) augers for sampling, and then reamed with 10-inch diameter augers, to allow well installation. Grab samples were collected while penetrating

the thickness of the artificial pads where applicable. The boreholes were continuously sampled with a Shelby-tube sampler during penetration of native strata in all wells.

The monitor well design was based on the criteria that well screen would be placed across the depth interval of the uppermost permeable sand, within the saturated zone. Twelve of the thirteen monitor wells are each constructed of a 9.5-foot length of 4-inch diameter, Schedule 40, PVC well screen with a 0.020-inch slot size. One well, MW-16, is constructed identical to the other wells except that the screen length is 2.0 feet as opposed to 9.5 feet (see Appendix D). Each well screen is topped with 4-inch diameter, Schedule 40, PVC casing pipe, of varying lengths which extend approximately 3 feet above the drilling site grade. Table 1 provides a summary of the monitor well construction parameters.

The annular space of ten of the wells was filled with a graded 10-20 size sand, compatible with the screen slot size, to approximately 5 feet above the top of the screen. The sand pack was emplaced to 3 feet above the top of the screen in monitor wells MW-9, MW-17, and MW-18. Monitor well MW-9 was completed in this manner as this was the method outlined in the original proposal. Subsequent to the completion of this well, a Louisiana Department of Environmental Quality field representative stated that he would prefer that the sand pack extend 5 feet above the top of the screen. Subsequent monitor well installations were completed with the 5-foot level where practical. (Monitor wells MW-17 and MW-18 were completed with sand packs 3 feet above the well screen due to lithologic factors and the placement depth, below grade, of the well screens). The sand pack in all wells was then topped with approximately 3 feet of bentonite pellets which were subsequently wetted and allowed to hydrate for six hours to form a seal. The remainder of the annular space to the surface was filled with a 6 percent bentonite/cement slurry (as specified in the chart in the Plans and Specifications), which was implaced via a pump-down tremie method. The grout was circulated out of the top of the hole until approximately 20-30 percent more than the calculated volume had been pumped to insure a non-diluted slurry within the annular space. The grout in each well was checked for shrinkage after a 24-hour period, at which time more grout was added, if needed, to fill the annular space up to the surface grade.

The monitor wells were developed, after all grouting procedures were completed, using a compressed air discharge below the internal water level of the well. Each monitor well was pumped until the well pumped dry or the discharge cleared; Table 2 provides the estimated volume of fluid pumped from each well.

The top of casing (T.O.C.) elevation of each monitor well was later surveyed relative to U.S. Army Corps of Engineers benchmark BM300 (Table 1). The survey was performed by S.E. Huey Company, Consulting Engineers, under the direction of Manville Forest Products Corporation.

Due to field and weather conditions, the locking steel covers and surface pads were not installed to complete the wells. Manville Forest Products Corporation successfully

completed this phase without the supervision of Groundwater Technology, Inc. at a later time with inspection by DEQ representatives. The completion specifications, supplied by Manville Forest Products Corporation, are included in Figures 2 and 3 and apply to all wells as an addendum to the well logs in Appendix C. In addition, the top of casings (T.O.C.) for MW-17 and MW-18 were later extended by Manville Forest Products Corporation; the elevations in Table 1 and Figure 1 reflect the final T.O.C. elevations.

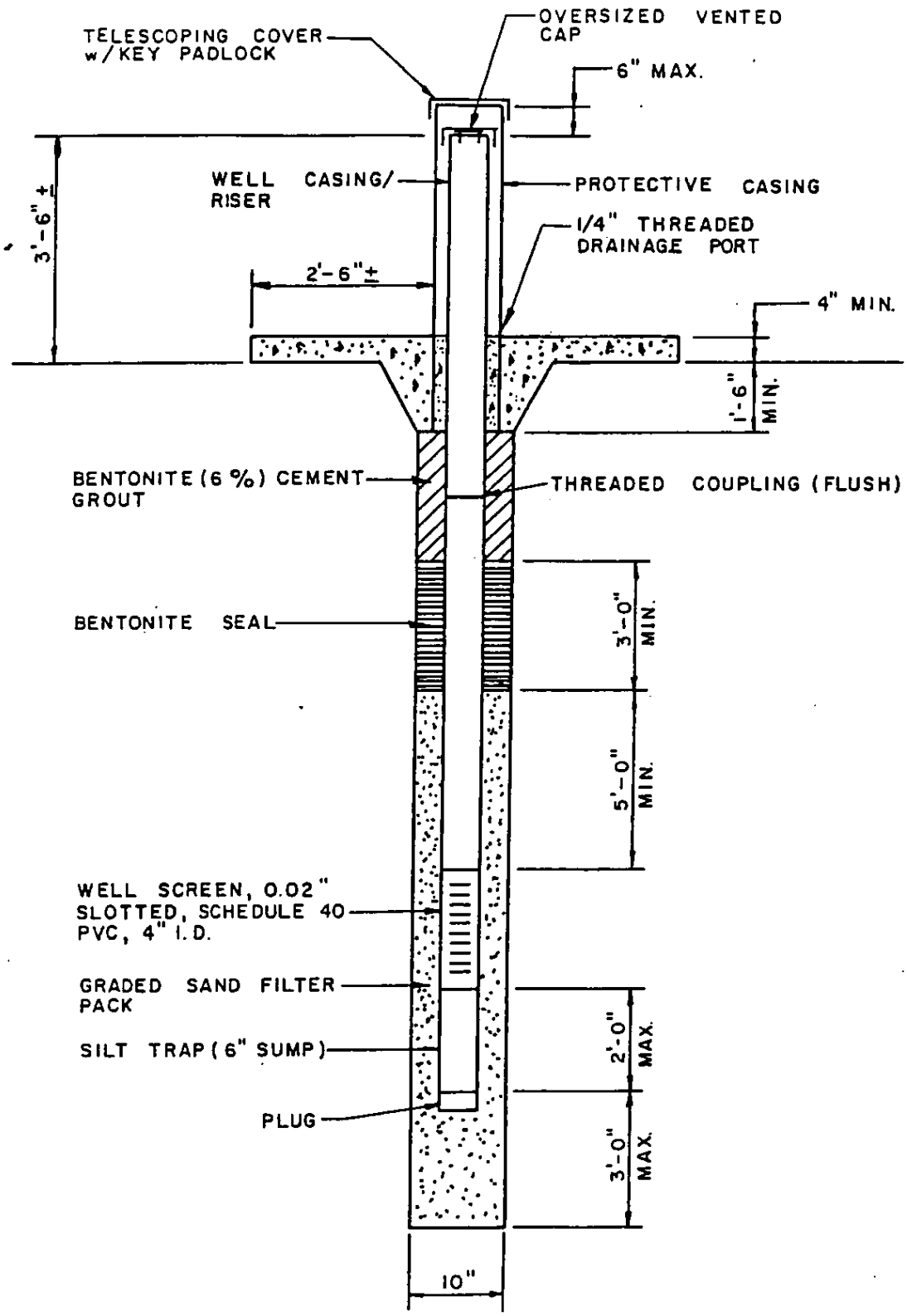
3.0 Site Geology

The sediments encountered beneath the site during drilling operations consist of clays, silts, and sands. At each drilling location, a permeable unit consisting of a sand matrix was encountered and well screen was emplaced opposite this unit.

The most permeable lithologic units within the saturated zone encountered in the boreholes may be placed in five (5) general categories (Table 3). Each specific Sand Unit generally was encountered within the same geographical and topographical area, and the depths below grade, relative to the other units, are somewhat comparable. Sand Unit 1 was encountered as the uppermost permeable zone along the eastern and southern boundaries of Pond Number 4. Depth to the top of this Unit ranged from approximately 47 feet to 53 feet. Sand Unit 2 was encountered as the uppermost permeable zone in the area due east of the proposed ash pond extension area and on the east bank of Toney Bayou. The top of this Sand Unit was encountered at approximately 39.5 feet. Sand Unit 3 was encountered as the uppermost permeable zone around the high intensity aeration pond and along the northern boundary of the proposed ash pond extension area. Depth to the top of this Unit ranged from approximately 6.5 feet to 28.0 feet in the boreholes drilled in this area. Sand Unit 4 was encountered as the uppermost permeable zone near the southwest corner of the primary sludge pond. Depth to the top of this Unit is 21 feet. Sand Unit 5 was encountered in the boreholes drilled along the western and southern boundaries of Pond Number 1. The top of this Unit below the top of the saturated zone ranges in depth from 14 to 17 feet.

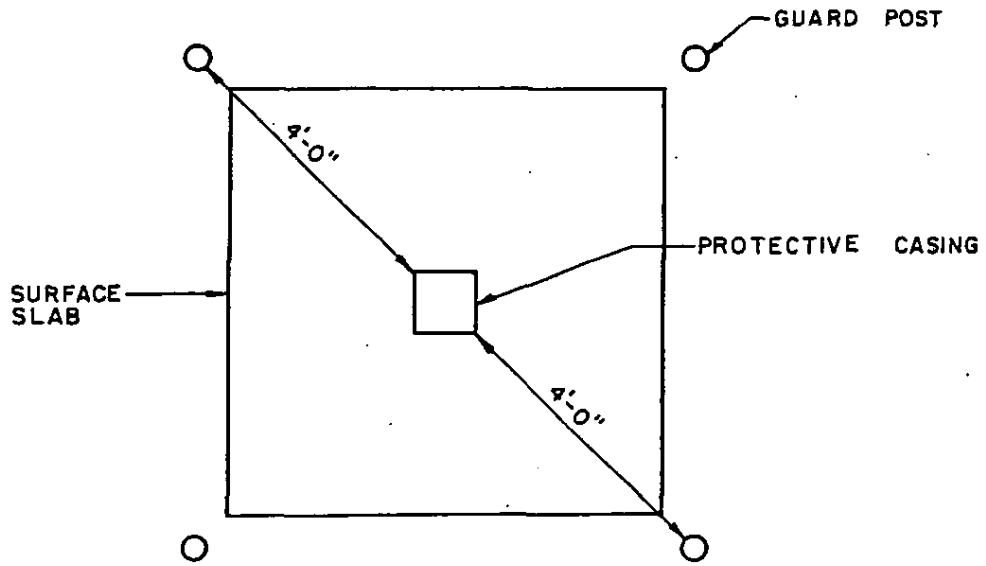
Sand Unit 1, which was the uppermost permeable Unit in the deepest wells installed, consists of a beige or beige to white sand with the finer grain sizes at the top and coarsening with depth. This Sand Unit is overlain predominately by silts and clays, with some sandy seams in evidence. Sand Unit 2, which was encountered at only one well location, consists of gray to white sand with the coarsest grain size at the top. This unit is approximately 3.5 feet thick and is overlain by silts and clays except for one 0.5-foot thick sand seam. Sand Unit 3 consists predominantly of beige or beige to white, generally well-sorted sands ranging from medium to extremely coarse-grained sizes. This sand is immediately overlain by sand, clay, and silt mixtures. Sand Unit 4, also encountered at only one well location, consists of gray to white, and tan and black, predominately coarse-grained sand. This sand is overlain by sand, silt, and clay mixtures grading into silt and clays extending to the surface. Sand Unit 5 consists of brown and tan clayey sands and silty sands, with alternating 0.5 to 1 foot thick clay layers, which are overlain by sands, silts and clays.

FIGURES

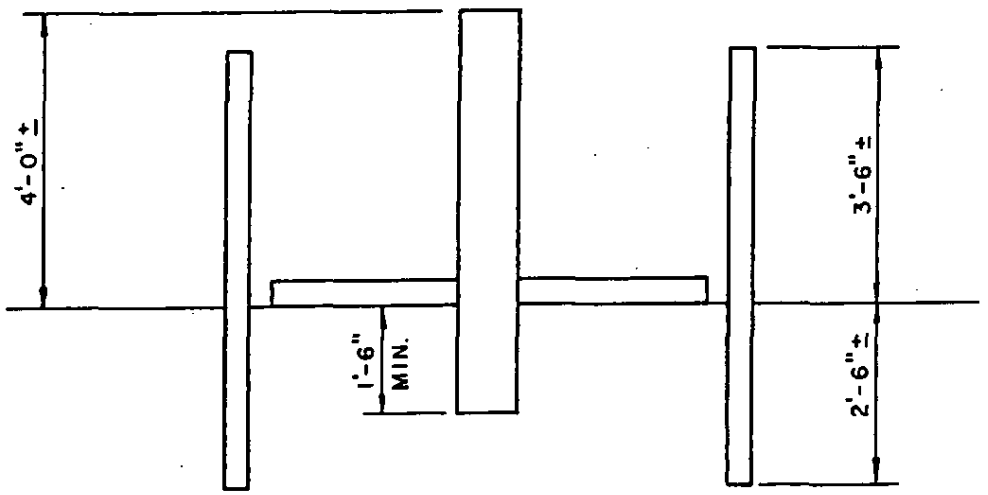


PROFILE DIAGRAM OF
GROUNDWATER MONITORING WELL

FIGURE 2	SCALE: NONE DATE: 10/29/90	DRAWN BY: KDB SHEET ___ OF ___	PLAT PREPARED FOR MANVILLE FOREST PRODU CORPORATION WEST MONROE LOUISIA
OFFICE OF S. E. HUEY CO. MONROE, LA. ENGINEERS & SURVEYORS	DWG. NO.		



PLAN



PROFILE

DIAGRAMS OF
SURFACE SLAB & GUARD POSTS

FIGURE 3	SCALE: NONE DATE: 10/29/90	DRAWN BY: KDB SHEET ___ OF ___	PLAT PREPARED FOR MANVILLE FOREST PRODU CORPORATION
OFFICE OF S. E. HUEY CO. MONROE, LA. ENGINEERS & SURVEYORS	DWG. NO. _____		WEST MONROE LOUISIA

TABLES

TABLE I
SUMMARY OF MONITOR WELL CONSTRUCTION

ORIGINAL WELL NUMBER	*MFPC WELL NUMBER	TOTAL DEPTH BELOW FINISHED GRADE (feet)	SCREENED INTERVAL BELOW FINISHED GRADE (feet)	LENGTH OF CASING (feet)	TOP OF CASING ELEVATION (feet) (MSL)
MW-1	MW-7	36.0	16 - 25.5	29.8	82.20
MW-2	MW-8	45.0	29 - 38.5	32.8	87.09
MW-3	MW-9	39.0	22 - 31.5	25.8	86.60
MW-4	MW-10	28.0	17 - 26.5	20.8	80.00
MW-5	MW-11	28.00	16 - 25.5	19.8	81.42
MW-6	MW-12	28.0	15 - 24.5	18.8	93.44
MW-7	MW-13	65.0	53 - 62.5	56.8	80.13
MW-9A	MW-14	65.0	51 - 60.5	54.8	78.58
MW-11A	MW-15	60.0	47 - 56.5	50.8	77.93
MW-14	MW-16	50.0	39.5 - 41.5	43.3	75.77
MW-15	MW-17	29.0	10- 19.5	13.8	80.50
MW-15A	MW-18	21.0	8 - 17.5	11.8	88.50
MW-16	MW-19	31.0	17 - 26.5	20.8	87.24

* Assigned for monitor well numbering continuity (Landfill P-0071: MW-1-MW-6)

TABLE 2
MONITOR WELL DEVELOPMENT

MFPC WELL NUMBER	DEPTH TO WATER BEFORE DEVELOPMENT BELOW T.O.C. (feet)	ESTIMATED NUMBER WELL VOLUMES PUMPED	RESULT
MW-7	19.74	2	PUMPED DRY
MW-8	19.81	5	CLEARED
MW-9	17.25	3	CLEARED
MW-10	14.00	5	CLEARED
MW-11	16.01	5	CLEARED
MW-12	16.64	3	CLEARED
MW-13	21.45	5	CLEARED
MW-14	20.49	5	CLEARED
MW-15	18.75	5	CLEARED
MW-16	14.97	2	PUMPED DRY
MW-17	14.71	5	CLEARED
MW-18	9.59	5	CLEARED
MW-19	19.49	5	CLEARED

TABLE 3
LITHOLOGIC CATEGORIZATION

LITHOLOGIC SAND UNIT	MONITOR WELLS SCREENED OPPOSITE THIS SAND UNIT (MFPC DESIGNATION)
1	MW-13, MW-14, MW-15
2	MW-16
3	MW-7, MW-8, MW-17, MW-18, MW-19
4	MW-9
5	MW-10, MW-11, MW-12

APPENDIX A
PLANS AND SPECIFICATIONS

FILE

REVISED

PLANS AND SPECIFICATIONS FOR MONITOR WELL INSTALLATION AT MANVILLE FOREST PRODUCTS CORPORATION WEST MONROE, LA FACILITY

OCTOBER 1989

Prepared for:
Manville Forest Products Corporation
P.O. Box 488
West Monroe, Louisiana 71294-0488

Prepared by:
Groundwater Technology, Inc.
700 Mariner's Plaza Dr., Suite 720
Mandeville, Louisiana 70448

1.0 General Information

In partial fulfillment of the requirements for a Solid Waste Standard Permit for solid waste impoundments at the Manville Forest Products Corporation (MFPC) facility in West Monroe, Louisiana, a groundwater monitoring program has been proposed to the Louisiana Department of Environmental Quality (DEQ). The originally proposed monitor well network has been modified, after negotiations with the DEQ and due to the site geology, to consist of the following:

1) Installation of two (2) test borings to a maximum depth of fifty (50) feet below original surface grade and the installation of either detection wells in the most permeable stratigraphic unit, or monitor wells in a sand unit below the water table.

2) Installation of eleven (11) monitor wells, screened in the shallowest sand unit below the water table.

The following guidelines should be consulted for general information regulating the installation of monitor wells:

1) Louisiana Administrative Code, Title 33, Volume 14, Part 7;

2) "Proposed Louisiana Solid Waste Rules and Regulations (Draft)", 1988, DEQ;

3) "Water Well Rules, Regulations, and Standards, State of Louisiana", 1985, Department of Transportation and Development (DOTD); and

4) "Proposed Standards and Specifications for Construction of Monitor Wells at Facilities Regulated by DEQ", 1989, DEQ.

At the time of this writing, DOTD regulations for monitor well installation are still in effect. However, the proposed DEQ regulations which will supercede DOTD regulations are pending. Review and approval of these plans and specifications by the DEQ has been completed.

...OGY, INC.

2.0 Site Hydrogeology

Descriptions of the site geology and hydrogeologic units are based on a series of geotechnical borings, designated B-1 through B-20, which were performed for the permit application (Exhibit C: Site Master Plan). The boring logs are included as Appendix A.

Three soil units were described from the investigation in order of increasing permeability:

I. Silty or sandy clay to clay

II. Clayey sand to silty sand

III. Sand to silty sand

Unit I, which extends to the maximum depth of penetration of 40 feet in two locations (B-11 and B-20), is overlain by Units II and III. In borings B-1 through B-7, and B-9, along the eastern side of Pond No. 4, Units II and III were not detected below a depth of 3 feet and a sand unit was not encountered below the estimated water table.

Depth to water, when observed in the boreholes, ranged from 8.5 feet below grade in B-6 to 16 feet in B-5 and B-7.

3.0 Monitor Well and Detection Well Installation

A total of eleven (11) monitor wells and two (2) detection wells or monitor wells are to be installed.

3.1 Location

Based on modifications to the originally proposed sixteen (16) monitor wells approved by the DEQ, the following locations, in reference to the enclosed Site Master Plan (Exhibit C of the Permit), are proposed:

1) Original monitor well locations 1 through 7, 14, and 16 are to remain valid.

2) Original location 15 is to be moved south to the corner of the proposed ash pond extension area, approximately 900 feet due north of location 14; (not as shown on Site Master Plan).

3) An additional well, designated 15 A, is to be installed approximately 800 feet due west from the new location for 15, outside of the extension area; (not shown on Site Master Plan).

4) Wells 14, 15, and 15A must be installed at a reasonable distance from the proposed extension area, which will be marked by MFPC, so as not to inhibit construction. All three of these monitor wells may be developed from existing piezometers.

5) Well locations 8 through 13 are no longer proposed due to the apparent absence of a sand unit in the vicinity of these proposed wells to a depth of 30 to 40 feet. This issue was negotiated with the DEQ, and they recommended the performance of two (2) test borings to a maximum depth of 50 feet below original grade. If a sand unit is encountered within this depth below the water table, monitor wells will be installed. If a sand unit is not present, then detection wells will be installed in the first water-bearing zone. If free-standing water is not encountered in the two test borings, the detection well shall be screened in the most permeable zone below the estimated water table. This determination will be made in the field from visual classification of borehole cores, and after approval by MFPC and DEQ. The two test borings are to be located as follows:

   a) One midway between B-1 and B-2, and

   b) One between the original locations for MW-11 and MW-12.

Man-made access pads are proposed to be constructed by MFPC to provide drilling access and elevate the surface grade of all of the monitor well and detection well locations to approximately [illegible] MSL.

3.2 Method

Acceptable methods for drilling are hollow-stem or solid-stem augers, and water or mud rotary. The appropriate drilling method must accommodate the most efficient method for continuous sampling of the borehole. In addition, water-bearing sands must be prohibited from collapsing prior to well installation. The drill sites should be accessible with either truck-mounted or all-terrain vehicle-mounted drilling equipment. The drilling and sampling equipment must be decontaminated before beginning the first borehole and between each borehole.

Table 1 provides information on the location, expected depth of exploration, correlative geotechnical boring number, expected pad fill thickness, sand unit thickness, and approximate depth to water as observed in borings B-1 through B-20. If a sand unit is not encountered in the monitor well locations, MFPC should be immediately notified so that an alternative can be discussed with the DEQ.

3.3 Borehole Logging

Borehole logging should be performed by a professional geologist. Continuous soil samples will be collected to determine the well design and the presence of a sand unit in the 50-foot deep test borings. Samples will be collected with a Shelby-tube in cohesive strata and split-spoon sampler in noncohesive strata.

The cores will be visually classified and described on a field log. Color, consistency, density, and classification of each distinguishable lithologic unit should be documented.

3.4 Well Design and Installation

Based on the results of the borehole logging, the final well design at each location must be accomplished in the field; so materials must be available to meet the design criteria (see Figure 1). The following pre-approved materials should be present for well completion:

1) Flush-threaded, 4-inch diameter, 0.01-inch slotted, PVC well screen in 2.5, 5.0, and 10.0-foot sections. (Note: no screened section shall be less than 5 feet or greater than 10 feet unless geologically required with approved justification.)

2) Flush-threaded Schedule 40, 4-inch diameter, PVC casing in 5, 10, and 20-foot sections.

3) Graded sand pack which is determined to be 99% coarser than the slot size of the screen.

4) Bentonite pellets.

5) Powdered bentonite, cement, and a source of water for mixing grout in known quantities at the drill site.

6) Centralizers for each 20-foot length of casing.

7) Blank casing, with a minimum length of six inches, and a bottom cap to add sump to each well.

The depth and thickness of the shallow sand will be determined from the boring log and the screen section will be assembled to adequately screen the saturated thickness of the sand up to a maximum length of 10 feet. The depth of the borehole should be measured prior to well construction. A six-inch sump will be added to the bottom of the well and centralizers will be placed at 20-foot intervals along the well casing above the screen. Casing will be added to project 2 to 3 feet above the top of the borehole.

Required volumes of all completion materials should be calculated and checked after emplacement. After the well is set, sand pack will be added to a depth of at least three feet above the top of the well screen (verified by measurement). A sample of the sand pack used in each well will be retained for grain size analysis, if necessary. A three-foot thick layer of bentonite pellets will be added to the top of the sand. The bentonite seal must be allowed to hydrate for a minimum of six hours before applying grout.

The grout mixture will be mixed with a minimum ratio of 28.2 lbs. (6%) of bentonite powder to 470 lbs. (5 x 94 lb. sacks) of cement to 45 gallons of water (see Chart I). The grout mixture will be tested with a calibrated mud scale to ensure that a weight of approximately 13.5 lbs./gallon is achieved. The grout must then be pumped via tremie pipe until undiluted flow is observed from the annulus at the ground surface. After the grout has been allowed to settle for a 24-hour period, more grout will be added, as needed, to the ground surface and finally cut back to one foot below surface to assure a pure grout to final concrete seal. The well will then be developed by either dedicated bailer evacuation, for a minimum of five well volumes, or by pumping water or air via discharge pipe from the bottom of the well until the discharge is clear.

Each well will be completed with a minimum 6-inch diameter locking protective cover and encased in cement, which will extend at least one foot deep around the protective cover. A threaded weephole will be added to the protective cover near the base. A 5-foot by 5-foot square, sloping cement pad, surrounded by four steel guard posts, will be installed by MFPC after well completion by the contractor. The inside of the protective cover will be marked to clearly identify the well number, well depth, and installation date. MFPC will survey to determine the locations and [illegible] casing elevations, which should be included in the contractor's

documentation.

4.0 Reporting Requirements

Each well must be registered with the DOTD by completing the necessary registration form (DOTD-GW-15). The original should be sent to DOTD with a copy included in the installation report to the owner.

A detailed report of the well installation project will be submitted to MFPC within 30 days after well completion. This report should include, but not be limited to, the following information:

1) Introduction and Purpose,

2) Well Installation Procedures, and

3) Boring Logs and Well Schematics with Required Information.

Figure 1. Typical Monitor Well Cross-Section (from MFPC)

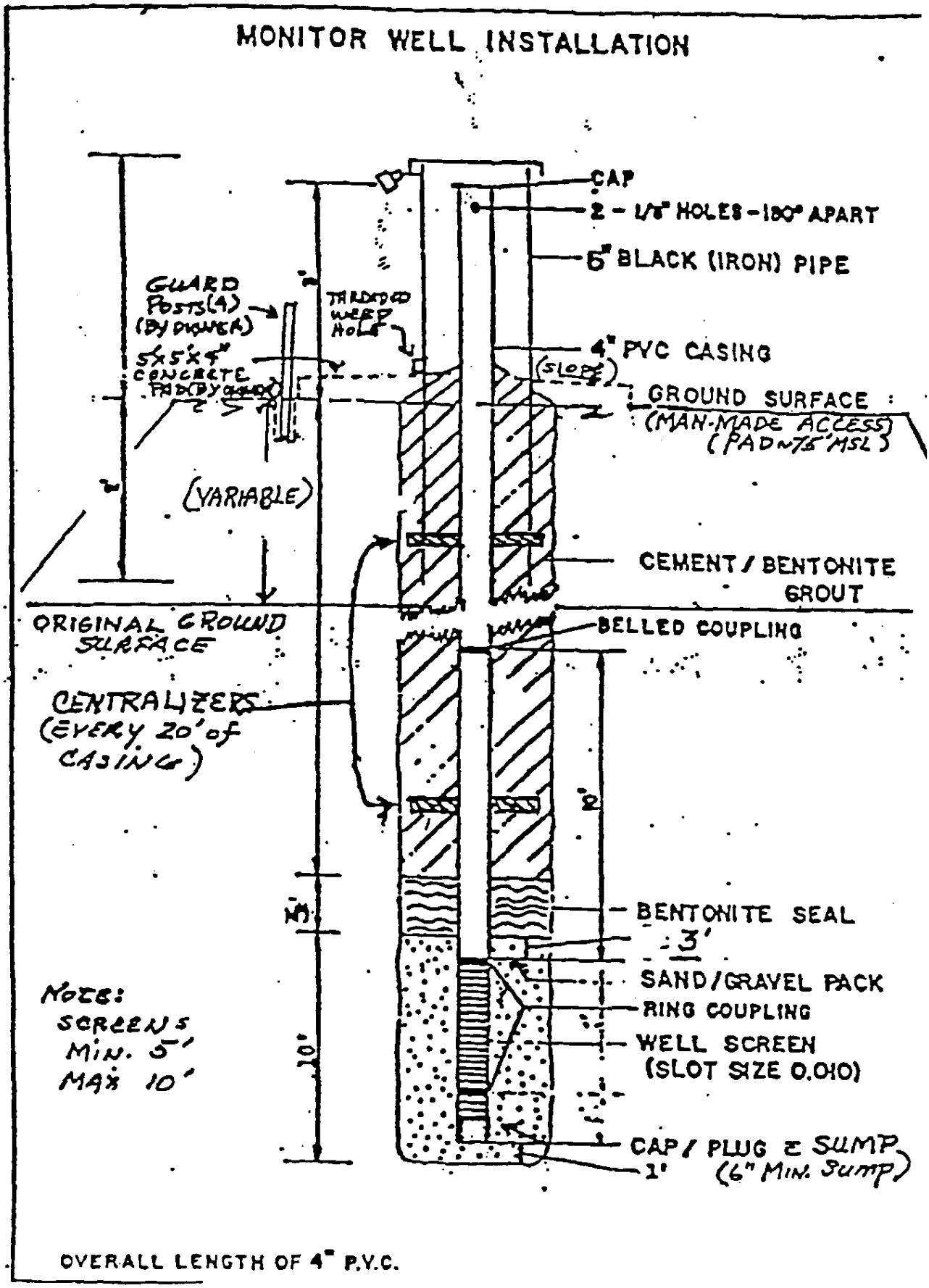


Chart 1. Grout Specifica[illegible] (from DEQ)

# of sa[illegible] Cement	cement	% Bentonite 8%	7%	6%	5%	4%	3%	2%	1%
1	94	7.52	6.58	5.64	4.7	3.76	2.82	1.88	0.94
2	188	15.04	13.16	11.16	9.4	7.52	5.64	3.76	1.88
3	282	22.56	19.74	16.92	14.1	11.28	8.46	5.64	2.82
4	376	30.08	26.32	22.56	18.8	15.04	11.28	7.52	3.76
5	470	37.6	32.9	28.2	23.5	18.8	14.1	9.4	4.7
6	564	45.12	39.48	33.84	28.2	22.56	16.92	11.28	5.64
7	658	52.64	46.06	39.48	32.9	26.32	19.74	13.16	6.58
8	752	60.16	52.64	45.12	37.6	30.08	22.56	15.04	7.52
9	846	67.68	59.22	50.76	42.3	33.84	25.38	16.92	8.46
10	940	75.2	65.8	56.4	47.0	37.6	28.2	18.8	9.4

PORTLAND CEMENT - API CLASS A
WITH BENTONITE
SLURRY PROPERTIES

Percent Bentonite	Maximum Water Requirements Gal./Sk.	Cu.Ft./Sk.	Slurry Weight Lbs./Gal.	Lbs./Cu.Ft.	Slurry Volume Cu.Ft./Sk.
0	5.2	0.70	15.6	117	1.18
1	5.9	0.79	15.2	114	1.27
2	6.5	0.87	14.7	110	1.36
3	7.2	0.96	14.4	108	1.46
[illegible]	[illegible]	1.04	14.1	105	1.55
[illegible]	[illegible]	1.13	13.8	103	1.64
		1.22	13.5	101	1.73
		1.31	13.3	99	1.83
		1.39	13.1	98	1.92

PORTLAND CEMENT — API CLASS A OR I
WITH BENTONITE

SLURRY PROPERTIES

Per Cent Bentonite	Maximum Water Requirements Gal./Sk.	Cu.Ft./Sk.	Slurry Weight Lbs./Gal.	Lbs./Cu.Ft.	Slurry Volume Cu.Ft./Sk.
0	5.2	0.70	15.6	117	1.18
2	6.5	0.87	14.7	110	1.36
4	7.2	1.04	14.1	105	1.55
6	9.1	1.21	13.5	101	1.73
8*	10.1	1.30	13.1	98	1.92

COMPRESSIVE STRENGTHS — PSI

Atmospheric Pressure

Per Cent Bentonite	60°F.	80°F.	100°F.	120°F.
		12 HOURS		
0	90	380	1035	1905
2	35	415	633	1300
4	20	210	315	150
6	15	85	315	100
8*	15	50	335	210
		24 HOURS		
0	415	1905	2610	3195
2	385	1095	1530	2040
4	225	750	1015	1340
6	85	360	730	775
8*	60	365	510	610
		72 HOURS		
0	2030	4135	4150	4450
2	1165	2040	3350	4110
4	960	1175	2430	2600
6	615	1110	1610	1710
8*	425	720	1045	1115

*For bentonite concentrations greater than 8 per cent see modified cement data.

THICKENING TIME — HOURS:MINUTES

(Pressure-Temperature Thickening-Time Test)

Per Cent Bentonite	API CASING TESTS 0,000'	6,000'	9,000'	API SQUEEZE TESTS 2,000'	4,000'	6,000'
0	3:00+	2:25	1:40	2:10	1:22	1:01
2	2:11	1:10	1:21	2:25	1:29	0:54
4	2:34	1:37	1:32	2:26	1:31	0:51
6	2:35	1:45	1:32	2:16	1:26	0:56
8*	2:44	1:50	1:34	2:31	1:28	0:56

APPENDIX B
WELL REGISTRATION FORMS

WAT[illegible]SOURCES SECTION
WATER WELL REC[illegible]ATION SHORT FORM (DOTD-GW-1S)

PL[illegible]PRINT IN INK OR TYPE WHEN COMPLETING THIS FORM

1. USE OF WELL (Check Appropriate Box)
   - [ ] DOMESTIC
   - [ ] RIG SUPPLY
   - [X] MONITORING
   - [ ] HEAT PUMP SUPPLY
   - [ ] HEAT PUMP HOLE
   - [ ] ABANDONED PILOT HOLE
   - [ ] OTHER _____ (Please Specify)
2. WELL OWNER Manville Forest Products PHONE (318) 362-2000
3. ADDRESS 1000 Jones Burreaux Road, West Monroe, LA 71294
4. OWNER'S WELL NUMBER OR NAME (if any) MW-1
5. DATE COMPLETED 12-18-89 DEPTH OF HOLE 36 FT., DEPTH OF WELL 26.3 FT.
6. STATIC WATER LEVEL 19.74 FT. BELOW GROUND SURFACE MEASURED ON 12-23-89 (Date)
7. CASING 4 IN. [ ] STEEL OR [X] PVC SCH. 40 LENGTH 15.2 FT.
8. SCREEN 4 IN. [ ] STEEL OR [X] PVC SCH. 40 SLOT SIZE .02 LENGTH 10.3 FT.
9. CEMENTED FROM 0.5 FT. TO GROUND SURFACE, USING [ ] PUMP-DOWN METHOD OR [X] GRAVITY METHOD
10. LOCATION OF WELL: PARISH OUACHITA WELL IS NEAR XXX at the (Town or City)

    XXXXXXXXXX XXXXXXXX Manville Forest Products facility in West Monroe. (Crossroads, Railroad, Any Landmark, etc.)

    (Please draw sketch on back of Original)
11. REMARKS: G.T.I. P.S.I. Job #95163
12. DRILLER'S LOG (Description and color of cuttings, such as shale, sand, etc, in feet)

FROM	TO	DESCRIPTION	FROM	TO	DESCRIPTION
		(see attached Log)			

13. FOR HEAT PUMP HOLES ONLY: AVG. DEPTH _____ FT., NUMBER OF HOLES _____

    TUBING MATERIAL [ ] PVC, [ ] PE, [ ] PB, [ ] OTHER _____
14. ABANDONMENT INFORMATION: DOES THE NEW WELL REPLACE AN OLD

P.S.I./P.T.I.
Name of Water Well Contractor

LICENSE NUMBER WWC — 285

Authorized Signature 1-22-90 Date

MAIL ORIGINAL TO:
LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
ATTN: CHIEF - WATER RESOURCES SECTION
P.O. BOX 94245
BATON ROUGE, LA 70804-9245
(504) 379-1434

FOR OFFICE USE ONLY

STATE 22 PARISH LOCAL WELL NO —

IDENTIFICATION NUMBER 322825092085201

OWNERS NAME

WELL DEPTH Ft. Use of Well

Date Completed MO YR

OWNER'S NO Geologic Unit

CONTRACTOR'S NAME

SECTION 010 TOWNSHIP 17N RANGE 03E

HOLE DEPTH ELEV. QUAD NO

Inspected By _____

Date _____

Professional Service Industries, Inc.
PTL Division

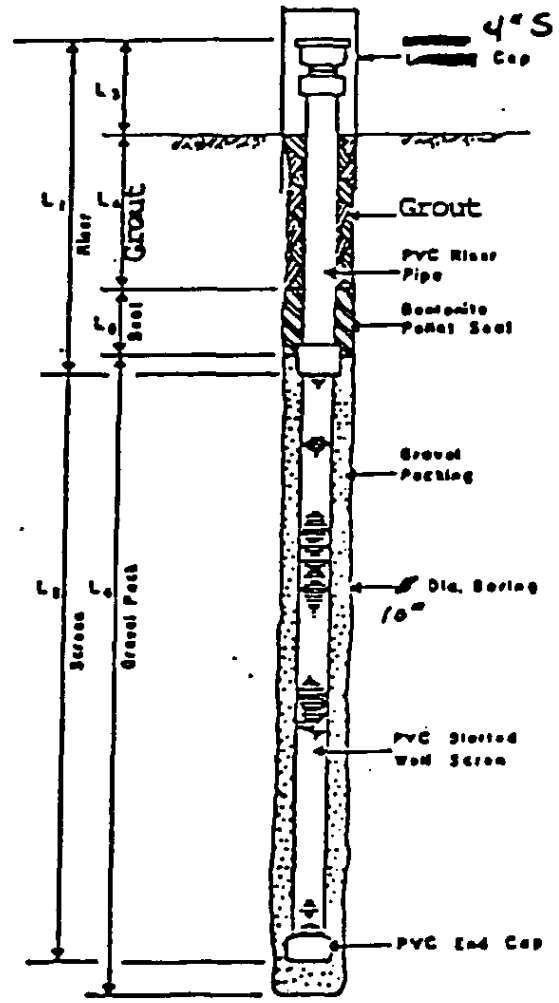
WELL INSTALLATION LOG

WELL NO. MW#2

Client: Groundwater Technology, Inc. Order No. 9516
Project: Manville Forest Products - W. Monroe, La Date 12-18
Grnd. Elev. _____ Datum _____ Water Depth 19.74 Date 12-23
Drilling Method Hollow Stem Drilled Depth 36' Screen Dia. 4" Slot Size .020
Drilling Crew E. Sands, M. Morgan, T. Grimes Log by Beau - G.

DEPTH IN FEET	SAMPLE	MATERIAL DESCRIPTION
0–9		Brown Silty Clay Fill
10–11		Gray Sand Silty Clay
12		Brown Sand
13		Gray Clay Sand
14–15		Brown Sand w/ Clay Seams
16–20		Brown Sand To 36'

MONITORING WELL



L_1 = 15'2" L_4 = 8'
L_2 = 10'4" L_5 = 3'
L_3 = 3' L_6 = 16'

Remarks: Well set @ 25'6" Bored to 27' w/10"
Continuous sampled to 36- Bored to 36' w/6"

FIGURE

WATER RESOURCES SECTION
WATER WELL REGISTRATION SHORT FORM (DOTD-GW-1S)

PLEASE PRINT IN INK OR TYPE WHEN COMPLETING THIS FORM

1 USE OF WELL (Check Appropriate Box)

[ ] DOMESTIC [ ] RIG SUPPLY [X] MONITORING [ ] HEAT PUMP SUPPLY

[ ] HEAT PUMP HOLE [ ] ABANDONED PILOT HOLE [ ] OTHER _____ (Please Specify)

2 WELL OWNER Manville Forest Products PHONE 318 362-200

3 ADDRESS 1000 Jones Burreaux Road West Monroe, LA 71294

4 OWNER'S WELL NUMBER OR NAME (if any) MW-2

5 DATE COMPLETED 12-15-89 DEPTH OF HOLE 45 FT., DEPTH OF WELL 39.3 FT.

6 STATIC WATER LEVEL 19.81 FT. BELOW GROUND SURFACE MEASURED ON 12-23-89 (Date)

7 CASING 4 IN. [ ] STEEL OR [X] PVC SCH. 40 LENGTH 32 FT.

8 SCREEN 4 IN. [ ] STEEL OR [X] PVC SCH. 40 SLOT SIZE .02 LENGTH 10.3 FT.

9. CEMENTED FROM 0.5 FT TO GROUND SURFACE, USING [ ] PUMP-DOWN METHOD OR [X] GRAVITY METHOD

10. LOCATION OF WELL: PARISH OUACHITA WELL IS XXXX at the (Town or City)

XXXXXXXXX XXXXXXXX Manville Forest Products facility in West Monroe. (Crossroads, Highway, Any Landmark, etc.)

(Please draw sketch on back of Original)

11. REMARKS G.T.I. P.S.I. Job#95163

12. DRILLER'S LOG (Description and color of cuttings, such as shale, sand, etc. in feet)

FROM	TO	DESCRIPTION	FROM	TO	DESCRIPTION
		(see attached log)			

13 FOR HEAT PUMP HOLES ONLY. AVG DEPTH _____ FT., NUMBER OF HOLES _____

TUBING MATERIAL [ ] PVC. [ ] PE. [ ] PB. [ ] OTHER _____

14 ABANDONMENT INFORMATION: DOES THE NEW WELL REPLACE AN EXISTING WELL

PSI/RTI
Name of Water Well Contractor

LICENSE NUMBER WWC-285

Authorized Signature 1-22-90 Date

MAIL ORIGINAL TO:
LOUISIANA DEPARTMENT OF
TRANSPORTATION AND DEVELOPMENT
ATTN CHIEF - WATER RESOURCES SECTION
P O BOX 94245
BATON ROUGE, LA 70804-9245
(504) 379-1434

FOR OFFICE USE ONLY

STATE 22 PARISH LOCAL WELL NO

REGISTRATION NUMBER 22-14097

OWNER'S NAME

WELL DEPTH FT Use of Well

Date Completed MO YR

OWNER'S NO Geologic Unit

CONTRACTOR'S NAME

SECTION 016 TOWNSHIP 17N RANGE 03E

HOLE DEPTH ELEV QUAD NO

Inspected By _____

Date _____

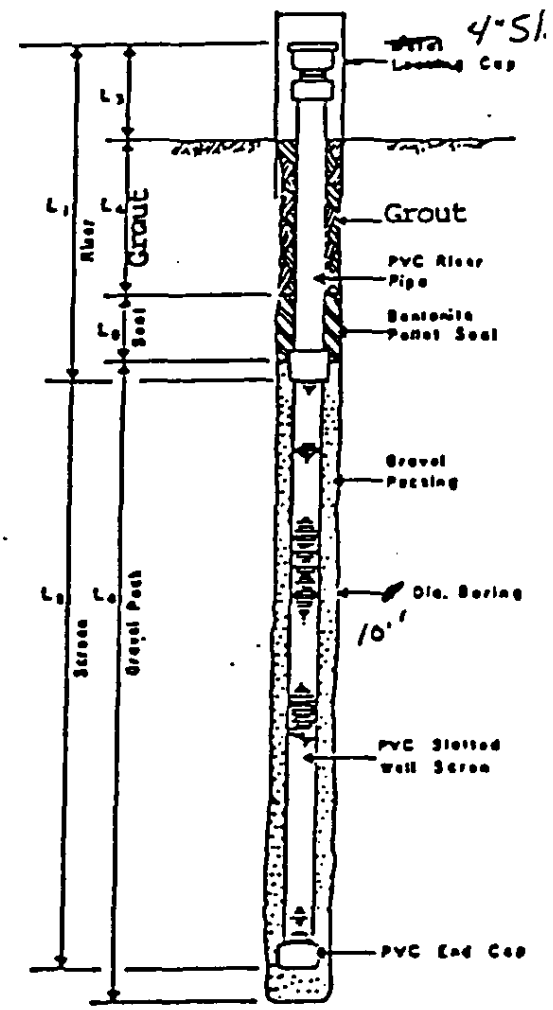
Professional Service Industries, Inc.
PTL Division

WELL INSTALLATION LOG
WELL NO. MW #2

Client: Groundwater Technology Inc. — Order No. 9516
Project: Manville Forest Products - W. Monroe, La. — Date: 12-19
Grnd. Elev. ____ Datum ____ Water Depth: 19.81' — Date: 12-23
Drilling Method: Hollow Stem — Drilled Depth: 45' — Screen Dia: 4" — Slot Size: .020
Drilling Crew: E. Sands, M. Morgan, T. Grimes — Log by: Bean - G.T.

DEPTH IN FEET	SAMPLE	MATERIAL DESCRIPTION
0–10		Brown Silty Clay
11		Black Silty Clay
12–16		Gray Silty Sandy Clay
17		Brown Silty
18–20		Gray Sandy Clay

MONITORING WELL



L_1 = 32' L_4 = 21'
L_2 = 10'4" L_5 = 3'
L_3 = 3' L_6 = 16'

Remarks: Well set @ 39'4" — Drilled 10" to 40'
Continuous Sampled to 45' — Drilled 6" To 45'

FIGURE

SLC-607-3 (REV.) 2/8/69

PITTSBURGH TESTING LABORATORY

LOG OF BORING

Job No. _____

Client _____

Project _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No MW #2 Date _____ Sheet ___

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

Field Party: _____

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Blows/foot on Sampler	ID of Sampler (inches)	Tot. length of recov. sample	Length of Lab. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION Soil type, color, texture, consistency, sampler driving note blows per foot on casing, depths wash water lost, observ fluctuations in water level, notes on drilling ease, etc.
							20		
							21		Gray Sandy Clay
							22		
							23		
							24		
							25		
							26		Gray Clayey Sand
							27		
							28		Brown Sand
							29		
							30		
							31		Gray Clay Silty Sand
							32		
							33		Brown Sand
							34		Gray Clayey silty Sand
							35		
							36		
							37		Brown Sand
							38		To 45'
							39		
							40		
							1		
		1							

Engineer _____

WATER RESOURCES SECTION
WATER WELL REGIST. ON SHORT FORM (DOTD-GW-1S)

PLEASE PRINT IN INK OR TYPE WHEN COMPLETING THIS FORM

1. USE OF WELL (Check Appropriate Box)
   [ ] DOMESTIC [ ] RIG SUPPLY [X] MONITORING [ ] HEAT PUMP SUPPLY
   [ ] HEAT PUMP HOLE [ ] ABANDONED PILOT HOLE [ ] OTHER _____ (Please Specify)
2. WELL OWNER Manville Forest Products PHONE (318) 362-2000
3. ADDRESS 1000 Jones Burreaux Road West Monroe, LA 71294
4. OWNER'S WELL NUMBER OR NAME (if any) MW-3
5. DATE COMPLETED 12-14-89 DEPTH OF HOLE 39 FT., DEPTH OF WELL 32.3 FT.
6. STATIC WATER LEVEL 14.32 FT. BELOW GROUND SURFACE MEASURED ON 12-23-89 (Date)
7. CASING 4 IN [ ] STEEL OR [X] PVC SCH. 40 LENGTH 25 FT.
8. SCREEN 4 IN. [ ] STEEL OR [X] PVC SCH. 40 SLOT SIZE .02 LENGTH 10.3 FT.
9. CEMENTED FROM 0.5 FT. TO GROUND SURFACE, USING [ ] PUMP DOWN METHOD OR [X] GRAVITY METHOD
10. LOCATION OF WELL PARISH Ouachita WELL IS ~~XXXX~~ at the _____ (Town or City)
    ~~XXXXXXXXXX~~ ~~XXXXXXX Manville Forest Products facility in West Monroe.~~ (Crossroads, Railroad, Any Landmark, etc.)
    (Please draw sketch on back of Original)
11. REMARKS: G.T.I. P.S.I. Job# 95163
12. DRILLER'S LOG (Description and color of cuttings, such as shale, sand, etc. in feet)

FROM	TO	DESCRIPTION	FROM	TO	DESCRIPTION
		(see attached log)			

13. FOR HEAT PUMP HOLES ONLY: AVG. DEPTH _____ FT., NUMBER OF HOLES _____
    TUBING MATERIAL [ ] PVC. [ ] PE. [ ] PB. [ ] OTHER _____
14. ABANDONMENT INFORMATION: [illegible]

P.S.I./P.T.L.
Name of Water Well Contractor

LICENSE NUMBER WWC-285

Authorized Signature 1-22-89 Date

MAIL ORIGINAL TO:
LOUISIANA DEPARTMENT OF
TRANSPORTATION AND DEVELOPMENT
ATTN: CHIEF - WATER RESOURCES SECTION
P.O. BOX 94245
BATON ROUGE, LA 70804-9245
(504) 379-1434

FOR OFFICE USE ONLY

STATE 22 PARISH LOCAL WELL NO.

IDENTIFICATION NUMBER 227570926E4E03

OWNER'S NAME

WELL DEPTH Ft Use of Well

Date Completed MO YR

OWNER'S NO. Geologic Unit

CONTRACTOR'S NAME

SECTION 015 TOWNSHIP 17W RANGE 02E

HOLE DEPTH ELEV QUAD NO.

Inspected By _____
Date

Professional Service Industries, Inc.
PTL Division

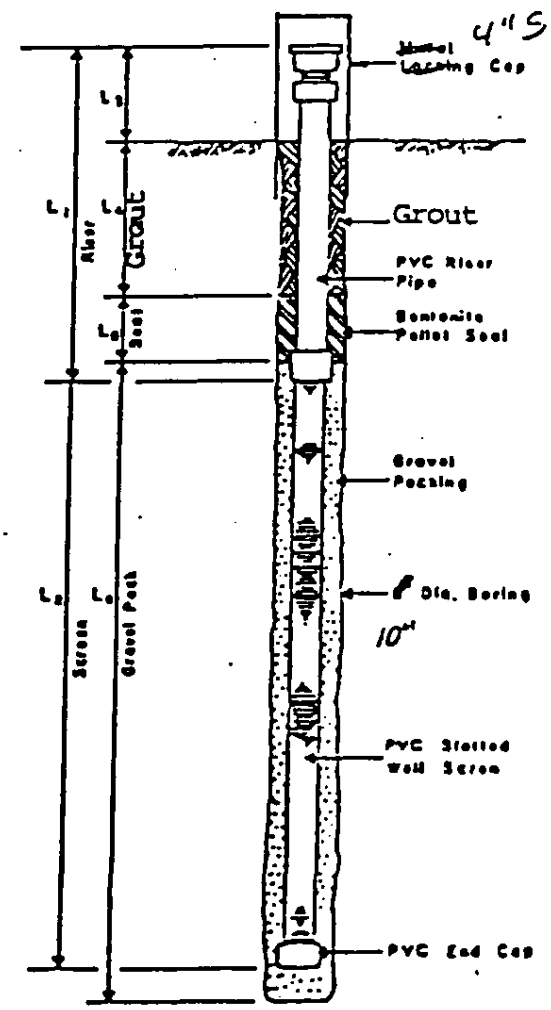
WELL INSTALLATION LOG

WELL NO. MW-3

Client: Groundwater Technology Inc. Order No. 9516
Project: Marville Forest Products - W. Monroe, La Date: 12-14
Grnd. Elev. _____ Datum _____ Water Depth: 14.32 Date: 12-23
Drilling Method: Hollow Stem Drilled Depth: 39' Screen Dia: 4" Slot Size: .020
Drilling Crew: E. Sauls, M. Magan, T. Grimes Log by: Bean - G.T.

DEPTH IN FEET	SAMPLE	MATERIAL DESCRIPTION
0–12		Brown Silty Clay
12–13		Black silty clay
13–20		Gray Silty Sandy Clay
20		Gray Clay Sand

MONITORING WELL



L_1 = 25' L_4 = 16'
L_2 = 10'4" L_5 = 3'
L_3 = 3' L_6 = 14'

Remarks: Well site 32'4" Drilled to 33' 4/10"
Continuous Sampled to 39' Drilled to 39' 4/6"

FIGURE

SLC-607-S (REV.) 2/6/89

PITTSBURGH TESTING LABORATORY

LOG OF BORING

Job No.

Client

Project

Location of Boring:	
Water Level	
Time	
Date	

Boring No. MW #3 Date Sheet

Type of Boring Rig

Casing used Size Drilling mud us

Boring begun Boring completed

Ground Elevation referred to

Field Party:

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Blows/foot on Sampler	ID of Sampler (inches)	Tot. length of recov. sample	Length of Lab. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION Soil type, color, texture, consistency, sampler driving n blows per foot on casing, depths wash water lost, obse fluctuations in water level, notes on drilling ease, etc.
							20		Gray Clayey Sand
							21		
							22		
							23		Gray & White Sand
							24		
							25		
							26		
							27		
							28		
							29		
							30		Tan & Black Sand
							31		
							32		
							33		
							34		
							35		
							36		
							37		
							38		Gray Silty Sandy Clay
							39		
							40		
							1		

Engineer

2. OWNER Manville Forest Products PHO 18 362-2000

3. ADDRESS 1000 Jones Burreaux Road West Monroe, LA 71294

4. OWNER'S WELL NUMBER OR NAME (if any) MW-4

5. DATE COMPLETED 12-12-89 DEPTH OF HOLE 28 FT., DEPTH OF WELL 27.3 FT.

6. STATIC WATER LEVEL 14.0 FT. BELOW GROUND SURFACE MEASURED ON 12-23-89 (Date)

7. CASING 4 IN. [ ] STEEL OR [X] PVC SCH. 40 LENGTH 19.3 FT.

8. SCREEN 4 IN. [ ] STEEL OR [X] PVC SCH. 40 SLOT SIZE .02 LENGTH 10.3 FT.

9. CEMENTED FROM 0.5 FT. TO GROUND SURFACE, USING [ ] PUMP-DOWN METHOD OR [X] GRAVITY METHOD

10. LOCATION OF WELL: PARISH OUACHITA WELL IS ~~NEAR~~ at the (Town or City)

~~APPROXIMATELY~~ ~~MILES FROM~~ Manville Forest Products facility in West Monroe. (Crossroads, Railroad, Any Landmark, etc.)

(Please draw sketch on back of Original)

11. REMARKS: G.T.I. P.S.I. Job #95163

12. DRILLER'S LOG (Description and color of cuttings, such as shale, sand, etc, in feet)

FROM	TO	DESCRIPTION	FROM	TO	DESCRIPTION
		(see attached log)			

13. FOR HEAT PUMP HOLES ONLY: AVG. DEPTH _____ FT., NUMBER OF HOLES _____

TUBING MATERIAL [ ] PVC, [ ] PE, [ ] PB, [ ] OTHER _____

14. ABANDONMENT INFORMATION: DOES THE NEW WELL REPLACE AN EXISTING WELL? YES [ ] NO [X]

(REV. 11/85)

CONTRACTOR'S COPY

Authorized Signature 12-22-89 Date

MAIL ORIGINAL TO:

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
ATTN: CHIEF - WATER RESOURCES SECTION
P.O. BOX 94245
BATON ROUGE, LA 70804-9245
(504) 379-1434

FOR OFFICE USE ONLY

STATE 22 PARISH LOCAL WELL NO -

IDENTIFICATION NUMBER 322735092083104

OWNERS NAME

WELL DEPTH Ft. Use of Well

Date Completed MO. YR

OWNER'S NO Geologic Unit

CONTRACTOR'S NAME

SECTION 01ST TOWNSHIP 17N RANGE 03E

HOLE DEPTH ELEV QUAD NO

Inspected By _____

Date _____

Remarks _____

LOUISIANA DEPART[illegible] TRANSPORTATION AND DEVELOPMENT
WA[illegible] RESOURCES SECTION
WATER WELL REGISTRATION SHORT FORM (DOTD-GW-1S)

PLEASE PRINT IN INK OR TYPE WHEN COMPLETING THIS FORM

1. USE OF WELL (Check Appropriate Box)
   - [ ] DOMESTIC
   - [ ] RIG SUPPLY
   - [X] MONITORING
   - [ ] HEAT PUMP SUPPLY
   - [ ] HEAT PUMP HOLE
   - [ ] ABANDONED PILOT HOLE
   - [ ] OTHER _____ (Please Specify)
2. WELL OWNER Manville Forest Products PHONE (318) 362-2000
3. ADDRESS 1000 Jones Burreaux Road West Monroe, LA 71294
4. OWNER'S WELL NUMBER OR NAME (if any) MW-5
5. DATE COMPLETED 12-12-89 DEPTH OF HOLE 28 FT., DEPTH OF WELL 26.3 FT.
6. STATIC WATER LEVEL 16.01 FT. BELOW GROUND SURFACE MEASURED ON 12-23-89 (Date)
7. CASING 4 IN. [ ] STEEL OR [X] PVC SCH. 40 LENGTH 19 FT.
8. SCREEN 4 IN. [ ] STEEL OR [X] PVC SCH. 40 SLOT SIZE .02 LENGTH 10.7 FT.
9. CEMENTED FROM 0.5 FT. TO GROUND SURFACE, USING [ ] PUMP-DOWN METHOD OR [X] GRAVITY METHOD
10. LOCATION OF WELL: PARISH OUACHITA WELL IS ~~NEAR~~ at the (Town or City)

    ~~XXXXXXXXXX~~ ~~XXXXXXX~~ Manville Forest Products facility in West Monroe. (Crossroads, Railroad, Any Landmark, etc.)

    (Please draw sketch on back of Original)
11. REMARKS: G.T.I. P.S.I. Job #95163
12. DRILLER'S LOG (Description and color of cuttings, such as shale, sand, etc, in feet)

FROM	TO	DESCRIPTION	FROM	TO	DESCRIPTION
		(see attached log)			

13. FOR HEAT PUMP HOLES ONLY: AVG. DEPTH _____ FT., NUMBER OF HOLES _____
    TUBING MATERIAL [ ] PVC, [ ] PE, [ ] PB, [ ] OTHER

P.S.I./P.T.L.
Name of Water Well Contractor

LICENSE NUMBER WWC-285

[signature] 1-22-90
Authorized Signature Date

MAIL ORIGINAL TO:
LOUISIANA DEPARTMENT OF
TRANSPORTATION AND DEVELOPMENT
ATTN: CHIEF - WATER RESOURCES SECTION
P.O. BOX 94245
BATON ROUGE, LA 70804-9245
(504) 379-1434

FOR OFFICE USE ONLY

STATE 22 PARISH LOCAL WELL NO -

IDENTIFICATION NUMBER 322726092082305

OWNERS NAME

WELL DEPTH Ft. Use of Well

Date Completed MO YR

OWNER'S NO Geologic Unit

CONTRACTOR'S NAME

SECTION 015 TOWNSHIP 17N RANGE 03E

HOLE DEPTH ELEV QUAD NO

Inspected By _____

Professional Service Industries, Inc.
PTL Division

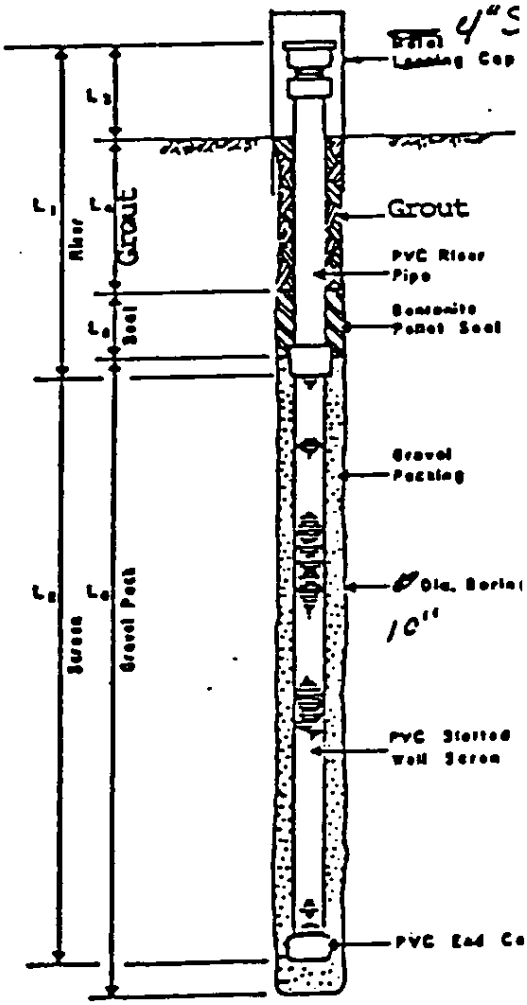
WELL INSTALLATION LOG

WELL NO. MW#5

Client: Groundwater Technology Inc. — Order No. 951
Project: Manville Forest Products - W. Monroe, La — Date 12-1-
Grnd. Elev. _____ Datum _____ Water Depth 16.01 Date 12-3
Drilling Method: Hollow Stem — Drilled Depth 28' — Screen Dia. 4" — Slot Size .02
Drilling Crew: E. Sands, M. Morgan, T. Grimes — Log by: Pete Lee - S

DEPTH IN FEET	SAMPLE	MATERIAL DESCRIPTION
0–6		Brown silty Sandy clay w/ Gravel
7–8		Tan Silty Sand
9–10		Tan silty Sandy Clay
11–14		Tan Clayey sand
15		Tan Silty Clay
16		Tan Clayey Sand
17		Tan Silty Clay
18–19		Tan silty Sand
20		Tan Silty Clay

MONITORING WELL



L_1 = 19' L_4 = 8"
L_2 = 10'8" L_5 = 3'
L_3 = 3' L_6 = 16'

Remarks: Well set @ 26'8" — Drilled to 27' w/10"
Continuous Sampled to 28' — Drilled to 28' w/6"

FIGUR

SLC-807-3 (REV.) 2/3/58

PITTSBURGH TESTING LABORATORY

LOG OF BORING

Job No._____

Client_____

Project_____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. MW#5 Date_____ Sheet____

Type of Boring_____ Rig_____

Casing used_____ Size_____ Drilling mud used_____

Boring begun_____ Boring completed_____

Ground Elevation_____ referred to_____

Field Party:_____

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Blows/foot on Sampler	ID of Sampler (inches)	Tot. length of recov. sample	Length of Lab. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION Soil type, color, texture, consistency, sampler driving note blows per foot on casing, depths wash water lost, observ fluctuations in water level, notes on drilling ease, etc.
							20		Tan Silty Sand
							21		Tan Silty Clay
							22		
							23		Tan Clay Sand
							24		
							25		
							26		Tan Silty Clay
							27		Brown Clay
							28		
							29		
							30		
							1		
							2		
							3		
							4		
							5		
							6		
							7		
							8		
							9		
							0		
							1		

Engineer_____

TRANSPORTATION AND DEVELOPMENT
WAT SOURCES SECTION
WATER WELL REG ATION SHORT FORM (DOTD-GW-1S)

PLEASE PRINT IN INK OR TYPE WHEN COMPLETING THIS FORM

1. USE OF WELL (Check Appropriate Box)
   - [ ] DOMESTIC
   - [ ] RIG SUPPLY
   - [X] MONITORING
   - [ ] HEAT PUMP SUPPLY
   - [ ] HEAT PUMP HOLE
   - [ ] ABANDONED PILOT HOLE
   - [ ] OTHER _____ (Please Specify)
2. WELL OWNER Manville Forest Products PHONE (318) 362-2000
3. ADDRESS 1000 Jones Burreaux Road West Monroe, LA 71294
4. OWNER'S WELL NUMBER OR NAME (if any) MW-6
5. DATE COMPLETED 12-13-89 DEPTH OF HOLE 28 FT., DEPTH OF WELL 25.3 FT.
6. STATIC WATER LEVEL 16.45 FT. BELOW GROUND SURFACE MEASURED ON 12-23-89 (Date)
7. CASING 4 IN [ ] STEEL OR [X] PVC SCH. 40 LENGTH 18 FT.
8. SCREEN 4 IN. [ ] STEEL OR [X] PVC SCH. 40 SLOT SIZE .02 LENGTH 10.3 FT.
9. CEMENTED FROM 0.5 FT TO GROUND SURFACE, USING [ ] PUMP DOWN METHOD OR [X] GRAVITY METHOD
10. LOCATION OF WELL: PARISH OUACHITA WELL IS ~~NEAR~~ at the _____ (Town or City)

~~XXXXXXXXXX~~ ~~XXXXXXXX~~ ~~Manville Forest Products facility in West Monroe.~~ (Crossroads, Railroad, Any Landmark, etc.)

(Please draw sketch on back of Original)

11. REMARKS: G.T.I. P.S.I. Job #95163
12. DRILLER'S LOG (Description and color of cuttings, such as shale, sand, etc, in feet)

FROM	TO	DESCRIPTION	FROM	TO	DESCRIPTION
		(see attached log)			

13. FOR HEAT PUMP HOLES ONLY AVG DEPTH _____ FT., NUMBER OF HOLES _____
    TUBING MATERIAL [ ] PVC. [ ] PE. [ ] PB. [ ] OTHER _____

Name of Water Well Contractor P.S.I./P.T.L.

LICENSE NUMBER WWC-285

Authorized Signature 1-22-90 Date

MAIL ORIGINAL TO:
LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
ATTN: CHIEF WATER RESOURCES SECTION
P.O. BOX 94245
BATON ROUGE, LA 70804-9245
(504) 379-1434

FOR OFFICE USE ONLY

STATE 22 PARISH LOCAL WELL NO. -

IDENTIFICATION NUMBER 322714092681000

OWNERS NAME

WELL DEPTH Ft. Use of Well

Date Completed MO YR

OWNERS NO. Geologic Unit

CONTRACTOR'S NAME

SECTION 023 TOWNSHIP 17N RANGE 03E

HOLE DEPTH ELEV QUAD NO.

Inspected By _____

Date

Professional Service Industries, Inc.
PTL Division

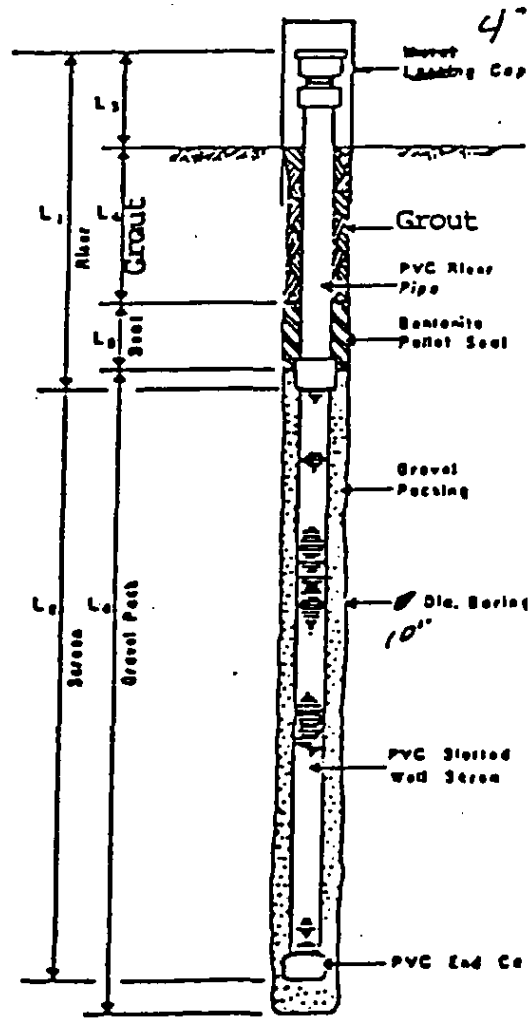
WELL INSTALLATION LOG

WELL NO. MW#6

Client Groundwater Technology Inc. Order No. 9516
Project Manville Forest Products – W. Monroe, La Date 12-13
Grnd. Elev. _____ Datum _____ Water Depth 16.45' Date 12-23
Drilling Method Hollow Stem Drilled Depth 28' Screen Dia. 4" Slot Size .020
Drilling Crew E. Sands, M. Morgan, T. Grimes Log by Pete Lee-C

DEPTH IN FEET	SAMPLE	MATERIAL DESCRIPTION
0–3		Brown Silty Clay
3–4		Tan Silty Clay
4–7		Brown Clayey Sand
7–8		Brown Sandy Clay
8–0		Brown Clayey Sand

MONITORING WELL



L_1 = 18' L_4 = 11
L_2 = 10'4" L_5 = 3'
L_3 = 3' L_6 = 12'

Remarks Well set @ 25'4" Drilled w/10" To 26
Continuous Sampled to 28' Drilled w/6" To 28'

FIGURE

SLC-807-3 (REV.) 2/8/89

PITTSBURGH TESTING LABORATORY

LOG OF BORING

Job No. _____

Client _____
Project _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. _____ Date _____ Sheet ___
Type of Boring _____ Rig _____
Casing used _____ Size _____ Drilling mud used.
Boring begun _____ Boring completed _____
Ground Elevation _____ referred to _____

Field Party: _____

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Blows/foot on Sampler	ID of Sampler (inches)	Tot. length of recov. sample	Length of Lab. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION Soil type, color, texture, consistency, sampler driving note blows per foot on casing, depths wash water lost, observe fluctuations in water level, notes on drilling ease, etc.
							0		
							1		
							2		Brown Clayey Sand
							3		
							4		
							5		Brown Silty Clay
							6		Brown & Gray Silty Clay
							7		Gray Clay
							8		
							9		
							0		
							1		
							2		
							3		
							4		
							5		
							6		
							7		
							8		
							9		
							0		
							1		

Engineer _____

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
WATER RESOURCES SECTION
WATER WELL REGISTRATION SHORT FORM (DOTD-GW-1S)

PLEASE PRINT IN INK OR TYPE WHEN COMPLETING THIS FORM

1. USE OF WELL (Check Appropriate Box)
   [ ] DOMESTIC [ ] RIG SUPPLY [X] MONITORING [ ] HEAT PUMP SUPPLY
   [ ] HEAT PUMP HOLE [ ] ABANDONED PILOT HOLE [ ] OTHER _____ (Please Specify)
2. WELL OWNER Manville Forest Products PHONE (318) 362-2000
3. ADDRESS 1000 Jones Burreaux Road West Monroe, LA 71294
4. OWNER'S WELL NUMBER OR NAME (if any) MW-7
5. DATE COMPLETED 12-13-89 DEPTH OF HOLE 65 FT., DEPTH OF WELL 63.3 FT
6. STATIC WATER LEVEL 21.45 FT. BELOW GROUND SURFACE MEASURED ON 12-23-89 (Date)
7. CASING 4 IN. [ ] STEEL OR [X] PVC SCH. 40 LENGTH 56 FT.
8. SCREEN 4 IN. [ ] STEEL OR [X] PVC SCH. 40 SLOT SIZE .02 LENGTH 10.3 FT.
9. CEMENTED FROM 0.5 FT. TO GROUND SURFACE, USING [ ] PUMP-DOWN METHOD OR [X] GRAVITY METHOD
10. LOCATION OF WELL: PARISH OUACHITA WELL IS ~~XXX~~ at the (Town or City)
    ~~XXXXXXXXXX~~ ~~XXXXXXX~~ Manville Forest Products facility in West Monroe. (Crossroads, Railroad, Any Landmark, etc.)
    (Please draw sketch on back of Original)
11. REMARKS: G.T.I. P.S.I. Job #95163
12. DRILLER'S LOG (Description and color of cuttings, such as shale, sand, etc. in feet)

FROM	TO	DESCRIPTION	FROM	TO	DESCRIPTION
		(see attached log)			

13. FOR HEAT PUMP HOLES ONLY: AVG. DEPTH _____ FT., NUMBER OF HOLES _____
    TUBING MATERIAL [ ] PVC, [ ] PE, [ ] PB, [ ] OTHER

P.S.I./P.T.L.
Name of Water Well Contractor

LICENSE NUMBER WWC-285

Authorized Signature 1-22-90

MAIL ORIGINAL TO:
LOUISIANA DEPARTMENT OF
TRANSPORTATION AND DEVELOPMENT
ATTN: CHIEF WATER RESOURCES SECTION
P.O. BOX 94245
BATON ROUGE, LA 70804-9245
(504) 379-1434

FOR OFFICE USE ONLY

STATE 22 PARISH ___ LOCATION ___

SERIAL NUMBER 522657012620007

WELL DEPTH ___ Ft Use of Well ___

Date Completed ___

Geologic Unit ___

CONTRACTOR'S NAME ___

SECTION 02 TOWNSHIP 17N RANGE 03E

TOTAL DEPTH ___ ELEV ___

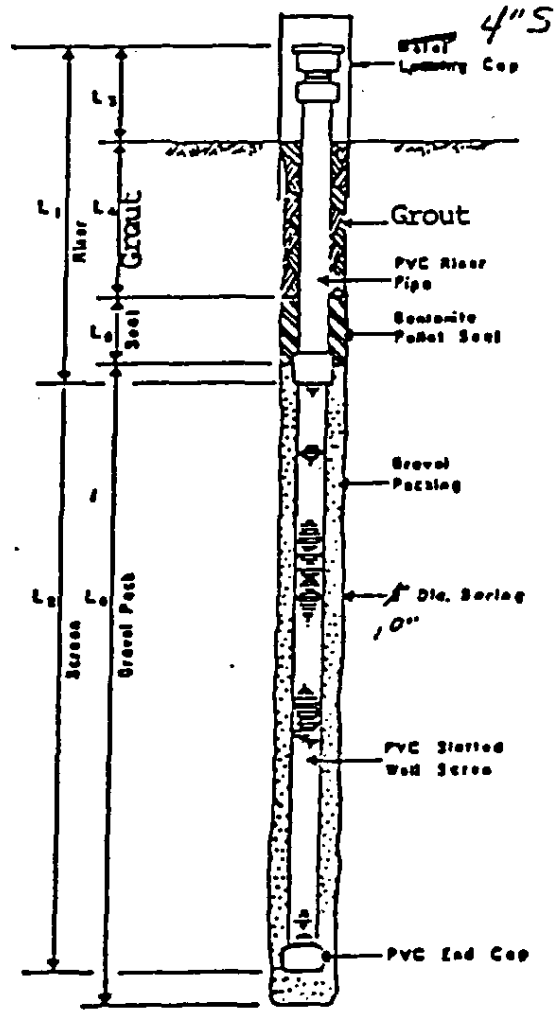
Inspected By _____

Professional Service Industries, Inc.
PTL Division

Well se
12-19

WELL INSTALLATION LOG
WELL NO. MW#7

Client Groundwater Technology Inc Order No. 95163
Project Manville Forest Products - Monroe, La Date 12-13-
Grnd. Elev. _____ Datum _____ Water Depth 21.45 Date 12-23-
Drilling Method Hollow Stem Drilled Depth 65' Screen Dia 4" Slot Size .020
Drilling Crew E. Sands, M. Morgan, T. Grimes Log by Pete Lee - G.

DEPTH IN FEET	SAMPLE	MATERIAL DESCRIPTION	MONITORING WELL
0		Brown Silty clay	
1			
2			
3			
4			
5			
6			
7			
8			
9			
0			
1			
2			
3			
4			
5			
6			
7			
8			
9			
0			

L_1 = 56 L_4 = 45'
L_2 = 10'4" L_5 = 3'
L_3 = 3' L_6 = 16'

Remarks Well set @ 63'4" Drilled w/10" To 64'
Continue 14-65' Drilled w/6" To 65' FIGURE

SLC-607-3 (REV.) 2/9/88

PITTSBURGH TESTING LABORATORY

LOG OF BORING

Job No. _____

Client _____

Project _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. MW-7 Date _____ Sheet.

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud use

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

Field Party: _____

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Blows/foot on Sampler	ID of Sampler (inches)	Tot. length of recov. sample	Length of Lab. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION Soil type, color, texture, consistency, sampler driving no blows per foot on casing, depths wash water lost, obse fluctuations in water level, notes on drilling ease, etc.
							20		
							21		Brown Silty Clay
							22		
							23		
							24		Brown Clay
							25		Brown & Gray Clay
							26		
							27		
							28		
							29		Brown Silty Clay
							30		
							31		
							32		
							33		
							34		
							35		
							36		
							37		Gray & Brown Clay
							38		
							39		
							40		
							41		

Engineer _____

SLC-607-3 (REV.) 2/8/88

PITTSBURGH TESTING LABORATORY

LOG OF BORING

Job No. _____

Client _____

Project _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. MW-2 Date _____ Sheet ___

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

Field Party: _____

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Blows/foot on Sampler	ID of Sampler (inches)	Tot. length of recov. sample	Length of Lab. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION Soil type, color, texture, consistency, sampler driving note blows per foot on casing, depths wash water lost, observ fluctuations in water level, notes on drilling ease, etc.
							40		
							41		
							42		
							43		Gray & Brown Clay
							44		
							45		
							46		
							47		
							48		
							49		
							50		
							51		
							52		
							53		
							54		Brown Sand
							55		
							56		
							57		
							58		
							59		
							60		Brown & White Sand
							61		To 65'

Engineer _____

LOUISIANA DEPAR[illegible] TRANSPORTATION AND DEVELOPMENT
WA[illegible] RESOURCES SECTION
WATER WELL REGISTRATION SHORT FORM (DOTD-GW-1S)

PLEASE PRINT IN INK OR TYPE WHEN COMPLETING THIS FORM

1. USE OF WELL (Check Appropriate Box)
   [ ] DOMESTIC [ ] RIG SUPPLY [X] MONITORING [ ] HEAT PUMP SUPPLY
   [ ] HEAT PUMP HOLE [ ] ABANDONED PILOT HOLE [ ] OTHER _____ (Please Specify)
2. WELL OWNER Manville Forest Products PHONE (318) 362-2000
3. ADDRESS 1000 Jones Burreaux Road West Monroe, LA 71294
4. OWNER'S WELL NUMBER OR NAME (if any) MW-9A
5. DATE COMPLETED 12-19-89 DEPTH OF HOLE 65 FT., DEPTH OF WELL 61.3 FT.
6. STATIC WATER LEVEL 20.49 FT. BELOW GROUND SURFACE MEASURED ON 12-23-89 (Date)
7. CASING 4 IN. [ ] STEEL OR [X] PVC SCH. 40 LENGTH 54.5 FT.
8. SCREEN 4 IN. [ ] STEEL OR [X] PVC SCH. 40 SLOT SIZE .02 LENGTH 10.3 FT.
9. CEMENTED FROM 0.5 FT. TO GROUND SURFACE, USING [ ] PUMP-DOWN METHOD OR [X] GRAVITY METHOD
10. LOCATION OF WELL. PARISH OUACHITA WELL IS XXX at the (Town or City)
    XXXXXXXXXX XXXXXXXX Manville Forest Products facility in West Monroe.
    (Crossroads, Railroad, Any Landmark, etc.)
    (Please draw sketch on back of Original)
11. REMARKS: G.T.I. P.S.I. Job #95163
12. DRILLER'S LOG (Description and color of cuttings, such as shale, sand, etc. in feet)

FROM	TO	DESCRIPTION	FROM	TO	DESCRIPTION
		(see attached log)			

13. FOR HEAT PUMP HOLES ONLY. AVG. DEPTH _____ FT., NUMBER OF HOLES _____
    TUBING MATERIAL [ ] PVC, [ ] PE, [ ] PB, [ ] OTHER

P.S.I./P.T.L.
Name of Water Well Contractor

LICENSE NUMBER WWC-285

Authorized Signature 1-22-90
Date

MAIL ORIGINAL TO:
LOUISIANA DEPARTMENT OF
TRANSPORTATION AND DEVELOPMENT
ATTN: CHIEF WATER RESOURCES SECTION
P.O. BOX 94245
BATON ROUGE, LA 70804-9245
(504) 379-1434

FOR OFFICE USE ONLY

22 [illegible]

32272209 2.7 4/12/1

Use of Well

Date Completed

Geologic Unit

014 17N 03E

Inspected By _____

BLC-607-3 (REV.) 3/8/88

PITTSBURGH TESTING LABORATORY

LOG OF BORING

Job No.

Client

Project

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 9A Date Sheet

Type of Boring Rig

Casing used Size Drilling mud used

Boring begun Boring completed

Ground Elevation referred to

Field Party:

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Blows/foot on Sampler	ID of Sampler (inches)	Tot. length of recov. sample	Length of Lab. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION Soil type, color, texture, consistency, sampler driving not blows per foot on casing, depths wash water lost, obser fluctuations in water level, notes on drilling ease, etc.
							20		Gray Silty Clay
							21		
							22		Brown & Gray Clay
							23		
							24		
							25		Gray Clay
							26		
							27		
							28		
							29		Gray Silty Clay
							30		
							31		Gray Sandy Clay
							32		
							33		
							34		Gray & Brown Clay
							35		
							36		
							37		Gray Silty Clay
							38		
							39		
							40		
							1		

Engineer

607-3 (REV.) 2/3/59

PITTSBURGH TESTING LABORATORY

LOG OF BORING

No. _____

_____

_____

ation of Boring:

r Level

Boring No. 9A Date _____ Sheet ___ of ___
Type of Boring _____ Rig _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring completed _____
Ground Elevation _____ referred to _____
_____ Date
Field Party: _____

Sample No.	Sample depth from-to (in feet)	Blows/foot on Sampler	ID of Sampler (inches)	Tot. length of recov. sample	Length of Lab. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
						0		
						1		Brown & White Sand
						2		
						3		Gray Clayey Sand
						4		
						5		
						6		
						7		
						8		
						9		
						0		
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		
						1		

Engineer _____

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
WATER RESOURCES SECTION
WATER WELL REGISTRATION SHORT FORM (DOTD-GW-1S)

PLEASE PRINT IN INK OR TYPE WHEN COMPLETING THIS FORM

1. USE OF WELL (Check Appropriate Box)
   [ ] DOMESTIC [ ] RIG SUPPLY [X] MONITORING [ ] HEAT PUMP SUPPLY
   [ ] HEAT PUMP HOLE [ ] ABANDONED PILOT HOLE [ ] OTHER _____ (Please Specify)
2. WELL OWNER Manville Forest Products PHONE (318 362-2000
3. ADDRESS 1000 Jones Burreaux Road West Monroe, LA 71294
4. OWNER'S WELL NUMBER OR NAME (if any) MW-11A
5. DATE COMPLETED 12-20-89 DEPTH OF HOLE 60 FT., DEPTH OF WELL 57.3 FT.
6. STATIC WATER LEVEL 18.75 FT. BELOW GROUND SURFACE MEASURED ON 12-23-89 (Date)
7. CASING 4 IN. [ ] STEEL OR [X] PVC SCH. 40 LENGTH 50 FT
8. SCREEN 4 IN. [ ] STEEL OR [X] PVC SCH. 40 SLOT SIZE .02 LENGTH 10.3 FT.
9. CEMENTED FROM 0.5 FT. TO GROUND SURFACE, USING [ ] PUMP-DOWN METHOD OR [X] GRAVITY METHOD
10. LOCATION OF WELL: PARISH OUACHITA WELL IS ~~XXX at the~~ (Town or City)
    XXXXXXXXXXX XXXXXXXX ~~Manville Forest Products facility in West Monroe.~~ (Crossroads, Railroad, Any Landmark, etc.)
    (Please draw sketch on back of Original)
11. REMARKS: G.T.I. P.S.I. Job #95163
12. DRILLER'S LOG (Description and color of cuttings, such as shale, sand, etc. in feet)

FROM	TO	DESCRIPTION	FROM	TO	DESCRIPTION
		(see attached log)			

13. FOR HEAT PUMP HOLES ONLY: AVG. DEPTH _____ FT., NUMBER OF HOLES _____
    TUBING MATERIAL [ ] PVC [ ] PE [ ] PB [ ] ...

P.S.I./P.T.L.
Name of Water Well Contractor

LICENSE NUMBER WWC-285

Authorized Signature 1-22-90
Date

MAIL ORIGINAL TO:
LOUISIANA DEPARTMENT OF
TRANSPORTATION AND DEVELOPMENT
ATTN CHIEF WATER RESOURCES SECTION
PO BOX 94245
BATON ROUGE, LA 70804-9245
(504) 379-1434

FOR OFFICE USE ONLY

STATE 22 COUNTY ___ WELL NO. ___

REGISTRATION NUMBER 2274001267571

WELL DEPTH ___ ft Use of Well ___

Date Completed ___

Geologic Unit ___

CONTRACTOR NUMBER ___

SECTION 047 TOWNSHIP 17N RANGE 03E

HOLE DEPTH ___ CITY ___ ZIP CODE ___

Inspected By _____

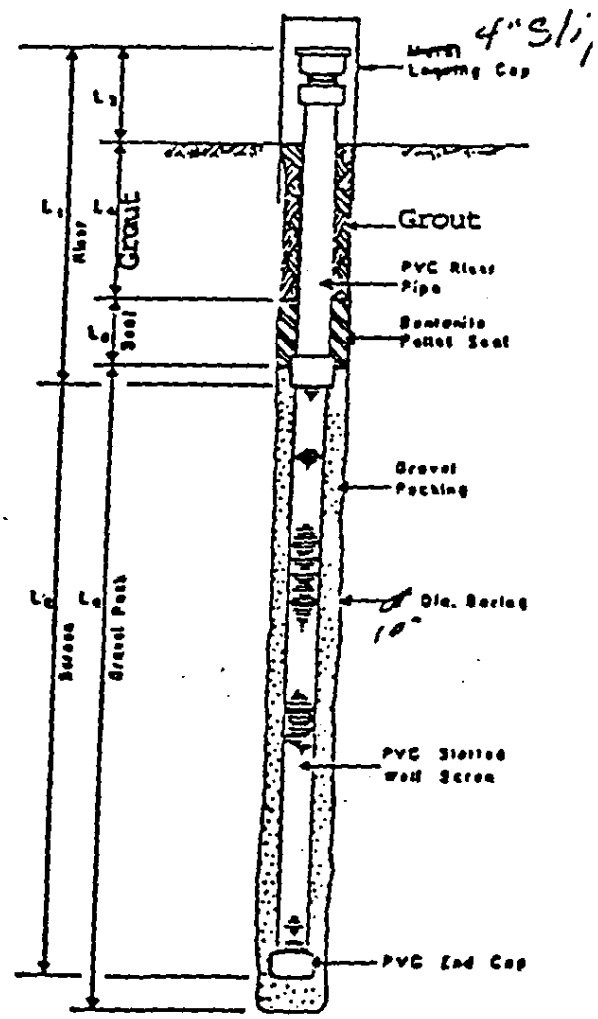
psi Professional Service Industries, Inc.
PTL Division

WELL INSTALLATION LOG
WELL NO. MW#11A

Client: Groundwater Technology Inc. Order No. 9516
Project: Manville Forest Product – W Monroe, La Date 12-20
Grnd. Elev. _____ Datum _____ Water Depth 18.75 Date 12-23
Drilling Method Hollow Stem Drilled Depth 60' Screen Dia. 4" Slot Size .020
Drilling Crew E. Sands, M. Moyan, T. Grimes Log by Bean – G.T.

DEPTH IN FEET	SAMPLE	MATERIAL DESCRIPTION
0–9		Brown Silty Clay
9–5		Gray & White Silty Sandy Clay
5–6		Brown Silt
6–6		Brown Silty Sand
6–8		Brown Sand
8–9		Brown Silty Sand
9–10		Brown Silty Clay

MONITORING WELL



L_1 = 50' L_4 = 39'
L_2 = 10'4" L_5 = 3'
L_3 = 3' L_6 = 16'

Marks Well set @ 57'4" Drilled w/10" To 58'
Continuous Sampled 9'-60' Drilled w/6" To 60'

FIGURE

SLC-807-S (REV.) 2/8/88

PITTSBURGH TESTING LABORATORY

LOG OF BORING

Job No. _____

Client _____

Project _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 11A Date _____ Sheet _____

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

Field Party: _____

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Blows/foot on Sampler	ID of Sampler (inches)	Tot. length of recov. sample	Length of Lab. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION Soil type, color, texture, consistency, sampler driving not blows per foot on casing, depths wash water lost, observ fluctuations in water level, notes on drilling ease, etc.
							20		Brown Silty Clay
							21		
							22		
							23		
							24		
							25		
							26		
							27		
							28		
							29		
							30		
							31		
							32		
							33		
							34		
							35		
							36		Gray Silty Clay
							37		Brown Silt
							38		
							39		Gray Silty Sandy Clay
							40		
							1		

Engineer _____

SLC-607-3 (REV. 12/8/69)

PITTSBURGH TESTING LABORATORY

LOG OF BORING

Job No. _____

Client _____

Project _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 11A Date _____ Sheet

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud us

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

Field Party: _____

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Blows/foot on Sampler	ID of Sampler (inches)	Tot. length of recov. sample	Length of Lab. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION Soil type, color, texture, consistency, sampler driving no blows per foot on casing, depths wash water lost, obse fluctuations in water level, notes on drilling ease, etc.
							40		
							41		Gray Silty Sandy Clay
							42		
							43		
							44		
							45		Gray Clayey Sand
							46		
							47		
							48		
							49		Brown Sand w/Gravel
							50		
							51		
							52		
							53		
							54		
							55		
							56		
							57		
							58		
							59		
							60		
							1		

Engineer _____

LOUISIANA DEPARTMENT TRANSPORTATION AND DEVELOPMENT
WATER RESOURCES SECTION
WATER WELL REGISTRATION SHORT FORM (DOTD-GW-1S)

PLEASE PRINT IN INK OR TYPE WHEN COMPLETING THIS FORM

1. USE OF WELL (Check Appropriate Box)
   [ ] DOMESTIC [ ] RIG SUPPLY [X] MONITORING [ ] HEAT PUMP SUPPLY
   [ ] HEAT PUMP HOLE [ ] ABANDONED PILOT HOLE [ ] OTHER _____ (Please Specify)
2. WELL OWNER Manville Forest Products PHONE (318) 362-2000
3. ADDRESS 1000 Jones Burreaux Road West Monroe, LA 71294
4. OWNER'S WELL NUMBER OR NAME (if any) MW-14
5. DATE COMPLETED 12-15-89 DEPTH OF HOLE 50 FT., DEPTH OF WELL 42.3 FT
6. STATIC WATER LEVEL 14.92 FT. BELOW GROUND SURFACE MEASURED ON 12-23-89 (Date)
7. CASING 4 IN. [ ] STEEL OR [X] PVC SCH. 40 LENGTH 42.8 FT.
8. SCREEN 4 IN. [ ] STEEL OR [X] PVC SCH. 40 SLOT SIZE .02 LENGTH 2.5 FT.
9. CEMENTED FROM 0.5 FT TO GROUND SURFACE, USING [ ] PUMP-DOWN METHOD OR [X] GRAVITY METHOD
10. LOCATION OF WELL: PARISH Ouachita WELL IS XXXX, at the _____ (Town or City)
    XXXXXXXXXX XXXXXXXX Manville Forest Products facility in West Monroe. (Crossroads, Railroad, Any Landmark, etc.)
    (Please draw sketch on back of Original)
11. REMARKS: G.T.I. P.S.I. Job #95163
12. DRILLER'S LOG (Description and color of cuttings, such as shale, sand, etc, in feet)

FROM	TO	DESCRIPTION	FROM	TO	DESCRIPTION
		(see attached log)			

13. FOR HEAT PUMP HOLES ONLY: AVG. DEPTH _____ FT., NUMBER OF HOLES _____

P.S.I./P.T.L.
Name of Water Well Contractor

LICENSE NUMBER WWC — 285

Authorized Signature 1-22-90

MAIL ORIGINAL TO:
LOUISIANA DEPARTMENT OF
TRANSPORTATION AND DEVELOPMENT
ATTN CHIEF - WATER RESOURCES SECTION
PO BOX 94245
BATON ROUGE, LA 70804-9245
(504) 379-1434

FOR OFFICE USE ONLY

STATE 22 PARISH ___ DOTD WELL No. ___

SOURCE ABBREVIATION 2 2 0 2 2 1 1 4

WATER DATA ___

WATER DEPTH ___ ft Use of Well ___

Date Completed MO YR ___

Geologic Unit ___

CENTRAL TIMES NAME ___

SEC 11 TOWNSHIP 17N RANGE 5E

CASING DEPTH ___ ELEV ___

Inspected By

Professional Service Industries, Inc.
PTL Division

Wells
12-2

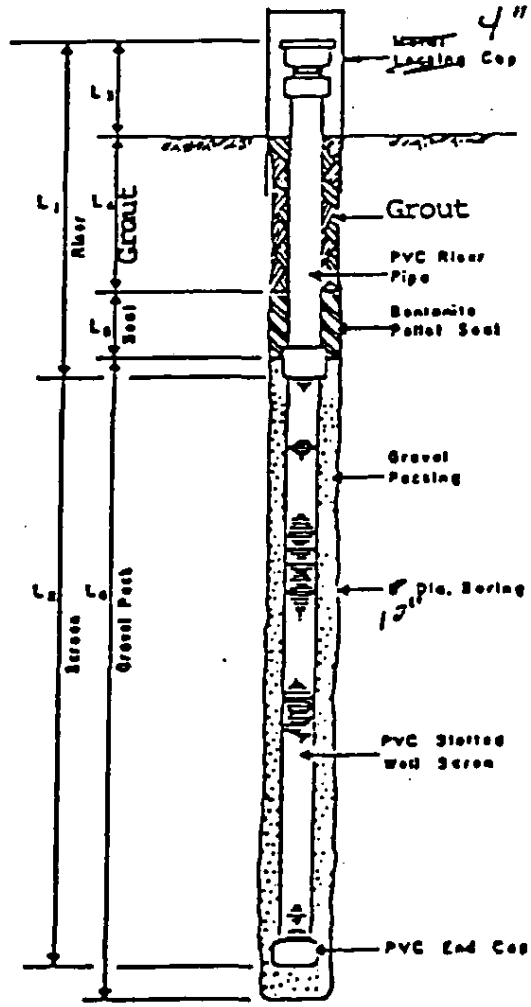
WELL INSTALLATION LOG

WELL NO. MW-14

Client Groundwater Technology Inc. Order No. 9516
Project Manville Forest Products — W. Monroe, La Date 12-15
Grnd. Elev. _____ Datum _____ Water Depth 14.92' Date 12-2
Drilling Method Hollow Stem Drilled Depth 50' Screen Dia. 4" Slot Size .020
Drilling Crew E. Sands, M. Morgan, T. Grimes Log by Bean — G.

DEPTH IN FEET	SAMPLE	MATERIAL DESCRIPTION
0		Brown Silty Clay
1		Brown Silt
2		
3		
4		
5		
6		
7		Gray Silty Clay
8		
9		Brown Silt
0		Brown Silty Sandy Clay
1		Red Silt w/ Fine Sand
2		
3		
4		
5		
6		
7		
8		
9		
0		

MONITORING WELL



L1 = 42'10" L4 = 31'6"
L2 = 2'6" L5 = 3'
L3 = 3' L6 = 8'6"

Remarks Well set @ 42'4" Drill 10" To 43'
Continuous Sample 0-50' Drill 6" To 50'

FIGURE

SLC-607-3 (REV.) 2/8/89

PITTSBURGH TESTING LABORATORY

LOG OF BORING

Job No. _____

Client _____

Project _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 14 Date _____ Sheet _____

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

Field Party: _____

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Blows/foot on Sampler	ID of Sampler (inches)	Tot. length of recov. sample	Length of Lab. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION Soil type, color, texture, consistency, sampler driving not blows per foot on casing, depths wash water lost, obser fluctuations in water level, notes on drilling ease, etc.
							20		
							21		Red Silt W/ Fine Sand
							22		
							23		Red Clayey Silt
							24		
							25		
							26		
							27		Fine Sandy Silt
							28		
							29		Gray Clayey Silt
							30		
							31		
							32		Gray Silty Clay
							33		
							34		
							35		Gray Clayey Silt
							36		
							37		
							38		
							39		Gray Silty Clay
							40		Gray & White Sand
							1		

Engineer _____

SLC-607-S (REV.) 2/8/69

PITTSBURGH TESTING LABORATORY

LOG OF BORING

Job No. _____

Client _____

Project _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 14 Date _____ Sheet ___

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

Field Party: _____

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Blows/foot on Sampler	ID of Sampler (inches)	Tot. length of recov. sample	Length of Lab. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION Soil type, color, texture, consistency, sampler driving note blows per foot on casing, depths wash water lost, observ fluctuations in water level, notes on drilling ease, etc.
							40		Gray & White Sand
							41		
							42		Gray Silty Sand
							43		
							44		
							45		Gray Clay
							46		
							47		
							48		
							49		Gray Sand
							50		Gray Clay
							51		
							52		
							53		
							54		
							55		
							56		
							57		
							58		
							59		
							60		
							1		

Engineer _____

WATER RESOURCES SECTION
WATER WELL REGISTRATION SHORT FORM (DOTD-GW-1S)

PLEASE PRINT IN INK OR TYPE WHEN COMPLETING THIS FORM

1. USE OF WELL (Check Appropriate Box)
   [ ] DOMESTIC [ ] RIG SUPPLY [X] MONITORING [ ] HEAT PUMP SUPPLY
   [ ] HEAT PUMP HOLE [ ] ABANDONED PILOT HOLE [ ] OTHER _____ (Please Specify)
2. WELL OWNER Manville Forest Products PHONE (318) 362-2000
3. ADDRESS 1000 Jones Burreaux Road West Monroe, LA 71294
4. OWNER'S WELL NUMBER OR NAME (if any) MW-15
5. DATE COMPLETED 12-15-89 DEPTH OF HOLE 29 FT., DEPTH OF WELL 20.3 FT.
6. STATIC WATER LEVEL 14.71 FT BELOW GROUND SURFACE MEASURED ON 12-23-89 (Date)
7. CASING 4 IN [ ] STEEL OR [X] PVC SCH 40 LENGTH 14.5 FT.
8. SCREEN 4 IN. [ ] STEEL OR [X] PVC SCH. 40 SLOT SIZE .02 LENGTH 10.3 FT.
9. CEMENTED FROM 0.5 FT TO GROUND SURFACE, USING [ ] PUMP-DOWN METHOD OR [X] GRAVITY METHOD
10. LOCATION OF WELL: PARISH OUACHITA WELL IS XXX. at the _____ (Town or City)
    XXXXXXXXX _____ XXXXXXX Manville Forest Products facility in West Monroe.
    (Crossroads, Railroad, Any Landmark, etc.)
    (Please draw sketch on back of Original)
11. REMARKS: G.T.I. P.S.I. Job #95163
12. DRILLER'S LOG (Description and color of cuttings, such as shale, sand, etc. in feet)

FROM	TO	DESCRIPTION	FROM	TO	DESCRIPTION
		(see attached log)			

13. FOR HEAT PUMP HOLES ONLY. AVG DEPTH _____ FT., NUMBER OF HOLES _____
    TUBING MATERIAL [ ] PVC, [ ] PE, [ ] PB, [ ] OTHER _____
14. ABANDONMENT INFORMATION

P.S.I./P.T.L.
Name of Water Well Contractor

LICENSE NUMBER WWC — 285

Authorized Signature 1-22-90
Date

MAIL ORIGINAL TO:
LOUISIANA DEPARTMENT OF
TRANSPORTATION AND DEVELOPMENT
ATTN: CHIEF - WATER RESOURCES SECTION
P.O. BOX 94245
BATON ROUGE, LA 70804-9245
(504) 379-1434

FOR OFFICE USE ONLY

STATE 22 PARISH LOCAL WELL NO.

IDENTIFICATION NUMBER 322414092082115

OWNER'S NAME

WELL DEPTH FT Use of Well

Date Completed MO YR

OWNER'S NO Geologic Unit

CONTRACTOR'S NAME

SECTION 011 TOWNSHIP 17N RANGE 6E

HOLE DEPTH ELEV QUAD NO.

Inspected By _____
Date

Professional Service Industries, Inc.
PTL Division

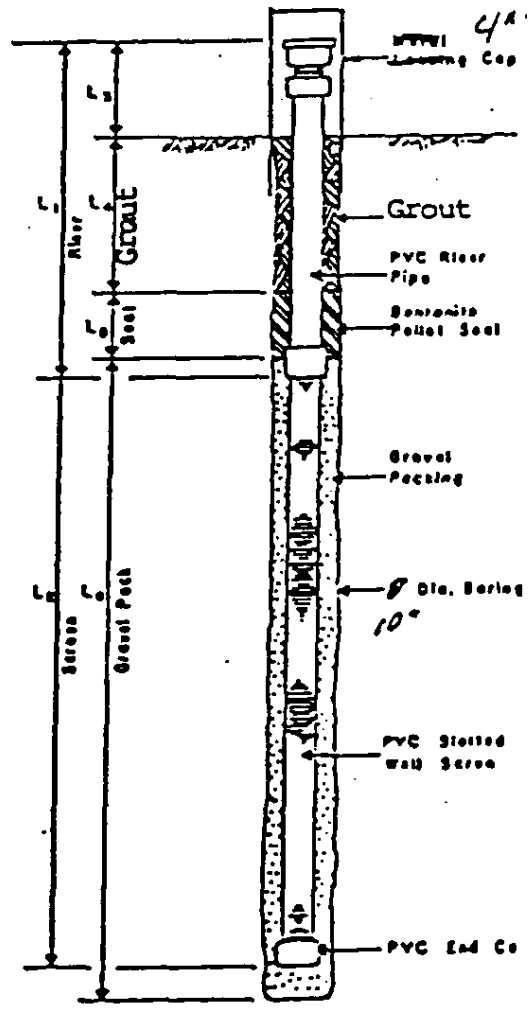
WELL INSTALLATION LOG

WELL NO. MW#15

Client: Groundwater Technology Inc. Order No. 9516
Project: Manville Forest Products — W. Monroe, La Date 12-15
Grnd. Elev. _____ Datum _____ Water Depth 14.71 Date 12-2
Drilling Method Hollow Stem Drilled Depth 29' Screen Dia 4" Slot Size .020
Drilling Crew E. Sauls, M. Morgan, T. Griggs Log by Bran - G. T

DEPTH IN FEET	SAMPLE	MATERIAL DESCRIPTION
0		Brown Silty Clay
1		
2		Gray Silty Sandy Clay
3		
4		
5		Gray Clayey Sand
		Brown Silt
6		Gray Sandy Clay
7		
8		Gray Clayey Sand
9		Gray Silty Sand
0		Brown Sand
1		
2		Brown & White Sand
3		
4		
5		
6		
7		
8		
9		
0		

MONITORING WELL



L_1 = 14'6" L_4 = 4'
L_2 = 10'4" L_5 = 3'
L_3 = 4'6" L_6 = 14'

Remarks: Well set @ 20'4" Drilled 21' W/10"
Sampled 0-29' Drilled 29' W/6"

FIGUR

SLC-607-5 (REV.) 2/8/89

PITTSBURGH TESTING LABORATORY

LOG OF BORING

No.

Client

Project

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 15 Date Sheet

Type of Boring Rig

Casing used Size Drilling mud used

Boring begun Boring completed

Ground Elevation referred to

Field Party:

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Blows/foot on Sampler	ID of Sampler (inches)	Tot. length of recov. sample	Length of Lab. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION Soil type, color, texture, consistency, sampler driving note blows per foot on casing, depths wash water lost, observ fluctuations in water level, notes on drilling ease, etc.
							20		Brown & White Sand
							21		
							22		
							23		White & Brown Sand w/ Gravel
							24		
							25		
							26		
							27		
							28		Gray Clay
							29		
							30		
							31		
							32		
							33		
							34		
							35		
							36		
							37		
							38		
							39		
							40		
							1		

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
WATER RESOURCES SECTION
WATER WELL REGISTRATION SHORT FORM (DOTD-GW-1S)

PLEASE PRINT IN INK OR TYPE WHEN COMPLETING THIS FORM

1 USE OF WELL (Check Appropriate Box)

[ ] DOMESTIC [ ] RIG SUPPLY [X] MONITORING [ ] HEAT PUMP SUPPLY

[ ] HEAT PUMP HOLE [ ] ABANDONED PILOT HOLE [ ] OTHER _____ (Please Specify)

2. WELL OWNER Manville Forest Products PHONE 318) 362-2000

3 ADDRESS 1000 Jones Burreaux Road West Monroe, LA 71294

4 OWNER'S WELL NUMBER OR NAME (if any) MW-15A

5 DATE COMPLETED 12-15-89 DEPTH OF HOLE 21 FT., DEPTH OF WELL 18.3 FT.

6 STATIC WATER LEVEL 9.59 FT. BELOW GROUND SURFACE MEASURED ON 12-23-89 (Date)

7 CASING 4 IN. [ ] STEEL OR [X] PVC SCH. 40 LENGTH 11 FT.

8. SCREEN 4 IN. [ ] STEEL OR [X] PVC SCH. 40 SLOT SIZE .02 LENGTH 10.3 FT.

9 CEMENTED FROM 0.5 FT. TO GROUND SURFACE, USING [ ] PUMP-DOWN METHOD OR [X] GRAVITY METHOD

10. LOCATION OF WELL: PARISH OUACHITA WELL IS NEAR ~~XXX~~ at the _____ (Town or City)

~~XXXXXXXXXX~~ ~~XXXXXXXXX Manville Forest Products facility in West Monroe.~~ (Crossroads, Railroad, Hwy, Landmark, etc.)

(Please draw sketch on back of Original)

11. REMARKS: G.T.I. P.S.I. Job #95163

12. DRILLER'S LOG (Description and color of cuttings, such as shale, sand, etc, in feet)

FROM	TO	DESCRIPTION	FROM	TO	DESCRIPTION
		(see attached log)			

13. FOR HEAT PUMP HOLES ONLY, AVG DEPTH _____ FT., NUMBER OF HOLES _____

TUBING MATERIAL [ ] PVC [ ] [ ] [ ]

Name of Water Well Contractor P.S.I./P.T.L.

LICENSE NUMBER WWC — 285

Authorized Signature 1-22-90 Date

MAIL ORIGINAL TO:
LOUISIANA DEPARTMENT OF
TRANSPORTATION AND DEVELOPMENT
ATTN CHIEF WATER RESOURCES SECTION
P O BOX 94245
BATON ROUGE, LA 70804-9245
(504) 379-1434

FOR OFFICE USE ONLY

STATE 22 PARISH WELL NO. –

REGISTRATION NO. 322-1602-2

WELL DEPTH ft Use of Well

Date Completed MO YR

Geologic Unit

SITE NO. 111 LATITUDE 173 LONGITUDE 5E

TOP DEPTH ELEV

Inspected By _____

Professional Service Industries, Inc.
PTL Division

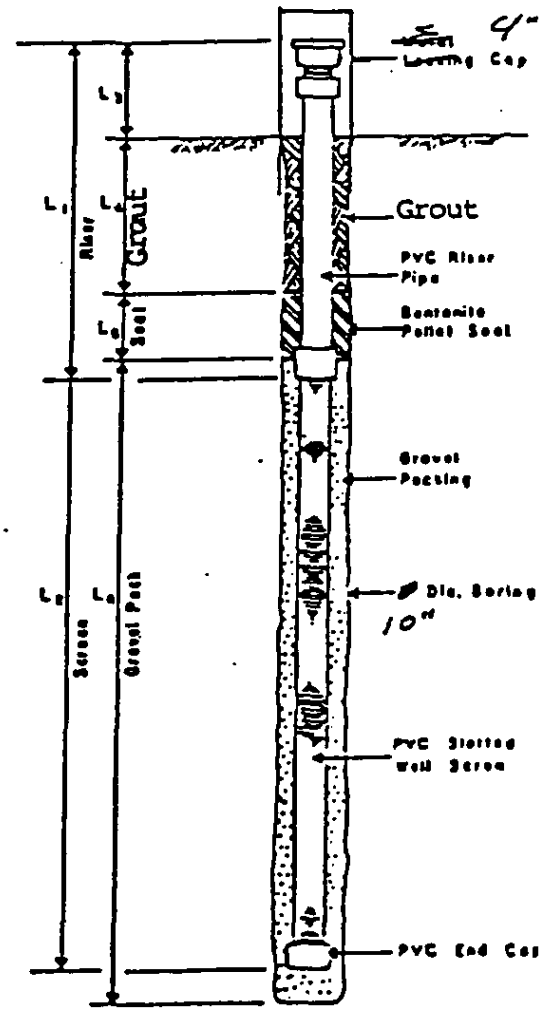
WELL INSTALLATION LOG

WELL NO. MW#15A

Client: Groundwater Technology Inc. Order No. 9516
Project: Manville Forest Products - W. Monroe, La. Date 12-15
Grnd. Elev. _____ Datum _____ Water Depth 9.59 Date 12-2
Drilling Method Hollow Stem Drilled Depth 21' Screen Dia 4" Slot Size .02
Drilling Crew E. Sauls, M. Morgan, T. Griner Log by Bea. - G.

DEPTH IN FEET	SAMPLE	MATERIAL DESCRIPTION
0–1		Brown Silty Clay
1–3		Gray Silty Sandy Clay
3–6		Gray Sandy Clay
6–8		Brown Sand
8–4		White & Brown Sand w/ Gravel
4–7		Brown Sand
7–8		Gray Silty Sand
8–0		Gray Silty Clay TO 21'

MONITORING WELL



L_1 = 11 L_4 = 2'
L_2 = 10'4" L_5 = 3'
L_3 = 3' L_6 = 14'

Remarks: Well set @ 18'4" Drilled 10" To 19'
Continuous Sampled 0-21' Drilled 6" To 21'

FIGURE

LOUISIANA DEPARTMENT OF [illegible]ATION AND DEVELOPMENT
WATER RES[illegible]ES SECTION
WATER WELL REGISTRATI[illegible] SHORT FORM (DOTD-GW-1S)

PLEASE PRINT IN INK OR TYPE WHEN COMPLETING THIS FORM

1. USE OF WELL (Check Appropriate Box)
   - [ ] DOMESTIC
   - [ ] RIG SUPPLY
   - [X] MONITORING
   - [ ] HEAT PUMP SUPPLY
   - [ ] HEAT PUMP HOLE
   - [ ] ABANDONED PILOT HOLE
   - [ ] OTHER _____ (Please Specify)
2. WELL OWNER Manville Forest Products PHONE (318) 362-2000
3. ADDRESS 1000 Jones Burreaux Road West Monroe, LA 71294
4. OWNER'S WELL NUMBER OR NAME (if any) MW-16
5. DATE COMPLETED 12-18-89 DEPTH OF HOLE 31 FT., DEPTH OF WELL 27.3 FT.
6. STATIC WATER LEVEL 19.49 FT. BELOW GROUND SURFACE MEASURED ON 12-23-89 (Date)
7. CASING 4 IN. [ ] STEEL OR [X] PVC SCH. 40 LENGTH 20.7 FT.
8. SCREEN 4 IN. [ ] STEEL OR [X] PVC SCH. 40 SLOT SIZE .02 LENGTH 10.3 FT.
9. CEMENTED FROM 0.5 FT. TO GROUND SURFACE, USING [ ] PUMP-DOWN METHOD OR [X] GRAVITY METHOD
10. LOCATION OF WELL: PARISH OUACHITA WELL IS ~~XXX~~ at the _____ (Town or City)

    ~~XXXXXXXXXX~~ ~~XXXXXXX~~ Manville Forest Products facility in West Monroe. (Crossroads, Railroad, Any Landmark, etc.)

    (Please draw sketch on back of Original)
11. REMARKS: G.I.I. P.S.I. Job #95163
12. DRILLER'S LOG (Description and color of cuttings, such as shale, sand, etc, in feet)

FROM	TO	DESCRIPTION	FROM	TO	DESCRIPTION
		(see attached log)			

13. FOR HEAT PUMP HOLES ONLY: AVG. DEPTH _____ FT. NUMBER OF HOLES _____

TUBING MATERIAL [ ] PVC. [ ] PE [ ] PB [ ] OTHER

P.S.I./P.T.L.
Name of Water Well Contractor

LICENSE NUMBER WWC-285

Authorized Signature 1-22-90 Date

MAIL ORIGINAL TO:
LOUISIANA DEPARTMENT OF
TRANSPORTATION AND DEVELOPMENT
ATTN CHIEF WATER RESOURCES SECTION
PO BOX 94245
BATON ROUGE, LA 70804-9245
(504) 379-1434

FOR OFFICE USE ONLY

STATE 22 COUNTY [ ] LOCAL NUMBER [ ]

REGISTRATION NUMBER 22-[illegible]

[ ]

WELL DEPTH [ ] Ft Use of Well [ ]

Date Completed [ ]

[ ] Geologic Unit [ ]

CONTRACTOR'S NAME [ ]

SEC 110 TOWNSHIP 17N RANGE 03E

CASING DEPTH [ ] ELEV [ ] QUADRANGLE [ ]

Inspected By _____

Professional Service Industries, Inc.
PTL Division

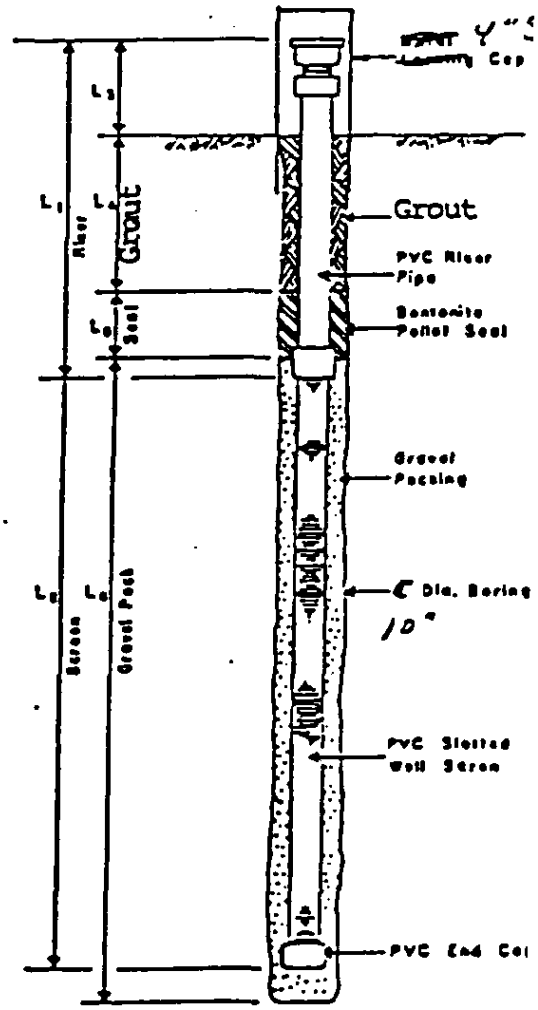
WELL INSTALLATION LOG

WELL NO. MW#6

Client Groundwater Technology Inc. Order No. 9516
Project Manville Forest Products - W. Monroe, La. Date 12-16
Grnd. Elev. _____ Datum _____ Water Depth 19.49 Date 12-2
Drilling Method Hollow Stem Drilled Depth 31' Screen Dia. 4" Slot Size .02
Drilling Crew E. Sauls, M. Morgan, T. Gries Log by Beau - G.

DEPTH IN FEET	SAMPLE	MATERIAL DESCRIPTION
0–9		Brown Silty Clay
9–12		Gray Sandy Silty Clay
12–19		Gray Clayey Sand
19–20		Brown Sand

MONITORING WELL



L_1 = 20'8" L_4 = 9'
L_2 = 10'4" L_5 = 3'
L_3 = 3' L_6 = 16'

Remarks Well set @ 27'4" Drilled 10" To 28'
Continuous Sampled 9-31' Drilled 6" To 31

FIGURE

SLC-807-3 (REV.) 2/8/88

PITTSBURGH TESTING LABORATORY

LOG OF BORING

Job No. _____

Client _____

Project _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 16 Date _____ Sheet _____

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

Field Party: _____

Depth of Casing, ft.	Sample No.	Sample depth (from-to) (in feet)	Blows/foot on Sampler	ID of Sampler (inches)	Tot. length of recov. sample	Length of Lab. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION Soil type, color, texture, consistency, sampler driving not blows per foot on casing, depths wash water lost, obser fluctuations in water level, notes on drilling ease, etc.
							20		
							21		Brown Sand
							22		
							23		Brown + White Sand
							24		
							25		
							26		Gray Sandy Silt
							27		Brown Sand
							28		Gray Clay
							29		
							30		
							31		
							32		
							33		
							34		
							35		
							36		
							37		
							38		
							39		
							40		
							1		

Engineer _____

APPENDIX C
MONITOR WELL LOGS

WELL LOG: MW-7

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 18-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 82.20'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 26.3'
DEPTH/HOLE: 36.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 19.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Cap			
0		6% Grout		0	0.0'-9.5': Brown, silty CLAY. (Pad fill material)
		Flush joint casing			
5			GRAB	5	
10		Bentonite seal		10	9.5'-10.0': Brown, silty, organic-rich CLA
					10.0'-11.5': Gray, silty, sandy CLAY with stain mottling.
**		Graded sand pack			11.5'-12.0': Beige, coarse-grained SAND.
					12.0'-13.5': Gray to beige, clayey SAND with iron staining and trace organics.
15			SHELBY TUBE	15	13.5'-16.0': Beige, medium to coarse-graine SAND with some gravel; iron stain mottling and trace organics; some gray clay streaks.
					16.0'-36.0': White to beige, well-sorted, extremely coarse-grained SAND with some mic
20		Slotted well screen		20	

CONTINUED TO NEXT PAGE

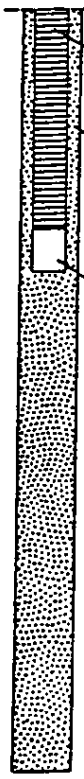
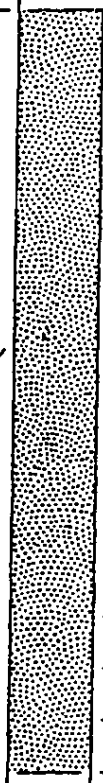
GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-7

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 18-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 82.20'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 26.3' DEPTH/HOLE: 36.0' DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5' DIA/SCREEN: 4.0" SLOT SIZE: 0.02"
LENGTH/CASING: 19.8' DIA/CASING: 4.0" TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Slotted well screen Graded sand pack End cap	SHELBY TUBE		16.0'-36.0': White to beige, well-sorted, extremely coarse-grained SAND with some mic
25				25	
30				30	
35				35	
40				40	
45				45	

** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-8

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 14-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 87.09'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 39.3' DEPTH/HOLE: 45.0' DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5' DIA/SCREEN: 4.0" SLOT SIZE: 0.02"
LENGTH/CASING: 32.8' DIA/CASING: 4.0" TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Cap			
0		6% Grout			0.0'-11.0': Brown, silty CLAY. (Pad fill material)
		Flush joint casing	GRAB		
5					
10					
					11.0'-12.0': Black, silty CLAY with abundar organics.
**			SHELBY TUBE		12.0'-16.0': Gray to beige, silty, sandy CL with iron stain mottling.
15					
					16.0'-17.0': Brown SILT.
					17.0'-24.0': Gray, sandy CLAY with trace organics and iron stain mottling.
20		Bentonite seal			

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GROUNDWATER TECHNOLOGY, INC

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-8

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 14-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 87.09'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 39.3' DEPTH/HOLE: 45.0' DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5' DIA/SCREEN: 4.0" SLOT SIZE: 0.02"
LENGTH/CASING: 32.8' DIA/CASING: 4.0" TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Bentonite seal			17.0'-24.0': Gray, sandy CLAY with trace organics and iron stain mottling.
25		Graded sand pack			24.0'-28.0': Gray, clayey, fine-grained SAN with iron staining.
		Flush joint casing			28.0'-29.0': Beige, medium-grained SAND.
30		Slotted well screen	SHELBY TUBE		29.0'-33.0': Beige to gray, clayey, silty, fine-grained SAND.
					33.0'-34.0': Beige, coarse-grained SAND.
					34.0'-35.0': Gray, silty, sandy CLAY.
35					35.0'-45.0': Beige to white, coarse-grained SAND.
40		End cap			
45					

** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-9

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 14-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 86.60'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 32.3'
DEPTH/HOLE: 39.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 25.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Cap			
0		6% Grout			0.0'-12.0': Brown, silty CLAY. (Pad fill material)
		Flush joint casing			
5			GRAB		
10					
					12.0'-13.5': Black, silty CLAY with abundant organics.
					13.5'-19.5': Gray, silty, sandy CLAY with ir stain mottling and trace organics.
15			SHELBY TUBE		
		Bentonite seal			
20**		Graded sand pack			19.5'-21.0': Gray, clayey, fine-grained SAND with iron staining.

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GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-9

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 14-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 86.60'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 32.3'
DEPTH/HOLE: 39.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 25.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Flush joint casing			21.0'-26.0': Gray to white, medium to coarse-grained SAND; iron stain mottling.
25		Slotted well screen			26.0'-37.0': Tan and black, coarse-grained SAND.
		Graded sand pack	SHELBY TUBE		
30					
		End cap			
35					37.0'-39.0': Gray, silty, sandy CLAY with iron staining.
40					
45					

** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-10

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 12-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: P.B. Lee
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 80.00'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 27.3'
DEPTH/HOLE: 28.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 20.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
0		Cap			
		6% Grout			0.0'-14.5': Brown, silty, sandy CLAY. (Pad fill material)
		Flush joint casing			
5			GRAB		
10		Bentonite seal			
**					
15		Graded sand pack	SHELBY TUBE		14.5'-17.0': Brown, silty CLAY with abundant organics.
					17.0'-17.5': Brown, silty SAND.
					17.5'-18.5': Brown CLAY.
		Slotted well screen			18.5'-19.0': Brown, silty SAND.
20					19.0'-20.0': Gray CLAY.

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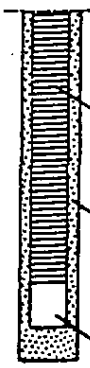
GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-10

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 12-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: P.B. Lee
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 80.00'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 27.3'
DEPTH/HOLE: 28.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 20.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Slotted well screen Graded sand pack End cap	SHELBY TUBE		20.0'-22.0': Brown, silty SAND. 22.0'-24.0': Brown, medium-grained SAND. 24.0'-28.0': Brown CLAY.
25				25	
30				30	
35				35	
40				40	
45				45	

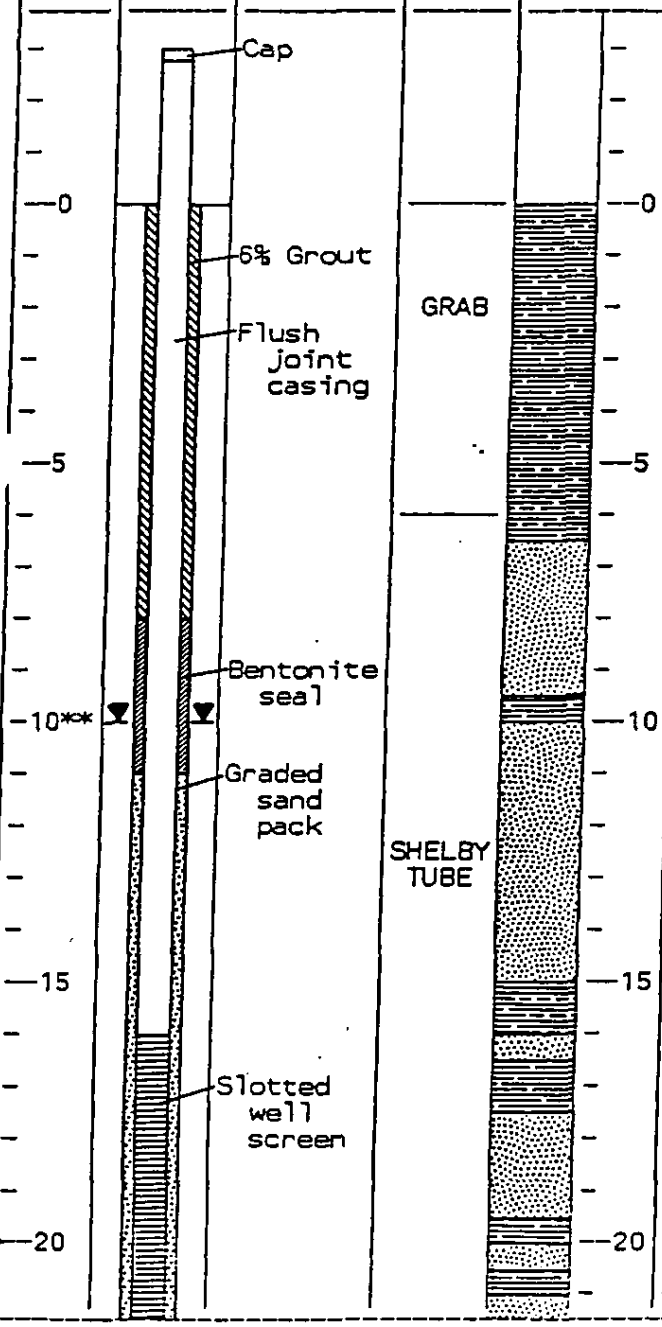
** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-11

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 12-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: P.B. Lee
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 81.42'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 26.3' DEPTH/HOLE: 28.0' DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5' DIA/SCREEN: 4.0" SLOT SIZE: 0.02"
LENGTH/CASING: 19.8' DIA/CASING: 4.0" TYPE: PVC



SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)

0.0'-6.5': Brown, silty CLAY. (Pad fill material)

6.5'-9.5': Tan, silty, fine-grained SAND.

9.5'-10.0': Tan, silty, sandy CLAY.

10.0'-15.0': Tan, clayey SAND.

15.0'-16.0': Tan, silty CLAY.

16.0'-16.5': Tan, clayey SAND.

16.5'-17.5': Tan, silty CLAY.

17.5'-19.5': Tan, silty SAND.

19.5'-20.0': Tan, silty CLAY.

20.0'-20.5': Tan, silty SAND.

20.5'-21.0': Tan, silty CLAY.

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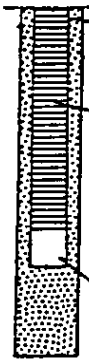
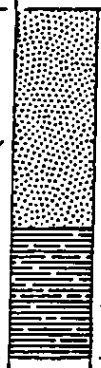
GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-11

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 12-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: P.B. Lee
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 81.42'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 26.3' DEPTH/HOLE: 28.0' DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5' DIA/SCREEN: 4.0" SLOT SIZE: 0.02"
LENGTH/CASING: 19.8' DIA/CASING: 4.0" TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Graded sand pack Slotted well screen End cap	SHELBY TUBE		21.0'-25.5': Tan, clayey SAND. 25.5'-26.0': Tan, silty CLAY. 26.0'-28.0': Brown CLAY.

25 30 35 40 45

** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-12

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 13-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: P. B. Lee
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 83.44'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 25.3' DEPTH/HOLE: 28.0' DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5' DIA/SCREEN: 4.0" SLOT SIZE: 0.02"
LENGTH/CASING: 18.8' DIA/CASING: 4.0" TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
0		Cap			
		6% Grout			0.0'-13.0': Brown, silty CLAY. (Pad fill material)
		Flush joint casing			
5			GRAB		
10		Bentonite seal			
					13.0'-14.0': Tan, silty CLAY.
		Graded sand pack			14.0'-17.0': Brown, clayey SAND.
15	**		SHELBY TUBE		
					17.0'-17.5': Gray, sandy CLAY with ferrous nodules.
		Slotted well screen			17.5'-24.5': Brown, clayey SAND.
20					

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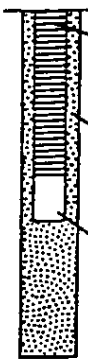
GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-12

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 13-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: P.B. Lee
T.O.C.: 83.44'
DRILLING METHOD: Hollow-Stem Auger
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 25.3'
DEPTH/HOLE: 28.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 18.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Slotted well screen Graded sand pack End cap	SHELBY TUBE		17.5'-24.5': Brown, clayey SAND. 24.5'-25.5': Brown, silty CLAY. 25.5'-26.0': Brown and gray, silty CLAY. 26.0'-28.0': Gray CLAY.

25 30 35 40 45

** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-13

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 18-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
T.O.C.: 80.13'
DRILLING METHOD: Hollow-Stem Auger
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 63.3'
LENGTH/SCREEN: 9.5'
LENGTH/CASING: 56.8'
DEPTH/HOLE: 65.0'
DIA/SCREEN: 4.0"
DIA/CASING: 4.0"
DIA/HOLE: 10.0"
SLOT SIZE: 0.02"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Cap			
0		6% Grout			0.0'-14.5': Brown, silty CLAY. (Pad fill material)
		Flush joint casing			
5			GRAB		
10					
15			SHELBY TUBE		14.5'-16.0': Brown, organic-rich, silty CLA with some iron stain mottling.
					16.0'-23.0': Brown and gray, silty CLAY wit ferrous nodules.
**					
20					

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** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-13

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 18-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 80.13'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 63.3' DEPTH/HOLE: 65.0' DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5' DIA/SCREEN: 4.0" SLOT SIZE: 0.02"
LENGTH/CASING: 56.8' DIA/CASING: 4.0" TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
					16.0'-23.0': Brown and gray, silty CLAY wit ferrous nodules.
					23.0'-24.0': Brown CLAY.
25		6% Grout		25	24.0'-24.5': Brown, silty CLAY with ferrous nodules.
					24.5'-26.0': Brown CLAY.
		Flush joint casing			26.0'-36.0': Brown and gray, silty CLAY wit ferrous nodules.
30				30	
			SHELBY TUBE		
35				35	
					36.0'-46.0': Gray and brown CLAY with silty streaks.
40				40	
45		Bentonite seal		45	

CONTINUED TO NEXT PAGE

GROUNDWATER TECHNOLOGY, INC.

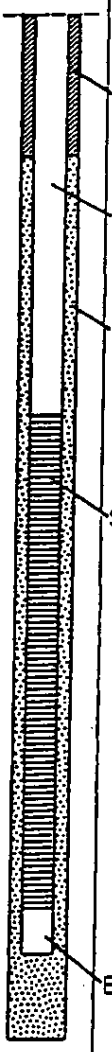
** Top of saturated zone as encountered during drilling.

WELL LOG: MW-13

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 18-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 80.13'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 63.3'
DEPTH/HOLE: 65.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 56.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Bentonite seal			36.0'-46.0': Gray and brown CLAY with sil streaks.
		Flush joint casing			46.0'-50.0': Gray, silty CLAY.
50		Graded sand pack			50.0'-53.0': Gray CLAY, with iron stain mottling.
			SHELBY TUBE		53.0'-59.0': Beige, medium-grained SAND w some mica.
55		Slotted well screen			
60					59.0'-65.0': Beige to white, medium to coarse-grained SAND with some mica.
		End cap			
65					



** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-14

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 19-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 78.58'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 61.3' DEPTH/HOLE: 65.0' DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5' DIA/SCREEN: 4.0" SLOT SIZE: 0.02"
LENGTH/CASING: 54.8' DIA/CASING: 4.0" TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
0	Cap, 6% Grout, Flush joint casing		GRAB		0.0'-15.0': Brown, silty CLAY. (Pad fill material)
5					
10					
15			SHELBY TUBE		15.0'-19.0': Brown and gray, organic-rich, silty CLAY.
** 20					19.0'-20.5': Gray, silty CLAY with iron sta mottling and trace organics.

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GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-14

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 19-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 78.58'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 61.3' DEPTH/HOLE: 65.0' DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5' DIA/SCREEN: 4.0" SLOT SIZE: 0.02"
LENGTH/CASING: 54.8' DIA/CASING: 4.0" TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
					20.5'-23.0': Brown and gray, blocky CLAY trace organics.
					23.0'-28.5': Gray CLAY.
25		6% Grout		25	
		Flush joint casing			
					28.5'-29.5': Gray, silty CLAY.
30				30	29.5'-32.0': Gray, silty, organic-rich CL
					32.0'-36.5': Gray and brown, blocky CLAY.
			SHELBY TUBE		
35				35	
					36.5'-45.0': Gray, silty CLAY with iron st mottling and trace organics.
40				40	
45		Bentonite seal		45	

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GROUNDWATER TECHNOLOGY, INC

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-14

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 19-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
T.O.C.: 78.58'
DRILLING METHOD: Hollow-Stem Auger
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 61.3'
LENGTH/SCREEN: 9.5'
LENGTH/CASING: 54.8'
DEPTH/HOLE: 65.0'
DIA/SCREEN: 4.0"
DIA/CASING: 4.0"
DIA/HOLE: 10.0"
SLOT SIZE: 0.02"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Bentonite seal			45.0'-48.0': Gray, sandy SILT.
		Flush joint casing			48.0'-50.5': Beige, silty, fine-grained SA
50		Graded sand pack		50	50.5'-51.0': Beige, fine-grained SAND.
					51.0'-56.0': Beige, medium-grained SAND.
55		Slotted well screen	SHELBY TUBE	55	56.0'-62.0': Beige and white, coarse-grain SAND.
60		End cap		60	62.0'-65.0': Gray, clayey, medium-grained SAND.
65				65	

** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-15

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 20-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 77.93'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 57.3'
DEPTH/HOLE: 60.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 50.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Cap			
0		6% Grout		0	0.0'-10.5': Brown, silty CLAY. (Pad fill Material)
		Flush joint casing			
5			GRAB	5	
10				10	10.5'-15.0': Gray and white, silty, sandy CLAY with iron stain mottling.
15				15	15.0'-15.5': Brown, organic SILT.
**			SHELBY TUBE		15.5'-16.0': Brown, organic-rich, silty, fine-grained SAND.
					16.0'-18.0': Brown, medium-grained SAND.
					18.0'-19.0': Brown, silty, fine-grained SAN
20				20	19.0'-27.5': Brown to gray, silty, blocky CLAY; iron staining within organic nodules.

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GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-15

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 20-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 77.93'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 57.3'
DEPTH/HOLE: 60.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 50.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
25		6% Grout			19.0'-27.5': Brown to gray, silty, blocky CLAY; iron staining within organic nodules
		Flush joint casing			
30			SHELBY TUBE		27.5'-35.5': Brown to beige, silty CLAY.
35					35.5'-37.5': Gray, silty CLAY with iron sta mottling and trace organics.
					37.5'-38.0': Brown SILT.
					38.0'-43.5': Gray, silty, sandy CLAY with trace organics and iron stain mottling.
40		Bentonite seal			
45		Graded sand pack			43.5'-47.0': Gray, clayey SAND with iron staining.

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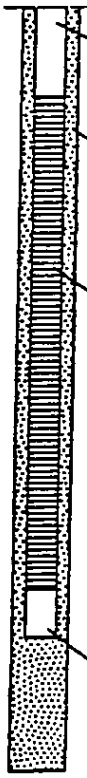
GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-15

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 20-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 77.93'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 57.3'
DEPTH/HOLE: 60.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 50.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Flush joint casing			43.5'-47.0': Gray, clayey SAND with iron staining.
		Graded sand pack			47.0'-60.0': Beige, coarse-grained SAND wi some gravel.
50		Slotted well screen	SHELBY TUBE		
55					
		End cap			
60					
65					

** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-16

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 15-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 75.77'
SAMPLE METHOD: Shelby Tube

DEPTH OF WELL: 42.3'
DEPTH/HOLE: 50.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 2.0'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 43.3'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
0		Cap			0.0'-0.5': Brown, silty, organic-rich CLAY.
		6% Grout			0.5'-6.5': Beige, well-sorted SILT.
		Flush joint casing			
5					6.5'-9.0': Gray, silty CLAY with iron stai mottling, some fine-grained sand and organ nodules.
			SHELBY TUBE		9.0'-9.5': Beige, well-sorted SILT.
10					9.5'-10.0': Beige, silty, sandy CLAY with iron stain mottling.
					10.0'-22.0': Red SILT with some organic-rich, sandy nodules.
15					
**					
20					

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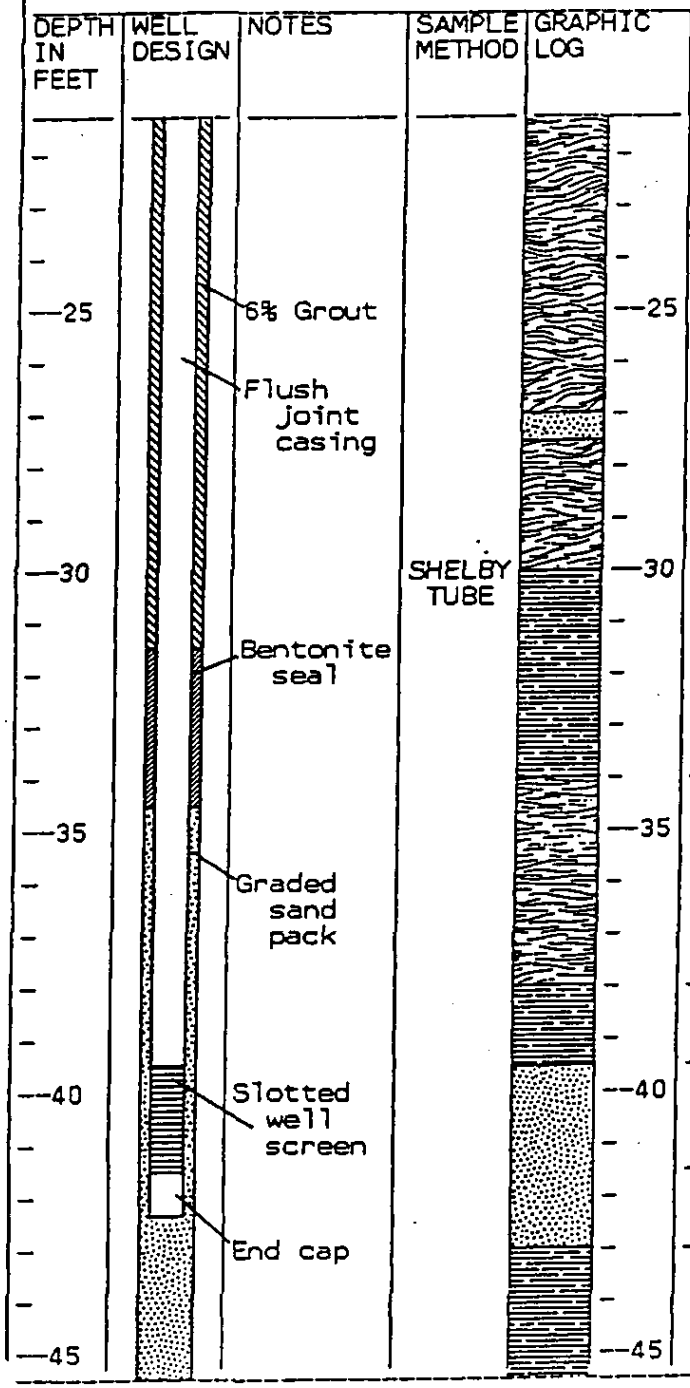
GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-16

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 15-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 75.77'
SAMPLE METHOD: Shelby Tube

DEPTH OF WELL: 42.3'
DEPTH/HOLE: 50.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 2.0'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 43.3'
DIA/CASING: 4.0"
TYPE: PVC



SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)

10.0'-22.0': Red SILT with some organic-ri sandy nodules.

22.0'-27.0': Red, clayey SILT with gray cl streaks.

27.0'-27.5': Red, silty, fine-grained SAND.

27.5'-30.0': Gray to blue, clayey SILT.

30.0'-34.0': Gray to blue, silty CLAY with some fine-grained sand streaks.

34.0'-38.0': Gray, clayey SILT.

38.0'-39.5': Gray, silty CLAY.

39.5'-41.5': Gray to white, coarse-grained SAND with some mica.

41.5'-43.0': Gray, silty, medium-grained SA

43.0'-48.0': Gray, stiff CLAY.

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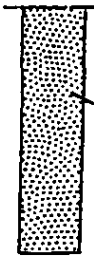
GROUNDWATER TECHNOLOGY, INC.

Top of saturated zone as encountered during drilling.

WELL LOG: MW-16

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 15-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 75.77'
SAMPLE METHOD: Shelby Tube

DEPTH OF WELL: 42.3'
DEPTH/HOLE: 50.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 2.0'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 43.3'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Graded sand pack	SHELBY TUBE		43.0'-48.0': Gray, stiff CLAY.
					48.0'-49.0': Gray, coarse-grained SAND.
					49.0'-50.0': Gray, stiff CLAY.
50				50	
55				55	
60				60	
65				65	

** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-17

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 15-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 75.54'
SAMPLE METHOD: Shelby Tube

DEPTH OF WELL: 20.3'
DEPTH/HOLE: 29.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 13.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
0		Cap			
		6% Grout			0.0'-0.8': Brown, silty CLAY.
		Flush joint casing			0.8'-4.5': Gray, silty, sandy CLAY with ir stain mottling and organic streaks.
5		Bentonite seal			4.5'-5.0': Gray, clayey, medium-grained SA
					5.0'-5.5': Brown, organic SILT.
**					5.5'-7.0': Gray, sandy CLAY with iron staining.
			SHELBY TUBE		7.0'-8.0': Gray, clayey, fine-grained SAND with iron staining.
10					8.0'-9.0': Gray, silty, medium-grained SAND with iron staining.
					9.0'-11.0': Gray to beige, medium to coarse-grained SAND.
					11.0'-21.0': Beige to white, medium to extremely coarse-grained SAND with some gravel and mica; iron stain mottling.
15		Graded sand pack			
		Slotted well screen			
20		End cap			

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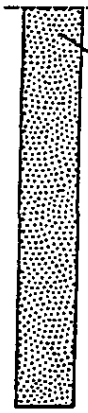
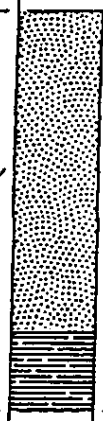
** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-17

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 15-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 75.54'
SAMPLE METHOD: Shelby Tube

DEPTH OF WELL: 20.3'
DEPTH/HOLE: 29.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 13.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Graded sand pack	SHELBY TUBE		21.0'-27.5': White to beige, extremely coarse-grained SAND with some gravel.
					27.5'-29.0': Gray, stiff CLAY.
25				25	
30				30	
35				35	
40				40	
45				45	

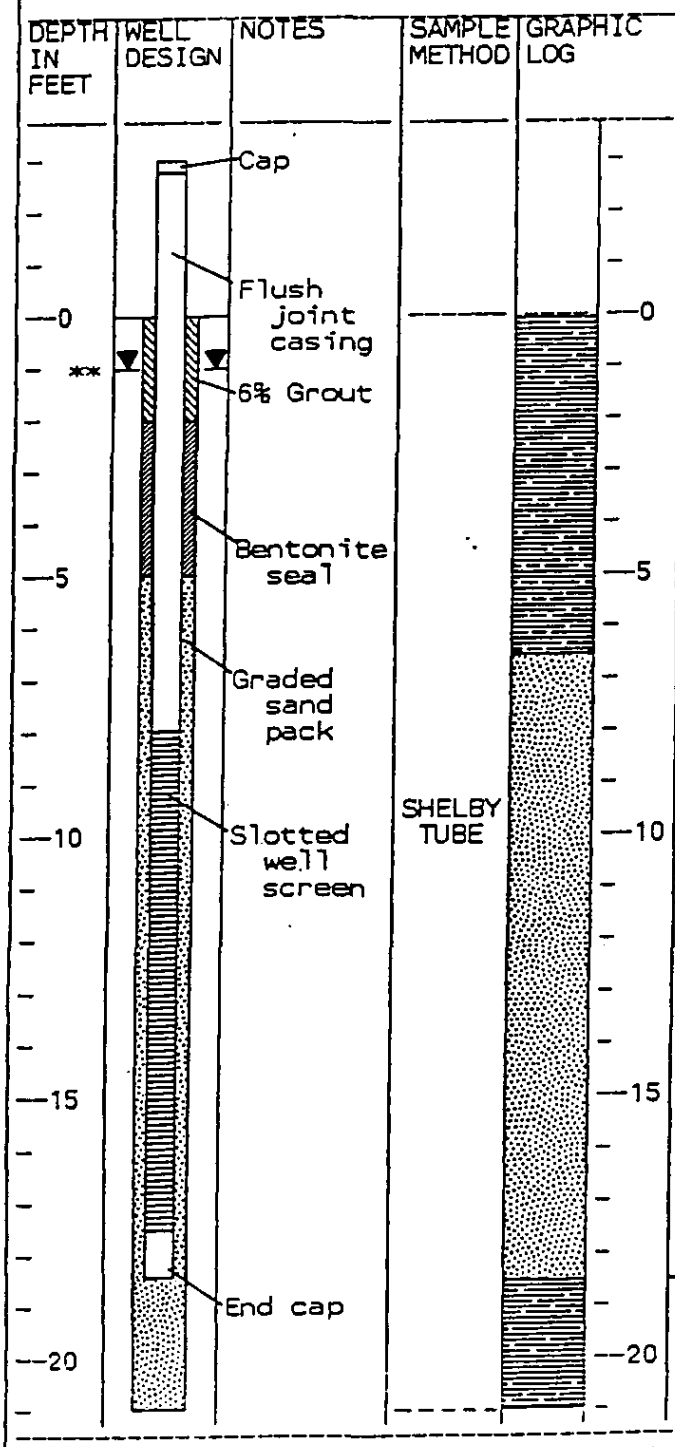
** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

WELL LOG: MW-18

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 15-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 73.74'
SAMPLE METHOD: Shelby Tube

DEPTH OF WELL: 18.3'
DEPTH/HOLE: 21.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 11.8'
DIA/CASING: 4.0"
TYPE: PVC



SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)

0.0'-1.0': Brown, silty, organic-rich CLA

1.0'-3.5': Gray, silty , sandy CLAY with stain mottling and trace organics.

3.5'-6.5': Gray, sandy CLAY with iron sta mottling.

6.5'-8.0': Beige, medium to coarse-grainec SAND with iron staining and trace organics

8.0'-14.0': White to beige, coarse-grainec SAND with some gravel and iron staining.

14.0'-17.0': Beige, coarse-grained SAND wi some mica and iron staining.

17.0'-18.5': Gray, silty, medium-grained SAND.

18.5'-21.0': Gray, silty CLAY.

** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC

WELL LOG: MW-19

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 18-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 87.24'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 27.3'
DEPTH/HOLE: 31.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 20.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
0		Cap			
		6% Grout			0.0'-11.5': Brown, silty CLAY. (Pad fill material)
		Flush joint casing			
5			GRAB		
10		Bentonite seal			11.5'-16.5': Gray, silty, sandy CLAY with iron stain mottling.
15 **		Graded sand pack	SHELBY TUBE		16.5'-19.0': Gray, clayey SAND with iron staining and trace organics.
20		Slotted well screen			19.0'-20.0': Beige, medium-grained SAND with iron staining.

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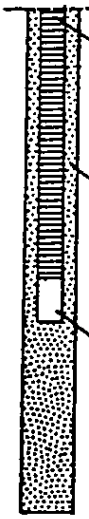
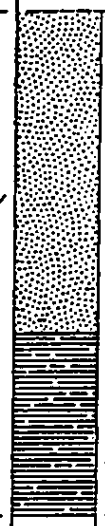
GROUNDWATER TECHNOLOGY, INC.

** Top of saturated zone as encountered during drilling.

WELL LOG: MW-19

PROJECT: Manville Forest Products Corporation
PROJECT #: 600-101-9152
DATE DRILLED: 18-DEC-89
LOCATION: West Monroe, LA
DRILLING CO.: PSI
DRILLER: E. Sauls
LOG BY: B. Rogers
DRILLING METHOD: Hollow-Stem Auger
T.O.C.: 87.24'
SAMPLE METHOD: Grab / Shelby Tube

DEPTH OF WELL: 27.3'
DEPTH/HOLE: 31.0'
DIA/HOLE: 10.0"
LENGTH/SCREEN: 9.5'
DIA/SCREEN: 4.0"
SLOT SIZE: 0.02"
LENGTH/CASING: 20.8'
DIA/CASING: 4.0"
TYPE: PVC

DEPTH IN FEET	WELL DESIGN	NOTES	SAMPLE METHOD	GRAPHIC LOG	SOIL CLASSIFICATION / DESCRIPTION (COLOR, TEXTURE, STRUCTURES)
		Slotted well screen Graded sand pack End cap	SHELBY TUBE		20.0'-21.5': Beige, coarse-grained SAND with iron staining. 21.5'-25.0': Beige to white, medium to coarse-grained SAND with iron staining. 25.0'-26.5': Gray, silty, fine-grained SAN with iron staining. 26.5'-27.5': Beige, medium-grained SAND wi iron staining. 27.5'-31.0': Gray, silty CLAY with iron stain mottling.

25 30 35 40 45

** Top of saturated zone as encountered during drilling.

GROUNDWATER TECHNOLOGY, INC.

APPENDIX D
VARIANCE VERIFICATION

FILE

GROUNDWATER TECHNOLOGY, INC.

700 Mariner's Plaza Drive, Suite 720, Mandeville, LA 70448 (504) 62

Fax: (504) 626-

March 26, 1990

Mr. Brett LeBlanc
Department of Environmental Quality
Solid Waste Division
P. O. Box 44307
Baton Rouge, Louisiana 70804-4307

Re: Monitor Well Installation
at MFPC Facility in
West Monroe, LA
GTI Project No. 600-101-9152

Dear Mr. LeBlanc:

Prior to initiation of the referenced project, the plans and specifications were reviewed, revised, and verbally approved by representatives of the Louisiana Department of Environmental Quality, Groundwater Protection Division (DEQ/GWPD).

During performance of the project, field conditions warranted both general and specific variances to the plans and specifications and to the proposed DEQ/GWPD Monitor Well Regulations.

The requested and verbally approved variances were as follow:

- During field operations, on December 12, 1989, Groundwater Technology, Inc. (GTI) contacted Ms. Brenda Kearns, DEQ/GWPD, to discuss termination of the use of metal centralizers on the monitor wells. This variance request was based on the utilized well installation method of setting the well within the inside diameter of the hollow-stem auger, thus assuring vertical and horizontal unity within the annulus, and the potential inorganic contribution from degradation of the steel centralizers to future groundwater analysis for metals.

  Attempts were made to locate non-metallic centralizers, which are apparently not commercially available. Ms. Kearns consulted with Mr. Brett LeBlanc and verbally approved the termination of the use of centralizers on the condition that a written request be transmitted after project completion.

- The most permeable sand unit encountered in MW-16 was from 39.5 to 41.5 feet below grade. On December 18, 1989, Mr. Brett LeBlanc was contacted by GTI and verbally approved the use of a 2-foot section of screen to isolate this zone, since the proposed DEQ/GWPD Monitor Well Regulations do not specify a minimum length of screen.

- Since a sand unit was not encountered in MW-13 within 50 feet below grade as expected, Mr. LeBlanc was consulted for advice on December 18, 1989. He recommended continuing the boring to 50 feet below natural grade (64.5 feet below grade) and, if a sand was encountered, to set a monitor well as for MW-14 and MW-15. A sand unit was encountered and screened from 53 to 62.5 feet below grade.

If you have any questions, please contact us at your convenience.

Sincerely,

Pete Lee

Pete Lee
Hydrogeologist

Marguerite H. Scully

Marguerite H. Scully
District Manager
Louisiana, Mississippi and
Arkansas

PBL/cmp

cc: David McQueen
DEQ-GWPD

Charles B. Welch
Manville Forest Products Corp.

MFPC-2

MONITORING WELL INSTALLATION REPORT

Riverwood International Corporation
41 Acre Ash/Sludge Impoundment
Ouachita Parish
West Monroe, Louisiana
Permit No. P-0244

Prepared For:
Riverwood International Corporation
P.O. Box 35800
West Monroe, LA 71294-5800

Prepared By:
Petroleum Automation Consultants, Inc.
P.O. Box 588, 109 Canterberry Road
Swartz, LA 71281

Sarah E. Moore, Project Manager

January 27, 1997

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 FIELD ACTIVITIES 2
- 2.1 Drilling and Sampling 2
- 2.2 Monitoring Well Installation 2
- 2.3 Well Development 3
- 2.4 Groundwater Sampling 3

3.0 SUMMARY 4

FIGURE
TABLE

APPENDICES
- A Soil Boring Logs
- B Monitoring Well Installation Diagrams
- C LDOTD Well Registration Forms
- D Daily Field Notes

1.0 INTRODUCTION

On behalf of Riverwood International Corporation (formerly known as Riverwood International U.S.A., Inc., Petroleum Automation Consultants, Inc. (PAC) has prepared this Monitoring Well Installation Report for five groundwater monitoring wells surrounding Riverwood's 41-acre ash/sludge impoundment. The impoundment was under construction at the time of monitoring well installation and is expected to be completed by March 1997. The impoundment will receive primary clarifier sludge and sluiced ash from the bark-fired power boiler. The monitoring wells and impoundment are under the regulatory authority of the Louisiana Department of Environmental Quality (LDEQ) Solid Waste Division. These wells will fulfill the groundwater monitoring requirement for Solid Waste Standard Permit No. P-0244.

The Riverwood facility is located south of Jonesboro Road (La. Hwy. 34) in West Monroe, Louisiana on the west side of the Ouachita River. The 41-acre ash/sludge impoundment is located southeast of the plant near the facility's sludge ponds and surface impoundments. The impoundment is surrounded by a levee of compacted clay which rises approximately 15 feet above the natural surface elevation of about 70 feet msl. The monitoring wells were constructed on pads of compacted clay and silty clay located on the levee perimeter. The elevation of the well pads equals that of the levee. Locations of monitoring wells MW-20, MW-21, MW-22, MW-23, and MW-24 are shown in Figure 1. Previously existing MW-17 will also be included in the groundwater monitoring program for the 41-acre impoundment.

2.0 FIELD ACTIVITIES

Field activities took place October 24-31, 1996 and December 5 and 6, 1996. PAC (WWC-258) worked in conjunction with Maxim Technologies, Inc. (WWC-261) of Shreveport, Louisiana to complete the project.

2.1 Drilling and Sampling

A soil boring was continuously sampled at each well location using 6.75" O.D. hollow stem augers with a 7.25" diameter bit and 3" x 5' Shelby tubes. The drilling equipment was decontaminated prior to drilling each borehole by steam cleaning. Borings were advanced from about 8 to 15 feet below the depth where groundwater was first encountered in order to identify the thickness of the first water bearing zone and select the appropriate depth for placement of the well screen. Borings for MW-21, MW-22, and MW-24 were sampled to 41 feet depth. MW-20 and MW-23 were sampled to 46 feet and 44 feet, respectively. Each sample was visually logged by the PAC geologist. Soil boring logs are included in Appendix A. Following completion of sampling, each borehole was overdrilled using 10" O.D. augers prior to installing the well.

2.2 Monitoring Well Installation

Monitoring wells were installed in accordance with the LDEQ/LDOTD document Construction of Geotechnical Boreholes and Groundwater Monitoring Systems Handbook, May 1993, and Standard Permit No. P-0244 requirements and specifications. All monitoring wells were completed with 9.75 feet of 4 inch I.D., 0.01 slot screen, a 0.5 foot sump, and 4 inch I.D. flush-threaded PVC casing. Stainless steel centralizers were placed 6 to 7 feet above the top of the screens. The well assembly, 20/40 filter pack sand, bentonite pellets, and fine "sugar" sand were installed within the hollow-stem augers using appropriate completion methods. Filter pack sand was installed to at least two feet above the top of the screen. An approximately three foot thick seal of bentonite pellets was added above the filter pack followed by one to 1.5 feet of fine sand. Ten gallons of potable water were added to hydrate the bentonite seal for eight hours or overnight. The remaining annular space was filled with mechanically-mixed 5% bentonite-portland cement grout. The grout mixture was pumped down into the borehole to the top of the fine sand, filling the annular space from the bottom up. Grout weights ranged from 13.8 lbs/gallon to 14.1 lbs/gallon. Monitoring well characteristics are summarized in Table 1.

On December 5 and 6, 1996, each well was completed with an aluminum protective casing, a 5' x 5' x 1' concrete pad, and four barrier posts. The monitoring well pads and levee were raised approximately one foot to 86 feet msl, the approximate elevation of the concrete well pads, using sand, clay, and gravel fill material. The protective casings and barrier posts will be painted international orange and a tag with the well name, installation

date, top-of-casing elevation, and well depth will be affixed to each well. Well installation diagrams are included in Appendix B.

All wells were surveyed by Maroney Engineers, Inc. for elevation of top of casing, concrete pad elevation, and latitude and longitude. This information will be integrated with the existing site survey to determine relative groundwater elevations across the facility.

A registration form for each monitoring well was sent to the LDOTD Water Resources Section on January 10, 1997. Copies of registration forms are included in Appendix C.

2.3 Well Development

On October 30 and 31, 1996, all wells were developed using the rig-mounted suction pump with sufficient new one inch O.D. cresline flexible pipe to reach the bottom of each well. New pipe was used for each well. MW-20 and MW-21 were also developed using a decontaminated 3.5" O.D. PVC bailer. All wells were pumped to dryness at least once during development. The recharge rate for MW-21 was particularly slow. Water volumes removed from each well during well development are given in Table 1.

2.4 Groundwater Sampling

Groundwater samples were collected from each well on October 31, 1996 following well development. The wells were left to recharge for a period of time and to allow suspended solids to settle before sampling. Depth to groundwater was gauged immediately prior to sampling. PAC collected groundwater samples using disposable high density polyethylene (HDPE) bailers for analysis of pH, specific conductance, total dissolved solids, sulfate, chemical oxygen demand, total organic carbon, and aluminum. Groundwater pH, specific conductance, and temperature were determined at each well site using calibrated, portable meters. Analytical results are included in a groundwater monitoring report prepared by ERM-Southwest, Inc. dated January 1997.

3.0 SUMMARY

The scope of work and results of this project may be summarized as follows:

- Five groundwater monitoring wells designated MW-20, MW-21, MW-22, MW-23, and MW-24 were installed around the perimeter of Riverwood's new 41-acre ash/sludge impoundment. With previously existing MW-17, these wells will fulfill the groundwater monitoring requirement for Solid Waste Permit No. P-0244.

- The monitoring wells are screened in the first water-bearing zone. Well depths range from about 37 feet to 46 feet below the top of the levee at 86 feet msl. Each 4-inch I.D. monitoring well was completed with 9.75 feet of 0.01 slot screen.

- The monitoring wells were installed in accordance with the LDEQ/LDOTD document, Construction of Geotechnical Boreholes and Groundwater Monitoring Systems Handbook, May 1993, and Standard Permit No. P-0244 requirements and specifications. Registration forms were submitted to the LDOTD Water Resources Section.

- Groundwater samples were collected from the five new monitoring wells following well development on October 31, 1996. Sampling results are included in a groundwater monitoring report prepared by ERM-Southwest, Inc. dated January 1997.

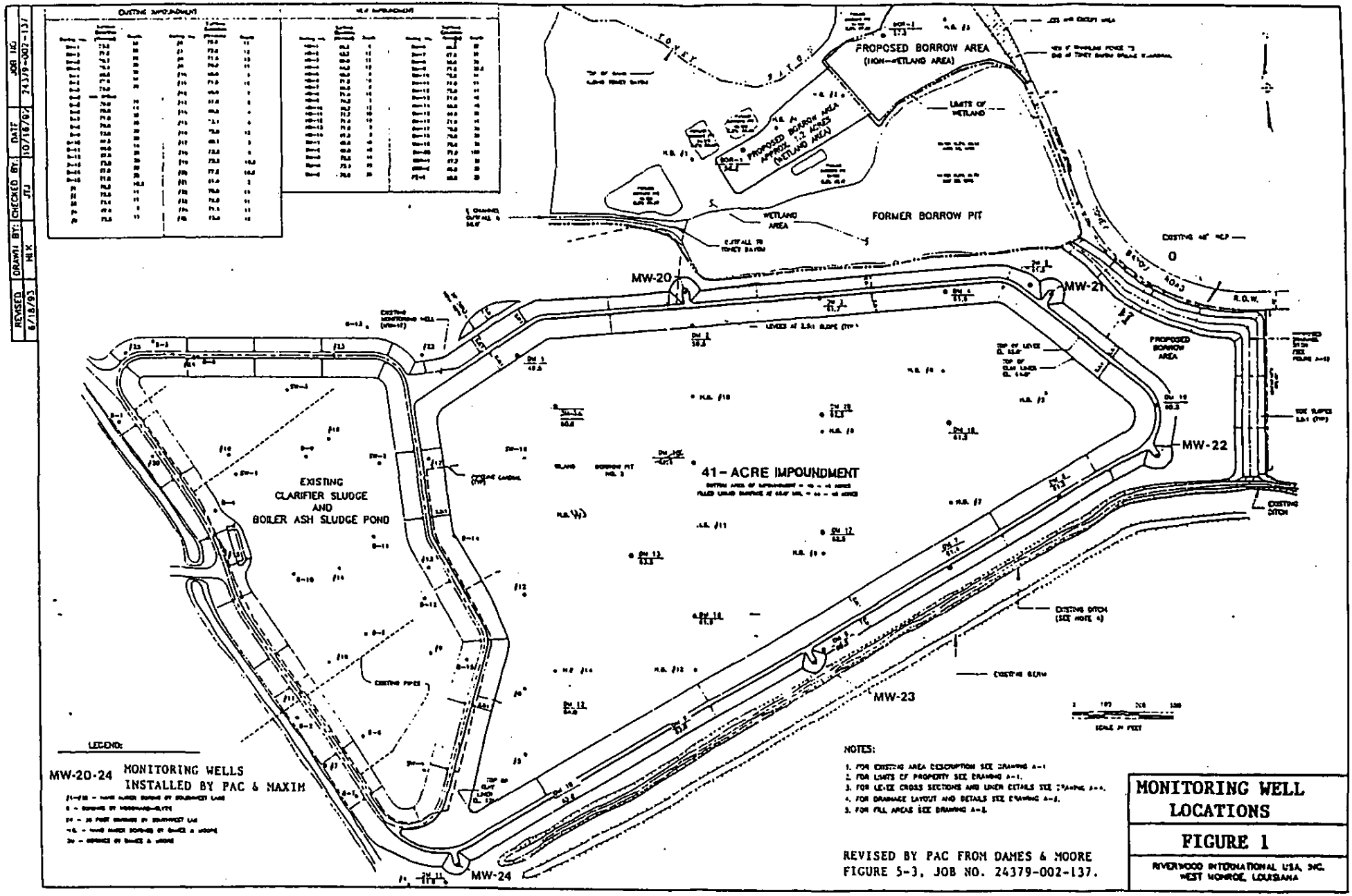

PROPOSED BORROW AREA
(NON-WETLAND AREA)
LIMITS OF WETLAND
PROPOSED BORROW AREA APPROX. 1.2 ACRES (WETLAND AREA)
WETLAND AREA
FORMER BORROW PIT
MW-20
MW-21
MW-22
MW-23
MW-24
41-ACRE IMPOUNDMENT
EXISTING CLARIFIER SLUDGE AND BOILER ASH SLUDGE POND
PROPOSED BORROW AREA
EXISTING DITCH
EXISTING DITCH (SEE NOTE 4)
EXISTING BERM
EXISTING PIPES
R.O.W.
LEGEND:
MW-20-24 MONITORING WELLS INSTALLED BY PAC & MAXIM
NOTES:
1. FOR EXISTING AREA DESCRIPTION SEE DRAWING A-1
2. FOR LIMITS OF PROPERTY SEE DRAWING A-1.
3. FOR LEVEE CROSS SECTIONS AND LINER DETAILS SEE DRAWING A-4.
4. FOR DRAINAGE LAYOUT AND DETAILS SEE DRAWING A-5.
5. FOR FILL AREAS SEE DRAWING A-6.
REVISED BY PAC FROM DAMES & MOORE FIGURE 5-3, JOB NO. 24379-002-137.
MONITORING WELL LOCATIONS
FIGURE 1
RIVERWOOD INTERNATIONAL USA, INC.
WEST MONROE, LOUISIANA
REVISED 6/18/93
DRAWN BY: HLK
CHECKED BY: JTJ
DATE 10/18/92
JOB NO. 24379-002-137

TABLE 1

MONITORING WELL CHARACTERISTICS
RIVERWOOD INTERNATIONAL CORPORATION

Well No.	MW-20	MW-21	MW-22	MW-23	MW-24
Installation Date	10/30/96	10/29/96	10/24/96	10/25/96	10/29/96
Unit Monitored	P-0244 Ash/Sludge Impoundment				
Latitude	32 28'30"	32 28'27"	32 28'22"	32 28'11"	32 28'06"
Longitude	92 08'17"	92 08'01"	92 07'58"	92 08'12"	92 08'21"
Gradient	Down	Up	Down	Down	Up
Casing Size & Material	4 Inch Diameter PVC				
Sampling Equipment	Dedicated Bladder Pumps (to be installed)				
Top of Casing Elevation (ft msl)	88.03	88.04	88.12	88.04	88.06
Concrete Pad Elevation (ft msl)	86.02	85.99	86.01	86.00	85.97
Well Depth (ft BGS)	46	37.2	40	40.7	40.7
Screen Interval (ft msl) FROM TO	50.25 40.5	59.0 49.25	56.4 46.65	55.55 45.8	55.55 45.8
Sump Length (ft)	0.5	0.5	0.5	0.5	0.5
Well Development Volume (gal)	50	28	57	60	45
10/31/96 Depth to Water (ft below TOC*)	25.84	25.50	25.11	26.31	23.68
12/11/96 Depth to Water (ft below TOC) Total Depth (ft below TOC) Groundwater Elevation (ft msl)	27.63 47.35 60.40	25.56 38.70 62.48	26.46 42.13 61.66	28.16 42.58 59.88	25.34 42.40 62.72

*On 10/31/96, TOC elevation was lower than final, surveyed TOC Elevation.

APPENDIX A

Soil Boring Logs

PAC, INC. ENVIRONMENTAL SERVICES
SOIL BORING LOG

Well No. MW-20
Drilled By: Maxim Technologies
Ray Henry (WWC-261)
Logged By: J. Sampognaro - PAC
Drilling Method: Hollow Stem Auger
Borehole Diameter: 10"
Screen Diam: 4" I.D. Length: 9.75' Material: Sch 40 PVC
Casing Diam: 4" I.D. Length: 35.75' Material: Sch 40 PVC
Top of Casing Elev: 88.03 ft msl

Client: Riverwood International, USA
Location: Ash/Sludge Impoundment
Project Number: 96097
Date: 10/30/96
Start: 6:30
Finish: 12:20
Concrete Pad Elev: 86.02 ft msl

Well Completion	Water Level	Depth (ft)	Sample Type	Sample Depth (ft)	Description Depth	USCS	Legend:
				0-1'	0-1		Sand, Clay, Gravel Fill
				1-6'	1-16	CH CL	Clay and Silty Clay Fill, tan, gray, and brown, mottled, slightly moist, plastic, very stiff, compacted, occassional loose silty lense.
		5					
				6-11'			
		10					
				11-16'			
		15					
				16-21'	16-20	CH	Clay, tan, gray, and brown, mottled, slightly moist, very stiff, plastic.
		20			20-21	ML	Silt, tan to brown with orange mottling, slightly moist.
				21-26'	21-26	SM	Silty Sand, v. fine grain, tan w/orange mottling, dry, woody organics and rootlets.
	V	25					

Legend:
- ▼ Groundwater First Encountered
- V Static Water Level (After 5 hrs)
- Shelby Tube
- Screen
- X Split Spoon
- Filter Pack
- Cuttings
- Bentonite Seal

SAMPLE DESCRIPTION

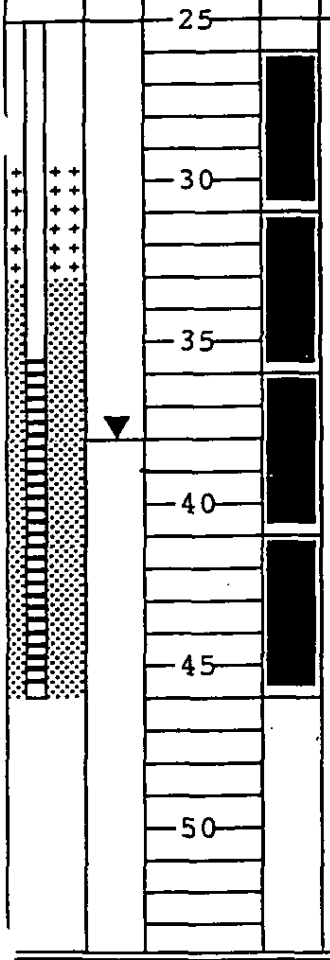
REMARKS: Depths below ground surface are referenced to top of concrete pad which is approximately one foot higher than ground surface at the time of well installation. Finished sampling to 46' at 8:45. Overdrilled borehole to 46' then set well with filter pack, bentonite, and sugar sand. Grouted at 12:30 on 10/31/96. DTW below TOC = 25.84 on 10/31/96.

PAC, INC. ENVIRONMENTAL SERVICES
SOIL BORING LOG

Well No. MW-20
Drilled By: Maxim Technologies
Ray Henry (WWC-261)
Logged By: J. Sampognaro - PAC
Drilling Method: Hollow Stem Auger
Borehole Diameter: 10"
Screen Diam: 4" I.D. Length: 9.75' Material: Sch 40 PVC
Casing Diam: 4" I.D. Length: 35.75' Material: Sch 40 PVC
Tope of Casing Elev: 88.03 ft msl

Client: Riverwood International, USA
Location: Ash/Sludge Impoundment
Project Number: 96097
Date: 10/30/96
Start: 6:30
Finish: 12:20
Concrete Pad Elev: 86.02 ft msl

Legend:
- Groundwater First Encountered
- Static Water Level (After 5 hrs)
- Shelby Tube
- Screen
- Split Spoon
- Filter Pack
- Cuttings
- Bentonite Seal



Well Completion	Water Level	Depth (ft)	Sample Type	Sample Depth (ft)	Description Depth	USCS	SAMPLE DESCRIPTION
		25			26-36	CH	Clay, brown to tan, orange mottling, slightly moist, very stiff.
				26-31'			
		30					
				31-36'			
		35			36-38.5	CH	Clay, gray w/orange mottling, moist, very stiff.
				36-41'	38.5-38.75	SP	Sand, med. grain, brown, saturated.
		40			38.5-40	CL	Silty Clay, tan w/orange mottling, moist, stiff.
				41-46'	40-41	SC	Clayey Sand, fine grain, tan, saturated, moderately silty, clay increases w/depth.
		45			41-42	SM	Silty Sand, fine-med. grain, tan, saturated.
		50			42-46	CH	Clay, gray w/orange mottling, moist, stiff.

REMARKS:

PAC, INC. ENVIRONMENTAL SERVICES
SOIL BORING LOG

Well No. MW-21 | Client: Riverwood International, USA
Drilled By: Maxim Technologies | Location: Ash/Sludge Impoundment
Ray Henry (WWC-261)
Logged By: Sarah Moore - PAC | Project Number: 96097
Drilling Method: Hollow Stem Auger
Borehole Diameter: 10" | Date: 10/29/96
Screen Diam: 4" I.D. Length: 9.75' Material: Sch 40 PVC Start: 9:40
Casing Diam: 4" I.D. Length: 27' Material: Sch 40 PVC Finish: 16:15
Top of Casing Elev: 88.04 ft msl Concrete Pad: 85.99 ft msl

Legend:
▼ Groundwater First Encountered
V Static Water Level (After 29.5 hours)
Shelby Tube | Screen
X Split Spoon | Filter Pack
Cuttings | Bentonite Seal

Well Completion	Water Level	Depth (ft)	Sample Type	Sample Depth (ft)	Description Depth	USCS	SAMPLE DESCRIPTION
				0-1'	0-1		Sand, Clay, Gravel Fill
				1-6'	1 - 16.5	CH CL	Clay Fill, gray to brown, mottled, slightly to very silty from 0-5', very stiff, compacted, plastic, dry to slightly moist, occassional loose silty seam, trace woody organics and carbonate modules.
		5					
				6-11'			
		10					
				11-16'			
		15					
				16-21'	16.5-17.5	ML	Silt, gray, loose, underlain by firm tan-orange silt with abnt. fine rootlets, orange mottling, dry, clay increases with depth.
		20					
	▼			21-26'	17.5-22	CH	Clay, gray to brown, mottled, stiff, blocky texture w/depth, rare silty streak
	V				22-23	CL	Silty Clay, brown, mottled, firm, moist, trace carbonate nodules.
		25					
					23-26	CL	Clayey Sand, fine grain, soft, moist, moderate plasticity, trace organics.

REMARKS: Depths below ground surface are referenced to top of concrete pad which is approximately one foot higher than ground surface at the time of well installation. Finished sampling to 41' BGS at 11:10. Overdrilled borehole to about 37.5' BGS then set well with filterpack, bentonite, and sugar sand. Grouted and developed well on 10/30/96.

PAC, INC. ENVIRONMENTAL SERVICES
SOIL BORING LOG

Well No. MW-21
Drilled By: Maxim Technologies
Ray Henry (WWC-261)
Logged By: Sarah Moore - PAC
Drilling Method: Hollow Stem Auger
Borehole Diameter: 10"
Screen Diam: 4" I.D. Length: 9.75' Material: Sch 40 PVC
Casing Diam: 4" I.D. Length: 27' Material: Sch 40 PVC
Top of Casing Elev: 88.04 ft msl

Client: Riverwood International, USA
Location: Ash/Sludge Impoundment
Project Number: 96097
Date: 10/29/96
Start: 9:40
Finish: 16:15
Concrete Pad Elev: 85.99 ft msl

Legend:
- Groundwater First Encountered
- Static Water Level (After 29.5 hours)
- Shelby Tube
- Screen
- Split Spoon
- Filter Pack
- Cuttings
- Bentonite Seal

Well Completion	Water Level	Depth (ft)	Sample Type	Sample Depth (ft)	Description Depth	USCS	SAMPLE DESCRIPTION
		25					
				26-31'	26-35	SM	Silty Sand, v. fine grain, brown, soft, saturated, clayey lenses, trace organics.
		30					
				31-36'			
		35			35-36	CH	Clay, gray to brown, mottled, firm, plastic, trace organic, large woody black root at 34'.
				36-41'			
		40			36-41	CH	No Recovery, sample slipped from Shelby tube. Clay on bottom 2' of Shelby tube and on bottom of augers and bit.
		45					
		50					

REMARKS: DTW before development on 10/30/96 was 22.1' BGS.

PAC, INC. ENVIRONMENTAL SERVICES
SOIL BORING LOG

Well No. MW-22
Drilled By: Maxim Technologies
Ray Henry (WWC-261)
Logged By: Sarah Moore - PAC
Drilling Method: Hollow Stem Auger
Borehole Diameter: 10"
Screen Diam: 4" I.D. Length: 9.75' Material: Sch 40 PVC
Casing Diam: 4" I.D. Length: 29.75' Material: Sch 40 PVC
Top of Casing Elev: 88.12 ft sml

Client: Riverwood International, USA
Location: Ash/Sludge Impoundment
Project Number: 96097
Date: 10/24/96
Start: 12:05
Finish: 19:00
Concrete Pad Elev: 86.01 ft msl

Legend:
- Groundwater First Encountered
- Static Water Level (After 2 hours)
- Shelby Tube
- Screen
- Split Spoon
- Filter Pack
- Cuttings
- Bentonite Seal

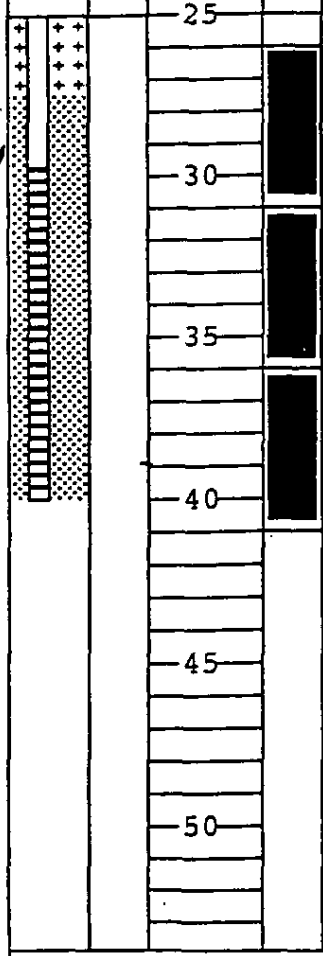
Well Completion	Water Level	Depth (ft)	Sample Type	Sample Depth (ft)	Description Depth	USCS	SAMPLE DESCRIPTION
				0-1'	0-1'		Sand, Clay, Gravel Fill
				1-6'	1-16'	CH CL	Clay Fill, gray to brown, mottled, loose silt and some v. fine sand in occassional lenses, very stiff, compacted, dry to moist, some iron nodules from 1-6', rare carbonate nodules.
		5					
				6-11'			
		10					
				11-16'			
		15					
					16-16.5	ML	Silt, gray, dry, some laminations.
				16-21'			
					16.5-21	ML	Silty Sand, dark orange to tan, v. fine grain, dry to moist below 19'.
		20					
					21-24	ML	Clayey Sand, v.fine grain, mottled, moderately silty, clay in lenses w/in sand, sat. below 23'. Iron staining & nodules.
	V			21-26'			
	▼	25			24-26	ML	Clay, dk gray to red-brown, mottled to laminated, very stiff, moist, plastic, saturated silty fine sand lenses btwn 24-25', trace organics.

REMARKS: Depths below ground surface are referenced to top of concrete pad which is approximately one foot higher than ground surface at the time of well installation. Encountered an apparently perched water table in clayey sand at 23' BGS. Encountered true groundwater table in silty clay at 31' BGS. Finished sampling to 41' BGS at 14:00.

PAC, INC. ENVIRONMENTAL SERVICES
SOIL BORING LOG

Well No. MW-22 | Client: Riverwood International, USA
Drilled By: Maxim Technologies | Location: Ash/Sludge Impoundment
Ray Henry (WWC-261)
Logged By: Sarah Moore - PAC | Project Number: 96097
Drilling Method: Hollow Stem Auger
Borehole Diameter: 10" | Date: 10/24/96
Screen Diam: 4" I.D. Length: 9.75' Material: Sch 40 PVC | Start: 12:05
Casing Diam: 4" I.D. Length: 29.75' Material: Sch 40 PVC | Finish: 19:00
Top of Casing Elev: 88.12 ft msl | Concrete Pad Elev: 86.01 ft msl

Legend:
- ▼ Groundwater First Encountered
- V Static Water Level (After 2 hours)
- Shelby Tube
- Screen
- X Split Spoon
- Filter Pack
- Cuttings
- Bentonite Seal



Sample Depth (ft)	Depth of Description	USCS	SAMPLE DESCRIPTION
26-31'	26-30.5	CH	Clay, dk gray w/red-brown mottling, moist, very stiff.
	30.5-37	CL	Silty Clay, red-brown, mottled, saturated, plastic, soft, blocky texture, trace dark organics.
31-36'			
	37-41	CH	Clay, dk gray to red-brown, mottled, moist, plastic, very stiff, trace dark organics and wood fragments, rare carbonate nodule.
36-41'			

REMARKS: Overdrilled borehole to 40' BGS then set well with filterpack, bentonite, and sugar sand. Grouted on 10/25/96. Developed well on 10/30/96. Depth to water before development was 23.4' BGS.

PAC, INC. ENVIRONMENTAL SERVICES
SOIL BORING LOG

Well No. MW-23 Client: Riverwood International, USA
Drilled By: Maxim Technologies Location: Ash/Sludge Impoundment
Ray Henry (WWC-261)
Logged By: Sarah Moore - PAC Project Number: 96097
Drilling Method: Hollow Stem Auger
Borehole Diameter: 10" Date: 10/25/9(
Screen Diam: 4" I.D. Length: 9.75' Material: Sch 40 PVC Start: 9:15
Casing Diam: 4" I.D. Length: 30.45' Material: Sch 40 PVC Finish: 13:50
Top of Casing Elev: 88.04 ft msl Concrete Pad Elev: 86.00 ft msl

Legend:
▼ Groundwater First Encountered
V Static Water Level (After 0.75 hr)
Shelby Tube — Screen
X Split Spoon — Filter Pack
Cuttings — Bentonite Seal

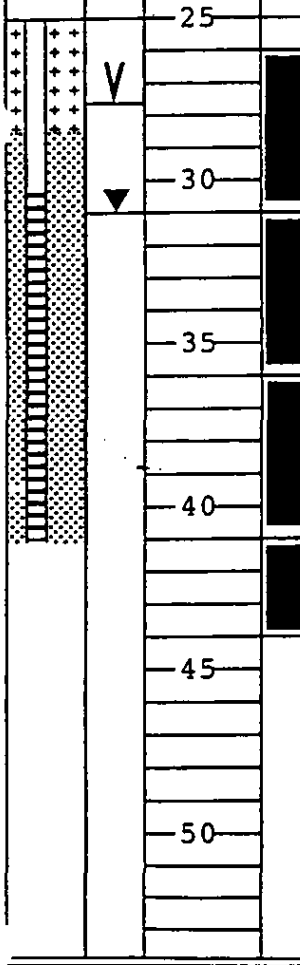
Well Completion	Water Level	Depth (ft)	Sample Type	Sample Depth (ft)	Depth Description	USCS	SAMPLE DESCRIPTION
				0-1'	0-1'		Sand, Clay, Gravel Fill
				1-6'	1-16'	CH	Clay Fill, gray, tan, and red-brown, mottled, firm, compacted, dry to moist, occassional loose silty to v. fine sand layer.
		5					
				6-11'			
		10					
				11-16'			
		15					
				16-21'	16.5-18.5	CH	Clay, red-brown, mottled, moist, stiff, plastic, trace dk granular organics, trace carbonate nodules.
		20			18.5-21	ML	Silt, dk gray, moist, nonplastic, relatively loose, slightly clayey, woody root fragment; unlerlain by stiff tan-orange silt w/abnt. fine rootlets, moist, nonplastic, slightly clayey.
				21-26'			
		25					
	V				21-26	CH	Clay, gray to red/brown, mottled, burrowed, moist, firm, trace carbonate nodules.

REMARKS: Depths below ground surface are referenced to top of concrete pac which is approximately one foot higher than ground surface at the time of well installation. Finished sampling to 44' at 10:45. DTW in augers = 27.6' BGS. Overdrilled borehole to 41' BGS then set well with filterpack, bentonite, and sugar sand. Grouted well on 10/28/96.

PAC, INC. ENVIRONMENTAL SERVICES
SOIL BORING LOG

Well No. MW-23 | Client: Riverwood International, USA
Drilled By: Maxim Technologies | Location: Ash/Sludge Impoundment
Ray Henry (WWC-261)
Logged By: Sarah Moore - PAC | Project Number: 96097
Drilling Method: Hollow Stem Auger
Borehole Diameter: 10" | Date: 10/25/96
Screen Diam: 4" I.D. Length: 9.75' Material: Sch 40 PVC Start: 9:15
Casing Diam: 4" I.D. Length: 30.45' Material: Sch 40 PVC Finish: 13:50
Top of Casing Elev: 88.04 ft msl | Concrete Pad Elev: 86.00 ft msl

Legend:
- Groundwater First Encountered
- Static Water Level (After 0.75 hr)
- Shelby Tube
- Screen
- Split Spoon
- Filter Pack
- Cuttings
- Bentonite Seal



Well Completion	Water Level	Depth (ft)	Sample Type	Sample Depth (ft)	Description Depth	USCS	SAMPLE DESCRIPTION
		25			26-30	CH	Clay, gray to red-brown, mottled, burrowed, moist, firm, trace carbonate nodules.
				26-31'			
		30			30-31	CL	Silty Clay, red-brown to orange, mottled moist, firm, trace dark organics.
				31-36'	31-38.75	SP	Sand, v. fine grain, red-brown, mottled, with some laminations, saturated, low plasticity, moderately clayey and silty, some clay lenses below 36'.
		35					
				36-41'	38.75-40	CL	Silty Clay, red-brown, mottled, saturated, plastic, some thin silty lenses, trace organics.
		40					
				41-44'	40-41	CH	Clay, red-brown, moist, firm, plastic, mottled.
		45			41-43	CL	Silty Clay, red-brown, mottled, saturated, plastic, trace organics, some thin silt lenses.
					43-44	CH	Clay, brown to gray, mottled, moist, firm, slightly silty, trace organics, rootlets.
		50					

REMARKS: DTW before development on 10/31/96 was 23.0' BGS.

PAC, INC. ENVIRONMENTAL SERVICES
SOIL BORING LOG

Well No. MW-24
Drilled By: Maxim Technologies
Ray Henry (WWC-261)
Logged By: Sarah Moore - PAC
Drilling Method: Hollow Stem Auger
Borehole Diameter: 10"
Screen Diam: 4" I.D. Length: 9.75' Material: Sch 40 PVC
Casing Diam: 4" I.D. Length: 30.45' Material: Sch 40 PVC
Top of Casing Elev: 88.06 ft msl

Client: Riverwood International, USA
Location: Ash/Sludge Impoundment
Project Number: 96097
Date: 10/28/
Start: 12:0
Finish: 10/29/
8:3

Concrete Pad Elev: 85.97 ft msl

Legend:
- Groundwater First Encountered
- Static Water Level (After 68 hours)
- Shelby Tube
- Screen
- Split Spoon
- Filter Pack
- Cuttings
- Bentonite Seal

Well Completion	Water Level	Depth (ft)	Sample Type	Sample Depth (ft)	Description Depth	USCS	SAMPLE DESCRIPTION
	▼	25					
				26-31'	26-27'	CL	Silty Clay, gray, saturated, v. soft, plastic.
		30			27-31'	CH	Clay, gray, some orange to brown mottling, firm, occassional silty layer.
				31-36'	31-36'	SP	Sand, v. fine to fine grain, gray to orange below 33.5', saturated, moderately silty, occassional 1-2" clay lense.
		35					
				36-41'	36-41'	SP	Sand, same as above, fine grain, with occassional clay lenses, some laminations.
		40					
		45					
		50					

REMARKS: and sugar sand. Grouted at 17:30 on 10/29/96. DTW before development on 10/31/96 was 23.7' BGS.

PAC, INC. ENVIRONMENTAL SERVICES
SOIL BORING LOG

Well No. MW-24
Drilled By: Maxim Technologies
Ray Henry (WWC-261)
Logged By: Sarah Moore - PAC
Drilling Method: Hollow Stem Auger
Borehole Diameter: 10"
Screen Diam: 4" I.D. Length: 9.75' Material: Sch 40 PVC
Casing Diam: 4" I.D. Length: 30.45' Material: Sch 40 PVC
Top of Casing Elev: 88.06 ft msl

Client: Riverwood International, USA
Location: Ash/Sludge Impoundment
Project Number: 96097
Date: 10/28/
Start: 12:0
Finish: 10/29/
8:3
Concrete Pad Elev: 85.97 ft msl

Legend:
▼ Groundwater First Encountered
Y Static Water Level (After 68 hours)
Shelby Tube
Screen
X Split Spoon
Filter Pack
Cuttings
Bentonite Seal

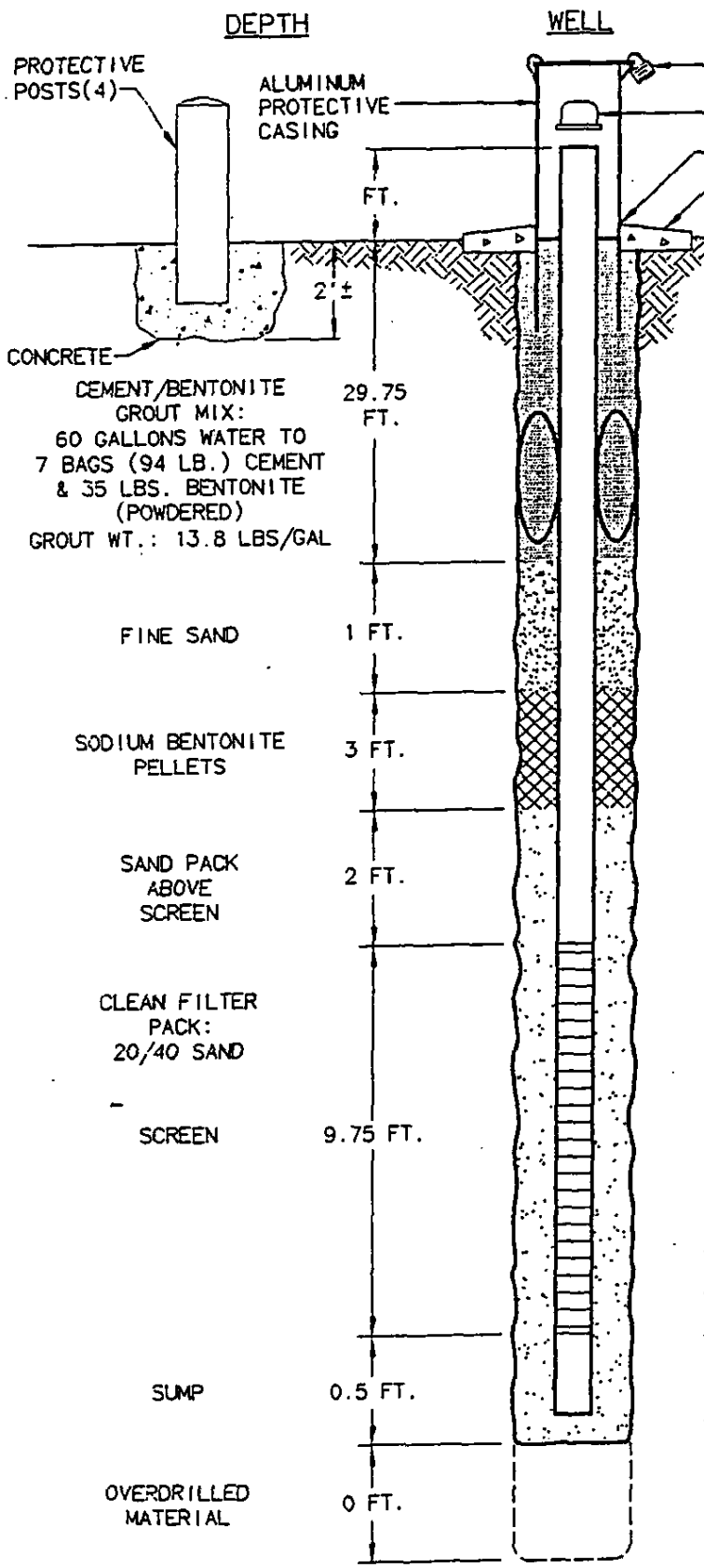
Well Completion	Water Level	Depth (ft)	Sample Type	Sample Depth (ft)	Description Depth	USCS	SAMPLE DESCRIPTION
				0-1'	0-1'	CH	Clay and Silty Clay Fill, brown, gray, and tan, mottled, dry to moist, firm, plastic, trace organics and carbonate nodules, woody root at 6', occassional loose silty layers.
				1-6'	1-14.5'	CL	
		5					
				6-11'			
		10					
				11-16'			
					14.5-16	CL	Silty Clay, gray, mottled, moist, plastic.
		15					
					16-21	CL	Sandy Clay, v.fine grain, gray to brown, some mottling, moist, plastic, relatively, soft, trace dark organics, woody rootlet.
				16-21'			
		20					
					21-22.5	CL	Sandy Clay, gray to orange, mottled, moist, firm, v. fine grain.
				21-26'			
	Y						
	▼	25			22.5-26	SM	Silty Sand, v. fine grain, light gray, very moist, soft, moderately clayey, low plasticity, trace dark organics, woody rootlets.

REMARKS: Depths below ground surface are referenced to top of concrete pad which is approximately one foot higher than ground surface at the time of well installation. Finished sampling to 41' BGS at 12:30. Attempted to overdrill but had problems with bottom plug in augers. Overdrilled to 41' on 10/29/96 then set well with filterpack, bentonite,

APPENDIX B

Monitoring Well Installation Diagrams

RIVERWOOD INTERNATIONAL, USA
MONITORING WELL INSTALLATION DIAGRAM



SPECIFICATIONS

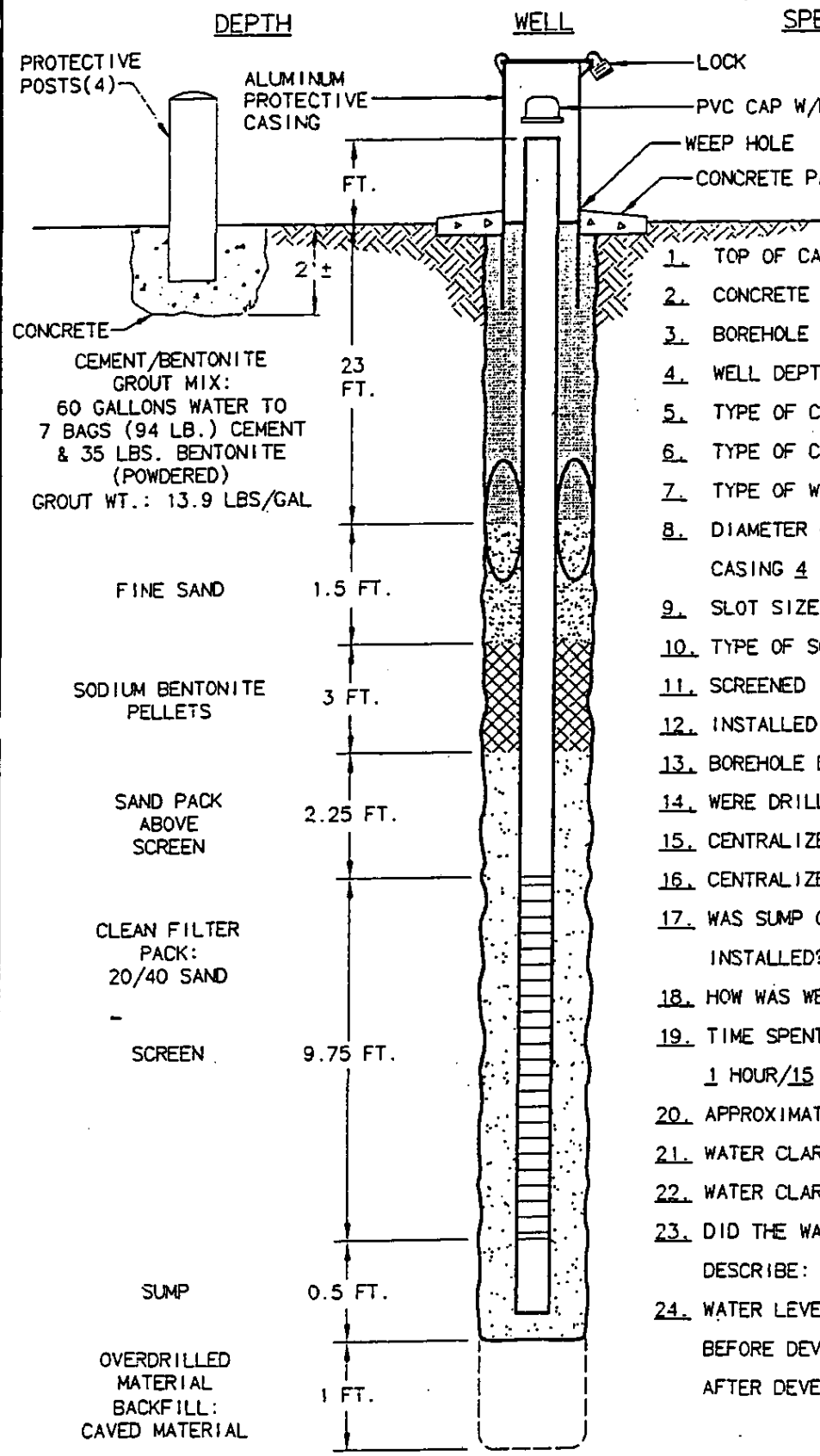
1. TOP OF CASING (NGVD): 88.03
2. CONCRETE PAD ELEVATION (NGVD): 86.02
3. BOREHOLE DEPTH: 46 FEET BGS
4. WELL DEPTH: 46 FEET BGS
5. TYPE OF CASING: PVC
6. TYPE OF CASING JOINTS: SCREW-COUPLE
7. TYPE OF WELL SCREEN: PVC
8. DIAMETER OF CASING AND WELL SCREEN: CASING 4 INCHES, SCREEN 4 INCHES
9. SLOT SIZE OF SCREEN: 0.01 INCH
10. TYPE OF SCREEN PERFORATION: FACTORY SLOTTED
11. SCREENED INTERVAL: 35.75 TO 45.5 FEET BGS
12. INSTALLED PROTECTOR PIPE W/LOCK: YES
13. BOREHOLE DIAMETER - 10 INCHES
14. WERE DRILLING ADDITIVES USED? NO
15. CENTRALIZER MATERIAL: STAINLESS STEEL
16. CENTRALIZER DEPTH: 28.5 TO 29.5 FEET BGS
17. WAS SUMP OR DENSE PHASE SAMPLING CUP INSTALLED? SUMP
18. HOW WAS WELL DEVELOPED? PUMP & BAILER
19. TIME SPENT ON WELL DEVELOPMENT? 2 HOURS/15 MINUTES
20. APPROXIMATE WATER VOLUME REMOVED? 50 GALLONS
21. WATER CLARITY BEFORE DEVELOPMENT? OPAQUE
22. WATER CLARITY AFTER DEVELOPMENT? CLOUDY
23. DID THE WATER HAVE ODOR? NO COLOR? YES
    DESCRIBE: BROWN CLAYEY SEDIMENT
24. WATER LEVEL SUMMARY (FROM TOP OF CASING)
    BEFORE DEVELOPMENT 25.6 FEET DATE 10/30/96
    AFTER DEVELOPMENT 25.84 FEET DATE 10/31/96

WELL NO. MW-20 DATE INSTALLED 10/30/96 DRILL RIG TYPE CME-75

DRILLER/FIRM MAXIM TECHNOLOGIES DRILLER C.R. HENRY GEOLOGIST J. SAMPOGNARO - PAC

13225W20 12-27-96

RIVERWOOD INTERNATIONAL, USA
MONITORING WELL INSTALLATION DIAGRAM



SPECIFICATIONS

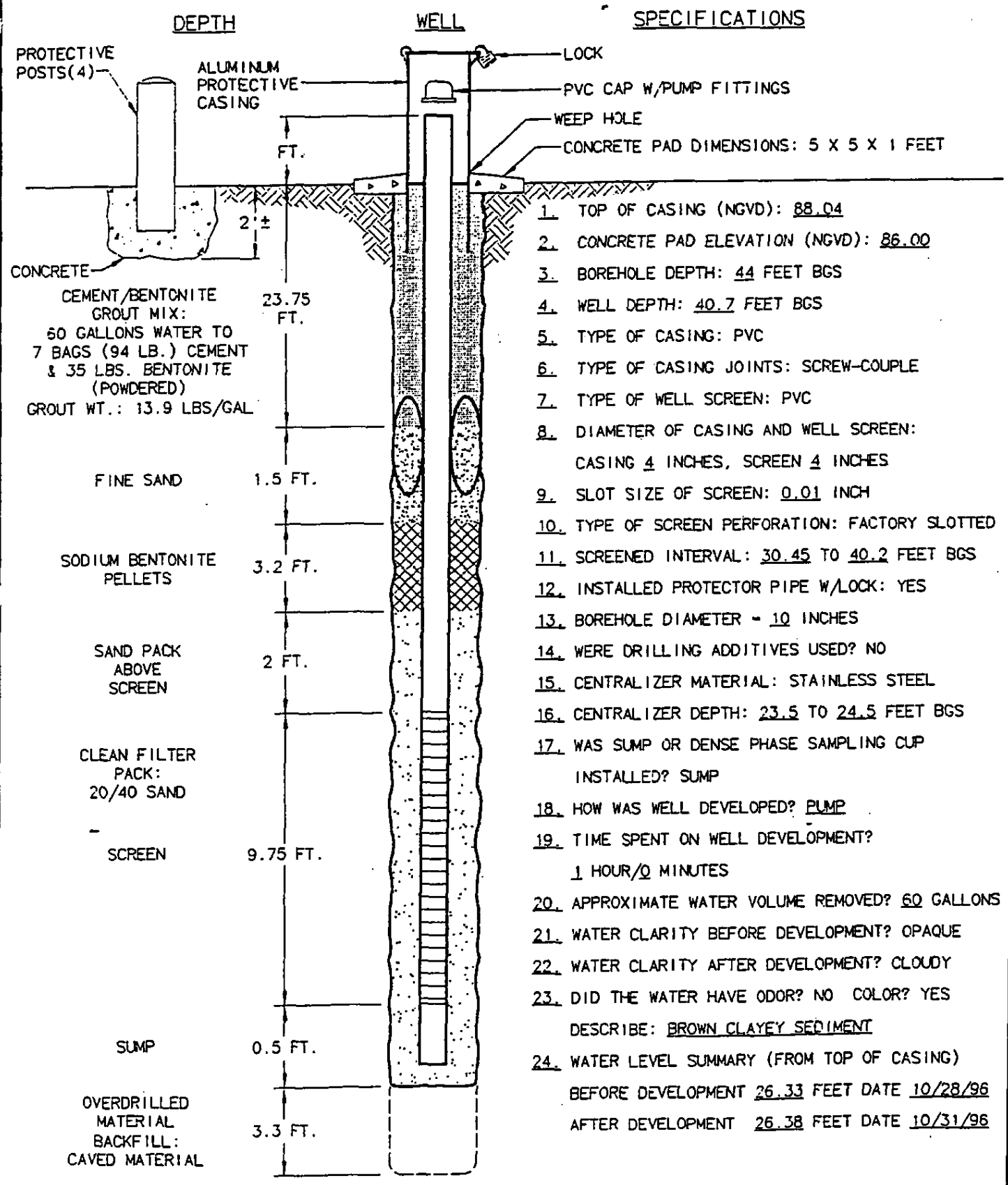
1. TOP OF CASING (NGVD): 88.12
2. CONCRETE PAD ELEVATION (NGVD): 86.01
3. BOREHOLE DEPTH: 41 FEET BGS
4. WELL DEPTH: 40 FEET BGS
5. TYPE OF CASING: PVC
6. TYPE OF CASING JOINTS: SCREW-COUPLE
7. TYPE OF WELL SCREEN: PVC
8. DIAMETER OF CASING AND WELL SCREEN: CASING 4 INCHES, SCREEN 4 INCHES
9. SLOT SIZE OF SCREEN: 0.01 INCH
10. TYPE OF SCREEN PERFORATION: FACTORY SLOTTED
11. SCREENED INTERVAL: 29.75 TO 39.5 FEET BGS
12. INSTALLED PROTECTOR PIPE W/LOCK: YES
13. BOREHOLE DIAMETER - 10 INCHES
14. WERE DRILLING ADDITIVES USED? NO
15. CENTRALIZER MATERIAL: STAINLESS STEEL
16. CENTRALIZER DEPTH: 22.5 TO 23.5 FEET BGS
17. WAS SUMP OR DENSE PHASE SAMPLING CUP INSTALLED? SUMP
18. HOW WAS WELL DEVELOPED? PUMP
19. TIME SPENT ON WELL DEVELOPMENT? 1 HOUR/15 MINUTES
20. APPROXIMATE WATER VOLUME REMOVED? 57 GALLONS
21. WATER CLARITY BEFORE DEVELOPMENT? OPAQUE
22. WATER CLARITY AFTER DEVELOPMENT? SL. CLOUDY
23. DID THE WATER HAVE ODOR? NO COLOR? YES
    DESCRIBE: BROWN CLAYEY SEDIMENT
24. WATER LEVEL SUMMARY (FROM TOP OF CASING)
    BEFORE DEVELOPMENT 25.38 FEET DATE 10/25/96
    AFTER DEVELOPMENT 25.78 FEET DATE 10/31/96

WELL NO. MW-22 DATE INSTALLED 10/24/96 DRILL RIG TYPE CME-75

DRILLER/FIRM MAXIM TECHNOLOGIES DRILLER C.R. HENRY GEOLOGIST S. MOORE - PAC

13226W22 12-27-96

RIVERWOOD INTERNATIONAL, USA
MONITORING WELL INSTALLATION DIAGRAM



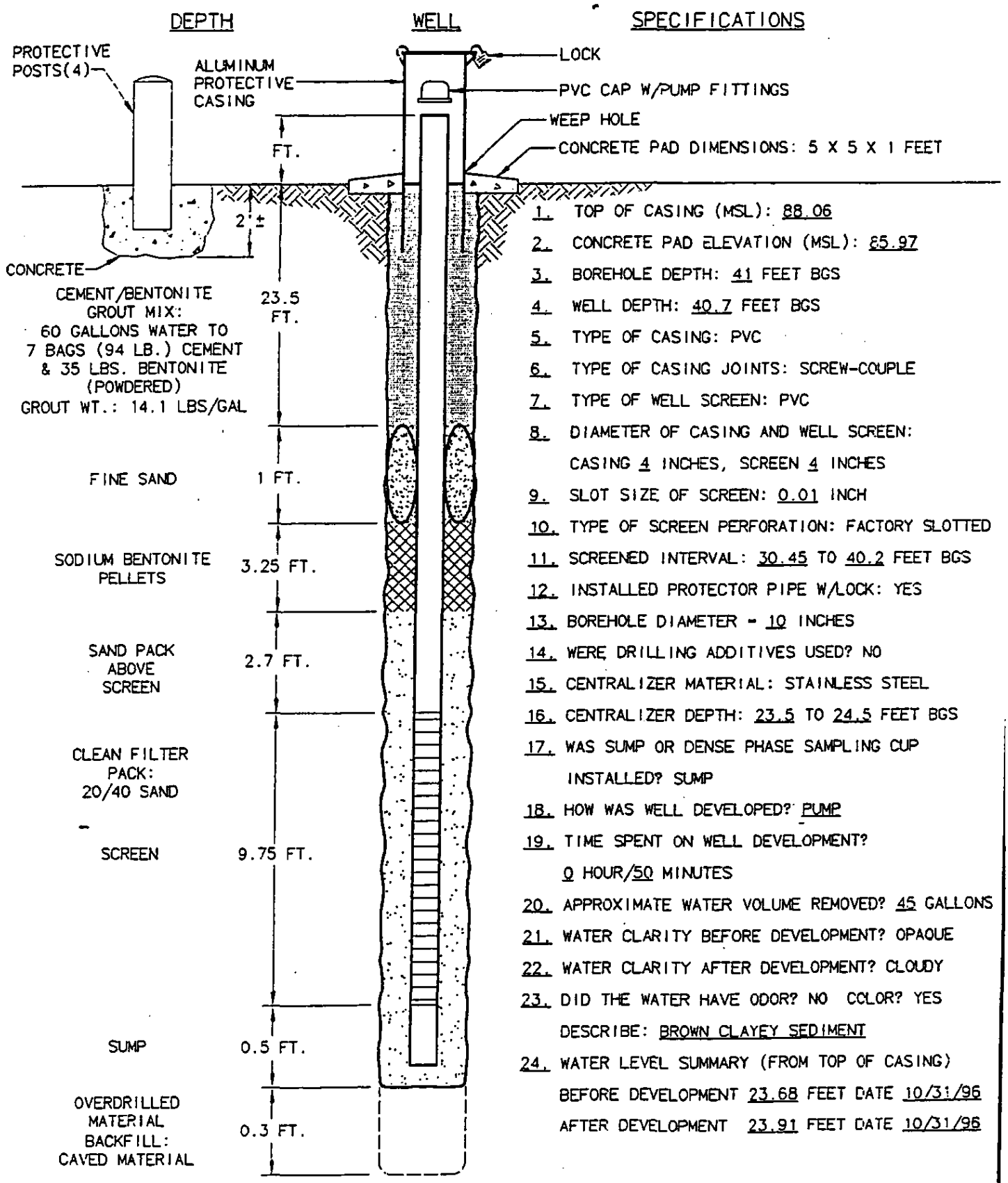
1. TOP OF CASING (NGVD): 88.04
2. CONCRETE PAD ELEVATION (NGVD): 86.00
3. BOREHOLE DEPTH: 44 FEET BGS
4. WELL DEPTH: 40.7 FEET BGS
5. TYPE OF CASING: PVC
6. TYPE OF CASING JOINTS: SCREW-COUPLE
7. TYPE OF WELL SCREEN: PVC
8. DIAMETER OF CASING AND WELL SCREEN:
   CASING 4 INCHES, SCREEN 4 INCHES
9. SLOT SIZE OF SCREEN: 0.01 INCH
10. TYPE OF SCREEN PERFORATION: FACTORY SLOTTED
11. SCREENED INTERVAL: 30.45 TO 40.2 FEET BGS
12. INSTALLED PROTECTOR PIPE W/LOCK: YES
13. BOREHOLE DIAMETER - 10 INCHES
14. WERE DRILLING ADDITIVES USED? NO
15. CENTRALIZER MATERIAL: STAINLESS STEEL
16. CENTRALIZER DEPTH: 23.5 TO 24.5 FEET BGS
17. WAS SUMP OR DENSE PHASE SAMPLING CUP
    INSTALLED? SUMP
18. HOW WAS WELL DEVELOPED? PUMP
19. TIME SPENT ON WELL DEVELOPMENT?
    1 HOUR/0 MINUTES
20. APPROXIMATE WATER VOLUME REMOVED? 60 GALLONS
21. WATER CLARITY BEFORE DEVELOPMENT? OPAQUE
22. WATER CLARITY AFTER DEVELOPMENT? CLOUDY
23. DID THE WATER HAVE ODOR? NO COLOR? YES
    DESCRIBE: BROWN CLAYEY SEDIMENT
24. WATER LEVEL SUMMARY (FROM TOP OF CASING)
    BEFORE DEVELOPMENT 26.33 FEET DATE 10/28/96
    AFTER DEVELOPMENT 26.38 FEET DATE 10/31/96

WELL NO. MW-23 DATE INSTALLED 10/25/96 DRILL RIG TYPE CME-75

DRILLER/FIRM MAXIM TECHNOLOGIES DRILLER C.R. HENRY GEOLOGIST S. MOORE - PAC

13226W23 12-27-96

RIVERWOOD INTERNATIONAL, USA
MONITORING WELL INSTALLATION DIAGRAM



1. TOP OF CASING (MSL): 88.06
2. CONCRETE PAD ELEVATION (MSL): 85.97
3. BOREHOLE DEPTH: 41 FEET BGS
4. WELL DEPTH: 40.7 FEET BGS
5. TYPE OF CASING: PVC
6. TYPE OF CASING JOINTS: SCREW-COUPLE
7. TYPE OF WELL SCREEN: PVC
8. DIAMETER OF CASING AND WELL SCREEN: CASING 4 INCHES, SCREEN 4 INCHES
9. SLOT SIZE OF SCREEN: 0.01 INCH
10. TYPE OF SCREEN PERFORATION: FACTORY SLOTTED
11. SCREENED INTERVAL: 30.45 TO 40.2 FEET BGS
12. INSTALLED PROTECTOR PIPE W/LOCK: YES
13. BOREHOLE DIAMETER - 10 INCHES
14. WERE DRILLING ADDITIVES USED? NO
15. CENTRALIZER MATERIAL: STAINLESS STEEL
16. CENTRALIZER DEPTH: 23.5 TO 24.5 FEET BGS
17. WAS SUMP OR DENSE PHASE SAMPLING CUP INSTALLED? SUMP
18. HOW WAS WELL DEVELOPED? PUMP
19. TIME SPENT ON WELL DEVELOPMENT? 0 HOUR/50 MINUTES
20. APPROXIMATE WATER VOLUME REMOVED? 45 GALLONS
21. WATER CLARITY BEFORE DEVELOPMENT? OPAQUE
22. WATER CLARITY AFTER DEVELOPMENT? CLOUDY
23. DID THE WATER HAVE ODOR? NO COLOR? YES
    DESCRIBE: BROWN CLAYEY SEDIMENT
24. WATER LEVEL SUMMARY (FROM TOP OF CASING)
    BEFORE DEVELOPMENT 23.68 FEET DATE 10/31/96
    AFTER DEVELOPMENT 23.91 FEET DATE 10/31/96

WELL NO. MW-24 DATE INSTALLED 10/28/96 DRILL RIG TYPE CME-75

DRILLER/FIRM MAXIM TECHNOLOGIES DRILLER C.R. HENRY GEOLOGIST S. MOORE - PAC

13226W24 12-27-96

APPENDIX C

LDOTD Well Registration Forms

APPENDIX C

LDOTD Well Registration Forms

WATER RESOURCES SECTION
WATER WELL REGISTRATION REPORT FORM (DOTD-GW-1S)

PLEASE PRINT IN INK OR TYPE WHEN COMPLETING THIS FORM

1. USE OF WELL (Check Appropriate Box)
☐ DOMESTIC ☐ RIG SUPPLY ☒ MONITORING ☐ PIEZOMETER ☐ RECOVERY
☐ HEAT PUMP HOLE ☐ HEAT PUMP SUPPLY ☐ ABANDONED PILOT HOLE ☐ OTHER _____ (Please Specify)

2. WELL OWNER Riverwood International USA PHONE (318) 362-2735

3. WELL OWNER'S ADDRESS P. O. Box 35800, West Monroe, LA 71294

4. OWNER'S WELL NUMBER OR NAME (if any) MW-20

5. DATE COMPLETED 10/30/96 DEPTH OF HOLE 46 FT. DEPTH OF WELL 46 FT.

6. STATIC WATER LEVEL 24 FT. BELOW GROUND SURFACE MEASURED ON 10/31/96 (Date)

7. CASING 4 IN. ☐ METAL ☒ PLASTIC ☐ OTHER LENGTH 38 FT.

8. SCREEN 4 IN. ☐ METAL ☒ PLASTIC ☐ OTHER SLOT SIZE 0.010 LENGTH 10 FT.

9. CEMENTED FROM 30 FT. TO GROUND SURFACE, USING ☒ PUMP DOWN METHOD OR ☐ GRAVITY METHOD

10. LOCATION OF WELL: PARISH Ouachita WELL IS NEAR, West Monroe, LA (Town or City)
APPROXIMATELY 1.4 MILES FROM southeast of the intersection of LA Hwy 617 (Crossroads, Railroad, Any Landmark, etc.)
and 34.
(Please draw sketch on back of Original)

11. REMARKS: Top of casing sticks up two (2) feet above the ground surface.

12. DRILLER'S LOG (Description and color of cuttings, such as shale, sand, etc. in feet)

FROM	TO	DESCRIPTION	FROM	TO	DESCRIPTION
0	16	Tan, gray and brown clay and silty clay fill	42	46	Gray and orange clay
16	20	Tan, gray and brown clay			
20	26	Tan and brown silt and silty sand			
26	38	Brown, tan and gray clay			
38	40	Brown, tan and orange sand and silty clay			
40	42	Tan and orange clayey sand and silty sand			

13. FOR HEAT PUMP ONLY: AVG. DEPTH _____ FT. NUMBER OF HOLES _____

14. ABANDONMENT INFORMATION: DOES THE NEW WELL REPLACE AN EXISTING WELL? YES ☐ NO ☒

15. NAME OF PERSON WHO DRILLED THE WELL: Charles Ray Henry

Southwestern Laboratories (Maxim)
Name of Water Well Contractor

LICENSE NUMBER WWC-261

Lloyd G. Hoover 1/9/97
Authorized Signature Date

MAIL ORIGINAL TO:
LOUISIANA DEPARTMENT OF
TRANSPORTATION AND DEVELOPMENT
ATTN.: CHIEF - WATER RESOURCES SECTION
P.O. BOX 94245
BATON ROUGE, LA 70804-9245
(504) 379-1434

FOR OFFICE USE ONLY
PARISH WELL NO
IDENTIFICATION NUMBER
REVISED COORDINATES
Geologic Unit
Use of Well
SECTION TOWNSHIP RANGE
ELEV QUAD NO
INPUT BY: DATE:
INSPECTED BY: DATE:
REMARKS:

FOR MONITOR/PIEZO/RECOVERY WELLS ONLY
LATITUDE 322830 LONGITUDE 920817
SECTION 011 TOWNSHIP 17N RANGE 03E
ELEV. 0086 QUAD NO 046A
SITE ADDRESS. no street address

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
WATER RESOURCES SECTION
WATER WELL REGISTRATION SHORT FORM (DOTD-GW-1S)

PLEASE PRINT IN INK OR TYPE WHEN COMPLETING THIS FORM

1. USE OF WELL (Check Appropriate Box)

☐ DOMESTIC ☐ RIG SUPPLY ☒ MONITORING ☐ PIEZOMETER ☐ RECOVERY

☐ HEAT PUMP HOLE ☐ HEAT PUMP SUPPLY ☐ ABANDONED PILOT HOLE ☐ OTHER _____ (Please Specify)

2. WELL OWNER Riverwood International USA PHONE (318) 362-2735

3. WELL OWNER'S ADDRESS P. O. Box 35800, West Monroe, LA 71294

4. OWNER'S WELL NUMBER OR NAME (if any) MW-21

5. DATE COMPLETED 10/29/96 DEPTH OF HOLE 41 FT. DEPTH OF WELL 37 FT.

6. STATIC WATER LEVEL 25 FT. BELOW GROUND SURFACE MEASURED ON 10/31/96 (Date)

7. CASING 4 IN. ☐ METAL ☒ PLASTIC ☐ OTHER LENGTH 29 FT.

8. SCREEN 4 IN. ☐ METAL ☒ PLASTIC ☐ OTHER SLOT SIZE 0.010 LENGTH 10 FT.

9. CEMENTED FROM 21 FT. TO GROUND SURFACE, USING ☒ PUMP DOWN METHOD OR ☐ GRAVITY METHOD

10. LOCATION OF WELL: PARISH Ouachita WELL IS NEAR, West Monroe, LA (Town or City)

APPROXIMATELY 1.4 MILES FROM southeast of the intersection of LA Hwy 617 (Crossroads, Railroad, Any Landmark, etc.)

and 34.

(Please draw sketch on back of Original)

11. REMARKS: Top of casing sticks up two (2) feet above the ground surface.

12. DRILLER'S LOG (Description and color of cuttings, such as shale, sand, etc. in feet)

FROM	TO	DESCRIPTION	FROM	TO	DESCRIPTION
0	16	Gray and brown clay and sandy clay fill			
16	21	Gray silt			
21	23	Gray and brown clay and silty clay			
23	35	Brown clayey sand and silty sand			
35	41	Brown clay			

13. FOR HEAT PUMP ONLY: AVG. DEPTH _____ FT NUMBER OF HOLES

Southwestern Laboratories (Maxim)
Name of Water Well Contractor

LICENSE NUMBER WWC- 261

Authorized Signature _____ Date 1/9/97

MAIL ORIGINAL TO:

LOUISIANA DEPARTMENT OF
TRANSPORTATION AND DEVELOPMENT
ATTN.: CHIEF - WATER RESOURCES SECTION
P.O. BOX 94245
BATON ROUGE, LA 70804-9245
(504) 379-1434

FOR OFFICE USE ONLY

PARISH WELL NO.

IDENTIFICATION NUMBER

REVISED COORDINATES

Geologic Unit

Use of Well

SECTION TOWNSHIP RANGE

ELEV. QUAD NO

INPUT BY: _____ DATE: _____

INSPECTED BY: _____ DATE: _____

REMARKS: _____

FOR MONITOR/PIEZO/RECOVERY WELLS ONLY

LATITUDE 322827 LONGITUDE 920801

SECTION 011 TOWNSHIP 17N RANGE 03E

ELEV. QUAD NO

WATER RESOURCES SECTION
WATER WELL REGISTRATION REPORT FORM (DOTD-GW-1S)

PLEASE PRINT IN INK OR TYPE WHEN COMPLETING THIS FORM

1. USE OF WELL (Check Appropriate Box)

☐ DOMESTIC ☐ RIG SUPPLY ☒ MONITORING ☐ PIEZOMETER ☐ RECOVERY

☐ HEAT PUMP HOLE ☐ HEAT PUMP SUPPLY ☐ ABANDONED PILOT HOLE ☐ OTHER _____ (Please Specify)

2. WELL OWNER Riverwood International USA PHONE (318) 362-2735

3. WELL OWNER'S ADDRESS P. O. Box 35800, West Monroe, LA 71294

4. OWNER'S WELL NUMBER OR NAME (if any) MW-22

5. DATE COMPLETED 10/24/96 DEPTH OF HOLE 41 FT. DEPTH OF WELL 40 FT.

6. STATIC WATER LEVEL 24 FT. BELOW GROUND SURFACE MEASURED ON 10/31/96 (Date)

7. CASING 4 IN. ☐ METAL ☒ PLASTIC ☐ OTHER LENGTH 32 FT.

8. SCREEN 4 IN. ☐ METAL ☒ PLASTIC ☐ OTHER SLOT SIZE 0.010 LENGTH 10 FT.

9. CEMENTED FROM 23 FT. TO GROUND SURFACE, USING ☒ PUMP DOWN METHOD OR ☐ GRAVITY METHOD

10. LOCATION OF WELL: PARISH Ouachita WELL IS NEAR, West Monroe, LA (Town or City)

APPROXIMATELY 1.4 MILES FROM southeast of the intersection of LA Hwy 617 (Crossroads, Railroad, Any Landmark, etc.)

and 34.

(Please draw sketch on back of Original)

11. REMARKS: Top of casing sticks up two (2) feet above the ground surface.

12. DRILLER'S LOG (Description and color of cuttings, such as shale, sand, etc. in feet)

FROM	TO	DESCRIPTION	FROM	TO	DESCRIPTION
0	16	Gray and brown clay, silt and sand fill			
16	24	Tan and orange silty sand and clayey sand			
24	41	Gray and reddish brown clay and silty clay			

13. FOR HEAT PUMP ONLY: AVG. DEPTH _____ FT. NUMBER OF HOLES _____

14. ABANDONMENT INFORMATION: DOES THE NEW WELL REPLACE AN EXISTING WELL? YES ☐ NO ☒

15. NAME OF PERSON WHO DRILLED THE WELL: Charles Ray H...

Southwestern Laboratories (Maxim)
Name of Water Well Contractor

LICENSE NUMBER WWC-261

Lloyd J. Howe 1/9/97
Authorized Signature Date

MAIL ORIGINAL TO:

LOUISIANA DEPARTMENT OF
TRANSPORTATION AND DEVELOPMENT
ATTN.: CHIEF - WATER RESOURCES SECTION
P.O BOX 94245
BATON ROUGE, LA 70804-9245
(504) 379-1434

FOR OFFICE USE ONLY

PARISH WELL NO

IDENTIFICATION NUMBER

REVISED COORDINATES

Geologic Unit Use of Well

SECTION TOWNSHIP RANGE

ELEV. QUAD NO.

INPUT BY: _____ DATE: _____

INSPECTED BY: _____ DATE: _____

REMARKS: _____

FOR MONITOR/PIEZO/RECOVERY WELLS ONLY

LATITUDE 322822 LONGITUDE 920758

SECTION 011 TOWNSHIP 17N RANGE 03E

ELEV 0086 QUAD NO 46A

SITE ADDRESS. no street address

WATER RESOU[illegible] SECTION
WATER WELL REGISTRATION [illegible]RT FORM (DOTD-GW-1S)

PLEASE PRINT IN INK OR TYPE WHEN COMPLETING THIS FORM

1. USE OF WELL (Check Appropriate Box)
   ☐ DOMESTIC ☐ RIG SUPPLY ☒ MONITORING ☐ PIEZOMETER ☐ RECOVERY
   ☐ HEAT PUMP HOLE ☐ HEAT PUMP SUPPLY ☐ ABANDONED PILOT HOLE ☐ OTHER _____ (Please Specify)
2. WELL OWNER Riverwood International USA PHONE (318) 362-2735
3. WELL OWNER'S ADDRESS P. O. Box 35800, West Monroe, LA 71294
4. OWNER'S WELL NUMBER OR NAME (if any) MW-23
5. DATE COMPLETED 10/25/96 DEPTH OF HOLE 44 FT. DEPTH OF WELL 41 FT.
6. STATIC WATER LEVEL 24 FT. BELOW GROUND SURFACE MEASURED ON 10/31/96 (Date)
7. CASING 4 IN. ☐ METAL ☒ PLASTIC ☐ OTHER LENGTH 33 FT.
8. SCREEN 4 IN. ☐ METAL ☒ PLASTIC ☐ OTHER SLOT SIZE 0.010 LENGTH 10 FT.
9. CEMENTED FROM 24 FT. TO GROUND SURFACE, USING ☒ PUMP DOWN METHOD OR ☐ GRAVITY METHOD
10. LOCATION OF WELL: PARISH Ouachita WELL IS NEAR, West Monroe, LA (Town or City)
    APPROXIMATELY 1.4 MILES FROM southeast of the intersection of LA Hwy 617 (Crossroads, Railroad, Any Landmark, etc.)
    and 34.
    (Please draw sketch on back of Original)
11. REMARKS: Top of casing sticks up two (2) feet above the ground surface.
12. DRILLER'S LOG (Description and color of cuttings, such as shale, sand, etc. in feet)

FROM	TO	DESCRIPTION	FROM	TO	DESCRIPTION
0	16	Gray, tan and reddish brown clay fill			
16	18	Reddish brown clay			
18	21	Dark gray silt			
21	31	Gray to reddish brown clay and silty clay			
31	36	Reddish brown sand			
38	44	Reddish brown and gray clay and silty clay			

13. FOR HEAT PUMP ONLY: AVG. DEPTH _____ FT. NUMBER OF HOLES _____
14. ABANDONMENT INFORMATION: DOES THE NEW WELL REPLACE AN EXISTING WELL? YES ☐ NO ☒

Southwestern Laboratories (Maxim)
Name of Water Well Contractor

LICENSE NUMBER WWC-261

Lloyd G Hoover 1/9/97
Authorized Signature Date

MAIL ORIGINAL TO:
LOUISIANA DEPARTMENT OF
TRANSPORTATION AND DEVELOPMENT
ATTN.: CHIEF - WATER RESOURCES SECTION
P.O. BOX 94245
BATON ROUGE, LA 70804-9245
(504) 379-1434

FOR OFFICE USE ONLY

PARISH WELL NO

IDENTIFICATION NUMBER

REVISED COORDINATES

Geologic Unit Use of Well

SECTION TOWNSHIP RANGE

ELEV. QUAD. NO

INPUT BY: _____ DATE: _____
INSPECTED BY: _____ DATE: _____
REMARKS: _____

FOR MONITOR/PIEZO/RECOVERY WELLS ONLY

LATITUDE 322811 LONGITUDE 920812
SECTION 011 TOWNSHIP 17N RANGE 03E
ELEV. 0086 QUAD NO 46A

SITE ADDRESS: no street address

WATER RESOU SECTION
WATER WELL REGISTRATION RT FORM (DOTD-GW-1S)

PLEASE PRINT IN INK OR TYPE WHEN COMPLETING THIS FORM

1. USE OF WELL (Check Appropriate Box)
   ☐ DOMESTIC ☐ RIG SUPPLY ☒ MONITORING ☐ PIEZOMETER ☐ RECOVERY
   ☐ HEAT PUMP HOLE ☐ HEAT PUMP SUPPLY ☐ ABANDONED PILOT HOLE ☐ OTHER _____ (Please Specify)
2. WELL OWNER Riverwood International USA PHONE (318) 362-2735
3. WELL OWNER'S ADDRESS P. O. Box 35800, West Monroe, LA 71294
4. OWNER'S WELL NUMBER OR NAME (if any) MW- 24
5. DATE COMPLETED 10/28/96 DEPTH OF HOLE 41 FT. DEPTH OF WELL 41 FT.
6. STATIC WATER LEVEL 22 FT. BELOW GROUND SURFACE MEASURED ON 10/31/96 (Date)
7. CASING 4 IN. ☐ METAL ☒ PLASTIC ☐ OTHER LENGTH 33 FT.
8. SCREEN 4 IN. ☐ METAL ☒ PLASTIC ☐ OTHER SLOT SIZE 0.010 LENGTH 10 FT.
9. CEMENTED FROM 24 FT. TO GROUND SURFACE, USING ☒ PUMP DOWN METHOD OR ☐ GRAVITY METHOD
10. LOCATION OF WELL: PARISH Ouachita WELL IS NEAR, West Monroe, LA (Town or City)
    APPROXIMATELY 1.4 MILES FROM southeast of the intersection of LA Hwy 617 (Crossroads, Railroad, Any Landmark, etc.)
    and 34.
    (Please draw sketch on back of Original)
11. REMARKS: Top of casing sticks up two (2) feet above the ground surface.
12. DRILLER'S LOG (Description and color of cuttings, such as shale, sand, etc. in feet)

FROM	TO	DESCRIPTION	FROM	TO	DESCRIPTION
0	14	Brown, gray and tan clay fill			
14	21	Gray, brown and orange silty clay and sandy cla			
21	25	Light gray silty sand			
25	30	Gray and orange clay and silty clay			
30	41	Gray to orange sand			

13. FOR HEAT PUMP ONLY: AVG. DEPTH _____ FT. NUMBER OF HOLES _____
14. ABANDONMENT INFORMATION: DOES THE NEW WELL REPLACE AN EXISTING WELL? YES ☐ NO ☒

Southwestern Laboratories (Maxim)
Name of Water Well Contractor

LICENSE NUMBER WWC— 261

Lloyd G Hoover 1/9/97
Authorized Signature Date

MAIL ORIGINAL TO:
LOUISIANA DEPARTMENT OF
TRANSPORTATION AND DEVELOPMENT
ATTN.: CHIEF - WATER RESOURCES SECTION
P.O. BOX 94245
BATON ROUGE, LA 70804-9245
(504) 379-1434

FOR OFFICE USE ONLY
PARISH WELL NO
IDENTIFICATION NUMBER 0
REVISED COORDINATES
Geologic Unit Use of Well
SECTION TOWNSHIP RANGE
ELEV QUAD NO
INPUT BY: _____ DATE: _____
INSPECTED BY: _____ DATE: _____
REMARKS: _____

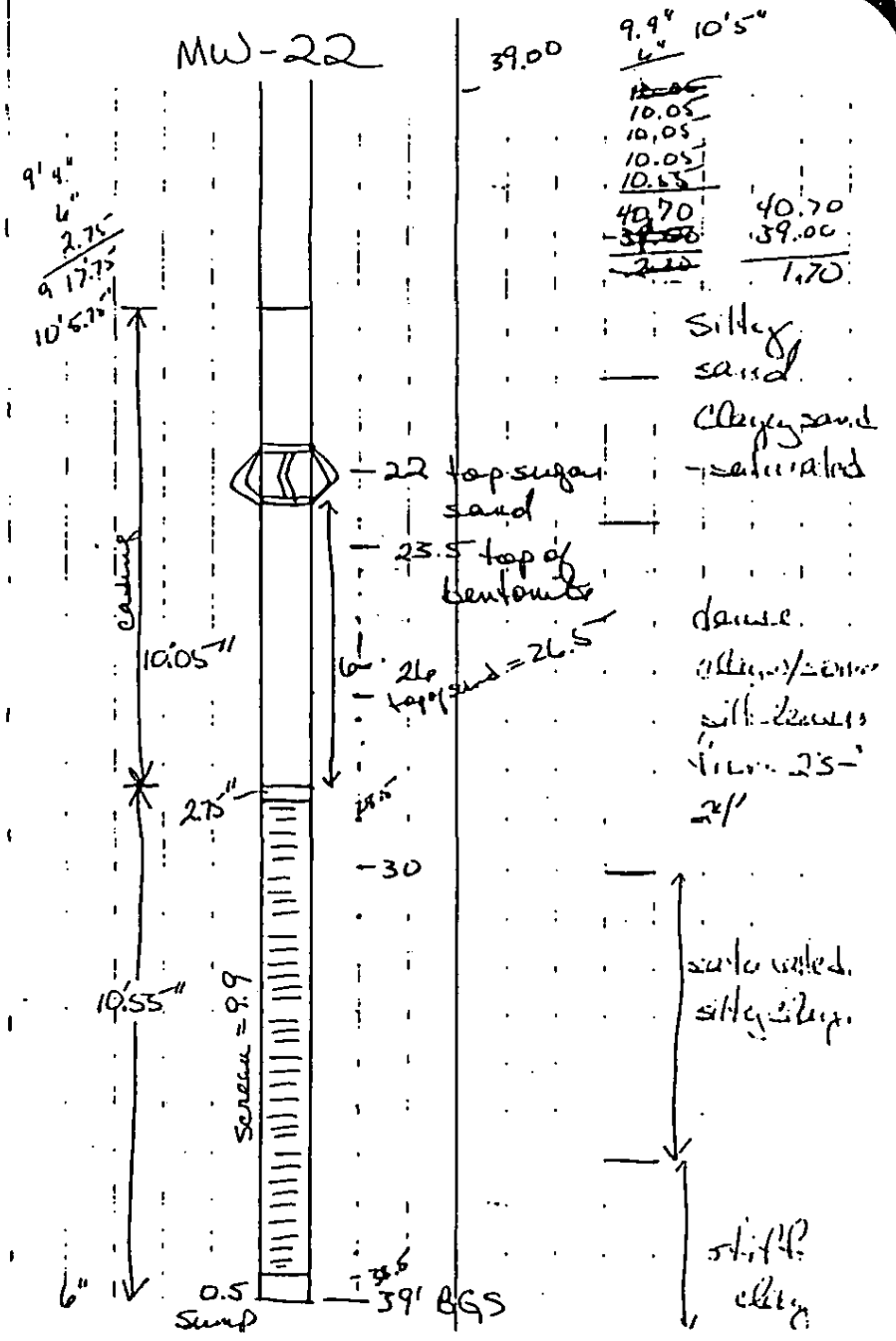
FOR MONITOR/PIEZO/RECOVERY WELLS ONLY
LATITUDE 322806 LONGITUDE 920821
SECTION 011 TOWNSHIP 17N RANGE 03E
ELEV. 0086 QUAD NO 46A
SITE ADDRESS: no street address

APPENDIX D

Daily Field Notes

10/24/96 THURS.

~900 Walmart - Wilmore 205346
Supplies for Riverwood job
~945 Met Eliz. at her office Riverwood
then waited for Crew at aban-
donned gas station
1100 Called Gene Gardner then met crew
at Community Drug.
~1200 Began drilling while Eliz took
crew to fill water truck.
Drilled and sampled MW-22 to
40' BGS.
215 Lunch
300 Back on site. Crew setting up decon
pad. Pulled augers from
borehole.
Drilled out w/large augers to 39'
Set well w/1.7' stickup (see calculations
Put filter pack sand thru augers
- v. slow to prevent bridging - 8 bags
to 26.5'. Added 1 3/4 buckets bentonite
to 23.5'. 1 bag sugar sand to 22'.
~700 Left site.
Misting rain & cold for about the
last 2 hrs.
9 hrs



10/25/96 FRI.

~740 At Riverwood site.
Crew pulling up augers.
Began mixing grout - 1st batch = 13.9 lb/gal. - 7 bags portland cement w/approx 35 lbs bentonite

835 Began grouting w/hose set ~1' above top of sugar sand. Grouted from bottom up.

845 Finished grouting up to ~1' from surface.

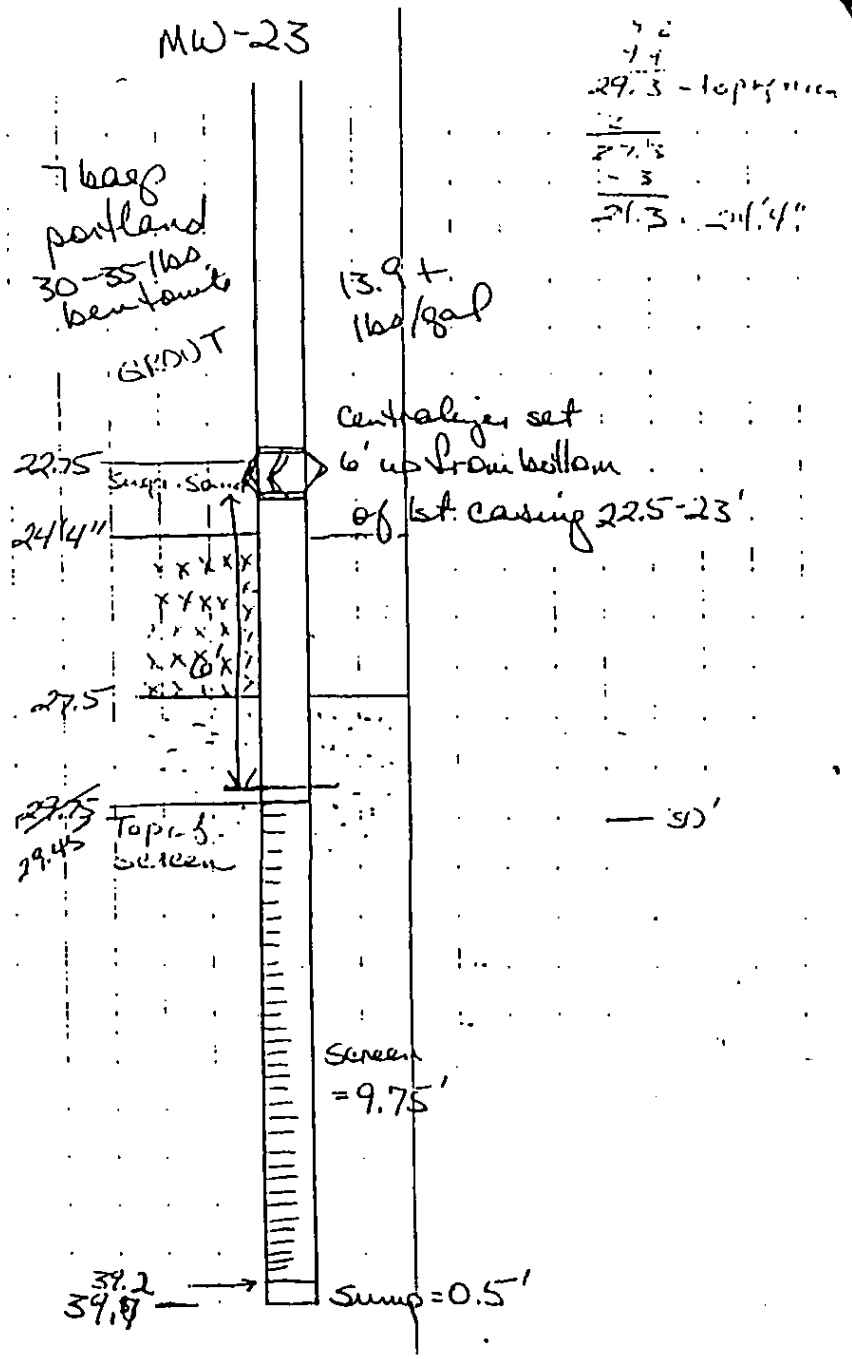
~900 Set upon MW-23

915 Started drilling. Amy Slaughter and another process engineer on-site. Larry Baldwin on-site briefly.

1045 Finished sampling MW-3 to 43 feet. Pulled augers and overdrilled.

~1130 Began overdrilling w/large augers.

~1215 Began setting well & sand up to 27.5. Well came up to 39'8" below surface (39.7'). Set sand up to 27.5' (should have set 2" higher).
Set bentonite pellets up to 24'4" BGS (21.3') - finished adding bentonite about 140 then calculated



1 bag sugar sand - ~~added~~ top of sugar sand = 22'9" = 22.75'

150 Finished well. Crew went to get diesel and steam clean.
left to pickup lunch. Called office.

~235 back on site. Maxim crew just left. Talked to Elizabeth.
Checked well sites and picked up.

330 left site
Drove home then to airport and office @ ~5:20. Picked up Calumet report and D.F report and paycheck.
7 hrs.

MON 10/28/96.

730 Onsite at MW-23. Crew finishing up pulling augers. 205461.
@ 7:50 DTW = 26.33, stickup = 0.7

~830 Crew grouted hole. 7 bag portland, 30-35 lbs bentonite. 13.9+ lbs/gal.
Too wet to drive down levee to MW-24. Discussed and eventually got passes for contractor gate and drove around 21 acre sludge pond to access well site from west.

~1120 At MW-24, site w/rig. Rig stabilizers sunk in soft ground. Went to get more wood. Called office - talked to ~~1205 S~~ Sherry re Chev. 690 & Gordon re D.F.

12:05 started drilling MW-24 to 40'

120 Finished sampling MW-24
lunch

~235 On site to ave. drill MW-21 to 40'
Pulled augers. Called Fritz & left message. Talked to Gordon on-site re DF report

325 Problems w/ plastic plug at bottom

~~began overdrilling~~ falling out last 2 and had to push to the bottom of the hole using small augers

~530 began calling to find shop to trim plugs to fit better

~555 left site. Drove to Joe's house. He cut down plugs using table saw

~9.5 hrs

MW-24

10' 0.75'
10' 0.75
10' 0.75'
10' 5.75'

40' 8.0" vs 40' 7"
= 40.7'
− 1' stickup
39.7' = TD
+ 1.5' sump
39.20
− 9.75
29.45 = top screen

TDES. 10/29/96

745 At well site MW-24, 205,492.
Maxim: installing filter pack in well. Well installed similar to MW-23. 1 foot casing stick up.
Bottom of well at 39.7'
Top of sand ~26'9" = 26.75'
8 bags (50lbs/bag) sand
Top of bentonite = 23'6"
Top of sugar sand = 22.5'
Pulled all augers
Finished well @ ~8:30

900 At MW-21 site. Waited for dozer to bring pad down to grade.

39.7 920 began setting up on MW-21
− 5 940 Began drilling. Sampled to 35'.
34.2 Tried to collect 35 to 40' sample
− 9.9 but it apparently slipped from
29.3 tube due to alot of water on top
− 2 At least 15' of water in hole
27.3 1110 Finished sampling
~1115 lunch
1230 On site. Crew pulling small augers from hole. Several feet of heavy clay at bottom of augers

Wrapped teflon tape around plug to make it fit in big auger bit
~1045 began overdrilling.
~115 Finished overdrilling
Casing length 10'0.75"
5' + 2.5' casing length - 7'7.25"
Screen + plug = 10'5.75"

7'7.25"
10'0.75" 2.5"
10'0.75"
10'5.75"
~~39.50~~ 37'14.5" = 38'2.5"
-36.00 -2.00
3.5 - stickup 36'2.5"

36.25
-10.5
25.75

145 Began setting sand pack. = 36.25'
36.25' +1 37.25
- .5' sump -.5
35.75 36.75'
- 9.75 screen
26.00
- 2
24.00 top of sand
- 3.00
21.00 top of bentonite

Problems with sand bridging in augers
~415 On-site. Crew just finished pulling augers. Packed up rig
~445 left MW-21
~510 Back at MW-21 to grout.
7 bags bentonite w/ ~35 ~~bag~~ lbs bentonite - 14.1 lbs/gal
Began grouting at ~530. Finished in ~5 min. Grout to about 0.5' of surface.
Left to set. rig on MW-20 had to drive back around plant.
600 left site

9hrs

Wed MW-20 10-30-96

6:30 began drilling MW-20

8:45 stopped drilling @ 45' BGS will overdrill and set well @ 45' BGS w/ 10' screen - Drill rig quit working (fuel filter problem Ray is repairing on site)

9:15 depth to water in bore hole prior to overdrilling 36.0' BGS

9:20-9:50 met w/ Elizabeth Smith

10:00 Began overdrilling MW-20 to 145'

10:45 stopped overdrilling @ 45' BGS

Wed MW-20 10-30-96

10:50 Began setting well
screen + plug = 10' 5.75"
casings = 10' 0.75"

5' 0.75"
10' 0.75"
10' 0.75"
10' 0.75"
10' 5.75" screen
45' 8.75" ≃ 45.75' well assuming

11:00 Began setting sand pack 45'
45.0'
-.5' sump
44.5'
-9.75 screen
34.75
-2
32.75 top of sand
-3
29.75 top of Bentonite

Well MW-20 10-30-96

12:10 completed sand pack to 33' BGS

12:10 Begin setting Bentonite plug to 30' w/ 1' of sugar sand on top of Bentonite - top of sugar sand - 29' BGS installation completed @ 12:20

12:30 left for lunch
13:00 Picked up supplies from McCoy's
13:30 arrived on site will begin purging wells @ MW-20

MW-20
DTW 25.6
TD 45.4
19.8
× .653 gallons / ft.
12.9 = 1 well vol.
× 3
38.7 = 3 well volumes

Well MW-20 10-30-96

3 well volumes = ~40 gallons
Start Purge - 14:15
End Purge - 16:00
Purge Volume - 30 gallons
Appearance - Start - very cloudy
End

Well were purged using the rig mounted suction pump w/ a 1" O.D. crestline flexible pipe. A sufficient length of pipe was used to reach the bottom of each well. New pipe was used to purge each well to prevent cross-contamination.

15:20 - 20 gallons purged well is dry will continue to pump until 3 well vols are removed - turned pump off @ 15:20 to let well recharge DTW @ 15:40 - 39.2

Wed MW-20 10-30-96

15:55 DTW -37' BGS
Restarted purge pumps

16:00 Stopped purge @ 30 gallons
will continue purging
Thursday

Wed MW-21 10-30-96

16:20 setting up to purge
& grout MW-21

DTW - 24.1
TD - 37.7
13.6
× .653
9.08 = 1 well vol.
× 3
27.24 = 3 well vol.

3 well vol = ~30 gallons

Start purge - 16:25
End purge
Purge Volume
Appearance - Start - very cloudy
End

16:55 Begun grouting w/ hose set
@ ~ above sand.
Grouted from bottom up.
1st Batch - Grout weight = 13.85 lbs/gal
7 bags of portland w/
~35 ~~lbs~~ lbs of bentonite

11:00 Finished grouting MW-21 to ~1' from surface. Purged 13 gallons ~~so far~~ before grouting and let well recharge for ~1 hour DTW - 36.6 - not enough water to start pump will begin purging here in the morning.

1:30 Staked wells ~~for~~ w/ barrier tape ~~and~~ and left site arrived home 18:00

THURS 10/31/96

630 Onsite - Joey's truck, Crew & Joey arrived at MW-21 site.
MW-21 DTW = 25.5'
Mileage on Red Nanda = 205,555
Started pumping MW-21 @ 700 - water brown & cloudy. Pumped dry in about 8 gal. Began clearing slightly. Waited 10 min and pumped dry in about 1 gal.

	DTW	TD	
MW-22	25.11	40.36	muddy bottom need an probe
MW-23	26.31	40.39	

~800 Began purging MW-22. Pumped ~19 gal before well went dry. Waited for recharge. Started pumping ~900 for a total of 32 gal - light brown slightly cloudy.
Moved to MW-23
MW-24 DTW = 23.68
TD = 40.36
Checked on crew at MW-23. Pumped ~35 gal. Well not dry, little

MW-22 DTW = 125.78'
pH = 6.99
spec cond = 0.49
temp = 20.7°C
TDS = 299
clear
pH = 7.08 w/our instrument
Collected sample at 13:55
Delivered samples to Stan Kirkekus
in lab and completed COC
~250 left Riverwood. [redacted]

8.5

APPENDIX P

OPERATIONAL PLAN

GRAPHIC PACKAGING INTERNATIONAL, INC.
WEST MONROE MILL
WEST MONROE, LOUISIANA

OPERATIONAL PLAN

APRIL 2006

PROVIDENCE ENGINEERING AND ENVIRONMENTAL GROUP LLC
6160 PERKINS ROAD, SUITE 100
BATON ROUGE, LOUISIANA 70808
(225) 766-7400

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1.0 INTRODUCTION

Graphic Packaging International, Inc. (Graphic Packaging) operates the surface impoundments (NPDES impoundments, 35-acre, 21-acre and 41-acre ash/sludge impoundments) in conjunction with the mill operations. The primary function of the surface impoundments is to manage on-site generated wastewaters in an environmentally safe manner. The impoundments are designed to accept process wastewaters derived from the associated mill. Listed hazardous wastes are not received by the facility for discharge. Hazardous wastes are wastes defined as a hazardous waste in the current Louisiana Hazardous Waste Regulations (LAC 33:V.) and/or by the Federal government under the Resource Conservation and Recovery Act and subsequent amendments.

Wastewater from all mill processes is routed to the primary clarifier. Clarified wastewater is sent to the NPDES Ponds for further treatment and eventual discharge. Underflow from the clarifier is currently sent to the Primary Clarifier Sludge/Bark Boiler Ash Sluice Impoundment and then routed to the 21-acre and 41-acre impoundments.

2.0 BACKGROUND

Graphic Packaging's West Monroe Facility operates a 2,700 ton/day unbleached kraft pulp and paper mill in West Monroe, Louisiana. Graphic Packaging was formerly known as Riverwood International USA, Inc. Graphic Packaging's West Monroe facility is located on approximately 3,300 acres of land in West Monroe, Ouachita Parish, Louisiana. The facility is located in Sections 11, 14, and 52 of Township 17 North, Range 3 East. The facility is bound by the cities of West Monroe and Monroe to the north and east, respectively; the Ouachita River (River Mile 161.2), agricultural and commercial land to the south; and, the Ouachita Sewage Treatment Facility to the west.

Access to the facility is by all-weather roads that meet the demands of the facility. The roads are designed to avoid, to the extent practicable, congestion, sharp turns, obstructions, or other hazards conducive to accidents.

3.0 PURPOSE

The Operational Plan allows for the safe and efficient use of the surface impoundments as storage discharge facilities for industrial process waters and storm water at the West Monroe facility. Following these guidelines and associated permits will ensure compliance and discharge of process waters in an environmentally sound manner.

4.0 REQUIREMENTS

Proper environmental, safety and process training are maintained to ensure that proper control is maintained over the surface impoundments in accordance with

the facility's permit as well as Louisiana Department of Environmental Quality (LDEQ) Solid Waste Rules and Regulations and water discharge requirements.

5.0 OVERVIEW OF FACILITY

5.1 Design

The solid waste facilities consist of on-site surface impoundments that are designed for on-site wastewater treatment. Filling and emptying operations are continuous processes that are accomplished by pumping and gravity drainage. The surface impoundments are designed, constructed, maintained, and operated to prevent overtopping and pond levels are checked periodically to prevent overflow.

5.2 Operations

Wastewater from all mill processes is routed to the primary clarifier. Clarified wastewater is sent to the NPDES Ponds for further treatment and eventual discharge. Underflow from the clarifier is currently sent to the Primary Clarifier Sludge/Bark Boiler Ash Sluice Impoundment and then routed to the 21-acre and 41-acre impoundments.

The primary clarifier underflow contains all settled solids from the total mill effluent. This includes fiber fines, wood debris, ashes, grits and dregs discharged from the process. Water insoluble, inert materials are retained in the impoundments. Decant from the ash/sludge impoundments is returned to the primary clarifier for biological treatment. Approximately 120 tons/day of sludge are deposited in the ash/sludge impoundments.

The impoundments also receive sluiced ash from the bark boiler multi-cyclone collectors. The sluice is currently pumped through a six-inch plastic pipe to the ash/sludge impoundments along with the primary clarifier underflow.

Approximately 20 to 25 percent of the mill steam and power requirements are satisfied by burning primarily bark and other wood residue fuels. Combustion gases are first centrifugally cleaned by passage through multi-cyclones followed by char reinjection and then washed by flow through a Venturi Scrubber before final discharge.

Bleed off from the Venturi Scrubber with makeup from other process wastewaters is used to sluice the dry material from the multi-cyclone catch. The bulk of the ash is typical solids from the burning of softwood and hardwood residues consisting mainly of inert grit and silicates. A grab sample is collected from the bark boiler ash sluice line approximately three times per week. Decant is again returned to the primary clarifier for biological treatment. The Quantities of sluice ash generated varies but normally averages 20 tons/day.

The maximum quantities of wastes per year to all of the solid waste units are calculated to 173,000 wet tons/year.

Only wastes generated on the Graphic Packaging property are disposed of in the impoundment system. These wastes are typical of those generated by coated and uncoated unbleached southern pine/hardwood kraft and semi-chemical pulp production. Two types of waste streams are introduced into the impoundment system. Decant from the HIAB, which is directed into the NPDES impoundments, and underflow from the Primary Clarifier, which is directed into the 35-acre, 21-acre and 41-acre impoundments. The only difference in these two streams is the concentration of solids. The only other solid waste entering the impoundment systems, other than by direct discharge from primary clarifier underflow or bark boiler ash sluice piping, are mill sewer clean-out wastes, gravity dewatered fiber spills and NPDES pond cleanout solids. All these solids would normally be included in primary clarifier underflow and have the same characteristics of the routine solid waste going into this impoundment. The bark boiler sluice material is dependent upon fuels provided to the boiler.

Nearly all solids handling of wastes at the ash/sludge impoundments is performed by simple hydraulic transport and gravimetric sedimentation. Sludge pumps motivate the primary clarifier underflow and ash sluice pumps handle the sluiced ash from the bark-fired boiler, as discussed in LAC 33:VII.521.H.1.a, above. In addition to the primary clarifier underflow and sluiced ash, secondary biological solids may be infrequently removed to the impoundments from the aeration ponds by barge-mounted sludge pumps and temporary piping and material such as sewer cleanout is occasionally hauled to the ash/sludge impoundments using a vacuum truck. Decant from the impoundments is returned to the primary clarifier via an overflow pipe. The decant is returned to the clarifier via the decant canal and separate decant line, which is also used for decant from the 41-acre impoundment.

5.3 Equipment, Associated Units, and Personnel

As a surface impoundment, the facility will require a minimum of staffing for efficient operation. The following personnel will routinely make observations of the impoundments and related equipment to ensure efficient operational status:

Environmental Department Technician - samples the influent and effluent and performs routine analyses of the water to gage treatment efficiency;

Maintenance Personnel - routinely checks and performs maintenance on associated pumps, valves, aerators, *etc.*; and

Powerhouse Auxiliary Operator - makes routine inspections of the overall condition of the facility.

The operation of the wastewater treatment system is further described in response to 521.H.1. and 2.

6.0 SURFACE WATER RUN-OFF

Surface drainage is prevented from entering the 21-acre impoundment and the 41-acre impoundment by levees that are approximately 15 feet higher (elevation 85 feet MSL) than the surrounding grade (elevation of approximately 70 feet MSL). The 100-year flood elevation is 83.1 feet MSL and, therefore, run-on from this event is prevented by an approximately two-foot freeboard. Precipitation that falls directly into the impoundments is collected on the surface of the waste and eventually is routed to the primary clarifier through the decant canal. Rain that falls outside the impoundment levees is directed away from the facility.

Dikes and levees about the NPDES ponds normally preclude surface drainage into these ponds as dikes and levee elevations are higher than adjacent ground surfaces.

While not usually considered surface drainage, there is one minor source of flow into the NPDES system. This source is the landfill leachate collection system (P-0071), which is injected into the mill effluent prior to the Primary Clarifier.

During periods of flooding, ponds are inundated in the following order: Pond 4, Pond 3, Pond 2, Pond 1, Effluent Canal, and lastly the Decant Canal.

The HIAB and Primary Clarifier Sludge/Ash Sluice Pond are flood protected by 100-year levees.

The Decant Canal is subject to minimal solids deposition because of solids depositing in the Sludge/Ash Pond and the light, almost colloidal nature of any solids that may flow through. While velocities in this narrow conduit mitigate against sedimentation, this canal is dredged periodically to protect decant pumps.

The Decant Canal has been breached by flooding only one time in the last 35 to 40 years and then only at one low point. During extreme flooding, such that the Decant Canal is breached, the Primary Clarifier Sludge/Ash Sluice Pond would be closed off and the Decant Canal pumped down. As river water enters the canal, the pumping would flush decantate and light solids from the canal, sending them to treatment. Any deposited solids that might be re-suspended during a flood would settle again within the confines of the total NPDES system, with no detrimental effects to the river.

Currently, storm water runoff from the solid waste management areas, including the 21-acre and 41-acre impoundments, at the Graphic Packaging West Monroe

Facility is treated and then discharged through Outfall 401, which is shown on **Figure 6**. Flow at Outfall 401 is monitored by a Parshall Flume as provided for in the water discharge permit. Flow proportional composite sampling is completed three times per week for BOD_5 and TSS compliance determination. Grab samples for pH analysis are also collected three times per week.

Storm water runoff from the area surrounding the 41-acre impoundment is clean since it is not possible for the runoff in areas outside the levees of the impoundment to have contact with the waste. This runoff drains to the surface water collection ditches located on the south and east sides of the 41-acre impoundment. The runoff is then directed into the pond located immediately north of the impoundment. This pond was created several years ago through the excavation of borrow material, leaving a large excavation that filled with water. The pond eventually overflows into an existing drainage canal that drains to Toney Bayou, which in turn drains into the Ouachita River.

The impoundments are constructed to maintain adequate freeboard during a 100-year flood event. The gravity over-flow structure in the 21-acre impoundment is a minimum of two feet lower than the impoundment levees.

All system discharge (*i.e.*, "site run-off") occurs at Outfall 401, which normally is the #4 pond outfall.

As flood waters rise or as impounded effluent backs up with permit required closure of the discharge gates to the river at Outfall 001, Outfall 401 monitoring moves upstream in the NPDES system, first to Pond 3 Outfall, then to Pond 2 Outfall, Pond 1 Outfall, and finally, under extreme flooding, to the Effluent Canal Outfall. As flooding below 75 to 80 feet NGVD is actually back flooding, with minimal flow velocities, the calculations of the variance requests based on actual hydrographs of the river during floods overstate the solids that may finally flow to the river. TSS discharge levels at monitoring points upstream from Discharge 001 definitely overstate the amounts that actually reach the river as the backwater provides even greater opportunity for sedimentation over the inundated NPDES areas.

7.0 LINER SYSTEM

The 21-acre impoundment contains a minimum three-foot thick recompacted clay liner with a permeability of 10^{-7} cm/sec or less, installed in accordance with the LDEQ-approved QA/QC Plan and specifications. This liner was selected because it met the requirements of the LSWRR for solid waste surface impoundments, provides adequate containment of the waste, and provides protection of the environment.

The 41-acre impoundment is designed to contain a minimum three-foot thick recompacted clay liner with a permeability of 10^{-7} cm/sec or less, overlain by a minimum 60-mil geosynthetic liner, each installed in accordance with the QA/QC Plans and specifications. This liner system meets the requirements of the

proposed LSWRR (dated September 1992) for solid waste surface impoundments, provides adequate containment of the waste, and protects the surrounding environment.

The NPDES system soils report by Southwestern Laboratories shows the degree to which suitable natural liner exists under the NPDES impoundments. The High Intensity Aeration Basin was lined with 2 feet of recompacted clay in all areas where natural clay did not occur during its construction. While no specific liner was applied during the 1963 construction of the Effluent Canal and No.1 Pond, nor the later 35-acre Primary Clarifier Sludge/Ash Sluice Pond, fine particle deposition over the years have blinded any permeable soils under the NPDES impoundments.

8.0 DIKES

The material used for levee construction was the soils taken from the surface impoundment excavations.

The surface impoundments are individually protected by a levee or dike that rises above the surrounding land. There is no runoff from the pond and wastewater and storm water are entirely retained. The effluent from the surface impoundments is monitored in accordance with the water discharge permit.

9.0 GROUNDWATER MONITORING

Twelve monitoring wells (MW-7 through MW-15 and MW-17 through MW-19) are evaluated for the NPDES Impoundment System and six monitoring wells (MW-19 through MW-24) are evaluated for the 40-acre Ash Sludge Pond. Monitoring wells MW-17, MW-18, and MW-20 are located hydraulically downgradient of the 21-acre impoundment.

Groundwater near the NPDES Impoundment System flows to the east toward the Ouachita River and associated bayous. Monitoring wells MW-8 through MW-12 remain hydraulically upgradient of the unit while MW-13, MW-14, MW-15 and MW-24 are downgradient.

Groundwater near the 40-acre and 21-acre Ash Sludge Pond flows primarily to the north, toward Judy Slough and Toney Bayou. Monitoring well MW-19 remains hydraulically upgradient of the unit while MW-17, MW-18, and Mw-20 are downgradient.

An investigation will be conducted and appropriate remedies will be implemented in the event that significant levels of indicator parameters are detected by the detection-monitoring program.

10.0 WASTES TO BE MANAGED IN THE DISPOSAL FACILITY

Wastewater from all mill processes is routed to the primary clarifier. Clarified wastewater is sent to the NPDES Ponds for further treatment and eventual

discharge. Underflow from the clarifier is currently sent to the Primary Clarifier Sludge/Bark Boiler Ash Sluice Impoundment and then routed to the 21-acre and 41-acre impoundments.

The primary clarifier underflow contains all settled solids from the total mill effluent. This includes fiber fines, wood debris, ashes, grits and dregs discharged from the process. Water insoluble, inert materials are retained in the impoundments. Decant from the ash/sludge impoundments is returned to the primary clarifier for biological treatment. Approximately 75 tons/day of sludge are deposited in the ash/sludge impoundments.

The impoundments also receive sluiced ash from the bark boiler multi-cyclone collectors. The sluice is currently pumped through a six-inch plastic pipe to the ash/sludge impoundments along with the primary clarifier underflow.

11.0 RESPONSIBLE PERSONS

General supervision is provided by the Site's Power and Recovery Superintendent and Environmental Department Manager.

12.0 Hours of operation

The hours of operation will be 24 hours a day, seven days a week.

13.0 SURVEILLANCE PROCEDURES

This section addresses the surveillance and maintenance procedures for the impoundments.

- Graphic Packaging personnel will visually inspect the levee berms and surrounding area for leaks, rills, outbreaks, and indications of erosion loss.
- Excessive vegetative growth that prevents proper access, inspection, or operation, or may provide a conduit for groundwater contamination will be removed.
- Graphic Packaging personnel will monitor hydraulic water levels of the surface impoundments to insure proper storage requirements associated with process flow rates and freeboard.
- Graphic Packaging personnel will monitor hydraulic water levels of the surface impoundments prior to hurricane surge events to ensure maximum storage.
- Graphic Packaging personnel will maintain on-site records for water levels of the groundwater monitoring wells.

- Graphic Packaging personnel will utilize the discharge permit for meeting discharge requirements from the surface impoundments.

- A log of these inspections will be maintained in the Power and Recovery Department. If unusual conditions are found, the Environmental Department Manager or designee will be notified immediately.

- The plant is a gated facility that is routinely patrolled by the guard service per their normal patrol schedule.

- If a leak in the impoundments is found, the administrative authority will be notified in accordance with LAC 33:I.Chapter 39.

14.0 QA/QC PROCEDURES

Analyses of the water and groundwater are required to ensure proper operation of the facility, compliance with environmental permits and to detect any vertical migration of waste constituents.

14.1 Water Sampling and Analysis

A laboratory will perform water permit analysis in accordance with water discharge permits. Environmental personnel will monitor appropriate outfall analytical data and notify the appropriate person immediately of any data that is not within the normal operating range.

14.2 Groundwater Analysis

Groundwater sampling and analyses will be performed in accordance with the plan described in permit application. These QA/QC procedures will ensure that the sample preservation, handling and analyses meet the specifications of SW-846.

23 monitor wells are installed for the surface impoundments. All 23 wells were installed in the upper permeable zone.

Graphic Packaging's Groundwater Sampling and Analysis Plan includes consistent sampling and analysis procedures that ensure that monitoring results provide reliable indications of groundwater at the background and down-gradient well locations.

15.0 CONSTRUCTION QA/QC PLAN

Future maintenance, construction and/or modification of the facility will be made to ensure compliance with permit conditions and to meet the operational needs of the facility with regards to water management. Selection of materials utilized for

maintenance, construction, *etc.* will be accomplished utilizing established industry practices.

16.0 EMERGENCY PROCEDURES

This section addresses the emergency procedures for the facility. A more detailed discussion of potential hazards and needed countermeasures are addressed in the facility's Contingency Plan and Emergency Procedures.

Access to the facility is by all-weather roads that are maintained to avoid hazardous conditions. The operation of the surface impoundments will continue through most weather conditions with no change in procedure.

All equipment involved in mill operations is periodically inspected and maintained to prevent breakdowns and ensure proper operation.

Severe weather conditions, such as in hurricanes or other violent storms, may result in the closing of the refinery, depending on the location and severity of such weather and the likelihood of direct impact on the refinery. Decisions to close the refinery in inclement weather are made by management personnel.

The surface impoundments are located well outside of the general traffic areas of the refinery; thus, public and employee contact with the site is minimal.

17.0 RECORDKEEPING

Graphic Packaging maintains routine management and administrative records and documentation necessary for the preparation of reports required by the LDEQ as outlined in the Solid Waste Rules and Regulations. These records will be maintained throughout the operational life of the facility and kept on file for at least three years after closure.

Graphic Packaging's recordkeeping system will contain the following, at a minimum:

- A copy of the current Solid Waste Rules and Regulations
- A copy of the permit application
- A copy of the permit, fully signed and executed
- A copy of any permit modifications
- Field notes for construction
- Operator training programs
- Daily logs
- Quality Assurance/Quality Control records
- Inspection by permit holder/operator;
- Records demonstrating that liner systems are constructed/installed in accordance with appropriate assurance procedures
- Discharge monitoring data

- Groundwater sampling results
- A copy of the groundwater monitoring reports
- Monitoring, testing, analytical data
- Post-closure monitoring reports
- A record of releases from the facility
- A copy of the facility contingency plan
- Any other documents received from/submitted to the LDEQ

The facility will maintain a copy of all applicable environmental permits, annual reports, records, and other documents specified in the permit application as necessary for the effective management of the facility and for preparing the required reports. These records will also be used to ensure compliance with state and federal regulations. The records shall be maintained for the life of the facility and shall be kept on file for at least three years after closure.

The records will be utilized to ensure that the facility is operated in accordance with all applicable permits. The records will also be used as the foundation for all reports required by the LDEQ and for the management of information for control of facility operations.

An annual report will be submitted to the Office of Environmental Services, Environmental Assistance Division (OES-EAD) and Permits Division indicating quantities (expressed in wet-weight tons per year) and types and sources of material disposed during the reporting period. All calculations used to determine the amounts of waste disposed during the annual reporting period will be submitted to the OES-EAD and the Permits Division. This form will be updated if changed by the administrative authority. The reporting period for the annual report will be from July 1 through June 30 and will be submitted to the administrative authority by August 1 of each reporting year.

The records of inspections, monitoring well analysis and semi-annual reports and annual solid waste report records will be maintained and kept on file at the refinery.

18.0 REVIEW

This section outlines the review procedures for this Operational Plan.

- The plan shall be reviewed annually by Graphic Packaging personnel to verify that the operating procedures set forth in this plan are current and continue to reflect good engineering judgment for the operation of the facility.

The plan shall be modified and updated as deemed appropriate by Graphic Packaging personnel.

APPENDIX Q

CLOSURE AND POST-CLOSURE PLAN

GRAPHIC PACKAGING INTERNATIONAL, INC.
WEST MONROE MILL
WEST MONROE, LOUISIANA

CLOSURE AND POST-CLOSURE PLAN

MAY 2007

Prepared By:

PROVIDENCE

PROVIDENCE ENGINEERING AND ENVIRONMENTAL GROUP LLC
6160 PERKINS ROAD, SUITE 100
BATON ROUGE, LOUISIANA 70808
(225) 766-7400

PROVIDENCE PROJECT NUMBER 001-007

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1.0 INTRODUCTION

1.1 Background

Graphic Packaging International Inc. (Graphic Packaging) has a solid waste permit for a series of impoundments and canals at the West Monroe Plant regulated under the Louisiana Solid Waste Rules and Regulations (LSWRR). The impoundments associated with the wastewater treatment system are as follows:

- High Intensity Aeration Basin (HIAB)
- 35-acre primary sludge pond
- 21-acre impoundment
- 41-acre impoundment
- Decant Canal
- NPDES Ponds 1 through 4
- Effluent Canal

The impoundment system is used for facility wastewater treatment. The sediment, which settles out in the impoundments, is regulated as solid waste by the Louisiana Department of Environmental Quality (LDEQ).

This plan identifies the steps that will be necessary to close each of the impoundments and canals.

1.2 Maximum Waste Inventory

The actual volume of stored solid wastes at any given time will vary as a function of the amount of residual sludges which collect in the impoundments and the water level in the pond. Graphic Packaging assumes that the impoundments will be nearly full at closure. The maximum volume of solid waste that will have accumulated in the impoundments at closure are listed in **Table 1**. Waste inventory volumes presented in **Table 1** assume that each impoundment is at design volume at the time of closure (*i.e.* worst-case conditions).

2.0 CLOSURE

2.1 Approach to Closure

Though closure of the impoundment system is not anticipated or planned, this closure plan is designed to ensure that, in the unlikely event of closure, the surface impoundments will be closed in accordance with the standards of the Louisiana Administrative Code (LAC) at LAC 33:VII.713.E and F. The impoundments are intended to be closed with waste-in-place, and receive 30 years of Post-Closure care in accordance with the standards of LAC 33:VII.713.E.3.c. Additionally, Graphic Packaging

reserves the right to close the impoundments in accordance with LAC 33:VII.713.E.4.

Pre-closure requirements will be met in accordance with LAC 33:VII.713.E.2., in that:

- Free liquids will be removed with existing pumps and vacuum trucks, and liquid disposal will be through the existing NPDES wastewater treatment outfall.

- Sludges containing free liquids will be removed by backhoe, dredge, dragline, bulldozer, *etc.* and dewatered prior to disposal back into the impoundments.

Closure activities will be conducted in accordance with the requirements of LAC 33:VII.711.E.3., including:

- The dike walls will be pushed inwards and the impoundments will be graded. As required by LAC 33:VII.711.E.a.ii and iii, 24-inches of clay and six-inches of topsoil will be placed over the compacted fill by backhoe, bulldozer, dragline, or other standard earthmoving equipment.

- Mechanical equipment will be removed by crane or truck, decontaminated and scrapped off site.

- Quality Assurance/Quality Control (QA/QC) procedures for final cover placement are provided in **Attachment 1**.

- The cover of each facility will be fertilized and planted with native vegetation to promote good growth and easy care, and to minimize soil erosion.

The closure activities will be inspected by a Professional Engineer to ensure that closure has proceeded according to plan. Following inspection of the closure activities, the sites will be fertilized and planted with native vegetation to promote good growth and easy care, and to minimize soil erosion. Closure will be completed after the inspection activities and after the vegetative cover has been placed.

2.2 Equipment and Structures Requiring Decontamination

During closure operations, the following pieces of equipment utilized will be decontaminated as follows:

- Dredge – steam cleaning with rinse water
- Earth Moving Equipment – steam cleaning with rinse water

- Transporting Hose/Piping/*etc.* – steam cleaning with rinse water

Prior to off site disposal, any mechanical equipment removed during closure will be steam cleaned with rinse water. Residual solids from decontamination will be disposed at an approved off-site landfill. The rinse water will be sent to the head of the on-site wastewater treatment facility or discharged through Outfall 001.

2.3 Closure Inspection

During the formal closure period, the services of a Registered Professional Engineer will be engaged to provide inspections during major closure steps. A total of four inspections are estimated. When closure is complete, Graphic Packaging and the Registered Professional Engineer will document closure activities.

After closure requirements have been met, the LDEQ will be requested to perform a closure inspection in accordance with the inspection provisions of LAC 33:VII.509.G.

3.0 TIME AND COST SCHEDULES

3.1 Schedule of Closure

It is anticipated that these impoundments will continue to be operated throughout the life of the Graphic Packaging West Monroe facility. There are currently no plans for plant closure. The plant plans to remain in operation for at least the next 50 years.

The Administrative Authority will be notified of the intention to close the solid waste impoundment(s). The notification will be in writing and will contain the following information pursuant to LAC 33:VII.713.E.1:

- Date of planned closure
- Changes, if any, in the approved closure plan
- Closure schedule and estimated cost

A tentative schedule of closure for a single facility is shown in **Table 2**. Note that 230 days is estimated for one impoundment. If all impoundments were to be closed simultaneously, efficiencies would likely be realized. However, the time required for closure of all facilities at once has not been estimated.

3.2 Closure Cost Estimates

Detailed closure cost estimates for the wastewater treatment system surface impoundments are given in **Table 3**. The closure costs were

developed using "worst case" assumptions, including the waste volumes presented in **Table 1**.

3.3 Plan Availability

Copies of this plan may be found at the Graphic Packaging West Monroe Plant at the following location:

Graphic Packaging, Inc.
P.O. Box 35800
1000 Jonesboro Road
West Monroe, Louisiana 71294

In addition, the closure document included as **Attachment 2** of this closure plan will be completed and filed upon closure of the facility, with the official Parish Record Keeper indicating the location and use of the property for solid waste disposal.

4.0 POST-CLOSURE CARE

Pursuant to LAC 33:VII.713.F.2.a, post closure care will be conducted for 30 years after closure unless the period is increased or decreased in accordance with the provisions of LAC 33:VII.713.F.1. Post-closure care costs are included on **Table 3**. Maintenance of the cover will be conducted in accordance with LAC 33:VII.713.F.2.b.i and the monitoring system will be maintained in accordance with LAC 33:VII.713.f.2.b.iv. The provisions of LAC 33:VII.F.2.b.ii and iii are not applicable to this permit.

It is anticipated that this site will continue to be utilized by Graphic Packaging after facility closure and that the long term use of the site will be in accordance with the facility's industrial setting.

TABLE 1

MAXIMUM WASTE INVENTORY

TABLE 1

MAXIMUM WASTE INVENTORY

Impoundment	Average Water Depth [a] (feet)	Area (acres)	Impoundment Capacity [b] (1,000 yds.^{3})	Final Cover Volume (1,000 yds.^{3})	Topsoil Volume (1,000 yds.^{3})
High Intensity Aeration Basin (HIAB)	23	17.8	664	57.4	14.4
Decant Canal	17	12.2	335	39.4	9.8
Effluent Canal	4.5	10.1	74	32.6	8.2
35-acre Impoundment	14	35	790.5	112.9	28.2
21-acre Impoundment	15	24	508.2	77.4	19.4
41-acre Impoundment	15	41	992.2	132.2	33
NPDES Pond 1	3.8	66.4	407	214.3	53.6
NPDES Pond 2	4.2	61.8	418	199.4	49.8
NPDES Pond 3	3.2	66.2	421	213.6	53.4
NPDES Pond 4	3.1	129.9	321	419.1	104.8
TOTALS	---	461.4	4,930.9	1498.3	374.6

Notes:

[a] Unless otherwise indicated, values obtained from Impoundment Cross-Section Drawings (Solid Waste Permit Renewal Application).

[b] The impoundment capacity is equal to the projected maximum waste volume at closure.

TABLE 2

CLOSURE SCHEDULE

TABLE 2

CLOSURE SCHEDULE

Task	Number of Days to Complete [a]
Operate Facility	Present
Notify Administration Authority of Intent to Commence Closure	90 days prior to closure
Last Date to Accept Waste; Start Closure	0
Removal of Free Liquids through Wastewater Treatment System (with one inspection by Professional Engineer)	30
Dewatering and Air Drying of Residual Sludges	100
Cap with 24" Clay and 6" Topsoil (supervised by Professional Engineer)	60
Grade, Level, and Revegetate Site	20
Certifying Inspection by the Professional Engineer	20
TOTAL DAYS	**230**

Note: Ponds will be closed one at a time, and time is estimated for closure of a single pond. Day 0 is defined as the start of closure.

TABLE 3

CLOSURE AND POST-CLOSURE COST ESTIMATES

TABLE 3

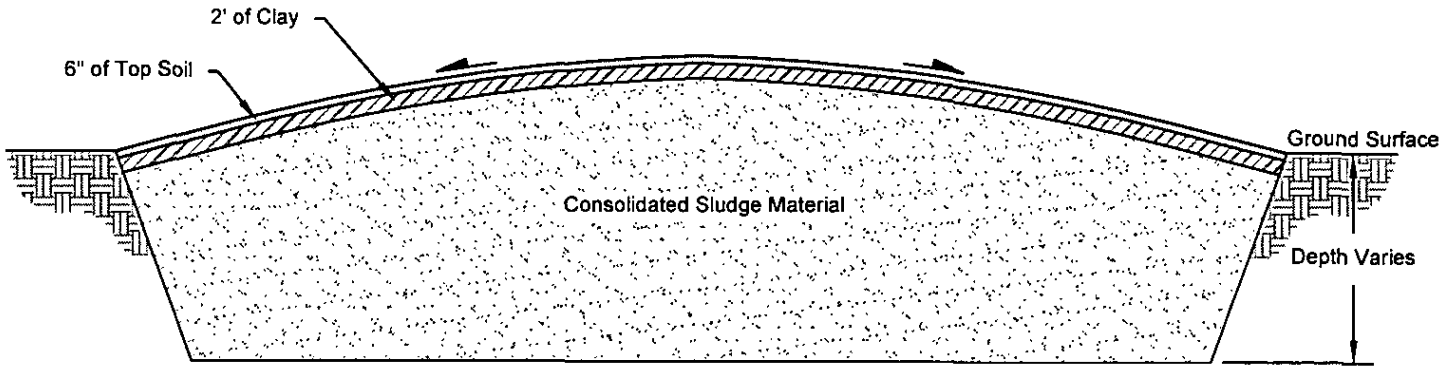
CLOSURE AND POST-CLOSURE COST ESTIMATES

Closure Activity	Quantity	Cost ($)
1. Remove free liquids (Routine operation – no closure costs associated)	--	--
2. Cap Site (Assume "worst case" – all materials must be hauled in)		
➢ *Purchase 24" thick clay, place and grade @ $10/ yd.^{3}	1,498,300 yd.^{3}	$14,983,000
➢ Purchase 6" topsoil, place and grade @ $8/ yd.^{3}	374,600 yd.^{3}	$2,996,800
➢ Seed and fertilize topsoil @ $1,500/acre	461.4 acres	$692,100
3. Site Inspection and certification by Professional Engineer @ $100/hour	20 8-hr. days	$16,000
4. Decontaminate Equipment		
➢ Steam and Wash equipment @ $100/hour	16 hrs.	$1,600
➢ Decontaminate rental equipment @ $75/day	2 days	$150
➢ Dispose of residual solids at an approved, off-site landfill @ $60/yd.^{3}	60 yd.^{3}	$ 3,600
5. Post-Closure Care		
➢ Groundwater Monitoring (Semi annual) @ $5,000/year	30 years	$150,000
➢ Maintenance of cap (mow, repair eroded areas, revegetate, and fertilize, *etc.*) (2 times/year) @ $4000/year	30 years	$120,000
Subtotal 1		$18,963,250
20% Engineering and Administrative Costs		$3,792,650
Subtotal 2		$22,755,900
10% Contingency		$2,275,590
	GRAND TOTAL	**$25,031,490**

* The facility is currently pursuing beneficial uses for the solid materials accumulating in Ponds 1-4 of the wastewater treatment system. The 6-inch topsoil layer may be replaced by solid materials removed from the ponds at the time of closure as authorized by the administrative authority.

FIGURE 1

FINAL CONTOURS MAP



Not to Scale

Note

The facility is currently pursuing beneficial uses for the solid materials accumulating in Ponds 1-4 of the wastewater treatment system. The 6-inch topsoil layer may be replaced with solid materials removed from the ponds at the time of closure as authorized by the administrative authority.

Typical Final Contours

Solid Waste Permit Renewal Application
Ouachita Parish

Graphic Packaging International, Inc.
West Monroe, Louisiana

PROVIDENCE
ENGINEERING & ENVIRONMENTAL GROUP LLC
BATON ROUGE, LOUISIANA

Doc Code	001-007	Drawn: LMH	Q1 Appendix
		Checked:	
Dwg. No.:	001-007-A003	Approved:	
		Date: 01/15/07	

ATTACHMENT 1

FINAL COVER INSTALLATION QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PLAN

GRAPHIC PACKAGING INTERNATIONAL, INC.
MONROE, OUACHITA PARISH, LOUISIANA

SOLID WASTE SURFACE IMPOUNDMENT FINAL COVER INSTALLATION QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PLAN

MAY 2007

PREPARED BY:

PROVIDENCE

Providence Engineering and Environmental Group LLC
1201 Main Street
Baton Rouge, Louisiana 70802
(225) 766-7400

PROVIDENCE ENGINEERING'S PROJECT NUMBER 001-007

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1.0 INTRODUCTION

This Final Cover Installation Quality Assurance/Quality Control (QA/QC) Plan has been developed to ensure that the final cover system for the solid waste surface impoundment units at the Graphic Packaging International Inc. (Graphic Packaging) facility is designed, constructed, installed, and maintained properly, in accordance with the solid waste permit. The QA/QC Plan will be implemented for final cover construction and maintenance of the following units:

NPDES Wastewater Treatment System

- Primary Clarifier Sludge/Bark Boiler Ash Sluice Pond
- High Intensity Aeration Basin (HIASB)
- High Intensity Aeration Basin Effluent Canal
- No. 1 Pond
- No. 2 Pond
- No. 3 Pond
- No. 4 Pond

21-Acre and 41-Acre Ash/Sludge Impoundments

The composite final cover system shall consist of the following components (from the bottom up):

- Clay Layer (recompacted) – 24 inches thick with a maximum permeability of 1×10^{-7} cm/sec
- Topsoil Layer – 6 inches thick

2.0 CLAY LAYER

2.1 General

Final cover areas shall be constructed to lines, grades, and cross sections as permitted through the Graphic Packaging's Solid Waste Standard Permit for the Surface Impoundment Units. Any brush, roots, sod, or other unsuitable materials shall be removed prior to placement of the final cover. The clay material shall be maintained in a satisfactory manner until the final completion of the actual installation. Subsequent to the final grading of the waste, a minimum 2-foot thick recompacted clay liner shall be constructed.

In general, construction of the clay liner will be accomplished by spreading and blading the clay with bulldozers, wetting the clay if needed, and compacting each lift with cleated compactors.

The suitable clay material shall be loosely distributed in lifts sufficient to achieve a six inch, maximum compacted thickness. Clay liner thickness should be periodically surveyed by the contractor for construction purposes.

Compaction is achieved by rolling each loose lift with several passes of a cleated compactor; or equivalent method. The upper one to two inches of compacted lift shall then be scarified in order to allow bonding between lifts. This process shall be continued until the design grade elevations are reached. Surveyed thickness verification shall be reported in the final "as-built" drawings.

2.2 QA/QC

The QA/QC criteria for clay liner placement, compaction, testing (lab and field), frequencies, and performance are provided in the sections that follow.

2.2.1 Visual Observation

The QC field representatives shall be present to observe placement and compaction of the clay liner. The visual observations associated with the various tasks included the following:

Placement:

- Observe material type and moisture content for material specifications
- Monitor uncompacted lift thickness and bonding techniques
- Monitor clod size
- Observe water application

Compaction:

- Observe compaction equipment, number of passes, *etc.*
- Observe compacted lift thickness

2.2.2 Field Testing

Field testing of the clay liner shall consist of performing moisture content and unit weight determinations (by nuclear methods – ASTM D3017 and ASTM D2922, respectively) on compacted lifts as necessary to evaluate compaction conditions. The resulting holes created by the nuclear gauge test shall be backfilled with clay liner material or bentonite for sealing.

The clay liner material shall be compacted to a dry density greater than or equal to 90 percent of the maximum dry density and shall be at a moisture content of 2 to 10 percent greater than optimum as determined by the Standard Proctor Compaction Test, ASTM Standard D-698 or to a density and moisture content that is

determined to yield a permeability of $1x10^{-7}$ cm/sec, whichever is more stringent.

Compaction tests shall be performed at the minimum rate of 8 tests per acre per lift. In the event of test failure, additional compaction efforts shall be expended until the material in the vicinity of the test meets specifications.

An additional test will be performed in the vicinity of the failure to verify that the additional clay processing effort remedied the area of the test failure.

2.2.3 Laboratory Testing

Laboratory testing of the clay liner material shall consist of particle size analyses (ASTM D1140), Atterberg limits determinations (ASTM D4318), moisture content and unit weight determinations (ASTM D2216), moisture/density relationships (standard Proctor compaction tests-ASTM D698), and permeability tests (*i.e.,* tests following Appendix VII, Permeability Tests, of the U.S. Army Corps of Engineers, Engineering and Design, Laboratory Soils Testing manual, publication number EM 1110-2-1906, dated November 30, 1970 or other approved methods).

A minimum of one sample from the clay material source shall be tested for Atterberg limit determinations (ASTM D4318), particle size analyses (ASTM D1140) and moisture/density relationship, and moisture/density versus permeability relationship prior to construction of the clay liner. These tests shall be reconducted each time it is determined that the source of the clay material changes.

Samples of undisturbed in-place clay liner shall be collected for analyses as described later in this section. Undisturbed sampling will be accomplished by using a three-inch diameter drive tube three inches long in a manner essentially conforming to Paragraph 6 of ASTM D2937. The resulting holes will be backfilled with tamped and wetted clay liner material. The samples shall be trimmed, identified, placed into individual bags for moisture retention, and transported to an approved geotechnical laboratory under chain-of-custody control.

Laboratory permeability tests shall be performed on the collected clay liner samples at the minimum rate of 1 test per 1 acre of linear surface area per lift and the sample tube will penetrate the entire thickness of the compacted lift. In the event of test failure, additional compaction efforts shall be expended until the material in the vicinity of the test meets specifications. An additional test will be performed

in the vicinity of the failure to verify that the additional compactive effort remedied the area of test failure.

3.0 TOPSOIL

No laboratory or field testing specifications have been developed for the installation of the topsoil layer. The topsoil shall be of quality to support vegetation and shall be placed in accordance with standard construction practices.

The facility is currently pursuing beneficial uses for the solids materials accumulating in Ponds 1-4 of the wastewater treatment system. The 6-inch topsoil layer may be replaced with solids materials removed from the ponds at time of closure as authorized by the administrative authority.

ATTACHMENT 2

CLOSURE DOCUMENT

Document to be Filed in the Parish Records upon Final Closure of a Solid Waste Disposal Facility

(**Name of permit holder**) hereby notifies the public that the following described property was used for the disposal of solid waste. This site was closed on (date facility was closed) in accordance with the *Louisiana Administrative Code*, Title 33, Part VII. Inquiries regarding the contents of (**the facility**) may be directed to (**name of person with knowledge of the contents of the facility**) at (**address of person with knowledge of the content of the facility**).

Property Description

(Specific Description of the Location of the Facility)

_____

Signature of Person Filing Parish Record

_____

Typed Name and Title of Person Filing Parish Record

_____

Date

APPENDIX R

ANNUAL REPORT

10kWIZARD
SEC POWER SEARCH

FORM 10-K

GRAPHIC PACKAGING CORP - GPK

Filed: March 03, 2006 (period: December 31, 2005)

Annual report which provides a comprehensive overview of the company for the past year

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UNITED STATES SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

Form 10–K

☑ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For the fiscal year ended December 31, 2005

or

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For the transition period from to

COMMISSION FILE NUMBER: 1–13182

Graphic Packaging Corporation
(Exact name of registrant as specified in its charter)

Delaware *(State of incorporation)*	**58–2205241** *(I.R.S. employer identification no.)*
814 Livingston Court, Marietta, Georgia *(Address of principal executive offices)*	**30067** *(Zip Code)*

(770) 644–3000
Registrant's telephone number, including area code:

Securities registered pursuant to Section 12(b) of the Act:

Title of Each Class	Name of Each Exchange on Which Registered
Common Stock, $0.01 par value per share	New York Stock Exchange
Series A Junior Participating Preferred Stock Purchase Rights Associated with the Common Stock	New York Stock Exchange

Securities registered pursuant to Section 12(g) of the Act:
None

Indicate by check mark if the registrant is a well–known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☐ No ☑

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes ☐ No ☑

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☑ No ☐

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S–K is not contained herein, and will not be contained, to the best of the registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10–K or any amendment to this Form 10–K. ☑

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer or a non–accelerated filer (as defined in Rule 12b–2 of the Act).
Large accelerated filer ☐ Accelarated filer ☑ Non–accelarated filer ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b–2 of the Act). Yes ☐ No ☑

The aggregate market value of voting and non–voting common equity held by non–affiliates at June 30, 2005 was $246.5 million.

As of February 24, 2006, there were 198,698,036 shares of the registrant's Common Stock, $0.01 par value per share outstanding.

DOCUMENTS INCORPORATED BY REFERENCE:

Portions of the registrant's definitive Proxy Statement for the Annual Meeting of Stockholders to be held on May 16, 2006 are incorporated by reference into Part III of this Annual Report on Form 10–K.

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EX–32.2 SECTION 906, CERTIFICATION OF THE CFO

INFORMATION CONCERNING FORWARD–LOOKING STATEMENTS

Certain statements of Graphic Packaging Corporation's expectations, including, but not limited to, statements regarding inflationary pressures, cost savings from its continuous improvement programs and manufacturing rationalization, capital spending, and depreciation and amortization, in this report constitute "forward–looking statements" as defined in the Private Securities Litigation Reform Act of 1995. Such statements are based on currently available operating, financial and competitive information and are subject to various risks and uncertainties that could cause actual results to differ materially from the Company's historical experience and its present expectations. These risks and uncertainties include, but are not limited to, inflation of and volatility in raw material and energy costs, the Company's substantial amount of debt, continuing pressure for lower cost products, the Company's ability to implement its business strategies, currency translation movements and other risks of conducting business internationally, and the impact of regulatory and litigation matters, including those that impact the Company's ability to protect and use its intellectual property. Undue reliance should not be placed on such forward–looking statements, as such statements speak only as of the date on which they are made and the Company undertakes no obligation to update such statements. Additional information regarding these and other risks is contained in Item 1A. Risk Factors herein.

PART I

ITEM 1. *BUSINESS*

Overview

Graphic Packaging Corporation ("GPC" and, together with its subsidiaries, the "Company") is a leading provider of paperboard packaging solutions for a wide variety of products to multinational and other consumer products companies. The Company strives to provide its customers with packaging solutions designed to deliver marketing and performance benefits at a competitive cost by capitalizing on its low–cost paperboard mills and converting plants, its proprietary carton designs and packaging machines, and its commitment to customer service.

The Company focuses on providing a range of paperboard packaging products to major companies with well–recognized brands. Its customers generally have prominent market positions in the beverage, food and household products industries. The Company offers customers its paperboard, cartons and packaging machines, either as an integrated solution or separately. The Company has long–term relationships with major companies, including Altria Group, Inc. (which includes Kraft Foods Inc. and the Philip Morris Companies), Anheuser–Busch Companies, Inc., General Mills, Inc., SABMiller plc., Molson Coors Brewing Company, and numerous Coca–Cola and Pepsi bottling companies.

The Company's packaging products are made from a variety of grades of paperboard. The Company makes most of its packaging products from coated unbleached kraft paperboard ("CUK board") and coated recycled paperboard ("CRB") that the Company produces at its mills, and a portion from paperboard purchased from external sources.

The Company reports its results in two business segments: paperboard packaging and containerboard/other. The Company operates in four geographic areas: the United States, Central and South America, Europe and Asia–Pacific. For business segment and geographic area information for each of the last three fiscal years, see Note 16 in the Notes to Consolidated Financial Statements included in Item 8. Financial Statements and Supplementary Data herein.

GPC (formerly known as Riverwood Holding, Inc.) was incorporated on December 7, 1995 under the laws of the State of Delaware. On August 8, 2003, the corporation formerly known as Graphic Packaging International Corporation merged with and into Riverwood Acquisition Sub LLC, a wholly–owned subsidiary of Riverwood Holding, Inc. ("Riverwood Holding"), with Riverwood Acquisition Sub LLC as the surviving entity (the "Merger"). At the closing of the Merger, one share of common stock of Riverwood Holding was exchanged for each share of common stock of Graphic Packaging International Corporation. Riverwood Acquisition Sub LLC then merged into Riverwood Holding, which was renamed Graphic Packaging Corporation. After the Merger, (1) RIC Holding, Inc. merged into Graphic Packaging Holdings, Inc., which was renamed GPI Holding, Inc., and (2) the corporation formerly known as Graphic Packaging Corporation merged into Riverwood International Corporation ("RIC"), which was renamed Graphic Packaging International, Inc. ("Graphic Packaging International"). The corporation formerly known as Graphic Packaging International Corporation and its subsidiaries for periods prior to the Merger are referred to herein as "Graphic."

The Company's website is located at http://www.graphicpkg.com. The Company makes available, free of charge through its website, its Annual Reports on Form 10–K, Quarterly Reports on Form 10–Q, Current Reports on Form 8–K, amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934 as soon as reasonably practicable after such materials are electronically filed or furnished to the Securities and Exchange Commission (the "SEC"), and investor presentations. The information contained or incorporated in the Company's website is not a part of this Annual Report on Form 10–K.

Paperboard Packaging

The Company's paperboard packaging products deliver marketing and performance benefits at a competitive cost. The Company supplies paperboard cartons and carriers designed to protect and contain products while providing:

- convenience through ease of carrying, storage, delivery and food preparation for consumers;
- a smooth surface printed with high–resolution, multi–color graphic images that help improve brand awareness and visibility of products on store shelves; and
- durability, stiffness, wet and tear strength, abrasion and heat resistance, leakage protection, microwave heating capabilities and moisture, gas and solvent barriers.

The Company produces paperboard at its mills, prints and cuts ("converts") the paperboard into cartons at its converting plants and designs and manufactures specialized, proprietary packaging machines that package bottles and cans and, to a lesser extent, non–beverage consumer products. The Company installs its packaging machines at customer plants under long–term leases and provides support, service and advanced performance monitoring of the machines. The Company also sells the paperboard it produces to independent converters.

The Company offers a variety of laminated, coated and printed packaging structures that are produced from its CUK board and CRB, as well as other grades of paperboard that are purchased from third party suppliers. The Company produces cartons using diverse structural designs and combinations of paperboard, films, foils, metalization, holographics, embossing and other characteristics that are tailored to the needs of individual products. The Company provides a wide range of paperboard packaging solutions for the following end–use markets:

- beverage, including beer, soft drinks, water and juices;
- food, including cereal, desserts, frozen and microwavable foods and pet foods;
- prepared foods, including snacks, quick serve foods in restaurants and food service products;
- household products, including dishwasher and laundry detergent, health care and beauty aids and tissues and papers; and
- tobacco, including flip top boxes and long cartons.

For its beverage customers, the Company supplies beverage cartons in a variety of designs and formats, including 6, 8, 12, 18, 24 and 30 unit multi–packs. Its proprietary high speed beverage packaging machines package cans, bottles and other beverage containers into its beverage cartons. The Company believes the use of such machines creates "pull–through" demand for its cartons which in turn creates demand for its CUK board. The Company seeks to increase the customers' use of its integrated packaging solutions in order to improve its revenue opportunities, enhance customer relationships, provide customers with greater packaging line and supply chain efficiencies and overall cash benefits, and expand opportunities for the Company to provide value–added support and service. The Company enters into annual or multi–year carton supply contracts with its beverage packaging customers, which generally require the customer to purchase a fixed portion of its carton requirements from the Company. Particularly in its international operations, the Company's CUK board may be sold to and converted by joint ventures and licensees of its beverage carton machines which, in turn, sell converted beverage cartons to end–users for use on the Company's proprietary packaging machines. The Company also sells CUK board that the Company produces to customers for use on third–party packaging machines.

The Company develops packaging applications to meet the needs of its customers. Described below are a number of characteristics of its packaging products.

Strength Packaging. Through its application of materials and package designs, the Company provides sturdiness to meet a variety of packaging needs, including tear and wet strength, puncture resistance, durability and compression strength (providing stacking strength to meet store display packaging requirements). The

Company achieves such strength characteristics through combinations of paperboard, film laminates and metallized layers tailored on a product–by–product basis.

Promotional Packaging. The Company offers a broad range of promotional packaging options that help differentiate its customers' products. The Company provides products designed to enhance point–of–purchase and marketing opportunities through package shapes, portability, metallization, holographics, embossing and micro–embossing, brilliant high–tech inks, specialized coatings, hot–stamp metal foil surfaces, in–pack and on–pack customized promotions, inserts, windows and die–cuts. These promotional enhancements improve brand awareness and visibility on store shelves.

Convenience Packaging. These packaging solutions improve package usage and food preparation:

- *beverage multiple packaging* — Fridge Vendor® and 6, 8, 12, 18, 24 and 30 unit multi–packs for beer, soft drinks, water and juices;
- *active microwave technologies* — Micro–Rite® bake–in–the–box, Focus Qwik Wave® trays, Quilt Wave™ and MicroFlex® Q substrates;
- *alternative containers* — Z–Flute® packaging for club stores, paperboard cans and formed trays;
- *easy opening and closing features* — pour spouts and resealable liners; and
- *ComposiGard®* — the Company's alternative to traditional "bag–in–box" packaging.

Barrier Packaging. The Company provides packages that protect against moisture, grease, oil, oxygen, sunlight, insects and other potential product–damaging factors. Its barrier technologies integrate a variety of specialized laminate and extruded film layers, metallized package layers, package sealing, applied coatings and other techniques — all customized to specific barrier requirements.

Converting Operations

The Company converts CUK board and CRB, as well as other grades of paperboard, into cartons at 24 carton converting plants that the Company operates in the United States, Canada, the United Kingdom, Spain, France and Brazil, as well as through converting plants associated with its joint ventures in Japan and Denmark and contract converters and at licensees in other markets outside the United States. The converting plants print, cut and glue paperboard into cartons designed to meet customer specifications. These plants utilize roll–fed web–printing presses with in–line cutters and sheet–fed printing presses to print and cut paperboard. Printed and cut cartons are in turn glued and shipped to the Company's customers.

The Company's U.S. converting plants are dedicated to converting paperboard produced by the Company, as well as paperboard supplied by outside producers, into cartons. The presses at the Company's U.S. converting plants have high cutting and printing speeds, thereby reducing the labor hours per ton of cartons produced for the high–volume U.S. market. The Company's international converting plants convert paperboard produced by the Company, as well as paperboard supplied by outside producers, into cartons. These converting plants outside of the United States are designed to meet the smaller volume orders of these markets.

Paperboard Production

CUK Board Production. The Company is the larger of two worldwide producers of CUK board. CUK board is a specialized high–quality grade of paperboard with excellent wet and dry tear strength characteristics and printability for high resolution graphics that make it particularly suited for a variety of packaging applications. The Company produces CUK board at its West Monroe, Louisiana mill and its Macon, Georgia mill. The Company has three machines at its West Monroe mill and two machines at its Macon mill capable of making paperboard. These mills have a current total combined annual production capacity of approximately 1.2 million gross tons of CUK board. The Company's CUK board production at its West Monroe and Macon mills was approximately 694,000 tons and 533,000 tons, respectively, in 2005.

CUK board is manufactured from blends of pine and hardwood fibers and, in some cases, recycled fibers, such as double lined kraft cuttings from corrugated box plants ("DLK") and clippings from its converting

operations. Virgin fiber is obtained in the form of wood chips or pulp wood acquired through open market purchases or the Company's long–term purchase contract with Plum Creek Timber Company, L.P. See "— Energy and Raw Materials." Wood chips are chemically treated to form softwood and hardwood pulp, which are then blended (together, in some cases, with recycled fibers). In the case of carrierboard (paperboard used in the beverage industry's multi–pack cartons), chemicals are added to increase moisture resistance. The pulp is then processed through the mill's paper machines, which consist of a paper–forming section, a press section (where water is removed by pressing the wet paperboard between rolls), a drying section and a coating section. Coating on CUK board, principally a mixture of pigments, binding agents and water, provides a white, smooth finish, and is applied in multiple steps to achieve desired levels of brightness, smoothness and shade on the print side of the paperboard. After the CUK board is coated, it is wound into rolls, which are then shipped to the Company's converting plants or to outside converters.

CRB Production. The Company's CRB is a grade of recycled paperboard that offers superior quality graphics, strength and appearance characteristics when compared to other recycled grades. The Company has two machines at its Kalamazoo, Michigan mill capable of making paperboard. The Company's CRB production at its Kalamazoo, Michigan mill was approximately 378,000 tons in 2005. The mill is the largest CRB facility in North America. The mill's paperboard is specifically designed to maximize throughput on high–speed web–litho presses. The Company consumes approximately 90% of the Kalamazoo mill's output in its carton converting operations, and the mill is an integral part of its low cost converting strategy.

White Lined Chip Board. The Company produces white lined chip ("WLC") board at its mill in Norrköping, Sweden, and produced approximately 160,000 tons of such board during 2005. WLC board which is similar to CRB, is used for a variety of folding carton applications principally throughout Europe. The Company's WLC board incorporates recycled fibers to meet the demands of the European marketplace.

Packaging Design and Proprietary Packaging Machinery

The Company has five research and design centers located in Golden, Colorado, Marietta, Georgia, Menasha, Wisconsin, West Monroe, Louisiana and Mississauga, Ontario, Canada. At these centers, the Company designs, tests and manufactures prototype packaging for consumer products packaging applications. The Company designs and tests packaging machinery at its Marietta, Georgia product development center. The Company's Golden, Colorado product development center contains full size pilot lines that can simulate the manufacturing environments of customers. The Company utilizes a network of computer equipment at its converting facilities to provide automated computer–to–plate graphic services designed to improve efficiencies and reduce errors associated with the pre–press preparation of printing plates.

At the Company's two microwave laboratories, in Menasha, Wisconsin and Mississauga, Ontario, the Company designs, prototypes, tests and reports food performance as part of the full–service, turn–key microwave solutions for its food customers. The Company has broad technical expertise in chemistry, paper science, microwave engineering, mechanical engineering, physics, electrical engineering, and food science. This experience base, along with food technologists and investment in sample line equipment and operators, enables the Company to rapidly design and test prototypes to help its customers develop, test and launch successful microwave products into the market.

The Company's engineers create and test packaging designs, processes and materials based on market and customer needs, which are generally characterized as enhanced stacking or tear strength, promotional or aesthetic appeal, consumer convenience or barrier properties. Concepts go through a gated review process through their development to ensure that resources are being focused on those projects that are most likely to succeed commercially. The Company also works to refine and build on current proprietary materials, processes and designs.

At the Company's product development center in Marietta, Georgia, the Company integrates carton and packaging machinery designs from a common database balancing carton manufacturing costs and packaging line performance. The Company also manufactures and designs packaging machines for beverage multiple packaging and other consumer products packaging applications at its principal U.S. manufacturing facility in Crosby, Minnesota and at a facility near Barcelona, Spain. The Company leases substantially all of its

packaging machines to customers, typically under machinery use agreements with original terms of three to six years.

The Company employs a "pull–through" marketing strategy for its beverage multiple packaging customers, the key elements of which are (1) the design and manufacture of proprietary packaging machines capable of packaging plastic and glass bottles, cans and other primary containers, (2) the installation of the machines at beverage customer locations under multi–year machinery use arrangements and (3) the development of proprietary beverage cartons with high–resolution graphics for use on those machines.

The Company's packaging machines are designed to package polyethylene terephthalate ("PET") bottles, glass bottles, cans and other primary beverage containers, as well as non–beverage consumer products, using cartons designed by the Company, made from its paperboard and converted into cartons by the Company, its joint venture partners or its licensees. In order to meet customer requirements, the Company has developed an extensive portfolio of packaging machines consisting of three principal machinery lines, including over eight different models of packaging machines. Its machines package cans and PET or glass bottles in a number of formats including baskets, clips, trays, wraps and fully enclosed cartons. These machines have packaging ranges from 2 to 36 cans per package and have the ability to package cans at speeds of up to 3,000 cans per minute.

The Company manufactures and leases packaging machines to its non–beverage consumer products packaging customers, internationally and in the United States, but to a lesser extent than its beverage multiple packaging customers. Its non–beverage consumer products packaging machines are designed to package cans or bottles in wraps or fully enclosed cartons. The Company also manufactures ancillary equipment, such as machines for inserting coupons in cartons or for dividing or turning filled packages for conveying.

The Company has introduced innovative beverage packaging machines such as its Quikflex® family of machines that package Fridge Vendor® and Twin–Stack® style cartons. The Quikflex TS®, a double–layer multiple packaging design, packages Twin–Stack® cartons providing better portability and a more visible billboard, or advertising space, compared with conventional large–volume multipacks. Double layer packaging allows for cans to be stacked vertically in a double layer in the same paperboard carton. The Company's other lines of packaging machines include the Marksman®, a family of machines designed to package bottles, cans, juice boxes and dairy products in a variety of wrap configurations and the Autoflex, a machine designed to package bottles in a variety of basket style carton configurations. The Company's newest packaging machines incorporate an advanced performance monitoring system called RADAR. This system provides continuous monitoring and reporting to the Company in real time over the Internet of the performance of packaging machines installed at customers' sites and provides technical support on–line and improved operational performance.

Marketing and Distribution

The Company markets its paperboard and paperboard–based products principally to multinational brewers, soft drink bottlers, food companies, and other well–recognized consumer products companies. It also sells paperboard in the open market to independent paperboard converters.

The Company's major customers for beverage cartons include Anheuser–Busch Companies, Inc., SABMiller plc, Molson Coors Brewing Company, numerous Coca–Cola and Pepsi bottling companies, Inbev and Asahi Breweries. The Company also sells beverage paperboard in the open market to independent converters, including licensees of its proprietary carton designs, for the manufacture of beverage cartons.

The Company's non–beverage consumer products packaging customers include Altria Group, Inc., General Mills, Inc., Nestle Group, Unilever, PepsiCo, Inc., Kellogg Company, The Schwan Food Company and Perseco. It also sells its paperboard to numerous independent converters who convert the paperboard into cartons for consumer products. The Company has entered into agreements with a number of major independent converters. Under the terms of these agreements, the converters agree to purchase a significant portion of their paperboard requirements from the Company and to assist the Company in customer development efforts designed to grow the market for paperboard.

Distribution is primarily accomplished through direct sales offices in the United States, Australia, Brazil, Denmark, Germany, Hong Kong, Italy, Japan, Mexico, Singapore, Spain, Sweden and the United Kingdom and, to a lesser degree, through broker arrangements with third parties. The Company's selling activities are supported by its technical and developmental staff.

During 2005, the Company did not have any one customer who represented 10% or more of its net sales.

Joint Ventures

To market machinery–based packaging systems, the Company is a party to joint ventures with Rengo Company Limited (in Japan) and Graphic Packaging International Schur A/S (in Scandinavia), in which it holds a 50% and 60% ownership interest, respectively. The joint venture agreements cover CUK board supply, use of proprietary carton designs and marketing and distribution of packaging systems.

Competition

A relatively small number of large competitors hold a significant portion of the paperboard packaging industry. The Company's primary competitors include Caraustar Industries, Inc., Field Container Company, L.P., International Paper Company, MeadWestvaco Corporation, Packaging Corporation of America, R.A. Jones & Company, Inc., Rock–Tenn Company and Smurfit–Stone Container Corporation. There are only two major producers in the United States of CUK board, MeadWestvaco Corporation and the Company. The Company faces significant competition in its CUK board business from MeadWestvaco as well as from other packaging materials manufacturers. Like the Company, MeadWestvaco produces and converts CUK board, designs and places packaging machines with customers and sells CUK board in the open market.

In beverage multiple packaging, cartons made from CUK board compete with plastics and corrugated packaging for packaging glass or plastic bottles, cans and other primary containers. Although plastics and corrugated packaging are typically priced lower than CUK board, the Company believes that cartons made from CUK board offer advantages over these materials, in areas such as distribution, high quality graphics, carton designs, package performance, package line speed, environmental friendliness and design flexibility.

In non–beverage consumer products packaging, the Company's paperboard competes principally with MeadWestvaco's CUK board, recycled clay–coated news ("CCN") and solid bleached sulphate board ("SBS") from numerous competitors and, internationally, WLC board and folding boxboard. Paperboard grades compete based on price, strength and printability. CUK board and CRB have generally been priced in a range that is lower than SBS board. There are a large number of producers in the paperboard markets, which are subject to significant competitive and other business pressures. Suppliers of paperboard compete primarily on the basis of price, strength and printability of their paperboard, quality and service.

Containerboard/Other

In the United States, the Company manufactures containerboard — linerboard, corrugating medium and kraft paper — for sale in the open market. Corrugating medium is combined with linerboard to make corrugated containers. Kraft paper is used primarily to make grocery bags and sacks. Although the Company's principal paper machines have the capacity to produce both linerboard and CUK board, the Company has shifted significant mill capacity away from linerboard production on its CUK board machines to more profitable packaging applications and intends to stop producing linerboard. The Company continues to operate two paper machines dedicated to the production of corrugating medium and kraft paper at its West Monroe mill.

In 2005, the Company shipped approximately 127,000 tons of corrugating medium, approximately 36,000 tons of kraft paper and approximately 13,000 tons of linerboard from its West Monroe mill. In 2005, the Company also shipped approximately 36,000 tons of various other linerboard products.

The primary customers for the Company's U.S. containerboard production are independent and integrated corrugated converters. The Company sells corrugating medium and linerboard through direct sales offices and agents in the United States. Outside of the United States, linerboard is primarily distributed through independent sales representatives.

The Company's containerboard business operates within a highly fragmented industry. Most products within this industry are viewed as commodities, consequently, selling prices tend to be cyclical, being affected by economic activity and industry capacity.

Energy and Raw Materials

Pine pulpwood, hardwood, paper and recycled fibers, (including DLK and old corrugated containers ("OCC")) and energy used in the manufacture of paperboard, as well as various chemicals used in the coating of paperboard represent the largest components of the Company's variable costs of paperboard production. The cost of these materials is subject to market fluctuations caused by factors beyond the Company's control.

Since the October 1996 sale of the Company's timberlands in Louisiana and Arkansas, the Company relies on private landowners and the open market for all of its pine pulpwood, hardwood and recycled fiber requirements, supplemented by CUK board clippings that are obtained from its converting operations. Under the terms of the sale of those timberlands, the Company entered into a 20–year supply agreement with the buyer, Plum Creek Timber Company, L.P., with a 10–year renewal option, for the purchase by the Company, at market–based prices, of a majority of the West Monroe mill's requirements for pine pulpwood and residual chips, as well as a portion of its needs for hardwood at the West Monroe mill. An assignee of Plum Creek supplies residual chips to the Company pursuant to this supply agreement. The Company purchases the remainder of the wood fiber used in CUK board production at the West Monroe mill from other private landowners in this region. The Company believes that adequate supplies of open market timber currently are available to meet its fiber needs at the West Monroe mill.

The Macon mill purchases most of its fiber requirements on the open market, and is a significant consumer of recycled fiber, primarily in the form of clippings from the Company's domestic converting plants as well as DLK and other recycled fibers. The Company has not experienced any significant difficulties obtaining sufficient DLK or other recycled fibers for its Macon mill operations, which the Company purchases in part from brokers located in the eastern United States. The Macon mill purchases substantially all of its pine pulpwood and hardwood requirements from private landowners in central and southern Georgia. Because of the adequate supply and large concentration of private landowners in this area, the Company believes that adequate supplies of pine pulpwood and hardwood timber currently are available to meet its fiber needs at the Macon mill.

The Kalamazoo mill produces paperboard made primarily from OCC, old newsprint ("ONP"), and boxboard clippings. ONP and OCC recycled fibers are purchased through brokers at market prices and, less frequently, purchased directly from sources under contract. Boxboard clippings are provided by the Company's folding carton converting plants and, to a lesser degree, purchased through brokers. The market price of each of the various recycled fiber grades fluctuates with supply and demand. The Company has many sources for its fiber requirements and believes that the supply is adequate to satisfy its needs.

In addition to paperboard that is supplied to its converting operations from its own mills, to a lessor extent, the Company converts a variety of other paperboard grades such as SBS and uncoated recycled board. The Company purchases such paperboard requirements, including additional CRB, from outside vendors, in some cases through multi–year supply agreements.

Energy, including natural gas, fuel oil and electricity, represents a significant portion of the Company's manufacturing costs. The Company has entered into contracts designed to manage risks associated with future variability in cash flows and price risk related to future energy cost increases for a significant portion of its natural gas requirements, primarily at its U.S. mills through December 2006. The Company plans to continue its hedging program for natural gas. Refer to Note 15 in Notes to Consolidated Financial Statements.

The Company purchases a variety of other raw materials for the manufacture of its paperboard and cartons, such as inks, aluminum foil, plastic filling, plastic resins, adhesives, process chemicals and coating chemicals such as kaolin and titanium dioxide. While such raw materials are generally readily available from many sources, and the Company is not dependent upon any one source of such raw materials, the Company has developed strategic long–standing alliances with some of its vendors, including the use of multi–year

supply agreements, in order to provide a guaranteed source of raw materials that satisfies customer requirements.

The Company continues to be negatively impacted by inflationary pressures, including higher costs for chemical–based inputs, energy and fiber and believes these higher costs will negatively impact its results for 2006. Since negotiated contracts and the market largely determine the pricing for its products, the Company is at times limited in its ability to pass through to its customers any inflationary or other cost increases that the Company may incur in the future.

Seasonality

The Company's net sales, income from operations and cash flows from operations are subject to moderate seasonality, with demand usually increasing in the spring and summer due to the seasonality of the worldwide beverage multiple packaging markets.

Working Capital

The Company continues to focus on reducing working capital needs and increasing liquidity. The Company's working capital needs arise primarily from maintaining a sufficient amount of inventories to meet the delivery requirements of the Company's customers and its policy to extend short–term credit to customers.

Research, Development and Engineering

The Company's research and development staff works directly with its sales and marketing personnel in meeting with customers and pursuing new business. The Company's development efforts include, but are not limited to, extending the shelf life of customers' products, reducing production costs, enhancing the heat–managing characteristics of food packaging and refining packaging appearance through new printing techniques and materials. The Company's revolutionary Fridge Vendor® carton, a horizontal beverage 12–pack that delivers cold beverages while conserving refrigerator space, is but one example of the Company's successful projects involving both carton and machine design to introduce a new consumer friendly package. This patented package has proven popular with consumers because it's convenient and with the Company's customers because it sells more product. Another recent award–winning package solution is the Company's Micro–Rite® even heating trays that are used for frozen entrees or side dishes that do not need browning and crisping. This new product line delivers conventional oven quality at microwave preparation speed and convenience to meet the needs of today's consumers.

Patents and Trademarks

As of December 31, 2005, the Company had a large patent portfolio, presently owning, controlling or holding rights to more than 1,700 U.S. and foreign patents, with more than 475 U.S. and foreign patent applications currently pending. The Company's patent portfolio consists primarily of patents relating to packaging machinery, manufacturing methods, structural carton designs and microwave and barrier protection packaging. These patents and processes are significant to the Company's operations and are supported by trademarks such as Z–flute®, Fridge Vendor®, Composipac® and Micro–Rite® Quiltwave™ and Tower Pack™. The Company takes significant steps to protect its intellectual property and proprietary rights, but may not be completely successful in all instances. The Company does not believe that the expiration of any of its patents at the end of their normal lives would have a material adverse effect on its financial condition or results of operations, and the Company's operations are not dependent upon any single patent or trademark.

Employees and Labor Relations

As of December 31, 2005, the Company had approximately 7,800 employees worldwide (excluding employees of joint ventures), of which approximately 51% were represented by labor unions and covered by collective bargaining agreements. The Company considers its employee relations to be satisfactory.

Employees covered by collective bargaining agreements are located at 11 different sites with 11 union contracts. The contracts with employees represented by the United Steel, Paper and Forestry, Rubber, Manufacturing, Energy, Allied–Industrial and Service Workers International Union ("USW"), formerly PACE, at the Company's Charlotte, NC and West Monroe, LA converting operations were scheduled to expire on August 12, 2005 and August 31, 2005, respectively. The Company and the USW negotiated a new four (4) year agreement in Charlotte, NC that runs from August 13, 2005 through August 12, 2009. Negotiations with USW for the West Monroe, LA converting facility continue to date with the old contract in force.

In addition to employees at the Charlotte, NC and West Monroe, LA, USW represents employees at the Gordonsville, TN, and Cincinnati, OH converting plants; the Macon, GA Paper mill; the West Monroe, LA Paper mill and the Kalamazoo, MI converting plant and mill. Both USW and International Brotherhood of Teamsters ("IBT") formerly GCIU, represent employees at the Wausau, WI and Menasha, WI converting plants and the International Association of Machinists and Aerospace Workers and the International Brotherhood of Electrical Workers also represent certain maintenance employees at the Macon, GA Paper mill who are covered by the same agreement as the Company has with USW.

The Company's contracts with USW and the IBT that cover employees at the Menasha and Wausau, WI plants extend through October 31, 2008 and June 30, 2009 respectively. The contract with the IBT covering certain employees at the Kalamazoo, MI transportation center extends through July 31, 2010.

The contract with USW at the Gordonsville, TN facility runs through October 14, 2007 and at the Macon, GA mill, a seven–year agreement with USW extends from January 1, 2004 through December 31, 2010. At the West Monroe Paper mill, a six–year contract with USW covers the period from March 1, 2003 to February 28, 2009. A contract was also reached in 2003 with USW for the Kalamazoo facility, which will expire in January 2008. The Company's labor agreement with USW for its Cincinnati, OH converting plant covers the five–year period from February 1, 2001 through January 31, 2006. Negotiations with USW for the Cincinnati, OH converting facility continue to date with the old contract in force.

IBT represented employees in the Clinton, MS converting plant were operating under a six–year contract covering the six–year period from February 1, 2003 through January 31, 2009, until the facility was permanently closed during the fourth quarter of 2005.

The Association of Western Pulp & Paper Union ("AWP & PU") represents employees at the North Portland, OR converting plant. In 2002, a four–year agreement was reached at the North Portland converting plant which expired February 28, 2006. Negotiations with AWP & PU for the North Portland, OR converting facility are scheduled to begin in March 2006.

The Company's international employees are represented by unions in Brazil, France, Spain, Sweden and the United Kingdom.

Environmental Matters

Certain environmental matters in which the Company is involved are discussed in "Management's Discussion and Analysis of Financial Condition and Results of Operations — Environmental Matters."

ITEM 1A. *RISK FACTORS*

The following important factors, and those important factors described elsewhere in this report, could affect (and in some cases have affected) the Company's actual results and could cause such results to differ materially from estimates or expectations reflected in the forward–looking statements:

- Because of the Company's substantial debt, its ability to obtain additional financing may be impaired; a substantial portion of its operating cash flow must be dedicated to service its debt, thus reducing funds available for other purposes; the Company is exposed to risk of increased interest costs because a portion of its borrowings are at variable rates of interest; and the Company's flexibility to adjust to changing market conditions and its ability to withstand competitive pressures could be limited.

- The Company's ability to generate the significant amount of cash needed to service its debt, and to comply with the covenants and restrictions contained in its debt instruments, will depend on its financial and operating performance, which, in turn, is subject to prevailing economic and competitive conditions and to the following financial and business factors: operating difficulties, increased operating costs, increased raw materials and energy costs, market cyclicality, product prices, the response of competitors, regulatory developments and delays in implementing strategic projects.
- Significant increases in the cost of energy or raw materials could have a material adverse effect on the Company's margins and income from operations.
- The Company's ability to implement successfully its business strategies and to realize anticipated savings is subject to significant business, economic and competitive uncertainties and contingencies, many of which are beyond the Company's control.
- The Company is dependent on key customers and strategic relationships, and the loss of or reduced sales to key customers or changes in these relationships could result in decreased revenues, impact the Company's cash flows and harm its financial position.
- The Company faces intense competition and, if it is unable to compete successfully against other manufacturers of paperboard or cartons, it could lose customers and its revenues may decline.
- The Company's net sales and profitability could be affected by intense pricing pressures. If the Company's facilities are not as cost efficient as those of its competitors, or if its competitors otherwise choose to lower prices, the Company may lose customers to its competitors, which may negatively impact its revenues, cash flows and financial condition.
- The Company's ability to generate cash flows is dependent in significant part on the sales volume and selling prices that it realizes for its products.
- Markets may not be able to absorb the Company's entire paperboard production, which may negatively impact the Company's financial condition and results of operations.
- Any prolonged disruption in production due to labor difficulties, equipment failures, destruction of or material damage to any of the Company's facilities could have a material adverse effect on the Company's net sales, margins and cash flows.
- The Company may not be able to adequately protect its intellectual property and proprietary rights, which could harm its future success and competitive position.
- The Company is subject to environmental, health and safety laws and regulations, and costs to comply with such laws and regulations, or any liability or obligation imposed under such laws or regulations, could negatively impact its financial condition and results of operations.
- Work stoppages and other labor relations matters may make it substantially more difficult or expensive for the Company to manufacture and distribute its products, which could result in decreased sales or increased costs, either of which would negatively impact its financial condition and results of operations.
- The Company is subject to significant risks associated with operating in foreign countries. Foreign currency risks and exchange rate fluctuations could hinder the results of the Company's international operations, and the strength of the U.S. dollar could disadvantage the Company relative to its foreign competitors.

ITEM 1B. *UNRESOLVED STAFF COMMENTS*

None.

ITEM 2. *PROPERTIES*

Headquarters

The Company's principal executive offices are located in Marietta, GA, where it currently leases approximately 52,000 square feet of office space.

Manufacturing Facilities

A listing of the principal plants and properties owned or leased and operated by the Company is set forth below. The Company's buildings are adequate and suitable for the business of the Company. The Company also leases certain smaller facilities, warehouses and office space throughout the United States and in foreign countries from time to time.

Type of Facility and Location	Floor Space in Square Feet	Related Segment(s) or Use of Facility
Paperboard Mills:		
West Monroe, LA	1,535,000	Paperboard Packaging; Containerboard/Other
Macon, GA	756,000	Paperboard Packaging; Containerboard/Other
Kalamazoo, MI	1,330,000	Paperboard Packaging
Norrköping, Sweden	417,000	Paperboard Packaging
Converting Plants:		
West Monroe, LA	695,000	Paperboard Packaging
Cincinnati, OH	240,000	Paperboard Packaging
Perry, GA (1)	267,000	Paperboard Packaging
Centralia, IL	283,000	Paperboard Packaging
Charlotte, NC	120,000	Paperboard Packaging
Fort Smith, AR	327,000	Paperboard Packaging
Golden, CO	299,000	Paperboard Packaging
Gordonsville, TN (2)	173,000	Paperboard Packaging
Kalamazoo, MI	238,000	Paperboard Packaging
Kendallville, IN	100,000	Paperboard Packaging
Lawrenceburg, TN	323,000	Paperboard Packaging
Lumberton, NC	246,000	Paperboard Packaging
Menasha, WI	442,000	Paperboard Packaging
Mitchell, SD	258,000	Paperboard Packaging
Portland, OR	530,000	Paperboard Packaging
Richmond, VA	130,000	Paperboard Packaging
Tuscaloosa, AL	126,000	Paperboard Packaging
Wausau, WI	481,000	Paperboard Packaging
Mississauga, Ontario, Canada (3)	44,000	Paperboard Packaging
Bristol, Avon, United Kingdom	357,000	Paperboard Packaging
Igualada, Barcelona, Spain (3)	131,000	Paperboard Packaging
Beauvois en Cambresis, France (3)	70,000	Paperboard Packaging
Le Pont de Claix, France	120,000	Paperboard Packaging
Jundiai, Sao Paulo, Brazil	95,000	Paperboard Packaging
Packaging Machinery/Other:		
Crosby, MN	188,000	Packaging machinery engineering design and manufacturing
Marietta, GA (3)	31,000	Research and development and packaging machinery engineering design
Igualada, Barcelona, Spain (3)	22,000	Packaging machinery engineering design and manufacturing
Golden, CO	26,000	Research and development/office
Mississauga, Ontario, Canada (3)	7,000	Research and development
West Monroe, LA	12,000	Research and development
Menasha, WI	5,000	Research and development

Notes:

(1) The facility is leased from the Middle Georgia Regional Development Authority in consideration of the issuance of industrial development bonds by such entity.
(2) Two facilities, one leased.
(3) Leased facility.

ITEM 3. *LEGAL PROCEEDINGS*

The Company is a party to a number of lawsuits arising in the ordinary conduct of its business. Although the timing and outcome of these lawsuits cannot be predicted with certainty, the Company does not believe that disposition of these lawsuits will have a material adverse effect on the Company's consolidated financial position, results of operations or cash flows.

ITEM 4. *SUBMISSION OF MATTERS TO A VOTE OF SECURITY HOLDERS*

During the fourth quarter of 2005, there were no matters submitted to a vote of security holders.

EXECUTIVE OFFICERS OF THE REGISTRANT

Pursuant to General Instruction G(3) of Form 10–K, the following list is included as an unnumbered item in Part I of this Report in lieu of being included in the definitive proxy statement that will be filed within 120 days after December 31, 2005.

Jeffrey H. Coors, 61, has been the Executive Chairman and a director of GPC since the closing of the Merger. Mr. Coors was Chairman of Graphic from 2000 and until the closing of the Merger, and was its Chief Executive Officer and President from Graphic's formation in 1992 and until the closing of the Merger. Mr. Coors served as Executive Vice President of the Adolph Coors Company from 1991 to 1992 and as its President from 1985 to 1989, as well as at Coors Technology Companies as its President from 1989 to 1992.

Stephen M. Humphrey, 61, has been the President and Chief Executive Officer and a director of GPC since the closing of the Merger. From March 1997 until the closing of the Merger, Mr. Humphrey was the President and Chief Executive Officer and a director of Riverwood, RIC Holding, Inc. and RIC. From 1994 through 1996, Mr. Humphrey was Chairman, President and Chief Executive Officer of National Gypsum Company, a manufacturer and supplier of building products and services. From 1981 until 1994, Mr. Humphrey was employed by Rockwell International Corporation, a manufacturer of electronic industrial, automotive products, telecommunications systems and defense electronics products and systems, where he held a number of key executive positions.

David W. Scheible, 49, has been the Company's Chief Operating Officer since October 2004. Previously, Mr. Scheible served as the Company's Executive Vice President of Commercial Operations since the closing of the Merger. Mr. Scheible served as Graphic's Chief Operating Officer from June 1999 until the closing of the Merger. He was President of Graphic's Flexible Division from January to June 1999. Before joining Graphic, he was affiliated with the Avery Denison Corporation, working most recently as its Vice President and General Manager of the Specialty Tape Division from 1995 through January 1999 and Vice President and General Manager of the Automotive Division from 1993 to 1995.

Daniel J. Blount, 50, has been the Company's Senior Vice President and Chief Financial Officer since September 2005. From October 2003 until September 2005, he was the Senior Vice President, Integration. From August 2003 until October 2003, he was the Senior Vice President, Integration, Chief Financial Officer and Treasurer. From June 2003 until August 2003, he was Senior Vice President, Chief Financial Officer and Treasurer of Riverwood, RIC Holding, Inc. and RIC. From September 1999 until June 2003, Mr. Blount was Senior Vice President and Chief Financial Officer of Riverwood, RIC Holding, Inc. and RIC. Mr. Blount was named Vice President and Chief Financial Officer of Riverwood, RIC Holding, Inc. and RIC in September 1998. Prior to joining Riverwood, Mr. Blount spent 13 years at Montgomery Kone, Inc., an elevator, escalator

and moving ramp product manufacturer, installer and service provider, lastly as Senior Vice President, Finance.

Stephen A. Hellrung, 58, has been the Company's Senior Vice President, General Counsel and Secretary since October 2003. He was Senior Vice President, General Counsel and Secretary of Lowe's Companies, Inc., a home improvement specialty retailer, from April 1999 until June 2003. Prior to joining Lowe's Companies, Mr. Hellrung held similar positions with The Pillsbury Company and Bausch & Lomb, Incorporated.

Wayne E. Juby, 58, has been the Company's Senior Vice President, Human Resources since the closing of the Merger. Mr. Juby was the Senior Vice President, Human Resources of Riverwood, RIC Holding, Inc. and RIC, from April 2001 until the closing of the Merger. Mr. Juby joined Riverwood in November 2000. From November 2000 until April 2001, Mr. Juby was Director, Corporate Training, of Riverwood. Prior to joining Riverwood, Mr. Juby was Vice President, Human Resources, of National Gypsum Company, from 1994 until 1996.

Robert M. Simko, 46, has been the Company's Senior Vice President — Paperboard Division since December 19, 2005. From October 2002 to December 2005, Mr. Simko served as the Company's Vice President, Supply Chain Operations. Mr. Simko joined the Company in February 1999 as the Vice President and Resident Manager, Georgia Paperboard Operations after serving as the Director of Operations for Sealright Co., Inc. for approximately three years and holding several key manufacturing positions with the Films Division at Mobil Chemical Co.

Michael R. Schmal, 53, has been the Company's Senior Vice President, Beverage Division since the closing of the Merger and was the Vice President and General Manager, Brewery Group of Riverwood from October 1, 1996 until the closing of the Merger. Prior to that time, Mr. Schmal held various positions at Riverwood since joining the Company in 1981.

Donald W. Sturdivant, 45, has been the Company's Senior Vice President, Consumer Packaging Division since December 2005. From the closing of the merger through December 2005, he served as the Company's Senior Vice President, Universal Packaging Division. Mr. Sturdivant joined Graphic in August 1999 as President of the Performance Packaging Division. Mr. Sturdivant joined James River Corporation in 1991, serving first as a General Manager, and then, beginning in June 1995, as Vice President and General Manager. He continued in this capacity after James River and Fort Howard merged to become Fort James Corporation in 1997. In February 1999, he was promoted to President of the Packaging Business and served in that position until Graphic's acquisition of the folding carton business of Fort James Corporation in August 1999.

PART II

ITEM 5. *MARKET FOR REGISTRANT'S COMMON EQUITY AND RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES*

GPC's common stock (together with the associated stock purchase rights) is traded on the New York Stock Exchange under the symbol "GPK." The historical range of the high and low sales price per share for each quarter of 2005 and 2004 are as follows:

	2005		2004	
	High	Low	High	Low
First Quarter	$ 7.42	$ 4.26	$ 4.97	$ 4.05
Second Quarter	$ 4.63	$ 2.98	$ 8.86	$ 4.82
Third Quarter	$ 3.97	$ 2.72	$ 8.81	$ 5.95
Fourth Quarter	$ 3.04	$ 2.09	$ 8.29	$ 6.09

No cash dividends have been paid during the last three years to the Company's common stockholders. The Company's intent is not to pay dividends at this time. Additionally, the Company's credit facilities and the indentures governing its debt securities place substantial limitations on the Company's ability to pay cash

dividends on its common stock (see "Covenant Restrictions" in "Management's Discussion and Analysis of Financial Condition and Results of Operations" and Note 7 in Notes to Consolidated Financial Statements).

On February 24, 2006, there were approximately 1,980 stockholders of record and 3,570 beneficial holders of GPC's common stock.

ITEM 6. *SELECTED FINANCIAL DATA*

The selected consolidated financial data set forth below should be read in conjunction with "Management's Discussion and Analysis of Financial Condition and Results of Operations" and the Consolidated Financial Statements of the Company and Notes thereto included elsewhere in this report.

	Year Ended December 31,				
	2005	2004	2003	2002	2001
	(Amounts in millions)				
Statement of Operations Data:					
Net Sales	$ 2,384.0	$ 2,386.5	$ 1,683.3	$ 1,247.3	$ 1,201.6
Income from Operations	86.9	115.6	106.1	140.6	107.3
Loss before Cumulative Effect of a Change in Accounting Principle (a)	(91.1)	(60.9)	(95.7)	(49.0)	(65.1)
Net Loss (a) (b)	(91.1)	(60.9)	(95.7)	(49.0)	(65.6)
Loss Per Share:					
Basic	$ (0.46)	$ (0.31)	$ (0.65)	$ (0.43)	$ (0.57)
Diluted	(0.46)	(0.31)	(0.65)	(0.43)	(0.57)
Weighted average number of shares outstanding:					
Basic	198.6	198.5	148.3	115.1	115.1
Diluted	198.6	198.5	148.3	115.1	115.1
Balance Sheet Data:					
(as of period end)					
Cash and Equivalents	$ 12.7	$ 7.3	$ 17.5	$ 13.8	$ 7.4
Total Assets	3,356.0	3,465.3	3,612.0	2,251.2	2,266.2
Total Debt	1,978.3	2,025.2	2,154.6	1,528.4	1,541.2
Total Shareholders' Equity	268.7	386.9	438.4	87.8	196.7
Additional Data:					
Depreciation & Amortization	$ 205.3	$ 228.9	$ 160.4	$ 133.8	$ 137.1
Capital Spending (c)	95.6	137.8	136.6	56.0	57.3
Research, Development and Engineering Expense	9.9	9.6	7.4	5.2	5.1

Notes:

(a) For the years ended December 31, 2003, 2002 and 2001, the Company recorded a Loss on Early Extinguishment of Debt of $45.3 million, $11.5 million and $8.7 million, respectively, net of applicable tax (see Note 14 in Notes to Consolidated Financial Statements).

(b) For the year ended December 31, 2001, the Company recorded a charge of $0.5 million, net of tax, for the cumulative effect of a change in accounting principle for derivatives.

(c) Includes capitalized interest and amounts invested in packaging machinery.

ITEM 7. *MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS*

INTRODUCTION

This management's discussion and analysis of financial conditions and results of operation is intended to provide investors with an understanding of the Company's past performance, its financial condition and its prospects. The following will be discussed and analyzed:

Overview of Business

Overview of 2005 Results

Results of Operations

Financial Condition, Liquidity and Capital Resources

Critical Accounting Policies

New Accounting Standards

Business Outlook

OVERVIEW OF BUSINESS

The Company's objective is to strengthen its position as a leading provider of paperboard packaging solutions. To achieve this objective, the Company offers customers its paperboard, cartons and packaging machines, either as an integrated solution or separately. The Company is also implementing strategies to expand market share in its current markets and to identify and penetrate new markets; to capitalize on the Company's customer relationships, business competencies, and mills and converting assets; to develop and market innovative products and applications; and to continue to reduce costs by focusing on operational improvements. The Company's ability to fully implement its strategies and achieve its objectives maybe influenced by a variety of factors, many of which are beyond its control including (i) inflation of raw material and other costs, which the Company cannot always pass through to its customers, and (ii) the effect of overcapacity in the worldwide paperboard packaging industry.

Significant Factors That Impact The Company's Business

Impact of Inflation. The Company's cost of sales consists primarily of energy (including natural gas, fuel oil and electricity), pine pulpwood, hardwood, chemicals, recycled fibers, purchased paperboard, paper, aluminum foil, ink, plastic films and resins, depreciation expense and labor. The Company continues to be negatively impacted by inflationary pressures which increased costs $96.3 million compared to the prior year and are primarily related to chemical–based inputs ($25.9 million); fiber, outside board purchases and corrugated shipping containers ($21.7 million); energy ($17.4 million); labor and related benefits ($15.8 million); freight ($12.2 million); and other ($3.3 million). The Company has entered into contracts designed to manage risks associated with future variability in cash flows and price risk related to future energy cost increases for a significant portion of its natural gas requirements, primarily at its U.S. mills through December 2006. The Company plans to continue its hedging program for natural gas. The Company believes that inflationary pressures will negatively impact its results for 2006. Since negotiated sales contracts and the market largely determine the pricing for its products, the Company is at times limited in its ability to raise prices and pass through to its customers any inflationary or other cost increases that the Company may incur thereby further exacerbating the inflationary problems.

Substantial Debt Obligations. The Company has approximately $1,978 million of outstanding debt obligations as of December 31, 2005. This debt can have significant consequences for the Company, as it requires a significant portion of cash flow from operations to be used for the payment of principal and interest, exposes the Company to the risk of increased interest rates and restricts the Company's ability to obtain additional financing. Covenants in the Company's Senior Secured Credit Agreement also prohibit or restrict, among other things, the disposal of assets, the incurrence of additional indebtedness (including guarantees) and

payment of dividends, loans or advances and certain other types of transactions. These restrictions could limit the Company's flexibility to respond to changing market conditions and competitive pressures. The covenants also require compliance with certain financial ratios. The Company's ability to comply in future periods with the financial covenants will depend on its ongoing financial and operating performance, which in turn will be subject to many other factors, many of which are beyond the Company's control. See "Financial Condition, Liquidity and Capital Resources — Liquidity and Capital Resources" and "— Covenant Restrictions" for additional information regarding the Company's debt obligations.

Commitment to Cost Reduction. In light of increasing margin pressure throughout the paperboard packaging industry, the Company has programs in place that are designed to reduce costs, improve productivity and increase profitability. The Company utilizes a global continuous improvement initiative that uses statistical process control to help design and manage many types of activities, including production and maintenance. This includes a Six Sigma process focused on reducing variable and fixed manufacturing and administrative costs. In addition, the Company finalized its initiative designed to enhance the competitiveness of its beverage multiple packaging converting operations and has begun to recognize improved converting performance. The Company has made expenditures of approximately $73 million on this initiative through December 31, 2005 and added new manufacturing technology, new presses and optimized current press capacity, and also consolidated certain beverage carton converting operations. As part of the Company's manufacturing rationalization initiatives, the Company announced in January 2004 plans to close its Garden Grove, CA converting plant, and in May 2004 announced plans to close its Bow, NH and Clinton, MS converting plants. In addition, the Company announced it is expanding certain of its existing sites, including Fort Smith, AR and Lumberton, NC, and as a result expects to make expenditures of approximately $28 million over the 2004 to 2006 period. The Company has spent approximately $26 million of the projected expenditures through December 31, 2005. During 2005, the Company achieved approximately $50 million in cost savings through its continuous improvement programs and manufacturing initiatives.

In December 2005, the Company completed a reduction in work force affecting 62 corporate and divisional support staff. The Company recorded a one–time charge of approximately $5 million for severance and related costs in the fourth quarter of 2005. The Company took this action to reduce on–going operating expenses in future periods.

Market Factors. Because some products can be packaged in different types of materials, the Company's sales are affected by competition from other manufacturers' CUK board and other substrates such as SBS, CCN and WLC, substitute products including shrink film and corrugated containers, as well as by general market conditions. In addition, the Company's sales historically are driven by consumer buying habits in the markets its customers serve. New product introductions and promotional activity by the Company's customers and the Company's introduction of new packaging products also impacted its sales. The Company's containerboard business is subject to conditions in the cyclical worldwide commodity paperboard markets that have a significant impact on containerboard sales. In addition, the Company's net sales, income from operations and cash flows from operations are subject to moderate seasonality, with demand usually increasing in the spring and summer due to the seasonality of the worldwide beverage multiple packaging markets.

The Company works to maintain market share through efficiency, product innovation and long–term board and machinery and supply contracts to its customers; however, pricing and other competitive pressures may occasionally result in the loss of a customer relationship.

Packaging machinery placements during 2005 decreased approximately 27% compared to 2004 due primarily to timing differences and to the additional placements in 2004 as a result of the success of the new Fridge Vendor® Package. The Company expects packaging machinery placements for 2006 to be higher when compared to 2005.

OVERVIEW OF 2005 RESULTS

- Net Sales in 2005 decreased by $2.5 million, or 0.1%, to $2,384.0 million from $2,386.5 million in 2004 due primarily to lower volumes and mix, somewhat offset by increased pricing.

- Income from Operations in 2005 decreased by $28.7 million, or 24.8%, to $86.9 million from $115.6 million in 2004 due primarily to inflationary pressures.
- Cost savings of approximately $50 million helped offset inflation of approximately $96 million.
- Debt was reduced by $46.9 million.

RESULTS OF OPERATIONS

Segment Information

The Company reports its results in two business segments: paperboard packaging and containerboard/other. Business segment information is as follows:

	Year Ended Dec. 31, 2005	Year Ended Dec. 31, 2004	Year Ended Dec. 31, 2003
	(Amounts in millions)		
NET SALES:			
Paperboard Packaging	$ 2,297.8	$ 2,291.2	$ 1,600.6
Containerboard/Other	86.2	95.3	82.7
	$ 2,384.0	$ 2,386.5	$ 1,683.3
INCOME (LOSS) FROM OPERATIONS:			
Paperboard Packaging	$ 161.7	$ 211.3	$ 169.8
Containerboard/Other	(16.1)	(21.6)	(27.3)
Corporate	(58.7)	(74.1)	(36.4)
	$ 86.9	$ 115.6	$ 106.1

2005 COMPARED WITH 2004

Net Sales

The components of the change in Net Sales are as follows:

	Year Ended Dec. 31, 2004	Variances				Year Ended Dec. 31, 2005
		Price	Volume/Mix	Exchange	Total	
		(Amounts in millions)				
Net Sales	$ 2,386.5	10.7	(15.5)	2.3	(2.5)	$ 2,384.0

Paperboard Packaging

The Company's Net Sales from paperboard packaging in 2005 increased by $6.6 million, or 0.3%, to $2,297.8 million from $2,291.2 million in 2004 due primarily to a 5.9% increase in North American food and consumer product carton sales as a result of higher unit volumes and increased pricing. These increases were somewhat offset by lower volumes in North American open market rollstock sales and lower volumes in international food and consumer product markets as well as lower pricing in North American beverage carton markets as a result of increased market competitiveness.

Containerboard/Other

The Company's Net Sales from containerboard/other in 2005 decreased by $9.1 million, or 9.5%, to $86.2 million from $95.3 million in 2004 due primarily to lower linerboard sales as a result of producing coated board in place of containerboard tons. This additional coated board was utilized in the production of food and consumer product cartons. This decrease was somewhat offset by improved pricing in the containerboard medium and linerboard markets.

Income (Loss) from Operations

The components of the change in Income (Loss) from Operations are as follows:

	Year Ended Dec. 31, 2004	Variances						Year Ended Dec. 31, 2005
		Price	Volume/Mix	Inflation	Exchange	Other(a)	Total	
		(Amounts in millions)						
Income (Loss) from Operations	$ 115.6	10.7	2.4	(96.3)	(2.8)	57.3	(28.7)	$ 86.9

Note:

(a) Includes the benefits from the Company's cost reduction initiatives.

Paperboard Packaging

The Company's Income from Operations from paperboard packaging in 2005 decreased by $49.6 million, or 23.5%, to $161.7 million from $211.3 million in 2004 due primarily to inflationary pressures primarily on chemical–based inputs, fiber, outside board purchases and corrugated shipping containers, energy, labor and related benefits and freight; and the lower pricing in North American beverage carton markets as a result of increased market competitiveness. These decreases were somewhat offset by worldwide cost reductions resulting from the Company's cost reduction initiatives, improved volume and pricing in the North American food and consumer product carton markets, and lower depreciation expense.

Containerboard/Other

The Company's Loss from Operations from containerboard/other was $16.1 million in 2005 compared to a loss of $21.6 million in 2004. This $5.5 million improvement was due primarily to improved pricing in the containerboard medium and linerboard markets.

Corporate

The Company's Loss from Operations from corporate was $58.7 million in 2005 compared to a loss of $74.1 million in 2004. This $15.4 million improvement was due primarily to lower amortization expense of Merger related intangibles of $15.3 million and a $4.5 million benefit relating to the settlement of a lawsuit, somewhat offset by higher consulting fees in 2005.

INTEREST INCOME, INTEREST EXPENSE, INCOME TAX EXPENSE, AND EQUITY IN NET EARNINGS OF AFFILIATES

Interest Income

Interest Income was $0.6 million in 2005 and 2004.

Interest Expense

Interest Expense increased by $6.9 million to $156.5 million in 2005 from $149.6 million in 2004, due to higher interest rates on the unhedged portion of the Company's floating rate debt. The increase was somewhat offset by lower average debt balances in 2005 and a 25 basis points reduction in interest charged during 2005 on the Term Loan Facility as a result of the first amendment to the Company's Senior Secured Credit Agreement (as defined herein).

Income Tax Expense

During 2005, the Company recognized an Income Tax Expense of $23.3 million on Loss before Income Taxes and Equity in Net Earnings of Affiliates of $69.0 million. During 2004, the Company recognized an Income Tax Expense of $28.9 million on Loss before Income Taxes and Equity in Net Earnings of Affiliates of $33.4 million. Income Tax Expense for 2005 and 2004 was primarily due to the noncash expense associated

with the amortization of goodwill for tax purposes, valuation allowance adjustments and tax withholding in foreign jurisdictions.

Equity in Net Earnings of Affiliates

Equity in Net Earnings of Affiliates was $1.2 million in 2005 and $1.4 million in 2004 and related to the Company's equity investment in the joint venture Rengo Riverwood Packaging, Ltd. ("Rengo").

2004 COMPARED WITH 2003

Net Sales

The components of the change in Net Sales are as follows:

	Year Ended Dec. 31, 2003	Variances					Year Ended Dec. 31, 2004
		Price	Volume/Mix	Exchange	Merger	Total	
		(Amounts in millions)					
Net Sales	$ 1,683.3	(5.4)	(21.4)	39.8	690.2	703.2	$ 2,386.5

Paperboard Packaging Segment

The Company's Net Sales from paperboard packaging in 2004 increased by $690.6 million, or 43.1%, to $2,291.2 million from $1,600.6 million in 2003 due primarily to the inclusion of an additional 221 days in 2004 of Graphic's paperboard packaging business, which resulted in increased Net Sales of $690.2 million. Net sales were positively impacted by foreign currency exchange rates of $39.8 million. These increases were somewhat offset by lower pricing in the Company's North American markets, primarily as a result of increased market competitiveness.

Containerboard/Other

The Company's Net Sales from containerboard/other in 2004 increased by $12.6 million, or 15.2%, to $95.3 million from $82.7 million in 2003 due primarily to improved pricing in the containerboard medium and linerboard markets.

Income (Loss) from Operations

The components of the change in Income (Loss) from Operations are as follows:

	Year Ended Dec. 31, 2003	Variances						Year Ended Dec. 31, 2004
		Price	Volume/Mix	Inflation	Exchange	Other(a)	Total	
		(Amounts in millions)						
Income (Loss) from Operations	$ 106.1	(5.4)	(10.9)	(44.1)	6.2	63.7	9.5	$ 115.6

Note:

(a) Includes the benefits from the Company's cost reduction initiatives and the inclusion of an additional 221 days in 2004 of Graphic's paperboard packaging business.

Paperboard Packaging Segment

The Company's Income from Operations from paperboard packaging in 2004 increased by $41.5 million, or 24.4%, to $211.3 million from $169.8 million in 2003 due primarily to the addition of Graphic's paperboard packaging business and worldwide cost reductions resulting from the Company's cost reduction initiatives. The increase was somewhat offset by inflationary pressures primarily on fiber, outside board purchases and corrugated shipping containers, energy, labor and related benefits, freight and chemical–based inputs as well as lower pricing in North American markets as a result of increased market competitiveness.

Containerboard/Other

The Company's Loss from Operations from containerboard/other was $21.6 million in 2004 compared to a loss of $27.3 million in 2003. This $5.7 million improvement was due primarily to improved pricing in the containerboard medium and linerboard markets.

Corporate

The Company's Loss from Operations from corporate was $74.1 million in 2004 compared to a loss of $36.4 million in 2003, due primarily to the inclusion of an additional 221 days in 2004 of Graphic's corporate operations as well as higher amortization expense of $17.7 million due to the effects of purchase accounting in connection with the Merger, and inflation including higher medical and health benefits and higher expenses associated with Sarbanes–Oxley compliance efforts.

LOSS ON EARLY EXTINGUISHMENT OF DEBT, INTEREST INCOME, INTEREST EXPENSE, INCOME TAX EXPENSE, AND EQUITY IN NET EARNINGS OF AFFILIATES

Loss on Early Extinguishment of Debt

In 2003 and in connection with the Merger and the related financing transactions, the Company recorded a non–cash charge to earnings of approximately $16.7 million, related to the write–off of remaining debt issuance costs on its prior senior secured credit facilities, RIC's 105/8% senior notes due 2007 ("Senior Notes due 2007") and RIC's 107/8% senior subordinated notes due 2008 ("Senior Subordinated Notes due 2008" and, together with the Senior Notes due 2007, the "Prior RIC Notes"), and also recorded a charge of approximately $28.6 million, related to the call premium paid upon redemption of the Prior RIC Notes.

Interest Income

Interest Income decreased by $0.4 million to $0.6 million in 2004 from $1.0 million in 2003 due primarily to interest received in 2003 on monies held in tax escrow.

Interest Expense

Interest Expense increased by $5.1 million to $149.6 million in 2004 from $144.5 million in 2003, due primarily to higher debt balances following the Merger. Interest Expense was also affected by higher interest rates on the unhedged portion of the Company's floating rate debt. The increase was somewhat offset by lower interest rates on the new Senior and Senior Subordinated notes and by lower interest rates resulting from the first amendment of the Senior Secured Credit Agreement (as defined herein).

Income Tax Expense

During 2004, the Company recognized an Income Tax Expense of $28.9 million on Loss before Income Taxes and Equity in Net Earnings of Affiliates of $33.4 million. During 2003, the Company recognized an Income Tax Expense of $14.3 million on Loss before Income Taxes and Equity in Net Earnings of Affiliates of $82.7 million. Income Tax Expense for 2004 resulted from the noncash expense associated with the amortization of goodwill for tax purposes, income earned in foreign countries, valuation allowance adjustments and tax contingencies. Income Tax Expense for 2003 resulted from the noncash expense associated with the amortization of goodwill for tax purposes and income earned in foreign countries somewhat offset by the benefit from valuation allowance adjustments.

Equity in Net Earnings of Affiliates

Equity in Net Earnings of Affiliates was $1.4 million in 2004 and $1.3 million in 2003 and related to the Company's non–consolidated joint venture, Rengo.

FINANCIAL CONDITION, LIQUIDITY AND CAPITAL RESOURCES

The Company broadly defines liquidity as its ability to generate sufficient funds from both internal and external sources to meet its obligations and commitments. In addition, liquidity includes the ability to obtain appropriate debt and equity financing and to convert into cash those assets that are no longer required to meet existing strategic and financial objectives. Therefore, liquidity cannot be considered separately from capital resources that consist of current or potentially available funds for use in achieving long–range business objectives and meeting debt service commitments.

Cash Flows

Cash and Equivalents increased by $5.4 million in 2005. Cash provided by operating activities in 2005 totaled $169.5 million, compared to $263.8 million in 2004. This decrease was principally due to lower operating income as well as $19.6 million of cash contributions made to fund the Company's pension plans and unfavorable changes in operating assets and liabilities. Cash used in investing activities in 2005 totaled $114.6 million, compared to $141.5 million in 2004. This decrease was principally due to lower capital investment of $42.2 million (see "— Capital Investment") which was somewhat offset by lower proceeds from the sale of assets. Cash used in financing activities in 2005 totaled $49.1 million, compared to $133.0 million in 2004. This decrease was principally due to lower debt payments and higher net borrowings under the Company's revolving credit facilities. Depreciation and amortization during 2005 totaled $205.3 million.

Liquidity and Capital Resources

The Company's liquidity needs arise primarily from debt service on its substantial indebtedness and from the funding of its capital expenditures, ongoing operating costs and working capital.

At December 31, 2005 and 2004, Long–Term Debt consisted of the following:

	December 31, 2005	December 31, 2004
	(Amounts in millions)	
Senior Notes with interest payable semi–annually at 8.5%, payable in 2011	$ 425.0	$ 425.0
Senior Subordinated Notes with interest payable semi–annually at 9.5%, payable in 2013	425.0	425.0
Senior Secured Term Loan Facility with interest payable at various dates at floating rates (6.60% at December 31, 2005 and 4.52% at December 31, 2004) payable through 2010	1,109.0	1,158.0
Senior Secured Revolving Facility with interest payable at various dates at floating rates (9.25% at December 31, 2005) payable in 2009	6.0	—
Other	3.5	3.8
	1,968.5	2,011.8
Less, current portion	1.2	0.8
Total	$ 1,967.3	$ 2,011.0

The Senior Notes are rated B– by Standard & Poor's and B2 by Moody's Investor Services. During 2005, cash paid for interest was approximately $152 million.

At December 31, 2005, the Company had the following commitments, amounts outstanding and amounts available under revolving credit facilities:

	Total Amount of Commitments	Total Amount Outstanding	Total Amount Available(a)
		(Amounts in millions)	
Revolving Credit Facility	$ 325.0	$ 6.0	$ 306.6
International Facilities	17.4	8.9	8.5
Total	$ 342.4	$ 14.9	$ 315.1

Note:

(a) In accordance with its debt agreements, the Company's availability under its Revolving Credit Facility has been reduced by the amount of standby letters of credit issued of $12.4 million as of December 31, 2005. These letters of credit are used as security against its self–insurance obligations and workers' compensation obligations. These letters of credit expire at various dates through 2006 unless extended.

Principal and interest payments under the Term Loan Facility and the Revolving Credit Facility, together with principal and interest payments on the Senior Notes and the Senior Subordinated Notes, represent significant liquidity requirements for the Company. Based upon current levels of operations, anticipated cost–savings and expectations as to future growth, the Company believes that cash generated from operations, together with amounts available under its Revolving Credit Facility and other available financing sources, will be adequate to permit the Company to meet its debt service obligations, necessary capital expenditure program requirements, ongoing operating costs and working capital needs, although no assurance can be given in this regard. The Company's future financial and operating performance, ability to service or refinance its debt and ability to comply with the covenants and restrictions contained in its debt agreements (see "— Covenant Restrictions") will be subject to future economic conditions and to financial, business and other factors, many of which are beyond the Company's control and will be substantially dependent on the selling prices and demand for the Company's products, raw material and energy costs, and the Company's ability to successfully implement its overall business and profitability strategies.

The Company expects that its working capital and business needs will require it to continue to have access to the Revolving Credit Facility or a similar revolving credit facility after the maturity date in 2009, and that the Company accordingly will have to extend, renew, replace or otherwise refinance such facility at or prior to such date. No assurance can be given that it will be able to do so. The Company has in the past refinanced and in the future may seek to refinance its debt prior to the respective maturities of such debt.

The Company uses interest rate swaps to manage interest rate risks caused by interest rate changes on its variable rate Term Loan Facility. The differential to be paid or received under these agreements is recognized as an adjustment to interest expense related to the debt. At December 31, 2005, the Company had interest rate swap agreements with a notional amount of $660 million, which expire on various dates from 2006 to 2008 under which the Company will pay fixed rates of 2.69% to 4.53% and receive three–month LIBOR.

Effective as of December 31, 2005, the Company had approximately $1.2 billion of net operating loss carryforwards ("NOLs") for U.S. federal income tax purposes. These NOLs generally may be used by the Company to offset taxable income earned in subsequent taxable years. However, the Company's ability to use these NOLs to offset its future taxable income may be subject to significant limitation as a result of certain shifts in ownership due to direct or indirect transfers of the Company's common stock by one or more 5 percent stockholders, or issuances or redemptions of the Company's common stock, which, when taken together with previous changes in ownership of the Company's common stock, constitute an ownership change under the Internal Revenue Code. Imposition of any such limitation on the use of NOLs could have an adverse effect on the Company's future after tax free cash flow.

Covenant Restrictions

The Senior Secured Credit Agreement, which governs the Term Loan Facility and the Revolving Credit Facility, imposes restrictions on the Company's ability to make capital expenditures and both the Senior Secured Credit Agreement and the indentures governing the Senior Notes and Senior Subordinated Notes (the "Notes") limit the Company's ability to incur additional indebtedness. Such restrictions, together with the highly leveraged nature of the Company, could limit the Company's ability to respond to market conditions, meet its capital spending program, provide for unexpected capital investments or take advantage of business opportunities. The covenants contained in the Senior Secured Credit Agreement, among other things, restrict the ability of the Company to dispose of assets, incur additional indebtedness, incur guarantee obligations, prepay other indebtedness, make dividend and other restricted payments, create liens, make equity or debt investments, make acquisitions, modify terms of indentures under which the Notes are issued, engage in mergers or consolidations, change the business conducted by the Company and its subsidiaries, make capital expenditures and engage in certain transactions with affiliates.

On October 17, 2005, the Company, entered into the Second Amendment (the "Second Amendment") to the Senior Secured Credit Agreement. As a result, the Company incurred fees and transaction costs of approximately $4 million.

The Second Amendment relaxed the maximum Consolidated Debt to Credit Agreement EBITDA Leverage Ratio covenant and the minimum Credit Agreement EBITDA to Consolidated Interest Expense Ratio covenant as shown below beginning with the covenant requirements for September 30, 2005.

	Maximum Consolidated Debt to Credit Agreement EBITDA Leverage Ratio		Minimum Credit Agreement EBITDA to Consolidated Interest Expense Ratio	
Four Fiscal Quarters Ending	Previous	As Amended	Previous	As Amended
2005				
September 30, 2005	6.15 to 1.00	6.75 to 1.00	2.25 to 1.00	1.75 to 1.00
December 31, 2005	5.75 to 1.00	6.75 to 1.00	2.35 to 1.00	1.75 to 1.00
2006				
March 31, 2006	5.75 to 1.00	6.75 to 1.00	2.35 to 1.00	1.75 to 1.00
June 30, 2006	5.75 to 1.00	6.75 to 1.00	2.35 to 1.00	1.75 to 1.00
September 30, 2006	5.75 to 1.00	6.75 to 1.00	2.35 to 1.00	1.75 to 1.00
December 31, 2006	5.25 to 1.00	6.75 to 1.00	2.50 to 1.00	1.75 to 1.00
2007				
March 31, 2007	5.25 to 1.00	6.50 to 1.00	2.50 to 1.00	1.75 to 1.00
June 30, 2007	5.25 to 1.00	6.50 to 1.00	2.50 to 1.00	1.75 to 1.00
September 30, 2007	5.25 to 1.00	6.50 to 1.00	2.50 to 1.00	1.75 to 1.00
December 31, 2007	4.75 to 1.00	6.00 to 1.00	2.75 to 1.00	1.85 to 1.00
2008				
March 31, 2008	4.75 to 1.00	6.00 to 1.00	2.75 to 1.00	1.85 to 1.00
June 30, 2008	4.75 to 1.00	6.00 to 1.00	2.75 to 1.00	1.85 to 1.00
September 30, 2008	4.75 to 1.00	6.00 to 1.00	2.75 to 1.00	1.85 to 1.00
December 31, 2008	4.50 to 1.00	5.50 to 1.00	2.90 to 1.00	2.00 to 1.00
2009				
March 31, 2009 and thereafter	4.50 to 1.00	4.50 to 1.00	2.90 to 1.00	2.90 to 1.00

At December 31, 2005, the Company was in compliance with the financial covenants in the Secured Credit Agreement, as amended, and the ratios were as follows:

Consolidated Debt to Credit Agreement EBITDA Leverage Ratio — 6.15 to 1.00

Credit Agreement EBITDA to Consolidated Interest Expense Ratio — 2.18 to 1.00

Credit Agreement EBITDA as used herein is a financial measure that is used in the Senior Secured Credit Agreement. Credit Agreement EBITDA is not a defined term under accounting principles generally accepted in the United States and should not be considered as an alternative to income from operations or net income as a measure of operating results or cash flows as a measure of liquidity. Credit Agreement EBITDA differs from the term "EBITDA" (earnings before interest expense, income tax expense, and depreciation and amortization) as it is commonly used. In addition to adjusting net income to exclude interest expense, income tax expense, and depreciation and amortization, Credit Agreement EBITDA also adjusts net income by excluding certain other items and expenses, as specified below. The Company's definition of Credit Agreement EBITDA may differ from that of other similarly titled measures at other companies.

The Company's management believes that presentation of Credit Agreement EBITDA provides useful information to investors because borrowings under the Senior Secured Credit Agreement are a key source of the Company's liquidity, and the Company's ability to borrow under the Senior Secured Credit Agreement is dependent on, among other things, its compliance with the financial ratio covenants. Failure to comply with these financial ratio covenants would result in a violation of the Senior Secured Credit Agreement and, absent a waiver or amendment from the lenders under such agreement, permit the acceleration of all outstanding borrowings under the Senior Secured Credit Agreement.

The calculations of the components of the Company's financial covenant ratios are listed below:

	Year Ended December 31, 2005 (Amounts in millions)
Net Loss	$ (91.1)
Income Tax Expense	23.3
Interest Expense, Net	155.9
Depreciation and Amortization	205.3
Equity in Net Earnings of Affiliates	(1.2)
Pension, Postemployment and Postretirement Benefits Expense, Net of Contributions	9.5
Merger Related Expenses	17.1
Write–Down of Assets	1.6
Dividends from Equity Investments	1.0
Credit Agreement EBITDA (a)	$ 321.4

	Year Ended December 31, 2005 (Amounts in millions)
Interest Expense, Net	$ 155.9
Amortization of Deferred Debt Issuance Costs	(8.3)
Credit Agreement Interest Expense Adjustments (b)	0.1
Consolidated Interest Expense (c)	$ 147.7

	As of December 31, 2005 (Amounts in millions)
Short–Term Debt	$ 11.0
Long–Term Debt	1,967.3
Total Debt	$ 1,978.3

Notes:

(a) Credit Agreement EBITDA is calculated in accordance with the definitions contained in the Company's Senior Secured Credit Agreement. Credit Agreement EBITDA is defined as consolidated net income

before consolidated interest expense, non–cash expenses and charges, total income tax expense, depreciation expense, expense associated with amortization of intangibles and other assets, non–cash provisions for reserves for discontinued operations, extraordinary, unusual or non–recurring gains or losses or charges or credits, gain or loss associated with sale or write–down of assets not in the ordinary course of business, and any income or loss accounted for by the equity method of accounting.

(b) Credit agreement interest expense adjustments include the discount from the financing of receivables.

(c) Consolidated Interest Expense is calculated in accordance with the definitions contained in the Company's Senior Secured Credit Agreement. Consolidated Interest Expense is defined as consolidated interest expense minus consolidated interest income plus any discount from the financing of receivables.

In addition to the changes to the financial covenants described above, the Second Amendment modifies the pricing for the Senior Secured Term Loan Facility by increasing the applicable margin by 0.25% if, and for so long as, the Company's indebtedness under the Senior Secured Credit Agreement is rated less than B+ by Standard & Poor's Ratings Group (a division of The McGraw Hill Companies Inc.) or less than B1 by Moody's Investors Service, Inc.

If the negative impact of inflationary pressures on key inputs continues, or depressed selling prices, lower sales volumes, increased operating costs or other factors have a negative impact on the Company's ability to increase its profitability, the Company may not be able to maintain its compliance with the financial covenants in its Senior Secured Credit Agreement, as amended. The Company's ability to comply in future periods with the financial covenants in the Senior Secured Credit Agreement will depend on its ongoing financial and operating performance, which in turn will be subject to economic conditions and to financial, business and other factors, many of which are beyond the Company's control and will be substantially dependent on the selling prices for the Company's products, raw material and energy costs, and the Company's ability to successfully implement its overall business strategies, and meet its profitability objective. If a violation of any of the covenants occurred, the Company would attempt to obtain a waiver or an amendment from its lenders, although no assurance can be given that the Company would be successful in this regard. The Senior Secured Credit Agreement and the indentures governing the Senior Subordinated Notes and the Senior Notes have covenants as well as certain cross–default or cross–acceleration provisions; failure to comply with these covenants in any agreement could result in a violation of such agreement which could, in turn, lead to violations of other agreements pursuant to such cross–default or cross–acceleration provisions. If an event of default occurs, the lenders are entitled to declare all amounts owed to be due and payable immediately. The Senior Secured Credit Agreement is collateralized by substantially all of the Company's domestic assets.

Capital Investment

The Company's capital investment in 2005 was $95.6 million, compared to $137.8 million in 2004. During 2005, the Company invested $46.9 million for improving process capabilities, $15.8 million for the expansion of its Fort Smith, AR and Lumberton, NC converting plants, $19.0 million for manufacturing packaging machinery, $8.2 million for compliance with environmental laws and regulations and $5.7 million for its beverage multiple packaging converting operations initiative.

Environmental Matters

The Company is subject to a broad range of foreign, federal, state and local environmental, health and safety laws and regulations that change from time to time, including those governing discharges to air, soil and water, the management, treatment and disposal of hazardous substances, solid waste and hazardous wastes, the investigation and remediation of contamination resulting from historical site operations and releases of hazardous substances, and the health and safety of employees. Compliance initiatives could result in significant costs, which could negatively impact the Company's financial position, results of operations or cash flows. Any failure to comply with such laws and regulations or any permits and authorizations required thereunder could subject the Company to fines, corrective action or other sanctions.

In addition, some of the Company's current and former facilities are the subject of environmental investigations and remediations resulting from historical operations and the release of hazardous substances or

other constituents. Some current and former facilities have a history of industrial usage for which investigation and remediation obligations may be imposed in the future or for which indemnification claims may be asserted against the Company. Also, potential future closures or sales of facilities may necessitate further investigation and may result in future remediation at those facilities.

The Company has established reserves for those facilities or issues where liability is probable and the costs are reasonably estimable. The Company believes that the amounts accrued for all of its loss contingencies, and the reasonably possible loss beyond the amounts accrued, are not material to the Company's financial position, results of operations or cash flows. The Company cannot estimate with certainty future compliance, investigation or remediation costs, all of which the Company currently considers to be remote. Costs relating to historical usage or indemnification claims that the Company considers to be reasonably possible are not quantifiable at this time. The Company will continue to monitor environmental issues at each of its facilities and will revise its accruals, estimates and disclosures relating to past, present and future operations as additional information is obtained.

Commitments

At December 31, 2005, total commitments of the Company under long-term, non-cancelable contracts were as follows:

	Payment Due by Year						
	2006	2007	2008	2009	2010	After 2010	Total
	(Amounts in millions)						
Long-Term Debt	$ 1.2	$ 11.7	$ 12.5	$ 17.4	$ 1,074.9	$ 850.8	$ 1,968.5
Operating Leases	12.5	7.5	5.4	4.6	3.8	12.6	46.4
Other Commitments (a)	157.2	148.3	141.4	139.4	130.5	157.3	874.1
Purchase Obligations (b)	52.4	42.7	41.5	41.0	40.5	226.0	444.1
Total Contractual Obligations (c)	$ 223.3	$ 210.2	$ 200.8	$ 202.4	$ 1,249.7	$ 1,246.7	$ 3,333.1

Notes:

(a) Other commitments primarily includes scheduled interest payments on the Company's long-term debt.

(b) Purchase obligations primarily consist of commitments related to pine pulpwood, hardwood, wood chips, wood processing and handling, chemical-based inputs, natural gas and electricity.

(c) Some of the figures included in this table are based on management's estimates and assumptions about these obligations. Because these estimates and assumptions are necessarily subjective, the obligations the Company will actually pay in the future periods may vary from those reflected in the table.

International Operations

For 2005, before intercompany eliminations, net sales from operations outside of the United States represented approximately 21% of the Company's net sales. The Company's revenues from export sales fluctuate with changes in foreign currency exchange rates. At December 31, 2005, approximately 6% of its total assets were denominated in currencies other than the U.S. dollar. The Company has significant operations in countries that use the Swedish krona, the British pound sterling, the Japanese yen, the Brazilian real or the euro as their functional currencies. The effect of a generally stronger U.S. dollar against the euro and other European currencies, and the Japanese yen, produced a net currency translation adjustment loss of $17.2 million, which was recorded as an adjustment to shareholders' equity for the year ended December 31, 2005. The magnitude and direction of this adjustment in the future depends on the relationship of the U.S. dollar to other currencies. The Company cannot predict major currency fluctuations. The Company pursues a currency hedging program in order to limit the impact of foreign currency exchange fluctuations on financial results. See "Financial Instruments" below.

Financial Instruments

The functional currency of the Company's international subsidiaries is the local currency for the country in which the subsidiaries own their primary assets. The translation of the applicable currencies into U.S. dollars is performed for balance sheet accounts using current exchange rates in effect at the balance sheet date and for revenue and expense accounts using a weighted average exchange rate during the period. Any related translation adjustments are recorded directly to shareholders' equity. Gains and losses on foreign currency transactions are included in Other Expense, Net for the period in which the exchange rate changes.

The Company pursues a currency hedging program which utilizes derivatives to limit the impact of foreign currency exchange fluctuations on its consolidated financial results. Under this program, the Company has entered into forward exchange contracts in the normal course of business to hedge certain foreign currency denominated transactions. Realized and unrealized gains and losses on these forward contracts are included in the measurement of the basis of the related foreign currency transaction when recorded. The Company also pursues a hedging program which utilizes derivatives designed to manage risks associated with future variability in cash flows and price risk related to future energy cost increases. Under this program the Company has entered into natural gas swap contracts to hedge a significant portion of its natural gas requirements through December 2006. Realized gains and losses on these contracts are included in the financial results concurrently with the recognition of the commodity purchased. The Company uses interest rate swaps to manage interest rate risks on future income caused by interest rate changes on its variable rate Term Loan facility. These instruments involve, to varying degrees, elements of market and credit risk in excess of the amounts recognized in the Consolidated Balance Sheets. The Company does not hold or issue financial instruments for trading purposes. See "Quantitative and Qualitative Disclosure About Market Risk."

CRITICAL ACCOUNTING POLICIES

The preparation of financial statements in conformity with U.S. generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities at the date of the financial statements and the reported amounts of net sales and expenses during the reporting period. Actual results could differ from these estimates, and changes in these estimates are recorded when known. The critical accounting policies used by management in the preparation of the Company's consolidated financial statements are those that are important both to the presentation of the Company's financial condition and results of operations and require significant judgments by management with regard to estimates used. The critical judgments by management relate to pension benefits, retained insurable risks, future cash flows associated with impairment testing for goodwill and long–lived assets, and deferred taxes.

• ***Pension Benefits***

The Company sponsors defined benefit pension plans (the "Plans") for eligible employees in North America and certain international locations. The funding policy for the qualified defined benefit plans in North America is to, at a minimum, contribute assets as required by the Internal Revenue Code Section 412. Nonqualified U.S. plans providing benefits in excess of limitations imposed by the U.S. income tax code are not funded.

U.S. pension expense for defined benefits pension plans was $22.0 million in 2005 compared with $18.7 million in 2004. Pension expense is calculated based upon a number of actuarial assumptions applied to each of the defined benefit plans. The expected long–term rate of return on pension fund assets used to calculate pension expense was 8.25% in both 2005 and 2004. The expected long–term rate of return on pension assets was determined based on several factors, including input from our pension investment consultants and projected long–term returns of broad equity and bond indices. The Company also considered the plan's historical 10–year compounded annual return of 8.80%, which has been in excess of these broad equity and bond benchmark indices. The Company will continue to evaluate its long–term rate of return assumptions at least annually and will adjust them as necessary.

The Company determined pension expense using both the fair value of assets and a calculated value that averages gains and losses over a period of years. Investment gains or losses represent the difference between

the expected and actual return on assets. As of December 31, 2005, the cumulative unrecognized investment loss was $96.6 million. These unrecognized net losses may increase future pension expense if not offset by (i) actual investment returns that exceed the assumed investment returns, or (ii) other factors, including reduced pension liabilities arising from higher discount rates used to calculate pension obligations, or (iii) other actuarial gains, including whether such accumulated actuarial losses at each measurement date exceed the "corridor" determined under SFAS 87, Employers' Accounting for Pensions.

The discount rate used to determine the present value of future pension obligations at December 31, 2005 was based on a yield curve constructed from a portfolio of high quality corporate debt securities with maturities ranging from 1 year to 30 years. Each year's expected future benefit payments were discounted to their present value at the appropriate yield curve rate thereby generating the overall discount rate for U.S. pension obligations. The discount rate for U.S. plans decreased from 6.00% in 2004 to 5.75% in 2005. For non–U.S. plans, the discount rate is determined using long–term local corporate bonds.

U.S. pension expense is estimated to be approximately $24 million in 2006. The estimate is based on an expected long–term rate of return of 8.25%, a discount rate of 5.75% and other assumptions. Pension expense beyond 2006 will depend on future investment performance, the Company's contribution to the plans, changes in discount rates and other factors related to covered employees in the plans.

If the discount rate assumptions for these plans were reduced by 0.25 percent, pension expense would increase by approximately $2 million and the December 31, 2005 minimum pension liability would increase by about $18 million.

The fair value of assets in the U.S. plans was $391.8 million at December 31, 2005 and $376.6 million at December 31, 2004. Lower discount rates have caused the projected benefit obligations to exceed that fair value of plan assets by approximately $183.2 million and $138.1 million as of December 31, 2005 and 2004, respectively. Primarily due to the lower discount rates, the accumulated benefit obligation ("ABO") exceeded plan assets by $159.2 million at the end of 2005. At the end of 2004, the ABO exceeded the fair value of plan assets by $111.2 million.

• ***Retained Insurable Risks***

The Company is self–insured for certain losses relating to workers' compensation claims and employee medical and dental benefits. Provisions for expected losses are recorded based on the Company's estimates, on an undiscounted basis, of the aggregate liabilities for known claims and estimated claims incurred but not reported. The Company has purchased stop–loss coverage or insurance with deductibles in order to limit its exposure to significant claims. The Company also has an extensive safety program in place to minimize its exposure to workers' compensation claims. Self–insured losses are accrued based upon estimates of the aggregate uninsured claims incurred using certain actuarial assumptions and loss development factors followed in the insurance industry and historical experience.

• ***Goodwill***

The Company tests the carrying amount of its goodwill using the discounted cash flow method of valuation on an annual basis and whenever events or circumstances indicate that impairment may have occurred. The review for impairment is based on a discounted cash flow approach, which requires the Company to estimate future net cash flows, the timing of these cash flows and a discount rate (based upon a weighted average cost of capital). The Company's cash flows are generated by its operations and are used to fund working capital needs, debt service and capital spending. The Company discounted these cash flows using a weighted average cost of capital of 9 percent. Changes in borrowing rates, which are impacted by market rate fluctuations, would impact discounted cash flow calculations. Other factors, such as significant operating losses or acquisitions of new operations, would also impact discounted cash flow calculations. If the discount rate used in the discounted cash flow calculations were to be increased 100 basis points, the fair value would continue to exceed the carrying amount in the Company's goodwill valuation analysis. The Company has completed its annual goodwill impairment testing and has determined that none of its goodwill is impaired.

• ***Recovery of Long–Lived Assets***

The Company reviews long–lived assets (including property, plant and equipment and intangible assets) for impairment whenever events or changes in circumstances indicate that the carrying amount of such long–lived assets may not be fully recoverable by undiscounted cash flows. Measurement of the impairment loss, if any, is based on the fair value of the asset, which is generally determined by the discounting of future estimated cash flows, or in the case of real estate, determining market value. The Company evaluates the recovery of its long–lived assets by analyzing operating results and considering significant events or changes in the business environment that may have triggered impairment.

• ***Deferred Income Taxes and Potential Assessments***

As of December 31, 2005, the Company has recorded deferred tax assets totaling $616.0 million primarily related to income tax loss carryforwards and income tax credit carryforwards and has established valuation allowances against these deferred tax assets of $252.1 million, thereby resulting in net deferred tax assets of $363.9 million. The remaining deferred tax assets may be utilized against future deferred tax liabilities excluding those liabilities resulting from indefinite lived intangible assets. As of December 31, 2004, the net deferred tax assets were $364.8 million. The Company's income tax losses are in U.S. and non–U.S. taxing jurisdictions. In determining the valuation allowances to establish against these deferred tax assets, the Company considers many factors, including the specific taxing jurisdiction, the carryforward period, forecasted earnings for the entities in each jurisdiction and tax strategies. A valuation allowance is recognized if, based on the weight of available evidence, the Company concludes that it is more likely than not that some portion or all of the deferred tax asset will not be realized.

As of December 31, 2005, the Company, in accordance with Accounting Principles Board ("APB") Opinion 23, *Accounting for Income Taxes, Special Areas* has determined that $71.5 million of undistributed foreign earnings are not intended to be reinvested indefinitely by its non–U.S. subsidiaries. Deferred income tax was recorded as a reduction to the Company's net operating losses on these undistributed earnings as well as the financial statement carrying value in excess of tax basis in the amount of $35.8 million. As of December 31, 2004 the Company had determined that $71.8 million of undistributed foreign earnings were not intended to be reinvested indefinitely. Deferred income tax was recorded as a reduction to the Company's net operating losses on these undistributed earnings as well as the financial statement carrying value in excess of tax basis in the amount of $48.8 million. Prior to 2004, the Company's intent was to permanently reinvest its foreign earnings and it was not practical to determine the amount of unrecognized deferred U.S. income tax liability on these unremitted earnings. The Company periodically determines whether the non–U.S. subsidiaries will invest their undistributed earnings indefinitely and reassesses this determination as appropriate.

The Company records current liabilities for potential assessments. The accruals relate to uncertain tax positions in a variety of taxing jurisdictions and are based on what management believes will be the ultimate resolution of these positions. These liabilities may be affected by changing interpretations of laws, rulings by tax authorities, or the expiration of the statute of limitations.

NEW ACCOUNTING STANDARDS

For a discussion of recent accounting pronouncements impacting the Company, see Note 3 in Notes to Consolidated Financial Statements.

BUSINESS OUTLOOK

The Company expects inflationary pressures for production inputs to continue to impact results in 2006. Specifically, the higher cost of natural gas is expected to negatively influence results, particularly in the first quarter 2006. Because higher priced inputs first began to impact the Company at the end of 2004, the Company expects prior period comparisons to be more favorable than in 2005.

To help offset inflation in 2006, the Company expects to realize approximately $50 million in year over year operating cost savings from its continuous improvement programs and manufacturing rationalization. In

addition, price increases announced in October 2005 for coated board and containerboard will carry through to 2006. Finally, the Company expects to gain further price increases on cartons.

Total capital investment for 2006 is expected to be between approximately $80 million and $90 million and is expected to relate principally to improving the Company's process capabilities (approximately $62 million), the production of packaging machinery (approximately $17 million) and environmental laws and regulations (approximately $6 million).

Depreciation and amortization is expected to be between approximately $190 million and $200 million for the full year 2006.

ITEM 7A. *QUANTITATIVE AND QUALITATIVE DISCLOSURE ABOUT MARKET RISK*

Interest Rates

The Company is exposed to changes in interest rates, primarily as a result of its short–term and long–term debt, which bear both fixed and floating interest rates. The Company uses interest rate swap agreements effectively to fix the LIBOR rate on $660.0 million of variable rate borrowings. The table below sets forth interest rate sensitivity information related to the Company's debt.

Long–Term Debt Principal Amount by Maturity–Average Interest Rate

	Expected Maturity Date							
	2006	2007	2008	2009	2010	Thereafter	Total	Fair Value
	(Amounts in millions)							
Total Debt								
Fixed Rate	0.2	0.2	1.2	—	—	850.8	852.4	834.2
Average Interest Rate	6.13%	6.13%	6.23%	N/A	N/A	9.00%		
Variable Rate	1.0	11.5	11.3	17.4	1,074.9	—	1,116.1	1,135.4
Average Interest Rate, spread range is 2.50% — 3.00%	LIBOR+ spread	LIBOR+ spread	LIBOR+ spread	LIBOR+ spread	LIBOR+ spread	LIBOR+ spread		

Total Interest Rate Swaps–Notional Amount by Expiration–Average Swap Rate

	Expected Maturity Date							
	2006	2007	2008	2009	2010	Thereafter	Total	Fair Value
	(Amounts in millions)							
Interest rate Swaps (Pay Fixed/Receive Variable)								
Notional	330.0	110.0	220.0	—	—	—	660.0	5.2
Average Pay Rate	3.348%	3.270%	4.532%	—	—			
Average Receive Rate	3–Month LIBOR	3–Month LIBOR	3–Month LIBOR	—	—			

Foreign Exchange Rates

The Company enters into forward exchange contracts to hedge substantially all accounts receivable resulting from transactions denominated in foreign currencies. The purpose of these forward exchange contracts is to protect the Company from the risk that the eventual functional currency cash flows resulting from the collection of the hedged accounts receivable will be adversely affected by changes in exchange rates.

Foreign Exchange Rates Sensitivity–Contractual Amount by Expected Maturity–Average Contractual Exchange Rate

	December 31, 2005	
	Contract Amount	Fair Value
	(Amounts in millions)	
FORWARD EXCHANGE AGREEMENTS:		
Functional Currency:		
Receive $US/Pay Yen	$ 1.3	$ —
Weighted average contractual exchange rate	117.01	
Receive $US/Pay Euro	$ 1.4	$ —
Weighted average contractual exchange rate	1.19	
Pay $US/Receive Euro	$ 0.5	$ —
Weighted average contractual exchange rate	1.20	
Receive $US/Pay GBP	$ 0.6	$ —
Weighted average contractual exchange rate	1.73	
Pay $US/Receive GBP	$ 0.4	$ —
Weighted average contractual exchange rate	1.74	
Receive $US/Pay AUD	$ 3.6	$ —
Weighted average contractual exchange rate	0.73	
Pay $US/Receive AUD	$ 3.0	$ —
Weighted average contractual exchange rate	0.73	

The Company also enters into forward exchange contracts to hedge certain other anticipated foreign currency transactions. The purpose of these contracts is to protect the Company from the risk that the eventual functional currency cash flows resulting from anticipated foreign currency transactions will be adversely affected by changes in exchange rates.

Foreign Exchange Rates Sensitivity–Contractual Amount by Expected Maturity–Average Contractual Exchange Rate

	December 31, 2005	
	Contract Amount	Fair Value
	(Amounts in millions)	
FORWARD EXCHANGE AGREEMENTS:		
Receive $US/Pay Yen	$ 34.5	$ 1.7
Weighted average contractual exchange rate	110.00	
Receive $US/Pay Euro	$ 35.2	$ 0.6
Weighted average contractual exchange rate	1.22	
Receive $US/Pay GBP	$ 13.1	$ 0.3
Weighted average contractual exchange rate	1.77	
Receive SEK/Pay Euro	$ 29.8	$ (0.3)
Weighted average contractual exchange rate	9.28	
Receive SEK/Pay GBP	$ 13.0	$ (0.1)
Weighted average contractual exchange rate	13.37	

Natural Gas Contracts

The Company entered into natural gas swap contracts to hedge prices for a significant portion of its natural gas requirements through December 2006 with a weighted average contractual rate of $11.24 per MMBTU. The carrying amount and fair value of the natural gas swap contracts was a liability of $1.2 million as of December 31, 2005 and was recorded in Other Accrued Liabilities in the Consolidated Balance Sheet. Such contracts are designated as cash flow hedges and are accounted for by deferring the quarterly change in fair value of the outstanding contracts in Accumulated Derivative Instruments Gain (Loss). On the date a contract matures, the resulting gain or loss is reclassified into Cost of Sales concurrently with the recognition of the commodity purchased. The ineffective portion of the swap contracts change in fair value, if any, would be recognized immediately in earnings. During 2005, there was a minimal amount of ineffective portion related to changes in fair value of natural gas swap contracts. Additionally, there were no amounts excluded from the measure of effectiveness. During 2004, there was no material ineffective portion related to changes in fair value of natural gas swap contracts. Additionally, there were no amounts excluded from the measure of effectiveness.

ITEM 8. *FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA*

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GRAPHIC PACKAGING CORPORATION

CONSOLIDATED BALANCE SHEETS

	December 31, 2005	December 31, 2004
	(Amounts in millions, except share amounts)	
ASSETS		
Current Assets:		
Cash and Equivalents	$ 12.7	$ 7.3
Receivables, Net	216.3	214.9
Inventories	298.5	301.2
Deferred Tax Assets	13.1	—
Other Current Assets	13.0	14.9
Total Current Assets	553.6	538.3
Property, Plant and Equipment, Net	1,551.5	1,649.0
Goodwill	642.6	643.4
Intangible Assets, Net	157.3	166.6
Deferred Tax Assets	350.8	364.8
Other Assets	100.2	103.2
Total Assets	$ 3,356.0	$ 3,465.3
LIABILITIES		
Current Liabilities:		
Short Term Debt	$ 11.0	$ 14.2
Accounts Payable	209.6	200.0
Compensation and Employee Benefits	84.4	91.9
Interest Payable	42.6	43.7
Other Accrued Liabilities	73.0	66.2
Total Current Liabilities	420.6	416.0
Long Term Debt	1,967.3	2,011.0
Deferred Tax Liabilities	461.5	440.0
Other Noncurrent Liabilities	237.9	211.4
Total Liabilities	3,087.3	3,078.4
SHAREHOLDERS' EQUITY		
Preferred Stock, par value $.01 per share; 50,000,000 shares authorized; no shares issued or outstanding	—	—
Common Stock, par value $.01 per share;		
Common Stock, 500,000,000 shares authorized; 198,663,007 and 198,586,108 shares issued and outstanding at December 31, 2005 and 2004, respectively	2.0	2.0
Capital in Excess of Par Value	1,169.6	1,169.2
Unearned Compensation	(0.1)	(0.4)
Accumulated Deficit	(800.6)	(709.5)
Minimum Pension Liability Adjustment	(90.0)	(65.2)
Accumulated Derivative Instruments Gain (Loss)	5.2	(9.0)
Cumulative Currency Translation Adjustment	(17.4)	(0.2)
Total Shareholders' Equity	268.7	386.9
Total Liabilities and Shareholders' Equity	$ 3,356.0	$ 3,465.3

The accompanying notes are an integral part of the consolidated financial statements.

GRAPHIC PACKAGING CORPORATION

CONSOLIDATED STATEMENTS OF OPERATIONS

	Year Ended December 31, 2005	Year Ended December 31, 2004	Year Ended December 31, 2003
	(Amounts in millions, except per share amounts)		
Net Sales	$ 2,384.0	$ 2,386.5	$ 1,683.3
Cost of Sales	2,071.3	2,026.7	1,398.5
Selling, General and Administrative	206.1	202.3	153.1
Research, Development and Engineering	9.9	9.6	7.4
Other Expense, Net	9.8	32.3	18.2
Income from Operations	86.9	115.6	106.1
Loss on Early Extinguishment of Debt	—	—	(45.3)
Interest Income	0.6	0.6	1.0
Interest Expense	(156.5)	(149.6)	(144.5)
Loss before Income Taxes and Equity in Net Earnings of Affiliates	(69.0)	(33.4)	(82.7)
Income Tax Expense	(23.3)	(28.9)	(14.3)
Loss before Equity in Net Earnings of Affiliates	(92.3)	(62.3)	(97.0)
Equity in Net Earnings of Affiliates	1.2	1.4	1.3
Net Loss	$ (91.1)	$ (60.9)	$ (95.7)
Loss Per Share — Basic	$ (0.46)	$ (0.31)	$ (0.65)
Loss Per Share — Diluted	$ (0.46)	$ (0.31)	$ (0.65)
Weighted Average Number of Shares Outstanding — Basic	198.6	198.5	148.3
Weighted Average Number of Shares Outstanding — Diluted	198.6	198.5	148.3

The accompanying notes are an integral part of the consolidated financial statements.

GRAPHIC PACKAGING CORPORATION

CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS

	Year Ended December 31, 2005	Year Ended December 31, 2004	Year Ended December 31, 2003
		(Amounts in millions)	
Net Loss	$ (91.1)	$ (60.9)	$ (95.7)
Other Comprehensive (Loss) Income:			
Derivative Instruments Income (Loss), Net of Tax of $0	14.2	3.7	(6.6)
Minimum Pension Liability Adjustment, Net of Tax of $0	(24.8)	(5.0)	11.1
Currency Translation Adjustments, Net of Tax of $0	(17.2)	10.4	20.1
Comprehensive Loss	$ (118.9)	$ (51.8)	$ (71.1)

The accompanying notes are an integral part of the consolidated financial statements.

GRAPHIC PACKAGING CORPORATION

CONSOLIDATED STATEMENTS OF CASH FLOWS

	Year Ended December 31, 2005	Year Ended December 31, 2004	Year Ended December 31, 2003
		(Amounts in millions)	
CASH FLOWS FROM OPERATING ACTIVITIES:			
Net Loss	$ (91.1)	$ (60.9)	$ (95.7)
Noncash Items Included in Net Loss:			
Depreciation and Amortization	205.3	228.9	160.4
Loss on Early Extinguishment of Debt	—	—	16.7
Deferred Income Taxes	24.5	23.6	11.8
Pension, Postemployment and Postretirement Benefits Expense, Net of Contributions	9.5	24.8	18.6
Amortization of Deferred Debt Issuance Costs	8.3	8.7	7.6
Loss on Retirement of Assets	3.7	10.8	8.4
Other, Net	3.3	(3.4)	7.0
Changes in Operating Assets & Liabilities	6.0	31.3	22.0
Net Cash Provided by Operating Activities	169.5	263.8	156.8
CASH FLOWS FROM INVESTING ACTIVITIES:			
Capital Spending	(95.6)	(137.8)	(136.6)
Acquisition Fees	—	—	(93.9)
Cash Acquired in Merger	—	—	6.1
Proceeds from Sales of Assets, Net of Selling Costs	1.1	11.8	—
Change in Other Assets	(20.1)	(15.5)	3.5
Net Cash Used in Investing Activities	(114.6)	(141.5)	(220.9)
CASH FLOWS FROM FINANCING ACTIVITIES:			
Borrowing under Revolving Credit Facilities	531.8	516.7	474.8
Payments on Revolving Credit Facilities	(527.2)	(541.0)	(456.6)
Proceeds from Issuance of Debt	—	—	2,125.0
Increase in Debt Issuance Costs	(4.2)	(0.9)	(57.4)
Premium Paid on Early Extinguishment of Debt	—	—	(28.6)
Payment on Debt	(50.0)	(108.2)	(1,989.1)
Other	0.5	0.4	(0.8)
Net Cash (Used in) Provided by Financing Activities	(49.1)	(133.0)	67.3
EFFECT OF EXCHANGE RATE CHANGES ON CASH	(0.4)	0.5	0.5
Net Increase (Decrease) in Cash and Equivalents	5.4	(10.2)	3.7
Cash and Equivalents at Beginning of Period	7.3	17.5	13.8
CASH AND EQUIVALENTS AT END OF PERIOD	$ 12.7	$ 7.3	$ 17.5

The accompanying notes are an integral part of the consolidated financial statements.

GRAPHIC PACKAGING CORPORATION

CONSOLIDATED STATEMENTS OF SHAREHOLDERS' EQUITY

(Amounts in millions, except share amounts)

	Common Stock		Class A Non-Redeemable Common Stock		Class B Non-Redeemable Common Stock		Capital in Excess of Par Value	Unearned Compensation	Accumulated Deficit	Minimum Pension Liability Adjustment	Cumulative Currency Translation Adjustment	Accumulated Derivative Instruments Gain (Loss)	Total Shareholders' Equity
	Shares	Amount	Shares	Amount	Shares	Amount							
Balances at December 31, 2002	—	—	7,000,000	$ 0.1	500,000	$ —	$ 748.7	$ —	$ (552.9)	$ (71.3)	$ (30.7)	$ (6.1)	$ 87.8
Net Loss	—	—	—	—	—	—	—	—	(95.7)	—	—	—	(95.7)
15.21-to-One Stock Split	—	—	99,470,000	1.0	7,105,000	0.1	(1.1)	—	—	—	—	—	—
Non-Redeemable Class A and Class B Common Stock Exchange	114,075,000	1.2	(106,470,000)	(1.1)	(7,605,000)	(0.1)	—	—	—	—	—	—	—
Redeemable Class A Common Stock Exchange	748,027	0.0	—	—	—	—	5.9	—	—	—	—	—	5.9
Common Stock issued in Merger	83,441,490	0.8	—	—	—	—	414.7	—	—	—	—	—	415.5
Accumulated Derivative Instruments Loss	—	—	—	—	—	—	—	—	—	—	—	(6.6)	(6.6)
Minimum Pension Liability Adjustment	—	—	—	—	—	—	—	—	—	11.1	—	—	11.1
Currency Translation Adjustment	—	—	—	—	—	—	—	—	—	—	20.1	—	20.1
Issuance of Common Stock	100,000	—	—	—	—	—	0.2	—	—	—	—	—	0.2
Net Issuance of Restricted Stock	13,593	—	—	—	—	—	0.1	—	—	—	—	—	0.1
Balances at December 31, 2003	198,378,110	2.0	—	—	—	—	1,168.5	—	(648.6)	(60.2)	(10.6)	(12.7)	438.4
Net Loss	—	—	—	—	—	—	—	—	(60.9)	—	—	—	(60.9)
Accumulated Derivative Instruments Loss	—	—	—	—	—	—	—	—	—	—	—	3.7	3.7
Minimum Pension Liability Adjustment	—	—	—	—	—	—	—	—	—	(5.0)	—	—	(5.0)
Currency Translation Adjustment	—	—	—	—	—	—	—	—	—	—	10.4	—	10.4
Issuance of Common Stock	149,828	—	—	—	—	—	0.4	—	—	—	—	—	0.4
Net Issuance of Restricted Stock	58,170	—	—	—	—	—	0.3	(0.4)	—	—	—	—	(0.1)
Balances at December 31, 2004	198,586,108	2.0	—	—	—	—	1,169.2	(0.4)	(709.5)	(65.2)	(0.2)	(9.0)	386.9
Net Loss	—	—	—	—	—	—	—	—	(91.1)	—	—	—	(91.1)
Accumulated Derivative Instruments Loss	—	—	—	—	—	—	—	—	—	—	—	14.2	14.2
Minimum Pension Liability Adjustment	—	—	—	—	—	—	—	—	—	(24.8)	—	—	(24.8)
Currency Translation Adjustment	—	—	—	—	—	—	—	—	—	—	(17.2)	—	(17.2)
Issuance of Common Stock	21,189	—	—	—	—	—	0.2	—	—	—	—	—	0.2
Restricted Stock Amortized to Expense	—	—	—	—	—	—	—	0.5	—	—	—	—	0.5
	55,710	—	—	—	—	—	0.2	(0.2)	—	—	—	—	—

Net issuance of Restricted Stock													
Balances at December 31, 2005	198,663,007	$ 2.0	—	$ —	—	$ —	$ 1,169.6	$ (0.1)	$ (800.6)	$ (90.0)	$ (17.4)	$ 5.2	$ 268.7

The accompanying notes are an integral part of the consolidated financial statements.

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

NOTE 1 — ORGANIZATION AND BASIS OF PRESENTATION

On August 8, 2003, the corporation formerly known as Graphic Packaging International Corporation merged with and into Riverwood Acquisition Sub LLC, a wholly owned subsidiary of Riverwood Holding, Inc. ("Riverwood Holding"), with Riverwood Acquisition Sub LLC as the surviving entity (the "Merger"). At the closing of the Merger, one share of common stock of Riverwood Holding was exchanged for each share of common stock of Graphic Packaging International Corporation. Riverwood Acquisition Sub LLC then merged into Riverwood Holding, which was renamed Graphic Packaging Corporation. After the Merger, (1) RIC Holding, Inc. merged into Graphic Packaging Holdings, Inc., which was renamed GPI Holding, Inc. and (2) the corporation formerly known as Graphic Packaging Corporation merged into Riverwood International Corporation ("RIC") which was renamed Graphic Packaging International, Inc. ("Graphic Packaging International"). Graphic Packaging International Corporation and its subsidiaries for periods prior to the Merger are referred to herein as "Graphic."

For accounting purposes, the Merger was accounted for as a purchase by the Company. Under the purchase method of accounting, the assets and liabilities of Graphic were recorded, as of the date of the closing of the Merger, at their respective fair values and added to those of the Company. The difference between the purchase price and the fair market values of the assets acquired and liabilities assumed of Graphic was recorded as goodwill. The historical financial statements of Riverwood Holding became the historical financial statements of Graphic Packaging Corporation. Note 2 provides summary unaudited pro forma information and other information pertaining to the Merger.

Graphic Packaging Corporation and GPI Holding, Inc., its wholly-owned subsidiary, conduct no significant business and have no independent assets or operations other than their ownership of Graphic Packaging International. Graphic Packaging Corporation and GPI Holding, Inc. fully and unconditionally guarantee substantially all of the debt of Graphic Packaging International.

NOTE 2 — MERGER

The Merger was entered into to create a value-added paperboard packaging company. Prior to the Merger, Riverwood Holding had two classes of common stock. There were 9.0 million shares of Class A common stock, par value $0.01, authorized with 7.0 million shares outstanding at August 8, 2003. There were 3.0 million shares of Class B common stock, par value $0.01, authorized with 0.5 million shares outstanding at August 8, 2003. In connection with the Merger, the Company's Board of Directors approved a 15.21-to-one stock split. At the time, the Class A and Class B common stock were reclassified as one class of common stock, par value $0.01. Immediately after the stock split, there were 500.0 million shares of common stock authorized with 114.8 million shares outstanding. The aggregate par value of the issued common stock was increased by $1.1 million as a result of keeping the par value price $0.01. Accordingly, Capital in Excess of Par Value was decreased $1.1 million. In connection with the Merger, the shareholders of Graphic Packaging International Corporation received one share of the Company's common stock and associated shareholder rights for each share of Graphic Packaging International Corporation common stock and associated shareholder rights they owned prior to the Merger. Accordingly, Capital in Excess of Par Value increased $419.5 million.

The Company determined that the relative outstanding share ownership and the designation of certain senior management positions required the Company to be the acquiring entity for accounting purposes, resulting in the historical financial statements of Riverwood Holding becoming the historical financial statements of Graphic Packaging Corporation. The assets and liabilities of the acquired business are included in the consolidated balance sheets at December 31, 2005 and 2004. Results of Graphic have been included in the consolidated statement of operations beginning August 9, 2003 through December 31, 2003. The purchase price for the acquisition, including transaction costs, has been allocated to the assets acquired and liabilities assumed based on the estimated fair market values at the date of the Merger. Goodwill is allocated entirely to

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

the paperboard packaging segment and is not deductible for tax purposes. The stock–for–stock exchange resulted in the issuance of 83.4 million shares of common stock to fund the purchase price of $469.8 million. During 2004, the Company recorded $19.4 million of additional Goodwill as a result of finalizing the purchase price allocation. The final purchase price allocation is as follows:

	(Amounts in millions)
Current assets	$ 209.6
Property, plant & equipment	480.3
Goodwill	375.4
Intangible assets	162.0
Other assets	20.0
Total assets acquired	$ 1,247.3
Accounts payable and accrued expenses	$ 150.5
Total debt	496.6
Pension and other post–retirement liabilities, assumed merger related liabilities, and other	130.4
Total liabilities assumed	$ 777.5
See also Note 17 — RESTRUCTURING CHARGES	

Selected Unaudited Pro Forma Combined Financial Information

The following unaudited pro forma combined financial information is presented to show the estimated effect of the Merger and the related financing transactions and represents the Company's pro forma combined financial information for the years ended December 31, 2003 as if the Merger and related financing transactions had occurred on January 1, 2003. The unaudited pro forma combined financial information includes adjustments directly attributable to the Merger and the related financing transactions that are expected to have a continuing impact on the Company. The pro forma adjustments are based upon available information and certain assumptions that management believes are reasonable.

The pro forma financial information was prepared using the purchase method of accounting, with the Company treated as the acquirer for accounting purposes. Under purchase accounting, the total cost of the Merger is allocated to the tangible and intangible assets acquired and liabilities assumed based upon their respective fair values at the effective date of the Merger. The allocation of the cost of the Merger has been made based upon currently available information and management's estimates.

The pro forma financial information is based on the Company's actual financial results for the period indicated and the historical results of Graphic from the beginning of the period presented through the date of the Merger. The pro forma financial information has been prepared in accordance with accounting principles generally accepted in the United States of America and is provided for comparison and analysis purposes only. The unaudited pro forma combined financial information does not purport to represent the combined company's results of operations or financial condition had the Merger and related financing transactions

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

actually occurred as of such dates or of the results that the combined company would have achieved after the Merger. The unaudited pro forma combined financial information is as follows:

Combined Company
Unaudited Condensed Pro Forma Combined Statement of Operations
For the Year Ended December 31, 2003

	Company	Graphic	Pro Forma Adjustments	Condensed Pro Forma Combined
	(Amounts in millions, except per share amounts)			
Net Sales	$ 1,683.3	$ 650.8	$ (38.0)A	$ 2,296.1
Cost of Sales	1,398.5	581.7	(45.0)A (1.3)B	1,933.9
Selling, General and Administrative, Research,Development and Engineering	178.7	44.0	18.0 B	240.7
Income from Operations	106.1	25.1	(9.7)	121.5
Interest Expense, Net	(143.5)	(23.0)	18.4 C	(148.1)
Loss on Early Extinguishment of Debt	(45.3)	(1.3)	—	(46.6)
(Loss) Income before Income Taxes and Equity in Net Earnings of Affiliates	(82.7)	0.8	8.7	(73.2)
Income Tax Expense	(14.3)	(1.0)	—	(15.3)
Loss before Equity in Net Earnings of Affiliates	(97.0)	(0.2)	8.7	(88.5)
Equity in Net Earnings of Affiliates	1.3	—	—	1.3
Net Loss	(95.7)	(0.2)	8.7	(87.2)
Preferred Stock Dividends Declared	—	6.1	(6.1)D	—
Net Loss Attributable to Common Stockholders	$ (95.7)	$ (6.3)	$ 14.8	$ (87.2)
Loss Per Share — Basic	$ (0.65)			$ (0.44)
Loss Per Share — Diluted	$ (0.65)			$ (0.44)
Weighted Average Number of Shares Outstanding:				
Basic	148.3			198.3
Diluted	148.3			198.3

Adjustments in the unaudited condensed pro forma combined financial statements are as follows:

A RIC sold coated unbleached kraft paperboard ("CUK") folding boxboard to Graphic for use in certain cartons manufactured by Graphic. This pro forma adjustment eliminates the intercompany sales and cost of sales $38.0 million for the period ended August 8, 2003, related to this activity. Cost of Sales also includes an adjustment of approximately $7 million related to a one–time non–recurring item which was the result of the Merger. The approximately $7 million adjustment is to eliminate the purchase accounting requirement to step–up the fair value of the acquired inventory.

B The amortization of the identifiable intangible assets (customer contracts, patents and proprietary technology) is reflected as a pro forma adjustment to the unaudited condensed pro forma combined statement of operations. The Company is amortizing the estimated fair value of the identifiable intangibles of approximately $162.0 million on a straight–line basis over an average estimated useful life of eighteen years, except for non–compete agreements which have an estimated useful life of approximately one year. Depreciation expense would have decreased by $1.3 million for the year ended

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

December 31, 2003 as a result of the Company revising the depreciable asset lives and the fair value of the property purchased in the Merger. The net effect of this increased amortization and decreased depreciation of $16.7 million for the year ended December 31, 2003, is reflected in the unaudited condensed pro forma combined statement of operations as follows:

	Year Ended December 31, 2003
Cost of Sales	$ (1.3)
Selling, General and Administrative, Research, Development and Engineering	18.0
Total Net Additional Amortization and Depreciation of Intangible Assets and Property, Plant and Equipment	$ 16.7

The asset lives were revised as a result of the valuation provided by a third party engaged by the Company to estimate the fair value and remaining useful lives of certain tangible and intangible assets of Graphic.

C In connection with the Merger, substantially all of RIC's and Graphic's then outstanding indebtedness was redeemed, repurchased or otherwise repaid and replaced with borrowings under the Senior Secured Credit Agreement and indebtedness under the Senior Notes and Senior Subordinated Notes. The condensed pro forma combined interest expense reflects an average variable interest rate of 3.9% for the combined company's new bank debt and a blended fixed rate of 9.0% on the combined company's Senior Notes and Senior Subordinated Notes.

D To reflect the new equity structure of the Company, including conversion of $100 million of Graphic's convertible preferred stock into common stock (accordingly there is no preferred stock dividend declared).

NOTE 3 — ACCOUNTING POLICIES

(A) BASIS OF PRESENTATION

The Company's Consolidated Financial Statements include all subsidiaries in which the Company has the ability to exercise direct or indirect control over operating and financial policies. The accompanying consolidated financial statements include the worldwide operations of the Paperboard Packaging segment which includes the paperboard, packaging, and packaging machinery businesses and the Containerboard/Other segment. Intercompany transactions and balances are eliminated in consolidation. The Company has reclassified the presentation of certain prior period information to conform to the current presentation format.

(B) USE OF ESTIMATES

The preparation of financial statements in conformity with U.S. generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities at the date of the financial statements and the reported amounts of net sales and expenses during the reporting periods. Actual results could differ from these estimates, and changes in these estimates are recorded when known. Estimates are used in accounting for, among other things, pension benefits, retained insurable risks, excess and obsolete inventory, allowance for doubtful accounts, useful lives for depreciation and amortization, future cash flows associated with impairment testing of goodwill and long–term assets, deferred tax assets and potential income tax assessments, and contingencies.

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

(C) CASH AND EQUIVALENTS

Cash and equivalents include time deposits, certificates of deposit and other marketable securities with original maturities of three months or less.

(D) INVENTORIES

Inventories are stated at the lower of cost or market with cost determined principally by the first–in, first–out ("FIFO") basis. Average cost basis is used to determine the cost of supplies inventories. Raw materials and consumables used in the production process such as wood chips and chemicals are valued at purchase cost on a FIFO basis upon receipt. Work in progress and finished goods inventories are valued at the cost of raw material consumed plus direct manufacturing costs (such as labor, utilities and supplies) as incurred and a proportion of manufacturing overhead. Inventories are stated net of an allowance for slow–moving and obsolete inventory, which is based on estimates.

During the fourth quarter of 2003, the Company changed its method of determining the cost of inventories from the LIFO method to the FIFO method. Prior to 2003, the majority of the Company's operations used the LIFO method of valuing inventory. The Company has concluded that the FIFO method will result in a better measurement of current inventory costs with revenues because the Company's operations have realized and expect to continue to realize cost reductions in its manufacturing operations.

(E) PROPERTY, PLANT AND EQUIPMENT

Property, plant and equipment are recorded at cost. Betterments, renewals and extraordinary repairs that extend the life of the asset are capitalized; other repairs and maintenance charges are expensed as incurred. The Company's cost and related accumulated depreciation applicable to assets retired or sold are removed from the accounts and the gain or loss on disposition is recognized in income.

Costs directly associated with the development and testing of computer information systems for internal use are deferred and included in property, plant and equipment. Such costs are amortized on a straight–line basis over the expected useful life of 5 years. Costs indirectly associated with such projects and ongoing maintenance costs are expensed as incurred. A total of $5.8 million and $7.3 million in costs relating to software development were capitalized in 2005 and 2004, respectively, and were included in property, plant and equipment at December 31, 2005 and 2004.

Interest is capitalized on major projects. The capitalized interest is recorded as part of the asset to which it relates and is amortized over the asset's estimated useful life. Capitalized interest was approximately $2.5 million, $3.8 million and $1.6 million in the years ended December 31, 2005, 2004 and 2003, respectively.

(F) DEPRECIATION AND AMORTIZATION, AND IMPAIRMENT

Depreciation is principally computed using the straight–line method based on the following estimated useful lives of the related assets:

Buildings	40 years
Land improvements	15 years
Machinery and equipment	3 to 40 years
Furniture and fixtures	10 years
Automobiles and light trucks	3 to 5 years

For certain major capital additions, the Company computes depreciation on the units–of–production method until the asset's designed level of production is achieved and sustained.

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

The Company assesses its long-lived assets, including goodwill and certain identifiable intangibles, for impairment whenever events or circumstances indicate that the carrying value of an asset may not be recoverable. To analyze recoverability, the Company projects future cash flows, undiscounted and before interest, over the remaining life of such assets. If these projected cash flows are less than the carrying amount, an impairment would be recognized, resulting in a write-down of assets with a corresponding charge to earnings. The impairment loss is measured based upon the difference between the carrying amount and the fair value of the assets. The Company assesses the appropriateness of the useful life of its long-lived assets periodically.

Intangible assets with a determinable life are amortized on a straight-line basis over that period. The related amortization expense is included in Other Expense, Net.

The following table displays the intangible assets that continue to be subject to amortization and aggregate amortization expense as well as intangible assets not subject to amortization as of December 31, 2005 and 2004:

	As of December 31, 2005		
	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
	(Amounts in millions)		
Amortizable Intangible Assets:			
Customer Relationships	$ 109.9	$ 12.5	$ 97.4
Non-Compete Agreements	23.3	23.2	0.1
Patents, Trademarks and Licenses	101.0	41.2	59.8
	$ 234.2	$ 76.9	$ 157.3
Unamortizable Intangible Assets:			
Goodwill	$ 642.6	—	$ 642.6

	As of December 31, 2004		
	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
Amortizable Intangible Assets:			
Customer Relationships	$ 109.9	$ 7.3	$ 102.6
Non-Compete Agreements	23.3	22.9	0.4
Patents, Trademarks and Licenses	98.5	34.9	63.6
	$ 231.7	$ 65.1	$ 166.6
Unamortizable Intangible Assets:			
Goodwill	$ 643.4	—	$ 643.4

The Company recorded amortization expense of $11.8 million, $27.0 million and $14.0 million for the years ended December 31, 2005, 2004 and 2003, respectively, relating to intangible assets subject to amortization. The Company expects amortization expense to be approximately $12 million per year for 2006 through 2010.

(G) INTERNATIONAL CURRENCY

The functional currency of the international subsidiaries is the local currency for the country in which the subsidiaries own their primary assets. The translation of the applicable currencies into U.S. dollars is performed for balance sheet accounts using current exchange rates in effect at the balance sheet date and for revenue and expense accounts using a weighted average exchange rate during the period. Any related

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

translation adjustments are recorded directly to Shareholders' Equity. Gains and losses on foreign currency transactions are included in Other Expense, Net for the period in which the exchange rate changes.

The Company pursues a currency hedging program which utilizes derivatives to limit the impact of foreign currency exchange fluctuations on its consolidated financial results. Under this program, the Company has entered into forward exchange contracts in the normal course of business to hedge certain foreign currency denominated transactions. Realized and unrealized gains and losses on these forward contracts are included in the measurement of the basis of the related foreign currency transaction when recorded.

(H) INCOME TAXES

The Company accounts for income taxes under the asset and liability method which requires that deferred tax assets or liabilities be recorded based on the difference between the tax bases of assets and liabilities and their carrying amounts for financial reporting purposes. These assets and liabilities are measured using the enacted tax rates and laws that are currently in effect. Subsequent changes in the tax laws will require adjustment to the assets and liabilities. A valuation allowance is established for deferred tax assets when it is more likely than not that the benefits of such assets will not be realized.

(I) REVENUE RECOGNITION

The Company receives revenue from the sales of manufactured products, the leasing of packaging machinery and the servicing of packaging machinery. The Company recognizes sales revenue when all of the following criteria are met: persuasive evidence of an agreement exists, delivery has occurred or services have been rendered, the Company's price to the buyer is fixed and determinable and collectibility is reasonably assured. Delivery is not considered to have occurred until the customer takes title and assumes the risks and rewards of ownership. The timing of revenue recognition is largely dependent on shipping terms. Revenue is recorded at the time of shipment for terms designated as free on board ("f.o.b.") shipping point. For sales transactions designated f.o.b. destination, revenue is recorded when the product is delivered to the customer's delivery site. The Company recognizes revenues on its annual and multi–year carton supply contracts as the shipment occurs in accordance with the shipping terms discussed above.

Payments from packaging machinery use agreements are recognized on a straight–line basis over the term of the agreements. Service revenue on packaging machinery is recorded at the time of service.

Discounts and allowances are comprised of trade allowances, cash discounts and sales returns. Cash discounts and sales returns are estimated using historical experience. Trade allowances are based on the estimated obligations and historical experience. Customer rebates are determined based on the quantity purchased and are recorded at the time of sale.

(J) RETAINED INSURABLE RISK

It is the Company's policy to self–insure or fund a portion of certain expected losses related to group health benefits and workers' compensation claims. Provisions for expected losses are recorded based on the Company's estimates, on an undiscounted basis, of the aggregate liabilities for known claims and estimated claims incurred but not reported.

(K) ENVIRONMENTAL REMEDIATION RESERVES

The Company records accruals for environmental obligations based on estimates developed in consultation with environmental consultants and legal counsel. Accruals for environmental liabilities are established in accordance with the American Institute of Certified Public Accountants Statement of Position 96–1, "Environmental Remediation Liabilities." The Company records a liability at the time it is probable and can be

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

reasonably estimated. Such liabilities are not reduced for potential recoveries from insurance carriers. Costs of future expenditures are not discounted to their present value.

(L) STOCK-BASED COMPENSATION

As permitted by Statement of Financial Accounting Standards ("SFAS") No. 123 "Accounting for Stock-Based Compensation," the Company continues to apply intrinsic value accounting for its stock option plans under Accounting Principles Board Opinion No. 25 ("APB 25"), "Accounting for Stock Issued to Employees." Compensation cost for stock options, if any, is measured as the excess of the market price of the Company's common stock at the date of grant over the exercise price to be paid by the grantee to acquire the stock. The Company has adopted disclosure-only provisions of SFAS No. 123 and SFAS No. 148, "Accounting for Stock-Based Compensation — Transition and Disclosure — an Amendment of FASB Statement No. 123." If the Company had elected to recognize compensation expense based upon the fair value at the grant dates for awards under these plans, the Company's Net Loss would have been as follows:

	Year Ended December 31,		
	2005	2004	2003
	(Amounts in millions, except per share amounts)		
Net Loss, As Reported	$ (91.1)	$ (60.9)	$ (95.7)
Add: Stock-Based Employee Compensation Expense Included in Reported Net Loss	—	(0.7)	0.9
Deduct: Total Stock-Based Employee Compensation Expense Determined Under Fair Value Based Method for All Awards	(5.5)	(8.5)	(0.3)
Adjusted Net Loss	$ (96.6)	$ (70.1)	$ (95.1)
Loss Per Basic Share-As Reported	$ (0.46)	$ (0.31)	$ (0.65)
Loss Per Basic Share-As Adjusted	$ (0.49)	$ (0.35)	$ (0.64)
Loss Per Diluted Share-As Reported	$ (0.46)	$ (0.31)	$ (0.65)
Loss Per Diluted Share-As Adjusted	$ (0.49)	$ (0.35)	$ (0.64)

On December 8, 2005, the Compensation and Benefits Committee of the Board of Directors of the Company approved the acceleration of the vesting of all of the unvested stock options granted to employees of the Company so that such options vested immediately. The action affected 1,835,268 stock options, 1,762,768 of which have exercise prices in excess of the current market price of the Company's common stock. The action is expected to reduce the Company's future compensation expense by $3.2 million. The $3.2 million related to this calculation is included in the $5.5 million deduction for 2005 above.

(M) RESEARCH AND DEVELOPMENT

Research and development, which relate primarily to the development and design of new packaging machines and products are expensed as incurred. Expenses for the years ended December 31, 2005, 2004 and 2003 were $9.9 million, $9.6 million and $7.4 million, respectively.

(N) SHIPPING AND HANDLING COSTS

The Company includes shipping and handling costs in Cost of Sales.

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

(O) RECENT ACCOUNTING PRONOUNCEMENTS

In November 2004, the Financial Accounting Standards Board ("FASB") issued SFAS No. 151, "Inventory Costs, an Amendment of ARB No. 43, Chapter 4 "("SFAS No. 151"), which is effective for inventory costs incurred during fiscal years beginning after June 15, 2005. SFAS No. 151 addresses financial accounting and reporting for inventory costs. The Company does not believe the adoption of SFAS No. 151 will have a material impact on its financial position and results of operations.

In December 2004, the FASB issued SFAS No. 153, "Exchanges of Nonmonetary Assets, an Amendment of APB Opinion No. 29" ("SFAS No. 153"), which is effective for nonmonetary asset exchanges occurring in fiscal periods beginning after June 15, 2005. SFAS No. 153 addresses the measurement of exchanges of nonmonetary assets. The adoption of SFAS No. 153 did not have a material impact on the Company's financial position and results of operations.

In December 2004, the FASB issued SFAS No. 123 (Revised 2004), "Share–Based Payment" ("SFAS No. 123R") which is effective for new awards and awards modified or settled occurring in fiscal years beginning after December 15, 2004. SFAS No. 123R amends and clarifies the accounting for stock compensation plans under SFAS No. 123, "Accounting for Stock–Based Compensation." The Company previously reported that it will adopt SFAS No. 123R for the quarter ending September 30, 2005. On April 14, 2005, however, the Securities and Exchange Commission ("SEC") deferred the required adoption date of SFAS No. 123R to the beginning of the first quarter of 2006, at which time the Company will adopt SFAS No. 123R. As previously mentioned, the Company accelerated the vesting of options and does not believe that such adoption of SFAS No. 123R will have a material impact on its financial position and results of operations.

Financial Accounting Standards Board Interpretation No. 47, "Accounting for Conditional Asset Retirement Obligations" ("FIN No. 47"), was issued in March 2005 and is effective no later than the end of fiscal years ending after December 15, 2005. FIN No. 47 clarifies the term conditional asset retirement obligation as used in FASB Statement No. 143, "Accounting for Asset Retirement Obligations." The adoption of FIN No. 47 did not have a material impact on the Company's financial position and results of operations.

In May 2005, the FASB issued SFAS No. 154 "Accounting Changes and Error Corrections, a replacement of APB Opinion No. 20 and Statement No. 3" ("SFAS No. 154"). Previously, APB Opinion No. 20 "Accounting Changes" and SFAS No. 3 "Reporting Accounting Changes in Interim Financial Statements" required the inclusion of the cumulative effect of changes in accounting principle in net income of the period of the change. SFAS No. 154 requires companies to recognize a change in accounting principle, including a change required in a new accounting pronouncement when the pronouncement does not include specific transition provisions, retrospectively to prior periods' financial statements. The Company will assess the impact of a change in accounting principle in accordance with SFAS No. 154 when such a change arises after the effective date of January 1, 2006.

NOTE 4 — SUPPLEMENTAL BALANCE SHEET DATA

The components of receivables at December 31 were as follows:

	2005	2004
	(Amounts in millions)	
Trade	$ 200.4	$ 207.7
Less, allowance	2.8	3.7
	197.6	204.0
Other	18.7	10.9
	$ 216.3	$ 214.9

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

The major classes of inventories at December 31 were as follows:

	2005	2004
	(Amounts in millions)	
Finished goods	$ 164.2	$ 166.9
Work in progress	22.7	14.9
Raw materials	67.3	76.2
Supplies	44.3	43.2
	$ 298.5	$ 301.2

The components of Property, Plant and Equipment at December 31 were as follows:

	2005	2004
Property, Plant and Equipment, at Cost		
Land and Improvements	$ 57.1	$ 60.3
Buildings	227.2	226.4
Machinery and Equipment	2,496.0	2,441.0
	2,780.3	2,727.7
Less: Accumulated Depreciation	1,228.8	1,078.7
Property, Plant and Equipment, Net	$ 1,551.5	$ 1,649.0

Other Assets included at December 31, consisted of the following:

	2005	2004
	(Amounts in millions)	
Deferred debt issuance costs, net	$ 43.8	$ 47.8
Capitalized spare parts	28.7	26.7
Pension intangible asset	8.2	10.7
Assets held for sale	3.9	1.5
Other	15.6	16.5
	$ 100.2	$ 103.2

Other Noncurrent Liabilities included at December 31, consisted of the following:

	2005	2004
	(Amounts in millions)	
Accrued Retirement and Post Employment Benefits	$ 189.7	$ 168.1
Deferred Revenue	19.2	18.7
Other	29.0	24.6
	$ 237.9	$ 211.4

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

NOTE 5 — SUPPLEMENTAL CASH FLOW INFORMATION

The components of changes in operating assets and liabilities for the year ended December 31 were as follows:

	2005	2004	2003
	(Amounts in millions)		
Receivables	$ (9.1)	$ (9.5)	$ 26.5
Inventories	(7.2)	5.6	(14.6)
Prepaid Expenses	6.9	4.3	1.4
Accounts Payable	12.8	18.2	30.3
Compensation and Employee Benefits	(11.2)	3.2	5.6
Income Taxes	(0.2)	(2.0)	(3.8)
Other Accrued Liabilities	13.1	1.5	(22.4)
Other Noncurrent Liabilities	0.9	10.0	(1.0)
	$ 6.0	$ 31.3	$ 22.0

Cash paid for interest and cash paid, net of refunds, for income taxes was as follows:

	Year Ended Dec. 31, 2005	Year Ended Dec. 31, 2004	Year Ended Dec. 31, 2003
	(In millions of dollars)		
Interest	$ 151.8	$ 131.6	$ 156.2
Income Taxes	$ 1.0	$ 3.5	$ 3.9

NOTE 6 — SHORT-TERM DEBT

Short-Term Debt at December 31, consisted of the following:

	2005	2004
	(Amounts in millions)	
Short-term borrowings	$ 9.8	$ 13.4
Current portion of long-term debt	1.2	0.8
	$ 11.0	$ 14.2

Short-term borrowings are principally at the Company's international subsidiaries. The weighted average interest rate on short-term borrowings as of December 31, 2005 and 2004 was 2.2% and 2.1%, respectively.

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

NOTE 7 — LONG–TERM DEBT

Long–Term Debt at December 31 consisted of the following:

	2005	2004
	(Amounts in millions)	
Senior Notes with interest payable semi–annually at 8.5%, payable in 2011	$ 425.0	$ 425.0
Senior Subordinated Notes with interest payable semi–annually at 9.5%, payable in 2013	425.0	425.0
Senior Secured Term Loan Facility with interest payable at various dates at floating rates (6.60% at December 31, 2005 and 4.52% at December 31, 2004) payable through 2010	1,109.0	1,158.0
Senior Secured Revolving Facility with interest payable at various dates at floating rates (9.25% at December 31, 2005) payable in 2009	6.0	—
Other	3.5	3.8
	1,968.5	2,011.8
Less, current portion	1.2	0.8
Total	$ 1,967.3	$ 2,011.0

Long–term debt maturities and expirations of funded long–term working capital commitments at December 31, 2005, were as follows:

	(Amounts in millions)
2006	$ 1.2
2007	11.7
2008	12.5
2009	17.4
2010	1,074.9
After 2010	850.8
	$ 1,968.5

At December 31, 2005, the Company had the following commitments, amounts outstanding and amounts available under revolving credit facilities:

	Total Amount of Commitments	Total Amount Outstanding	Total Amount Available(a)
		(Amounts in millions)	
Revolving Credit Facility	$ 325.0	$ 6.0	$ 306.6
International Facilities	17.4	8.9	8.5
Total	$ 342.4	$ 14.9	$ 315.1

Note:

(a) In accordance with its debt agreements, the Company's availability under its Revolving Credit Facility has been reduced by the amount of standby letters of credit issued of approximately $12.4 million as of December 31, 2005. These letters of credit are used as security against its self–insurance obligations and workers' compensation obligations. These letters of credit expire at various dates through 2006 unless extended.

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

The Senior Secured Credit Agreement, which governs the Term Loan Facility and the Revolving Credit Facility, imposes restrictions on the Company's ability to make capital expenditures and both the Senior Secured Credit Agreement and the indentures governing the Senior Notes and Senior Subordinated Notes (the "Notes") limit the Company's ability to incur additional indebtedness. Such restrictions, together with the highly leveraged nature of the Company, could limit the Company's ability to respond to market conditions, meet its capital spending program, provide for unexpected capital investments or take advantage of business opportunities. The covenants contained in the Senior Secured Credit Agreement, among other things, restrict the ability of the Company to dispose of assets, incur additional indebtedness, incur guarantee obligations, prepay other indebtedness, make dividend and other restricted payments, create liens, make equity or debt investments, make acquisitions, modify terms of indentures under which the Notes are issued, engage in mergers or consolidations, change the business conducted by the Company and its subsidiaries, make capital expenditures and engage in certain transactions with affiliates.

On October 17, 2005, the Company, entered into the Second Amendment (the "Second Amendment") to the Senior Secured Credit Agreement. As a result, the Company incurred fees and transaction costs of approximately $4 million.

The Second Amendment relaxed the maximum Consolidated Debt to Credit Agreement EBITDA Leverage Ratio covenant and the minimum Credit Agreement EBITDA to Consolidated Interest Expense Ratio covenant as shown below beginning with the covenant requirements for September 30, 2005.

	Maximum Consolidated Debt to Credit Agreement EBITDA Leverage Ratio(a)		Minimum Credit Agreement EBITDA to Consolidated Interest Expense Ratio(a)	
Four Fiscal Quarters Ending	Previous	As Amended	Previous	As Amended
2005				
September 30, 2005	6.15 to 1.00	6.75 to 1.00	2.25 to 1.00	1.75 to 1.00
December 31, 2005	5.75 to 1.00	6.75 to 1.00	2.35 to 1.00	1.75 to 1.00
2006				
March 31, 2006	5.75 to 1.00	6.75 to 1.00	2.35 to 1.00	1.75 to 1.00
June 30, 2006	5.75 to 1.00	6.75 to 1.00	2.35 to 1.00	1.75 to 1.00
September 30, 2006	5.75 to 1.00	6.75 to 1.00	2.35 to 1.00	1.75 to 1.00
December 31, 2006	5.25 to 1.00	6.75 to 1.00	2.50 to 1.00	1.75 to 1.00
2007				
March 31, 2007	5.25 to 1.00	6.50 to 1.00	2.50 to 1.00	1.75 to 1.00
June 30, 2007	5.25 to 1.00	6.50 to 1.00	2.50 to 1.00	1.75 to 1.00
September 30, 2007	5.25 to 1.00	6.50 to 1.00	2.50 to 1.00	1.75 to 1.00
December 31, 2007	4.75 to 1.00	6.00 to 1.00	2.75 to 1.00	1.85 to 1.00
2008				
March 31, 2008	4.75 to 1.00	6.00 to 1.00	2.75 to 1.00	1.85 to 1.00
June 30, 2008	4.75 to 1.00	6.00 to 1.00	2.75 to 1.00	1.85 to 1.00
September 30, 2008	4.75 to 1.00	6.00 to 1.00	2.75 to 1.00	1.85 to 1.00
December 31, 2008	4.50 to 1.00	5.50 to 1.00	2.90 to 1.00	2.00 to 1.00
2009				
March 31, 2009 and thereafter	4.50 to 1.00	4.50 to 1.00	2.90 to 1.00	2.90 to 1.00

Note:

(a) Credit Agreement EBITDA is calculated in accordance with the definitions contained in the Company's Senior Secured Credit Agreement. Credit Agreement EBITDA is defined as consolidated net income

before consolidated interest expense, non–cash expenses and charges, total income tax expense, depreciation expense, expense associated with amortization of intangibles and other assets, non–cash provisions for reserves for discontinued operations, extraordinary, unusual or non–recurring gains or losses or charges or credits, gain or loss associated with sale or write–down of assets not in the ordinary course of business, and any income or loss accounted for by the equity method of accounting.

At December 31, 2005, the Company was in compliance with the financial covenants in the Secured Credit Agreement, as amended, and the ratios were as follows:

Consolidated Debt to Credit Agreement EBITDA Leverage Ratio — 6.15 to 1.00

Credit Agreement EBITDA to Consolidated Interest Expense Ratio – 2.18 to 1.00

In addition to the changes to the financial covenants described above, the Second Amendment modifies the pricing for the Senior Secured Term Loan Facility by increasing the applicable margin by 0.25% if, and for so long as, the Company's indebtedness under the Senior Secured Credit Agreement is rated less than B+ by Standard & Poor's Ratings Group (a division of The McGraw Hill Companies Inc.) or less than B1 by Moody's Investors Service, Inc.

If the negative impact of inflationary pressures on key inputs continues, or depressed selling prices, lower sales volumes, increased operating costs or other factors have a negative impact on the Company's ability to increase its profitability, the Company may not be able to maintain its compliance with the financial covenants in its Senior Secured Credit Agreement, as amended. The Company's ability to comply in future periods with the financial covenants in the Senior Secured Credit Agreement will depend on its ongoing financial and operating performance, which in turn will be subject to economic conditions and to financial, business and other factors, many of which are beyond the Company's control and will be substantially dependent on the selling prices for the Company's products, raw material and energy costs, and the Company's ability to successfully implement its overall business strategies, and meet its profitability objective. If a violation of any of the covenants occurred, the Company would attempt to obtain a waiver or an amendment from its lenders, although no assurance can be given that the Company would be successful in this regard. The Senior Secured Credit Agreement and the indentures governing the Senior Subordinated Notes and the Senior Notes have covenants as well as certain cross–default or cross–acceleration provisions; failure to comply with these covenants in any agreement could result in a violation of such agreement which could, in turn, lead to violations of other agreements pursuant to such cross–default or cross–acceleration provisions. If an event of default occurs, the lenders are entitled to declare all amounts owed to be due and payable immediately. The Senior Secured Credit Agreement is collateralized by substantially all of the Company's domestic assets.

NOTE 8 — STOCK INCENTIVE PLANS

The Company has eight equity compensation plans, seven of which were adopted by the Company or Graphic prior to the Merger and are no longer used to make new option grants or equity awards. The Company's only active plan as of December 31, 2005 is the Graphic Packaging Corporation 2004 Stock and Incentive Compensation Plan ("2004 Plan"), pursuant to which the Company may grant stock options, stock appreciation rights, restricted stock, restricted stock units and other types of stock–based awards to employees and directors of the Company. The other plans are the 2003 Riverwood Holding, Inc. Long–Term Incentive Plan ("2003 LTIP"), the 2003 Riverwood Holding, Inc. Directors Stock Incentive Plan ("2003 Directors' Plan"), the Riverwood Holding, Inc. 2002 Stock Incentive Plan ("2002 SIP"), the Riverwood Holding, Inc. Supplemental Long–Term Incentive Plan ("1999 LTIP"), the Riverwood Holding, Inc. Stock Incentive Plan ("1996 SIP"), the Graphic Packaging Equity Incentive Plan ("EIP"), and the Graphic Packaging Equity Compensation Plan for Non–Employee Directors ("Graphic NEDP"). Stock options and other awards granted under all of the Company's plans generally vest and expire in accordance with terms established at the time of grant.

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

Stock Options

The Company applies APB Opinion No. 25 "Accounting for Stock Issued to Employees," and related interpretations in accounting for stock options issued under its plans. Accordingly, the Company recognizes compensation expense for stock options when the exercise price is less than the related fair value at the date of grant or when the performance criteria is met. The Company did not grant any options in 2005 and accelerated the vesting of all options in December 2005. The weighted average fair value of stock options is estimated to be $2.73 per option as of the date of grant for stock options granted in 2004. The Company used the Black–Scholes option pricing model to value stock options with the following assumptions: dividend yield of zero, expected volatility ranging from 0% to 74%, risk–free interest rates ranging from 4.23% to 6.75%, a zero forfeiture rate and an expected life of 3 to 10 years. The weighted average contractual life of the options outstanding at December 31, 2005 is 5.4 years.

The following table summarizes information pertaining to stock options outstanding and exercisable at December 31, 2005. No options have been granted under the 2004 Plan or the 2003 Director's Plan, so these plans have been omitted from the table.

Plan	Shares Subject to Options	Weighted Avg. Exercise Price	Shares Subject to Exercisable Options	Weighted Avg. Exercise Price
2003 LTIP	1,694,605	$ 5.70	1,694,605	$ 5.70
2002 SIP	6,503,948	7.88	6,503,948	7.88
1999 LTIP	848,599	6.57	848,599	6.57
1996 SIP	3,898,448	5.20	3,898,448	5.20
EIP	2,983,462	7.44	2,983,462	7.44
Graphic NEDP	15,277	7.37	15,277	7.37
Total	15,944,339	$ 6.84	15,944,339	$ 6.84

As of December 31, 2004 and 2003, there were exercisable options in the amount of 11,247,769 and 9,666,720, respectively.

A summary of option activity during the three years ended December 31, 2005 is as follows:

	Shares	Exercise Price
Outstanding — December 31, 2002	16,866,642	$ 6.98
Granted	2,098,178	$ 6.16
Exercised	(100,000)	$ 1.56
Canceled	(7,231,741)	$ 5.54
Assumed From Merger	5,476,836	$ 5.90
Outstanding — December 31, 2003	17,109,915	$ 7.17
Granted	62,500	$ 4.60
Exercised	(149,828)	$ 2.63
Canceled	(364,691)	$ 6.56
Outstanding — December 31, 2004	16,657,896	$ 6.81
Canceled	(713,557)	$ 6.17
Outstanding — December 31, 2005	15,944,339	$ 6.84

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

Restricted Stock Units and Other Stock–Based Awards

The 2004 Plan and 2003 LTIP provide for restricted stock awards (shares or stock units ("RSUs")). All restricted stock awards vest and become unrestricted in one to five years from date of grant. Upon vesting, RSUs granted in 2005 are 50% payable in cash and 50% in shares of common stock. All other RSUs are payable in shares of common stock.

Data concerning restricted stock awards follows:

	2005	2004	2003
	(Shares in thousands)		
RSUs — employees	506	38	3,226
Weighted–average price per share	$ 4.84	$ 4.70	$ 4.05
Restricted shares — Board of Directors	67	60	16
Weighted–average price per share	$ 3.59	$ 5.72	$ 4.70

The value of restricted stock units is based on the market value of the Company's common stock at date of grant. The shares payable in cash are subject to variable accounting and marked to market accordingly. Both components are recorded as a liability.

The value of restricted stock awards is based on the market value of the Company's common stock at the date of grant and recorded at the date of the award as unearned compensation on restricted stock in a separate component of stockholders' equity.

During 2005, 2004 and 2003, $4.0 million, $4.1 million and $1.4 million, respectively was charged to compensation expense.

During 2005 and 2004, the Company also issued 23,071 and 8,030 shares of phantom stock, respectively, representing deferred compensation by one of its directors. These shares of phantom stock vest on the first anniversary of the date of grant and are payable upon termination of service. The Company also has an obligation to issue 195,288 shares in payment of employee deferred compensation.

NOTE 9 — LEASES AND PURCHASE OBLIGATIONS

The Company leases certain warehouse facilities, office space, data processing equipment and plant equipment under long–term, non–cancelable contracts that expire at various dates. At December 31, 2005, total minimum rental payments under these leases were as follows:

	(Amounts in Millions)
Year ended December 31,	
2006	$ 12.5
2007	7.5
2008	5.4
2009	4.6
2010	3.8
Thereafter	12.6
	$ 46.4

Total rental expense was approximately $14.1 million, $13.6 million and $11.8 million for the years ended December 31, 2005, 2004 and 2003, respectively.

The Company has entered into other long–term contracts principally for the purchase of fiber and electricity. The minimum purchase commitments extend beyond 2010. Commitments under these contracts are

approximately $52.4 million in 2006, $42.7 million in 2007, $41.5 million in 2008, $41.0 million in 2009 and $40.5 million in 2010. Total commitments beyond the year 2010 are $226.0 million.

NOTE 10 — ENVIRONMENTAL AND LEGAL MATTERS

Environmental Matters

The Company is subject to a broad range of foreign, federal, state and local environmental, health and safety laws and regulations that change from time to time, including those governing discharges to air, soil and water, the management, treatment and disposal of hazardous substances, solid waste and hazardous wastes, the investigation and remediation of contamination resulting from historical site operations and releases of hazardous substances, and the health and safety of employees. Compliance initiatives could result in significant costs, which could negatively impact the Company's financial position, results of operations or cash flows. Any failure to comply with such laws and regulations or any permits and authorizations required thereunder could subject the Company to fines, corrective action or other sanctions.

In addition, some of the Company's current and former facilities are the subject of environmental investigations and remediations resulting from historical operations and the release of hazardous substances or other constituents. Some current and former facilities have a history of industrial usage for which investigation and remediation obligations may be imposed in the future or for which indemnification claims may be asserted against the Company. Also, potential future closures or sales of facilities may necessitate further investigation and may result in future remediation at those facilities.

The Company has established reserves for those facilities or issues where liability is probable and the costs are reasonably estimable. The Company believes that the amounts accrued for all of its loss contingencies, and the reasonably possible loss beyond the amounts accrued, are not material to the Company's financial position, results of operations or cash flows. The Company cannot estimate with certainty future compliance, investigation or remediation costs, all of which the Company currently considers to be remote. Costs relating to historical usage or indemnification claims that the Company considers to be reasonably possible are not quantifiable at this time. The Company will continue to monitor environmental issues at each of its facilities and will revise its accruals, estimates and disclosures relating to past, present and future operations as additional information is obtained.

Legal Matters

The Company is a party to a number of lawsuits arising in the ordinary conduct of its business. Although the timing and outcome of these lawsuits cannot be predicted with certainty, the Company does not believe that disposition of these lawsuits will have a material adverse effect on the Company's consolidated financial position, results of operations or cash flows.

NOTE 11 — PENSIONS

U.S. PENSION PLANS

The Company maintains defined benefit pension plans for its U.S. employees. Benefits are based on years of service and average base compensation levels over a period of years. The Company's funding policies with respect to its U.S. pension plans are to contribute funds to trusts as necessary to at least meet the minimum funding requirements of the U.S. Internal Revenue Code. Plan assets are invested in equities and fixed income securities.

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

(A) PENSION EXPENSE

The pension expense related to the U.S. plans consisted of the following:

	Year Ended December 31, 2005	Year Ended December 31, 2004	Year Ended December 31, 2003
		(Amounts in millions)	
Components of Net Periodic Pension Cost:			
Service Cost	$ 14.5	$ 14.1	$ 9.3
Interest Cost	30.8	28.9	21.4
Expected Return on Plan Assets	(30.8)	(29.3)	(31.2)
Amortizations:			
Prior Service Cost	2.6	2.6	1.6
Actuarial Loss	3.3	2.4	14.6
Special One Time Benefit	1.2	—	—
Curtailment Loss	0.4	—	—
Net Periodic Pension Cost	$ 22.0	$ 18.7	$ 15.7

A special one time benefit expense of $1.2 million was recorded for those plan participants at one of the Company's facilities who elected to take early retirement with unreduced benefits. In addition, a curtailment charge of $0.4 million, for the write–off of prior service costs, was recorded relating to the closure of the Clinton facility.

Certain assumptions used in determining the pension expense were as follows:

	Year Ended December 31, 2005	Year Ended December 31, 2004	Year Ended December 31, 2003
Weighted Average Assumptions:			
Discount Rate	6.00%	6.25%	6.50%
Rate of Increase in Future Compensation Levels	4.50%	4.50%	4.42%
Expected Long–Term Rate of Return on Plan Assets	8.25%	8.25%	8.41%

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

(B) FUNDED STATUS

The following table sets forth the funded status of the U.S. pension plans as of December 31:

	2005	2004
	(Amounts in millions)	
Change in Benefit Obligation:		
Benefit Obligation at Beginning of Year	$ 514.7	$ 469.5
Service Cost	14.5	14.1
Interest Cost	30.8	28.9
Actuarial Loss	36.9	18.9
Special One Time Benefit	1.2	—
Amendments	(1.1)	3.3
Benefits Paid	(22.0)	(20.0)
Benefit Obligation at End of Year	$ 575.0	$ 514.7
Change in Plan Assets:		
Fair Value of Plan Assets at Beginning of Year	$ 376.6	$ 360.9
Actual Return on Plan Assets	19.5	35.4
Employer Contributions	17.7	0.3
Benefits Paid	(22.0)	(20.0)
Fair Value of Plan Assets at End of Year	$ 391.8	$ 376.6
Plan Assets Less than Projected Benefit Obligation	$ (183.2)	$ (138.1)
Unrecognized Net Actuarial Loss	96.6	51.1
Unrecognized Prior Service Cost	7.4	12.1
Net Amount Recognized	$ (79.2)	$ (74.9)
Amounts Recognized in the Consolidated Balance Sheets Consist of:		
Pension Intangible Asset	$ 8.2	$ 10.7
Accrued Pension Liability	(160.8)	(128.0)
Accumulated Other Comprehensive Income(a)	73.4	42.4
Net Amount Recognized	$ (79.2)	$ (74.9)
Weighted Average Assumptions:		
Discount Rate	5.75%	6.00%
Rates of Increase in Future Compensation Levels	4.50%	4.50%

Note:

(a) During 2005 and 2004, the Company recorded a charge to Other Comprehensive Loss of $31.0 million and $6.4 million in its Consolidated Statements of Comprehensive Loss due to market conditions.

The accumulated benefit obligation for all defined benefit plans was $551.0 million and $487.8 million at December 31, 2005 and 2004, respectively.

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

For plans with accumulated benefit obligations in excess of plan assets, at December 31, the projected benefit obligation, accumulated benefit obligation and fair value of the plan assets were:

	2005	2004
	(Amounts in millions)	
Projected Benefit Obligation	$ 575.0	$ 514.7
Accumulated Benefit Obligation	$ 551.0	$ 487.8
Fair Value of Plan Assets	$ 391.8	$ 376.6

The Company's approach to developing its expected long–term rate of return on pension plan assets combines an analysis of historical investment performance by asset class, the Company's investment guidelines and current and expected economic fundamentals.

The Company's retirement plan asset allocation at December 31, 2005 and 2004 and target allocation for 2006 by asset category are as follows:

	Target Allocation 2006	Percentage of Plan Assets at December 31, 2005	2004
Asset Category:			
Equity Securities	60.0%	62.7%	63.8%
Debt Securities	40.0%	37.1%	36.1%
Cash	—	0.2%	0.1%
Total	100.0%	100.0%	100.0%

Active management of assets is used in asset classes and strategies where there is a potential to add value over a passive benchmark. Investment risk is measured and monitored on an on–going basis through annual liability measurements, periodic asset/liability studies, and quarterly investment portfolio reviews.

At December 31, 2005 and 2004, pension investments did not include any direct investments in the Company's stock or the Company's debt.

During 2005 and 2004, the Company made $17.7 million and $0.3 million, respectively of contributions to its U.S. pension plans. For 2006, the Company expects to make contributions of approximately $27 million.

The following represents the Company's estimated future benefit payments through the year 2015:

Year	(Amounts in Millions)
2006	$ 24.2
2007	$ 25.8
2008	$ 27.5
2009	$ 29.6
2010	$ 31.9
2011 — 2015	$ 193.1

INTERNATIONAL PENSION PLANS

(A) PENSION EXPENSE

The Company maintains international defined benefit pension plans that are both noncontributory and contributory and are funded in accordance with applicable local laws. The pension or termination benefits are based primarily on years of service and the employees' compensation.

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

The pension expense related to the international plans consisted of the following:

	Year Ended December 31, 2005	Year Ended December 31, 2004	Year Ended December 31, 2003
		(Amounts in millions)	
Components of Net Periodic Pension Cost:			
Service Cost	$ 0.5	$ 0.6	$ 0.1
Interest Cost	6.3	6.4	5.3
Expected Return on Plan Assets	(7.1)	(5.9)	(4.7)
Amortizations:			
Actuarial Loss	0.6	0.8	0.5
Net Periodic Pension Cost	$ 0.3	$ 1.9	$ 1.2
Assumptions:			
Discount Rate	5.25%	5.50%	5.50%
Rates of Increase in Future Compensation Levels	0.00%	0.00%	0.00%
Expected Long-Term Rate of Return on Plan Assets	7.00%	6.25%	6.00%

Approximately 340 employees participate in a multi-employer pension plan that provides defined benefits to employees under certain union-employer organization agreements. Pension expense for this plan was $5.4 million, $5.6 million and $5.0 million for the years ended December 31, 2005, 2004 and 2003, respectively.

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

(B) FUNDED STATUS

The following table sets forth the funded status of the international pension plans as of December 31:

	2005	2004
	(Amounts in millions)	
Change in Benefit Obligation:		
Benefit Obligation at Beginning of Year	$ 129.1	$ 115.9
Service Cost	0.5	0.6
Interest Cost	6.3	6.4
Actuarial Loss	10.1	3.1
Foreign Exchange Translation	(13.7)	8.8
Expenses Paid	(0.5)	(0.6)
Benefits Paid	(5.3)	(5.1)
Benefit Obligation at End of Year	$ 126.5	$ 129.1
Change in Plan Assets:		
Fair Value of Plan Assets at Beginning of Year	$ 109.3	$ 93.0
Actual Return on Plan Assets	20.7	10.3
Foreign Exchange Translation	(12.1)	7.3
Expenses Paid	(0.5)	(0.6)
Employer Contribution	1.9	4.4
Benefits Paid	(5.3)	(5.1)
Fair Value of Plan Assets at End of Year	$ 114.0	$ 109.3
Plan Assets Less Than Projected Benefit Obligation	$ (12.5)	$ (19.8)
Unrecognized Net Actuarial Loss	16.6	22.7
Net Amount Recognized	$ 4.1	$ 2.9
Amounts Recognized in the Consolidated Balance Sheets Consist of:		
Accrued Pension Liability	$ (12.5)	$ (19.8)
Accumulated Other Comprehensive Income(a)	16.6	22.7
Net Amount Recognized	$ 4.1	$ 2.9
Weighted Average Assumptions:		
Discount Rate	4.80%	5.25%
Rates of Increase in Future Compensation Levels	0.00%	0.00%

Note:

(a) During 2005 and 2004, the Company recorded a credit to Other Comprehensive Loss of approximately $6.1 million and $1.5 million in its Consolidated Statements of Comprehensive Loss due to market conditions.

The accumulated benefit obligation for the Company's international defined benefit plan was $122.4 million and $129.1 million at December 31, 2005 and 2004, respectively.

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

The Company's approach to developing its expected long–term rate of return on pension plan assets combines an analysis of historical investment performance by asset class, the Company's investment guidelines and current and expected economic fundamentals. The Company's retirement plan asset allocation at December 31, 2005 and 2004 and target allocation for 2006 by asset category are as follows:

	Target Allocation	Percentage of Plan Assets at December 31,	
	2006	2005	2004
Asset Category:			
Equity Securities	70.0%	71.0%	69.8%
Debt Securities	30.0%	27.4%	28.7%
Cash	—	1.6%	1.5%
Total	100.0%	100.0%	100.0%

Active management of assets is used in asset classes and strategies where there is a potential to add value over a passive benchmark. Investment risk is measured and monitored on an on–going basis through annual liability measurements, periodic asset/liability studies, and quarterly investment portfolio reviews.

During 2005 and 2004, the Company made $1.9 million and $4.4 million, respectively of contributions to its international pension plan. For 2006, the Company expects to make contributions of approximately $2 million.

The following represents the Company's estimated future benefit payments through the year 2015:

Year	(Amounts in Millions)
2006	$ 4.7
2007	$ 4.5
2008	$ 4.7
2009	$ 4.8
2010	$ 4.8
2011 — 2015	$ 26.3

DEFINED CONTRIBUTION PLANS

The Company provides defined contribution plans for eligible U.S. employees. The Company's contributions to the plans are based upon employee contributions and the Company's annual operating results. Contributions to these plans for the years ended December 31, 2005, 2004 and 2003 were $8.2 million, $7.3 million and $4.3 million, respectively.

NOTE 12 — OTHER POSTRETIREMENT BENEFITS

The Company sponsors postretirement health care plans that provide medical and life insurance coverage to eligible salaried and hourly retired U.S. employees and their dependents. No postretirement medical benefits are offered to the Company's salaried employees who began employment after December 31, 1993 or to Graphic employees hired after June 15, 1999.

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

The other postretirement benefits expense consisted of the following:

	Year Ended December 31, 2005	Year Ended December 31, 2004	Year Ended December 31, 2003
		(Amounts in millions)	
Service Cost	$ 0.9	$ 0.9	$ 0.7
Interest Cost	2.3	2.8	2.5
Amortizations:			
Prior Service Cost	0.1	(0.2)	(0.2)
Actuarial (Gain) loss	(0.2)	0.4	0.7
Net Periodic Postretirement Benefits Cost	$ 3.1	$ 3.9	$ 3.7
Weighted Average Assumptions:			
Discount Rate	5.8%	6.0%	6.5%
Initial Health Care Cost Trend Rate	8.5%	9.0%	9.1%
Ultimate Health Care Cost Trend Rate(a)	5.0%	5.0%	5.0%
Ultimate Year(a)	2012	2012	2007

Note:

(a) The Company's salaried plan's cost was capped beginning in 1999.

The accrued postretirement benefit obligation at December 31 was as follows:

	2005	2004
	(Amounts in millions)	
Change in Benefit Obligation:		
Benefit Obligation at Beginning of Year	$ 50.2	$ 55.0
Service Cost	0.9	0.9
Interest Cost	2.3	2.8
Actuarial Gain	(6.9)	(1.9)
Amendments	1.4	—
Benefits Paid	(3.4)	(2.8)
Impact of Medicare Rx	—	(3.8)
Benefit Obligation at End of Year	$ 44.5	$ 50.2
Fair Value of Plan Assets at End of Year	—	—
Accumulated Postretirement Benefit Obligation in Excess of Plan Assets	$ (44.5)	$ (50.2)
Unrecognized Net Actuarial (Gain)/Loss	(1.3)	6.3
Unrecognized Prior Service Cost/(Credit)	0.3	(1.1)
Total Accrued Postretirement Benefit Obligation, net	$ (45.5)	$ (45.0)
Weighted Average Assumptions:		
Discount Rate	5.65%	5.75%
Initial Health Care Cost Trend Rate	9.00%	8.50%
Ultimate Health Care Cost Trend Rate(a)	5.00%	5.00%
Ultimate Year(a)	2014	2012

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

	2005	
	1 Percentage Point Increase	1 Percentage Point Decrease
Health Care Trend Rate Sensitivity:		
Effect on Total of Interest and Service Cost Components	$ 0.2	$ (0.2)
Effect on Year-End Postretirement Benefit Obligation	$ 2.4	$ (2.1)

Note:

(a) The Company's salaried plan assumes no future increases in employer subsidies.

In December 2003, President Bush signed into law the Medicare Prescription Drug, Improvement and Modernization Act of 2003 (the "Act"). The Act expands Medicare primarily by adding a prescription drug benefit for Medicare-eligible individuals beginning in 2006. The Act has not and is not expected to have a material impact on the Company's financial position and results of operations.

The Company made benefit payments of $2.6 million during 2005. The Company estimates its postretirement benefit payments through 2015 to be:

Year	(Amounts in Millions)
2006	$ 2.9
2007	$ 2.9
2008	$ 2.9
2009	$ 3.0
2010	$ 3.1
2011 — 2015	$ 17.0

NOTE 13 — INCOME TAXES

The U.S. and international components of Loss before Income Taxes and Equity in Net Earnings of Affiliates consisted of the following:

	Year Ended Dec. 31, 2005	Year Ended Dec. 31, 2004	Year Ended Dec. 31, 2003
		(Amounts in millions)	
U.S.	$ (60.7)	$ (35.4)	$ (93.2)
International	(8.3)	2.0	10.5
Loss before Income Taxes and Equity in Net Earnings of Affiliates	$ (69.0)	$ (33.4)	$ (82.7)

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

The provisions for Income Tax (Expense) Benefit on Loss before Income Taxes and Equity in Net Earnings of Affiliates consisted of the following:

	Year Ended Dec. 31, 2005	Year Ended Dec. 31, 2004	Year Ended Dec. 31, 2003
		(Amounts in millions)	
Current			
U.S. Federal	$ 0.2	$ —	$ —
U.S. State and Local	—	(0.5)	—
International	1.0	(4.8)	(2.5)
Total Current	1.2	(5.3)	(2.5)
Deferred			
U.S.	(19.5)	(19.1)	(12.8)
International	(5.0)	(4.5)	1.0
Income Tax Expense	$ (23.3)	$ (28.9)	$ (14.3)

A reconciliation of Income Tax Expense on Loss before Income Taxes and Equity in Net Earnings of Affiliates at the federal statutory rate of 35% compared with the Company's actual Income Tax Expense is as follows:

	Year Ended Dec. 31, 2005 (Amounts in millions)	Percent	Year Ended Dec. 31, 2004 (Amounts in millions)	Percent	Year Ended Dec. 31, 2003 (Amounts in millions)	Percent
Benefit income tax at U.S. statutory rate	$ 24.2	35.0%	$ 11.7	35.0%	$ 28.9	35.0%
U.S. state and local tax benefit	1.3	1.9	1.2	3.6	3.3	4.0
Valuation allowance on current year benefit	(25.4)	(36.8)	(16.6)	(49.7)	(38.4)	(46.4)
International tax rate differences	(0.2)	(0.3)	0.1	0.3	0.4	0.5
Valuation allowance adjustment	(6.1)	(8.8)	(3.2)	(9.6)	3.9	4.7
Amortization of goodwill	(19.5)	(28.3)	(19.1)	(57.2)	(12.8)	(15.5)
Foreign withholding tax	(0.1)	(0.1)	(0.4)	(1.2)	(0.4)	(.5)
Adjustment to tax contingencies	2.5	3.6	(2.5)	(7.5)	—	—
Other	—	—	(0.1)	(0.3)	0.8	0.9
Income Tax Expense	$ (23.3)	(33.8%)	$ (28.9)	(86.6%)	$ (14.3)	(17.3%)

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

The tax effects of differences that give rise to significant portions of the deferred tax assets and deferred tax liabilities as of December 31, were as follows:

	2005	2004
	(Amounts in millions)	
Short-term deferred tax assets		
Compensation based accruals	$ 17.0	$ —
Other	4.6	—
Valuation allowance	(8.5)	—
Net short-term deferred tax assets	$ 13.1	$ —
Long-term deferred tax assets		
Net operating loss carryforwards	451.3	516.8
Pension accrual	62.5	—
Tax credits	24.9	—
Other	55.7	69.7
Valuation allowance	(243.6)	(221.7)
Net long-term deferred tax assets	$ 350.8	$ 364.8
Long-term deferred tax liabilities		
Property, plant and equipment	$ (325.4)	$ (370.3)
Goodwill	(89.3)	(69.7)
Other intangibles	(41.3)	—
Other	(5.5)	—
Total long-term deferred tax liabilities	$ (461.5)	$ (440.0)
Net deferred tax liability	$ (97.6)	$ (75.2)

The Company has reviewed the net deferred tax assets as of both December 31, 2005 and 2004, respectively, and determined that t is more likely than not that some or all of the net deferred tax assets will not be realized. The need for a valuation allowance is made on a country-by-country basis and the amount of the valuation allowance has increased as of December 31, 2005, over 2004 primarily due to operating activities in various countries in 2005 and changes in deferred tax balances. As of December 31, 2005 the Company has concluded that due to difficulty in maintaining profitability and the lack of sufficient future taxable income of the appropriate character, realization is less than more likely than not on the deferred tax assets related primarily to the Company's Brazil, Germany and the United Kingdom operations and as a result, a valuation allowance of $6.1 million for these operations was accrued in 2005. The valuation allowance of $252.1 million and $221.7 million at December 31, 2005 and 2004, respectively, is maintained on the remaining net deferred tax assets for which the Company has not determined that realization is more likely than not.

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

The U.S. federal net operating loss carryforward amount totals $1,218.6 million and expires as follows:

Year	Amounts in Millions
2012	$ 378.5
2018	295.0
2019	196.8
2021	144.2
2022	72.1
2023	122.0
2025	10.0

International net operating loss carryforward amounts total $60.5 million of which $1.0 million expire through 2020 and $59.5 million have no expiration date.

As of December 31, 2005, the Company, in accordance with APB Opinion 23, Accounting for Income Taxes, Special Areas, has determined that $71.5 million of undistributed foreign earnings are not intended to be reinvested indefinitely by its non–U.S. subsidiaries. Deferred income tax was recorded as a reduction to the Company's net operating losses on these undistributed earnings as well as the financial statement carrying value in excess of tax basis in the amount of $35.8 million. As of December 31, 2004, the Company had determined that $71.8 million of undistributed foreign earnings were not intended to be reinvested indefinitely. Deferred income tax was recorded as a reduction to the Company's net operating losses on these undistributed earnings as well as the financial statement carrying value in excess of tax basis in the amount of $48.8 million. Prior to 2004, the Company's intent was to permanently reinvest its foreign earnings. It is not practicable to determine the amount of unrecognized deferred U.S. income tax liability on these unremitted earnings. The Company periodically determines whether the non–U.S. subsidiaries will invest their undistributed earnings indefinitely and reassesses this determination as appropriate. The Company has determined that it is not beneficial to utilize the temporary incentive related to the repatriation of earnings accumulated outside the U.S. as provided in the American Jobs Creation Act of 2004.

NOTE 14 — LOSS ON EARLY EXTINGUISHMENT OF DEBT

In 2003 and in connection with the Merger, the Company recorded a non–cash charge to earnings of $16.7 million, related to the write–off of remaining debt issuance costs on its prior senior secured credit facilities and the Prior RIC Notes and also recorded a charge of $28.6 million, related to the call premium paid upon redemption of the Prior RIC Notes.

NOTE 15 — FINANCIAL INSTRUMENTS, DERIVATIVES AND HEDGING ACTIVITIES

The Company is exposed to fluctuations in interest rates on its variable debt, fluctuations in foreign currency transaction cash flows and variability in cash flows attributable to certain commodity purchases. The Company actively monitors these fluctuations and periodically uses derivatives and other financial instruments to hedge exposures to interest, currency and commodity risks. The Company's use of derivative instruments may result in short–term gains or losses and may increase volatility in its earnings. In addition, these instruments involve, to varying degrees, elements of market and credit risk in excess of the amounts recognized in the Consolidated Balance Sheets. The Company does not trade or use derivative instruments with the objective of earning financial gains on interest or currency rates, nor does it use leveraged instruments or instruments where there are no underlying exposures identified.

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

Interest Rate Risk

The Company uses interest rate swaps to manage interest rate risks on future income caused by interest rate changes on its variable rate Term Loan facility. The differential to be paid or received under these agreements is recognized as an adjustment to interest expense related to the debt. At December 31, 2005, the Company had interest rate swap agreements with a notional amount of $660 million, which expire on various dates from 2006 to 2008 under which the Company will pay fixed rates of 2.69% to 4.53% and receive three–month LIBOR.

During 2005, there was no ineffective portion related to changes in the fair value of the interest rate swap agreements. Additionally, there were no amounts excluded from the measure of effectiveness.

During 2004, there was approximately $2.5 million determined to be the ineffective portion related to changes in the fair value of the interest rate swap agreements. Additionally, there were no amounts excluded from the measure of effectiveness.

Commodity Risk

To manage risks associated with future variability in cash flows and price risk attributable to certain commodity purchases, the Company entered into natural gas swap contracts to hedge prices for a significant portion of its natural gas requirements through December 2006 with a weighted average contractual rate of $11.24 per MMBTU. Such contracts are designated as cash flow hedges. When a contract matures, the resulting gain or loss is reclassified into Cost of Sales concurrently with the recognition of the commodity purchased. The ineffective portion of the swap contracts change in fair value, if any, would be recognized immediately in earnings. During 2005, there was a minimal amount of ineffective portion related to changes in fair value of natural gas swap contracts. Additionally, there were no amounts excluded from the measure of effectiveness. During 2004, there was no material ineffective portion related to changes in fair value of natural gas swap contracts. Additionally, there were no amounts excluded from the measure of effectiveness.

Foreign Currency Risk

The Company enters into forward exchange contracts to manage risks associated with future variability in cash flows resulting from anticipated foreign currency transactions that may be adversely affected by changes in exchange rates. Gains/losses, if any, related to these contracts are recognized in income when the anticipated transaction affects income.

At December 31, 2005 and 2004, multiple forward exchange contracts existed that expire on various dates throughout 2006. Those purchased forward exchange contracts outstanding at December 31, 2005, when measured in U.S. dollars at December 31, 2005 exchange rates, had notional amounts totaling $125.6 million. Those purchased forward exchange contracts outstanding at December 31, 2004, when measured in U.S. dollars at December 31, 2004 exchange rates, had notional amounts totaling $154.8 million.

No amounts were reclassified to earnings during 2005 or 2004 in connection with forecasted transactions that were no longer considered probable of occurring and there was no amount of ineffective portion related to changes in the fair value of foreign currency forward contracts. Additionally, there were no amounts excluded from the measure of effectiveness.

Derivatives not Designated as Hedges

The Company enters into forward exchange contracts to effectively hedge a portion of accounts receivable resulting from transactions denominated in foreign currencies in order to manage risks associated with foreign currency transactions adversely affected by changes in exchange rates. At December 31, 2005 and 2004, multiple foreign currency forward exchange contracts existed, with maturities ranging up to three and six

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

months, respectively. Those forward currency exchange contracts outstanding at December 31, 2005, when aggregated and measured in U.S. dollars at December 31, 2005 exchange rates, had net notional amounts totaling $3.0 million. Those forward currency exchange contracts outstanding at December 31, 2004, when aggregated and measured in U.S. dollars at December 31, 2004 exchange rates, had net notional amounts totaling $12.8 million. Generally, unrealized gains and losses resulting from these contracts are recognized in operations and approximately offset corresponding unrealized gains and losses recognized on the hedged accounts receivable. These contracts are presently being and will continue to be marked to market through the income statement.

Foreign Currency Movement Effect

Net international currency exchange losses included in determining Income from Operations for the years ended December 31, 2005, 2004 and 2003 were $6.3 million, $4.6 million and $1.3 million, respectively.

Accumulated Derivative Instruments Gain (Loss)

The following is a reconciliation of changes in the fair value of the interest rate swap agreements, natural gas swaps and foreign currency forward contracts which have been recorded as Accumulated Derivative Instruments Gain (Loss) in the accompanying Consolidated Balance Sheets at December 31, 2005 and 2004, and as Derivative Instruments Income (Loss) in the accompanying Consolidated Statements of Comprehensive Loss for years ended December 31, 2005, 2004 and 2003.

	2005	2004	2003
	(Amounts in millions)		
Balance at January 1	$ (9.0)	$ (12.7)	$ (6.1)
Reclassification to earnings	(11.4)	(6.7)	(5.0)
Current period change in fair value	25.6	10.4	(1.6)
Balance at December 31	$ 5.2	$ (9.0)	$ (12.7)

The balance recorded in Accumulated Derivative Instruments Gain (Loss) at December 31, 2005 is expected to be reclassified into future earnings, contemporaneously with and offsetting changes in the related hedged exposure. The actual amount that will be reclassified to future earnings over the next twelve months may vary from this amount as a result of changes in market conditions.

Fair Value of Financial Instruments

The following methods and assumptions were used to estimate the fair value of each category of financial instrument for which it is practicable to estimate that value:

- Other Receivables and Short–Term Borrowings

The carrying amount of these instruments approximates fair value due to their short–term nature.

- Long–Term Debt

The fair value of long–term debt is based on quoted market prices.

- Forward Exchange Contracts

The fair value of forward exchange contracts is based on quoted market prices by counter parties.

- Interest Rate Swap Contracts

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

The fair value of interest rate swap contracts is based on quoted market prices by counter parties.

- Natural Gas Swap Contracts

The fair value of natural gas swap contracts is based on quoted market prices by counter parties.

The carrying amounts and estimated fair value of the Company's financial instruments as of December 31 were as follows:

	2005		2004	
	Carrying Amounts	Fair Value	Carrying Amounts	Fair Value
	(Amounts in millions)			
Other receivables	$ 18.7	$ 18.7	$ 10.9	$ 10.9
Short-term borrowings	9.8	9.8	13.4	13.4
Long-term debt	1,968.5	1,969.6	2,011.8	2,130.5
Currency forward exchange contracts	2.2	2.2	(8.0)	(8.0)
Interest rate swap contracts	5.2	5.2	2.7	2.7
Natural gas swap contracts	(1.2)	(1.2)	(1.6)	(1.6)

NOTE 16 — BUSINESS SEGMENT AND GEOGRAPHIC AREA INFORMATION

The Company reports its results in two business segments: paperboard packaging and containerboard/other. These segments are evaluated by the chief operating decision maker based primarily on income from operations. The Company's reportable segments are based upon strategic business units that offer different products. The paperboard packaging business segment includes the production and sale of paperboard for its beverage multiple packaging and consumer products packaging businesses from its West Monroe, Louisiana, Macon, Georgia, Kalamazoo, Michigan and Norrköping, Sweden mills; carton converting facilities in the United States, Europe, Brazil and Canada; and the design, manufacture and installation of packaging machinery related to the assembly of cartons. The containerboard/other business segment primarily includes the production and sale of linerboard, corrugating medium and kraft paper from paperboard mills in the United States.

The Company's customers are not concentrated in any specific geographic region, but are concentrated in certain industries. Customers of the Paperboard Packaging business segment include the beverage and consumer products packaging industries. Customers of the Containerboard/Other business segment include integrated and non-integrated containerboard converters. During 2005 or 2004, the Company did not have any one customer who accounted for 10% or more of the Company's net sales. During 2003, the Company had one customer who accounted for approximately 11% of the Company's net sales.

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

Business segment information is as follows:

	Year Ended December 31, 2005	Year Ended December 31, 2004	Year Ended December 31, 2003
		(Amounts in millions)	
NET SALES:			
Paperboard Packaging	$ 2,297.8	$ 2,291.2	$ 1,600.6
Containerboard/Other	86.2	95.3	82.7
	$ 2,384.0	$ 2,386.5	$ 1,683.3
INCOME (LOSS) FROM OPERATIONS:			
Paperboard Packaging	$ 161.7	$ 211.3	$ 169.8
Containerboard/Other	(16.1)	(21.6)	(27.3)
Corporate(a)	(58.7)	(74.1)	(36.4)
	$ 86.9	$ 115.6	$ 106.1
CAPITAL EXPENDITURES:			
Paperboard Packaging	$ 84.0	$ 125.1	$ 123.5
Containerboard/Other	1.6	2.0	2.3
Corporate	10.0	10.7	10.8
	$ 95.6	$ 137.8	$ 136.6
DEPRECIATION AND AMORTIZATION:			
Paperboard Packaging	$ 172.3	$ 176.0	$ 124.6
Containerboard/Other	11.0	15.1	13.5
Corporate	22.0	37.8	22.3
	$ 205.3	$ 228.9	$ 160.4

	2005	2004
	(Amounts in millions)	
ASSETS AT DECEMBER 31:		
Paperboard Packaging(b)	$ 2,762.1	$ 2,852.1
Containerboard/Other(b)	116.9	153.4
Corporate(c)	477.0	459.8
	$ 3,356.0	$ 3,465.3

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

Business geographic area information is as follows:

	Year Ended December 31, 2005	Year Ended December 31, 2004	Year Ended December 31, 2003
		(Amounts in millions)	
NET SALES:			
United States/North America	$ 2,034.2	$ 2,021.6	$ 1,350.2
Central/South America	17.8	17.9	16.6
Europe	343.3	366.2	340.9
Asia Pacific	128.4	133.3	118.8
Eliminations(d)	(139.7)	(152.5)	(143.2)
	$ 2,384.0	$ 2,386.5	$ 1,683.3
INCOME (LOSS) FROM OPERATIONS:			
United States/North America	$ 73.1	$ 86.4	$ 73.4
Central/South America	(3.2)	(5.0)	(3.4)
Europe	6.9	22.3	25.2
Asia Pacific	12.9	14.9	14.9
Eliminations(d)	(2.8)	(3.0)	(4.0)
	$ 86.9	$ 115.6	$ 106.1

	2005	2004
	(Amounts in millions)	
ASSETS AT DECEMBER 31:		
United States/North America	$ 2,667.0	$ 2,751.2
Central/South America	14.3	15.4
Europe	167.4	195.8
Asia Pacific	30.3	43.1
Corporate(c)	477.0	459.8
	$ 3,356.0	$ 3,465.3

Notes:

(a) Primarily consists of unallocated general corporate expenses.

(b) Certain mill assets are allocated based on production.

(c) Corporate assets are principally cash and equivalents, other current assets, deferred tax assets, deferred loan costs and a portion of property, plant and equipment.

(d) Represents primarily the elimination of intergeographic sales and profits from transactions between the Company's U.S., Europe, Asia Pacific and Central/South America operations.

NOTE 17 — RESTRUCTURING CHARGES

The Company adopted a plan in the first quarter of 2004 to restructure its operations by closing facilities, relocating equipment and severing employees in an effort to better position the Company to operate in the

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

current business environment. The restructuring activities described herein affect only the paperboard packaging segment. Components of the restructuring charges for 2004 are as follows:

	Year Ended Dec. 31, 2004 (Amounts in millions)
Restructuring Charges:	
Equipment Removal Costs	$ 1.4
Facility Restoration and Carrying Costs	0.7
Severance of Employees and Other Employee Termination–Related Charges	4.2
Total Restructuring Charges	$ 6.3

The initial purchase price allocation of $7.2 million recorded at March 31, 2004 was reduced by $0.9 million in the second quarter of 2004 primarily for facility restoration and carrying costs as a building was sold sooner than anticipated and by $1.0 million in the fourth quarter of 2005 for a change in estimate for certain severance and other employee related termination costs. Through December 31, 2005 the Company has made payments for severance and other employee termination–related charges in the amount of $2.6 million and for equipment removal and facilities restoration in the amount of $1.5 million, both of which reduced the initial reserve detailed above. The remaining reserve is for carrying costs until the building is sold and additional severance to be paid. As of December 31, 2005, the Company had $1.2 million accrued for restructuring, as follows:

	Balance at December 31, 2004	Adjustments (Statement of Operations Impact) Expense	Adjustments (Statement of Operations Impact) Reversal	Purchase Price Allocation	Cash Payments	Balance at December 31, 2005
	(Amounts in millions)					
Equipment Removal Costs	$ 0.8	$ —	$ —	$ —	$ (0.8)	$ —
Facility Restoration and Carrying Costs	0.6	—	—	—	—	0.6
Severance of Employees and Other Employee Termination–Related Charges	3.1	—	(1.0)	—	(1.5)	0.6
Total	$ 4.5	$ —	$ (1.0)	$ —	$ (2.3)	$ 1.2

As of December 31, 2004, the Company had $4.5 million accrued for restructuring, as follows:

	Balance at January 1, 2004	Adjustments (Statement of Operations Impact) Expense	Adjustments (Statement of Operations Impact) Reversal	Purchase Price Allocation	Cash Payments	Balance at December 31, 2004
	(Amounts in millions)					
Equipment Removal Costs	$ —	$ —	$ —	$ 1.4	$ (0.6)	$ 0.8
Facility Restoration and Carrying Costs	—	—	—	0.7	(0.1)	0.6
Severance of Employees and Other Employee Termination–Related Charges	—	—	—	4.2	(1.1)	3.1
Total	$ —	$ —	$ —	$ 6.3	$ (1.8)	$ 4.5

GRAPHIC PACKAGING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

NOTE 18 — RELATED PARTY TRANSACTIONS

On November 18, 1999, the Company loaned $5.0 million to a principal employee in a non-interest bearing note due March 26, 2002. On December 19, 2001, the Company extended the maturity of the loan through March 26, 2007. At December 31, 2005 and 2004, this receivable was included in Other Assets on the Consolidated Balance Sheets.

The Company received certain management services provided by Clayton, Dubilier and Rice, Inc. ("CD&R"), an affiliate of an equity investor in the Company. Charges for such services, including reimbursement of expenses, totaled nil for the years ended December 31, 2005 and 2004 and $0.4 million for the year ended December 31, 2003, and were included in Selling, General and Administrative in the Consolidated Statements of Operations. In connection with the Merger, the Company paid a transaction fee of $10 million to CD&R for assistance in connection with negotiation of all aspects of the Merger, including the contribution analysis, financial and business due diligence, structure of the proposed refinancing and arranging for proposals by and handling negotiations with financing sources to provide funds for the refinancing.

Coors Brewing Company, a subsidiary of Molson Coors Brewing Company (formerly known as the Adolph Coors Company), accounted for approximately $84 million, $110 million and $39 million of the Company's Net Sales for the year ended December 31, 2005, 2004 and since the date of the Merger through December 31, 2003, respectively. The Company continues to sell packaging products to Coors Brewing Company. The loss of Coors Brewing Company as a customer in the foreseeable future could have a material effect on the Company's results of operations. The supply agreement, effective April 1, 2003, with Coors Brewing Company will not expire until December 31, 2006. The Company's Executive Chairman, Mr. Jeffrey H. Coors, was an Executive Vice President of the Adolph Coors Company from 1991 to 1992 and its President from 1985 to 1989. Together with family members and related trusts, Mr. Coors owns a significant interest in Molson Coors Brewing Company.

NOTE 19 — QUARTERLY FINANCIAL INFORMATION (UNAUDITED)

Results of operations for the four quarters of 2005 and 2004 are shown below.

(Quarter)	Net Sales	Gross Profit	Income From Operations	Net (Loss) Income	Net (Loss) Income per Basic Share	Net (Loss) Income per Diluted Share
	(Amounts in millions, except per share amounts)					
2005						
First	$ 583.0	$ 67.2	$ 12.3	$ (29.6)	$ (0.15)	$ (0.15)
Second	623.0	85.8	23.6	(19.6)	(0.10)	(0.10)
Third	605.4	98.6	44.1	0.6	—	—
Fourth	572.6	61.1	6.9	(42.5)	(0.21)	(0.21)
Year	$ 2,384.0	$ 312.7	$ 86.9	$ (91.1)	$ (0.46)	$ (0.46)
2004						
First	$ 575.9	$ 89.0	$ 26.7	$ (17.2)	$ (0.09)	$ (0.09)
Second	606.3	98.1	36.7	(4.6)	(0.02)	(0.02)
Third	617.2	104.2	47.0	0.7	—	—
Fourth	587.1	68.5	5.2	(39.8)	(0.20)	(0.20)
Year	$ 2,386.5	$ 359.8	$ 115.6	$ (60.9)	$ (0.31)	$ (0.31)

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Shareholders of Graphic Packaging Corporation:

We have completed integrated audits of Graphic Packaging Corporation's December 31, 2005 and December 31, 2004 consolidated financial statements and of its internal control over financial reporting as of December 31, 2005, and an audit of its December 31, 2003 consolidated financial statements in accordance with the standards of the Public Company Accounting Oversight Board (United States). Our opinions, based on our audits, are presented below.

Consolidated financial statements

In our opinion, the accompanying consolidated balance sheets and the related consolidated financial statements present fairly, in all material respects, the financial position of Graphic Packaging Corporation and its subsidiaries at December 31, 2005 and December 31, 2004, and the results of their operations and their cash flows for each of the three years in the period ended December 31, 2005 in conformity with accounting principles generally accepted in the United States of America. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits of these statements in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit of financial statements includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

Internal control over financial reporting

Also, in our opinion, management's assessment, included in the accompanying Management's Report on Internal Control Over Financial Reporting, that the Company maintained effective internal control over financial reporting as of December 31, 2005 based on criteria established in *Internal Control — Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO), is fairly stated, in all material respects, based on those criteria. Furthermore, in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2005, based on criteria established in *Internal Control — Integrated Framework* issued by the COSO. The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting. Our responsibility is to express opinions on management's assessment and on the effectiveness of the Company's internal control over financial reporting based on our audit. We conducted our audit of internal control over financial reporting in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. An audit of internal control over financial reporting includes obtaining an understanding of internal control over financial reporting, evaluating management's assessment, testing and evaluating the design and operating effectiveness of internal control, and performing such other procedures as we consider necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinions.

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ PRICEWATERHOUSECOOPERS LLP
PricewaterhouseCoopers LLP

Atlanta, Georgia
March 3, 2006

Item 9. *CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE*

None.

Item 9A. *CONTROLS AND PROCEDURES*

Evaluation of Disclosure Controls and Procedures

The Company's management has established disclosure controls and procedures designed to ensure that information required to be disclosed by the Company in the reports that it files or submits under the Securities Exchange Act of 1934, as amended (the "Exchange Act") is recorded, processed, summarized and reported within time periods specified in the Securities and Exchange Commission rules and forms. Such disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by the Company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the Company's management to allow timely decisions regarding required disclosure.

Based on management's evaluation as of the end of the period covered by this Annual Report on Form 10–K, the Company's Chief Executive Officer and Chief Financial Officer have concluded that the Company's disclosure controls and procedures (as defined in Rules 13a–15(e) and 15d–15(e) promulgated under the Exchange Act) were effective as of the end of the period covered by this Annual Report on Form 10–K.

Management's Report on Internal Control Over Financial Reporting

The Company's management is responsible for establishing and maintaining adequate internal control over financial reporting for the Company, as such term is defined in Exchange Act Rule 13a–15(f). Internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. Internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the Company's assets; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of the financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures are being made only with proper authorizations; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of the Company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

The Company's management, under the supervision of and with the participation of the Chief Executive Officer and the Chief Financial Officer, assessed the effectiveness of the Company's internal control over financial reporting as of December 31, 2005 based on criteria for effective control over financial reporting described in *Internal Control — Integrated Framework* issued by the COSO. Based on this assessment, the Company's management concluded that its internal control over financial reporting was effective as of December 31, 2005.

Management's assessment of the effectiveness of the Company's internal control over financial reporting as of December 31, 2005 has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report which appears herein.

Changes in Internal Control Over Financial Reporting

During the fiscal quarter ended December 31, 2005, there were changes in the Company's internal control over financial reporting that have materially affected, or are likely to materially affect, the Company's internal control over financial reporting. These changes include oversight and management review of all tax activities by the newly hired tax director, enhanced documentation to support valuation allowances and loss contingencies, and completion of the reconciliation of tax accounts. The Company made such changes in its internal control over financial reporting which have remediated the material weakness in accounting for income taxes.

ITEM 9B. ***OTHER INFORMATION***

None.

PART III

ITEM 10. ***DIRECTORS AND EXECUTIVE OFFICERS OF THE REGISTRANT***

Pursuant to Instruction G(3) to Form 10–K, the information relating to Directors of the Registrant, compliance with Section 16(a) of the Exchange Act and compliance with the Company's Code of Ethics required by Item 10 is incorporated by reference to the Registrant's definitive Proxy Statement for the Annual Meeting of Stockholders to be held on May 16, 2006, which is to be filed pursuant to Regulation 14A within 120 days after the end of the Registrant's fiscal year ended December 31, 2005.

ITEM 11. ***EXECUTIVE COMPENSATION***

Pursuant to Instruction G(3) to Form 10–K, the information required by Item 11 is incorporated by reference to the Registrant's definitive Proxy Statement for the Annual Meeting of Stockholders to be held on May 16, 2006, which is to be filed pursuant to Regulation 14A within 120 days after the end of the Registrant's fiscal year ended December 31, 2005.

ITEM 12. ***SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS***

Pursuant to Instruction G(3) to Form 10–K, the information required by Item 12 is incorporated by reference to the Registrant's definitive Proxy Statement for the Annual Meeting of Stockholders to be held on May 16, 2006, which is to be filed pursuant to Regulation 14A within 120 days after the end of the Registrant's fiscal year ended December 31, 2005.

ITEM 13. ***CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS***

Pursuant to Instruction G(3) to Form 10–K, the information required by Item 13 is incorporated by reference to the Registrant's definitive Proxy Statement for the Annual Meeting of Stockholders to be held on May 16, 2006, which is to be filed pursuant to Regulation 14A within 120 days after the end of the Registrant's fiscal year ended December 31, 2005.

ITEM 14. ***PRINCIPAL ACCOUNTING FEES AND SERVICES***

Pursuant to Instruction G(3) to Form 10–K, the information required by Item 14 is incorporated by reference to the Registrant's definitive Proxy Statement for the Annual Meeting of Stockholders to be held on May 16, 2006, which is to be filed pursuant to Regulation 14A within 120 days after the end of the Registrant's fiscal year ended December 31, 2005.

PART IV

ITEM 15. *EXHIBITS AND FINANCIAL STATEMENT SCHEDULES*

a.) Financial statements, financial statement schedule and exhibits filed as part of this report:

1. Consolidated Balance Sheets as of December 31, 2005 and 2004

Consolidated Statements of Operations for each of the three years in the period ended December 31, 2005

Consolidated Statements of Comprehensive Loss for each of the three years in the period ended December 31, 2005

Consolidated Statements of Cash Flows for each of the three years in the period ended December 31, 2005

Consolidated Statements of Shareholders' Equity for each of the three years in the period ended December 31, 2005

Notes to Consolidated Financial Statements

Report of Independent Registered Public Accounting Firm

2. Schedule II — Valuation and Qualifying Accounts.

All other schedules are omitted as the information required is either included elsewhere in the consolidated financial statements herein or is not applicable.

3. Exhibits to Annual Report on Form 10–K for Year Ended December 31, 2005.

Exhibit Number	Description
2.1	Agreement and Plan of Merger, dated as of March 25, 2003, among Registrant, Riverwood Acquisition Sub LLC and Graphic Packaging International Corporation. Filed as Exhibit 2.1 to Registrant's Current Report on Form 8– K filed on March 27, 2003 (Commission File No. 001–11113), and incorporated herein by reference.
2.2	Amendment No. 1 to Agreement and Plan of Merger, dated as of July 11, 2003, among Registrant, Riverwood Acquisition Sub LLC and Graphic Packaging International Corporation. Filed as part of Annex A to Registrant's Amendment No. 3 to Registration Statement on Form S–4 filed on July 17, 2003 (Registration No. 333–104928), and incorporated herein by reference.
3.1	Restated Certificate of Incorporation of Graphic Packaging Corporation. Filed as Exhibit 3.1 to Registrant's Current Report on Form 8–K filed on August 13, 2003 (Commission File No. 001–13182), and incorporated herein by reference.
3.2	Bylaws of Graphic Packaging Corporation, as amended and restated on November 19, 2003. Filed as Exhibit 3.2 to Registrant's Quarterly Report on Form 10–Q filed on November 4, 2004 and incorporated herein by reference.
3.3	Graphic Packaging Corporation Certificate of Designation, Preferences and Rights of Series A Junior Participating Preferred Stock. Filed as Exhibit 3.3 to Registrant's Current Report on Form 8–K filed on August 13, 2003 (Commission File No. 001–13182), and incorporated herein by reference.
4.1	Form of Certificate for the Common Stock, par value $0.01 per share. Filed as Exhibit 4.1 to Registrant's Amendment No. 2 to Registration Statement on Form S–4 filed on June 13, 2003 (Registration No. 333–104928), and incorporated herein by reference.
4.2	Rights Agreement, dated as of August 7, 2003, between Registrant and Wells Fargo Bank Minnesota, National Association. Filed as Exhibit 4.1 to Registrant's Current Report on Form 8–K filed on August 13, 2003 (Commission File No. 001–13182), and incorporated herein by reference.

Exhibit Number	Description
4.3	Credit Agreement, dated as of August 8, 2003, among Graphic Packaging International, Inc., the several lenders from time to time parties thereto, JPMorgan Chase Bank, as administrative agent, Deutsche Bank Securities Inc., as syndication agent, and Goldman Sachs Credit Partners L.P. and Morgan Stanley Senior Funding, Inc., as documentation agents. Filed as Exhibit 4.2 to Registrant's Current Report on Form 8–K filed on August 13, 2003 (Commission File No. 001–13182), and incorporated herein by reference.
4.4	Guarantee and Collateral Agreement, dated as of August 8, 2003, made by Registrant, Riverwood Acquisition Sub LLC, GPI Holding, Inc., Graphic Packaging International, Inc., and certain of its subsidiaries in favor of JPMorgan Chase Bank as administrative agent. Filed as Exhibit 4.3 to Registrant's Current Report on Form 8–K filed on August 13, 2003 (Commission File No. 001–13182), and incorporated herein by reference.
4.5	Indenture, dated as of August 8, 2003, among Graphic Packaging International, Inc., as Issuer, Registrant and GPI Holding, Inc., as Note Guarantors, and Wells Fargo Bank Minnesota, National Association, as Trustee, relating to the 8.50% Senior Notes due 2011 of Graphic Packaging International, Inc. Filed as Exhibit 4.4 to Registrant's Current Report on Form 8–K filed on August 13, 2003 (Commission File No. 001–13182), and incorporated herein by reference.
4.6	Indenture, dated as of August 8, 2003, among Graphic Packaging International, Inc., as Issuer, Registrant and GPI Holding, Inc., as Note Guarantors, and Wells Fargo Bank Minnesota, National Association, as Trustee, relating to the 9.50% Senior Subordinated Notes due 2013 of Graphic Packaging International, Inc. Filed as Exhibit 4.5 to Registrant's Current Report on Form 8–K filed on August 13, 2003 (Commission File No. 001–13182), and incorporated herein by reference.
4.7	Form of 8.50% Senior Notes due 2011 of Graphic Packaging International, Inc. (included in Exhibit 4.5). Filed as Exhibit A to the Indenture, dated as of August 8, 2003, among Graphic Packaging International, Inc., as Issuer, Registrant and GPI Holding, Inc., as Note Guarantors, and Wells Fargo Bank Minnesota, National Association, as Trustee, relating to the 8.50% Senior Notes due 2011 of Graphic Packaging International, Inc. filed as Exhibit 4.4 to Registrant's Current Report on Form 8–K filed on August 13, 2003 (Commission File No. 001–13182), and incorporated herein by reference.
4.8	Form of 9.50% Senior Subordinated Notes due 2013 of Graphic Packaging International, Inc. (included in Exhibit 4.6). Filed as Exhibit A to the Indenture, dated as of August 8, 2003, among Graphic Packaging International, Inc., as Issuer, Registrant and GPI Holding, Inc., as Note Guarantors, and Wells Fargo Bank Minnesota, National Association, as Trustee, relating to the 9.50% Senior Subordinated Notes due 2013 of Graphic Packaging International, Inc. filed as Exhibit 4.5 to Registrant's Current Report on Form 8–K filed on August 13, 2003 (Commission File No. 001–13182), and incorporated herein by reference.
4.9	First Amendment to Credit Agreement dated as of October 1, 2004 among Graphic Packaging International, Inc., the Several Lenders Parties thereto, JPMorgan Chase Bank, as administrative agent, and J.P. Morgan Securities Inc., as lead arranger and sole bookrunner. Filed as Exhibit 99.1 to the Registrant's Current Report on Form 8–K filed on October 7, 2004 and incorporated herein by reference.
4.10	Second Amendment to Credit Agreement dated as of October 17, 2005 among Graphic Packaging International, Inc., the Lenders, JPMorgan Chase Bank, as administrative agent, and J.P. Morgan Securities Inc., as lead arranger and sole bookrunner. Filed as Exhibit 10.1 to the Registrant's Current Report on Form 8–K filed on October 20, 2005 and incorporated herein by reference.
10.1	Amended and Restated Registration Rights Agreement, dated as of March 25, 2003, among Registrant, the Family Stockholders named therein, Clayton Dubilier & Rice Fund V Limited Partnership, EXOR Group S.A., and the Other Riverwood Stockholders named therein. Filed as Exhibit 10.1 to Registrant's Registration Statement on Form S–4 filed on May 2, 2003 (Registration No. 333–104928), and incorporated herein by reference.

Exhibit Number	Description
10.2	Stockholders Agreement, dated as of March 25, 2003, by and among Registrant, the Family Stockholders named therein, Clayton Dubilier & Rice Fund V Limited Partnership and EXOR Group S.A. Filed as Exhibit 10.2 to Registrant's Registration Statement on Form S–4 filed on May 2, 2003 (Registration No. 333–104928), and incorporated herein by reference.
10.3	Amendment No. 1 to Stockholders Agreement, dated as of April 29, 2003, by and among Registrant, the Family Stockholders named therein, Clayton Dubilier & Rice Fund V Limited Partnership and EXOR Group S.A. Filed as Exhibit 10.3 to Registrant's Registration Statement on Form S–4 filed on May 2, 2003 (Registration No. 333– 104928), and incorporated herein by reference.
10.4	Amendment No. 2 to Stockholders Agreement, dated as of June 12, 2003, by and among Registrant, the Family Stockholders named therein, Clayton Dubilier & Rice Fund V Limited Partnership and EXOR Group S.A. Filed as Exhibit 10.4 to Registrant's Amendment No. 1 to Registration Statement on Form S–4 filed on June 13, 2003 (Registration No. 333–104928), and incorporated herein by reference.
10.5	Third Amended and Restated Graphic Packaging International Corporation Executive Employment Agreement, dated as of March 25, 2003, among Graphic Packaging International Corporation, each of the Affiliated Companies named therein and Jeffrey H. Coors. Filed as Exhibit 10.24 to Registrant's Registration Statement on Form S–4 filed on May 2, 2003 (Registration No. 333–104928), and incorporated herein by reference.
10.6	Third Amended and Restated Graphic Packaging International Corporation Executive Employment Agreement, dated as of March 25, 2003, among Graphic Packaging International Corporation, the Affiliated Companies named therein and David W. Scheible. Filed as Exhibit 10.25 to Registrant's Registration Statement on Form S–4 filed on May 2, 2003 (Registration No. 333–104928), and incorporated herein by reference.
10.7	Employment Agreement, dated as of November 30, 2005, among Graphic Packaging International, Inc., Registrant and Daniel J. Blount. Filed as Exhibit 10.1 to Registrant's Current Report on Form 8–K filed on December 2, 2005 (Commission File No. 001–13182), and incorporated herein by reference.
10.8	Third Amended and Restated Graphic Packaging International Corporation Executive Employment Agreement, dated as of March 25, 2003, among Graphic Packaging International Corporation, the Affiliated Companies named therein and Donald W. Sturdivant. Filed as Exhibit 10.31 to Registrant's Amendment No. 1 to Registration Statement on Form S–4 filed on June 13, 2003 (Registration No. 333–104928), and incorporated herein by reference.
10.9	Employment Agreement, dated as of August 8, 2003, among Riverwood International Corporation, Registrant and Michael R. Schmal. Filed as Exhibit 10.10 to Registrant's Quarterly Report on Form 10–Q filed on November 14, 2003 (Commission File No. 001–13182), and incorporated herein by reference.
10.10	Amendment No. 1 to Riverwood Holding, Inc. Stock Incentive Plan, Riverwood Holding, Inc. Supplemental Long–Term Incentive Plan and Riverwood Holding, Inc. 2002 Stock Incentive Plan. Filed as Exhibit 10.11 to Registrant's Quarterly Report on Form 10–Q filed on November 14, 2003 (Commission File No. 001–13182), and incorporated herein by reference.
10.11	Form of Restricted Unit Agreement, dated as of August 8, 2003, entered into by and between Registrant and each of Jeffrey H. Coors, David W. Scheible and Donald W. Sturdivant. Filed as Exhibit 10.12 to Registrant's Quarterly Report on Form 10–Q filed on November 14, 2003 (Commission File No. 001–13182), and incorporated herein by reference.
10.12	Form of Management Stock Option Agreement entered into by and between Registrant and each of Wayne E. Juby, Michael R. Schmal, Daniel J. Blount, and Stephen A. Hellrung. Filed as Exhibit 10.13 to Registrant's Quarterly Report on Form 10–Q filed on November 14, 2003 (Commission File No. 001–13182), and incorporated herein by reference.

Exhibit Number	Description
10.13	Form of Restricted Unit Agreement entered into by and between Registrant and each of Wayne E. Juby, Michael R. Schmal, Daniel J. Blount, and Stephen A. Hellrung. Filed as Exhibit 10.14 to Registrant's Quarterly Report on Form 10–Q filed on November 14, 2003 (Commission File No. 001–13182), and incorporated herein by reference.
10.14	Form of Option Cancellation Acknowledgement of Wayne E. Juby and Michael R. Schmal. Filed as Exhibit 10.15 to Registrant's Quarterly Report on Form 10–Q filed on November 14, 2003 (Commission File No. 001–13182), and incorporated herein by reference.
10.15	Form of Amendment to Employment Agreement, dated as of August 7, 2003, entered into by and among Graphic Packaging International, Inc., Registrant and Wayne E. Juby. Filed as Exhibit 10.16 to Registrant's Quarterly Report on Form 10–Q filed on November 14, 2003 (Commission File No. 001–13182), and incorporated herein by reference.
10.16	Management Stock Option Agreement, dated as of August 8, 2003 entered into by and between Registrant and Stephen M. Humphrey. Filed as Exhibit 10.17 to Registrant's Quarterly Report on Form 10–Q filed on November 14, 2003 (Commission File No. 001–13182), and incorporated herein by reference.
10.17	Restricted Unit Agreement, dated as of August 8, 2003, entered into by and between Registrant and Stephen M. Humphrey. Filed as Exhibit 10.18 to Registrant's Quarterly Report on Form 10–Q filed on November 14, 2003 (Commission File No. 001–13182), and incorporated herein by reference.
10.18	Form of Officers' Salary Continuation Agreement, as amended. Filed as Exhibit 10.10 to Graphic Packaging International Corporation's Annual Report on Form 10–K filed on March 20, 1995 (Commission File No. 0–20704), and incorporated herein by reference.
10.19	Employment Agreement, dated as of October 6, 2003, entered into by and between Registrant, Graphic Packaging International, Inc. and Stephen A. Hellrung. Filed as Exhibit 10.21 to Registrant's Quarterly Report on Form 10–Q filed on November 14, 2003 (Commission File No. 001–13182), and incorporated herein by reference.
10.20	Graphic Packaging Equity Incentive Plan, as amended and restated, effective as of March 1, 2001. Filed as Exhibit 10.9 to Graphic Packaging International Corporation's Annual Report on Form 10–K filed on March 23, 2001 (Commission File No. 001–14060), and incorporated herein by reference.
10.21	Graphic Packaging Equity Compensation Plan for Non–Employee Directors, as amended and restated. Filed as Exhibit 10.10 to Graphic Packaging International Corporation's Annual Report on Form 10–K filed on March 23, 2001 (Commission File No. 001–14060), and incorporated herein by reference.
10.22	ACX Technologies, Inc. Phantom Equity Plan. Filed as Exhibit 10.11 to Graphic Packaging International Corporation's Current Report on Form 8–K filed on November 19, 1992 (Commission File No. 0–20704), and incorporated herein by reference.
10.23	Graphic Packaging Excess Benefit Plan, as restated, effective as of January 1, 2000. Filed as Exhibit 10.12 to Graphic Packaging International Corporation's Annual Report on Form 10–K filed on March 23, 2001 (Commission File No. 001–14060), and incorporated herein by reference.
10.24	Graphic Packaging Supplemental Retirement Plan, as restated, effective as of January 1, 2000. Filed as Exhibit 10.13 to Graphic Packaging International Corporation's Annual Report on Form 10–K filed on March 23, 2001 (Commission File No. 001–14060), and incorporated herein by reference.
10.25	ACX Technologies, Inc. Deferred Compensation Plan, as amended. Filed as Exhibit 10.15 to Graphic Packaging International Corporation's Annual Report on Form 10–K filed on March 7, 1996 (Commission File No. 0–20704), and incorporated herein by reference.
10.26	First Amendment to the Graphic Packaging Deferred Compensation Plan. Filed as Exhibit 10.16 to Graphic Packaging International Corporation's Annual Report on Form 10–K filed on March 23, 2001 (Commission File No. 001–14060), and incorporated herein by reference.
10.27	Graphic Packaging Executive Incentive Plan, as amended and restated, effective May 15, 2001. Filed as Exhibit 10.17 to Graphic Packaging International Corporation's Quarterly Report on Form 10–Q filed on October 31, 2002 (Commission File No. 001–14060), and incorporated herein by reference.

Exhibit Number	Description
10.28	Form of Indemnification Agreement, dated as of September 10, 2003, entered into by and among Registrant, GPI Holding, Inc., Graphic Packaging International, Inc. and each of Jeffrey H. Coors, Stephen M. Humphrey, Kevin J. Conway, G. Andrea Botta, John D. Beckett, Harold R. Logan, Jr., John R. Miller, Robert W. Tieken, B. Charles Ames (as emeritus director) and William K. Coors (as emeritus director). Filed as Exhibit 10.30 to Registrant's Annual Report on Form 10–K filed on March 16, 2004 (Commission File No. 001–13182) and incorporated herein by reference.
10.29	Indemnification Agreement, dated as of September 10, 2003, entered into by and among Registrant, GPI Holding, Inc., Graphic Packaging International, Inc. and Lawrence C. Tucker. Filed as Exhibit 10.31 to Registrant's Annual Report on Form 10–K filed on March 16, 2004 (Commission File No. 001–13182) and incorporated herein by reference.
10.30	2004 Stock and Incentive Compensation Plan of Graphic Packaging Corporation. Filed as Appendix B to the Company's definitive proxy statement filed on April 5, 2004 (Commission File No. 001–13182) and incorporated herein by reference.
10.31	Employment Agreement dated August 8, 2003 by and between Riverwood International Corporation and Robert M. Simko, as amended by that certain Amendment to Employment Agreement dated February 21, 2006. Filed as Exhibit 10.1 to the Registrant's Current Report on Form 8–K filed on February 24, 2006 and incorporated herein by reference.
10.32	Form of Service Restricted Stock Unit Award Agreement granted on March 16, 2005 under the 2004 Stock and Incentive Compensation Plan.
14.1	Code of Business Conduct and Ethics. Filed as Exhibit 14.1 to Registrant's Annual Report on Form 10–K filed on March 16, 2004 (Commission File No. 001–13182) and incorporated by reference.
21.1	List of Subsidiaries.
23.1	Consent of PricewaterhouseCoopers LLP.
31.1	Certification required by Rule 13a–14(a).
31.2	Certification required by Rule 13a–14(a).
32.1	Certification required by Section 1350 of Chapter 63 of Title 18 of the United States Code.
32.2	Certification required by Section 1350 of Chapter 63 of Title 18 of the United States Code.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

GRAPHIC PACKAGING CORPORATION
(Registrant)

/s/ STEPHEN M. HUMPHREY Stephen M. Humphrey	President and Chief Executive Officer (Principal Executive Officer)	March 3, 2006
/s/ DANIEL J. BLOUNT Daniel J. Blount	Senior Vice President and Chief Financial Officer (Principal Financial Officer)	March 3, 2006
/s/ DEBORAH R. FRANK Deborah R. Frank	Vice President and Controller (Principal Accounting Officer)	March 3, 2006

POWER OF ATTORNEY

Pursuant to the requirements of the Securities Exchange Act of 1934, this report on Form 10–K has been signed below by the following persons on behalf of the Registrant and in the capacities and on the dates indicated. Each of the directors of the Registrant whose signature appears below hereby appoints Daniel J. Blount and Stephen A. Hellrung, and each of them severally, as his or her attorney–in–fact to sign in his or her name and behalf, in any and all capacities stated below, and to file with the Securities and Exchange Commission any and all amendments to this report on Form 10–K, making such changes in this report on Form 10–K as appropriate, and generally to do all such things on their behalf in their capacities as directors and/or officers to enable the Registrant to comply with the provisions of the Securities Exchange Act of 1934, and all requirements of the Securities and Exchange Commission.

Signatures	Title	Date
/s/ JEFFREY H. COORS Jeffrey H. Coors	Executive Chairman and Director	March 3, 2006
/s/ KEVIN J. CONWAY Kevin J.Conway	Director	March 3, 2006
/s/ G. ANDREA BOTTA G. Andrea Botta	Director	March 3, 2006
/s/ JOHN D. BECKETT John D. Beckett	Director	March 3, 2006
/s/ HAROLD R. LOGAN, JR. Harold R. Logan, Jr.	Director	March 3, 2006

Signatures	Title	Date
/s/ JOHN R. MILLER John R. Miller	Director	March 3, 2006
/s/ WILLIAM R. FIELDS William R. Fields	Director	March 3, 2006
/s/ ROBERT W. TIEKEN Robert W. Tieken	Director	March 3, 2006
/s/ STEPHEN M. HUMPHREY Stephen M. Humphrey	Director	March 3, 2006

GRAPHIC PACKAGING CORPORATION

SCHEDULE II — VALUATION AND QUALIFYING ACCOUNTS

(Classification)	Balance Beginning of Period	Increase Due to Merger	(Credits) Charges to Costs and Expenses	(Deductions) Additions	Balance at End of Period
			(Amounts in millions)		
Year ended December 31, 2005					
Allowances Reducing the Assets in the Balance Sheet:					
Accounts receivable	$ 3.7	—	21.2	(22.1)	$ 2.8
Deferred tax assets	221.7	—	25.6	4.8	252.1
Total	$ 225.4	$ —	$ 46.8	$ (17.3)	$ 254.9
Year ended December 31, 2004					
Allowances Reducing the Assets in the Balance Sheet:					
Accounts receivable	$ 7.1	—	22.5	(25.9)	$ 3.7
Deferred tax assets	260.2	—	22.3	(60.8)	221.7
Total	$ 267.3	$ —	$ 44.8	$ (86.7)	$ 225.4
Year ended December 31, 2003					
Allowances Reducing the Assets in the Balance Sheet:					
Accounts receivable	$ 3.9	3.2	16.8	(16.8)	$ 7.1
Deferred tax assets	257.9	—	8.9	(6.6)	260.2
Total	$ 261.8	$ 3.2	$ 25.7	$ (23.4)	$ 267.3

Exhibit 10.32

Service Restricted Stock Unit Award Agreement

Graphic Packaging Corporation

March 16, 2005

Graphic Packaging Corporation
Service Restricted Stock Unit Award Agreement

THIS AGREEMENT, effective March 16, 2005, represents the grant of Service Restricted Stock Units by Graphic Packaging Corporation (the "Company"), to the Participant named below, pursuant to the provisions of the 2004 Stock and Incentive Compensation Plan (the "Plan").

The Plan provides a complete description of the terms and conditions governing the Service Restricted Stock Units. If there is any inconsistency between the terms of this Agreement and the terms of the Plan, the Plan's terms shall completely supercede and replace the conflicting terms of this Agreement. All capitalized terms shall have the meanings ascribed to them in the Plan, unless specifically set forth otherwise herein. The parties hereto agree as follows:

Overview of the Participant's Award

1. Date of Grant. March 16, 2005 ("Date of Grant").

2. Grant of Service Restricted Stock Units. The Company hereby grants the Participant an Award of ___Service Restricted Stock Units pursuant to the terms and conditions contained herein.

3. Vesting Period. The Service Restricted Stock Units shall vest in accordance with the following:

(a) One third (1/3) of the Service Restricted Stock Units (rounded to a whole Share) will vest on each of the first, second and third anniversaries following the Date of Grant, provided the Participant has continued in the employment of the Company, its Affiliates, and/or its Subsidiaries through such dates (this time period is referred to herein as the "Vesting Period").

(b) All vesting restrictions shall lapse and the Service Restricted Stock Units shall become one hundred percent (100%) vested upon the Participant's termination of employment due to death, Disability, Retirement provided the Participant has continued in the employment of the Company, its Affiliates, and/or its Subsidiaries through such event.

(c) Upon the Participant's termination of employment due to Early Retirement, the portion of Service Restricted Stock Units that is to vest in the calendar year in which the termination of employment occurs shall vest on a prorata basis. The pro-ration shall be determined by taking the number of days worked since the later of the grant date or the most recent vesting date, divided by 365.

(d) Upon the Participant's termination of employment due to Involuntary Termination, all vesting restrictions shall lapse and the Service Restricted Stock Units shall become one hundred percent (100%) vested upon the Participant's termination of employment. In the event a termination is both an Involuntary

Termination and an Early Retirement, the vesting provisions more favorable to the employee shall prevail.

For purposes of this Agreement, Retirement means termination of employment at age 65 and Early Retirement means termination of employment by the Participant with age and years of service credit totaling at least sixty–five (65), with the minimum age at which a Participant may be considered to be retired being fifty–five (55). Involuntary Termination means an involuntary termination of the Participant's employment for reasons other than Cause, death, or Disability.

4. Termination of Employment for Other Reasons. In the event of the Participant's termination of employment with the Company, its Affiliates, and/or its Subsidiaries for any reason other than those reasons set forth in Paragraphs 3(b), 3(c), 3(d), or 9, all of the unvested Service Restricted Stock Units the Participant holds at the time of the Participant's termination of employment shall be forfeited to the Company.

5. Mandatory Holding Period. The vested Service Restricted Stock Units will be distributed to the Participant on March 17, 2010 (the "Mandatory Holding Period"). This Mandatory Holding Period is applicable to these Service Restricted Stock Units held by the Participant while he is employed by the Company as well as any of these Service Restricted Stock Units retained by the Participant subsequent to his termination of employment. Such Mandatory Holding Period will be waived upon a Participant's termination of employment due to death, Disability, Retirement, or Involuntary Termination.

6. Payment of Service Restricted Stock Units. The Participant shall be entitled to receive one–half of the value of the Service Restricted Stock Units in Shares and one–half of the value of the Service Restricted Stock Units in cash. Such payments shall be made for Service Restricted Stock Units whose restrictions have lapsed pursuant to Paragraphs 3 or 9 herein and after the Mandatory Holding Period set forth in Paragraph 5 has lapsed.

7. Dividend Equivalents. Graphic Packaging Corporation currently does not pay a dividend. Should a dividend be declared prior to the time these Service Restricted Stock Units are paid out, further information will be provided as to whether the Participant will benefit from such dividend payments. Absent such additional information, the Participant will not be entitled to dividend equivalent payments.

8. Right as Stockholder. The Participant shall not have voting or any other rights as a shareholder of the Company with respect to Service Restricted Stock Units. The Participant will obtain full voting and other rights as a shareholder of the Company upon the settlement of Service Restricted Stock Units in Shares upon completion of the Mandatory Holding Period.

9. Change in Control. In the event of a Change in Control of the Company, all then–outstanding Service Restricted Stock Units shall vest in full and be free of restrictions and any Mandatory Holding Period shall be immediately waived upon the Change in Control.

10. Nontransferability. During the vesting period and the Mandatory Holding Period, Service Restricted Stock Units awarded pursuant to this Agreement may not be sold, transferred, pledged, assigned or otherwise alienated or hypothecated (a "Transfer") other than by will or by the

laws of descent and distribution, except as provided in the Plan. The designation of a beneficiary shall not constitute a Transfer.

11. Requirements of Law. The granting of Service Restricted Stock Units under the Plan shall be subject to all applicable laws, rules, and regulations, and to such approvals by any governmental agencies or national securities exchanges as may be required.

12. Tax Withholding. With respect to withholding required upon any taxable event arising as a result of Service Restricted Stock Units granted hereunder, the Company will satisfy the tax withholding requirement on the cash portion by withholding cash equal to the total minimum statutory tax required to be withheld, and on the Share portion by withholding Shares having a Fair Market Value as of the date that the amount of tax to be withheld is to be determined as nearly equal as possible to the total minimum statutory tax required to be withheld on the transaction.

13. Administration. This Agreement and the Participant's rights hereunder are subject to all the terms and conditions of the Plan, as the same may be amended from time to time, as well as to such rules and regulations as the Committee may adopt for administration of the Plan. It is expressly understood that the Committee is authorized to administer, construe, and make all determinations necessary or appropriate to the administration of the Plan and this Agreement, all of which shall be final and binding upon the Participant.

14. Continuation of Employment. This Agreement shall not confer upon the Participant any right to continuation of employment by the Company, its Affiliates, and/or its Subsidiaries, nor shall this Agreement interfere in any way with the Company's, its Affiliates', and/or its Subsidiaries' right to terminate the Participant's employment at any time.

15. Amendment to the Plan. Subject to the terms of the Plan, this Agreement may be modified or amended only by the written agreement of the parties hereto. The waiver by the Company of any provision of the Agreement by the Participant shall not operate or be construed as a waiver of any subsequent breach by the Participant. Notwithstanding the foregoing, the Committee shall have unilateral authority to amend the Plan and the Agreement without Participant consent to the extent necessary to comply with applicable law or changes to applicable law (including, but in no way limited to, Code Section 409A) and related regulations or other guidance and federal securities laws).

16. Successor. All obligations of the Company under the Plan and this Agreement, with respect to the Service Restricted Stock Units, shall be binding on any successor to the Company, whether the existence of such successor is the result of a direct or indirect purchase, merger, consolidation, or otherwise, of all or substantially all of the business and/or assets of the Company.

17. Severability. The provisions of this Agreement are severable and if any one or more provisions are determined to be illegal or otherwise unenforceable, in whole or in part, the remaining provisions shall nevertheless be binding and enforceable.

18. Applicable Laws and Consent to Jurisdiction. The validity, construction, interpretation, and enforceability of this Agreement shall be determined and governed by the laws of the state of Delaware without giving effect to the principles of conflicts of law.

19. Voiding of Agreement Provision. At the sole discretion of the Company, if any provision under this Agreement causes an amount to be considered deferred under Code Section 409A and as such become subject to income tax under the Code prior to the time such amount is paid or delivered to the Participant, such Award shall be deemed null and void with respect to such amount and the Committee will take whatever steps as may be required to accomplish the objectives of the Agreement without causing early taxation of such amount and without the Company incurring additional cost or liability.

20. Notices. Except as may be otherwise provided by the Plan or determined by the Committee and communicated to the Participant, any written notices provided for in this Agreement or the Plan shall be in writing and shall be deemed sufficiently given if either hand–delivered or if sent by fax or overnight courier, or by postage paid first class mail. Notices sent by mail shall be deemed received five business days after mailed, but in no event later than the date of actual receipt. Notices shall be directed, if to the Participant, at the Participant's address indicated by the Company's records or, if to the Company, at the Company's principal executive office, Attention: Senior Vice President, Human Resources, Graphic Packaging Corporation.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed effective as of March 16, 2005.

Graphic Packaging Corporation

By: _____

Name: Wayne E. Juby
Title: Senior Vice President, Human Resources

Participant

_____

Number of Restricted Stock Units: _____

Exhibit 21.1

SUBSIDIARIES OF THE REGISTRANT

Subsidiary Name	Jurisdiction of Incorporation
ACX (UK) Ltd.	England
ACX Group Ltd.	Wales
Fiskeby Board A/S	Denmark
Fiskeby Board Ltd.	UK
Fiskeby Board SARL	France
Golden Equities, Inc.	Colorado
Golden Properties Limited	Colorado
Golden Technologies Company, Inc.	Colorado
GPI Holding, Inc.	Colorado
Graphic Packaging International	France
Graphic Packaging International — Schur A/S	Denmark
Graphic Packaging International (Cyprus) Limited	Cyprus
Graphic Packaging International Asia Pacific Limited	Hong Kong
Graphic Packaging International Asia Pte Ltd.	Singapore
Graphic Packaging International Australia Pty Limited	Australia
Graphic Packaging International Canada Corporation	Canada
Graphic Packaging International do Brasil — Embalagens Ltda.	Brazil
Graphic Packaging International Europe S.A.	Belgium
Graphic Packaging International France	France
Graphic Packaging International G.m.b.H	Germany
Graphic Packaging International Holding Company	Delaware
Graphic Packaging International Holding Sweden AB	Sweden
Graphic Packaging International Limited	UK
Graphic Packaging International Mexicana, S. de R.L. de C.V.	Mexico
Graphic Packaging International S.p.A.	Italy
Graphic Packaging International Spain, S.A.	Spain
Graphic Packaging International Sweden AB	Sweden
Graphic Packaging International, Inc.	Delaware
IL Returpapper AB	Sweden
Industrikompetens i Ostergotland AB	Sweden
Kalamazoo Valley Group Partnership	Michigan(a)
Lauener Engineering Limited/Lauener Engineering AG	Delaware/Switzerland(b)
New Materials Limited	UK
NMC Group Ltd.	England
Recywrap Recycling GmbH	Germany
Rengo Riverwood Packaging, Ltd.	Japan
Riverwood International Corp. Philanthropic Fund	Delaware
Riverwood International Enterprises, Inc.	Delaware
Riverwood International Japan, Ltd.	Japan
Riverwood International Machinery, Inc.	Delaware
Riverwood International Pension Trustee Company Ltd.	UK
Slevin South Company	Arkansas
Svensk Kartongatervinning AB	Sweden

Notes:

(a) Jurisdiction of partnership.

(b) Lauener entity was incorporated in both Delaware and Switzerland.

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statement on Form S–8 (No. 333–115745 and No. 333–108256) of Graphic Packaging Corporation of our report dated March 3, 2006 relating to the financial statements, financial statement schedule, management's assessment of the effectiveness of internal control over financial reporting and the effectiveness of internal control over financial reporting, which appears in this Form 10–K.

/s/ PRICEWATERHOUSECOOPERS LLP
PricewaterhouseCoopers LLP

Atlanta, Georgia
March 3, 2006

Exhibit 31.1

CERTIFICATION

I, Stephen M. Humphrey, President and Chief Executive Officer, certify that:

1. I have reviewed this Annual Report on Form 10–K of Graphic Packaging Corporation;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a–15(e) and 15d–15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a–15(f) and 15d–15(f)) for the registrant and have:
   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

/s/ STEPHEN M. HUMPHREY
Stephen M. Humphrey,
President and Chief Executive Officer
(Principal Executive Officer)
March 3, 2006

Exhibit 31.2

CERTIFICATION

I, Daniel J. Blount, Senior Vice President and Chief Financial Officer, certify that:

1. I have reviewed this Annual Report on Form 10–K of Graphic Packaging Corporation;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a–15(e) and 15d–15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a–15(f) and 15d–15(f)) for the registrant and have:
   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles.
   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

/s/ DANIEL J. BLOUNT
Daniel J. Blount
Senior Vice President and Chief Financial Officer
(Principal Financial Officer)
March 3, 2006

Exhibit 32.1

CERTIFICATION
Pursuant to 18 United States Code Section 1350,
As adopted pursuant to Section 906 of the
Sarbanes–Oxley Act of 2002

The undersigned hereby certifies that, to my knowledge, the Annual Report on Form 10–K for the period ended December 31, 2005 of Graphic Packaging Corporation (the "Company") filed with the Securities and Exchange Commission on the date hereof fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that the information contained in such report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ STEPHEN M. HUMPHREY
Name: Stephen M. Humphrey
Title: President and Chief Executive Officer
March 3, 2006

Exhibit 32.2

CERTIFICATION
Pursuant to 18 United States Code Section 1350,
As adopted pursuant to Section 906 of the
Sarbanes–Oxley Act of 2002

The undersigned hereby certifies that, to my knowledge, the Annual Report on Form 10–K for the period ended December 31, 2005 of Graphic Packaging Corporation (the "Company") filed with the Securities and Exchange Commission on the date hereof fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that the information contained in such report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ DANIEL J. BLOUNT
Name: Daniel J. Blount
Title: Senior Vice President and Chief Financial Officer
March 3, 2006

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APPENDIX S

FINANCIAL ASSURANCE DOCUMENTATION

GRAPHIC PACKAGING
CORPORATION

August 22, 2006

Ms. Beth Scardina
Louisiana Department of Environmental Quality
Office of Environmental Services
Waste Permits Division
P. O. Box 4313
Baton Rouge, LA 70821-4313

RE: Financial Assurance Documentation

Dear Ms. Beth Scardina:

Enclosed is the financial assurance documentation required to satisfy the regulatory requirements pursuant to LAC33: VII.727.A.1 and A.2, as adjusted. Please distribute the necessary information to Mr. Mike McDaniel on Graphic Packaging International's behalf. Should you have any questions regarding this submittal, please contact me at 770-644-3321 or deborah.frank@graphicpkg.com.

Sincerely,

Deborah Frank
Vice President and Corporate Controller

GRAPHIC PACKAGING
CORPORATION

SOLID WASTE FACILITY

CORPORATE GUARANTEE FOR LIABILITY COVERAGE, CLOSURE, AND/OR POST-CLOSURE CARE

Guarantee made this August 22, 2006 by Graphic Packaging Corporation, a business corporation organized under the laws of the State of Delaware, herein referred to as guarantor, to the Louisiana Department of Environmental Quality, obligee, on behalf of our subsidiary Graphic Packaging International, Inc. of P. O. Box 35800, West Monroe, LA 71294-5800.

Recitals

1. The guarantor meets or exceeds the financial test criteria, *as adjusted*, and agrees to comply with the reporting requirements for guarantors as specified in LAC 33:VII.727.A.2.i.ix.

2. Graphic Packaging International, Inc. is the permit holder, hereinafter referred to as "permit holder," for the following solid waste facility covered by this guarantee:

Graphic Packaging International, Inc.
Wastewater Treatment Impoundments
NPDES Wastewater Treatment Facility
Ouachita Parish
GD-073-0405
SWMD Standard Permit P-0199
Guarantee is for liability coverage, closure, and post-closure.
Annual aggregate liability coverage: $1,000,000*
Estimated closure and post closure costs: $5,656,500

Graphic Packaging International, Inc.
Industrial Landfill
Ouachita Parish
GD-073-0405
SWMD Standard Permit P0071
Guarantee is for liability coverage, closure, and post-closure.
Annual aggregate liability coverage: $1,000,000*
Estimated closure and post closure costs: $2,825,100

Graphic Packaging International, Inc.
Primary Clarifier Sludge/
Ash Sluice Impoundment (21 Acre)
NPDES Wastewater Treatment Facility
Ouachita Parish
Site GD-073-0405
SWMD Standard Permit P-0244
Guarantee is for liability coverage, closure, and post-closure.
Annual aggregate liability coverage: $1,000,000*
Estimated closure and post closure costs: $5,665,000

GRAPHIC PACKAGING CORPORATION
814 Livingston Court • Marietta, Georgia 30067 • Phone 770.644.3000

Graphic Packaging International, Inc.
Primary Clarifier Sludge/
Ash Sluice Impoundment (40 Acre)
NPDES Wastewater Treatment Facility
Ouachita Parish
Site GD-073-0405
SWMD Standard Permit P-0244
Guarantee is for liability coverage, closure, and post-closure.

Annual aggregate liability coverage:	$1,000,000*
Estimated closure and post closure costs:	$10,509,800

* $1,000,000 per occurrence and $1,000,000 annual aggregate liability coverage in total for the site as required in LAC 33:VII.727.A.1.a.

3. "Closure plans" as used below refers to the plans maintained as required by the *Louisiana Administrative Code*, Title 33, Part VII, for the closure and/or post-closure care of the facility as identified in Paragraph 2 above.

4. For value received from permit holder, guarantor guarantees to the Louisiana Department of Environmental Quality that in the event that permit holder fails to perform closure and post-closure care of the above facility in accordance with the closure plan and other permit requirements whenever required to do so, the guarantor shall do so or establish a trust fund as specified in LAC 33:VII.727.A.2.d, as applicable, in the name of permit holder in the amount of the current closure and/or post-closure estimates as specified in LAC 33:VII.727.A.2.

5. For value received from permit holder, guarantor guarantees to any and all third parties who have sustained or may sustain bodily injury or property damage caused by sudden and accidental occurrences arising from operations of the facility covered by this guarantee that in the event that permit holder fails to satisfy a judgment or award based on a determination of liability for bodily injury or property damage to third parties caused by sudden and accidental occurrences arising from the operation of the above-named facilities, or fails to pay an amount agreed to in settlement of a claim arising from or alleged to arise from such injury or damage, the guarantor will satisfy such judgment(s), award(s), or settlement agreement(s) up to the coverage limits identified above.

6. The guarantor agrees that if, at the end of any fiscal year before termination of this guarantee, the guarantor fails to meet the financial test criteria, *as adjusted*, guarantor shall send within 90 days, by certified mail, notice to the administrative authority and to permit holder that he intends to provide alternative financial assurance as specified in LAC 33:VII.727.A.1 and/or LAC 33:VII.727.A.2, as applicable, in the name of the permit holder, within 120 days after the end of such fiscal year, the guarantor shall establish such financial assurance unless permit holder has done so.

7. The guarantor agrees to notify the administrative authority, by certified mail, of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming guarantor as debtor, within 10 days after commencement of the proceeding.

8. The guarantor agrees that within 30 days after being notified by the administrative authority of a determination that guarantor no longer meets the financial test criteria, *as adjusted*, or that he is disallowed from continuing as guarantor of liability coverage or closure and/or post-closure care, he shall establish alternate financial assurance as specified in LAC 33:VII.727.A.1 and/or LAC

33:VII.727.A.2, as applicable, in the name of permit holder unless permit holder has done so.

9. The guarantor agrees to remain bound under this guarantee notwithstanding any or all of the following: amendment or modification of the closure and or post-closure care, the extension or reduction of the time of performance of closure and/or post-closure or any other modification or alternation of an obligation of the permit holder pursuant to the *Louisiana Administrative Code*, Title 33, Part VII.

10. The guarantor agrees to remain bound under this guarantee for as long as the permit holder must comply with the applicable financial assurance requirements of LAC 33:VII.727.A.1 and/or LAC 33:VII.727.A.2, *as adjusted*, for the above-listed facility except that guarantor may cancel this guarantee by sending notice by certified mail, to the administrative authority and to the permit holder, such cancellation to become effective no earlier than 90 days after receipt of such notice by both the administrative authority and the permit holder, as evidenced by the return receipts.

11. The guarantor agrees that if the permit holder fails to provide alternative financial assurance as specified in LAC 33:VII.727.A.1 and/or LAC 33:VII.727.A.2, as applicable, and obtain written approval of such assurance from the administrative authority within 60 days after a notice of cancellation by the guarantor is received by the administrative authority from guarantor, guarantor shall provide such alternate financial assurance in the name of permit holder.

12. The guarantor expressly waives notice of acceptance of this guarantee by the administrative authority or by the permit holder. Guarantor expressly waives notice of amendments or modifications of the closure and/or post-closure plan and of amendments or modifications of the facility permit(s).

I hereby certify that the wording of this guarantee is identical to the wording specified in LAC 33:VII.727.A.2.i.ix.(1), *except as noted in italics*, effective on the date first above written.

Effective date: August 22, 2006

Graphic Packaging Corporation

BY: _____
Deborah Frank
Vice President and Corporate Controller

Thus sworn and signed before me on this the 22nd day of August, 2006.

_____
NOTARY PUBLIC
My commission expires: _____

RAYLENE E. WEIS
NOTARY PUBLIC
EXPIRES
GEORGIA
APRIL 20, 2008
FULTON COUNTY

GRAPHIC PACKAGING
CORPORATION

August 22, 2006

Mike McDaniel, Ph.D.
Secretary
Louisiana Department of Environmental Quality
Post Office Box 4313
Baton Rouge, Louisiana 70821-4313
Attention: Office of Environmental Services,
Waste Permits Division

Dear Sir:

I am the chief financial officer of Graphic Packaging Corporation, 814 Livingston Court, Marietta, Georgia 30067. This letter is in support of this firm's use of the financial test to demonstrate financial responsibility for liability coverage, closure, and post-closure, as specified in LAC 33:VII.727.A.1.and A.2.

1. The firm identified above is the parent corporation of the permit holder of the following solid waste facilities, whether in Louisiana or not, for which liability coverage is being demonstrated through the financial test specified in LAC 33:VII.727.A.1, *as adjusted.* The amount of annual aggregate liability coverage covered by the test is shown for each facility:

Graphic Packaging International, Inc.[1] Wastewater Treatment Impoundments NPDES Wastewater Treatment Facility Ouachita Parish GD-073-0405 SWMD Standard Permit P-0199	$1,000,000*
Graphic Packaging International, Inc. Industrial Landfill Ouachita Parish GD-073-0405 SWMD Standard Permit P-0071	$1,000,000*

[1] Graphic Packaging International, Inc., with a local address of P. O. Box 35800, West Monroe, LA 71294-5800, is a wholly-owned subsidiary of Graphic Packaging Corporation (formerly Riverwood Holding, Inc.).

Graphic Packaging International, Inc.
Primary Clarifier Sludge/
Ash Sluice Impoundments
NPDES Wastewater Treatment Facility
Ouachita Parish
Site GD-073-0405
SWMD Standard Permit P-0244 $1,000,000*

* $1,000,000 per occurrence and $1,000,000 annual aggregate liability coverage in total for the site as required in LAC 33:VII.727.A.1.a.

2. The firm identified above is the parent corporation of the permit holder of the following solid waste facilities, whether in Louisiana or not, for which financial assurance for closure and post-closure is demonstrated through a financial test similar to that specified in LAC 33:VII.727.A.2, *as adjusted*, or other forms of self insurance. The current closure and post-closure cost estimates covered by the test are shown for each facility:

A. Graphic Packaging International, Inc.
Wastewater Treatment Impoundments
NPDES Wastewater Treatment Facility
Ouachita Parish
GD-073-0405
SWMD Standard Permit P-0199
Estimated closure and post closure costs: $5,656,500

B. Graphic Packaging International, Inc.
Industrial Landfill
Ouachita Parish
GD-073-0405
SWMD Standard Permit P-0071
Estimated closure and post closure costs: $2,825,100

C. Graphic Packaging International, Inc.
Primary Clarifier Sludge/
Ash Sluice Impoundment (21 Acre)
NPDES Wastewater Treatment Facility
Ouachita Parish
Site GD-073-0405
SWMD Standard Permit P-0244
Estimated closure and post closure costs: $5,665,000

D. Graphic Packaging International, Inc.
Primary Clarifier Sludge/
Ash Sluice Impoundment (40 Acre)
NPDES Wastewater Treatment Facility
Ouachita Parish
Site GD-073-0405
SWMD Standard Permit P-0244
Estimated closure and post closure costs: $10,509,800

3. This firm guarantees through a corporate guarantee similar to that specified in LAC 33:VII.727.A.1 and 2, liability coverage and closure and post-closure care of the following solid waste facilities, whether in Louisiana or not, of which Graphic Packaging International, Inc. is a subsidiary of this firm. The amount of annual aggregate liability coverage covered by the guarantee for each facility and/or the current cost estimates for the closure and/or post-closure care so guaranteed are shown for each facility:

Site ID	Site Name	Facility Name	Facility Permit Number	Annual Aggregate Liability Coverage	Closure/Post Closure Cost Estimates
GD-073-0405	Graphic Packaging International, Inc. Ouachita Parish	Wastewater Treatment Impoundments NPDES Wastewater Treatment Facility	SWMD Standard Permit P-0199	$1,000,000*	$5,656,500
		Industrial Landfill	SWMD Standard Permit P-0071	$1,000,000*	$2,825,100
		Primary Clarifier Sludge/ Ash Sluice Impoundment (21 Acre) NPDES Wastewater Treatment Facility	SWMD Standard Permit P-0244	$1,000,000*	$5,665,000
		Primary Clarifier Sludge/ Ash Sluice Impoundment (40 Acre) NPDES Wastewater Treatment Facility	SWMD Standard Permit P-0244	$1,000,000*	$10,509,800

* $1,000,000 per occurrence and $1,000,000 annual aggregate liability coverage in total for the site as required in LAC 33:VII.727.A.1.a.

4. This firm is the owner or operator of the following solid waste facilities, whether in Louisiana or not, for which financial assurance for liability coverage, closure and/or post-closure care is not demonstrated either to the U.S. Environmental Protection Agency or to a State through a financial test or any other financial assurance mechanism similar to those specified in LAC 33:VII.727.A.1 and/or 2. The current closure and/or post-closure cost estimates not covered by such financial assurance are shown for each facility.

None.

This firm is required to file a Form 10K with the Securities and Exchange Commission (SEC) for the latest fiscal year.

The fiscal year of this firm ends on December 31. The figures for the following items marked with an asterisk are derived from this firm's independently audited, year-end financial statements for the latest completed year, ended December 31, 2005.

The results of the calculations performed to demonstrate financial responsibility for liability coverage and closure and post-closure care are contained below. These results are derived from this Firm's December 31, 2005 GAAP financial statements as filed with the Securities and Exchange Commission and audited by the Company's independent auditors. As previously approved by the Department, the Firm performed calculations to carve out the effect of purchase accounting resulting from the acquisition of Graphic Packaging International, Inc. on March 27, 1996. The results shown below are equal to the December 31, 2005 GAAP financial information adjusted for the purchase accounting effects.

Part C. Liability Coverage, Closure, and/or Post Closure

ALTERNATIVE I
(Millions of Dollars)

1.	Sum of current closure and/or post-closure cost estimates (total of all cost estimates listed above)	$24.7
2.	Amount of annual aggregate liability coverage to be demonstrated	1.0
3.	Sum of lines 1 & 2	25.7
*4.	Total liabilities	1,670.8
*5.	Tangible net worth	369.6
*6.	Net worth	923.6
*7.	Current assets	552.9
*8.	Current liabilities	408.3
*9.	The sum of net income plus depreciation, depletion, and amortization	136.7
*10.	Total assets in U.S.	2,331.9

		YES	NO
11.	Is line 5 at least $10 million?	X	
12.	Is line 5 at least 6 times lines 3?	X	
13.	Are at least 90 percent of assets located in the U. S.? If not, complete line 14.		X
14.	Is line 10 at least 6 times line 3?	X	

I hereby certify that the wording of this letter is identical to the wording specified in LAC 33:VII.727.A.2.i.iv.(e), *except as noted in italics*.

Graphic Packaging Corporation

BY: _____
Daniel J. Blount
Senior Vice President and Chief Financial Officer

Graphic Packaging Corporation
Unaudited Proforma Condensed Consolidated Balance Sheet
December 31, 2005

(in millions of dollars)	Actual	Proforma Adjustments	Proforma
ASSETS			
CURRENT ASSETS			
Cash and Equivalents	$ 12.7	$ -	$ 12.7
Receivables, Net	216.3	-	216.3
Inventories	298.5	-	298.5
Deferred Tax Asset	13.1	(0.7)	12.4
Othe Current Assets	13.0	-	13.0
Total Current Assets	553.6	(0.7)	552.9
PROPERTY, PLANT AND EQUIPMENT, net	1,551.5	(171.5)	1,380.0
DEFERRED TAX ASSETS	350.8	(347.1)	3.7
OTHER ASSETS	251.0	25.7	276.7
INVESTMENTS IN NET ASSETS OF EQUITY AFFILIATES	6.5	-	6.5
GOODWILL	642.6	(268.0)	374.6
TOTAL ASSETS	$ 3,356.0	$ (761.6)	$ 2,594.4

Graphic Packaging Corporation
Unaudited Proforma Condensed Consolidated Balance Sheet
December 31, 2005

(In millions of dollars)	Actual	Proforma Adjustments	Proforma
LIABILITIES			
CURRENT LIABILITIES			
Short-Term Debt	$ 11.0	$ (9.8)	$ 1.2
Accounts Payable	209.6	-	209.6
Compensation and Employee Benefits	84.4	-	84.4
Income Taxes	7.0	-	7.0
Interest Payable	42.6	(10.8)	31.8
Other Accrued Liabilities	66.0	8.3	74.3
Total Current Liabilities	420.6	(12.3)	408.3
LONG-TERM DEBT, less Current Portion	1,967.3	(1,095.7)	871.6
DEFERRED TAX LIABILITIES	461.5	(238.0)	223.5
OTHER NON-CURRENT LIABILITIES	237.9	(70.5)	167.4
TOTAL LIABILITIES	3,087.3	(1,416.5)	1,670.8
SHAREHOLDERS' EQUITY			
COMMON STOCK	2.0	0.6	2.6
ADDITIONAL PAID-IN CAPITAL	1,169.6	(221.1)	948.5
Unearned Compensation	(0.1)	-	(0.1)
(ACCUMULATED DEFICIT)/RETAINED EARNINGS	(800.6)	886.9	86.3
ACCUMULATED DEVIATIVE INSTRUMENTS LOSS	5.2	-	5.2
CUMULATIVE CURRENCY TRANSLATION ADJUSTMENT	(17.4)	(11.5)	(28.9)
MINIMUM PENSION LIABILITY ADJUSTMENT	(90.0)		(90.0)
TOTAL SHAREHOLDERS' EQUITY	268.7	654.9	923.6
TOTAL LIABILITIES AND EQUITY	$ 3,356.0	$ (761.6)	$ 2,594.4

PRICEWATERHOUSECOOPERS

PricewaterhouseCoopers LLP
10 Tenth Street, Suite 1400
Atlanta GA 30309-3851
Telephone (678) 419 1000
Facsimile (678) 419 1239

Report of Independent Accountants

To the Board of Directors of Graphic Packaging Corporation:

We have performed the procedures enumerated below, which were agreed to by the Louisiana Department of Environmental Quality (the "State") and Graphic Packaging Corporation ("the Company"), solely to assist you in evaluating management's assertion about the Company's compliance with the financial test option, as adjusted, of Louisiana Environmental Regulatory Code 33:VII.727.A.1. and A.2. as of December 31, 2005. The Company is responsible for the Graphic Packaging Corporation's compliance with those requirements and any and all proforma adjustments made to the Unaudited Proforma Condensed Consolidated Balance Sheet. This agreed-upon procedures engagement was conducted in accordance with attestation standards established by the American Institute of Certified Public Accountants. The sufficiency of these procedures is solely the responsibility of those parties specified in this report. Consequently, we make no representation regarding the sufficiency of the procedures described below either for the purpose for which this report has been requested or for any other purpose.

The procedures we performed were as follows:

1. We performed the following procedures on the Unaudited Proforma Condensed Consolidated Balance Sheet:

    a. We compared the amounts to be included under the caption "Actual" to the corresponding amounts in the consolidated financial statements included in the Company's 2005 Annual Report, on Form 10-K.

We were not engaged to and did not conduct an examination, the objective of which would be the expression of an opinion on compliance. Accordingly, we do not express such an opinion. Had we performed additional procedures, other matters might have come to our attention that would have been reported to you.

This report is intended solely for the information and use of the Board of Directors and management of the Company and the State, and is not intended to be and should not be used by anyone other than these specified parties.

PricewaterhouseCoopers LLP.

PricewaterhouseCoopers LLP
August 22, 2006

REVISED FINANCIAL ASSURANCE RESPONSES
(LAC 33:VII.727)

Financial Assurance for All Processors and Disposers of Solid Waste

§727. Financial Assurance

A. Financial Responsibility during Operation and for Closure and Post-Closure Care

1. Financial Responsibility during Operation. Permit holders or applicants for standard permits of Type I, I-A, II, II-A, and III facilities have the following financial responsibilities while the facility is in operation.

   a. Permit holders or applicants for Type I and II facilities shall maintain liability insurance, or its equivalent, for sudden and accidental occurrences in the amount of $1 million per occurrence and $1 million annual aggregate, per site, exclusive of legal-defense costs, for claims arising from injury to persons or property, owing to the operation of the site. Evidence of this coverage shall be updated annually and provided to the Office of Environmental Services, Water and Waste Permits Division.

      Graphic Packaging International, Inc. is a Type I Facility that will maintain liability insurance or its equivalent, for sudden and accidental occurrences in the amount of $1 million per occurrence and $1 million annual aggregate, per site, exclusive of legal-defense costs, for claims arising from injury to persons or property, owing to the operation of the site. Evidence of this coverage shall be updated annually and provided to the Office of Environmental Services, Water and Waste Permits Division.

   b. Permit holders or applicants for Type I-A and II-A facilities shall maintain liability insurance, or its equivalent, for sudden and accidental occurrences in the amount of $500,000 per occurrence, and $500,000 annual aggregate, per site, exclusive of legal-defense costs, for claims arising from injury to persons or property, owing to the operation of the site. Evidence of this coverage shall be updated annually and provided to the Office of Environmental Services, Water and Waste Permits Division.

      Not Applicable. Graphic Packaging International, Inc. is a Type I Facility.

   c. Permit holders or applicants for Type III facilities shall maintain liability insurance, or its equivalent, for sudden and accidental occurrences in the amount of $250,000 per occurrence, and

$250,000 annual aggregate, per site, exclusive of legal-defense costs, for claims arising from injury to persons or property, owing to the operation of the site. Evidence of this coverage shall be updated annually and provided to the Office of Environmental Services, Water and Waste Permits Division.

Not Applicable. Graphic Packaging International, Inc. is a Type I Facility.

d. The financial responsibility may be established by any one or a combination of the following.

   i. Evidence of liability insurance may consist of either a signed duplicate original of a solid waste liability endorsement, or a certificate of insurance. All liability endorsements and certificates of insurance must include:

      (a). a statement of coverage relative to environmental risks;
      (b). a statement of all exclusions to the policy; and
      (c). a certification by the insurer that the insurance afforded with respect to such sudden accidental occurrences is subject to all of the terms and conditions of the policy, provided, however, that any provisions of the policy inconsistent with the following Clauses (i) through (vi) are amended to conform with said clauses:
         (i). bankruptcy or insolvency of the insured shall not relieve the insurer of its obligations under the policy;
         (ii). the insurer is liable for the payment of amounts within any deductible applicable to the policy, with a right of reimbursement by the insured for any such payment made by the insurer. This provision does not apply with respect to that amount of any deductible for which coverage is demonstrated as specified in Clause A.1.d.ii, iii, or iv of this Section;
         (iii). whenever requested by the administrative authority, the insurer agrees to furnish to the administrative authority a signed duplicate original of the policy and all endorsements;
         (iv). cancellation of the policy, whether by the insurer or the insured, will be effective only upon written notice and upon lapse of 60 days after a copy of such written notice is received by the Office of Environmental Services, Water and Waste Permits Division;
         (v). any other termination of the policy will be effective only upon written notice and upon lapse of 30 days after a copy of such written notice is received by the Office of Environmental Services, Water and Waste Permits Division;

(vi).the insurer is admitted, authorized, or eligible to conduct insurance business in Louisiana.

(d). The wording of the liability endorsement shall be identical to the wording that follows, except that the instructions in brackets are to be replaced with the relevant information and the brackets deleted.

Not Applicable. Graphic Packaging International, Inc. utilizes the Financial Test and Corporate Guarantee to demonstrate financial assurance.

ii. Letter of Credit. A permit holder or applicant may satisfy the requirements of this Section by obtaining an irrevocable standby letter of credit that conforms to the following requirements, and by submitting the letter to the administrative authority.

(a). The issuing institution must be an entity that has the authority to issue letters of credit and whose letter-of-credit operations are regulated and examined by a federal or state agency.

(b). A permit holder or applicant who uses a letter of credit to satisfy the requirements of this Section must also provide to the administrative authority evidence of the establishment of a standby trust fund. Under the terms of the letter of credit, all amounts paid pursuant to a draft by the administrative authority will be deposited by the issuing institution directly into the standby trust fund. The wording of the standby trust fund agreement shall be as specified in Clause A.2.d.ix of this Section.

(c). The letter of credit must be accompanied by a letter from the permit holder or applicant referring to the letter of credit by number, name of issuing institution, and date, and providing the following information: solid waste identification number, site name, facility name, facility permit number, and the amount of funds assured for liability coverage of the facility by the letter of credit.

(d). The letter of credit must be irrevocable and issued for a period of at least one year unless, at least 120 days before the current expiration date, the issuing institution notifies both the permit holder and the administrative authority by certified mail of a decision not to extend the expiration date. Under the terms of the letter of credit, the 120 days will begin on the date when both, the permit holder and the Office of Environmental Services, Water and Waste Permits Division, receive the notice, as evidenced by the return receipts.

(e). The wording of the letter of credit shall be identical to the wording that follows, except that the instructions in brackets

are to be replaced with the relevant information and the brackets deleted.

Not Applicable. Graphic Packaging International, Inc. utilizes the Financial Test and Corporate Guarantee to demonstrate financial assurance.

iii. Financial Test

(a). To meet this test, the applicant, permit holder, parent corporation of the applicant (corporate guarantor), or permit holder must submit to the Office of Environmental Services, Water and Waste Permits Division, the documents required by Paragraph A.2 of this Section demonstrating that the requirements of that Subsection have been met. Use of the financial test may be disallowed on the basis of the accessibility of the assets of the permit holder, applicant, or parent corporation (corporate guarantor). If the applicant, permit holder, or parent corporation is using the financial test to demonstrate liability coverage and closure and post-closure care, only one letter from the chief financial officer is required.

The parent corporation/corporate guarantor utilizes the financial test to demonstrate financial responsibility for liability coverage, closure and post-closure care. The document required by Paragraph A.2 of this Section will be submitted to the Office of Environmental Services, Water and Waste Permits Division under separate cover. It is acknowledged that use of the financial test may be disallowed on the basis of the accessibility of the assets of the permit holder, applicant, or parent corporation (corporate guarantor). It is also acknowledged that only one letter from the chief financial officer is required.

(b). The assets of the parent corporation of the applicant or permit holder shall not be used to determine whether the applicant or permit holder satisfies the financial test, unless the parent corporation has supplied a corporate guarantee as authorized in Clause A.1.d.iv of this Section.

The corporate guarantor has supplied a corporate guarantee as authorized in Clause A.1.d.iv.

(c). The wording of the financial test shall be as specified in Subclause A.2.i.iv.(e) of this Section.

The wording of the financial test is as specified in Subclause A.2.iv.(e) of this section.

iv. Corporate Guarantee

(a). A permit holder or applicant may meet the requirements of Paragraph A.1 of this Section for liability coverage by obtaining a written guarantee, hereafter referred to as a "corporate guarantee." The guarantor must demonstrate to the administrative authority that the guarantor meets the requirements in Subparagraph A.2.i of this Section and must comply with the terms of the corporate guarantee. The corporate guarantee must accompany the items sent to the administrative authority specified in Clauses A.2.i.ii and iv of this Section. The terms of the corporate guarantee must be in an authentic act signed and sworn to by an authorized officer of the corporation before a notary public and must provide that:

Graphic Packaging International, Inc. meets the requirements of Paragraph A.1. of this Section for liability coverage through the corporate guarantee. The guarantor meets the requirements of Subsection A.2.i of this Section and will comply with all terms of the corporate guarantee. The corporate guarantee will accompany the items sent to the administrative authority specified in Clauses A.2.ii and iv of this Section. The terms of the corporate guarantee are an authentic act signed and sworn to by an authorized officer of the corporation before a notary public and provides for the following provisions:

(i). the guarantor meets or exceeds the financial-test criteria and agrees to comply with the reporting requirements for guarantors as specified in Subparagraph A.2.i of this Section;

(ii). the guarantor is the parent corporation of the permit holder or applicant of the solid waste facility or facilities to be covered by the guarantee, and the guarantee extends to certain facilities;

(iii). if the permit holder or applicant fails to satisfy a judgment based on a determination of liability for bodily injury or property damage to third parties caused by sudden and accidental occurrences (or both as the case may be), arising from the operation of facilities covered by the corporate guarantee, or fails to pay an amount agreed to in settlement of the claims arising from or alleged to arise from such injury or damage, the guarantor will do so up to the limits of coverage;

(iv). the guarantor agrees that if, at the end of any fiscal year before termination of the guarantee, the guarantor fails to meet the financial-test criteria, the guarantor shall send within 90 days, by certified mail, notice to the Office of Environmental Services, Water and Waste Permits Division, and to the permit holder or applicant, that he intends to provide alternative financial assurance as specified in Paragraph A.1 of this Section, in the name of the permit holder or applicant, and that within 120 days after the end of said fiscal year the guarantor shall establish such financial assurance, unless the permit holder or applicant has done so;

(v). the guarantor agrees to notify the Office of Environmental Services, Water and Waste Permits Division, by certified mail of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming the guarantor as debtor, within 10 days after commencement of the proceeding;

(vi). the guarantor agrees that within 30 days after being notified by the administrative authority of a determination that the guarantor no longer meets the financial-test criteria or that he or she is disallowed from continuing as a guarantor of closure or post-closure care, he or she shall establish alternate financial assurance as specified in Paragraph A.1 of this Section in the name of the permit holder or applicant unless the permit holder or applicant has done so;

(vii). the guarantor agrees to remain bound under the guarantee notwithstanding any or all of the following: amendment or modification of the permit, or any other modification or alteration of an obligation of the permit holder or applicant pursuant to these regulations;

(viii). the guarantor agrees to remain bound under the guarantee for as long as the permit holder or applicant must comply with the applicable financial assurance requirements of Paragraph A.2 of this Section for the above-listed facilities, except that the guarantor may cancel this guarantee by sending notice by certified mail to the administrative authority and the permit holder or applicant. Such cancellation will become effective no earlier than 90 days after receipt of such notice by both the administrative authority and the permit holder, as evidenced by the return receipts;

(ix). the guarantor agrees that if the permit holder or applicant fails to provide alternate financial assurance, as specified in Paragraph A.1 of this Section, and obtain written approval of such assurance from the administrative authority within 60 days after the

administrative authority receives the guarantor's notice of cancellation, the guarantor shall provide such alternate financial assurance in the name of the permit holder or applicant;

(x). the guarantor expressly waives notice of acceptance of the guarantee by the administrative authority or by the permit holder or applicant. Guarantor also expressly waives notice of amendments or modifications of the facility permit(s);

(xi). the wording of the corporate guarantee shall be as specified in Subclause A.2.i.ix.(l) of this Section.

Graphic Packaging International, Inc. acknowledges and will abide by the terms and requirements set forth above for the corporate guarantee.

(b). A corporate guarantee may be used to satisfy the requirements of this Section only if the attorney general(s) or insurance commissioner(s) of the state in which the guarantor is incorporated, and the state in which the facility covered by the guarantee is located, has submitted a written statement to the Office of Environmental Services, Water and Waste Permits Division, that a corporate guarantee is a legally valid and enforceable obligation in that state.

Graphic Packaging International, Inc. acknowledges that a corporate guarantee may be used only if the attorney general(s) or insurance commissioner(s) of the state in which the guarantor is incorporated, and the state in which the facility covered by the guarantee is located, has submitted a written statement to the Office of Environmental Services, Water and Waste Permits Division, that a corporate guarantee is a legally valid and enforceable obligation in that state. These written statements have been provided to the Office of Environmental Services, Water and Waste Permits.

e. The use of a particular financial responsibility mechanism is subject to the approval of the administrative authority.

Graphic Packaging International, Inc. acknowledges that the financial responsibility mechanism is subject to approval by the administrative authority.

f. Permit holders of existing facilities must submit, on or before February 20, 1995, financial responsibility documentation that complies with the requirements of Paragraph A.1 of this Section. Applicants for permits for new facilities must submit evidence of

financial assurance in accordance with this Section at least 60 days before the date on which solid waste is first received for processing or disposal.

Graphic Packaging International, Inc. acknowledges the above regulation and complied with the financial responsibility documentation requirement prior to February 20, 1995.

2. Financial Responsibility for Closure and Post-Closure Care. Permit holders or applicants of Type I, I-A, II, II-A, and III facilities have the following financial responsibilities for closure and post-closure care.

   a. Permit holders or applicants for processing or disposal facilities shall establish and maintain financial assurance for closure and post-closure care.

      Graphic Packaging International, Inc. acknowledges that financial assurance must be established and maintained for closure and post-closure care.

   b. The applicant or permit holder shall submit to the Office of Environmental Services, Water and Waste Permits Division, the estimated closure date and the estimated cost of closure and post-closure care in accordance with the following procedures.

      i. The applicant or permit holder must have a written estimate, in current dollars, of the cost of closing the facility in accordance with the requirements in these rules. The estimate must equal the cost of closure at the point in the facility's operating life when the extent and manner of its operation would make closure the most expensive, as indicated by the closure plan, and shall be based on the cost of hiring a third party to close the facility in accordance with the closure plan.

         Graphic Packaging International, Inc. acknowledges the requirement above and has provided a written estimate, in current dollars, of the cost of closing the facility in accordance with the requirements of these rules. The closure and post-closure cost estimate has been provided in the permit document.

      ii. The applicant or permit holder of a facility subject to post-closure monitoring or maintenance requirements must have a written estimate, in current dollars, of the annual cost of post-closure monitoring and maintenance of the facility in accordance with the provisions of these rules. The estimate of post-closure costs is calculated by multiplying the annual post-closure cost estimate by the number of years of post-closure care required and shall be

based on the cost of hiring a third party to conduct post-closure activities in accordance with the closure plan.

iii. **Graphic Packaging International, Inc. acknowledges that the facility is subject to post-closure monitoring or maintenance in accordance with the provisions of these rules. The estimate of post-closure costs has been calculated by multiplying the annual post-closure care required and is based on the cost of hiring a third party to conduct post-closure activities in accordance with the closure plan. The closure and post-closure cost estimate has been provided in the permit document.**

iv. The cost estimates must be adjusted within 30 days after each anniversary of the date on which the first cost estimate was prepared on the basis of either the inflation factor derived from the Annual Implicit Price Deflator for Gross Domestic Product, as published by the U.S. Department of Commerce in its Survey of Current Business or a re-estimation of the closure and post-closure costs in accordance with Clauses A.2.b.i and ii of this Section. The permit holder or applicant must revise the cost estimate whenever a change in the closure/post-closure plans increases or decreases the cost of the closure plan. The permit holder or applicant must submit a written notice of any such adjustment to the Office of Environmental Services, Water and Waste Permits Division, within 15 days following such adjustment.

Graphic Packaging International, Inc. acknowledges that the cost estimates must be adjusted within 30 days after each anniversary of the date on which the first cost estimate was prepared on the basis of either the inflation factor derived from the Annual Implicit Price Deflator for Gross Domestic Product, as published by the U.S. Department of Commerce in its Survey of Current Business or a re-estimation of the closure and post-closure costs in accordance with Clauses A.2.b.i and ii of this Section. Graphic Packaging International, Inc. will revise the cost estimate whenever a change in the closure/post-closure plans increases or decreases the cost of the closure plan. Graphic Packaging International, Inc. will submit a written notice of any such adjustment to the Office of Environmental Services, Water and Waste Permits Division, within 15 days following such adjustment.

iv. For trust funds, the first payment must be at least equal to the current closure and post-closure cost estimate, divided by the number of years in the pay-in period. Subsequent payments must be made no later than 30 days after each annual anniversary of the date of the first payment. The amount of each subsequent

payment must be determined by subtracting the current value of the trust fund from the current closure and post-closure cost estimates and dividing the result by the number of years remaining in the pay-in period. The initial pay-in period is based on the estimated life of the facility.

Not applicable. Graphic Packaging International, Inc. is not utilizing a trust fund to establish financial responsibility.

c. Financial Assurance Mechanisms. The financial assurance mechanism must be one or a combination of the following: a trust fund, a financial guarantee bond ensuring closure funding, a performance bond, a letter of credit, an insurance policy, or the financial test. The financial assurance mechanism is subject to the approval of the administrative authority and must fulfill the following criteria.

The financial assurance mechanism established to demonstrate financial responsibility is the financial test.

i. Except when a financial test, trust fund, or certificate of insurance is used as the financial assurance mechanism, a standby trust fund naming the administrative authority as beneficiary must be established at the time of the creation of the financial assurance mechanism into which the proceeds of such mechanism could be transferred should such funds be necessary for either closure or post-closure of the facility, and a signed copy must be furnished to the administrative authority with the mechanism.

Although not applicable, Graphic Packaging International, Inc. acknowledges the requirements above for the establishment of a standby trust fund.

ii. A permit holder or applicant may use a financial assurance mechanism specified in this Section for more than one facility, if all such facilities are located within Louisiana and are specifically identified in the mechanism.

Graphic Packaging International, Inc. acknowledges that the financial assurance mechanism specified in this Section may be used for more than one facility, if all such facilities are located within Louisiana and are specifically identified in the mechanism.

iii. The amount covered by the financial assurance mechanism(s) must equal the total of the current closure and post-closure estimates for each facility covered.

The amount covered by the established financial test is equal to the total of the current closure and post-closure estimates for each facility covered.

iv. When all closure and post-closure requirements have been satisfactorily completed, the administrative authority shall execute an approval to terminate the financial assurance mechanism(s).

Graphic Packaging International, Inc. acknowledges that when all closure and post-closure requirements have been satisfactorily completed, the administrative authority shall execute an approval to terminate the financial assurance mechanism(s).

d. Trust Funds. A permit holder or applicant may satisfy the requirements of this Section by establishing a closure trust fund that conforms to the following requirements and submitting an originally signed duplicate of the trust agreement to the Office of Environmental Services, Water and Waste Permits Division.

i. The trustee must be an entity that has the authority to act as a trustee and whose trust operations are regulated and examined by a federal or state agency.

ii. Trusts must be accomplished in accordance with and subject to the laws of Louisiana. The beneficiary of the trust shall be the administrative authority.

iii. Trust-fund earnings may be used to offset required payments into the fund, to pay the fund trustee, or to pay other expenses of the funds, or may be reclaimed by the permit holder or applicant upon approval of the administrative authority.

iv. The trust agreement must be accompanied by an affidavit certifying the authority of the individual signing the trust on behalf of the permit holder or applicant.

v. The permit holder or applicant may accelerate payments into the trust fund or deposit the full amount of the current closure cost estimate at the time the fund is established. The permit holder or applicant must, however, maintain the value of the fund at no less than the value that the fund would have if annual payments were made as specified in Clause A.2.b.iv of this Section.

vi. If the permit holder or applicant establishes a trust fund after having used one or more of the alternate mechanisms specified in this Section, his first payment must be in at least the amount that the fund would contain if the trust fund were established initially and annual payments made according to the specifications of this Paragraph.

vii. After the pay-in period is completed, whenever the current cost estimate changes, the permit holder must compare the new estimate with the trustee's most recent annual valuation of the trust fund. If the value of the fund is less than the amount of the

new estimate, the permit holder or applicant, within 60 days after the change in the cost estimate, must either deposit an amount into the fund that will make its value at least equal to the amount of the closure/post-closure cost estimate or it must estimate or obtain other financial assurance as specified in this Section to cover the difference.

viii. After beginning final closure, a permit holder, or any other person authorized by the permit holder to perform closure and/or post-closure may request reimbursement for closure and/or post-closure expenditures by submitting itemized bills to the Office of Environmental Services, Water and Waste Permits Division. Within 60 days after receiving bills for such activities, the administrative authority will determine whether the closure and/or post-closure expenditures are in accordance with the closure plan or otherwise justified, and if so, he or she will instruct the trustee to make reimbursement in such amounts as the administrative authority specifies in writing. If the administrative authority has reason to believe that the cost of closure and/or post-closure will be significantly greater than the value of the trust fund, he may withhold reimbursement for such amounts as he deems prudent until he determines that the permit holder is no longer required to maintain financial assurance.

ix. The wording of the trust agreement shall be identical to the wording that follows, except that the instructions in brackets are to be replaced with the relevant information and the brackets deleted. The trust agreement shall be accompanied by a formal certification of acknowledgement.

Not Applicable. Graphic Packaging International, Inc. has established the financial test to demonstrate financial responsibility.

e. Surety Bonds. A permit holder or applicant may satisfy the requirements of this Section by obtaining a surety bond that conforms to the following requirements and submitting the bond to the Office of Environmental Services, Water and Waste Permits Division.

i. The surety company issuing the bond must, at a minimum, be among those listed as acceptable sureties on federal bonds in Circular 570 of the U.S. Department of the Treasury and approved by the administrative authority.

ii. The permit holder or applicant who uses a surety bond to satisfy the requirements of this Section must also provide to the administrative authority evidence of the establishment of a standby trust fund. Under the terms of the bond, all payments made thereunder will be deposited by the surety directly into the standby trust fund in accordance with instructions from the administrative authority. The wording of the standby trust fund shall be as specified in Clause A.2.d.ix of this Section.

iii. The bond must guarantee that the operator will:
   (a). fund the standby trust fund in an amount equal to the penal sum of the bond before the beginning of final closure of the facility; or
   (b). fund the standby trust fund in an amount equal to the penal sum within 15 days after an order to begin closure or post-closure is issued; or
   (c). provide alternate financial assurance as specified in this Section and obtain the administrative authority's written approval of the assurance provided, within 90 days after receipt by both the permit holder and the administrative authority of a notice of cancellation of the bond from the surety.

iv. Under the terms of the bond, the surety will become liable on the bond obligation when the permit holder fails to perform as guaranteed by the bond.

v. The penal sum of the bond must be at least equal to the current closure and post-closure cost estimates.

vi. Whenever the current cost-estimate increases to an amount greater than the penal sum, the permit holder, within 60 days after the increase, must either cause the penal sum to be increased to an amount at least equal to the current closure and post-closure estimate and submit evidence of such increase to the Office of Environmental Services, Water and Waste Permits Division, or obtain other financial assurance as specified in this Section to cover the increase. Whenever the current cost estimate decreases, the penal sum may be reduced to the amount of the current cost estimate following written approval by the administrative authority.

vii. Under the terms of the bond, the surety may cancel the bond by sending notice of cancellation by certified mail to the permit holder and to the administrative authority. Cancellation may not occur, however, before 120 days have elapsed, beginning on the date that both the permit holder and the administrative authority receive the notice of cancellation, as evidenced by the return receipts.

viii. The wording of the surety bond guaranteeing payment into a standby trust fund shall be identical to the wording that follows, except that the instructions in brackets are to be replaced with the relevant information and the brackets delete.

Not Applicable. Graphic Packaging International, Inc. has established the financial test to demonstrate financial responsibility.

f. Performance Bonds. A permit holder or applicant may satisfy the requirements of this Section by obtaining a surety bond that conforms

to the following requirements and submitting the bond to the Office of Environmental Services, Water and Waste Permits Division.

i. The surety company issuing the bond must, at a minimum, be among those listed as acceptable sureties on federal bonds in Circular 570 of the U.S. Department of the Treasury and approved by the administrative authority.
ii. The permit holder or applicant who uses a surety bond to satisfy the requirements of this Section must also provide to the administrative authority evidence of establishment of a standby trust fund. Under the terms of the bond, all payments made thereunder will be deposited by the surety directly into the standby trust fund in accordance with instructions from the administrative authority. The wording of the standby trust fund shall be as specified in Clause A.2.d.ix of this Section.
iii. The bond must guarantee that the permit holder or applicant will:
    (a). perform final closure and post-closure in accordance with the closure plan and other requirements of the permit for the facility whenever required to do so; or
    (b). provide alternate financial assurance as specified in this Section and obtain the administrative authority's written approval of the assurance provided within 90 days after the date both the permit holder and the administrative authority receive notice of cancellation of the bond from the surety.
iv. Under the terms of the bond, the surety will become liable on the bond obligation when the permit holder fails to perform as guaranteed by the bond. Following a determination by the administrative authority that the permit holder has failed to perform final closure and post-closure in accordance with the closure plan and other permit requirements when required to do so, under the terms of the bond the surety will perform final closure and post-closure as guaranteed by the bond or will deposit the amount of the penal sum into the standby trust fund.
v. The penal sum of the bond must be at least equal to the current closure and post-closure cost estimates.
vi. Whenever the current closure cost estimate increases to an amount greater than the penal sum, the permit holder, within 60 days after the increase, must either cause the penal sum to be increased to an amount at least equal to the current closure and post-closure cost estimates and submit evidence of such increase to the Office of Environmental Services, Water and Waste Permits Division, or obtain other financial assurance as specified in this Section. Whenever the current cost estimate decreases, the penal sum may be reduced to the amount of the current cost estimate after written approval of the administrative authority.
vii. Under the terms of the bond, the surety may cancel the bond by sending notice of cancellation by certified mail to the permit holder and to the Office of Environmental Services, Water and Waste

Permits Division. Cancellation may not occur before 120 days have elapsed beginning on the date that both the permit holder and the administrative authority receive the notice of cancellation, as evidenced by the return receipts.

viii. The wording of the performance bond shall be identical to the wording that follows, except that the instructions in brackets are to be replaced with the relevant information and the brackets deleted.

Not Applicable. Graphic Packaging International, Inc. has established the financial test to demonstrate financial responsibility.

g. Letter of Credit. A permit holder or applicant may satisfy the requirements of this Section by obtaining an irrevocable standby letter of credit that conforms to the following requirements and submitting the letter to the Office of Environmental Services, Water and Waste Permits Division.

i. The issuing institution must be an entity that has the authority to issue letters of credit and whose letter-of-credit operations are regulated and examined by a federal or state agency.

ii. A permit holder or applicant who uses a letter of credit to satisfy the requirements of this Section must also provide to the administrative authority evidence of the establishment of a standby trust fund. Under the terms of the letter of credit, all amounts paid pursuant to a draft by the administrative authority will be deposited by the issuing institution directly into the standby trust fund. The wording of the standby trust fund shall be as specified in Clause A.2.d.ix of this Section.

iii. The letter of credit must be accompanied by a letter from the permit holder or applicant referring to the letter of credit by number, issuing institution, and date, and providing the following information: solid waste identification number, site name, facility name, facility permit number, and the amount of funds assured for closure and/or post-closure of the facility by the letter of credit.

iv. The letter of credit must be irrevocable and issued for a period of at least one year, unless, at least 120 days before the current expiration date, the issuing institution notifies both the permit holder and the Office of Environmental Services, Water and Waste Permits Division, by certified mail of a decision not to extend the expiration date. Under the terms of the letter of credit, the 120 days will begin on the date when both the permit holder and the administrative authority receive the notice, as evidenced by the return receipts.

v. The letter of credit must be issued in an amount at least equal to the current closure and post-closure cost estimates.

vi. Whenever the current cost estimates increase to an amount greater than the amount of the credit, the permit holder, within 60

days after the increase, must either cause the amount of the credit to be increased so that it at least equals the current closure and post-closure cost estimates and submit evidence of such increase to the Office of Environmental Services, Water and Waste Permits Division, or obtain other financial assurance as specified in this Section to cover the increase. Whenever the current cost estimate decreases, the amount of the credit may be reduced to the amount of the current closure and post-closure cost estimates upon written approval of the administrative authority.

vii. Following a determination by the administrative authority that the permit holder has failed to perform final closure or post-closure in accordance with the closure plan and other permit requirements when required to do so, the administrative authority may draw on the letter of credit.

viii. The wording of the letter of credit shall be identical to the wording that follows, except that the instructions in brackets are to be replaced with the relevant information and the brackets deleted.

Not Applicable. Graphic Packaging International, Inc. has established the financial test to demonstrate financial responsibility.

h. Insurance. A permit holder or applicant may satisfy the requirements of this Section by obtaining insurance that conforms to the requirements of this Subparagraph and submitting a certificate of such insurance to the Office of Environmental Services, Water and Waste Permits Division.

i. At a minimum, the insurer must be licensed to transact the business of insurance, or eligible to provide insurance as an excess- or surplus-lines insurer in one or more states, and authorized to transact insurance business in Louisiana.

ii. The insurance policy must be issued for a face amount at least equal to the current closure and post-closure cost estimates.

iii. The term face amount means the total amount the insurer is obligated to pay under the policy. Actual payments by the insurer will not change the face amount, although the insurer's future liability will be lowered by the amount of the payments.

iv. The insurance policy must guarantee that funds will be available to close the facility and provide post-closure care once final closure occurs. The policy must also guarantee that, once final closure begins, the insurer will be responsible for paying out funds up to an amount equal to the face amount of the policy, upon the direction of the administrative authority, to such party or parties as the administrative authority specifies.

v. After beginning final closure, a permit holder or any other person authorized by the permit holder to perform closure and post-closure may request reimbursement for closure or post-closure

expenditures by submitting itemized bills to the Office of Environmental Services, Water and Waste Permits Division. Within 60 days after receiving such bills, the administrative authority will determine whether the expenditures are in accordance with the closure plan or otherwise justified, and if so, he or she will instruct the insurer to make reimbursement in such amounts as the administrative authority specifies in writing.

vi. The permit holder must maintain the policy in full force and effect until the administrative authority consents to termination of the policy by the permit holder.

vii. Each policy must contain a provision allowing assignment of the policy to a successor permit holder. Such assignment may be conditional upon consent of the insurer, provided consent is not unreasonably refused.

viii. The policy must provide that the insurer may not cancel, terminate, or fail to renew the policy except for failure to pay the premium. The automatic renewal of the policy must, at a minimum, provide the insured with the option of renewal at the face amount of the expiring policy. If there is a failure to pay the premium, the insurer may elect to cancel, terminate, or fail to renew the policy by sending notice by certified mail to the permit holder and the Office of Environmental Services, Water and Waste Permits Division. Cancellation, termination, or failure to renew may not occur, however, before 120 days have elapsed, beginning on the date that both the administrative authority and the permit holder receive notice of cancellation, as evidenced by the return receipts. Cancellation, termination, or failure to renew may not occur, and the policy will remain in full force and effect in the event that, on or before the date of expiration:

(a). the administrative authority deems the facility abandoned; or

(b). the permit is terminated or revoked or a new permit is denied; or

(c). closure and/or post-closure is ordered; or

(d). the permit holder is named as debtor in a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code; or

(e). the premium due is paid.

ix. Whenever the current cost estimate increases to an amount greater than the face amount of the policy, the permit holder, within 60 days after the increase, must either increase the face amount to at least equal to the current closure and post-closure cost estimates and submit evidence of such increase to the Office of Environmental Services, Water and Waste Permits Division, or obtain other financial assurance as specified in this Section to cover the increase. Whenever the current cost estimate decreases, the face amount may be reduced to the amount of the current closure and post-closure cost estimates following written approval by the administrative authority.

x. The wording of the certificate of insurance shall be identical to the wording that follows, except that the instructions in brackets are to be replaced with the relevant information and the brackets deleted.

Not Applicable. Graphic Packaging International, Inc. has established the financial test to demonstrate financial responsibility.

i. Financial Test. A permit holder, applicant, or parent corporation of the permit holder or applicant, which will be responsible for the financial obligations, may satisfy the requirements of this Section by demonstrating that he or she passes a financial test as specified in this Subparagraph. The assets of the parent corporation of the applicant or permit holder shall not be used to determine whether the applicant or permit holder satisfies the financial test, unless the parent corporation has supplied a corporate guarantee as outlined in Clause A.1.d.iv of this Section.

i. To pass this test, the permit holder, applicant, or parent corporation of the permit holder or applicant, must meet the criteria of either Subclause (a) or (b) below.

(a). The permit holder, applicant, or parent corporation of the permit holder or applicant must have:

(i). tangible net worth of at least six times the sum of the current closure and post-closure estimates to be demonstrated by this test, and the amount of liability coverage to be demonstrated by this test; and

(ii). tangible net worth of at least $10 million; and

(iii). assets in the United States amounting to either at least 90 percent of his total assets, or at least six times the sum of the current closure and post-closure estimates, to be demonstrated by this test, and the amount of liability coverage to be demonstrated by this test.

As shown on the Financial Test (Alternative I form), the parent corporation meets the above criteria.

(b). The permit holder, applicant, or parent corporation of the permit holder or applicant must have:

(i). a current rating for his most recent bond issuance of AAA, AA, A, or BBB, as issued by *Standard and Poor's*, or Aaa, Aa, or Baa, as issued by *Moody's*; and

(ii). tangible net worth of at least $10 million; and

(iii). assets in the United States amounting to either 90 percent of his total assets or at least six times the sum of the current closure and post-closure estimates, to be demonstrated by this test, and the amount of liability coverage to be demonstrated by this test.

Not Applicable. Financial Test requirements are met by the above section.

ii. To demonstrate that he or she meets this test, the permit holder, applicant, or parent corporation of the permit holder or applicant must submit the following three items to the Office of Environmental Services, Water and Waste Permits Division:

(a). a letter signed by the chief financial officer of the permit holder, applicant, or parent corporation demonstrating and certifying the criteria in Clause A.2.i.i of this Section and including the information required by Clause A.2.i.iv of this Section. If the financial test is provided to demonstrate both assurance for closure and/or post-closure care and liability coverage, a single letter to cover both forms of financial responsibility is required;

A copy of a single letter from the chief financial officer of the parent corporation certifying the criteria in Clause A.2.i.i of this Section and including the information required by Clause A.2.i.iv of this Section has been provided to LDEQ.

(b). a copy of the independent certified public accountant (CPA)'s report on the financial statements of the permit holder, applicant, or parent corporation of the permit holder or applicant for the latest completed fiscal year;

A copy of the independent CPA's report on the financial statements of the parent corporation has been provided to LDEQ.

(c). a special report from the independent CPA to the permit holder, applicant, or parent corporation of the permit holder or applicant stating that:

(i). he or she has computed the data specified by the chief financial officer as having been derived from the independently audited, year-end financial statements with the amounts for the latest fiscal year in such financial statements; and

(ii). in connection with that procedure, no matters came to his attention that caused him to believe that the specified data should be adjusted.

The special report from the independent CPA stating the above requirements for this report has been provided to the LDEQ.

iii. The administrative authority may disallow use of this test on the basis of the opinion expressed by the independent CPA in his report on qualifications based on the financial statements. An

adverse opinion or a disclaimer of opinion will be cause for disallowance. The administrative authority will evaluate other qualifications on an individual basis. The administrative authority may disallow the use of this test on the basis of the accessibility of the assets of the parent corporation (corporate guarantor), permit holder, or applicant. The permit holder, applicant, or parent corporation must provide evidence of insurance for the entire amount of required liability coverage, as specified in this Section, within 30 days after notification of disallowance.

Graphic Packaging International, Inc. acknowledges that the administrative authority may disallow use of the test on the basis of the opinion expressed by the independent CPA in his report on qualifications based on the financial statements. An adverse opinion or a disclaimer of opinion will be cause for disallowance. Graphic Packaging International, Inc. also acknowledges that the administrative authority will evaluate other qualifications on an individual basis and may disallow the use of this test on the basis of the accessibility of the assets of the parent corporation (corporate guarantor). Graphic Packaging International, Inc. or the parent company will provide evidence of insurance for the entire amount of required liability coverage, as specified in this Section, within 30 days after notification of disallowance.

iv. The permit holder, applicant, or parent corporation (if a corporate guarantor) of the permit holder or applicant shall provide to the Office of Environmental Services, Water and Waste Permits Division, a letter from the chief financial officer certifying the following information:

(a). a list of solid waste facilities, whether in Louisiana or not, owned or operated by the permit holder or applicant of the facility, for which financial assurance for liability coverage is demonstrated through the use of financial tests, including the amount of liability coverage;

(b). a list of solid waste facilities, whether in Louisiana or not, owned or operated by the permit holder or applicant, for which financial assurance for the closure or post-closure care is demonstrated through the use of a financial test or self-insurance by the permit holder or applicant, including the cost estimates for the closure and post-closure care of each facility;

(c). a list of the solid waste facilities, whether in Louisiana or not, owned or operated by any subsidiaries of the parent corporation for which financial assurance for closure and/or post-closure is demonstrated through the financial test or through use of self-insurance, including the current cost estimate for the closure or post-closure care for each facility

and the amount of annual aggregate liability coverage for each facility; and

(d). a list of solid waste facilities, whether in Louisiana or not, for which financial assurance for closure or post-closure care is not demonstrated through the financial test, self-insurance, or other substantially equivalent state mechanisms, including the estimated cost of closure and post-closure of such facilities.

(e). The wording of the letter from the chief financial officer shall be identical to the wording as follows, except that the instructions in brackets are to be replaced with the relevant information and the brackets deleted.

The letter from the chief financial officer certifying that the requirements above in the wording that is identical to the wording as follows except that the instructions in brackets are replaced with facility information has been provided to the Office of Environmental Services, Water and Waste Permits Division.

Please see the most current financial assurance documentation.

SOLID WASTE FACILITY
LETTER FROM THE CHIEF FINANCIAL OFFICER

(Liability Coverage, Closure, and/or Post-Closure)

Secretary
Louisiana Department of Environmental Quality
Post Office Box 4313
Baton Rouge, Louisiana 70821-4313
Attention: Office of Environmental Services,
Water and Waste Permits Division

Dear Sir:
I am the chief financial officer of [name and address of firm, which may be either the permit holder, applicant, or parent corporation of the permit holder or applicant]. This letter is in support of this firm's use of the financial test to demonstrate financial responsibility for [insert "liability coverage," "closure," and/or "post-closure," as applicable] as specified in [insert "LAC 33:VII.727.A.1," "LAC 33:VII.727.A.2,"or LAC 33:VII.727.A.1 and A.2"].
[Fill out the following four Paragraphs regarding facilities and associated liability coverage, and closure and post-closure cost estimates. If your firm does not have facilities that belong in a particular Paragraph, write "None" in the space indicated. For each facility, list the site identification number, site name, facility name, and facility permit number.]

1. The firm identified above is the [insert "permit holder," "applicant for a standard permit," or "parent corporation of the permit holder or applicant for a standard permit"] of the following solid waste facilities, whether in Louisiana or not, for which liability coverage is being demonstrated through the financial test specified in LAC 33:VII.727.A.1. The amount of annual aggregate liability coverage covered by the test is shown for each facility:
2. The firm identified above is the [insert "permit holder," "applicant for a standard permit," or "parent corporation of the permit holder or applicant for a standard permit"] of the following solid waste facilities, whether in Louisiana or not, for which financial assurance for [insert "closure," "post-closure," or "closure and post-closure"] is demonstrated through a financial test similar to that specified in LAC 33:VII.727.A.2 or other forms of self-insurance. The current [insert "closure," "post-closure," or "closure and post-closure"] cost estimates covered by the test are shown for each facility:
3. This firm guarantees through a corporate guarantee similar to that specified in [insert " LAC 33:VII.727.A.2," or LAC 33:VII.727.A.1 and 2"], [insert "liability coverage," "closure," "post-closure," or "closure and post-closure"] care of the following solid waste facilities, whether in Louisiana or not, of which [insert the name of the permit holder or applicant] are/is a subsidiary of this firm. The amount of annual aggregate liability coverage covered by the guarantee for each facility and/or the current cost estimates for the closure and/or post-closure care so guaranteed is shown for each facility:
4. This firm is the owner or operator of the following solid waste facilities, whether in Louisiana or not, for which financial assurance for liability coverage, closure

and/or post-closure care is not demonstrated either to the U.S. Environmental Protection Agency or to a state through a financial test or any other financial assurance mechanism similar to those specified in LAC 33:VII.727.A.1 and/or 2. The current closure and/or post-closure cost estimates not covered by such financial assurance are shown for each facility.

This firm [insert "is required" or "is not required"] to file a Form 10K with the Securities and Exchange Commission (SEC) for the latest fiscal year.

The fiscal year of this firm ends on [month, day]. The figures for the following items marked with an asterisk are derived from this firm's independently audited, year-end financial statements for the latest completed year, ended [date].

[Fill in Part A if you are using the financial test to demonstrate coverage only for the liability requirements.]

Part A. Liability Coverage for Accidental Occurrences

[Fill in Alternative I if the criteria of LAC 33:VII.727.A.2.i.i.(a) are used.]

Alternative I		
1. Amount of annual aggregate liability coverage to be demonstrated	$_____	
*2. Current assets	$_____	
*3. Current liabilities	$_____	
*4. Tangible net worth	$_____	
*5. If less than 90 percent of assets are located in the U.S., give total U.S. assets	$_____	
	YES	NO
6. Is line 4 at least $10 million?	___	___
7. Is line 4 at least 6 times line 1?	___	___
*8. Are at least 90 percent of assets located in the U.S.? If not, complete line 9.	___	___
9. Is line 4 at least 6 times line 1?	___	___

[Fill in Alternative II if the criteria of
LAC 33:VII.727.A.2.i.i.(b) are used.]

Alternative II		
1. Amount of annual aggregate liability coverage to be demonstrated	$_____	
2. Current bond rating of most recent issuance of this firm and name of rating service	_____	
3. Date of issuance of bond	_____	
4. Date of maturity of bond	_____	
*5. Tangible net worth	$_____	
*6. Total assets in U.S. (required only if less than 90 percent of assets are located in the U.S.)	$_____	
	YES	NO
7. Is line 5 at least $10 million?	___	___
8. Is line 5 at least 6 times line 1?	___	___
*9. Are at least 90 percent of assets located in the U.S.? If not, complete line 10.	___	___
10. Is line 6 at least 6 times lines 1?	___	___

[Fill in Part B if you are using the financial test to demonstrate
assurance only for closure and/or post-closure care.]

Part B. Closure And/Or Post-Closure

[Fill in Alternative I if the criteria of LAC 33:VII.727.A.2.i.i.(a) are used.]

Alternative I		
1. Sum of current closure and/or post-closure estimate (total all cost estimates shown above)	$_____	
*2. Tangible net worth	$_____	
*3. Net worth	$_____	
*4. Current Assets	$_____	
*5. Current liabilities	$_____	
*6. The sum of net income plus depreciation, depletion, and amortization	$_____	
*7. Total assets in U.S. (required only if less than 90 percent of firm's assets are located in the U.S.)	$_____	
	YES	NO
8. Is line 2 at least $10 million?	___	___
9. Is line 2 at least 6 times line 1?	___	___
*10. Are at least 90 percent of the firm's assets located in the U.S.? If not, complete line 11.	___	___
11. Is line 7 at least 6 times line 1?	___	___

[Fill in Alternative II if the criteria of LAC 33:VII.727.A.2.i.i.(b) are used.]

Alternative II		
1. Sum of current closure and post-closure cost estimates (total of all cost estimates shown above)	$_____	
2. Current bond rating of most recent issuance of this firm and name of rating service	_____	
3. Date of issuance of bond	_____	
4. Date of maturity of bond	_____	
*5. Tangible net worth (If any portion of the closure and/or post-closure cost estimate is included in "total liabilities" on your firm's financial statement, you may add the amount of that portion to this line)	$_____	
*6. Total assets in U.S. (required only if less than 90 percent of the firm's assets are located in the U.S.)	$_____	
	YES	NO
7. Is line 5 at least $10 million?	____	____
8. Is line 5 at least 6 times line 1?	____	____
9. Are at least 90 percent of the firm's assets located in the U.S.? If not, complete line 10.	____	____
10. Is line 6 at least 6 times line 1?	____	____

[Fill in Part C if you are using the financial test to demonstrate assurance for liability coverage, closure, and/or post-closure care.]

Part C. Liability Coverage, Closure, and/or Post-Closure

[Fill in Alternative I if the criteria of LAC 33:VII.727.A.2.i.i.(a) are used.]

Alternative I		
1. Sum of current closure and/or post-closure cost estimates (total of all cost estimates listed above)	$_____	
2. Amount of annual aggregate liability coverage to be demonstrated	$_____	
3. Sum of lines 1 and 2	$_____	
*4. Total liabilities (If any portion of your closure and/or post-closure cost estimates is included in your "total liabilities" in your firm's financial statements, you may deduct that portion from this line and add that amount to lines 5 and 6.)	$_____	
*5. Tangible net worth	$_____	
*6. Net worth	$_____	
*7. Current assets	$_____	
*8. Current liabilities	$_____	
*9. The sum of net income plus depreciation, depletion, and amortization	$_____	
*10. Total assets in the U.S. (required only if less than 90 percent of assets are located in the U.S.)	$_____	
	YES	NO
11. Is line 5 at least $10 million?	____	____
12. Is line 5 at least 6	____	____

times line 3?	___	___
*13. Are at least 90 percent of assets located in the U.S.? If not, complete line 14.	____ ___	____ ___
14. Is line 10 at least 6 times line 3?	____ ___	____ ___

[Fill in Alternative II if the criteria of LAC 33:VII.727.A.2.i.i.(b) are used.]

ALTERNATIVE II	
1. Sum of current closure and/or post-closure cost estimates (total of all cost estimates listed above)	$_____
2. Amount of annual aggregate liability coverage to be demonstrated	$_____
3. Sum of lines 1 and 2	$_____
4. Current bond rating of most recent issuance of this firm and name of rating service	_____
5. Date of issuance of bond	_____
6. Date of maturity of bond	_____
*7. Tangible net worth (If any portion of the closure and/or post-closure cost estimates is included in the "total liabilities" in your firm's financial statements, you may add that portion to this line.)	$_____
*8. Total assets in U.S. (required only if less than 90 percent of assets are located in the U.S.)	$_____
	YES / NO
9. Is line 7 at least $10 million?	____ / ____
10. Is line 7 at least 6 times line 3?	____ / ____

*11. Are at least 90 percent of assets located in the U.S.? If not, complete line 12.	____	____
12. Is line 8 at least 6 times line 3?	____	____

(The following is to be completed by all firms providing the financial test)

I hereby certify that the wording of this letter is identical to the wording specified in LAC 33:VII.727.A.2.i.iv.(e).

_____
[Signature of Chief Financial Officer for the Firm]

_____
[Typed Name of Chief Financial Officer]

_____
[Title]

_____
[Date]

v. For the purposes of Paragraph A.2 of this Section, the phrase "tangible net worth" shall mean the tangible assets that remain after liabilities have been deducted; such assets would not include intangibles such as good will and rights to patents or royalties.

Graphic Packaging International, Inc. acknowledges the above regulatory citation.

vi. The phrase "current closure and post-closure cost estimates," as used in Clause A.2.i.i of this Section, includes the cost estimates required to be shown in Division A.2.i.i.(a).(i) of this Section.

Graphic Packaging International, Inc. acknowledges the above regulatory citation.

vii. After initial submission of the items specified in Clause A.2.i.ii of this Section, the permit holder, applicant, or parent corporation of the permit holder or applicant must send updated information to the Office of Environmental Services, Water and Waste Permits Division, within 90 days after the close of each succeeding fiscal year. This information must include all three items specified in Clause A.2.i.ii of this Section.

Graphic Packaging International, Inc. acknowledges the above regulatory citation. Updated information is sent to the Office of Environmental Services, Water and Waste Permits Division within 90 days after the close of each succeeding fiscal year. The information includes all three items specified in Clause A.2.i.ii of this Section.

viii. The administrative authority may, on the basis of a reasonable belief that the permit holder, applicant, or parent corporation of the permit holder or applicant may no longer meet the requirements of Subparagraph A.2.i of this Section, require reports of financial condition at any time in addition to those specified in Clause A.2.i.ii of this Section. If the administrative authority finds, on the basis of such reports or other information, that the permit holder, applicant, or parent corporation of the permit holder or applicant no longer meets the requirements of Clause A.2.i.ii of this Section, the permit holder or applicant, or parent corporation of the permit holder or applicant must provide alternate financial assurance as specified in Paragraph A.2 of this Section within 30 days after notification of such a finding.

Graphic Packaging International, Inc. acknowledges and will abide by the above regulatory citation.

ix. A permit holder or applicant may meet the requirements of Subparagraph A.2.i of this Section for closure and/or post-closure by obtaining a written guarantee, hereafter referred to as a "corporate guarantee." The guarantor must be the parent corporation of the permit holder or applicant. The guarantor must meet the requirements and submit all information required for permit holders or applicants in Clauses i-viii of this Subparagraph and must comply with the terms of the corporate guarantee. The corporate guarantee must accompany the items sent to the administrative authority specified in Clauses ii and iv of this Subparagraph. The terms of the corporate guarantee must be in an authentic act signed and sworn by an authorized officer of the corporation before a notary public and must provide that:

Graphic Packaging International, Inc. utilizes the corporate guarantee to meet the requirements of Subparagraph A.2.i of this Section for closure and/or post-closure. The guarantor meets the requirements and has submitted all information required for permit holders or applicants in Clauses i-viii of this Subparagraph and complies with the terms of the corporate guarantee. The corporate guarantee will accompany the items sent to the administrative authority specified in Clauses ii and iv of this Subparagraph. The terms of the corporate guarantee is in an authentic act signed and sworn by an authorized officer of the corporation before a notary public.

(a). the guarantor meets or exceeds the financial test criteria and agrees to comply with the reporting requirements for guarantors as specified in Subparagraph A.2.i of this Section;

The guarantor meets or exceeds the financial test criteria and agrees with the reporting requirements for guarantors as specified in Subparagraph A.2.i of this Section. Please reference the corporate guarantee.

(b). the guarantor is the parent corporation of the permit holder or applicant of the solid waste management facility or facilities to be covered by the guarantee, and the guarantee extends to certain facilities;

The guarantor is the parent corporation of the permit holder of the solid waste management facility covered by the guarantee and the guarantee extends to certain facilities. Please reference the corporate guarantee.

(c). "closure plans," as used in the guarantee, refers to the plans maintained as required by the Louisiana solid waste rules and

regulations for the closure and post-closure care of facilities, as identified in the guarantee;

Graphic Packaging International, Inc. acknowledges the reference to closure plans as stated above and as used in the guarantee. Please reference the corporate guarantee.

(d). for value received from the permit holder or applicant, the guarantor guarantees to the Louisiana Department of Environmental Quality that the permit holder or applicant will perform closure, post-closure care, or closure and post-closure care of the facility or facilities listed in the guarantee, in accordance with the closure plan and other permit or regulatory requirements whenever required to do so. In the event that the permit holder or applicant fails to perform as specified in the closure plan, the guarantor shall do so or establish a trust fund as specified in Subparagraph A.2.d of this Section, in the name of the permit holder or applicant, in the amount of the current closure or post-closure cost estimates or as specified in Subparagraph A.2.b. of this Section;

Graphic Packaging International, Inc. acknowledges the requirements of the guarantor as stated above. Please reference the corporate guarantee.

(e). guarantor agrees that if, at the end of any fiscal year before termination of the guarantee, the guarantor fails to meet the financial test criteria, the guarantor shall send within 90 days after the end of the fiscal year, by certified mail, notice to the Office of Environmental Services, Water and Waste Permits Division, and to the permit holder or applicant that he intends to provide alternative financial assurance as specified in Paragraph A.2 of this Section, in the name of the permit holder or applicant, and that within 120 days after the end of such fiscal year, the guarantor shall establish such financial assurance unless the permit holder or applicant has done so;

Graphic Packaging International, Inc. acknowledges the requirements of the guarantor as stated above. Please reference the corporate guarantee.

(f). the guarantor agrees to notify the Office of Environmental Services, Water and Waste Permits Division, by certified mail of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming the guarantor as debtor, within 10 days after commencement of the proceeding;

Graphic Packaging International, Inc. acknowledges the requirements of the guarantor as stated above. Please reference the corporate guarantee.

(g). the guarantor agrees that within 30 days after being notified by the administrative authority of a determination that the guarantor no longer meets the financial test criteria or that he is disallowed from continuing as a guarantor of closure or post-closure care, he shall establish alternate financial assurance as specified in Paragraph A.2 of this Section in the name of the permit holder or applicant, unless the permit holder or applicant has done so;

Graphic Packaging International, Inc. acknowledges the requirements of the guarantor as stated above. Please reference the corporate guarantee.

(h). the guarantor agrees to remain bound under the guarantee, notwithstanding any or all of the following: amendment or modification of the closure plan, amendment or modification of the permit, extension or reduction of the time of performance of closure or post-closure, or any other modification or alteration of an obligation of the permit holder or applicant pursuant to these regulations;

Graphic Packaging International, Inc. acknowledges the requirements of the guarantor as stated above. Please reference the corporate guarantee.

(i). the guarantor agrees to remain bound under the guarantee for as long as the permit holder must comply with the applicable financial assurance requirements of Paragraph A.2 of this Section for the above-listed facilities, except that the guarantor may cancel this guarantee by sending notice by certified mail to the Office of Environmental Services, Water and Waste Permits Division, and the permit holder or applicant. The cancellation will become effective no earlier than 90 days after receipt of such notice by both the administrative authority and the permit holder or applicant, as evidenced by the return receipts;

Graphic Packaging International, Inc. acknowledges the requirements of the guarantor as stated above. Please reference the corporate guarantee.

(j). the guarantor agrees that if the permit holder or applicant fails to provide alternative financial assurance as specified in Paragraph A.2 of this Section, and to obtain written approval of

such assurance from the administrative authority within 60 days after the administrative authority receives the guarantor's notice of cancellation, the guarantor shall provide such alternate financial assurance in the name of the owner or operator;

Graphic Packaging International, Inc. acknowledges the requirements of the guarantor as stated above. Please reference the corporate guarantee.

(k). the guarantor expressly waives notice of acceptance of the guarantee by the administrative authority or by the permit holder. Guarantor also expressly waives notice of amendments or modifications of the closure plan and of amendments or modifications of the facility permit(s).

Graphic Packaging International, Inc. acknowledges the requirements of the guarantor as stated above. Please reference the corporate guarantee.

(l). The wording of the corporate guarantee must be as follows, except that instructions in brackets are to be replaced with the relevant information and the brackets deleted.

The wording of the corporate guarantee is as follows with the exception of the information provided within the brackets. Please reference the corporate guarantee.

SOLID WASTE FACILITY

CORPORATE GUARANTEE FOR LIABILITY COVERAGE, CLOSURE, AND/OR POST-CLOSURE CARE

Guarantee made this [date] by [name of guaranteeing entity], a business corporation organized under the laws of the state of [insert name of state], hereinafter referred to as guarantor, to the Louisiana Department of Environmental Quality, obligee, on behalf of our subsidiary [insert the name of the permit holder or applicant] of [business address].

Recitals

1. The guarantor meets or exceeds the financial test criteria and agrees to comply with the reporting requirements for guarantors as specified in LAC 33:VII.727.A.2.i.ix.

2. [Subsidiary] is the [insert "permit holder," "applicant for a permit"] hereinafter referred to as [insert "permit holder" or "applicant"] for the following solid waste facility covered by this guarantee: [List the site identification number, site name, facility name, and facility permit number. Indicate for each facility whether guarantee is for liability coverage, closure, and/or post-closure and the amount of annual aggregate liability coverage, closure, and/or post-closure costs covered by the guarantee]

   [Fill in Paragraphs 3 and 4 below if the guarantee is for closure and/or post-closure.]

3. "Closure plans" as used below refers to the plans maintained as required by the *Louisiana Administrative Code*, Title 33, Part VII, for the closure and/or post-closure care of the facility identified in Paragraph 2 above.

4. For value received from [insert "permit holder" or "applicant"], guarantor guarantees to the Louisiana Department of Environmental Quality that in the event that [insert "permit holder" or "applicant"] fails to perform [insert "closure," "post-closure care," or "closure and post-closure care"] of the above facility in accordance with the closure plan and other permit requirements whenever required to do so, the guarantor shall do so or shall establish a trust fund as specified in LAC 33:VII.727.A.2.d as applicable, in the name of [insert "permit holder" or "applicant"] in the amount of the current closure and/or post-closure estimates as specified in LAC 33:VII.727.A.2.

   [Fill in Paragraph 5 below if the guarantee is for liability coverage.]

5. For value received from [insert "permit holder" or "applicant"], guarantor guarantees to any and all third parties who have sustained or may sustain bodily injury or property damage caused by sudden and accidental occurrences arising from operations of the facility covered by this guarantee that in the event that [insert "permit holder" or "applicant"] fails to satisfy a judgment or award based on a determination of liability for bodily injury or property damage to third parties caused by sudden and accidental occurrences arising from the operation of the

above-named facilities, or fails to pay an amount agreed to in settlement of a claim arising from or alleged to arise from such injury or damage, the guarantor will satisfy such judgment(s), award(s), or settlement agreement(s) up to the coverage limits identified above.

6. The guarantor agrees that if, at the end of any fiscal year before termination of this guarantee, the guarantor fails to meet the financial test criteria, guarantor shall send within 90 days, by certified mail, notice to the administrative authority and to [insert "permit holder" or "applicant"] that he intends to provide alternative financial assurance as specified in [insert "LAC 33:VII.727.A.1" and/or "LAC 33:VII.727.A.2"], as applicable, in the name of the [insert "permit holder" or "applicant"], within 120 days after the end of such fiscal year, the guarantor shall establish such financial assurance unless [insert "permit holder" or "applicant"] has done so.

7. The guarantor agrees to notify the administrative authority, by certified mail, of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming guarantor as debtor, within 10 days after commencement of the proceeding.

8. The guarantor agrees that within 30 days after being notified by the administrative authority of a determination that guarantor no longer meets the financial test criteria or that he is disallowed from continuing as a guarantor of [insert "liability coverage" or "closure and/or post-closure care"] he shall establish alternate financial assurance as specified in [insert "LAC 33:VII.727.A.1" and/or "LAC 33:VII.727.A.2"] as applicable, in the name of [insert "permit holder" or "applicant"] unless [insert "permit holder" or "applicant"] has done so.

9. The guarantor agrees to remain bound under this guarantee notwithstanding any or all of the following: [if the guarantee is for closure and post-closure insert "amendment or modification of the closure and or post-closure care, the extension or reduction of the time of performance of closure and/or post-closure"] or any other modification or alternation of an obligation of the [insert "permit holder" or "applicant"] pursuant to the Louisiana Administrative Code, Title 33, Part VII.

10. The guarantor agrees to remain bound under this guarantee for as long as the [insert "permit holder" or "applicant"] must comply with the applicable financial assurance requirements of [insert "LAC 33:VII.727.A.1" and/or "LAC 33:VII.727.A.2"] for the above-listed facility except that guarantor may cancel this guarantee by sending notice by certified mail, to the administrative authority and to the [insert "permit holder" or "applicant"], such cancellation to become effective no earlier than 90 days after receipt of such notice by both the administrative authority and the [insert "permit holder" or "applicant"], as evidenced by the return receipts.

11. The guarantor agrees that if the [insert "permit holder" or "applicant"] fails to provide alternative financial assurance as specified in [insert "LAC

33:VII.727.A.1" and/or "LAC 33:VII.727.A.2"], as applicable, and obtain written approval of such assurance from the administrative authority within 60 days after a notice of cancellation by the guarantor is received by the administrative authority from guarantor, guarantor shall provide such alternate financial assurance in the name of the [insert "permit holder" or "applicant"].

12. The guarantor expressly waives notice of acceptance of this guarantee by the administrative authority or by the [insert "permit holder" or "applicant"]. Guarantor expressly waives notice of amendments or modifications of the closure and/or post-closure plan and of amendments or modifications of the facility permit(s).

I hereby certify that the wording of this guarantee is identical to the wording specified in LAC 33:VII.727.A.2.i.ix.(l), effective on the date first above written.

Effective date:_____

_____
[Name of Guarantor]

_____
[Authorized signature for guarantor]

_____
[Typed name and title of person signing]

_____
Thus sworn and signed before me this [date].

j. Local Government Financial Test. An owner or operator that satisfies the requirements of Clauses A.2.j.i-iii of this Section may demonstrate financial assurance up to the amount specified in Clause A.2.j.iv of this Section.

i. Financial Component

(a). The owner or operator must satisfy the following conditions, as applicable:

(i). if the owner or operator has outstanding, rated, general obligation bonds that are not secured by insurance, a letter of credit, or other collateral or guarantee, it must have a current rating of Aaa, Aa, A, or Baa, as issued by *Moody's*, or AAA, AA, A, or BBB, as issued by *Standard and Poor's,* on all such general obligation bonds; or

(ii). the owner or operator must satisfy the ratio of cash plus marketable securities to total expenditures being greater than or equal to 0.05 and the ratio of annual debt service to total expenditures less than or equal to 0.20 based on the owner or operator's most recent audited annual financial statement.

(b). The owner or operator must prepare its financial statements in conformity with Generally Accepted Accounting Principles for governments and have its financial statements audited by an independent certified public accountant (or appropriate state agency).

(c). A local government is not eligible to assure its obligations under Subparagraph A.2.j of this Section if it:

(i). is currently in default on any outstanding general obligation bonds;

(ii). has any outstanding general obligation bonds rated lower than Baa as issued by Moody's or BBB as issued by Standard and Poor's;

(iii). operated at a deficit equal to five percent or more of total annual revenue in each of the past two fiscal years; or

(iv). receives an adverse opinion, disclaimer of opinion, or other qualified opinion from the independent certified public accountant (or appropriate state agency) auditing its financial statement as required under Subclause A.2.j.i.(b) of this Section. The administrative authority may evaluate qualified opinions on a case-by-case basis and allow use of the financial test in cases where the administrative authority deems the qualification insufficient to warrant disallowance of use of the test.

(d). The following terms used in this Subsection are defined as follows.

(i). *Deficit*—total annual revenues minus total annual expenditures.

(ii). Total Revenues—revenues from all taxes and fees, but does not include the proceeds from borrowing or asset sales, excluding revenue from funds managed by local government on behalf of a specific third party.

(iii). Total Expenditures—all expenditures, excluding capital outlays and debt repayment.

(iv). Cash Plus Marketable Securities—all the cash plus marketable securities held by the local government on the last day of a fiscal year, excluding cash and marketable securities designated to satisfy past obligations such as pensions.

(v). Debt Service—the amount of principal and interest due on a loan in a given time period, typically the current year.

ii. Public Notice Component. The local government owner or operator must place a reference to the closure and post-closure care costs assured through the financial test into its next comprehensive annual financial report (CAFR) after the effective date of this Section or prior to the initial receipt of waste at the facility, whichever is later. Disclosure must include the nature and source of closure and post-closure care requirements, the reported liability at the balance sheet date, the estimated total closure and post-closure care cost remaining to be recognized, the percentage of landfill capacity used to date, and the estimated landfill life in years. A reference to corrective action costs must be placed in the CAFR not later than 120 days after the corrective action remedy has been selected in accordance with the requirements of LAC 33:VII.709.E.6. For the first year the financial test is used to assure costs at a particular facility, the reference may be placed in the operating record until issuance of the next available CAFR if timing does not permit the reference to be incorporated into the most recently issued CAFR or budget. For closure and post-closure costs, conformance with *Government Accounting Standards Board Statement 18* assures compliance with this public notice component.

iii. Recordkeeping and Reporting Requirements

(a). The local government owner or operator must place the following items in the facility's operating record:

(i). a letter signed by the local government's chief financial officer that lists all the current cost estimates covered by a financial test, as described in Clause A.2.j.iv of this Section. It must provide evidence that the local government meets the conditions of Subclauses A.2.j.i.(a), (b), and (c) of this Section, and certify that the local government meets the conditions of Subclauses A.2.j.i.(a), (b), (c), Clauses A.2.j.ii and iv of this Section;

(ii). the local government's independently audited year-end financial statements for the latest fiscal year (except for local governments where audits are required every two years and unaudited statements may be used in years when audits are not required), including the unqualified opinion of the auditor who must be an independent

certified public accountant or an appropriate state agency that conducts equivalent comprehensive audits;

(iii). a report to the local government from the local government's independent certified public accountant or the appropriate state agency based on performing an agreed upon procedures engagement relative to the financial ratios required by Division A.2.j.i.(a).(ii) of this Section, if applicable, and the requirements of Subclause A.2.j.i.(b) and Divisions A.2.j.i.(c).(iii) and (iv) of this Section. The certified public accountant or state agency's report should state the procedures performed and the certified public accountant or state agency's findings; and

(iv). a copy of the comprehensive annual financial report (CAFR) used to comply with Clause A.2.j.ii of this Section (certification that the requirements of General Accounting Standards Board Statement 18 have been met).

(b). The items required in Subclause A.2.j.iii.(a) of this Section must be placed in the facility operating record as follows:

(i). in the case of closure and post-closure care, either before the effective date of this Section, which is April 9, 1997, or prior to the initial receipt of waste at the facility, whichever is later; or

(ii). in the case of corrective action, not later than 120 days after the corrective action remedy is selected in accordance with the requirements of LAC 33:VII.709.E.6.

(c). After the initial placement of the items in the facility's operating record, the local government owner or operator must update the information and place the updated information in the operating record within 180 days following the close of the owner or operator's fiscal year.

(d). The local government owner or operator is no longer required to meet the requirements of Clause A.2.j.iii of this Section when:

(i). the owner or operator substitutes alternate financial assurance, as specified in this Section; or

(ii). the owner or operator is released from the requirements of this Section in accordance with Paragraph A.1 or 2 of this Section.

(e). A local government must satisfy the requirements of the financial test at the close of each fiscal year. If the local government owner or operator no longer meets the requirements of the local government financial test, it must, within 210 days following the close of the owner or operator's fiscal year, obtain alternative financial assurance that meets the requirements of this Section, place the required submissions for that assurance in the operating record, and notify the Office of Environmental Services, Water and Waste Permits Division, that the owner or operator no longer meets

the criteria of the financial test and that alternate assurance has been obtained.

(f). The administrative authority, based on a reasonable belief that the local government owner or operator may no longer meet the requirements of the local government financial test, may require additional reports of financial condition from the local government at any time. If the administrative authority finds, on the basis of such reports or other information, that the owner or operator no longer meets the local government financial test, the local government must provide alternate financial assurance in accordance with this Section.

iv. Calculation of Costs to be Assured. The portion of the closure, post-closure, and corrective action costs for which an owner or operator can assure under Subparagraph A.2.j of this Section is determined as follows.

(a). If the local government owner or operator does not assure other environmental obligations through a financial test, it may assure closure, post-closure, and corrective action costs that equal up to 43 percent of the local government's total annual revenue.

(b). If the local government assures other environmental obligations through a financial test, including those associated with UIC facilities under 40 CFR 144.62, petroleum underground storage tank facilities under 40 CFR Part 280, PCB storage facilities under 40 CFR Part 761, and hazardous waste treatment, storage, and disposal facilities under 40 CFR Parts 264 and 265, or corresponding state programs, it must add those costs to the closure, post-closure, and corrective action costs it seeks to assure under Subparagraph A.2.j of this Section. The total that may be assured must not exceed 43 percent of the local government's total annual revenue.

(c). The owner or operator must obtain an alternate financial assurance instrument for those costs that exceed the limits set in Subclauses A.2.j.iv.(a) and (b) of this Section.

Not applicable. Graphic Packaging International, Inc. has established the financial test to demonstrate financial assurance.

k. Local Government Guarantee. An owner or operator may demonstrate financial assurance for closure, post-closure, and corrective action, as required by Paragraphs A.1-2 of this Section, by obtaining a written guarantee provided by a local government. The guarantor must meet the requirements of the local government financial test in Subparagraph A.2.j of this Section, and must comply with the terms of a written guarantee.

i. Terms of the Written Guarantee. The guarantee must be effective before the initial receipt of waste or before the effective date of this Section,

whichever is later, in the case of closure and post-closure care, or no later than 120 days after the corrective action remedy has been selected in accordance with the requirements of LAC 33:VII.709.E.6. The guarantee must provide that:

(a). if the owner or operator fails to perform closure, post-closure care, and/or corrective action of a facility covered by the guarantee, the guarantor will:

(i). perform, or pay a third party to perform closure, post-closure care, and/or corrective action as required; or

(ii). establish a fully funded trust fund as specified in Subparagraph A.2.d of this Section in the name of the owner or operator;

(b). the guarantee will remain in force unless the guarantor sends notice of cancellation by certified mail to the owner or operator and to the Office of Environmental Services, Water and Waste Permits Division. Cancellation may not occur, however, during the 120 days beginning on the date of receipt of the notice of cancellation by both the owner or operator and the administrative authority, as evidenced by the return receipts; and

(c). if a guarantee is canceled, the owner or operator must, within 90 days following receipt of the cancellation notice by the owner or operator and the administrative authority, obtain alternate financial assurance, place evidence of that alternate financial assurance in the facility operating record, and notify the Office of Environmental Services, Water and Waste Permits Division. If the owner or operator fails to provide alternate financial assurance within the 90-day period, then the owner or operator must provide that alternate assurance within 120 days following the guarantor's notice of cancellation, place evidence of the alternate assurance in the facility operating record, and notify the Office of Environmental Services, Water and Waste Permits Division.

ii. Recordkeeping and Reporting

(a). The owner or operator must place a certified copy of the guarantee, along with the items required under Clause A.2.j.iii of this Section, into the facility's operating record before the initial receipt of waste or before the effective date of this Section, whichever is later, in the case of closure or post-closure care, or no later than 120 days after the corrective action remedy has been selected in accordance with the requirements of LAC 33:VII.709.E.6.

(b). The owner or operator is no longer required to maintain the items specified in Clause A.2.k.ii of this Section when:

(i). the owner or operator substitutes alternate financial assurance as specified in this Section; or

(ii). the owner or operator is released from the requirements of this Section in accordance with Paragraphs A.1-2 of this Section.

(c). If a local government guarantor no longer meets the requirements of Subparagraph A.2.j of this Section, the owner or operator must, within 90 days, obtain alternate assurance, place evidence of the

alternate assurance in the facility operating record, and notify the Office of Environmental Services, Water and Waste Permits Division. If the owner or operator fails to obtain alternate financial assurance within that 90-day period, the guarantor must provide that alternate assurance within the next 30 days.

Not Applicable. Graphic Packaging International, Inc. has established the financial test to demonstrate financial responsibility.