Duke Power Company
Wachovia Center
P.O. Box 1007
Charlotte, N.C. 28201-1007

Carmen Johnson 4/17/12
60-04

DUKE POWER

June 15, 1992

SOLID WASTE SECTION
JUN 16 1992

Sherri Hoyt
Division of Solid Waste Management
North Carolina Department of Environment,
Health, and Natural Resources
P.O. Box 27687
Raleigh, N.C. 27611-7687

SUBJECT: Duke Power/ McGuire Sanitary Landfill (60-04)
Lined Expansion
File: MN-707.25

Dear Ms. Hoyt:

Duke Power Company requests that an Operating Permit be issued to operate the lined expansion to the McGuire Sanitary Landfill (Permit No. 60-04). Construction of the lined expansion was completed in accordance with Conditions 1 and 2 of the Construction Section of the approved Construction Permit issued on July 30, 1991. In compliance with Condition 3 of the Construction Section of the approved Construction Permit the following pre-operative requirements have been met:

a. Site preparation was performed in accordance with the Construction Permit and the submitted application package/approved revisions to the application package.

b. Pre-operational inspection of the lined expansion by Sherri Hoyt (DSWM), Rick Doby (Mooresville), and John Gibson (Mecklenburg County) is scheduled for June 23, 1992.

c. Appropriate signs have been posted at the entrance to the lined expansion providing the permit number and the words "No Hazardous Or Liquid Wastes Accepted".

d. Attached for your review are the CQA Report and three (3) sets of as-built document drawings.

e. Attached for your review is a copy of the current McGuire NPDES Permit (third page of attachment) which addresses management of leachate from the lined expansion to the McGuire Landfill.

f. Groundwater monitoring wells as approved by the North Carolina Department of Solid Waste Management have been installed and developed. Attached for your review is a copy of the baseline (background) sampling results.

If you have any questions or require any additional information, please contact me at 704-373-2647. Thank you for your continued cooperation.

Larry D. Evans

L. D. Evans, Scientist
Environmental Protection

LDE/A6925

Attachments

bc (w/o att): J. R. Hendricks
M. E. Hollis
C. N. Davis
D. W. Phillips
P. R. Simpson
M. R. Robinson
J. T. Estridge
P. A. Clawson
Staff (route)

DUKE POWER COMPANY
MCGUIRE NUCLEAR STATION
SANITARY LANDFILL
CONSTRUCTION QUALITY ASSURANCE REPORT

In accordance with the requirements set forth in the Amendment to Permit No. 60-04 Date Issued 7-30-91 Permit to Construct, the following is a summation of the methodology, modifications, and construction quality control measures necessary to construct the landfill in accordance with the approved plans.

Methodology

I. Erosion Control Measures

Throughout the project duration, erosion control measures were maintained to protect the surrounding area. The erosion control measures implemented were constructed in accordance with the *North Carolina Erosion and Sediment Control Planning and Design Manual* and are illustrated on drawings **CFD-MG-6433C-C-0070** and **CFD-MG-6433C-C-0080**.

II. Earthwork Construction

The most time consuming activity in the construction of the landfill was the earthwork construction phase. This portion was divided into three phases: 1) clearing and grubbing, 2) excavation and fill, and 3) final grading. All earthwork was performed in accordance with the specification and drawings **CFD-MG-6433C-C-0020** and **CFD-MG-6433C-C-0030**.

III. Liner Construction

The liner installation was performed by Plastic Fusion Fabricators for both the landfill basin and the leachate collection pond. A 60 mil HDPE (High Density Polyethylene) liner was used for the synthetic liner. Appendix 1 provides Quality Assurance documents from Plastic Fusion Fabricators and Gundle Lining Manufacturer, Geomembrane repair/testing log, and Geomembrane seam pressure testing log.

IV. Leachate Collection System Construction

The leachate collection system consists of a gravity and pressure systems which are separated by a leachate collection basin. The collection system is composed of 2"ϕ SDR-11, 6"ϕ SDR-11, and 8"ϕ SDR-17 Plexco polyethylene pipe, two (2) CSO-V Vertical Wet Pit Process Pumps. The system ties into the WC treatment system at McGuire Nuclear Station.

Modifications

I. Increased Erosion Control

Based on the contour of the ground surface in the area, minor modifications were made to the erosion control measures implemented during the construction phase. These modifications were all in addition to the approved plan; therefore, no justification is required.

II. Location of Sediment Basin #1

The construction phase for the erosion control revealed that Sediment Basin #1 was in the vicinity of a wetlands area. Therefore, Duke Power environmental compliance and biological personnel were consulted

to determine a more appropriate location for the basin. The basin was shifted closer to the landfill basin by approximately 50 feet.

III. Boundary Fence Location

Initially, the boundary fence was located only around the landfill basin itself. However, to increase security the fence was extended to encompass the entire landfill site. Furthermore, a second fence was installed around the leachate collection pond.

IV. Access Road & Ramp

The access road around the landfill basin was shifted from the top of the berm on the east side to the toe of the slope on the west side. This modification increases safety for the vehicles transporting the waste and eliminates constant maintenance on the top of the berm due to high traffic.

V. Optimum Moisture Content Parameters

The specification requirement for actual condition to be within ± 2% of theoretical Optimum Moisture Content was revised to allow for a - 2% to + 4% tolerance of the theoretical Optimum Moisture Content.

VI. Filter Sand for Subsurface Drainage

The filter sand utilized for the drainage blanket has the following gradation characteristics as provided by the supplier:

Screen Sizes	2S (% Passing)	Filter Sand (% Passing)
3/8"	100	100
#4	95-100	98.7
#8	80-100	72.8
#16	45-95	47.7
#30	25-75	31.5
#50	8-30	19.9
#100	0.5-10	9.7
#200	0-3	3.1

After reviewing the physical properties of the soil and the interaction in the field, the filter sand was determined to an acceptable replacement for the required 2S "concrete sand".

VII. Pipe Penetration Detail

Upon the recommendation from Plastic Fusion Fabricators, the penetration detail of the leachate collection pipe through the side of the basin was modified to provide a greater assurance of workmanship quality. The detail, as designed, allowed for a questionable barrier; therefore, the detail, as illustrated on **CFD-MG-6433C-C-0030**, was modified to provide increased reliability from potential leakage.

Construction Quality Assurance Measures

I. Soil Inspection

Appendix 2 provides the inspection data for the field soils analysis performed during the construction phase. Moisture check, field density tests, sieve analysis, and Proctor compaction test data are provided.

II. Liner Seam Inspection

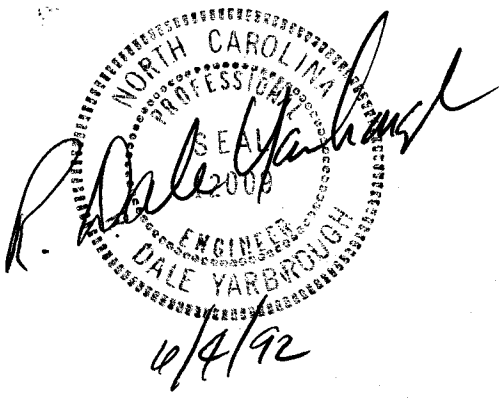
The liner inspection was performed during the installation of the liner. Plastic Fusion Fabricators, Inc. performed the testing of the liner seams and patches.

Engineer's Certification

I, R. D. Yarbrough, as a duly registered Professional Engineer in the State of North Carolina, having been authorized to observe the construction of the McGuire Landfill Expansion Project for McGuire Nuclear Station, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the approved plans and specifications.

Signature R. Dale Yarbrough Registration No. 12009 NC

Date 6/4/92



Appendix 1

PLASTIC FUSION FABRICATORS, INC.
THERMOPLASTIC CONSULTING FABRICATION INSTALLATION
3455 STANWOOD BLVD.
HUNTSVILLE, AL 35811
205/852/0378 BUS
205/852/0388 FAX

Warranty No. : 91060
Effective Date: 4/1/92

Workmanship Warranty

Plastic Fusion Fabricators, Inc. hereby warrants that the linings installed by Plastic Fusion Fabricators, Inc. under this warranty shall be installed free from defects in Plastic Fusion Fabricator's workmanship. The warranty set forth in the preceding sentence (the "Workmanship Warranty") shall commence on the date that Plastic Fusion Fabricators, Inc. completes the installation of the linings and shall apply until, and shall expire on the last day of a period of 1 year from said date, and shall be subject to the following conditions:

1. The Workmanship Warranty shall extend to proper installation of the linings. The Warranty shall not apply to any alleged defect in installation that is occasioned by fire, Acts of God, or acts of any person or entity other than Plastic Fusion Fabricators, Inc. or its agent, including without limitations: abuse, negligence, misuse, improper treatment, vandalism, or by falling objects, abnormal environmental conditions, improper site preparation, subgrade settlement, or by any event beyond the reasonable control of Plastic Fusion Fabricators, Inc.

2. The Workmanship Warranty shall not be effective unless Plastic Fusion Fabricators, Inc. receives Company's written claim therefore within the warranty period and within thirty (30) days after the date of discovery of such defect. Plastic Fusion Fabricators, Inc. shall have the right to verify, by its own representative, the nature and extent of the defects complained of.

3. The extent of Plastic Fusion Fabricators, Inc.'s liability for breach of Workmanship Warranty shall be limited to timely repairing or replacing the defective installation workmanship, utilizing such workmanship as should result in providing the pro-rated performance remaining under the original Workmanship Warranty for the defective workmanship, In the event that it is necessary for Plastic Fusion Fabricators, Inc. to repair or replace any defective workmanship with respect to the linings, Company shall afford Plastic Fusion Fabricators, Inc. clear and unrestricted access to the linings, which shall not be encumbered by any overlying material or liquid, and shall cooperate in all respect with Plastic Fusion Fabricators, Inc. to accomplish said repair. In no event will Plastic Fusion Fabricators, Inc. be liable for the cost of labor expended by any person or entity other than Plastic Fusion Fabricators, Inc. or its agent on any defective workmanship with respect to the installation of the linings.

4. The Workmanship Warranty is extended to Company and is non-transferable and non-assignable. No rights against Plastic Fusion Fabricators, Inc. shall be created by any transfer or assignment, nor shall any rights against Plastic Fusion Fabricators, Inc. survive any transfer or assignment.

5. No terms of conditions, other than those stated herein, and no agreement or understanding, oral or written, and no course of conduct or performance, in any way purporting to modify the Workmanship Warranty or to waive Plastic Fusion Fabricators, Inc.'s rights hereunder, shall be binding on Plastic Fusion Fabricators, Inc. unless the same shall be clearly described in written memorandum that expressly refers to the Workmanship Warranty and expressly to having such effect upon the Workmanship Warranty and is separately signed by a duly-authorized representative of Plastic Fusion Fabricators, Inc. Moreover, additional liabilities of, or limitations upon, the rights and remedies of Plastic Fusion Fabricators, Inc. contained in such documents as purchase orders, order acknowledgements, or change orders which may subsequently be exchanged between the parties shall have no force of effect upon the Workmanship Warranty. All proposals, negotiations and representations, if any, made prior to or with reference hereto are merged herein.

6. This Workmanship Warranty shall not be effective unless payment in full has been made to Plastic Fusion Fabricators,Inc. for all labor, installation, and other services provided.

7. The laws of the State of Alabama shall govern the rights and duties of the parties under this Agreement. Venue for all legal proceedings involving this Workmanship Warranty or any other matter contained within, shall be in Madison County, Alabama.

The foregoing Workmanship Warranty is in lieu of all other warranties (except of title), express, implied, or statutory. In no event shall Plastic Fusion Fabricators, Inc. be liable for loss of profits, or any other incidental or consequential losses, resulting from any defects in Plastic Fusion Fabricators, Inc.'s workmanship, including improper installation of the linings.

Purchaser/(Company): Duke Power Company

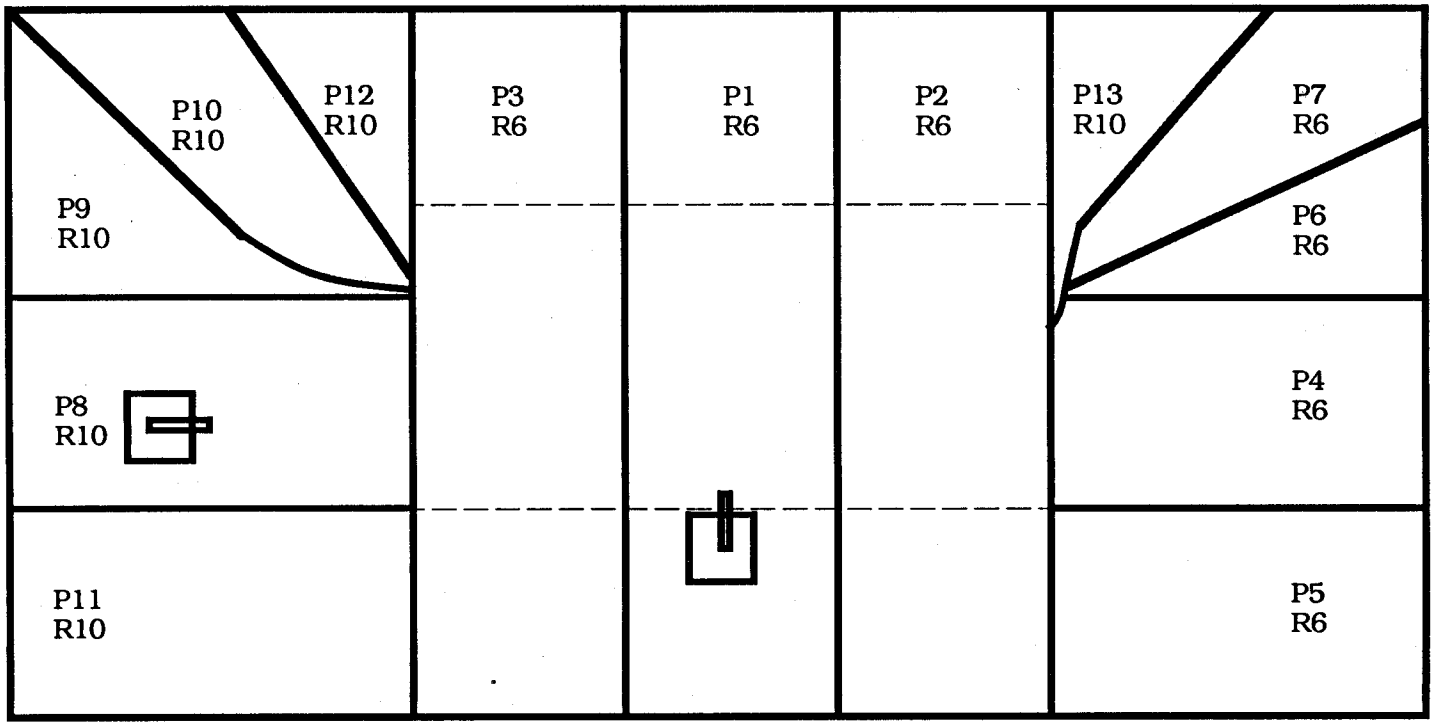
Location of Installation: Huntersville, NC

Description of Intended Use: McGuire Landfill

Plastic Fusion Fabricators, Inc.
3455 Stanwood Boulevard
Huntsville, AL 35811

Larry G. Lice VP

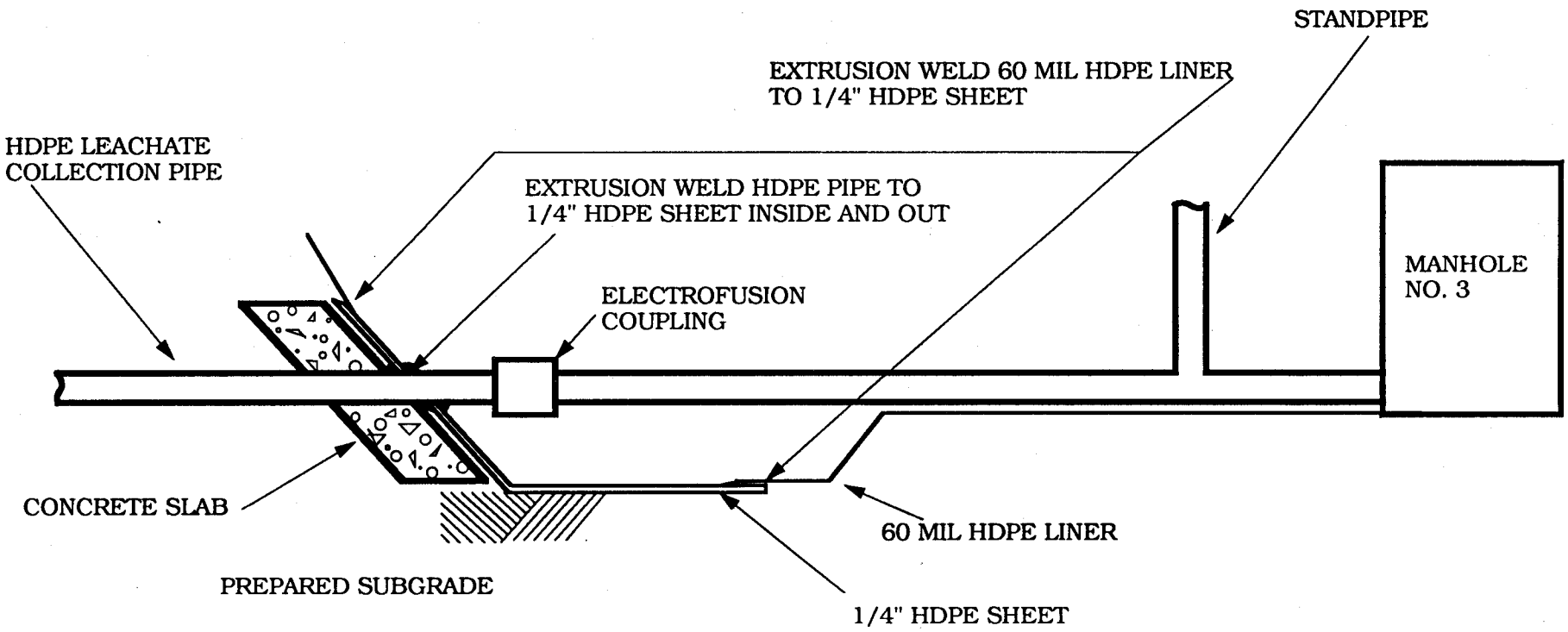
4-1-92
Date



PLASTIC FUSION FABRICATORS, INC.	
3455 STANWOOD BLVD. HUNTSVILLE, AL. 35811	DATE: 4-24-92 DWN BY: RJW
SMALL LEACHATE POND	
DUKE POWER - MCGUIRE LANDFILL	
HUNTERSVILLE, N.C.	
INSTALLED JANUARY 17, 1992	

NO.	DATE	REVISION	BY

SCALE: 1" = 20'-0"	DWG NO.
JOB NO. 91060	PFF92-1-0003
	SHEET 1 OF 1



PIPE PENETRATION DETAIL

NO.	DATE	REVISION	BY

PLASTIC FUSION FABRICATORS, INC.

3455 STANWOOD BLVD.
HUNTSVILLE, AL. 35811

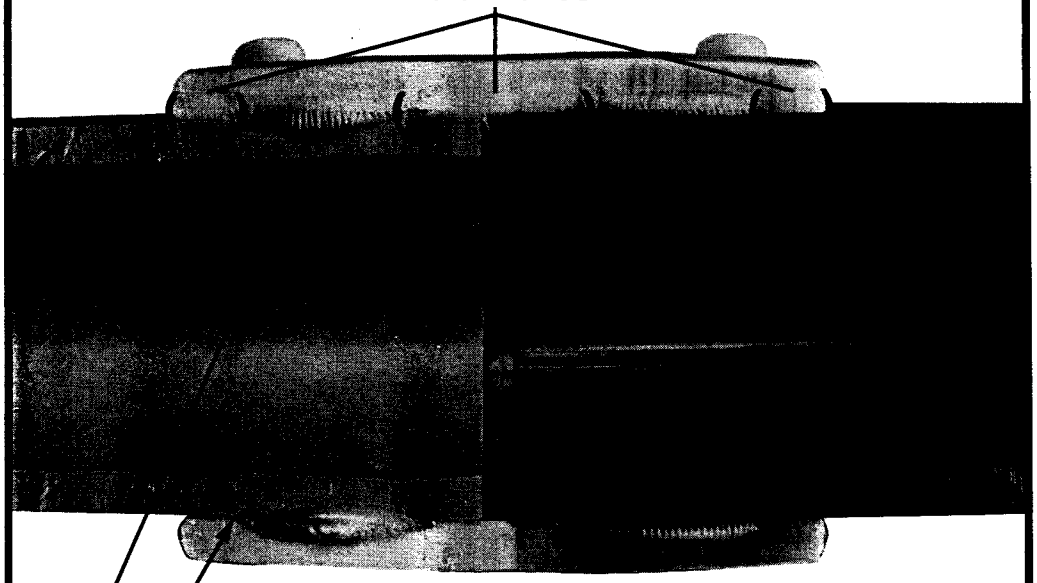
DATE: 4-24-92
DWN BY: RJW

LANDFILL - PIPE PENETRATION DETAIL
DUKE POWER - MCGUIRE LANDFILL
HUNTERSVILLE, N.C.
INSTALLED JANUARY 17, 1992

SCALE: NONE
JOB NO. 91060

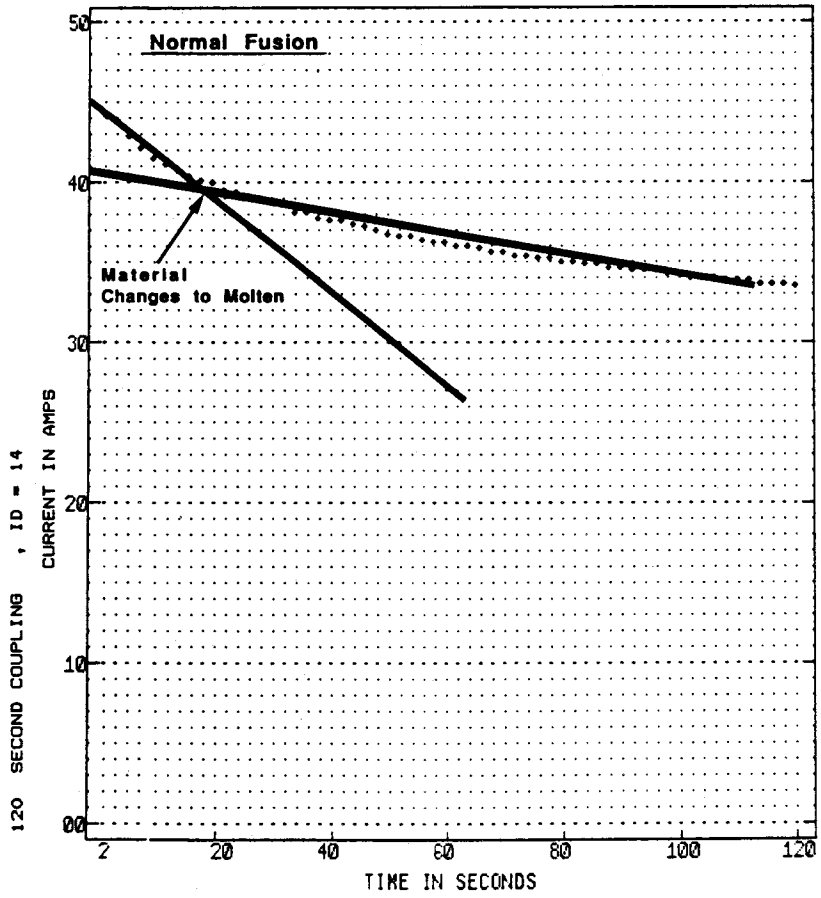
DWG NO.
PFF92-1-0002
SHEET 2 OF 2

Normal Fusion



Solidified material freezing off escape path. This happens when molten material hits the cold zone. This allows containment of the molten material.

Melt penetration builds interface pressure. This is necessary for proper mixing of material.



Electrofusion Systems®

Computer Controlled Fusion

CENTRAL

Gundle Lining Systems Inc

19103 Gundle Road
Houston, Texas 77073-3598
U.S.A.

Phone: (713) 443-8564
Toll Free: (800) 435-2008
Telex: 166657 GUNDLE HOU
FAX: (713) 875-6010

LETTER OF TRANSMITTAL

DATE April 24, 1992
M.R. NO. 7108-02
JOB NAME MCGUIRE LANDFILL
PO 02805

PLASTIC FUSION FABRICATORS
215 WHOLESALE AVENUE
HUNTSVILLE AL 35811
ATTN: JUDY CAYTON

TRANSMITTED VIA: ~~REGULAR MAIL~~ Fed X
FEDERAL EXPRESS NO:

GENTLEMEN: We are sending you:

___QC Documentation ___Samples ___Copy of letter ___Original purchase order

___Certification letter ___Specifications ___Submittals XX_Material warranty

No. of Copies	Description of items attached
1	MATERIAL WARRANTY NO. PLA7108-02-A

THESE ARE TRANSMITTED AS NOTED BELOW:

___For approval ___Approved as noted ___Resubmit ___ Copies for approval

XX_For your use ___Returned for corrections ___Approval as Submitted

XX_As requested ___Return ___For review and comment

GUNDLE LINING PACKING LIST:

ROLL NUMBERS: 03012497, 03012499. 03012505, 03012551, 03012557, 03012562, 05012032, 05012035

APPROVAL _____

DATE _____

Gundle Lining Systems Inc

19103 Gundle Road
Houston, Texas 77073-3598
U.S.A.

Phone: (713) 443-8564
Toll Free: (800) 435-2008
Telex: 166657 GUNDLE HOU
FAX: (713) 875-6010

WARRANTY NO. **PLA7108-02-A**

EFFECTIVE DATE: **APRIL 1, 1992**

MATERIAL WARRANTY

GUNDLE LINING SYSTEMS, INC. warrants to (and only to) DUKE POWER COMPANY ("Company") the material GUNDLINE HD to conform at the time of sale to the specifications of GUNDLE LINING SYSTEMS, INC., to be free from defects in materials and to be able to withstand normal weathering and use from the date of installation or sale for a period of 20 year(s) for 60 mil HDT TEXTURED under normal uses and services for which it is designed and manufactured, in any customary weather which may be encountered and which is not customarily considered to be in the nature of an Act of God, casualty or catastrophe, such as but not limited to earthquake, flood, piercing hail or tornado. Normal use and service excludes, among other things but without limitation, the exposure of the liner to chemicals known to be harmful to the liner, mechanical abuse by machinery, equipment or people or excessive pressure or stress from any source.

Should defects or premature loss of use within the scope of the above Material Warranty occur, GUNDLE LINING SYSTEMS, INC. will, at its option, supply repair or replacement material on a pro-rata basis at the then current price in such manner as to charge Company only for that portion of the warranted 20 year life which has elapsed since the purchase of the material. To enable GUNDLE LINING SYSTEMS, INC.'S technical staff properly to determine the cause of any alleged defect and to take appropriate steps to supply repair or replacement material for timely corrective measures, any claim for alleged breach of warranty must be made by Company in writing, by certified mail, to GUNDLE LINING SYSTEMS, INC. within 30 days after the alleged defect was first noticed and within the warranty period or the defect and all warranties will be deemed to have been waived by Company. If repairs or replacements are to be effected, the lined area must be tendered to GUNDLE LINING SYSTEMS, INC. in a clean, dry, unencumbered condition. This includes but is not limited to removal of all water, dirt, sludge, residuals or liquid of any kind from the lined area.

GUNDLE LINING SYSTEMS, INC.'S liability under this Material Warranty shall in no event exceed the amount of the sale price of the material sold to the Company for the particular installation in which any defect or premature loss of use is alleged to have occurred, and under no circumstances shall GUNDLE LINING SYSTEMS, INC. have any liability for consequential damages arising from loss of production or product owing to the failure of the material or installation, and no allowance will be made for repairs, replacements or alterations made by Company unless with GUNDLE LINING SYSTEMS, INC.'S written consent. GUNDLE LINING SYSTEMS, INC. neither assumes nor authorizes any person (other than an officer of GUNDLE LINING SYSTEMS, INC.) to assume for it any other or additional liability in connection with the GUNDLINE HD liner. Any repairs, replacements or alterations made without GUNDLE LINING SYSTEMS INC.'S written consent or any attempted assumption of any such liability will void this Material Warranty.

This Material Warranty is limited to the installation and sale for commercial, industrial or municipal uses at the location described below and does not apply to consumer uses as defined by the Magnuson-Moss Warranty Act, any similar successor federal statute or any similar state consumer warranty statute. This Material Warranty extends to no person, entity or municipality other than Company.

This Material Warranty shall not be effective unless payment in full has been made to GUNDLE LINING SYSTEMS, INC. for all material provided.

Gundle®

The Material Warranty is extended to Company and is non-transferable and non-assignable. No rights against GUNDLE LINING SYSTEMS, INC. shall be created by any attempted transfer or assignment, nor shall any rights against GUNDLE LINING SYSTEMS, INC. survive any attempted transfer or assignment. This Warranty does not extend to any materials furnished or installed by others in connection with the intended use of the Material.

THE LAWS OF THE STATE OF TEXAS SHALL GOVERN THE RIGHTS AND DUTIES OF THE PARTIES UNDER THIS WARRANTY. VENUE FOR ALL LEGAL PROCEEDINGS INVOLVING THIS MATERIAL WARRANTY OR ANY MATTER CONTAINED WITHIN SHALL BE IN HARRIS COUNTY, TEXAS.

THE FOREGOING MATERIAL WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES (EXCEPT OF TITLE), EXPRESS, IMPLIED, OR STATUTORY. IN NO EVENT SHALL GUNDLE LINING SYSTEMS, INC. BE LIABLE FOR LOSS OF PROFITS OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL LOSSES RESULTING FROM ANY DEFECTS IN ITS MATERIAL.

PURCHASER/(COMPANY): DUKE POWER COMPANY

LOCATION OF INSTALLATION: HUNTERSVILLE, NORTH CAROLINA

DESCRIPTION OF INTENDED USE: MCGUIRE LANDFILL

GUNDLE LINING SYSTEMS, INC.
19103 GUNDLE ROAD
HOUSTON, TEXAS 77073

A. Reed Newland
Corporate Counsel

4/23/92
Date

This warranty covers only the following roll numbers:

03012497	03012499	03012505	03012551	03012557
03012562	05012032	05012035		

WTYMATP11/91

Gundle Lining Systems Inc

19103 Gundle Road
Houston, Texas 77073-3598
U.S.A.

Phone: (713) 443-8564
Toll Free: (800) 435-2008
Telex: 166657 GUNDLE HOU
FAX: (713) 875-6010

WARRANTY NO. **PLA6897-03-A**

EFFECTIVE DATE: **APRIL 1, 1992**

MATERIAL WARRANTY

GUNDLE LINING SYSTEMS, INC. warrants to (and only to) DUKE POWER COMPANY ("Company") the material GUNDLINE HD to conform at the time of sale to the specifications of GUNDLE LINING SYSTEMS, INC., to be free from defects in materials and to be able to withstand normal weathering and use from the date of installation or sale for a period of 20 year(s) for 60 mil HDT TEXTURED under normal uses and services for which it is designed and manufactured, in any customary weather which may be encountered and which is not customarily considered to be in the nature of an Act of God, casualty or catastrophe, such as but not limited to earthquake, flood, piercing hail or tornado. Normal use and service excludes, among other things but without limitation, the exposure of the liner to chemicals known to be harmful to the liner, mechanical abuse by machinery, equipment or people or excessive pressure or stress from any source.

Should defects or premature loss of use within the scope of the above Material Warranty occur, GUNDLE LINING SYSTEMS, INC. will, at its option, supply repair or replacement material on a pro-rata basis at the then current price in such manner as to charge Company only for that portion of the warranted 20 year life which has elapsed since the purchase of the material. To enable GUNDLE LINING SYSTEMS, INC.'S technical staff properly to determine the cause of any alleged defect and to take appropriate steps to supply repair or replacement material for timely corrective measures, any claim for alleged breach of warranty must be made by Company in writing, by certified mail, to GUNDLE LINING SYSTEMS, INC. within 30 days after the alleged defect was first noticed and within the warranty period or the defect and all warranties will be deemed to have been waived by Company. If repairs or replacements are to be effected, the lined area must be tendered to GUNDLE LINING SYSTEMS, INC. in a clean, dry, unencumbered condition. This includes but is not limited to removal of all water, dirt, sludge, residuals or liquid of any kind from the lined area.

GUNDLE LINING SYSTEMS, INC.'S liability under this Material Warranty shall in no event exceed the amount of the sale price of the material sold to the Company for the particular installation in which any defect or premature loss of use is alleged to have occurred, and under no circumstances shall GUNDLE LINING SYSTEMS, INC. have any liability for consequential damages arising from loss of production or product owing to the failure of the material or installation, and no allowance will be made for repairs, replacements or alterations made by Company unless with GUNDLE LINING SYSTEMS, INC.'S written consent. GUNDLE LINING SYSTEMS, INC. neither assumes nor authorizes any person (other than an officer of GUNDLE LINING SYSTEMS, INC.) to assume for it any other or additional liability in connection with the GUNDLINE HD liner. Any repairs, replacements or alterations made without GUNDLE LINING SYSTEMS INC.'S written consent or any attempted assumption of any such liability will void this Material Warranty.

This Material Warranty is limited to the installation and sale for commercial, industrial or municipal uses at the location described below and does not apply to consumer uses as defined by the Magnuson-Moss Warranty Act, any similar successor federal statute or any similar state consumer warranty statute. This Material Warranty extends to no person, entity or municipality other than Company.

This Material Warranty shall not be effective unless payment in full has been made to GUNDLE LINING SYSTEMS, INC. for all material provided.

The Material Warranty is extended to Company and is non-transferable and non-assignable. No rights against GUNDLE LINING SYSTEMS, INC. shall be created by any attempted transfer or assignment, nor shall any rights against GUNDLE LINING SYSTEMS, INC. survive any attempted transfer or assignment. This Warranty does not extend to any materials furnished or installed by others in connection with the intended use of the Material.

THE LAWS OF THE STATE OF TEXAS SHALL GOVERN THE RIGHTS AND DUTIES OF THE PARTIES UNDER THIS WARRANTY. VENUE FOR ALL LEGAL PROCEEDINGS INVOLVING THIS MATERIAL WARRANTY OR ANY MATTER CONTAINED WITHIN SHALL BE IN HARRIS COUNTY, TEXAS.

THE FOREGOING MATERIAL WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES (EXCEPT OF TITLE), EXPRESS, IMPLIED, OR STATUTORY. IN NO EVENT SHALL GUNDLE LINING SYSTEMS, INC. BE LIABLE FOR LOSS OF PROFITS OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL LOSSES RESULTING FROM ANY DEFECTS IN ITS MATERIAL.

PURCHASER/(COMPANY): **DUKE POWER COMPANY**

LOCATION OF INSTALLATION: **HUNTERSVILLE, NORTH CAROLINA**

DESCRIPTION OF INTENDED USE: **MCGUIRE LANDFILL**

GUNDLE LINING SYSTEMS, INC.
19103 GUNDLE ROAD
HOUSTON, TEXAS 77073

A. Reed Newland

A. Reed Newland
Corporate Counsel

4/23/92

Date

This warranty covers only the following roll numbers:

02013416	02013475	03012595	03012399	03012400	04008441	04008525
04008528	04008532	04008569				

WTYMATP11/91

Gundle Lining Systems Inc

19103 Gundle Road
Houston, Texas 77073-3598
U.S.A.

Phone: (713) 443-8564
Toll Free: (800) 435-2008
Telex: 166657 GUNDLE HOU
FAX: (713) 875-6010

LETTER OF TRANSMITTAL

DATE April 24, 1992
M.R. NO. 6897-03
JOB NAME MCGUIRE LANDFILL
PO 02605

PLASTIC FUSION FABRICATORS
215 WHOLESALE AVENUE
HUNTSVILLE AL 35811
ATTN: JUDY CAYTON

TRANSMITTED VIA: ~~REGULAR MAIL~~ FAX
FEDERAL EXPRESS NO:

GENTLEMEN: We are sending you:

___QC Documentation ___Samples ___Copy of letter ___Original purchase order
___Certification letter ___Specifications ___Submittals XX_Material warranty

No. of Copies	Description of items attached
1	MATERIAL WARRANTY NO. PLA6897-03-A

THESE ARE TRANSMITTED AS NOTED BELOW:

___For approval ___Approved as noted ___Resubmit ___ Copies for approval
XX_For your use ___Returned for corrections ___Approval as Submitted
XX_As requested ___Return ___For review and comment

GUNDLE LINING PACKING LIST:

ROLL NUMBERS: 02013416, 02013475, 02012595, 03012399, 03012400, 04008441, 04008525, 04008528, 04008532, 04008569

APPROVAL _____

DATE _____

Gundle Lining Systems Inc

19103 Gundle Road
Houston, Texas 77073-3598
U.S.A.

Phone: (713) 443-8564
Toll Free: (800) 435-2008
Telex: 166657 GUNDLE HOU
FAX: (713) 875-6010

LETTER OF TRANSMITTAL

DATE April 24, 1992
M.R. NO. 7108-01
JOB NAME MCGUIRE LANDFILL
PO 02671

PLASTIC FUSION FABRICATORS
215 WHOLESALE AVENUE
HUNTSVILLE AL 35811
ATTN: JUDY CAYTON

TRANSMITTED VIA: ~~REGULAR MAIL~~ Fed X
FEDERAL EXPRESS NO:

GENTLEMEN: We are sending you:

___QC Documentation ___Samples ___Copy of letter ___Original purchase order

___Certification letter ___Specifications ___Submittals XX_Material warranty

No. of Copies	Description of items attached
1	MATERIAL WARRANTY NO. PLA7108-01-A

THESE ARE TRANSMITTED AS NOTED BELOW:

___For approval ___Approved as noted ___Resubmit ___ Copies for approval

XX_For your use ___Returned for corrections ___Approval as Submitted

XX_As requested ___Return ___For review and comment

GUNDLE LINING PACKING LIST:

ROLL NUMBERS: 03012518, 03012522. 03012523, 03012496, 03012501, 03012502, 03012503, 03012504, 03012507, 03012507, 03012508, 03012509, 03012511

APPROVAL _____

DATE _____

The Material Warranty is extended to Company and is non-transferable and non-assignable. No rights against GUNDLE LINING SYSTEMS, INC. shall be created by any attempted transfer or assignment, nor shall any rights against GUNDLE LINING SYSTEMS, INC. survive any attempted transfer or assignment. This Warranty does not extend to any materials furnished or installed by others in connection with the intended use of the Material.

THE LAWS OF THE STATE OF TEXAS SHALL GOVERN THE RIGHTS AND DUTIES OF THE PARTIES UNDER THIS WARRANTY. VENUE FOR ALL LEGAL PROCEEDINGS INVOLVING THIS MATERIAL WARRANTY OR ANY MATTER CONTAINED WITHIN SHALL BE IN HARRIS COUNTY, TEXAS.

THE FOREGOING MATERIAL WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES (EXCEPT OF TITLE), EXPRESS, IMPLIED, OR STATUTORY. IN NO EVENT SHALL GUNDLE LINING SYSTEMS, INC. BE LIABLE FOR LOSS OF PROFITS OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL LOSSES RESULTING FROM ANY DEFECTS IN ITS MATERIAL.

PURCHASER/(COMPANY): **DUKE POWER COMPANY**

LOCATION OF INSTALLATION: **HUNTERSVILLE, NORTH CAROLINA**

DESCRIPTION OF INTENDED USE: **MCGUIRE LANDFILL**

GUNDLE LINING SYSTEMS, INC.
19103 GUNDLE ROAD
HOUSTON, TEXAS 77073

A. Reed Newland
Corporate Counsel

4/23/92
Date

This warranty covers only the following roll numbers:

03012518	03012522	03012523	03012496	03012501	03012502	03012503
03012504	03012507	03012508	03012509	03012511		

WTYMATP11/91

Gundle Lining Systems Inc

19103 Gundle Road
Houston, Texas 77073-3598
U.S.A.

Phone: (713) 443-8564
Toll Free: (800) 435-2008
Telex: 166657 GUNDLE HOU
FAX: (713) 875-6010

WARRANTY NO. **PLA7108-01-A**

EFFECTIVE DATE: **APRIL 1, 1992**

MATERIAL WARRANTY

GUNDLE LINING SYSTEMS, INC. warrants to (and only to) DUKE POWER COMPANY ("Company") the material GUNDLINE HD to conform at the time of sale to the specifications of GUNDLE LINING SYSTEMS, INC., to be free from defects in materials and to be able to withstand normal weathering and use from the date of installation or sale for a period of 20 year(s) for 60 mil HDT TEXTURED under normal uses and services for which it is designed and manufactured, in any customary weather which may be encountered and which is not customarily considered to be in the nature of an Act of God, casualty or catastrophe, such as but not limited to earthquake, flood, piercing hail or tornado. Normal use and service excludes, among other things but without limitation, the exposure of the liner to chemicals known to be harmful to the liner, mechanical abuse by machinery, equipment or people or excessive pressure or stress from any source.

Should defects or premature loss of use within the scope of the above Material Warranty occur, GUNDLE LINING SYSTEMS, INC. will, at its option, supply repair or replacement material on a pro-rata basis at the then current price in such manner as to charge Company only for that portion of the warranted 20 year life which has elapsed since the purchase of the material. To enable GUNDLE LINING SYSTEMS, INC.'S technical staff properly to determine the cause of any alleged defect and to take appropriate steps to supply repair or replacement material for timely corrective measures, any claim for alleged breach of warranty must be made by Company in writing, by certified mail, to GUNDLE LINING SYSTEMS, INC. within 30 days after the alleged defect was first noticed and within the warranty period or the defect and all warranties will be deemed to have been waived by Company. If repairs or replacements are to be effected, the lined area must be tendered to GUNDLE LINING SYSTEMS, INC. in a clean, dry, unencumbered condition. This includes but is not limited to removal of all water, dirt, sludge, residuals or liquid of any kind from the lined area.

GUNDLE LINING SYSTEMS, INC.'S liability under this Material Warranty shall in no event exceed the amount of the sale price of the material sold to the Company for the particular installation in which any defect or premature loss of use is alleged to have occurred, and under no circumstances shall GUNDLE LINING SYSTEMS, INC. have any liability for consequential damages arising from loss of production or product owing to the failure of the material or installation, and no allowance will be made for repairs, replacements or alterations made by Company unless with GUNDLE LINING SYSTEMS, INC.'S written consent. GUNDLE LINING SYSTEMS, INC. neither assumes nor authorizes any person (other than an officer of GUNDLE LINING SYSTEMS, INC.) to assume for it any other or additional liability in connection with the GUNDLINE HD liner. Any repairs, replacements or alterations made without GUNDLE LINING SYSTEMS INC.'S written consent or any attempted assumption of any such liability will void this Material Warranty.

This Material Warranty is limited to the installation and sale for commercial, industrial or municipal uses at the location described below and does not apply to consumer uses as defined by the Magnuson-Moss Warranty Act, any similar successor federal statute or any similar state consumer warranty statute. This Material Warranty extends to no person, entity or municipality other than Company.

This Material Warranty shall not be effective unless payment in full has been made to GUNDLE LINING SYSTEMS, INC. for all material provided.

PLASTIC FUSION FABRICATORS, INC.

JOB NO.: 91060 CONTRACTOR: Johnson Contractors

PROJECT: McGuire Landfill OWNER: Duke Power QA MONITOR:

GEOMEMBRANE REPAIR / TESTING LOG

REPAIR NO.	REPAIR TYPE	SIZE	MACHINE NO./ SETTING	OPERATOR/ REPAIR DATE	OPERATOR/ TEST DATE	RESULTS/ TEST TYPE	OPERATOR/ REWORK DATE	OPERATOR/ RETEST DATE	RESULTS/TEST TYPE/REMARKS
1	Patch	24"	177 265	12/22 ME	SB 1/9	P VT			
2		24"							
3		30"							
4		16x30							
5		12							
6		12							
7		12							
8		50"							
9		18							
10		16"		1/9					
11		15"							
12		18"							
	Boot	48x48		12/22		ST			
	Boot	48x60		1/9		ST			

REPAIR CODES: P-PATCH G-GRIND AND WELD C-CAP / RESULT CODES: P-PASS F-FAIL / TEST CODES: V-VACUM TEST S-SPARK TEST

PLASTIC FUSION FABRICATORS, INC.

JOB NO.: 91060 DATE: _____ CONTRACTOR: Johnson Contractors

PROJECT: McGuire Landfill OWNER: Duke Power Company

GEOMEMBRANE SEAM PRESSURE TESTING LOG

SEAM #	SEGMENT	TIME		OPERATOR	PRESSURE		COMP. ✓	REMARKS	QA MON.
		START	END		START	END			
1/2		942	947	RT	30	29		12/11/91	
2/3		1022	1036	RT	31	30			
3/4		1110	1115	ME	30	30			
4/5		1253	114	ME	33	33			
5/6		1255	114	ME	36	35			
6/7		200	205	RT	36	36			
7/8		210	215	RT	30	30			
8/9		330	335	RT	32	32			
9/10		390	348	RT	31	31			
10/11		358	405	RT	30	30			
11/12		412	417	RT	36	36			
12/13		430	435	ME	32	32			
13/14		905	910	RT	42	42		12/12/91	
14/15		1136	1141	~~RT~~ DF	32	32			
15/16		1019	1024	DF	32	32			
16/17		1130	1135	DF	30	30			
17/18		123	130	RT	30	30			
18/19		1130	1135	RT	40	40			
19/20		220	225	DF	38	38			
20/21		330	336	DF	40	40			

PLASTIC FUSION FABRICATORS, INC.

JOB NO.: 91060 DATE: _____ CONTRACTOR: Johnson Contractors

PROJECT: McGuire Landfill OWNER: Duke Power Company

GEOMEMBRANE SEAM PRESSURE TESTING LOG

SEAM #	SEGMENT	TIME		OPERATOR	PRESSURE		COMP. ✓	REMARKS	QA MON.
		START	END		START	END			
21/22		440	445	DF	42	42			
22/23		358	404	DF	34	34			
23/24		410	415	MB	32	32			
24/25		417	422	DF	38	38			
25/26		424	429	DF	~~42~~ 34	34 ~~42~~			
26/27		915	1020	RT	30	30			
27/28		1025	1030	RT	36	36			
28/29		1144	200	RT	34	32			
29/30		200	207	RT	35	35			
30/31		205	210	RT	35	35			
31/32		210	215	RT	33	33			
32/33		220	410	RT	36	34			
33/34		405	413	RT	40	40			
34/35		410	415	RT	39	39			
35/36		415	420	RT	40	40			
36/37		425	430	RT	36	36			
37 35 36 34/38		900	915	RT	39	39			
39/39A		1105	1110	RT	38	38			
39/40		1055	1100	RT	40	40			
40/41		1013	1018	RT	43	43			

PLASTIC FUSION FABRICATORS, INC.

JOB NO.: 91060 DATE: _____ CONTRACTOR: Johnson Contractors

PROJECT: McGuire Landfill OWNER: Duke Power Company

GEOMEMBRANE SEAM PRESSURE TESTING LOG

SEAM #	SEGMENT	TIME		OPERATOR	PRESSURE		COMP. ✓	REMARKS	QA MON.
		START	END		START	END			
41/42		1010	1015	RT	32	32			
42/43		1100	1105	RT	40	40			
43/44		253	300	DF	40	40			
44/45		309	316	DF	40	40			
45/46		330	335	DF	36	36			
46/47		340	352	DF	41	40			
47/48		336	341	DF	37	37			
48/49		341	346	DF	42	42			
51/52		330	335	RT	50	50			
51/52/49		401	406	RT	30	30			
51/48/49/47/50		445	450	RT	35	35			
53/54	12/18/91	1023	1027	ME	42	42			
54/55		1045	1050	ME	32	31			
53/56		250	255	[illegible]	45	45			
56/57		240	245	[illegible]	40	40			
57/62		720	725	[illegible]	42	42			
62/63		725	730	[illegible]	45	45			
55/58		1052	1057	RT	40	40			
58/59		1101	1106	ME	43	43			
59/60	12/18/91	1145	1150	[illegible]	41	41			

PLASTIC FUSION FABRICATORS, INC.

JOB NO.: 91060 DATE: _____ CONTRACTOR: Johnson Contractors

PROJECT: McGuire Landfill OWNER: Duke Power Company

GEOMEMBRANE SEAM PRESSURE TESTING LOG

SEAM #	SEGMENT	TIME		OPERATOR	PRESSURE		COMP. ✓	REMARKS	QA MON.
		START	END		START	END			
60/61		330	335	RT	36	36			
61/63		915	921	AE	36	36			
64/65		1138	1143	AE	40	39			
64/66		1215	1245	SB BE	42	41			
66/67		1120	1125	BE	40	40			
67/68		1044	1051	BE	40	34			
68/69		1032	1040	BE	50	48			
69/70		1020	1025	BE	40	39			
70/71		1050	1055	RT	42	42			
71/72		321	326	DF	30	30			
72/73		327	333	DF	36	36			
73/74		~~1227~~ 328	334	DF	42	42			
74/75		340	345	DF	50	50			
75/76		350	355	DF	42	42			
76/77		353	358	DF	60	60			
77/78		359	405	DF	50	50			
78/79		406	412	DF	48	48			
79/80		415	420	DF	50	50			
81/81		325	336	RT	43	43			
81/82		400	410	RT	40	40			

PLASTIC FUSION FABRICATORS, INC.

JOB NO.: 91060 DATE: _____ CONTRACTOR: Johnson Contractors

PROJECT: McGuire Landfill OWNER: Duke Power Company

GEOMEMBRANE SEAM PRESSURE TESTING LOG

SEAM #	SEGMENT	TIME		OPERATOR	PRESSURE		COMP. ✓	REMARKS	QA MON.
		START	END		START	END			
82/83		900	915	DF	37	36			
83/93		920	925	DF	38	38			
81									
90									
79/93		950	955	BE	40	40			
77/76									
79									
84/85		421	426	DF	38	38			
85/86		417	422	DF	44	44			
86/87		413	420	DF	40	40			
87/88		404	410	DF	37	36			
84/87		445	450	DF	40	39			
89/90	135/S	515	530	BB	36	36			
89/90	135/N	820	825	RT	32	32			
90/91		215	220	RT	32	32			
91/92		224	229	RT	30	30			
1st Tie in		100	110	RT		35			
2nd Tie in		1115	1130	RT	37	37			

PLASTIC FUSION FABRICATORS, INC.

JOB NO.: 91060 DATE: _____ CONTRACTOR: Johnson Contractors

PROJECT: Small Pond --McGuire Landfill OWNER: Duke Power Company

GEOMEMBRANE SEAM PRESSURE TESTING LOG

SEAM #	SEGMENT	TIME		OPERATOR	PRESSURE		COMP. ✓	REMARKS	QA MON.
		START	END		START	END			
1/2		~~1032~~ 1105	~~1100~~ 1110		40				
1/3		~~1025~~	1055/1100		37				
4/5		1132	1137		44				
4/6		1150	1155		42				
6/7		1222	1227		40				
7/13		235	240		36				
2/13 7 6 4 5		405	410		35				
		~~1~~							
8/11		150	155		30				
8/9		105	110		32				
9/10		210	215		30				
10/12		215	220		40				
12/10 8/11	3	312	317		34				

Appendix 2

TRANSMITTAL LETTER

MCGUIRE LANDFILL PROJECT TID# 020
CMD-Northern Division
Date 11.14.91

To: C.N. Davis
Design Engineering

TRANSMITTED:
(✓) Herewith ( ) Under Separate Cover
( ) In Accordance With Your Request

FOR:
( ) Approval ( ) Distribution ( ) Information
( ) Review & Comment (✓) Record
(✓) Use ( )

THE FOLLOWING:
( ) Drawings ( ) Samples (✓) Specifications
( ) Prints ( ) Product Literature
( ) Change Order ( ) Supplemental Instructions
( ) Proposal Request

Copies	Date	Rev #	Description	Action
3	11.5.91		SOILS ANALYSIS	B

Action Code:
A. Action Indicated on Item Transmitted
B. No Action Required
C. For Signature and Return to This Office
D. For Signature and Forwarding (See Remarks)
E. See Remarks Below.

Remarks:

Copies To:
FILE

By: R. D. Yarbrough

25563 (R9-85)

FORM M-1J | REV. 7

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

SOIL PARTICLE SIZE ANALYSIS

SOURCE OF SAMPLE Landfill DATE SAMPLED 11 Sept 23, 1991 SAMPLE NUMBER L-1

SAMPLE PREPARATION

A) INITIAL WEIGHT OF SAMPLE 544.92
B) WT RETAINED ON #10 SIEVE 00.0
C) WT PASSING #10 (A-B) 544.92
D) %PASSING #10 (C ÷ A) X 100 100.00
SCALE SER NO. McQua 32765

E) DRY WT OF SAMPLE 100 GR
F) (PORTION PASSING #10 SIEVE)
F) FACTOR (D ÷ E) 1.00
SPECIFIC GRAVITY 2.70
SIEVE SER. NO. N/A
OVEN SER. NO. McQua

HYDROMETER ANALYSIS

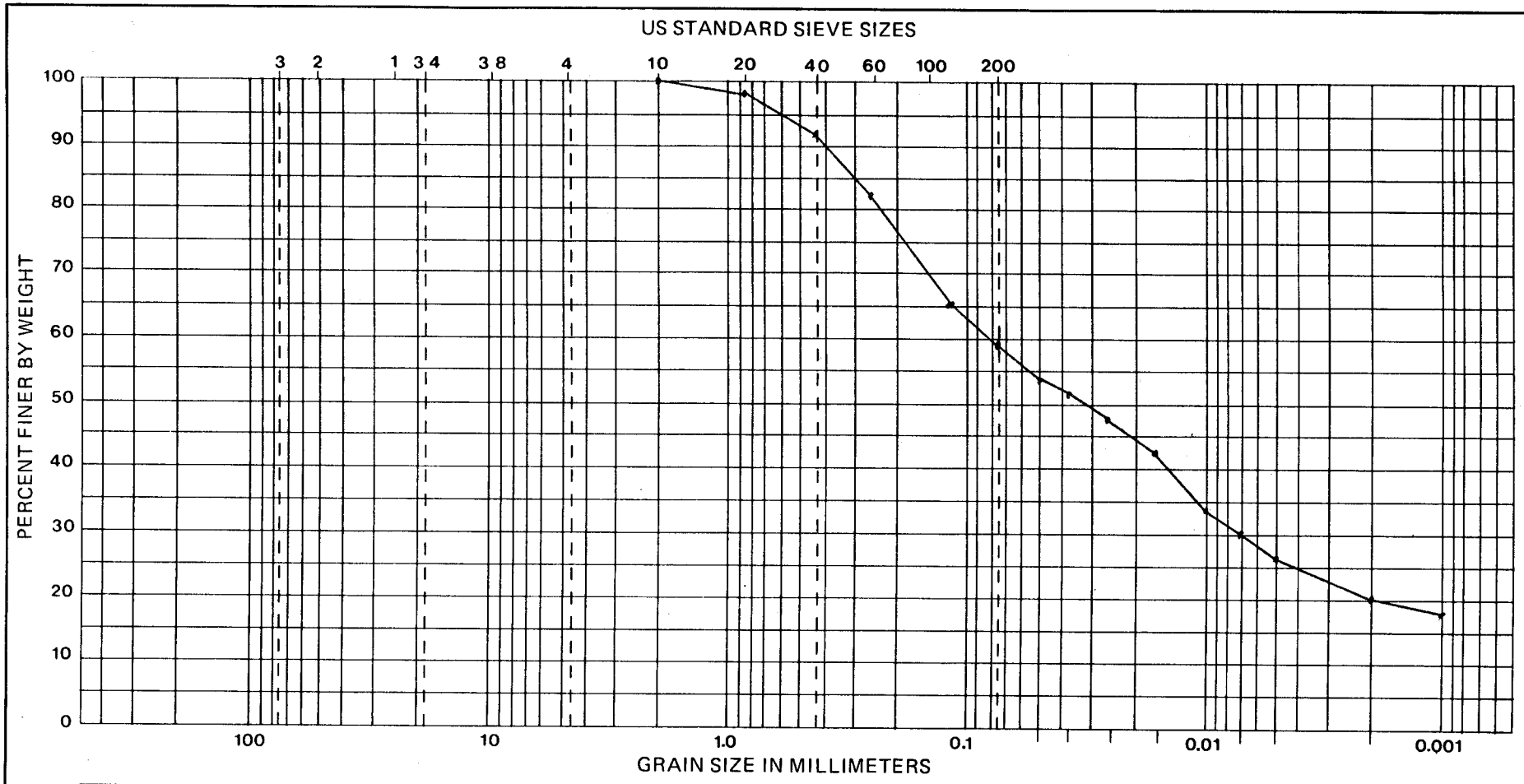
HYDROMETER NO. 1 DISPERSING AGENT CL-288
THERMOMETER SER. NO. McQua 32161
STARTING TIME 740 AM TEMPERATURE 22°C DATE TESTED 11/5/91

TIME (MIN)	HYDROMETER READING	TEMPERATURE CORRECTION: SOLUTION CORRECTION	TEMPERATURE CORRECTION: MENISCUS CORRECTION	CORRECTED HYDROMETER READING	% = CORRECTED HYDROMETER READING X F = TOTAL PASSING	PARTICLE DIAMETER (MM)	% OF TOTAL PASSING
0.5	58	6	1	53		.050	53.0
1.0	57	6	1	52		.037	52.0
2.0	53	6	1	48		.025	48.0
5.0	48	6	1	43		.017	43.0
15.0	39	6	1	34		.010	34.0
30.0	35	6	1	30		.007	30.0
60.0	31	6	1	26		.005	26.0
250.0	25	6	1	20		.002	20.0
1440.0	~~25~~ 23	6	1	18		.001	18.0

SIEVE ANALYSIS

SIEVE NO.	SIEVE SER. NO.	CUMULATIVE WT. RETAINED	CUMULATIVE WT. PASSING	CUMMULATIVE WEIGHT PASSING = % OF TOTAL PASSING X F	PARTICLE DIAMETER (MM)	% OF TOTAL PASSING
10		0	100		.00	100
20		1.62	98.38		.841	98.4
40		7.44	92.56		.420	92.6
60		17.57	82.43		.250	82.4
140		35.00	65.00		.105	65.0
200		40.36	59.64		.074	59.6
PAN		0				

INSPECTOR R.R Seaught DATE 11/5/91
LEVEL II EVALUATION DATE
QA APPROVAL DATE



BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

PROJECT McGuire Landfill

BORING NO	ELEV OR DEPTH	NAT WC	LL	PL	PI	DESCRIPTION OR CLASSIFICATION
N/A	N/A	N/A	N/A	N/A	N/A	

GRAIN SIZE DISTRIBUTION

TEST NO. L-1 JOB NO. N/A

INSPECTOR B.R. Seaquist

DATE Nov 7, 1991

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

LEVEL II EVALUATION _____

QA APPROVAL _____ DATE _____

25565 (R9-85)

FORM M-1L

REV. 5

25563 (R9-85)

FORM M-1J	REV. 7

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

SOIL PARTICLE SIZE ANALYSIS 9/26/91

SOURCE OF SAMPLE Sandfill DATE SAMPLED ~~Sept. 23, 1991~~ SAMPLE NUMBER L-4

SAMPLE PREPARATION

A) INITIAL WEIGHT OF SAMPLE 646.16
B) WT RETAINED ON #10 SIEVE 1.44
C) WT PASSING #10 (A-B) 638.67
D) %PASSING #10 (C ÷ A) X 100 99.8
SCALE SER. NO. McQua 32765

E) DRY WT OF SAMPLE 100
F) (PORTION PASSING #10 SIEVE)
F) FACTOR (D ÷ E) .998
SPECIFIC GRAVITY 2.74
SIEVE SER. NO. N/A
OVEN SER. NO. McQua

HYDROMETER ANALYSIS

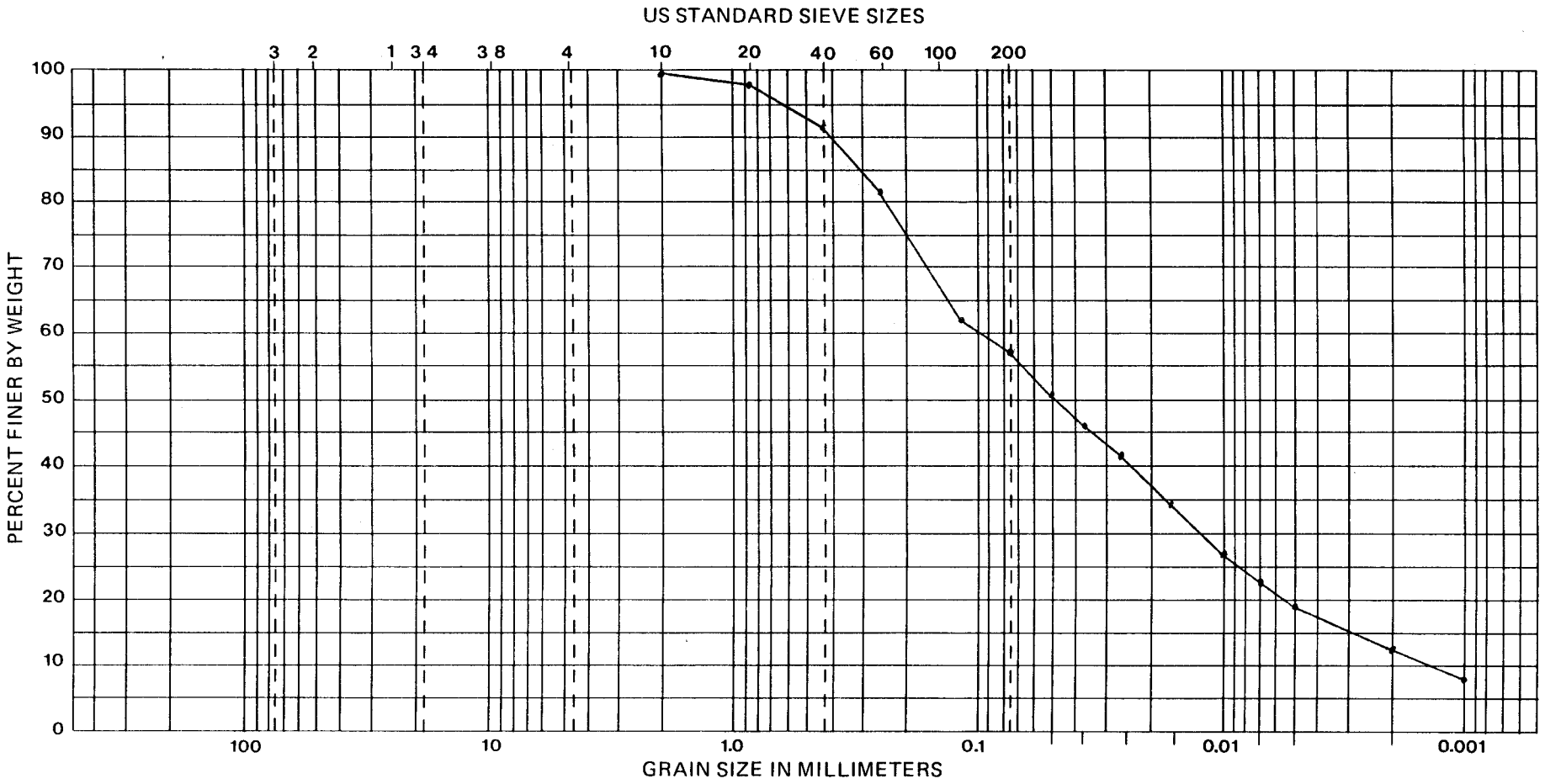
HYDROMETER NO. 2 DISPERSING AGENT CL-288
THERMOMETER SER. NO. McQua 32161
STARTING TIME 745 AM TEMPERATURE 22° DATE TESTED 11/5/91

TIME (MIN)	HYDROMETER READING	TEMPERATURE CORRECTION: SOLUTION CORRECTION	TEMPERATURE CORRECTION: MENISCUS CORRECTION	CORRECTED HYDROMETER READING	% TOTAL PASSING = CORRECTED HYDROMETER READING X F	PARTICLE DIAMETER (MM)	% OF TOTAL PASSING
0.5	56	6	1	51		.050	50.9
1.0	51	6	1	46		.037	45.9
2.0	47	6	1	42		.025	41.9
5.0	40	6	1	35		.017	34.9
15.0	32	6	1	27		.010	26.9
30.0	28	6	1	23		.007	22.6
60.0	24	6	1	19		.005	19.0
250.0	18	6	1	13		.002	13.0
1440.0	13	6	1	8		.001	8.0

SIEVE ANALYSIS

SIEVE NO.	SIEVE SER. NO.	CUMULATIVE WT. RETAINED	CUMULATIVE WT. PASSING	CUMMULATIVE WEIGHT PASSING = F X % OF TOTAL PASSING	PARTICLE DIAMETER (MM)	% OF TOTAL PASSING
10		0	100		.00	99.8
20		2.19	97.81		.841	97.6
40		9.44	90.56		.420	90.4
60		18.98	81.02		.250	80.9
140		37.37	62.63		.105	62.5
200		42.91	57.09		.074	57.0
PAN						

INSPECTOR B.R. Leavitt DATE 11/5/91
LEVEL II EVALUATION _____ DATE _____
QA APPROVAL _____ DATE _____



BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

PROJECT _____

BORING NO	ELEV OR DEPTH	NAT WC	LL	PL	PI	DESCRIPTION OR CLASSIFICATION
N/A	N/A	N/A	N/A	N/A	N/A	

GRAIN SIZE DISTRIBUTION

TEST NO. L-4 JOB NO. N/A

INSPECTOR R.R. Seaught

DATE Nov 7, 1991

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

LEVEL II EVALUATION _____ QA APPROVAL _____ DATE _____

25565 (R9-85)

FORM M-1L

REV. 5

25562 (R4-84)

Form M-1H | Revision 4

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

ATTERBERG LIMITS

Location McGuire Landfill

Tested by R.R. Seaflat

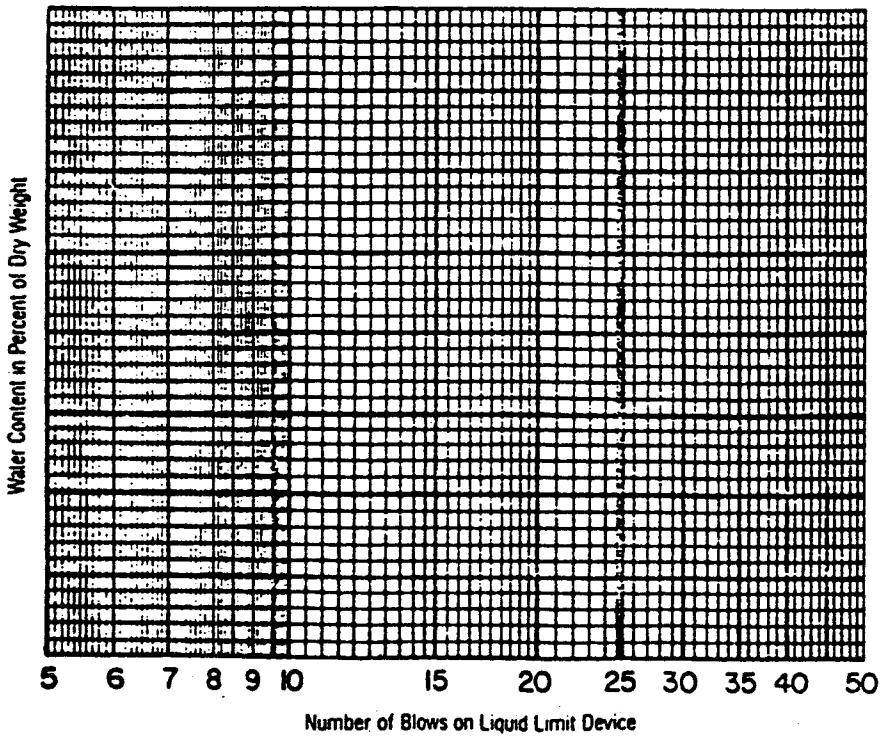
Project Landfill L-1 Date Nov. 8, 1991 Specific gravity

LL = Liquid Limit Test - %
PL = Plastic Limit Test - %
PI = Plasticity Index - %

LIQUID LIMIT TEST	1	2	3	4	5	6
Sample Number						
Container Number						
Number of Blows	N/P					
Scale Serial Number						
Oven Serial Number						
Weight Sample + Tare Wet						
Weight Sample + Tare Dry						
Weight of Water						
Tare Weight						
Weight of Dry Soil						
Water Content						
Liquid Limit						

PLASTIC LIMIT TEST	1	2	3	4	5	6
Sample Number						
Container Number						
Scale Serial Number	N/P					
Oven Serial Number						
Weight Sample + Tare Wet						
Weight Sample + Tare Dry						
Weight of Water						
Tare Weight						
Weight of Dry Soil						
Water Content						
Plastic Limit						

FLOW CURVE



RESULTS	1	2	3
LL	N/P		
PL			
PI			
Specific gravity	2.70		
Natural water content			
Remarks			

QA Approval _____ Date _____

25562 (R4-84)

Form M-1H | Revision 4

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

ATTERBERG LIMITS

Location McGuire Landfill

Tested by R.R. Searight

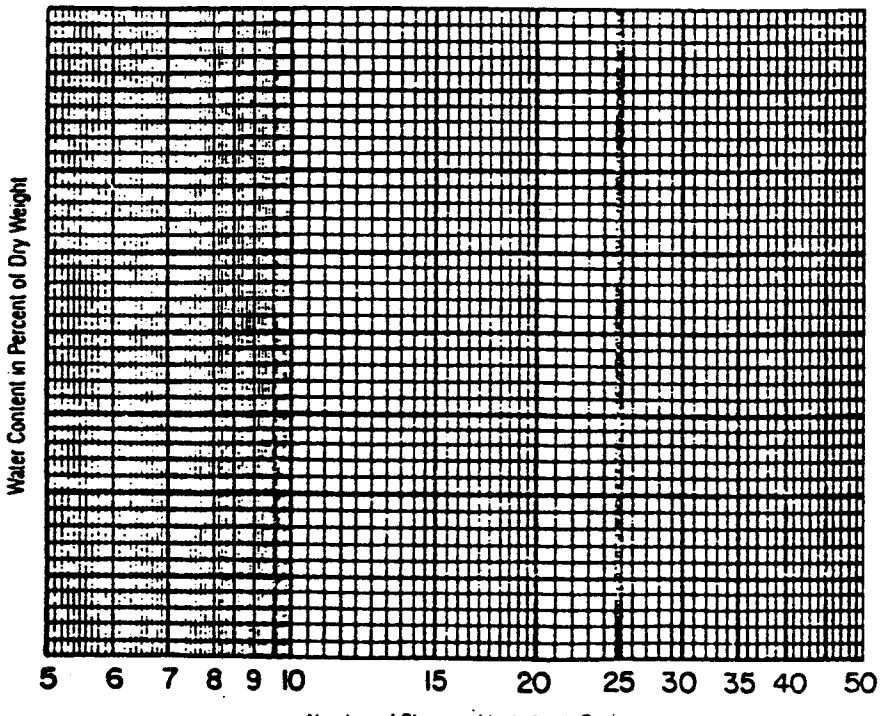
Project Landfill L-4 Date NOV. 8, 1991 Specific gravity 2.74

LL = Liquid Limit Test - %
PL = Plastic Limit Test - %
PI = Plasticity Index - %

LIQUID LIMIT TEST	1	2	3	4	5	6
Sample Number						
Container Number						
Number of Blows						
Scale Serial Number						
Oven Serial Number	N					
Weight Sample + Tare Wet	P					
Weight Sample + Tare Dry						
Weight of Water						
Tare Weight						
Weight of Dry Soil						
Water Content						
Liquid Limit						

PLASTIC LIMIT TEST	1	2	3	4	5	6
Sample Number						
Container Number						
Scale Serial Number						
Oven Serial Number	N					
Weight Sample + Tare Wet						
Weight Sample + Tare Dry	P					
Weight of Water						
Tare Weight						
Weight of Dry Soil						
Water Content						
Plastic Limit						

FLOW CURVE



RESULTS	1	2	3
LL	N		
PL	P		
PI			
Specific gravity	2.74		
Natural water content	N/A		
Remarks			

QA Approval _____ Date _____

25564 (R6-86)
25564 (R6-86)

FORM M-1K
FORM M-1K

REVISION 6
REVISION 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire Landfill

SPECIFIC GRAVITY

1. SAMPLE NUMBER	L-1	L-4							
2. DATE	11/5/91	11/5/91							
3. FLASK NUMBER	11	13							
4. SCALE SER. NO.	meQuA 3276	5							
5. THERMOMETER SER. NO.	meQuA 3261								
6. WT. OF FLASK (GRAMS)	180.32	176.59							
7. WT. OF FLASK WITH WATER (GRAMS)	679.00	674.80							
8. TEMPERATURE OF WATER (°C)	21°C	21°C							
9. DENSITY OF WATER	~~998023~~ ~~998434~~	.998023							
10. VOLUME OF FLASK(7-6)-9(cc)	~~499.67~~ ~~492.71~~	499.20							
11. WT. OF SAMPLE (GRAMS)	100	100							
12. TIME UNDER VACUUM (MIN.)	50 min	50 min.							
13. WT. OF FLASK, SAMPLE & WATER (GRAMS)	742.30	738.60							
14. TEMPERATURE OF WATER (°C)	19°C	19°C							
15. DENSITY OF WATER	.998434	.998434							
16. WT. OF FLASK & WATER 13-11(GRAMS)	642.30	638.60							
17. WT. OF WATER IN FLASK 16-6 (GRAMS)	461.98	462.01							
18. VOLUME OF WATER IN FLASK 17÷15 (cc)	462.70	462.73							
19. VOLUME OF SOIL10-18 (cc)	36.97	36.47							
20. SPECIFIC GRAVITY 11÷19	2.70	2.74							
21. INSPECTOR'S INITIAL	RRS	RRS							
22. LEVEL II EVALUATION	N/A	N/A							

Q.A. APPROVAL _____ DATE _____

25563 (R9-85)

FORM M-1J | REV. 7

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

SOIL PARTICLE SIZE ANALYSIS

SOURCE OF SAMPLE Landfill DATE SAMPLED 11 Sept 23.1991 SAMPLE NUMBER L-1

SAMPLE PREPARATION

A) INITIAL WEIGHT OF SAMPLE 544.92
B) WT RETAINED ON #10 SIEVE 00.0
C) WT PASSING #10 (A-B) 544.92
D) %PASSING #10 (C ÷ A) X 100 100.00
SCALE SER NO. McQua 32765

E) DRY WT OF SAMPLE 100 GR
F) (PORTION PASSING #10 SIEVE)
F) FACTOR (D ÷ E) 1.00
SPECIFIC GRAVITY 2.70
SIEVE SER. NO. N/A
OVEN SER. NO. McQua

HYDROMETER ANALYSIS

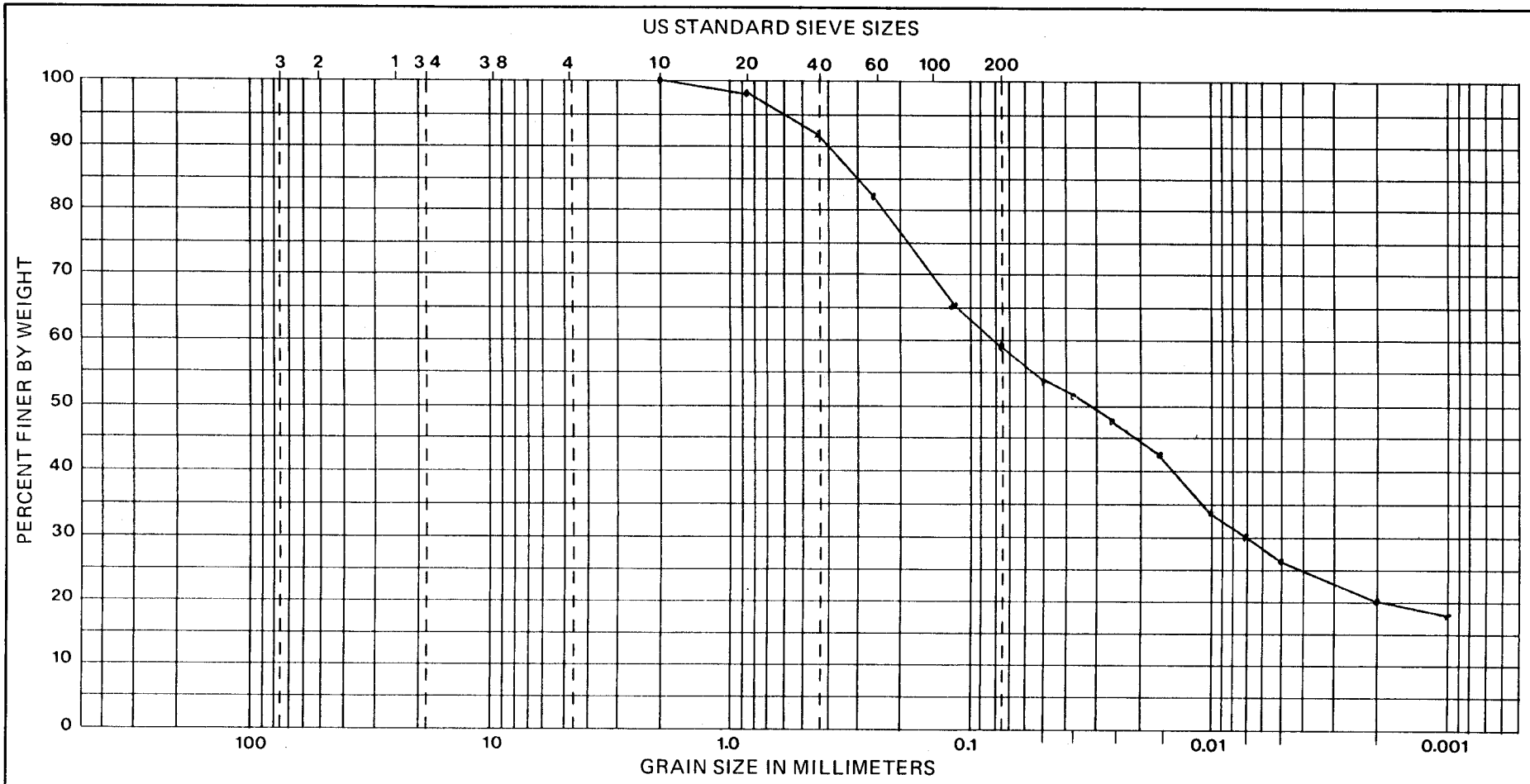
HYDROMETER NO. 1 DISPERSING AGENT CL-288
THERMOMETER SER. NO. McQua 32161
STARTING TIME 740 AM TEMPERATURE 22°C DATE TESTED 11/5/91

TIME (MIN)	HYDROMETER READING	TEMPERATURE CORRECTION: SOLUTION CORRECTION	TEMPERATURE CORRECTION: MENISCUS CORRECTION	CORRECTED HYDROMETER READING	% CORRECTED HYDROMETER READING X F = TOTAL PASSING	PARTICLE DIAMETER (MM)	% OF TOTAL PASSING
0.5	58	6	1	53		.050	53.0
1.0	57	6	1	52		.037	52.0
2.0	53	6	1	48		.025	48.0
5.0	48	6	1	43		.017	43.0
15.0	39	6	1	34		.010	34.0
30.0	35	6	1	30		.007	30.0
60.0	31	6	1	26		.005	26.0
250.0	25	6	1	20		.002	20.0
1440.0	~~25~~ 23	6	1	18		.001	18.0

SIEVE ANALYSIS

SIEVE NO.	SIEVE SER. NO.	CUMULATIVE WT. RETAINED	CUMULATIVE WT. PASSING	CUMMULATIVE WEIGHT PASSING X F = % OF TOTAL PASSING	PARTICLE DIAMETER (MM)	% OF TOTAL PASSING
10		0	100		.00	100
20		1.62	98.38		.841	98.4
40		7.44	92.56		.420	92.6
60		17.57	82.43		.250	82.4
140		35.00	65.00		.105	65.0
200		40.36	59.64		.074	59.6
PAN		0				

INSPECTOR R.R Seaught DATE 11/5/91
LEVEL II EVALUATION DATE
QA APPROVAL DATE



BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

PROJECT McGuire Landfill

BORING NO	ELEV OR DEPTH	NAT WC	LL	PL	PI	DESCRIPTION OR CLASSIFICATION
N/A	N/A	N/A	N/A	N/A	N/A	

GRAIN SIZE DISTRIBUTION

TEST NO. L-1 JOB NO. N/A

INSPECTOR R.R. Seagle

DATE Nov 7, 1991

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

LEVEL II EVALUATION _____

QA APPROVAL _____ DATE _____

25565 (R9-85)

FORM M-1L

REV. 5

25563 (R9-85)

FORM M-1J	REV. 7

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

SOIL PARTICLE SIZE ANALYSIS 9/26/91

SOURCE OF SAMPLE Sandfill DATE SAMPLED ~~Sept. 23 1991~~ SAMPLE NUMBER L-4

SAMPLE PREPARATION

A) INITIAL WEIGHT OF SAMPLE 646.16
B) WT RETAINED ON #10 SIEVE 7.49
C) WT PASSING #10 (A-B) 638.67
D) %PASSING #10 (C ÷ A) X 100 99.8
SCALE SER NO. McGua 32765

E) DRY WT OF SAMPLE 100
F) (PORTION PASSING #10 SIEVE)
F) FACTOR (D ÷ E) .998
SPECIFIC GRAVITY 2.74
SIEVE SER. NO. N/A
OVEN SER. NO. McGua

HYDROMETER ANALYSIS

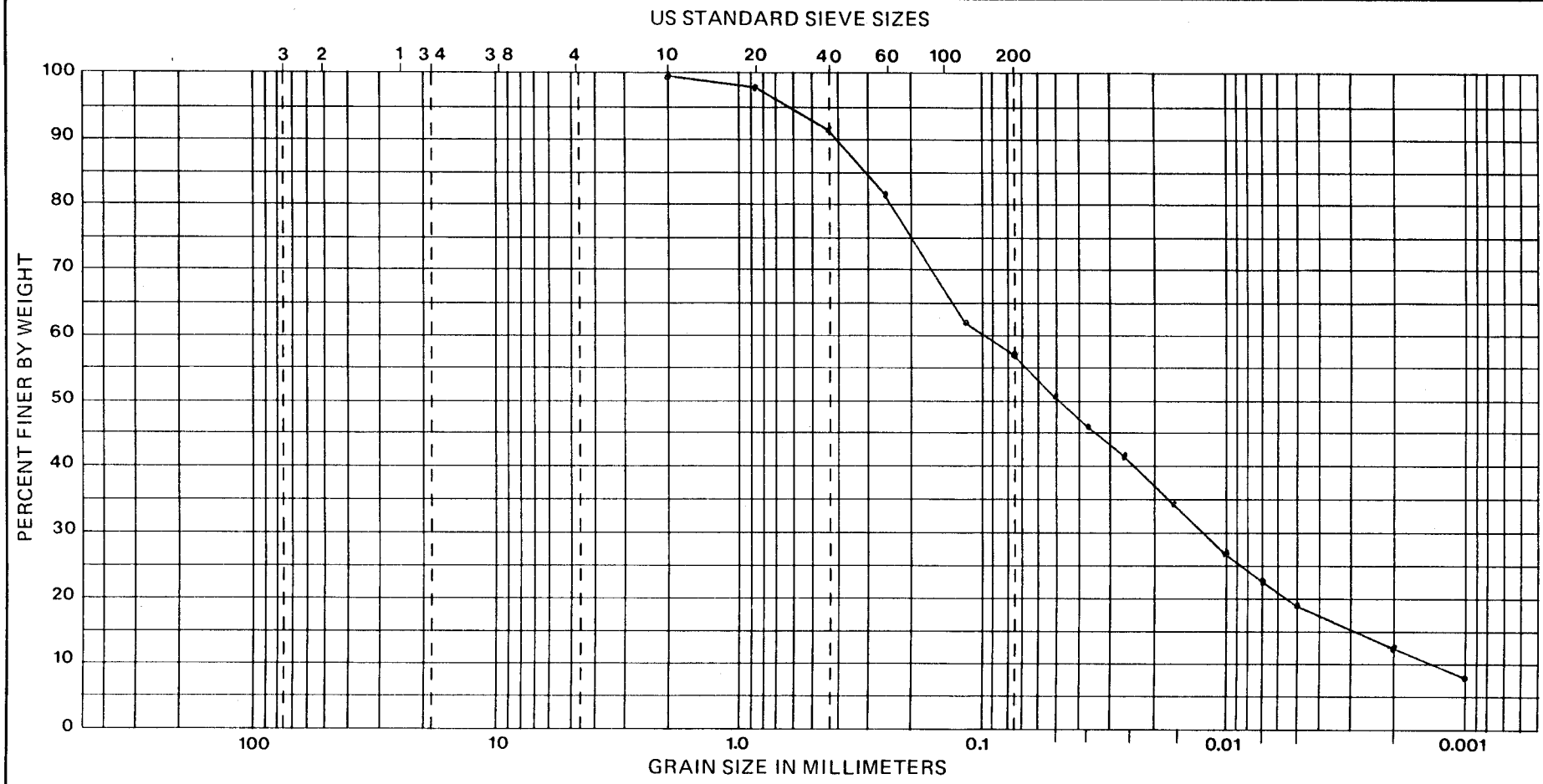
HYDROMETER NO. 2 DISPERSING AGENT CL 288
THERMOMETER SER. NO. McGua 32161
STARTING TIME 745 AM TEMPERATURE 22° DATE TESTED 11/5/91

TIME (MIN)	HYDROMETER READING	TEMPERATURE CORRECTION: SOLUTION CORRECTION	TEMPERATURE CORRECTION: MENISCUS CORRECTION	CORRECTED HYDROMETER READING	% TOTAL PASSING = F X HYDROMETER READING	PARTICLE DIAMETER (MM)	% OF TOTAL PASSING
0.5	56	6	1	51		.050	50.9
1.0	51	6	1	46		.037	45.9
2.0	47	6	1	42		.025	41.9
5.0	40	6	1	35		.017	34.9
15.0	32	6	1	27		.010	26.9
30.0	28	6	1	23		.007	22.9
60.0	24	6	1	19		.005	19.0
250.0	18	6	1	13		.002	13.0
1440.0	13	6	1	8		.001	8.0

SIEVE ANALYSIS

SIEVE NO.	SIEVE SER. NO.	CUMULATIVE WT. RETAINED	CUMULATIVE WT. PASSING	CUMMULATIVE % OF TOTAL PASSING = F X WEIGHT PASSING	PARTICLE DIAMETER (MM)	% OF TOTAL PASSING
10		0	100		.00	99.8
20		2.19	97.81		.841	97.6
40		9.44	90.56		.420	90.4
60		18.98	81.02		.250	80.9
140		37.37	62.63		.105	62.5
200		42.91	57.09		.074	57.0
PAN						

INSPECTOR B.R. Leaphart DATE 11/5/91
LEVEL II EVALUATION _____ DATE _____
QA APPROVAL _____ DATE _____



BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

PROJECT _____

BORING NO	ELEV OR DEPTH	NAT WC	LL	PL	PI	DESCRIPTION OR CLASSIFICATION
N/A	N/A	N/A	N/A	N/A	N/A	

GRAIN SIZE DISTRIBUTION

TEST NO. L-4 JOB NO. N/A

INSPECTOR R.R. Seaugh

DATE Nov 7, 1991

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

LEVEL II EVALUATION _____

QA APPROVAL _____ DATE _____

25565 (R9-85)

FORM M-1L

REV. 5

25562 (R4-84)

Form M-1H | Revision 4

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

ATTERBERG LIMITS

Location McGuire Landfill

Tested by R.R. Seaught

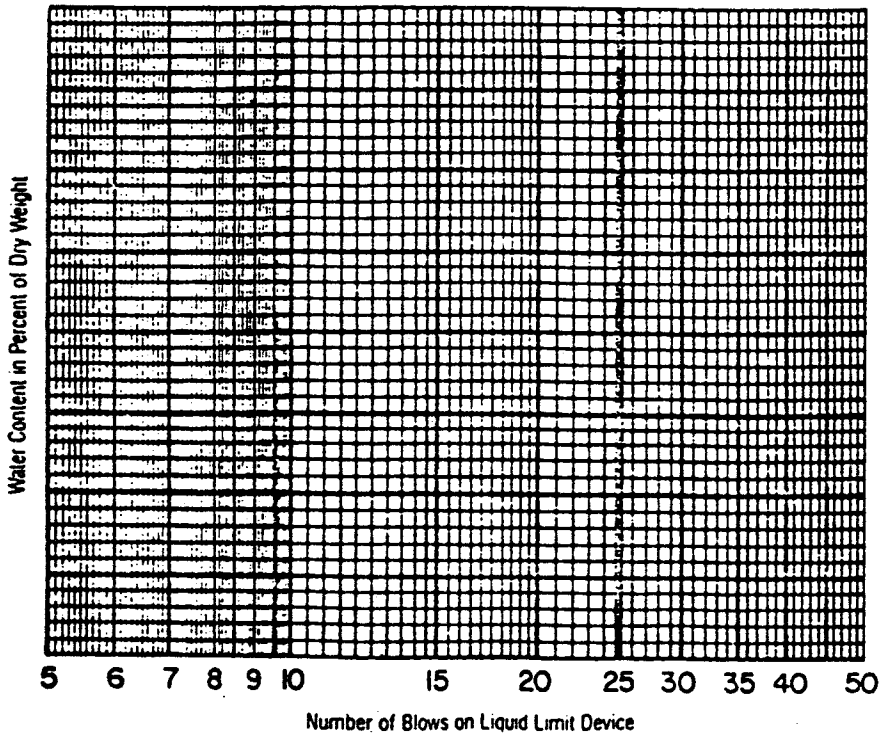
Project Landfill L-1 Date Nov. 8 1991 Specific gravity _____

LL = Liquid Limit Test - %
PL = Plastic Limit Test - %
PI = Plasticity Index - %

LIQUID LIMIT TEST	1	2	3	4	5	6
Sample Number						
Container Number						
Number of Blows	N					
Scale Serial Number	P					
Oven Serial Number						
Weight Sample + Tare Wet						
Weight Sample + Tare Dry						
Weight of Water						
Tare Weight						
Weight of Dry Soil						
Water Content						
Liquid Limit						

PLASTIC LIMIT TEST	1	2	3	4	5	6
Sample Number						
Container Number						
Scale Serial Number	N					
Oven Serial Number	P					
Weight Sample + Tare Wet						
Weight Sample + Tare Dry						
Weight of Water						
Tare Weight						
Weight of Dry Soil						
Water Content						
Plastic Limit						

FLOW CURVE



RESULTS	1	2	3
LL	N		
PL	P		
PI			
Specific gravity	2.70		
Natural water content			
Remarks			

QA Approval _____ Date _____

25562 (R4-84)

Form M-1H | Revision 4

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

ATTERBERG LIMITS

Location McGuire Landfill

Tested by R.R. Searight

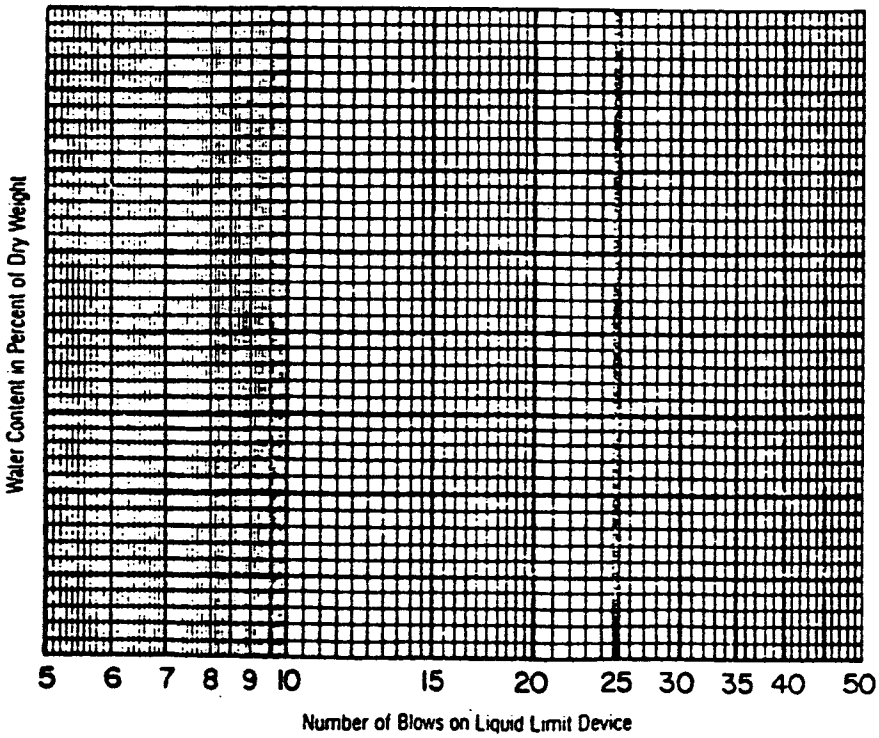
Project Landfill L-4 Date Nov. 8, 1991 Specific gravity 2.74

LL = Liquid Limit Test - %
PL = Plastic Limit Test - %
PI = Plasticity Index - %

LIQUID LIMIT TEST	1	2	3	4	5	6
Sample Number						
Container Number						
Number of Blows	N					
Scale Serial Number						
Oven Serial Number						
Weight Sample + Tare Wet	P					
Weight Sample + Tare Dry						
Weight of Water						
Tare Weight						
Weight of Dry Soil						
Water Content						
Liquid Limit						

PLASTIC LIMIT TEST	1	2	3	4	5	6
Sample Number						
Container Number						
Scale Serial Number						
Oven Serial Number	N					
Weight Sample + Tare Wet						
Weight Sample + Tare Dry	P					
Weight of Water						
Tare Weight						
Weight of Dry Soil						
Water Content						
Plastic Limit						

FLOW CURVE



RESULTS	1	2	3
LL	N		
PL	P		
PI			
Specific gravity	2.74		
Natural water content	N/A		
Remarks			

QA Approval _____ Date _____

25564 (R6-86)
25564 (R6-86)

FORM M-1K
FORM M-1K

REVISION 6
REVISION 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire Landfill

SPECIFIC GRAVITY

1. SAMPLE NUMBER	L-1	L-4							
2. DATE	11/5/91	11/5/91							
3. FLASK NUMBER	11	13							
4. SCALE SER. NO.	meQUA 3276 5								
5. THERMOMETER SER. NO.	meQUA 32161								
6. WT. OF FLASK (GRAMS)	180.32	176.59							
7. WT. OF FLASK WITH WATER (GRAMS)	679.00	674.80							
8. TEMPERATURE OF WATER (°C)	21°C	21°C							
9. DENSITY OF WATER	~~.998023~~ ~~.998434~~	.998023							
10. VOLUME OF FLASK (7-6)+9(cc)	~~499.67~~ ~~442.71~~	499.20							
11. WT. OF SAMPLE (GRAMS)	100	100							
12. TIME UNDER VACUUM (MIN.)	50 min	50 min.							
13. WT. OF FLASK, SAMPLE & WATER (GRAMS)	742.30	738.60							
14. TEMPERATURE OF WATER (°C)	19°C	19°C							
15. DENSITY OF WATER	.998434	.998434							
16. WT. OF FLASK & WATER 13-11(GRAMS)	642.30	638.60							
17. WT. OF WATER IN FLASK 16-6 (GRAMS)	461.98	462.01							
18. VOLUME OF WATER IN FLASK 17÷15 (cc)	462.70	462.73							
19. VOLUME OF SOIL 10-18 (cc)	36.97	36.47							
20. SPECIFIC GRAVITY 11÷19	2.70	2.74							
21. INSPECTOR'S INITIAL	RRS	RRS							
22. LEVEL II EVALUATION	N/A	N/A							

Q.A. APPROVAL _____ DATE _____

25563 (R9-85)

FORM M-1J	REV. 7

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

SOIL PARTICLE SIZE ANALYSIS

SOURCE OF SAMPLE Landfill DATE SAMPLED 11 Sept 23.1991 SAMPLE NUMBER L-1

SAMPLE PREPARATION

A) INITIAL WEIGHT OF SAMPLE 574.92
B) WT RETAINED ON #10 SIEVE 00.0
C) WT PASSING #10 (A-B) 574.92
D) %PASSING #10 (C ÷ A) X 100 100.00
SCALE SER NO. McQua 32765

E) DRY WT OF SAMPLE 100 GR
F) (PORTION PASSING #10 SIEVE)
F) FACTOR (D ÷ E) 1.00
SPECIFIC GRAVITY 2.70
SIEVE SER. NO. N/A
OVEN SER. NO. McQua

HYDROMETER ANALYSIS

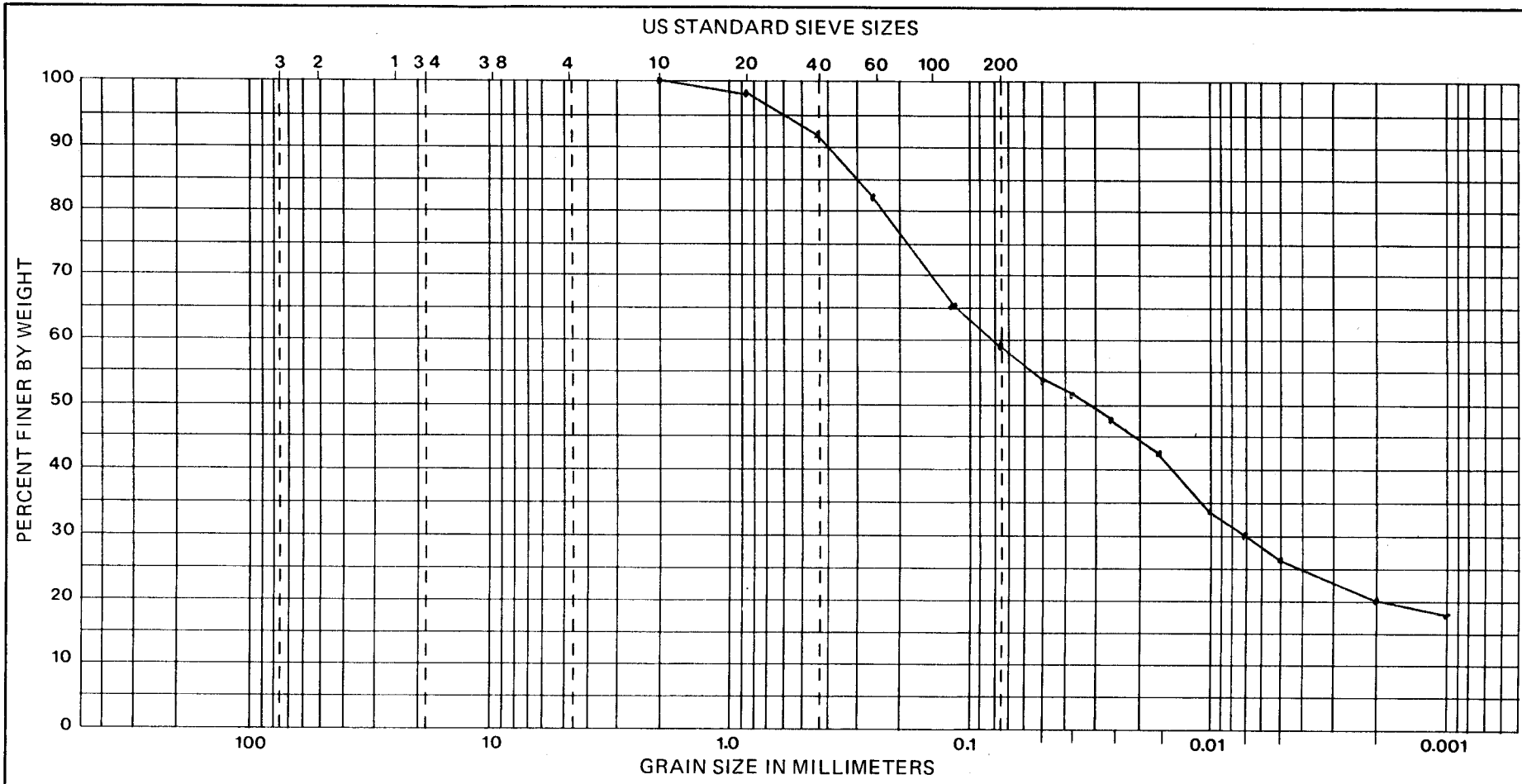
HYDROMETER NO. 1 DISPERSING AGENT CL-288
THERMOMETER SER. NO. McQua 32161
STARTING TIME 740 AM TEMPERATURE 22°C DATE TESTED 11/5/91

TIME (MIN)	HYDROMETER READING	TEMPERATURE CORRECTION: SOLUTION CORRECTION	TEMPERATURE CORRECTION: MENISCUS CORRECTION	CORRECTED HYDROMETER READING	% TOTAL PASSING = CORRECTED HYDROMETER READING X F	PARTICLE DIAMETER (MM)	% OF TOTAL PASSING
0.5	58	6	1	53		.050	53.0
1.0	57	6	1	52		.037	52.0
2.0	53	6	1	48		.025	48.0
5.0	48	6	1	43		.017	43.0
15.0	39	6	1	34		.010	34.0
30.0	35	6	1	30		.007	30.0
60.0	31	6	1	26		.005	26.0
250.0	25	6	1	20		.002	20.0
1440.0	~~25~~ 23	6	1	18		.001	18.0

SIEVE ANALYSIS

SIEVE NO.	SIEVE SER. NO.	CUMULATIVE WT. RETAINED	CUMULATIVE WT. PASSING	CUMMULATIVE WEIGHT PASSING = % OF TOTAL PASSING X F	PARTICLE DIAMETER (MM)	% OF TOTAL PASSING
10		0	100		.00	100
20		1.62	98.38		.841	98.4
40		7.44	92.56		.420	92.6
60		17.57	82.43		.250	82.4
140		35.00	65.00		.105	65.0
200		40.36	59.64		.074	59.6
PAN		0				

INSPECTOR R.R Seaught DATE 11/5/91
LEVEL II EVALUATION DATE
QA APPROVAL DATE



BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

PROJECT McGuire Landfill

BORING NO	ELEV OR DEPTH	NAT WC	LL	PL	PI	DESCRIPTION OR CLASSIFICATION
N/A	N/A	N/A	N/A	N/A	N/A	

GRAIN SIZE DISTRIBUTION

TEST NO. L-1 JOB NO. N/A

INSPECTOR R.R. Seaught

DATE Nov 7, 1991

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

LEVEL II EVALUATION _____

QA APPROVAL _____ DATE _____

25565 (R9-85)

FORM M-1L

REV. 5

25563 (R9-85)

FORM M-1J	REV. 7

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

SOIL PARTICLE SIZE ANALYSIS 9/26/91

SOURCE OF SAMPLE Sandfill DATE SAMPLED ~~Sept. 23, 1991~~ SAMPLE NUMBER L-4

SAMPLE PREPARATION

A) INITIAL WEIGHT OF SAMPLE 646.16
B) WT RETAINED ON #10 SIEVE 7.54
C) WT PASSING #10 (A-B) 638.62
D) %PASSING #10 (C ÷ A) X 100 99.8
SCALE SER NO. McQua 32765

E) DRY WT OF SAMPLE 100
F) (PORTION PASSING #10 SIEVE)
F) FACTOR (D ÷ E) .998
SPECIFIC GRAVITY 2.74
SIEVE SER. NO. N/A
OVEN SER. NO. McQua

HYDROMETER ANALYSIS

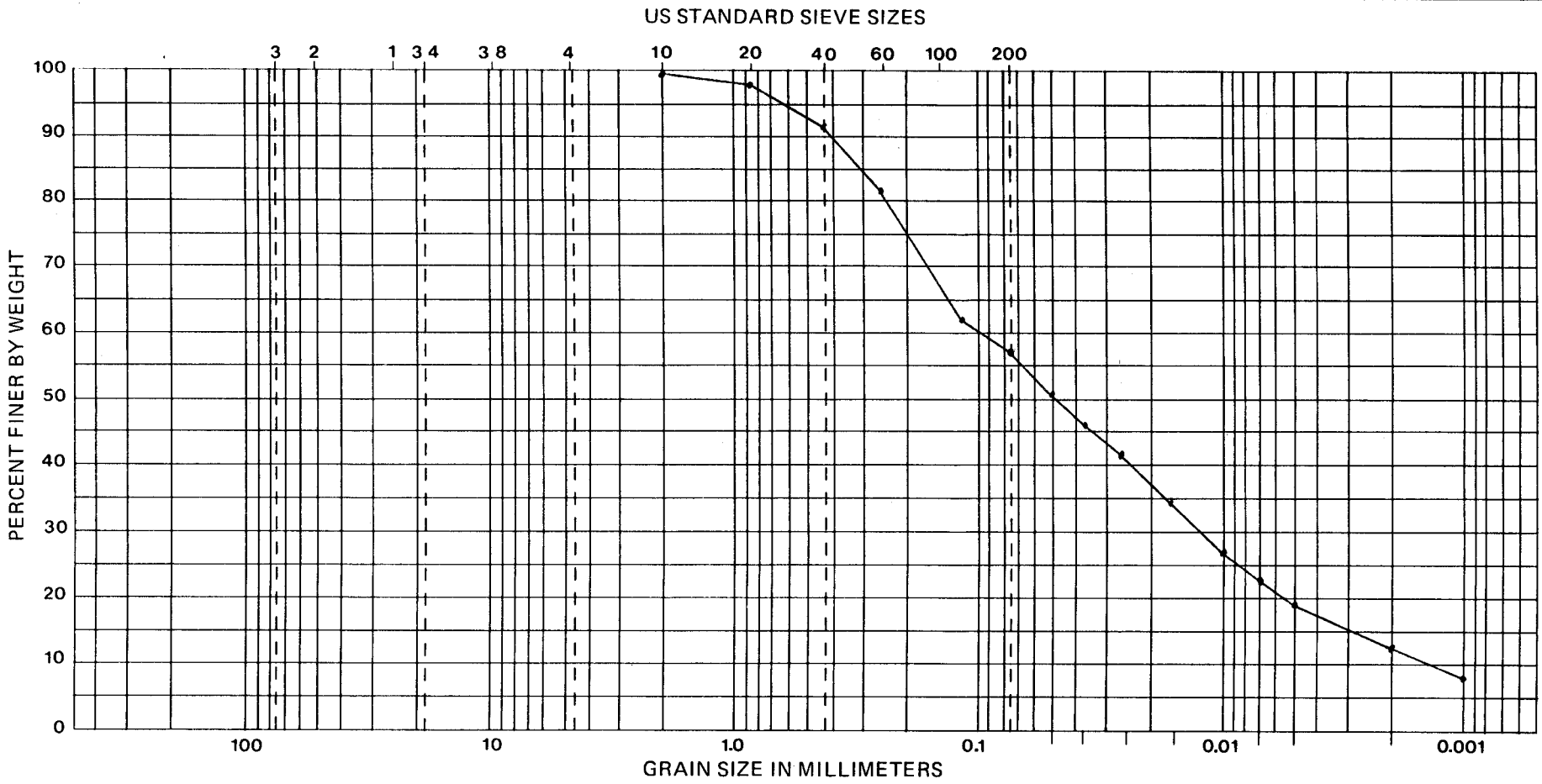
HYDROMETER NO. 2 DISPERSING AGENT CL-288
THERMOMETER SER. NO. McQua 32161
STARTING TIME 745 AM TEMPERATURE 22° DATE TESTED 11/5/91

TIME (MIN)	HYDROMETER READING	TEMPERATURE CORRECTION: SOLUTION CORRECTION	TEMPERATURE CORRECTION: MENISCUS CORRECTION	CORRECTED HYDROMETER READING	% CORRECTED HYDROMETER READING X F = TOTAL PASSING	PARTICLE DIAMETER (MM)	% OF TOTAL PASSING
0.5	56	6	1	51		.050	50.9
1.0	51	6	1	46		.037	45.9
2.0	47	6	1	42		.025	41.9
5.0	40	6	1	35		.017	34.9
15.0	32	6	1	27		.010	26.9
30.0	28	6	1	23		.007	22.6
60.0	24	6	1	19		.005	19.0
250.0	18	6	1	13		.002	13.0
1440.0	13	6	1	8		.001	8.0

SIEVE ANALYSIS

SIEVE NO.	SIEVE SER. NO.	CUMULATIVE WT. RETAINED	CUMULATIVE WT. PASSING	CUMULATIVE % WEIGHT PASSING X F = % OF TOTAL PASSING	PARTICLE DIAMETER (MM)	% OF TOTAL PASSING
10		0	100		.00	99.8
20		2.19	97.81		.841	97.6
40		9.44	90.56		.420	90.4
60		18.98	81.02		.250	80.9
140		37.37	62.63		.105	62.5
200		42.91	57.09		.074	57.0
PAN						

INSPECTOR B.R. Leaught DATE 11/5/91
LEVEL II EVALUATION DATE
QA APPROVAL DATE



BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

PROJECT _____

BORING NO	ELEV OR DEPTH	NAT WC	LL	PL	PI	DESCRIPTION OR CLASSIFICATION
N/A	N/A	N/A	N/A	N/A	N/A	

GRAIN SIZE DISTRIBUTION

TEST NO. L-4 JOB NO. N/A

INSPECTOR R.R. Seaught

DATE Nov 7, 1991

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

LEVEL II EVALUATION _____ QA APPROVAL _____ DATE _____

25565 (R9-85)

FORM M-1L

REV. 5

25562 (R4-84)

Form M-1H | Revision 4

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

ATTERBERG LIMITS

Location McGuire Landfill

Tested by R.R. Seamster

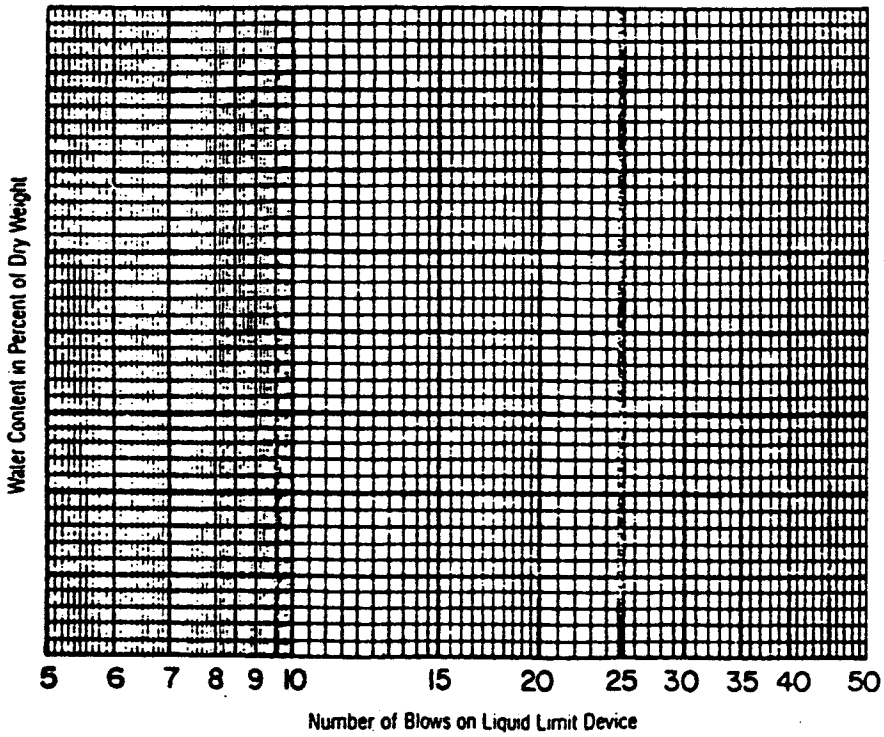
Project Landfill L-1 Date Nov. 8, 1991 Specific gravity

LL = Liquid Limit Test - %
PL = Plastic Limit Test - %
PI = Plasticity Index - %

LIQUID LIMIT TEST	1	2	3	4	5	6
Sample Number						
Container Number						
Number of Blows	N/P					
Scale Serial Number						
Oven Serial Number						
Weight Sample + Tare Wet						
Weight Sample + Tare Dry						
Weight of Water						
Tare Weight						
Weight of Dry Soil						
Water Content						
Liquid Limit						

PLASTIC LIMIT TEST	1	2	3	4	5	6
Sample Number						
Container Number						
Scale Serial Number	N/P					
Oven Serial Number						
Weight Sample + Tare Wet						
Weight Sample + Tare Dry						
Weight of Water						
Tare Weight						
Weight of Dry Soil						
Water Content						
Plastic Limit						

FLOW CURVE



RESULTS	1	2	3
LL	N/P		
PL			
PI			
Specific gravity	2.70		
Natural water content			
Remarks			

QA Approval _____ Date _____

25562 (R4-84)

Form M-1H | Revision 4

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

ATTERBERG LIMITS

Location McGuire Landfill

Tested by R.R. Seawright

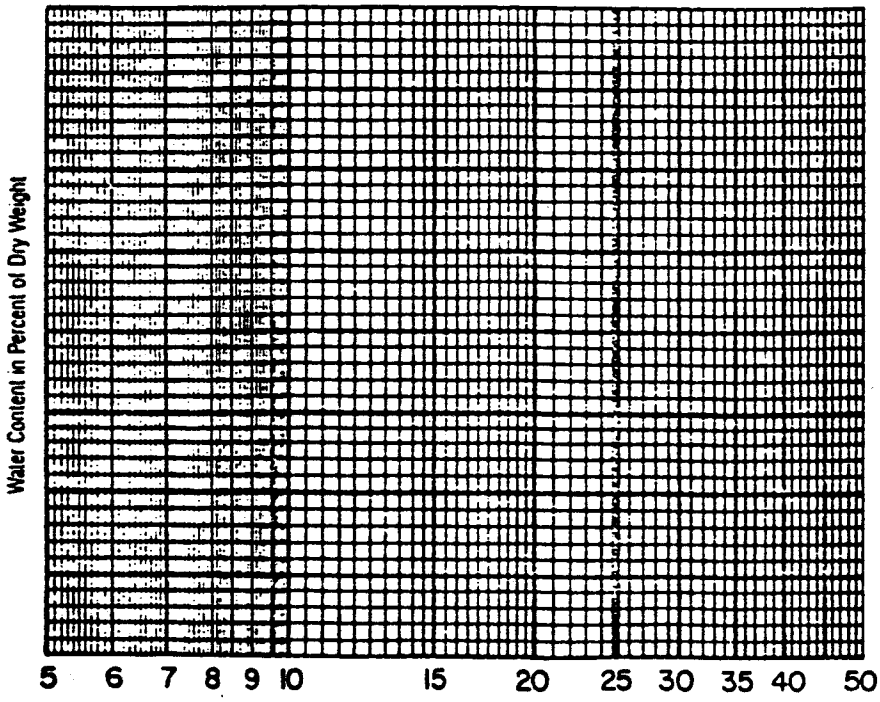
Project Landfill L-4 Date Nov. 8, 1991 Specific gravity 2.74

LL = Liquid Limit Test - %
PL = Plastic Limit Test - %
PI = Plasticity Index - %

LIQUID LIMIT TEST	1	2	3	4	5	6
Sample Number						
Container Number						
Number of Blows						
Scale Serial Number						
Oven Serial Number	N					
Weight Sample + Tare Wet	P					
Weight Sample + Tare Dry						
Weight of Water						
Tare Weight						
Weight of Dry Soil						
Water Content						
Liquid Limit						

PLASTIC LIMIT TEST	1	2	3	4	5	6
Sample Number						
Container Number						
Scale Serial Number						
Oven Serial Number	N					
Weight Sample + Tare Wet	P					
Weight Sample + Tare Dry						
Weight of Water						
Tare Weight						
Weight of Dry Soil						
Water Content						
Plastic Limit						

FLOW CURVE



RESULTS	1	2	3
LL	N		
PL	P		
PI			
Specific gravity	2.74		
Natural water content	N/A		
Remarks			

QA Approval _____ Date _____

25564 (R6 86)
25564 (R6-86)

FORM M-1K
FORM M 1K

REVISION 6
REVISION 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire Landfill

SPECIFIC GRAVITY

1. SAMPLE NUMBER	L-1	L-4							
2. DATE	11/5/91	11/5/91							
3. FLASK NUMBER	11	13							
4. SCALE SER. NO.	meQuA 32765								
5. THERMOMETER SER. NO.	meQuA 32161								
6. WT. OF FLASK (GRAMS)	180.32	176.59							
7. WT. OF FLASK WITH WATER (GRAMS)	679.00	674.80							
8. TEMPERATURE OF WATER (°C)	21°C	21°C							
9. DENSITY OF WATER	~~.998023~~ ~~.998434~~	.998023							
10. VOLUME OF FLASK (7-6)+ 9(cc)	~~499.67~~ ~~492.71~~	499.20							
11. WT. OF SAMPLE (GRAMS)	100	100							
12. TIME UNDER VACUUM (MIN.)	50 min	50 min.							
13. WT. OF FLASK, SAMPLE & WATER (GRAMS)	742.30	738.60							
14. TEMPERATURE OF WATER (°C)	19°C	19°C							
15. DENSITY OF WATER	.998434	.998434							
16. WT. OF FLASK & WATER 13-11(GRAMS)	642.30	638.60							
17. WT. OF WATER IN FLASK 16-6 (GRAMS)	461.98	462.01							
18. VOLUME OF WATER IN FLASK 17÷15 (cc)	462.70	462.23							
19. VOLUME OF SOIL 10-18 (cc)	36.97	36.47							
20. SPECIFIC GRAVITY 11÷19	2.70	2.74							
21. INSPECTOR'S INITIAL	RRS	RRS							
22. LEVEL II EVALUATION	N/A	N/A							

Q.A. APPROVAL _____ DATE _____

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

MOISTURE CHECK

Location Of Fill Landfill

*Indicates Failing Test **Indicates Retest

Test Number	1	2	3					
Date	11/14/91	11/14/91	11/15/91					
Location								
Elevation								
Scale Ser. No.	MC&A 32765	→	→					
Quick Dry Number/ Oven Ser. No.	3690	3688	3690					
Wet Weight Of Sample	100.04	100.04	100.05					
Dry Weight Of Sample	75.50	76.01	78.17					
Weight Of Water	24.54	24.03	21.88					
% Moisture	32.5	31.6	28.0					
Corrected % Moisture	N/A	N/A	N/A					
Optimum Moisture	25.1	25.1	24.3					
Proctor Comparison	L-10	L-10	L-5					
Deviation From Optimum	+7.4 2.RRS	+6.5	+3.7					
Inspector's Initial	RRS	RRS	RRS					
LEVEL II EVALUATOR'S INITIAL								

QA APPROVAL _____ DATE _____

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill Landfill

*Indicates Failing Test **Indicates Retest

A	Test Number	181	182	183	184			
B	Date	11/18/91	→	→	11/19/91			
C	Elevation							
D	Station							
E	Scale Ser. No.	McGuire 32765 32764	→	→	→			
F	W W Sample & Mold	5.18	5.29	5.21	5.07			
G	Wt. & Volume Of Mold	1.38 2.99	1.35 2.99	1.35 2.99	1.38 2.99			
H	W W Sample (F-G)	3.80	3.94 ~~3.81 RRS~~	3.86	3.72			
I	W W/CU Ft. (H – Vol)	115.1	117.8	115.4	111.2			
J	W W Moist Sample	100.02	100.03	100.0	100.01			
K	Quick Dry Number/ Oven Ser. No.	3688	3690	3688	3690			
L	D W Moist Sample	80.20	80.00	80.09	80.37			
M	Wt. Water (J-L)	19.82	20.03	20.01	19.64			
N	% Moisture (M ÷ L) X 100	24.6	25.0	25.0	24.4			
O	Dry Density [I – (N + 100)] X 100	92.4	94.2	92.3	89.4			
P	Max. Density	96.8	96.8	96.8	96.8			
Q	Optimum Moisture	24.4	24.4	24.4	24.4			
R	Proctor Comparison No.	L-7	L-7	L-7	L-7			
S	% Compaction (O – P) X 100	95.5	97.3	95.4	92.4			
T	% Compaction Required	90	90	90	90			
U	Inspector's Initial	RRS	RRS	RRS	RRS			
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill Sandhill

*Indicates Failing Test **Indicates Retest

A	Test Number	174	175	176	177	178	179	180
B	Date	11/6/91		11/7/91		11/15/91		11/18/91
C	Elevation							
D	Station							
E	Scale Ser. No.							
F	W W Sample & Mold	5.12	5.02	4.91	4.95	4.95	5.19	5.35
G	Wt. & Volume Of Mold	1.41 29.9	29.9 1.33	1.33 29.9	1.33 29.9	1.35 29.9	1.35 29.9	1.41 29.9
H	W W Sample (F–G)	3.71	3.69	3.58	3.62	3.60	3.84	3.94
I	W W/CU Ft. (H – Vol)	116.1	110.3	107.0	108.2	107.6	114.8	117.8
J	W W Moist Sample	100.08	100.09	100.14	100.12	100.03	100.02	100.12
K	Quick Dry Number/ Oven Ser. No.	3690	3688	3690	3688	3690	3688	3690
L	D W Moist Sample	82.41	82.36	80.45	81.71	79.41	81.08	79.41
M	Wt. Water (J–L)	17.67	17.73	19.69	18.41	20.41	18.94	20.71
N	% Moisture (M ÷ L) X 100	21.4	21.5	24.5	22.5	26.0	23.4	26.1
O	Dry Density [I – (N + 100)] X 100	89.1	90.8	85.9	88.3	85.4	93.0	93.4
P	Max. Density	94.5	96.8	94.5	94.5	94.5	94.5	96.8
Q	Optimum Moisture	25.2	24.4	25.2	25.2	25.2	25.2	24.4
R	Proctor Comparison No.	L-9	L-7	L-9	L-9	L-9	L-9	L-7
S	% Compaction (O ÷ P) X 100	94.3	93.8	90.9	93.4	90.4	98.4	96.5
T	% Compaction Required	90	90	90	90	90.0	90	90
U	Inspector's Initial	RRS	RRS	RRS	RRS	RRS	RRS	RRS
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill Sandhill

*Indicates Failing Test **Indicates Retest

A	Test Number	168	169	170	171	172	173	1
B	Date	11/4/91	→	→	11/5/91	→	→	
C	Elevation							
D	Station							
E	Scale Ser. No.	McGuire 32745	32764	→	→	→	→	→
F	W W Sample & Mold	4.93	5.11	5.09	5.12	5.09	5.03	
G	Wt. & Volume Of Mold	1.33 29.9	1.41 29.9	1.33 29.9	1.41 29.9	1.35 29.9	1.35 29.9	
H	W W Sample (F-G)	3.60	3.70	3.76	3.71	3.74	3.68	
I	W W/CU Ft. (H – Vol)	108.2	110.6	112.4	110.9	111.8	110.0	
J	W W Moist Sample	100.05	100.05	100.06	100.06	100.07	100.17	
K	Quick Dry Number/ Oven Ser. No.	3690	3688	3690	3688	3696	3685	
L	D W Moist Sample	77.23	77.52	77.29	77.15	77.53	79.34	
M	Wt. Water (J-L)	22.82	22.53	22.77	22.91	22.53	20.83	
N	% Moisture (M ÷ L) X 100	29.5	29.1	29.5	29.7	29.1	26.3	
O	Dry Density [I – (N + 100)] X 100	83.6	85.7	86.8	85.5	86.6	87.1	
P	Max. Density	91.0	91.0	94.5	94.5	94.5	96.6	
Q	Optimum Moisture	25.4	25.4	25.2	25.2	25.2	24.3	
R	Proctor Comparison No.	L-4	L-4	L-9	L-9	L-9	L-5	
S	% Compaction (O – P) X 100	91.9	94.2	91.9	90.5	91.6	90.2	
T	% Compaction Required	90	90	90	90	90	90	
U	Inspector's Initial	RRS	RRS	RRS	RRS	RRS	RRS	
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill Landfill

*Indicates Failing Test | **Indicates Retest

A	Test Number	161	162	163	164	165	166	167
B	Date	10/31/91	11/1/91	11/1/91	11/4/91	→	→	→
C	Elevation							
D	Station							
E	Scale Ser. No.	[illegible]	32765 3276J	→	→	→	→	→
F	W W Sample & Mold	5.21	5.07	5.12	4.99	4.90	4.95	5.11
G	Wt. & Volume Of Mold	1.33 29.9	1.35 29.9	1.41 29.9	1.33 29.9	1.35 29.9	1.33 29.9	1.41 29.9
H	W W Sample (F–G)	3.88	3.72	3.71	3.66	3.55	3.62	3.70
I	W W/CU Ft. (H – Vol)	111.0	111.2	110.9	109.4	106.1	108.2	110.6
J	W W Moist Sample	100.15	100.12	100.07	100.00	100.00	100.05	100.08
K	Quick Dry Number/ Oven Ser. No.	3688	3690	3688	3690	3688	3690	3688
L	D W Moist Sample	77.62	78.69	77.79	78.31	77.77	77.23	77.52
M	Wt. Water (J–L)	22.53	21.43	22.28	21.69	22.23	22.82	22.53
N	% Moisture (M ÷ L) X 100	29.0	27.2	28.6	27.7	28.6	29.5	29.1
O	Dry Density [I – (N + 100)] X 100	89.9	87.4	86.2	85.7	82.5	83.6	85.7
P	Max. Density	94.5	96.6	94.5	92.8	91.0	91.6	91.0
Q	Optimum Moisture	25.2	24.3	25.2	25.1	25.4	25.4	25.4
R	Proctor Comparison No.	L-9	L-5	L-9	L-10	L-4	L-4	L-4
S	% Compaction (O ÷ P) X 100	95.1	90.5	91.2	92.3	90.7	91.9	94.2
T	% Compaction Required	90	90	90	90	90	90	90
U	Inspector's Initial	RRS	RRS	RRS	RRS	RRS	RRS	RR
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill Landfill

*Indicates Failing Test **Indicates Retest

A	Test Number	154	155	156	157	158	159	160
B	Date	10/30/91	→	→	→	10/31/91	→	→
C	Elevation							
D	Station							
E	Scale Ser. No.	McGuire	32765 32764	→	→	→	→	→
F	W W Sample & Mold	5.09	5.08	5.13	4.99	5.17	5.06	5.17
G	Wt. & Volume Of Mold	1.33 29.9	1.41 29.9	1.41 29.9	1.41 29.9	1.33 29.9	1.35 29.9	1.41 29.9
H	W W Sample (F-G)	3.76	3.67	3.72	3.58	3.84	3.71	3.76
I	W W/CU Ft. (H – Vol)	112.4	109.7	112.7	107.0	114.8	110.9	112.4
J	W W Moist Sample	100.05	100.14	100.07	100.04	100.07	100.05	100.09
K	Quick Dry Number/ Oven Ser. No.	3690	3688	3690	3688	3690	3688	3690
L	D W Moist Sample	77.60	78.18	77.67	77.49	78.45	77.37	77.68
M	Wt. Water (J-L)	22.45	21.96	22.40	22.55	21.62	22.68	22.41
N	% Moisture (M ÷ L) X 100	28.9	28.1	28.8	29.1	27.6	29.3	28.8
O	Dry Density [I – (N + 100)] X 100	87.2	85.6	87.5	82.8	90.0	85.8	87.3
P	Max. Density	94.5	94.5	91.0	91.0	94.5	94.5	94.5
Q	Optimum Moisture	25.2	25.2	25.4	25.4	25.2	25.2	25.2
R	Proctor Comparison No.	L-9	L-9	L-4	L-4	L-9	L-9	L-9
S	% Compaction (O ÷ P) X 100	92.3	90.6	92.2	91.0	95.2	90.8	92.4
T	% Compaction Required	90	90	90	90	90	90	90
U	Inspector's Initial	RRS	RRS	RRS	RRS	RRS	RRS	RRS
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill Sandhill

*Indicates Failing Test **Indicates Retest

A	Test Number	147	148	149	150	151	152	153
B	Date	10/28/91	→	→	10/29/91	→	→	→
C	Elevation							
D	Station							
E	Scale Ser. No.	mc Gun	32765 32764	→	→	→	→	→
F	W W Sample & Mold	5.09	4.97	5.12	5.08	5.13	5.07	5.23
G	Wt. & Volume Of Mold	133 29.9	1.41 29.9	1.35 29.9	1.33 29.9	1.41 29.9	1.41 29.9	135 29.9
H	W W Sample (F–G)	3.74	3.56	3.77	3.73	3.72	3.66	3.88
I	W W/CU Ft. (H ÷ Vol)	113.3	106.4	112.1	111.5	111.2	109.4	116.0
J	W W Moist Sample	100.10	100.01	100.08	100.21	100.04	100.00	100.05
K	Quick Dry Number/ Oven Ser. No.	3688	3688	3690	3688	3690	3690	3690
L	D W Moist Sample	78.39	78.28	77.89	78.96	8000	77.83	81.36
M	Wt. Water (J–L)	21.71	21.73	22.19	21.25	20.04	22.17	18.69
N	% Moisture (M ÷ L) X 100	27.7	27.8	28.5	26.9	25.1	28.5	23.0
O	Dry Density [I ÷ (N + 100)] X 100	88.7	83.3	87.7	89.9	88.9	85.1	94.3
P	Max. Density	91.0	91.0	91.0	96.8	96.8	94.5	96.4
Q	Optimum Moisture	25.4	25.4	25.4	24.4	24.4	25.2	24.0
R	Proctor Comparison No.	L-4	L-4	L-4	L-7	L-7	L-9	L-8
S	% Compaction (O ÷ P) X 100	97.5	91.5	96.4	90.1	91.8	90.1	97.8
T	% Compaction Required	90	90.0	90	90	90	90.	90.
U	Inspector's Initial	RRS	RRS	RRS	RRS	RRS	RRS	RRS
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill Sand Fill

*Indicates Failing Test **Indicates Retest

A	Test Number	140	141	142	143	144	145	146
B	Date	10/23/91	→	10/24/91	→	→	→	10/28/91
C	Elevation	Pipe	→					
D	Station	*	*					
E	Scale Ser. No.	McGuire 32764 & 32765	→	→	→	→	→	→
F	W W Sample & Mold	4.99	4.79	4.84	5.25	5.17	4.96	5.10
G	Wt. & Volume Of Mold	1.35 2.99	1.33 29.9	1.35 29.9	1.35 29.9	1.41 2.99	1.35 29.9	1.41 29.9
H	W W Sample (F–G)	3.64	3.46	3.49	3.90	3.76	3.61	3.69
I	W W/CU Ft. (H ÷ Vol)	108.8	94.5	104.4	116.6	112.4	107.9	110.3
J	W W Moist Sample	100.03	100.09	100.03	100.10	100.12	100.03	100.10
K	Quick Dry Number/ Oven Ser. No.	McGuire 3690	3688	3688	3690	3690	3688	3690
L	D W Moist Sample	78.82	76.09	80.20	80.00	79.44	79.28	78.21
M	Wt. Water (J–L)	21.21	24.00	19.83	20.10	20.68	20.75	21.89
N	% Moisture (M ÷ L) X 100	27.2	31.5*	24.7	25.1	26.0	26.2	28.0
O	Dry Density [I ÷ (N + 100)] X 100	85.5	71.9	83.7	93.2	89.2	85.5	86.2
P	Max. Density	91.0	91.0	92.5	95.9	96.6	91.0	91.0
Q	Optimum Moisture	25.4	25.4	22.0	21.8	24.3	25.4	25.4
R	Proctor Comparison No.	L-4	L-4	L-2	L-3	L-5	L-4	L-4
S	% Compaction (O ÷ P) X 100	94.0**	79.0*	90.5	97.2	92.3	94.0	94.7
T	% Compaction Required	95.0	95.0	90.0	90.0	90.0	90.0	90
U	Inspector's Initial	RRS	RRS	RRS	RRS	RRS	RRS	RRS
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

Shelby tubes taken 10/23/91 over pipe all failed compaction some failed moisture requirements.

GA was notified, testing would not be required, per Dale Yarbrough MD-N

Test taken were East of MH-4

Test are hilited in red

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill Sandhill

*Indicates Failing Test **Indicates Retest

A	Test Number	136	137	135	136	137	138	139
B	Date	10/22/98	10/23/98	→	→	→	→	→
C	Elevation		Pipe	→	→	→	→	→
D	Station		*	*	*	*	*	*
E	Scale Ser. No.	McGirt 32765 McGirt 32764	→	→	→	→	→	→
F	W W Sample & Mold	5.24	5.03	4.58	5.03	4.81	5.13	4.99
G	Wt. & Volume Of Mold	1.33 29.9	1.41 29.9	1.33 29.9	1.41 29.9	1.33 29.9	1.41 29.9	1.41 29.9
H	W W Sample (F-G)	3.49	3.62	3.25	3.62	3.48	3.72	3.58
I	W W/CU Ft. (H – Vol)	116.3	108.2	97.2	108.2	104.1	111.2	107.0
J	W W Moist Sample	100.65	100.00	100.03	100.33	100.05	100.80	100.02
K	Quick Dry Number/ Oven Ser. No.	McGirt 3683	3690	3690	3690	3688	3690	3688
L	D W Moist Sample	79.98	78.03	74.22	76.45	76.05	78.24	77.85
M	Wt. Water (J-L)	20.67	21.97	25.81	23.88	24.0	22.56	22.17
N	% Moisture (M – L) X 100	25.1	28.2	34.8*	31.2*	31.6*	28.8	28.5
O	Dry Density [I ÷ (N + 100)] X 100	95.4	84.4	72.1	82.5	79.1	86.3	83.3
P	Max. Density	96.4	91.0	96.4	94.5	94.5	92.8	91.0
Q	Optimum Moisture	24.6	25.4	24.0	25.2	25.2	25.1	25.1
R	Proctor Comparison No.	L-8	L-4	L-8	L-9	L-9	L-10	L-4
S	% Compaction (O ÷ P) X 100	99.0	92.7*	74.8*	87.3*	83.7*	93*	91.5*
T	% Compaction Required	90.0	95.0	95.0	95.	95.0	95.0	95.0
U	Inspector's Initial	RRS	RRS					
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill Sand fill

*Indicates Failing Test **Indicates Retest

A	Test Number	129	130	131	132	133	134	135
B	Date	10/21/91 →	→	→	10/22/91	→	→	→
C	Elevation				LEACHATE DIKE			
D	Station							
E	Scale Ser. No.	McGuire 32762 & 32765 →	→	→	→	→	→	→
F	W W Sample & Mold	5.15	5.81	4.99	5.32	5.26	5.18	5.25
G	Wt. & Volume Of Mold	1.41 29.9	1.33 29.9	1.35 29.9	1.35 29.9	1.41 29.9	1.35 29.9	1.35 29.9
H	W W Sample (F–G)	3.74	3.68	3.64	3.97	3.79	3.83	3.90
I	W W/CU Ft. (H – Vol)	111.8	110.0	108.8	118.7	113.3	114.5	116.6
J	W W Moist Sample	100.52	100.12	100.03	100.08	100.06	100.00	100.14
K	Quick Dry Number/ Oven Ser. No.	3690	3688	3690	~~39~~ 3690	3690	3688	3690
L	D W Moist Sample	78.50	79.06	78.92	80.29	78.56	79.03	80.38
M	Wt. Water (J–L)	21.52	21.06	21.13	19.79	21.50	20.97	19.76
N	% Moisture (M ÷ L) X 100	27.4	26.6	26.8	24.6	27.4	26.5	24.6
O	Dry Density [I ÷ (N + 100)] X 100	87.8	86.9	85.8	95.2	88.9	90.5	93.5
P	Max. Density	94.5	94.5	94.5	96.8	94.5	94.5	96.4
Q	Optimum Moisture	25.2	25.2	25.2	24.4	25.2	25.0	24.8
R	Proctor Comparison No.	L-9	L-9	L-9	L-7	L-9	L-9	L-8
S	% Compaction (O ÷ P) X 100	92.9	92.0	90.8	98.3	94.1	95.8	97.0
T	% Compaction Required	90	90	90	95	90	90	90
U	Inspector's Initial	RRS	RRS	RRS	RRS	RRS	RRS	RRS
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire
FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill Landfill

*Indicates Failing Test | **Indicates Retest

A	Test Number	121A	123 **	124 **	125 *	126	127	128
B	Date	10/17/91	10/17/91	10/17/91	10/17/91	10/21/91		
C	Elevation							
D	Station							
E	Scale Ser. No.	mcQUA 32764	mcQUA 32765					
F	W W Sample & Mold	5.03	5.26	5.31	4.82	5.10	5.15	5.20
G	Wt. & Volume Of Mold	1.33 29.9	1.33 29.9	1.41 29.9	1.33 29.9	1.41 29.9	1.33 29.9	1.33 29.9
H	W W Sample (F-G)	3.70	3.93	3.90	3.49	3.69	3.82	3.85
I	W W/CU Ft. (H ÷ Vol)	110.6	117.5	116.6	104.4	110.3	114.2	115.1
J	W W Moist Sample	100.21	100.23	100.40	100.59	100.0	100.03	100.05
K	Quick Dry Number/ Oven Ser. No.					3690	3688	3690
L	D W Moist Sample	78.62	78.56	79.90	79.71	78.31	80.40	78.79
M	Wt. Water (J-L)	21.59	21.67	20.50	20.38	21.69	19.63	21.26
N	% Moisture (M ÷ L) X 100	27.5	27.6	25.7	26.2	27.7	24.4	27.0
O	Dry Density [I ÷ (N + 100)] X 100	86.7	92.1	92.8	82.7	86.4	91.8	90.6
P	Max. Density	94.5	96.4	96.4	~~87.5~~ 94.5	94.5	96.8	96.4
Q	Optimum Moisture	25.2	29.0	29.0	25.2	25.2	~~24.4~~ 24.0	24.0
R	Proctor Comparison No.	L-9	L-8	L-8	L-9	L-9	L-8	L-8
S	% Compaction (O ÷ P) X 100	91.7	95.5	96.3	87.5	91.4	94.8	94.0
T	% Compaction Required	90.0	90.0	90.0	90.0	90.0	90.0	90
U	Inspector's Initial	R.P.	R.P.	R.P.	R.P.	RRS	RRS	RRS
V	Level II Evaluator's Initial							

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill Landfill

*Indicates Failing Test | **Indicates Retest

A	Test Number	118	119	120	121	118A	119A	122
B	Date	10/16/91	10/16/91	10/16/91	10/16/91	10/17/91	10/17/91	10/17/91
C	Elevation							
D	Station							
E	Scale Ser. No.	MC90A 32764 / MC90A 32765						
F	W W Sample & Mold	5.17	5.22	5.14	5.10	5.18	5.01	5.19
G	Wt. & Volume Of Mold	1.33 / 29.9	1.33 / 29.9	1.33 / 29.9	1.41 / 29.9	1.35 / 29.9	1.33 / 29.9	1.41 / 29.9
H	W W Sample (F–G)	3.84	3.89	3.81	3.69	3.83	3.68	3.78
I	W W/CU Ft. (H ÷ Vol)	114.8	116.3	113.9	110.3	114.5	110.0	113.0
J	W W Moist Sample	100.30	100.29	100.30	100.15	100.27	100.17	100.41
K	Quick Dry Number/ Oven Ser. No.	3690	3688	3690	3688			
L	D W Moist Sample	77.30	77.51	77.64	76.27	79.33	77.64	78.13
M	Wt. Water (J–L)	23.00	22.73	22.66	23.88	20.94	22.53	22.28
N	% Moisture (M ÷ L) X 100	29.8*	29.3	29.2	31.3	26.4	29.0	28.5
O	Dry Density [I ÷ (N + 100)] X 100	88.4	89.9	88.2	84.0	90.6	85.3 / ~~110.0~~	87.9
P	Max. Density	94.5	94.5	94.5	94.5	94.5	94.5	94.5
Q	Optimum Moisture	25.2	25.2	25.2	25.2	25.2	25.2	25.2
R	Proctor Comparison No.	L 9	L 9	L 9	L 9	L 9	L 9	L 9
S	% Compaction (O ÷ P) X 100	93.5	95.1	93.3	88.9	95.9	90.3	93.0
T	% Compaction Required	90.0	90.0	90.0	90.0	90.0	90.0	90.0
U	Inspector's Initial	R P	R P	R P	R P	R P	R P	R P
V	Level II Evaluator's Initial							

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill Loads 11

*Indicates Failing Test | **Indicates Retest

A	Test Number	111	112	113	114	115	116	117
B	Date	10/15/91	10/15/91	10/15/91	10/16/91	10/16/91	10/16/91	10/16/91
C	Elevation							
D	Station							
E	Scale Ser. No.	mcQOA 32764 mcQOA 32765						
F	W W Sample & Mold	5.15	5.24	4.98	5.28	5.27	5.25	5.09
G	Wt. & Volume Of Mold	1.33 29.9	1.35 29.9	1.33 29.9	1.33 29.9	1.35 29.9	1.35 29.9	1.33 29.9
H	W W Sample (F-G)	3.82	3.89	3.65	3.95	3.92	3.90	3.76
I	W W/CU Ft. (H – Vol)	114.2	116.3	109.1	118.1	117.2	116.6	112.4
J	W W Moist Sample	100.61	100.53	100.31	100.15	100.52	100.31	100.18
K	Quick Dry Number/ Oven Ser. No.	3690	3688	3690	3688	3690	3688	3690
L	D W Moist Sample	80.00	79.07	79.85	75.00	78.26	78.54	80.30
M	Wt. Water (J-L)	20.61	21.46	20.96	22.15	22.26	21.77	19.88
N	% Moisture (M – L) X 100	25.8	27.1	25.6	28.4	28.4	27.7	24.8
O	Dry Density [I – (N ÷ 100)] X 100	90.9	91.5	86.9	92.0	91.3	91.3	90.1
P	Max. Density	94.5	94.5	94.5	94.5	94.5	94.5	94.5
Q	Optimum Moisture	25.2	25.2	25.2	25.2	25.2	25.2	25.2
R	Proctor Comparison No.	L9	L9	L9	L9	L9	L9	L9
S	% Compaction (O – P) X 100	96.1	96.8	92.0	97.4	96.6	96.6	95.3
T	% Compaction Required	90.0	90.0	90.0	90.0	90.0	90.0	90.0
U	Inspector's Initial	R.P	R.P	R.P	R.P	R.P	R.P	R.P
V	Level II Evaluator's Initial							

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill Landfill

*Indicates Failing Test **Indicates Retest

A	Test Number	104	105	106	107	108	109	110
B	Date	10/15/91	10/15/91	10/15/91	10/15/91	10/15/91	10/15/91	10/15/91
C	Elevation							
D	Station							
E	Scale Ser. No.	mcqca 32765 / mcqca 32764						
F	W W Sample & Mold	5.05	5.23	5.03	5.09	5.05	5.10	5.10
G	Wt. & Volume Of Mold	1.33 / 29.9	1.41 / 29.9	1.33 / 29.9	1.33 / 29.9	1.33 / 29.9	1.35 / 29.9	1.33 / 29.9
H	W W Sample (F-G)	3.72	3.82	3.70	3.76	3.72	3.75	3.77
I	W W/CU Ft. (H ÷ Vol)	111.2	114.2	110.6	112.4	111.2	112.1	112.7
J	W W Moist Sample	100.29	100.19	100.30	100.13	100.06	100.26	100.08
K	Quick Dry Number/ Oven Ser. No.	3688	3688	3690	3688	3690	3688	3690
L	D W Moist Sample	81.15	80.92	80.01	80.38	80.85	80.86	80.66
M	Wt. Water (J-L)	19.14	19.27	20.29	19.25	19.21	19.40	19.42
N	% Moisture (M ÷ L) X 100	23.6	23.8	25.4	23.8	23.8	24.0	24.1
O	Dry Density [I ÷ (N + 100)] X 100	90.0	92.2	88.2	90.8	89.8	90.4	96.8
P	Max. Density	95.9	95.9	96.4	96.4	96.4	96.4	96.4
Q	Optimum Moisture	21.8	21.8	24.0	24.0	24.0	24.0	24.0
R	Proctor Comparison No.	L3	L3	L8	L8	L8	L8	L9
S	% Compaction (O ÷ P) X 100	93.8	96.1	91.5	94.2	93.2	93.8	94.2
T	% Compaction Required	90.0	90.0	90.0	90.0	90.0	90.0	90.0
U	Inspector's Initial	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.
V	Level II Evaluator's Initial							

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT _____
FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill _____

*Indicates Failing Test | **Indicates Retest

A	Test Number	97	98	99	100	101	102	103
B	Date	10/14/91	10/14/91	10/14/91	10/14/91	10/15/91	10/15/91	10/15/91
C	Elevation							
D	Station							
E	Scale Ser. No.	mc90A 32764 / mc90A 32765						
F	W W Sample & Mold	4.92	5.14	5.10	5.06	5.14	5.19	5.16
G	Wt. & Volume Of Mold	1.33 / 29.9	1.33 / 29.9	1.35 / 29.9	1.33 / 29.9	1.33 / 29.9	1.35 / 29.9	1.33 / 29.9
H	W W Sample (F-G)	3.59	3.81	3.75	3.73	3.81	3.84	3.83
I	W W/CU Ft. (H ÷ Vol)	107.3	113.9	112.1	111.5	113.9	114.8	114.5
J	W W Moist Sample	100.17	100.33	100.03	100.07	100.23	100.28	100.38
K	Quick Dry Number/ Oven Ser. No.	3690	3688	3699	3688	3690	3688	3690
L	D W Moist Sample	80.77	79.93	81.15	81.46	79.93	79.22	80.07
M	Wt. Water (J-L)	19.40	20.40	18.88	18.61	20.30	21.06	20.31
N	% Moisture (M ÷ L) X 100	29.00	25.5	23.3	22.8	25.4	26.6	25.4
O	Dry Density [I ÷ (N ÷ 100)] X 100	86.5	90.8	90.9	90.8	90.8	90.7	91.3
P	Max. Density	95.9	96.4	~~24.0~~ 96.4	96.6	96.4	96.4	96.4
Q	Optimum Moisture	21.8	24.0	24.0	24.3	24.0	24.0	24.0
R	Proctor Comparison No.	L3	L8	L8	L5	L8	L8	L8
S	% Compaction (O ÷ P) X 100	90.2	94.2	94.3	94.0	94.2	94.1	94.7
T	% Compaction Required	90.0	90.0	90.0	90.0	90.0	90.0	90.0
U	Inspector's Initial	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.
V	Level II Evaluator's Initial							

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill Landfill

*Indicates Failing Test **Indicates Retest

A	Test Number	90	91	92	93	94	95	96
B	Date	10/10/91	10/10/91	10/10/91	10/14/91	10/14/91	10/14/91	10/14/91
C	Elevation							
D	Station							
E	Scale Ser. No.	mcgua 32764 / mcgua 32765						
F	W W Sample & Mold	5.12	5.07	5.22	5.08	5.10	4.95	5.03
G	Wt. & Volume Of Mold	1.35 / 29.9	1.41 / 29.9	1.33 / 29.9	1.33	1.33	1.35	1.35
H	W W Sample (F–G)	3.77	3.66 ~~3.99~~ RP	3.89	3.75	3.77	3.60	3.68
I	W W/CU Ft. (H – Vol)	112.7	109.9	116.3	112.1	112.7	107.6	110.0
J	W W Moist Sample	100.19	100.22	100.21	100.14	100.11	100.17	100.57
K	Quick Dry Number/ Oven Ser. No.	3683	3690	3688	3680	3688	3680	3688
L	D W Moist Sample	80.44	80.81	79.86	80.65	81.25	81.12	80.00
M	Wt. Water (J–L)	19.51	19.41	20.35	19.49	18.86	19.05	20.57
N	% Moisture (M – L) X 100	24.2	24.0	25.5	24.2	23.2	23.5	25.7
O	Dry Density [1 – (N + 100)] X 100	90.7	88.2	92.7	90.3	91.5	87.2	87.5
P	Max. Density	96.4	96.4	98.0	96.4	95.9	95.9	96.4
Q	Optimum Moisture	24.0	24.0	23.8	24.0	21.8	21.8	24.0
R	Proctor Comparison No.	L 8	L 8	L 6	L 8	L 3	L 3	L 8
S	% Compaction (O – P) X 100	94.1	91.5	94.6	93.7	95.4	90.9	90.8
T	% Compaction Required	90.0	90.0	90.0	90.0	90.0	90.0	90.0
U	Inspector's Initial	R.P	R.P.	R.P.	R.P	R.P	R.P.	R.P.
V	Level II Evaluator's Initial							

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill Landfill

*Indicates Failing Test **Indicates Retest

A	Test Number	84	85	86	87	88	87A **	89
B	Date	10/10/91	10/10/91	10/10/91	10/10/91	10/10/91	10/10/91	10/10/91
C	Elevation							
D	Station							
E	Scale Ser. No.	mcgua 32764 / mcgua 32765						
F	W W Sample & Mold	5.05	5.04	5.17	4.89	5.06	5.11	5.07
G	Wt. & Volume Of Mold	1.33 / 29.9	1.35 / 29.9	1.33 / 29.9	1.41 / 29.9	1.33 / 29.9	1.33	1.33
H	W W Sample (F-G)	3.72	3.69	3.82	3.48	3.73	3.78	3.74
I	W W/CU Ft. (H — Vol)	111.2	110.3	114.2	104.1	111.5	113.0	111.8
J	W W Moist Sample	100.28	100.15	100.39	100.13	100.37	100.36	100.39
K	Quick Dry Number/ Oven Ser. No.	3690	3688	3690	3688	3690	3688	3690
L	D W Moist Sample	79.15	80.16	80.90	80.23	80.51	79.02	79.96
M	Wt. Water (J-L)	21.13	19.99	19.42	19.9	19.9	21.34	20.43
N	% Moisture (M — L) X 100	26.7	24.9	24.0	24.8	24.7	27.0	25.6
O	Dry Density [I — (N — 100)] X 100	87.4	88.3	92.1	83.4	89.4	90.0	89.0
P	Max. Density	96.9	96.9	96.9	96.9	96.9	96.9	96.7
Q	Optimum Moisture	24.0	24.0	24.0	24.0	24.0	24.0	24.0
R	Proctor Comparison No.	L-8	L-8	L-8	L-8	L-8	L-8	L-8
S	% Compaction (O — P) X 100	91.1	91.6	95.6	(86.5)	92.7	93.4	92.3
T	% Compaction Required	90.0	90.0	90.0	90.0	90.0	90.0	90.0
U	Inspector's Initial	R.P	R.P	R.P	R.P	R.P	R.P	R.P
V	Level II Evaluator's Initial							

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill Land Fill

*Indicates Failing Test **Indicates Retest

A	Test Number	78	79	80	81	82	82A	83
B	Date	10/9/91	10/9/91	10/9/91	10/9/91	10/9/91	10/10/91	10/10/91
C	Elevation							
D	Station							
E	Scale Ser. No.	mequn 32764 / mequn 32765						
F	W W Sample & Mold	5.09	5.07	5.10	5.01	5.00	5.01	4.90
G	Wt. & Volume Of Mold	1.33 / 29.9	1.33 / 29.9	1.41 / 29.9	1.33 / 29.9	1.41 / 29.9	1.35 29.9 ~~5.66 R.P.~~	1.33
H	W W Sample (F-G)	3.76	3.74	3.69	3.68	3.59	3.66	3.57
I	W W/CU Ft. (H – Vol)	112.4	111.8	110.3	110.0	107.3	109.4	106.7
J	W W Moist Sample	100.38	100.21	100.10	100.51	100.20	100.11	100.18
K	Quick Dry Number/ Oven Ser. No.	3690 ~~3687~~	3690 R.P. ~~3687~~	3688	3690	3688	3690	3688	3690
L	D W Moist Sample	81.29	80.81	80.68	80.12	80.06	80.44	80.76
M	Wt. Water (J-L)	19.09	19.40	19.42	20.39	20.14	19.67	19.42
N	% Moisture (M – L) X 100	23.5	24.5	24.1	25.4	25.2	24.5	24.0
O	Dry Density [I ÷ (N + 100)] X 100	91.0	89.8	88.9	87.7	85.7	87.9	86.0
P	Max. Density	96.8	96.8	96.6	96.6	96.8	96.8	95.3
Q	Optimum Moisture	24.4	24.4	24.3	24.3	24.4	24.4	21.2
R	Proctor Comparison No.	L-7	L-7	L-5	L-5	L-7	L-7	L-1
S	% Compaction (O ÷ P) X 100	94.0	92.8	92.0	90.5	(88.5)	90.8	90.2
T	% Compaction Required	90.0	90.0	90.0	90.0	90.0	90.0	90.0
U	Inspector's Initial	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.
V	Level II Evaluator's Initial							

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill McGuire Landfill

*Indicates Failing Test **Indicates Retest

A	Test Number	73	68A **	72A **	74	75	76	77
B	Date	10/8/91	10/8/91	10/9/91	10/9/91	10/9/91	10/9/91	10/9/91
C	Elevation							
D	Station							
E	Scale Ser. No.	mcgia 32769 / mcgia 32765						
F	W W Sample & Mold	5.22	5.17	5.05	5.09	5.25	5.09	5.06
G	Wt. & Volume Of Mold	1.35 / 29.9	1.35 / 29.9	1.35 / 29.9	1.35 / 29.9	1.41 / 29.9	1.41 / 29.9	1.33 / 29.9
H	W W Sample (F-G)	3.87	3.82	3.70	3.74	3.84	3.68	3.73
I	W W/CU Ft. (H ÷ Vol)	115.7	114.2	110.6	111.8	114.8	110.0	111.5
J	W W Moist Sample	100.20	100.47	100.42	100.20	100.36	100.63	100.18
K	Quick Dry Number/ Oven Ser. No.	#10	3690	3690	3658	3690	3688	3690
L	D W Moist Sample	81.27	81.33	80.95	81.27	81.15	80.01	80.98
M	Wt. Water (J-L)	18.93	19.14	19.47	18.93	~~23.3~~ 19.11 RD	20.62	19.2
N	% Moisture (M ÷ L) X 100	23.3	23.5	24.1	23.3	23.5	25.8	23.7
O	Dry Density [I ÷ (N + 100)] X 100	93.8	92.5	89.1	90.7	93.0	87.4	90.1
P	Max. Density	98.0	96.8	96.8	96.8	98.0	91.0	95.9
Q	Optimum Moisture	23.8	24.4	24.4	24.4	23.8	25.4	21.8
R	Proctor Comparison No.	L-6	L-7	L-7	L7	L6	L4	L3
S	% Compaction (O ÷ P) X 100	95.7	95.6	92.0	93.7	94.9	97.1	94.0
T	% Compaction Required	90.0	90.0	90.0	90.0	90.0	90.0	90.0
U	Inspector's Initial	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill Landfill

*Indicates Failing Test | **Indicates Retest

A	Test Number	66	67	68	69	70	71	72
B	Date	10/8/91	10/8/91	10/8/91	10/8/91	10/8/91	10/8/91	10/8/91
C	Elevation							
D	Station							
E	Scale Ser. No.	mcgca 32768 / mcgca 32765						
F	W W Sample & Mold	5.13	5.02	4.89	5.14	5.01	4.96	4.98
G	Wt. & Volume Of Mold	1.33 / 29.9	1.41 / 29.9	1.33 / 29.9	1.41 / 29.9	1.33 / 29.9	1.33 / 29.9	1.41
H	W W Sample (F–G)	3.8	3.61	3.54	3.73	3.68	3.63	3.57
I	W W/CU Ft. (H ÷ Vol)	113.6	107.9	105.8	111.5	110.03	108.54	106.7
J	W W Moist Sample	100.46	100.20	100.09	100.45	100.44	100.12	100.52
K	Quick Dry Number/ Oven Ser. No.	3690	3688	3690	3688	3690	3688	3690
L	D W Moist Sample	80.92	81.41	81.60	81.67	80.52	81.36	80.44
M	Wt. Water (J–L)	19.54	18.79	18.49	18.78	19.92	18.76	20.08
N	% Moisture (M ÷ L) X 100	24.15	23.08	22.66	23.00	24.7	23.1	25.0
O	Dry Density [I ÷ (N + 100)] X 100	91.5	87.7	86.3	90.7	88.2	89.4	85.4
P	Max. Density	96.8	96.8	96.8	96.8	96.8	96.8	96.8
Q	Optimum Moisture	24.4	24.4	24.4	24.4	24.4	24.4	24.4
R	Proctor Comparison No.	L-7	L-7	L-7	L-7	L-7	L-7	L-7
S	% Compaction (O ÷ P) X 100	94.5	90.6	89.27	93.7	91.1	92.4	88.27
T	% Compaction Required	~~94.5~~ 90.0 R-P	90.0	90.0	90.0	90.0	90.0	90.0
U	Inspector's Initial	R.P	R.P	R.P	R.P	R.P	R.P	R.P
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

25557 (R9-85) | Form M-1C | Revision 7

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT _____

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill _____

*Indicates Failing Test **Indicates Retest

A	Test Number	59 **	60	61	62	63	64	65
B	Date	10/7/91	10/8/91	10/8/91	10/8/91	10/8/91	10/8/91	10/8/91
C	Elevation							
D	Station							
E	Scale Ser. No.	mcqua 32764 / mcqoa 32765						
F	W W Sample & Mold	4.89	5.23	5.11	5.00	4.94	5.15	5.25
G	Wt. & Volume Of Mold	1.35 / 29.9	1.35 / 29.9	1.35 / 29.9	1.33 / 29.9	1.33 / 29.9	1.41 / 29.9	1.35 / 29.9
H	W W Sample (F–G)	3.53	3.88	3.76	3.67	3.61	3.74	3.90
I	W W/CU Ft. (H ÷ Vol)	105.6	116.0	112.4	109.7	107.9	111.8	116.6
J	W W Moist Sample	100.74	100.11	100.02	100.24	100.08	100.55	100.20
K	Quick Dry Number/ Oven Ser. No.	3688	3690	3688	3690	3688	3690	3688
L	D W Moist Sample	82.0	81.63	78.90	80.49	80.94	81.87	81.36
M	Wt. Water (J–L)	18.44	18.48	21.13	19.75	19.14	18.68	18.84
N	% Moisture (M ÷ L) X 100	22.5	22.6	26.8	24.5	23.6	22.8	23.2
O	Dry Density [I ÷ (N + 100)] X 100	86.2	94.6	88.6	88.1	87.3	91.0	94.6
P	Max. Density	95.9	98.0	96.8	96.8	96.8	96.6	98.0
Q	Optimum Moisture	21.8	23.8	24.3	24.3	24.3	24.3	23.8
R	Proctor Comparison No.	L-3	L-6	L-7	L-7	L-7	L-5	L-6
S	% Compaction (O ÷ P) X 100	~~89.9~~ 85.9 R.P.	96.5	91.5	91.0	90.2	94.2	96.5
T	% Compaction Required	90.0	90.0	90.0	90.0	90.0	90.0	90.0
U	Inspector's Initial	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

25557 (R9-85)

Form M-1C	Revision 7

DUKE POWER COMPANY

CONSTRUCTION DEPARTMENT

PROJECT _____

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill _____

*Indicates Failing Test **Indicates Retest

A	Test Number	54	55	56	57	58	59	58A
B	Date	10/7/91	10/7/91	10/7/91	10/7/91	10/7/91	10/7/91	10/7/91
C	Elevation							
D	Station							
E	Scale Ser. No.	mequa 32764 mequa 32765						
F	W W Sample & Mold	5.20	4.95	5.12	5.23	4.73	4.88	4.99
G	Wt. & Volume Of Mold	1.35 29.9	1.33 29.9	1.35 29.9	1.41 29.9	1.35 29.9	1.41 29.9	1.35 29.9
H	W W Sample (F–G)	3.85	3.62	3.77	3.82	3.38	3.47	3.64
I	W W/CU Ft. (H ÷ Vol)	115.1	108.2	112.7	114.2	101.1	103.8	108.8
J	W W Moist Sample	100.37	100.30	100.40	100.22	100.12	100.51	100.04
K	Quick Dry Number/ Oven Ser. No.	3690	3690	3688	3690	3690	3688	3690
L	D W Moist Sample	80.21	81.48	81.43	82.13 ~~81.97~~ R.P.	81.97 R.P. ~~83.50~~	80.96	81.35
M	Wt. Water (J–L)	20.16	18.82	18.97	18.1	18.15 R.P. ~~16.63~~	19.55	18.69
N	% Moisture (M ÷ L) X 100	25.1	23.1	23.3	22.0	22.1 R.P. ~~19.9~~	24.1	23.0
O	Dry Density [I ÷ (N + 100)] X 100	92.0	87.9	91.4	93.6	82.8	83.6	88.5
P	Max. Density	96.6	95.9	98.0	98.0	95.9	95.9	95.9
Q	Optimum Moisture	24.3	21.8	23.8 ~~93.3~~ R.P.	23.8	21.8	21.8	21.8
R	Proctor Comparison No.	L5	L3	L6	L6	L3	L3	L3
S	% Compaction (O ÷ P) X 100	95.2	91.7	93.3	95.5	86.3 ~~86.3~~ R.P.	87.2	92.3
T	% Compaction Required	90.0	90.0	90.0	90.0	90.0	90.0	90.0
U	Inspector's Initial	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

25557 (R9-85) | Form M-1C | Revision 7

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT _____

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill _____

*Indicates Failing Test **Indicates Retest

A	Test Number	48	49	50	49**	51	52	53
B	Date	10/7/91	10/7/91	10/7/91	10/7/91	10/7/91	10/7/91	10/7/91
C	Elevation							
D	Station							
E	Scale Ser. No.	mequ.1 / mequ2						
F	W W Sample & Mold	4.90	4.84	5.10	4.99	5.00	5.12	5.19
G	Wt. & Volume Of Mold	1.35 / 29.9	1.41 / 29.9	1.41 / 29.9	1.33 / 29.9	1.41 / 29.9	1.33 / 29.9	1.35 / 29.9
H	W W Sample (F–G)	3.55	3.43	3.69	3.66	3.59	3.79	3.84
I	W W/CU Ft. (H ÷ Vol)	106.1	102.6	110.3	109.4	107.3	113.3	114.8
J	W W Moist Sample	100.20	100.22	100.14	100.36	100.28	100.31	100.42
K	Quick Dry Number/ Oven Ser. No.	3658	3680	3658	3680	3658	3690	3658
L	D W Moist Sample	82.61	81.16	81.22	81.20	82.33	81.56	81.23
M	Wt. Water (J–L)	17.59	19.06	18.92	19.16	17.95	18.45	19.19
N	% Moisture (M ÷ L) X 100	21.3	23.5	23.3	23.6	21.8	22.5	23.6
O	Dry Density [I ÷ (N + 100)] X 100	87.5	83.1	89.5	88.5	88.1	92.5	92.9
P	Max. Density	95.9	95.9	95.9	95.9	95.9	95.9	96.6
Q	Optimum Moisture	21.8	21.8	21.8	21.8	21.8	21.8	24.3
R	Proctor Comparison No.	L-3	L-3	L 3	L-3	L-3	L-3	L 5
S	% Compaction (O ÷ P) X 100	91.3	86.7	93.3 R.P.	92.3	~~97.0~~ 91.9 R.P.	96.5	96.2
T	% Compaction Required	90.0	90.0	90.0	90.0	90.0	90.0	90.0
U	Inspector's Initial	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill McGuire Land fill

*Indicates Failing Test **Indicates Retest

A	Test Number	28	29	30	31	32	33	34
B	Date	10/1/91	10/1/91	10/1/91	10/2/91	10/2/91	10/2/91	10-2-91
C	Elevation							
D	Station							
E	Scale Ser. No.	mcgun 32764 / mcgun 32765						
F	W W Sample & Mold	5.18	5.15	4.93	1 4.86	3 5.04	2 4.85	R.P. 5.25
G	Wt. & Volume Of Mold	1.41 / 29.9	1.35 / 29.9	1.41 / 29.9	1.41 / 29.9	1.35 / 29.9	1.35 / 29.9	1.35 / 29.9
H	W W Sample (F–G)	3.77	3.80	3.52	3.45	3.69	3.50	3.90
I	W W/CU Ft. (H – Vol)	112.7	113.6	105.2	103.2	110.3	104.7	116.6
J	W W Moist Sample	100.43	100.71	100.04	100.54	100.06	100.10	100.48
K	Quick Dry Number/ Oven Ser. No.	3688	3690	3688	3690 ~~215~~	3688	3690	3688
L	D W Moist Sample	79.25	83.30	77.81	79.03	80.06	79.14	81.74
M	Wt. Water (J–L)	21.18	17.41	22.23	21.51	20.00	20.96	18.74
N	% Moisture (M – L) X 100	26.7	20.9	28.6	27.2	25.0	26.5	22.9
O	Dry Density [I – (N + 100)] X 100	90.6	94.0	81.8	81.1	88.2	82.8	94.9
P	Max. Density	91.0	95.9	~~90.~~ 91.0	91.0	~~96.9~~ 91.0 R.P.	91.0	95.9
Q	Optimum Moisture	25.4	21.8	25.4	25.4	25.4	~~21.8~~ RP 25.4	21.8
R	Proctor Comparison No.	L-4	L-3	L-4	L-4	L-4	L-4	L-3
S	% Compaction (O – P) X 100	98.9	98.0	89.9	89.1	96.9	91.0	99.0
T	% Compaction Required	90.0	90.0	90.0	90.0	90.0	90.0	90.0
U	Inspector's Initial	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill McGuire Landfill

*Indicates Failing Test **Indicates Retest

A	Test Number	21	22	23	24	25	26	27
B	Date	10/1/91	10/1/91	10/1/91	10/1/91	10/1/91	10/1/91	10/1/91
C	Elevation							
D	Station							
E	Scale Ser. No.	mcQua 32764 mcQua 32765						
F	W W Sample & Mold	5.04	5.19	4.87	5.11	489	4.95	5.02
G	Wt. & Volume Of Mold	1.44 29.9	1.35 29.9	1.33 29.9	1.33 29.9	1.33 29.9	1.41 29.9	1.33 29.9
H	W W Sample (F–G)	3.60	3.84	3.54	378	3.56	3.54	3.69
I	W W/CU Ft. (H ÷ Vol)	107.6	114.8	105.8	113.0	106.4	105.8	110.3
J	W W Moist Sample	100.07	100.48	100.20	100.36	100.31	100.20	100.29
K	Quick Dry Number/ Oven Ser. No.	3688	3690	3688	3690	3688	3690	3690
L	D W Moist Sample	78.65	78.90	83.58	80.08	78.81	78.07	78.36
M	Wt. Water (J–L)	21.42	20.58	16.62	20.18	21.50	22.13	21.93
N	% Moisture (M ÷ L) X 100	27.2	~~25.4~~ 27.4 RP	19.9	25.2	27.3	28.3	28.0
O	Dry Density [I ÷ (N + 100)] X 100	84.6	90.1	88.2	90.3	83.6	82.5	86.2
P	Max. Density	91.0	91.0	95.3	91.0	91.0	~~90.1~~ 91.0 RP	91.0
Q	Optimum Moisture	25.4	25.4	21.2	25.4	25.4	25.4	25.4
R	Proctor Comparison No.	L-4	L-4	L-1	L-4	L-4	L-4	L-4
S	% Compaction (O ÷ P) X 100	93.0	99.0	92.5	99.2	91.9	90.1	94.7
T	% Compaction Required	90.0	90.0	90.0	90.0	90.0	90.0	90.0
U	Inspector's Initial	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill McGuire Landfill

*Indicates Failing Test | **Indicates Retest

A	Test Number	14	15	16	17	18	19	20
B	Date	9/30/91	9/30/91	9/30/91	9/30/91	10/1/91	10/1/91	10/1/91
C	Elevation							
D	Station							
E	Scale Ser. No.	mcQua 32765 mcQua 32764	→	→	→	→	→	→
F	W W Sample & Mold	4.98	490.0	490.0	5.00 500.0	5.14	4.98	490
G	Wt. & Volume Of Mold	1.35 29.9	1.35 29.9	1.33 29.9	1.35 R.P. 29.9	1.41 29.9	1.35 29.9	1.33 29.9
H	W W Sample (F–G)	3.63	3.55	3.57	3.65	3.73	3.63	3.57
I	W W/CU Ft. (H – Vol)	108.5	106.1	106.7	109.1	111.5	108.5	106.7
J	W W Moist Sample	100.42	100.47	100.56	100.29	100.19	100.52	100.21
K	Quick Dry Number/ Oven Ser. No.	3690	3688	3690	3688	3690	3688	3690
L	D W Moist Sample	81.34	79.51	79.96	80.16	81.80	83.75	78.86
M	Wt. Water (J–L)	19.08	20.96	21.10	20.13	18.39	16.74	21.35
N	% Moisture (M – L) X 100	23.5	26.4	26.6	25.1	22.5	20.0	27.1
O	Dry Density [I – (N + 100)] X 100	87.9	83.9	84.3	87.2	91.0	90.4	83.9
P	Max. Density	95.9	91.0	91.0	91.0	95.9	95.9	91.0
Q	Optimum Moisture	21.8	25.4	25.4	25.4	21.8	21.8	25.4
R	Proctor Comparison No.	L-3	L-4	L-4	L-4	L-3	L-3	L-4
S	% Compaction (O – P) X 100	91.7	92.2	92.6	95.8	94.9 R.P.	94.3	92.2
T	% Compaction Required	90.0	90.0	90.0	90.0	90.0	90.0	90.0
U	Inspector's Initial	R.P.	R.P.	R.P.	R.P.	R.P	R.P	R.P.
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

25557 (R9-85)

Form M-1C | Revision 7

DUKE POWER COMPANY

CONSTRUCTION DEPARTMENT

PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill McGuire landfill

*Indicates Failing Test

**Indicates Retest

A	Test Number	8	4A	9	10	11	12	13
B	Date	9/25/91	9/25/91	9/30/91	9/30/91	9/30/91	9/30/91	9/30/91
C	Elevation							
D	Station							
E	Scale Ser. No.	mcgun 32764 / mcgun 32765						
F	W W Sample & Mold	4.95	4.97	5.18	5.18	5.01 RP	4.98	5.22
G	Wt. & Volume Of Mold	1.33 / 29.9	1.33 / 29.9	1.91 / 28.9	1.91 / 29.9	1.33 / 29.9	1.35 / 29.9	1.33 / 29.9
H	W W Sample (F-G)	3.62	3.64	3.73	3.73	3.68	3.63	3.89
I	W W/CU Ft. (H – Vol)	108.2	108.8	112.7	112.7	110.0	108.5	116.3
J	W W Moist Sample	100.06	100.10	100.96	100.90	100.29	100.08	100.17
K	Quick Dry Number/ Oven Ser. No.	3688	3688	3690	3690	3690	3688	3690
L	D W Moist Sample	79.90	81.20	82.99	81.95	81.26	81.47	80.70
M	Wt. Water (J-L)	20.16	18.90	17.97	18.95	19.03	18.61	19.97
N	% Moisture (M – L) X 100	25.2	23.3	21.0	22.5	23.4	22.8	24.1
O	Dry Density [I – (N + 100)] X 100	86.4	88.2	93.1	92.0	89.1	88.9	93.7
P	Max. Density	95.9	91.0	95.9	95.9	91.0	95.9	95.9
Q	Optimum Moisture	21.8	25.4	21.8	21.8	25.4	21.8	21.8
R	Proctor Comparison No.	L-3	L-4	L-3	L-3	L-4	L-3	L-3
S	% Compaction (O – P) X 100	90.1	96.9	97.1	95.9	97.9	92.2	97.7
T	% Compaction Required	90	90.0	90.0	90.0	90.0	90.0	90.0
U	Inspector's Initial	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

25557 (R9-85) | Form M-1C | Revision 7

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill McGuire Head Fill

*Indicates Failing Test **Indicates Retest

	A Test Number	1	2	3	4	5	6	7
B	Date	9/24/91	9/24/91	9/24/91	9/24/91	9-24-91	9-24-91	9.25-91
C	Elevation							
D	Station							
E	Scale Ser. No.	MCQUA 32764 MCQUA 32765						MCQUA 32764 MCQUA 32765
F	W W Sample & Mold	4.97	5.07	5.07	4.82	5.02	4.96	4.96
G	Wt. & Volume Of Mold	1.33 29.9	1.41 29.9	1.41 29.9	1.33 29.9	1.41 29.9	1.35 29.9	1.41 29.9
H	W W Sample (F-G)	3.64	3.66	3.66	3.49	3.61	3.61	3.55
I	W W/CU Ft. (H – Vol)	108.8	109.4	109.4	104.4	107.9	107.9	106.1
J	W W Moist Sample	100.03	103.0	100.10	100.00	100.0	100.02	100.02
K	Quick Dry Number/ Oven Ser. No.	3690	3688	3690	36.58	36.90	3688	3690
L	D W Moist Sample	81.65	82.41	80.09	78.06	78.46	79.30	82.51
M	Wt. Water (J-L)	18.88	20.59	20.01	21.94	21.54	20.72	17.51
N	% Moisture (M – L) X 100	23.3	25.0	25.0	28.1	27.5	26.1	21.2
O	Dry Density [I – (N + 100)] X 100	88.2	81.5	87.5	81.5	84.6	85.6	87.5
P	Max. Density	92.5	92.5	91.0	91.0	91.0	91.0	95.9
Q	Optimum Moisture	22.0	22.0	25.4	25.4	25.4	25.4	21.8
R	Proctor Comparison No.	L 2	L 2	L 4	L 4	L 4	L 4	L 3
S	% Compaction (O – P) X 100	95.4	94.6	96.2	89.6	93.0	94.1	91.2
T	% Compaction Required	90.0	90.0	90.0	90.0	90.0	90.0	90.0
U	Inspector's Initial	R.P.	R.P.	R.P.	R.P.	R.P	R.P.	R.P.
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

25582 (R8-85) | FORM M-2P | REVISION 4

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire Landfill

SIEVE ANALYSIS

Manuf. Sand

SPECIFICATIONS		SAMPLE IDENT.	SIEVE	WEIGHT RETAINED	CUMULATIVE WEIGHT RETAINED	% WEIGHT PASSING	% WEIGHT RETAINED
		SIEVE SERIAL NO.	2"				
~~ASTM~~-C-33	N. CAROLINA		1½"				
	HIGHWAY		1"				
	25	RR	¾"				
		~~MCGUIRE~~	½"				
100	100	~~32765~~	⅜"		0	100.0	0.0
95-100	95-100	2/6/92	#4		26.57	94.1	5.9
80-100	80-100	N/A	#8		144.30	68.7	31.3
			#10				
45-95	45-95		#16		247.02	44.9	55.1
			#20				
25-75	25-75		#30		314.48	29.9	70.1
			#40				
0-36	8-30		#50		361.52	19.4	80.6
			#60				
0-10	0.5-10		#100		407.30	9.2	90.8
0-3	0-3		#200		433.99	3.2	96.8
			PAN		448.50		

SAMPLE IDENT. _____ CAR OR TRUCK NO. N/A
SOURCE OF SAMPLE Landfill basin NO. 1
DATE RECEIVED 2/6/92 DATE SAMPLED 2/6/92 DATE TESTED 2/6/92

LARGEST % RETAINED ON ONE SIEVE 23.3% SAND FINENESS MODULUS 4.31

FINER THAN 200 BY WASH | SCALE SERIAL NO. MCQA 32765

CONCRETE INSPECTOR/LEVEL R.R. Seagle ELP | LEVEL II EVALUATION _____

THE ABOVE SIEVE ANALYSIS (☐ IS ☐ IS NOT) ACCEPTABLE IN ACCORDANCE WITH THE SPECIFICATION REQUIREMENTS.

ACTION TAKEN IF NOT ACCEPTABLE: _____

QA APPROVAL _____ DATE _____

26377 (R7-85)
QA QCPM
Procedure No. QCC-1

ENCLOSURE 5.18

FORM QCC-1R	REV. 1

DUKE POWER COMPANY
QUALITY ASSURANCE DEPARTMENT

DAILY COMPRESSION TEST RECORD

TESTING MACHINE CALIB. SERIAL NUMBER 90044 PROJECT McGuire Landfill

Cylinder Identification	Mix No.	Day Break	CYLINDER I			CYLINDER II			Average Strength PSI
			Unit Weight	Load	Strength PSI	Unit Weight	Load	Strength PSI	
LF-1	4000	~~28~~	NA	169870	6009	NA	167220	5915	5962
		30							

IF COMPRESSION STRENGTH IS BELOW DESIGN STRENGTH, NOTE THE TYPE OF FAILURE:

RRS

THESE COMPRESSION TESTS WERE MADE BY R. R. Searight DATE 12-~~24~~ 26-91

LEVEL II REVIEW

THESE COMPRESSION TESTS HAVE BEEN CHECKED AGAINST THE REQUIREMENTS OF THE SPECIFIED MIXES FOR 28 DAY STRENGTH AND ARE HEREBY CERTIFIED AS MEETING THE SPECIFCATION REQUIREMENTS WITH THE FOLLOWING EXCEPTIONS: (☐ NONE)

ACTION TAKEN ON EXCEPTIONS

QA APPROVAL _____ DATE _____

25556 (R9-85) | FORM M-1B | REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Landfill DATE 11/18/91, 11/22/91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	RRS
2) DRAINAGE MATERIAL	N/A	RRS
3) FILL MATERIAL	L-71	RRS
4) HAUL ROADS & EQUIPMENT	OK 3-Scrapers 1-Tractors & rollers	RRS
5) LAYER THICKNESS	8"	RRS
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	11-18-91 – 4 Tubes) OK 11-19-91 – 1 Tubes)	RRS
7) SLOPE PROTECTION	walked on with dozer	R RS
8) YARDS PLACED	N/A	RRS
9) APPROXIMATE THICKNESS PLACED	N/A	RRS
10) FILLING TIME	10 Hrs	RRS

INSPECTOR R R Simms DATE 11-22-91

LEVEL II EVALUATION _____ DATE _____

QA APPROVAL _____ DATE _____

25556 (R9-85) | FORM M-1B | REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Landfill DATE 11/11/91 / 11/15/91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	RRS
2) DRAINAGE MATERIAL	N/A	RRS
3) FILL MATERIAL	L-9 / L-7	RRS
4) HAUL ROADS & EQUIPMENT	6/C 3-dozer 3-Scraper 1-tractor & roller	RRS
5) LAYER THICKNESS	8"	RRS
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	11/14/91 - 2-moisture corrected 11/15/91 1-moisture OK 1-Shelby tube	RRS
7) SLOPE PROTECTION	Walked in with dozer	RRS
8) YARDS PLACED	N/A	RRS
9) APPROXIMATE THICKNESS PLACED	N/A	RRS
10) FILLING TIME	10 Hrs	RRS

INSPECTOR R.R. Sarratt DATE 11/15/91
LEVEL II EVALUATION _____ DATE _____
QA APPROVAL _____ DATE _____

25556 (R9-85) | FORM M-1B | REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Sandfill

DATE week of 11/4/91 - 11/7/91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	RRS
2) DRAINAGE MATERIAL	N/A	RRS
3) FILL MATERIAL	L-10 / L-4 / L-9 / L-5	RRS
4) HAUL ROADS & EQUIPMENT	OK 2-Dozer 3-Scrapers 1-Tractor & roller 1-Motor grader	RRS
5) LAYER THICKNESS	6"	RRS
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	11/4/91 - 7 tubes 11/5/91 - 5 Tubes 11/6/91 - 2 tubes 11/7/91 - 2 Tubes } ok	RRS
7) SLOPE PROTECTION	walked in with dozer	RRS
8) YARDS PLACED	N/A	RRS
9) APPROXIMATE THICKNESS PLACED	N/A	RRS
10) FILLING TIME	10HR	RRS

INSPECTOR RR Smith DATE 11/7/91

LEVEL II EVALUATION _____ DATE _____

QA APPROVAL _____ DATE _____

25556 (R9-85) | FORM M-1B | REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS week of

LOCATION Landfill DATE 10/28/91 / 11/1/91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	RRS
2) DRAINAGE MATERIAL	NA	RRS
3) FILL MATERIAL	L-4 / L-1 / L-3 / L-9	RRS
4) HAUL ROADS & EQUIPMENT	ok 2-Dozer 3-Scraper 1-Tractor & rollers 1-Motor grader	RRS
5) LAYER THICKNESS	6"	RRS
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	10/28/91 - 4-Tubes 10/29/91 - 4 Tubes 10/30/91 - 4-Tubes } ok 10/31/91 - 4-Tubes 11/1/91 - 2 Tubes	RRS
7) SLOPE PROTECTION	walked on with dozer	RRS
8) YARDS PLACED	N/A	RRS
9) APPROXIMATE THICKNESS PLACED	N/A ~~HOHR~~ - N/A	RRS
10) FILLING TIME	10 HRS	RRS

INSPECTOR R R Arnold DATE 11-1-91
LEVEL II EVALUATION _____ DATE _____
QA APPROVAL _____ DATE _____

25556 (R9-85) | FORM M-1B | REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Landfill DATE 10/24/91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	RRS
2) DRAINAGE MATERIAL	N/A	RRS
3) FILL MATERIAL	L-2, L-3, L-4, L-5	RRS
4) HAUL ROADS & EQUIPMENT	2-Scraper 1-Dozer with rollers o/c 2-dozer	RRS
5) LAYER THICKNESS	8 inches	RRS
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	4-tubes taken o/c filling on North end over Pipe MH-4	RRS
7) SLOPE PROTECTION	Walked in with dozer	RRS
8) YARDS PLACED	N/A	RRS
9) APPROXIMATE THICKNESS PLACED	N/A	RRS
10) FILLING TIME	10 hrs.	RRS

INSPECTOR R R Sturgeon DATE 10/24/91
LEVEL II EVALUATION _____ DATE _____
QA APPROVAL _____ DATE _____

25556 (R9-85) | FORM M-1B | REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Landfill DATE 10/23/91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	RRS
2) DRAINAGE MATERIAL	N/A	RRS
3) FILL MATERIAL	Didn't fill	RRS
4) HAUL ROADS & EQUIPMENT	N/A	RRS
5) LAYER THICKNESS	N/A	RRS
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	8-tubes taken over pipe all failed Compaction some moisture CMD-N notified QA not required over pipe	RRS
7) SLOPE PROTECTION	Walked in with dozer	RRS
8) YARDS PLACED	N/A	RRS
9) APPROXIMATE THICKNESS PLACED	N/A	RRS
10) FILLING TIME	N/A	RRS

INSPECTOR RR Linnell DATE 10/23/91

LEVEL II EVALUATION _____ DATE _____

QA APPROVAL _____ DATE _____

25556 (R9-85) | FORM M-1B | REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Landfill DATE 10/22/91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	RRS
2) DRAINAGE MATERIAL	N/A	RRS
3) FILL MATERIAL	L-7, L-9, L-8	RRS
4) HAUL ROADS & EQUIPMENT	ok 1- Ford tractor & roller 1- Scraper 2- Dozers	RRS
5) LAYER THICKNESS	8"	RRS
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	4. Shelby Tubes 1- tube taken on leachate dike O/C	RRS
7) SLOPE PROTECTION	Walked in with dozer	RRS
8) YARDS PLACED	N/A	RRS
9) APPROXIMATE THICKNESS PLACED	N/A 1'	RRS
10) FILLING TIME	10 hrs	RRS

INSPECTOR R.R. Simmons Jr. DATE 10/22/91
LEVEL II EVALUATION _____ DATE _____
QA APPROVAL _____ DATE _____

25556 (R9-85)

FORM M-1B	REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Sandfill DATE 10/21/91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	RRS
2) DRAINAGE MATERIAL	N/A	RRS
3) FILL MATERIAL	L-8 — L-9	RRS
4) HAUL ROADS & EQUIPMENT	OK 1. Ford tracton & rollers 2. Scraper 2. Dozer	RRS
5) LAYER THICKNESS	8"	RRS
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	6. Shelby tubes OK	RRS
7) SLOPE PROTECTION	Walked in with dozers	RRS
8) YARDS PLACED	N/A	RRS
9) APPROXIMATE THICKNESS PLACED	N/A	RRS
10) FILLING TIME	10 hR	RRS

INSPECTOR R R Searingfield DATE 10/21/91
LEVEL II EVALUATION _____ DATE _____
QA APPROVAL _____ DATE _____

25556 (R9-85) | FORM M-1B | REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Landfill DATE 10/17/91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	R.P.
2) DRAINAGE MATERIAL	N/A	R.P.
3) FILL MATERIAL	LBBL9	R.P.
4) HAUL ROADS & EQUIPMENT	OK 1-D-7 2-Scrapers 1-Ford Tractor & Roller 1-D-8 1-Motor Grader	R.P.
5) LAYER THICKNESS	8"	R.P.
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	7-Shelby Tubes	R.P.
7) SLOPE PROTECTION	N/A	
8) YARDS PLACED	N/A	
9) APPROXIMATE THICKNESS PLACED	N/A	
10) FILLING TIME	10 hrs	

INSPECTOR Richard Payne DATE 10/17/91
LEVEL II EVALUATION _____ DATE _____
QA APPROVAL _____ DATE _____

25556 (R9-85) | FORM M-1B | REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Landfill DATE 10/16/91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	R.P.
2) DRAINAGE MATERIAL	N/A	R.P.
3) FILL MATERIAL	CL	R.P.
4) HAUL ROADS & EQUIPMENT	ok; 1-D-7; 3-Scrapers; 1-Ford Tractor & Roller; 1-D-8; 1-Motor Grader	R.P.
5) LAYER THICKNESS	8"	R.P.
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	8 Shelby Tubes	R.P.
7) SLOPE PROTECTION	N/A	R.P.
8) YARDS PLACED	N/A	R.P.
9) APPROXIMATE THICKNESS PLACED	N/A	R.P.
10) FILLING TIME	10 hrs	R.P.

INSPECTOR Richard Pruitt DATE 10/16/91
LEVEL II EVALUATION _____ DATE _____
QA APPROVAL _____ DATE _____

25556 (R9-85) | FORM M-1B | REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT Mc Guire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Landfill DATE 10/15/91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	R.P.
2) DRAINAGE MATERIAL	N/A	R.P.
3) FILL MATERIAL	L8, L3 L9	R.P.
4) HAUL ROADS & EQUIPMENT	OK; 1-D7; 2-Scrapers; 1-Ford Tractor & Roller; 1-D-8; 1-Motor Grader	
5) LAYER THICKNESS	8"	
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	13 Shelby Tubes	
7) SLOPE PROTECTION	N/A	R.P.
8) YARDS PLACED	N/A	R.P.
9) APPROXIMATE THICKNESS PLACED	N/A	R.P.
10) FILLING TIME	10 hrs	R.P.

INSPECTOR Richard Payne DATE 10/15/91

LEVEL II EVALUATION _____ DATE _____

QA APPROVAL _____ DATE _____

25556 (R9-85) | FORM M-1B | REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Landfill DATE 10/14/91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	R.P.
2) DRAINAGE MATERIAL	N/A	R.P.
3) FILL MATERIAL	L8, L3 L5	R.P.
4) HAUL ROADS & EQUIPMENT	OK; 1-D-8; 2 Scrapers; 1-Ford Tractor & Roller; 1-D-7; 1-Motor Grader	R.P.
5) LAYER THICKNESS	8"	
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	8 Shelby Tubes	R.P.
7) SLOPE PROTECTION	N/A	R.P.
8) YARDS PLACED	N/A	R.P.
9) APPROXIMATE THICKNESS PLACED	N/A	R.P.
10) FILLING TIME	10 hrs	R.P.

INSPECTOR Richard Payne DATE 10/14/91
LEVEL II EVALUATION _____ DATE _____
QA APPROVAL _____ DATE _____

25556 (R9-85) | FORM M-1B | REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Landfill DATE 10-10-91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	R.P.
2) DRAINAGE MATERIAL	N/A	R.P.
3) FILL MATERIAL	L-7, L-1, L-8 & L6	R.P.
4) HAUL ROADS & EQUIPMENT	ok 3 Scrapers 1-D-7 1-D8 1-Ford Tractor & Roller 1-Motor Grader	
5) LAYER THICKNESS	8"	R.P.
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	10-Shelby Tubes 1-Retest	R.P.
7) SLOPE PROTECTION	N/A	R.P.
8) YARDS PLACED	N/A	R.P.
9) APPROXIMATE THICKNESS PLACED	N/A	R.P.
10) FILLING TIME		

INSPECTOR Richard Penn DATE 10/10/91
LEVEL II EVALUATION _____ DATE _____
QA APPROVAL _____ DATE _____

25556 (R9-85) | FORM M-1B | REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT Marshall Curve

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Landfill DATE 10-9-91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Appreved	R.P.
2) DRAINAGE MATERIAL	N/A	R.P.
3) FILL MATERIAL	L-7, L-6, L-4, L-3 & L-5	R.P.
4) HAUL ROADS & EQUIPMENT	OK 3 - Scrapers 1 - D-7 1 - D-8 1 - Ford Tractor & Roller 1 - Motor Grader	
5) LAYER THICKNESS	8"	R.P.
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	10 - Shelby Tubes 1 - Retest	R.P.
7) SLOPE PROTECTION	N/A	R.P.
8) YARDS PLACED	N/A	R.P.
9) APPROXIMATE THICKNESS PLACED	N/A	R.P.
10) FILLING TIME	10 hrs	R.P.

INSPECTOR Richard C Payne DATE 10/9/91
LEVEL II EVALUATION _____ DATE _____
QA APPROVAL _____ DATE _____

25556 (R9-85) | FORM M-1B | REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Landfill DATE 10-8-91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	R.P.
2) DRAINAGE MATERIAL	N/A	R.P.
3) FILL MATERIAL	L-7, L-6 & L-5	R.P.
4) HAUL ROADS & EQUIPMENT	OK 3- Scrapers 1- D-7 1- D8 1- Ford Tractor & Roller 1- Motor Grader	
5) LAYER THICKNESS	8"	R.P.
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	19 Shelby Tubes 2- Retest	R.P.
7) SLOPE PROTECTION		R.P.
8) YARDS PLACED	N/A	
9) APPROXIMATE THICKNESS PLACED	N/A	
10) FILLING TIME	10 hrs	R.P.

INSPECTOR Richard Powell DATE 10/8/91
LEVEL II EVALUATION _____ DATE _____
QA APPROVAL _____ DATE _____

25556 (R9-85) | FORM M-1B | REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Landfill DATE 10-7-91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	R.P.
2) DRAINAGE MATERIAL	N/A	R.P.
3) FILL MATERIAL	L-3, L-5 & L-6	R.P.
4) HAUL ROADS & EQUIPMENT	OK 1-D8 4-Scrapers 1-Ford Tractor & Roller 1-D-7 1-Motor Grader	R.P.
5) LAYER THICKNESS	8"	R.P.
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	14-Shelby Tubes 3. Retest	
7) SLOPE PROTECTION	N/A	R.P.
8) YARDS PLACED	N/A	R.P.
9) APPROXIMATE THICKNESS PLACED	N/A	R.P.
10) FILLING TIME		

INSPECTOR Richard Payne DATE 10/7/91
LEVEL II EVALUATION _____ DATE _____
QA APPROVAL _____ DATE _____

25556 (R9-85)

FORM M-1B	REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Landfill DATE 10-3-91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	R.P.
2) DRAINAGE MATERIAL	N/A	R.P.
3) FILL MATERIAL	L-5, L-3 & L-1	R.P.
4) HAUL ROADS & EQUIPMENT	OK 1-D8 3-Scrapers 1-Ford Tractor & Roller 1-D-7 1-Motor Grader	R.P.
5) LAYER THICKNESS		
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	5-Shelby Tubes	
7) SLOPE PROTECTION		R.P.
8) YARDS PLACED		R.P.
9) APPROXIMATE THICKNESS PLACED		R.P.
10) FILLING TIME	5 hrs	

INSPECTOR Richard Pope DATE 10/3/91
LEVEL II EVALUATION _____ DATE _____
QA APPROVAL _____ DATE _____

25556 (R9-85) | FORM M-1B | REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Landfill DATE 10-2-91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	R.P.
2) DRAINAGE MATERIAL	N/A	R.P.
3) FILL MATERIAL	L-3, L-4	R.P.
4) HAUL ROADS & EQUIPMENT	Ok 1-D8 4-Scrapers 1-Ford Tractor & Roller 1-D-7 1-Motor Grader	R.P.
5) LAYER THICKNESS		
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	10 Shelby Tubes 1-Retest	R.P.
7) SLOPE PROTECTION	N/A	R.P.
8) YARDS PLACED	N/A	R.P.
9) APPROXIMATE THICKNESS PLACED	N/A	R.P.
10) FILLING TIME	10 hrs	

INSPECTOR Richard Payne DATE 10/2/91
LEVEL II EVALUATION _____ DATE _____
QA APPROVAL _____ DATE _____

25556 (R9-85) | FORM M-1B | REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Landfill DATE 10-1-91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	R.P.
2) DRAINAGE MATERIAL	N/A	R.P.
3) FILL MATERIAL	L-3, L4 & L1	R.P.
4) HAUL ROADS & EQUIPMENT	OK 1-D8 3 Scrapers 1-Ford Tractor & Roller 1-D-7 1-Motor Grader	R.P.
5) LAYER THICKNESS		
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	13 Shelby Tubes	R.P
7) SLOPE PROTECTION	N/A	R.P.
8) YARDS PLACED	N/A	R.P.
9) APPROXIMATE THICKNESS PLACED	N/A	R.P
10) FILLING TIME	10 hrs	R.P.

INSPECTOR Richard Pearce DATE 10/1/91
LEVEL II EVALUATION _____ DATE _____
QA APPROVAL _____ DATE _____

25556 (R9-85) | FORM M-1B | REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Landfill DATE 9-30-91

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	R.P.
2) DRAINAGE MATERIAL	N/A	R.P.
3) FILL MATERIAL	L3, L4	R.P.
4) HAUL ROADS & EQUIPMENT	OK; 1-D8; 3 Scrapers; 1- Ford Tractor & Roller; 1-D-7; 1- Motor Grader	R.P.
5) LAYER THICKNESS	8"	
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	9- Shelby Tubes	R.P.
7) SLOPE PROTECTION	N/a	R.P.
8) YARDS PLACED	N/a	R.P.
9) APPROXIMATE THICKNESS PLACED	N/a	R.P.
10) FILLING TIME		

INSPECTOR Richard Powers DATE 9/30/91
LEVEL II EVALUATION _____ DATE _____
QA APPROVAL _____ DATE _____

25556 (R9-85) | FORM M-1B | REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Landfill DATE Sept. 25, 1991

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	RRS
2) DRAINAGE MATERIAL	N/A	RRS
3) FILL MATERIAL	L-1, L-2,	RRS
4) HAUL ROADS & EQUIPMENT	OK 1-D-8 4-Scrapers 1-Ford tractor & roller 1-D-7 1-Motor Grader	RRS
5) LAYER THICKNESS	8"	RRS
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	6-Shelby tubes	RRS
7) SLOPE PROTECTION	N/A	RRS
8) YARDS PLACED	N/A	RRS
9) APPROXIMATE THICKNESS PLACED	N/A	RRS
10) FILLING TIME	10 hr	RRS

INSPECTOR _____ DATE _____

LEVEL II EVALUATION _____ DATE _____

QA APPROVAL _____ DATE _____

25556 (R9-85)

FORM M-1B	REV. 5

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

DAILY INSPECTION OF COMPACTED EARTH FILLS

LOCATION Sandfill DATE Sept. 23, 1991

INSPECTION ITEMS	REMARKS	INITAL
1) UNDERLYING MATERIAL	Approved	RRS
2) DRAINAGE MATERIAL	N/A	RRS
3) FILL MATERIAL	N/A Didn't haul	RRS
4) HAUL ROADS & EQUIPMENT	4- Scraper (Terex) 1- water truck 1- D8 2- D7	RRS
5) LAYER THICKNESS	N/A	RRS
6) TEST PERFORMED & CORRECTIVE ACTION TAKEN	1- Proctor L-1	RRS
7) SLOPE PROTECTION	N/A	RRS
8) YARDS PLACED	N/A	RRS
9) APPROXIMATE THICKNESS PLACED	N/A	RRS
10) FILLING TIME	N/A	RRS

INSPECTOR R.R. Seaught DATE 9/23/91
LEVEL II EVALUATION _____ DATE _____
QA APPROVAL _____ DATE _____

25570 (R9-85) | FORM M-1S | REVISION 6

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

PROCTOR COMPACTION TEST DATA

LOCATION McGuire Landfill DATE Sept 23, 1991

STANDARD A MODIFIED _____ 5 LAYER _____ PROCTOR _____ CBR _____

SAMPLE DESCRIPTION Mixture light red brown, yellowish silty fine sand SAMPLE NO. L-1

WATER CONTENT

QUICK DRY NO.	SAMPLE & CAN WT.	SCALE SER. NO.	CAN WT.	SAMPLE WET WT.	SAMPLE DRY WT.	WT. OF WATER	% MOISTURE ACTUAL	% MOISTURE CORRECTED
GA 3696	NA	McGuA	NA	100.00	84.10	15.90	18.9	NA
3688		32765			82.51	17.49	21.2	*
3690					81.24	18.76	23.1	
3688					81.90	18.10	22.1	
3690				100.03	83.82	16.21	19.3	

COMPACTED SAMPLE

SAMPLE & MOLD WEIGHT	MOLD WEIGHT	SCALE SER. NO.	SAMPLE WET WEIGHT	WEIGHT PER CUBIC FT.	SAMPLE DRY WEIGHT	WATER ADDED
13.12	9.41	McGuA	3.71	112.4	94.5	F.
13.22		32764	3.81	115.5	95.3	.10 *
13.27			3.86	117.6	95.0	.20
13.24			3.83	116.1	95.1	.15
13.14			3.73	113.0	94.7	.05

OPTIMUM MOISTURE 21.2 MAXIMUM DENSITY 95.3

INSPECTOR R.R Seawright

LEVEL II EVALUATION _____

Q. A. APPROVAL _____ DATE _____

25560 (R9-85)

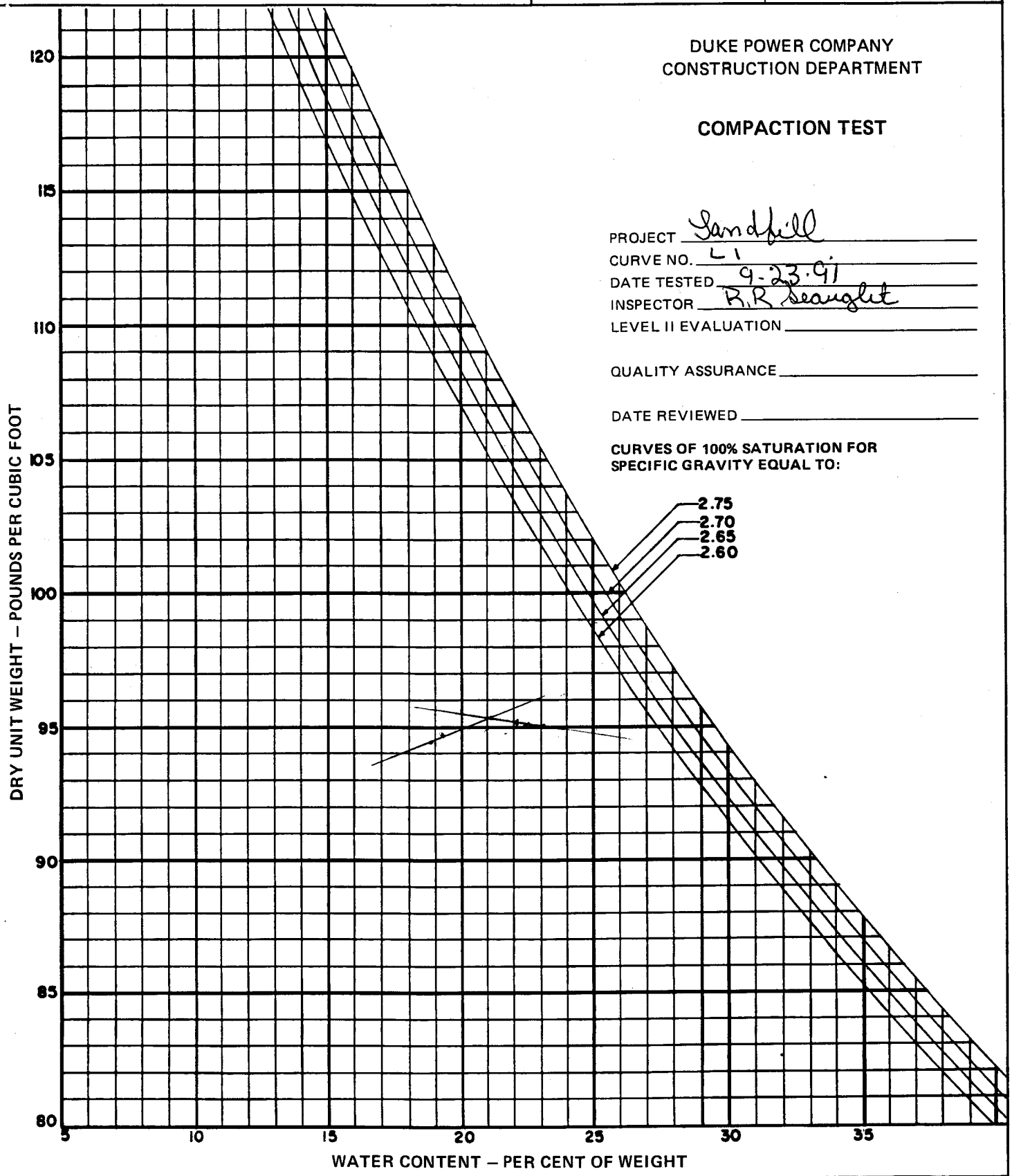
FORM M-1F	REV. 4

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

COMPACTION TEST

PROJECT Landfill
CURVE NO. L1
DATE TESTED 9-23-91
INSPECTOR B.R Seanglit
LEVEL II EVALUATION
QUALITY ASSURANCE
DATE REVIEWED

CURVES OF 100% SATURATION FOR SPECIFIC GRAVITY EQUAL TO:



MOISTURE DENSITY RELATION	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
1/A	STD METHOD "A"	95.3	21.2	mixture light red brown yellowish silty fine sand mic.

25570 (R9-85) | FORM M-1S | REVISION 6

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

PROCTOR COMPACTION TEST DATA

LOCATION Sand fill DATE Sept. 24, 1991

STANDARD A MODIFIED _____ 5 LAYER _____ PROCTOR _____ CBR _____

SAMPLE DESCRIPTION light brown yellowish SAMPLE NO. L-2

WATER CONTENT

QUICK DRY NO.	SAMPLE & CAN WT.	SCALE SER. NO.	CAN WT.	SAMPLE WET WT.	SAMPLE DRY WT.	WT. OF WATER	% MOISTURE ACTUAL	% MOISTURE CORRECTED
QA3690	NA	McQUA 32765	NA	100.07	83.13	16.94	20.4	NA
3688				100.02	82.06	17.96	21.9	
3690				100.16	80.08	20.02	25.0	
3688				100.10	82.52	17.58	21.3	
3690				100.01	80.44	19.57	24.3	

COMPACTED SAMPLE

SAMPLE & MOLD WEIGHT	MOLD WEIGHT	SCALE SER. NO.	SAMPLE WET WEIGHT	WEIGHT PER CUBIC FT.	SAMPLE DRY WEIGHT	WATER ADDED
13.01	9.41	McQUA 32765	3.60	109.1	96.6	F
13.12			3.71	112.4	92.2	10
13.20			3.79	114.8	91.8	20
13.07			3.66	110.9	91.4	5
13.18			3.77	114.2	91.9	15

OPTIMUM MOISTURE 22.0 MAXIMUM DENSITY 92.5

INSPECTOR R R Wainright

LEVEL II EVALUATION _____

Q. A. APPROVAL _____ DATE _____

25560 (R9-85)

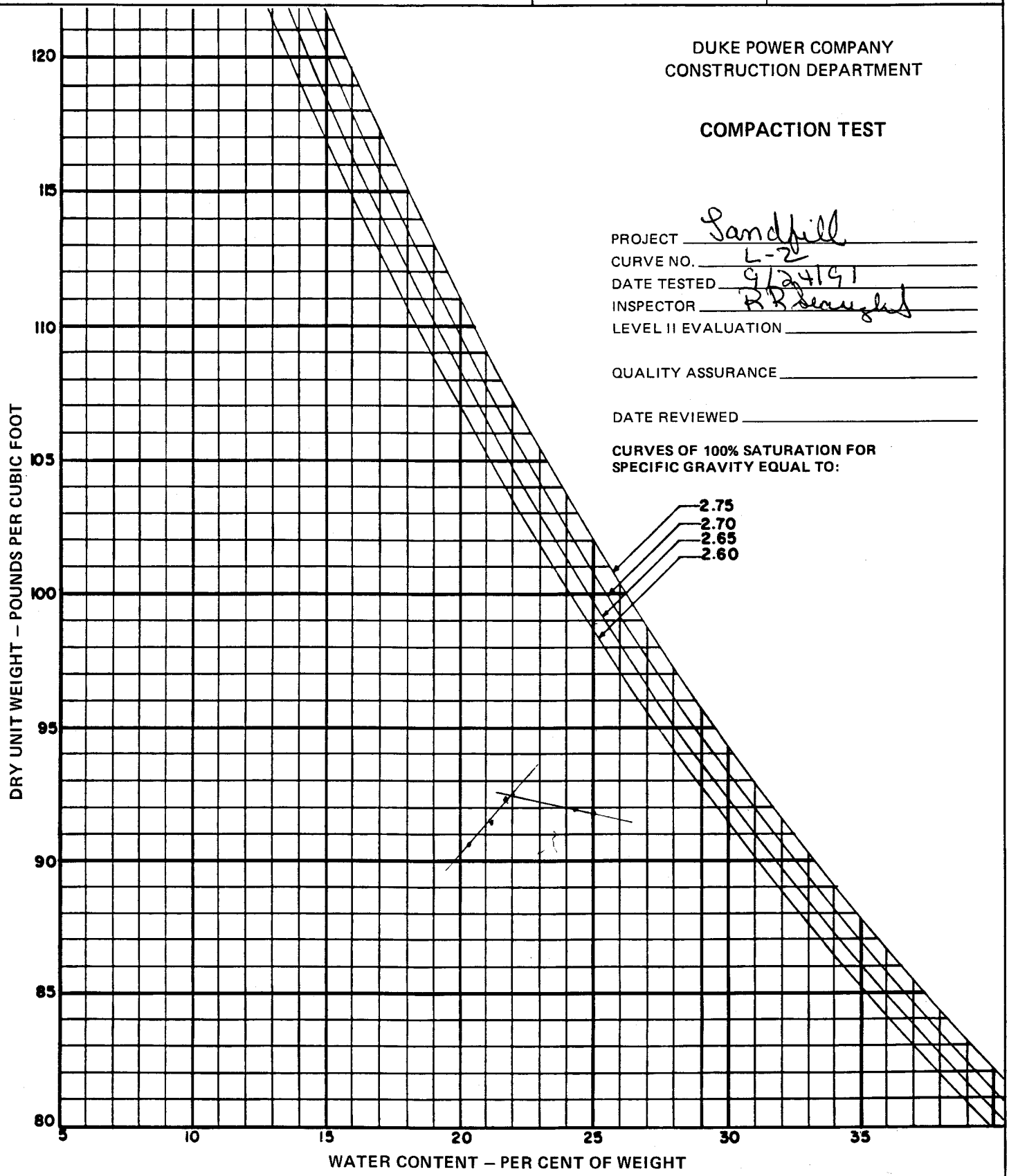
FORM M-1F	REV. 4

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

COMPACTION TEST

PROJECT Sandfill
CURVE NO. L-2
DATE TESTED 9/24/91
INSPECTOR R B Seaught
LEVEL II EVALUATION
QUALITY ASSURANCE
DATE REVIEWED

CURVES OF 100% SATURATION FOR SPECIFIC GRAVITY EQUAL TO:



MOISTURE DENSITY RELATION	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
N/A	A	92.5	22.0	light brown yellowish silty sand mica.

25570 (R9-85) | FORM M-1S | REVISION 6

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

PROCTOR COMPACTION TEST DATA

LOCATION Sand fill DATE 9/25/91

STANDARD A MODIFIED _____ 5 LAYER _____ PROCTOR _____ CBR _____

SAMPLE DESCRIPTION _____ SAMPLE NO. L-3

WATER CONTENT

QUICK DRY NO.	SAMPLE & CAN WT.	SCALE SER. NO.	CAN WT.	SAMPLE WET WT.	SAMPLE DRY WT.	WT. OF WATER	% MOISTURE	
							ACTUAL	CORRECTED
GA 3690	NA	MCQUA 32765	NA	100.04	87.21	12.83	14.7	F
3688	↓	↓	↓	100.04	85.70	14.34	16.7	10
3690				100.07	84.07	16.00	19.0 RDS	20
3688				100.01	81.04	18.97	23.4	40
3690				100.30	79.66	20.64	25.9	50

COMPACTED SAMPLE

SAMPLE & MOLD WEIGHT	MOLD WEIGHT	SCALE SER. NO.	SAMPLE WET WEIGHT	WEIGHT PER CUBIC FT.	SAMPLE DRY WEIGHT	WATER ADDED
12.86	9.41	MC 32765	3.45	104.5	91.1	F
12.98	↓	↓	3.57	108.2	92.7	10
13.10			3.69	111.8	93.9	20
13.29			3.88	117.6	95.3	40
13.33			3.92	118.8	94.4	50

OPTIMUM MOISTURE ~~22.2~~ DDW 21.8 MAXIMUM DENSITY ~~96.1~~ DDW 95.9

INSPECTOR RR Seamight

LEVEL II EVALUATION _____

Q. A. APPROVAL _____ DATE _____

25560 (R9-85)

FORM M-1F	REV. 4

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

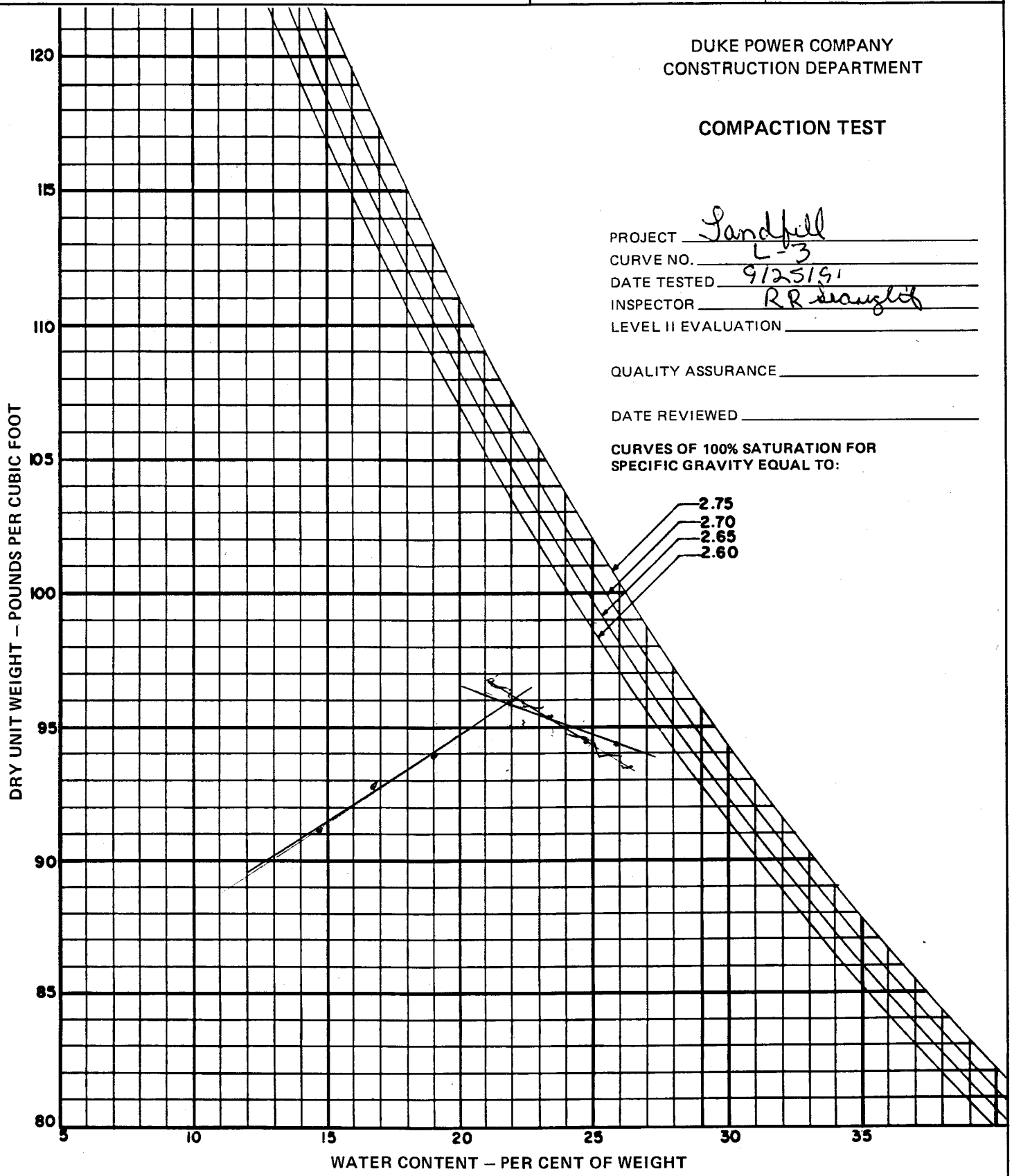
COMPACTION TEST

PROJECT Landfill
CURVE NO. L-3
DATE TESTED 9/25/91
INSPECTOR RR Draughn
LEVEL II EVALUATION _____

QUALITY ASSURANCE _____

DATE REVIEWED _____

CURVES OF 100% SATURATION FOR SPECIFIC GRAVITY EQUAL TO:



MOISTURE DENSITY RELATION	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
/A	A	~~96.1~~ 95.9	~~22.2~~ 21.9	

25570 (R9-85) | FORM M-1S | REVISION 6

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

PROCTOR COMPACTION TEST DATA

LOCATION Land fill DATE 9-26-91 R.P. 9-27

STANDARD A MODIFIED _____ 5 LAYER _____ PROCTOR _____ CBR _____

SAMPLE DESCRIPTION Reddish yellow mica ~~Sandy~~ RP Sandy Silt SAMPLE NO. L-4

WATER CONTENT

QUICK DRY NO.	SAMPLE & CAN WT.	SCALE SER. NO.	CAN WT.	SAMPLE WET WT.	SAMPLE DRY WT.	WT. OF WATER	% MOISTURE ACTUAL	% MOISTURE CORRECTED
90				100.01	86.65	13.36	15.4	F
88					83.72	16.36	19.5	20
90	N/A	MCGUA B276		100.06	80.84	19.22	23.8	40
90				100.06	78.62	21.44	27.3	60
90				100.07	78.0	22.07	28.3	65

COMPACTED SAMPLE

SAMPLE & MOLD WEIGHT	MOLD WEIGHT	SCALE SER. NO.	SAMPLE WET WEIGHT	WEIGHT PER CUBIC FT.	SAMPLE DRY WEIGHT	WATER ADDED
12.73	9.91	MCGUA 32764	3.32	100.6	87.2	F
12.93			3.52	106.7	89.3	20
13.12			3.71	112.4	90.8	40
13.22			3.81	115.5	90.7	60
13.23			3.82	115.8	90.3	65

OPTIMUM MOISTURE 25.4 MAXIMUM DENSITY 91.0

INSPECTOR R. Payne & R. R. Seawright

LEVEL II EVALUATION _____

Q. A. APPROVAL _____ DATE _____

25560 (R9-85)

FORM M-1F	REV. 4

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

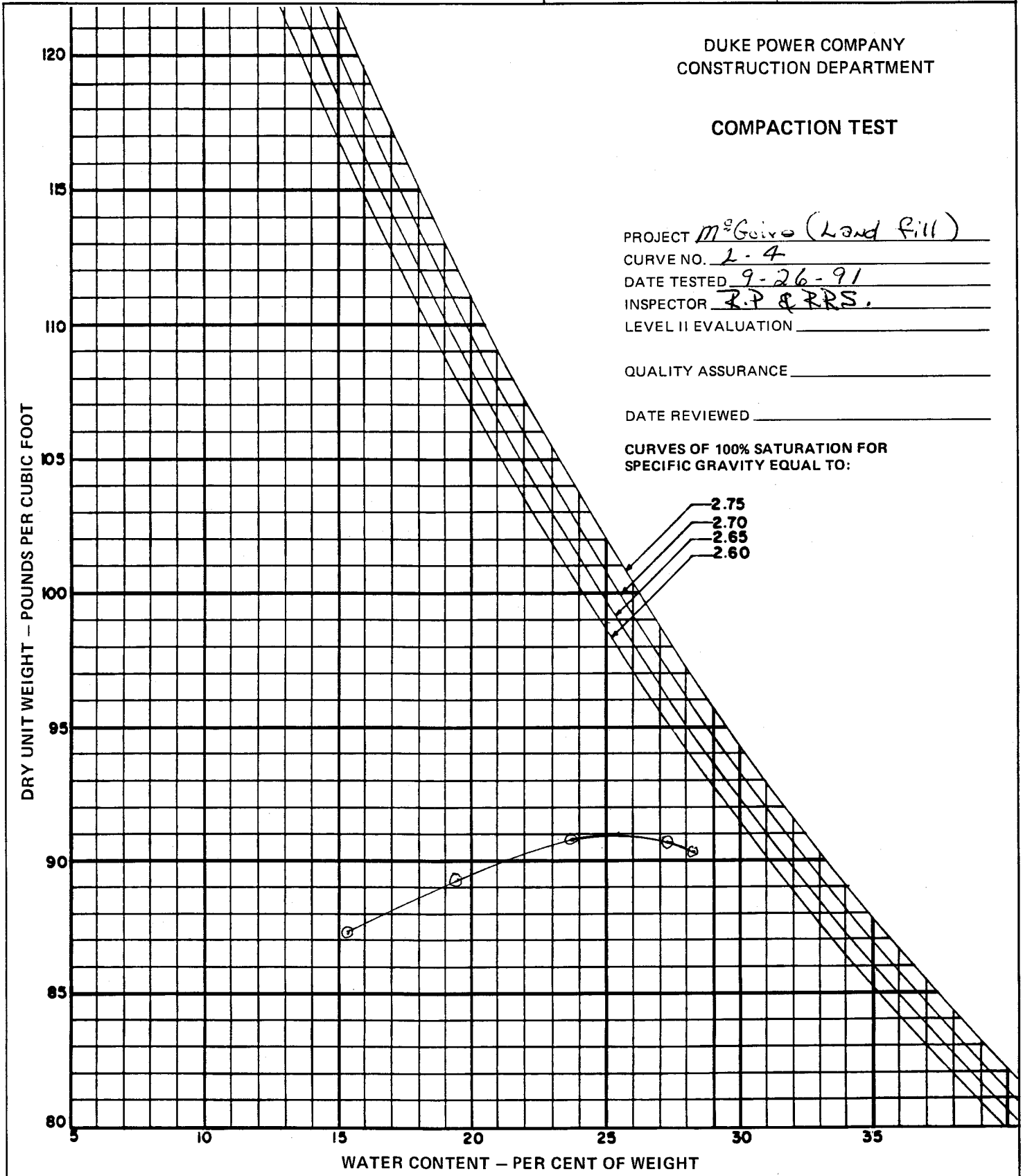
COMPACTION TEST

PROJECT McGuire (Land Fill)
CURVE NO. 2-4
DATE TESTED 9-26-91
INSPECTOR R.P & R.R.S.
LEVEL II EVALUATION _____

QUALITY ASSURANCE _____

DATE REVIEWED _____

CURVES OF 100% SATURATION FOR SPECIFIC GRAVITY EQUAL TO:



MOISTURE DENSITY RELATION	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
N/A	STD. Method "A"	91.0	25.4	Reddish yellow mic Sandy Silt

25570 (R9-85)

FORM M-1S	REVISION 6

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

PROCTOR COMPACTION TEST DATA

LOCATION McGuire Landfill DATE 10/3/91

STANDARD ✓ MODIFIED _____ 5 LAYER _____ PROCTOR _____ CBR _____

SAMPLE DESCRIPTION yellowish Red mic Sandy Silty SAMPLE NO. L-5

WATER CONTENT

QUICK DRY NO.	SAMPLE & CAN WT.	SCALE SER. NO.	CAN WT.	SAMPLE WET WT.	SAMPLE DRY WT.	WT. OF WATER	% MOISTURE ACTUAL	% MOISTURE CORRECTED
3690		MCQUA 32765		100.45	88.74	11.71	13.2	F
3688		~~MCQUA 32764~~ R.P.		100.38	84.54	15.84	18.7	20
3690	N/A			100.08	81.22	18.86	23.2	40
3688				100.60	79.44	21.16	26.6	60
3690				100.47	80.54	19.93	24.7	50

COMPACTED SAMPLE

SAMPLE & MOLD WEIGHT	MOLD WEIGHT	SCALE SER. NO.	SAMPLE WET WEIGHT	WEIGHT PER CUBIC FT.	SAMPLE DRY WEIGHT	WATER ADDED
12.95	9.41	MCQUA 32764	3.54	107.3	94.8	F
13.16	9.41	↓	3.75	113.6	95.7	20
13.32	9.41	↓	3.91	118.5	96.2	40
13.35			3.94	119.4	94.3	60
13.36			3.95	119.7	96.0	50

OPTIMUM MOISTURE 24.3 MAXIMUM DENSITY 96.6

INSPECTOR R. Payne

LEVEL II EVALUATION _____

Q. A. APPROVAL _____ DATE _____

25560 (R9-85)

FORM M-1F	REV. 4

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

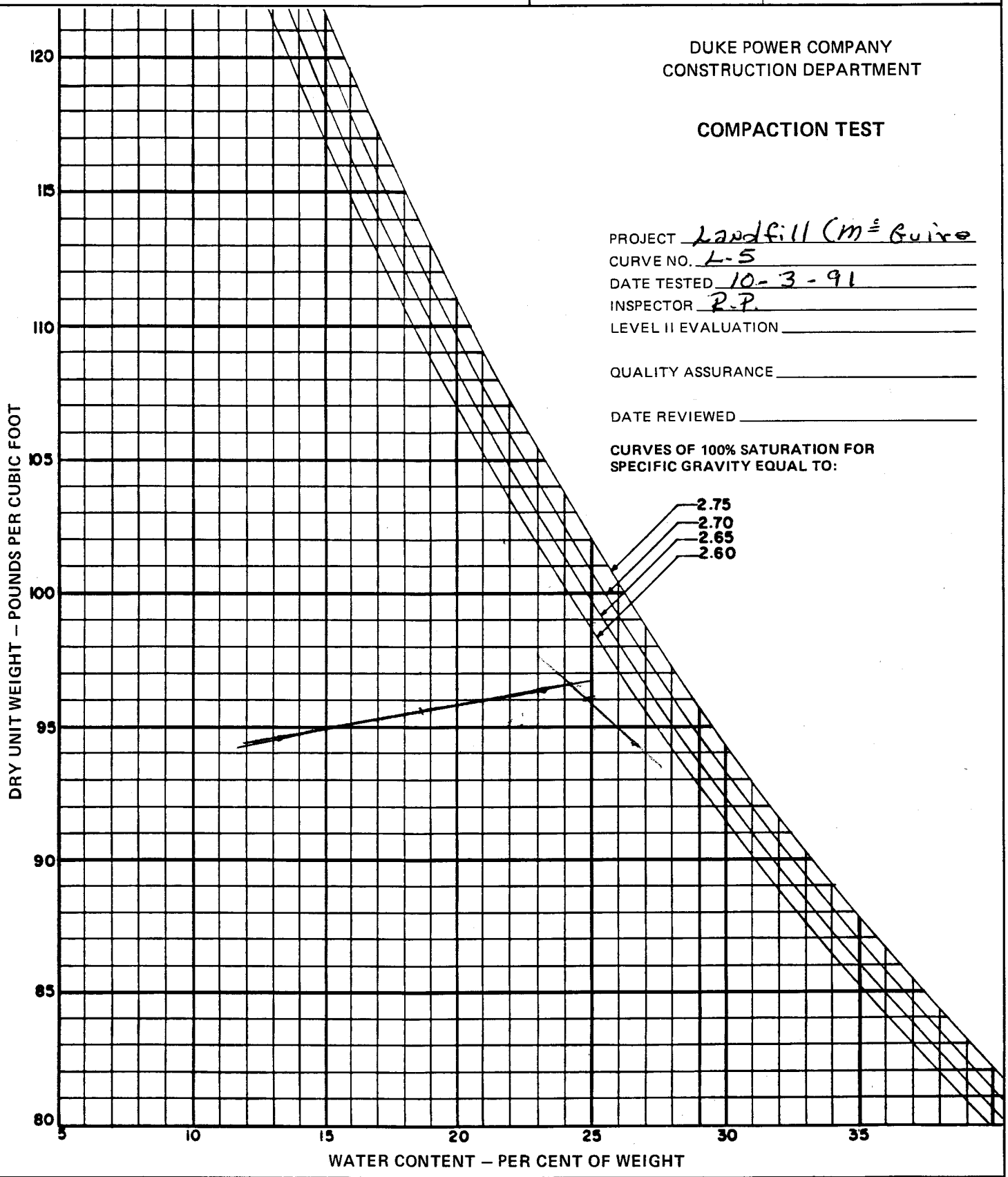
COMPACTION TEST

PROJECT Landfill (Mc Guire
CURVE NO. L-5
DATE TESTED 10-3-91
INSPECTOR R.P.
LEVEL II EVALUATION _____

QUALITY ASSURANCE _____

DATE REVIEWED _____

CURVES OF 100% SATURATION FOR SPECIFIC GRAVITY EQUAL TO:



MOISTURE DENSITY RELATION	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
N/A	"A"	96.6	24.3	yellowish Red mic. sandy Silt

25570 (R9-85) | FORM M-1S | REVISION 6

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

PROJECT McGuire

PROCTOR COMPACTION TEST DATA

LOCATION Landfill DATE 10/7/91

STANDARD "A" MODIFIED _____ 5 LAYER _____ PROCTOR _____ CBR _____

SAMPLE DESCRIPTION Reddish Tan Mic. Sandy Silt SAMPLE NO. L-6

WATER CONTENT

QUICK DRY NO.	SAMPLE & CAN WT.	SCALE SER. NO.	CAN WT.	SAMPLE WET WT.	SAMPLE DRY WT.	WT. OF WATER	% MOISTURE	
							ACTUAL	CORRECTED
3690	N/A	mcgo2 32765	N/A	100.10	85.50	14.60	17.1	20
3688				100.48	82.17	18.31	22.3	40
3690				100.19	80.08	20.11	25.1	50
3688				100.51	83.60	16.91	20.2	30
3690				100.39	79.53	20.86	26.2	55

COMPACTED SAMPLE

SAMPLE & MOLD WEIGHT	MOLD WEIGHT	SCALE SER. NO.	SAMPLE WET WEIGHT	WEIGHT PER CUBIC FT.	SAMPLE DRY WEIGHT	WATER ADDED
13.12	9.41	mcgoA 32764	3.71	112.4	96.0	20
13.35			3.94	119.4	97.6	40
13.42			4.01	121.5	97.1	50
13.25			3.84	116.4	96.8	30
13.43			4.02	121.8	96.5	55

OPTIMUM MOISTURE 23.8 MAXIMUM DENSITY 98.0

INSPECTOR Richard Payne

LEVEL II EVALUATION _____

Q. A. APPROVAL _____ DATE _____

25560 (R9-85)

FORM M-1F	REV. 4

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

COMPACTION TEST

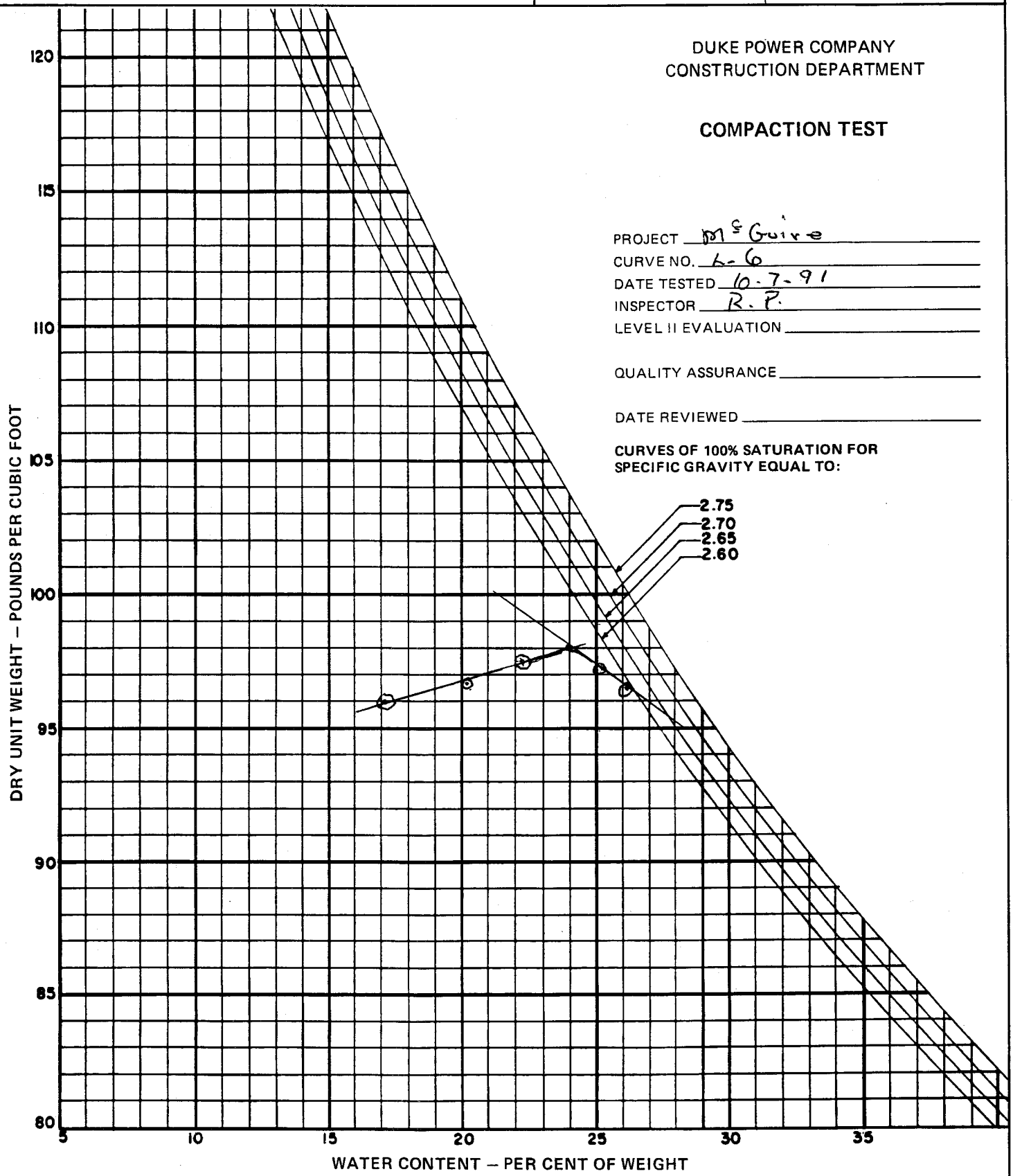
PROJECT McGuire
CURVE NO. L-6
DATE TESTED 10-7-91
INSPECTOR R. P.
LEVEL II EVALUATION _____

QUALITY ASSURANCE _____

DATE REVIEWED _____

CURVES OF 100% SATURATION FOR SPECIFIC GRAVITY EQUAL TO:

2.75
2.70
2.65
2.60



MOISTURE DENSITY RELATION	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
N/A	Std Method A	98.0	23.8	Reddish Tan micaceous Silty Clay

25570 (R9-85) | FORM M-1S | REVISION 6

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

PROJECT McGuire

PROCTOR COMPACTION TEST DATA

LOCATION McGuire Landfill DATE 10/8/91

STANDARD A MODIFIED _____ 5 LAYER _____ PROCTOR _____ CBR _____

SAMPLE DESCRIPTION Reddish Br. mic Sandy Silt SAMPLE NO. 6-7

WATER CONTENT

QUICK DRY NO.	SAMPLE & CAN WT.	SCALE SER. NO.	CAN WT.	SAMPLE WET WT.	SAMPLE DRY WT.	WT. OF WATER	% MOISTURE	
							ACTUAL	CORRECTED
QA 3690	N/A	mcqua 32765	N/A	100.18	86.29	13.89	16.1	F
3688				100.27	83.10	17.17	20.7	20
3690				100.90	81.73	18.67	22.8	30
3688				100.17	78.97	21.20	26.8	50
3690				100.15	79.81	20.57	25.8	45

COMPACTED SAMPLE

SAMPLE & MOLD WEIGHT	MOLD WEIGHT	SCALE SER. NO.	SAMPLE WET WEIGHT	WEIGHT PER CUBIC FT.	SAMPLE DRY WEIGHT	WATER ADDED
13.01	9.41	mcqua 32764	3.60	109.1	94.0	F
13.22			3.80 R.P.	115.5	95.7	20
13.31			3.90	118.2	96.3	30
13.38			3.97	120.3	94.9	50
13.39			3.98	120.6	95.9	45

OPTIMUM MOISTURE 24.4 MAXIMUM DENSITY 96.8

INSPECTOR Richard Payne

LEVEL II EVALUATION _____

Q. A. APPROVAL _____ DATE _____

25560 (R9-85) | FORM M-1F | REV. 4

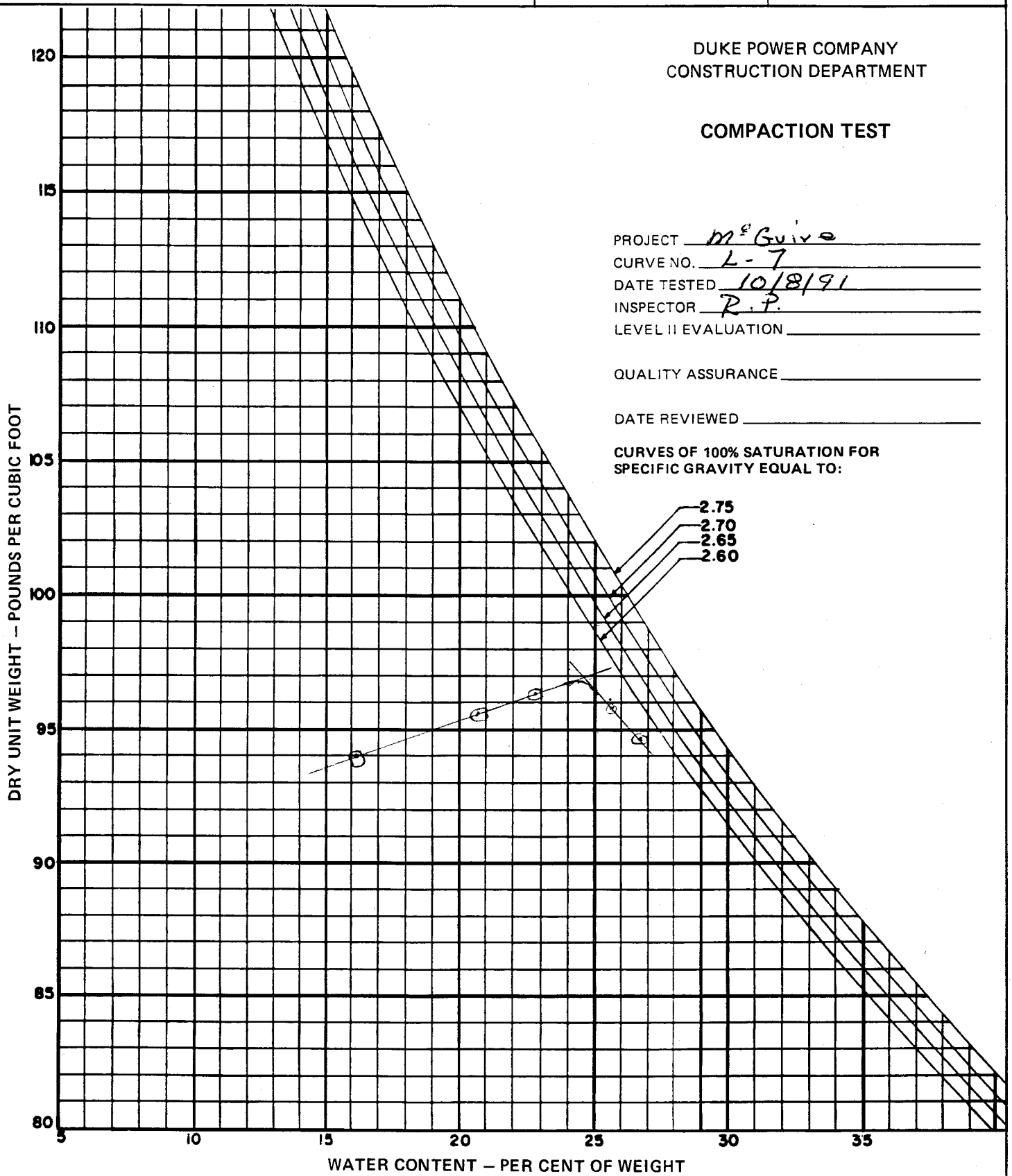
DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

COMPACTION TEST

PROJECT McGuire
CURVE NO. L-7
DATE TESTED 10/8/91
INSPECTOR R.P.
LEVEL II EVALUATION
QUALITY ASSURANCE
DATE REVIEWED

CURVES OF 100% SATURATION FOR SPECIFIC GRAVITY EQUAL TO:

2.75
2.70
2.65
2.60



MOISTURE DENSITY RELATION	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
N/A	STD METHOD A	96.8	24.4	Reddish Brown micaceous Sandy Silt

25570 (R9-85) | FORM M-1S | REVISION 6

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT McGuire

PROCTOR COMPACTION TEST DATA

LOCATION Landfill DATE 10-10-91

STANDARD A MODIFIED _____ 5 LAYER _____ PROCTOR _____ CBR _____

SAMPLE DESCRIPTION Reddish Br. Mic Sandy Silt SAMPLE NO. L-8

WATER CONTENT

QUICK DRY NO.	SAMPLE & CAN WT.	SCALE SER. NO.	CAN WT.	SAMPLE WET WT.	SAMPLE DRY WT.	WT. OF WATER	% MOISTURE	
							ACTUAL	CORRECTED
QA 3690	N/A	mcgun 32765	N/A	100.36	83.83	16.53	19.7	F
3688				100.34	82.32	18.02	21.9	10
3690				100.22	80.63	19.59	24.3	20
3688				100.19	79.50	20.69	26.0	30
3690				100.28	81.63	18.65	22.8	15
				100.20	78.94	21.26	26.9	35

COMPACTED SAMPLE

SAMPLE & MOLD WEIGHT	MOLD WEIGHT	SCALE SER. NO.	SAMPLE WET WEIGHT	WEIGHT PER CUBIC FT.	SAMPLE DRY WEIGHT	WATER ADDED
13.13	9.41	mcgun 32764	3.72	112.7	94.2	F
13.27			3.86	117.0	96.0	10
13.35			3.94	119.4	96.1	20
13.40			3.99	120.9	96.0	30
13.31			3.90	118.2	96.3	15
13.38			3.97	120.3	94.8	35

OPTIMUM MOISTURE 24.0 MAXIMUM DENSITY 96.4

INSPECTOR _____

LEVEL II EVALUATION _____

Q. A. APPROVAL _____ DATE _____

25560 (R9-85)

FORM M-1F	REV. 4

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

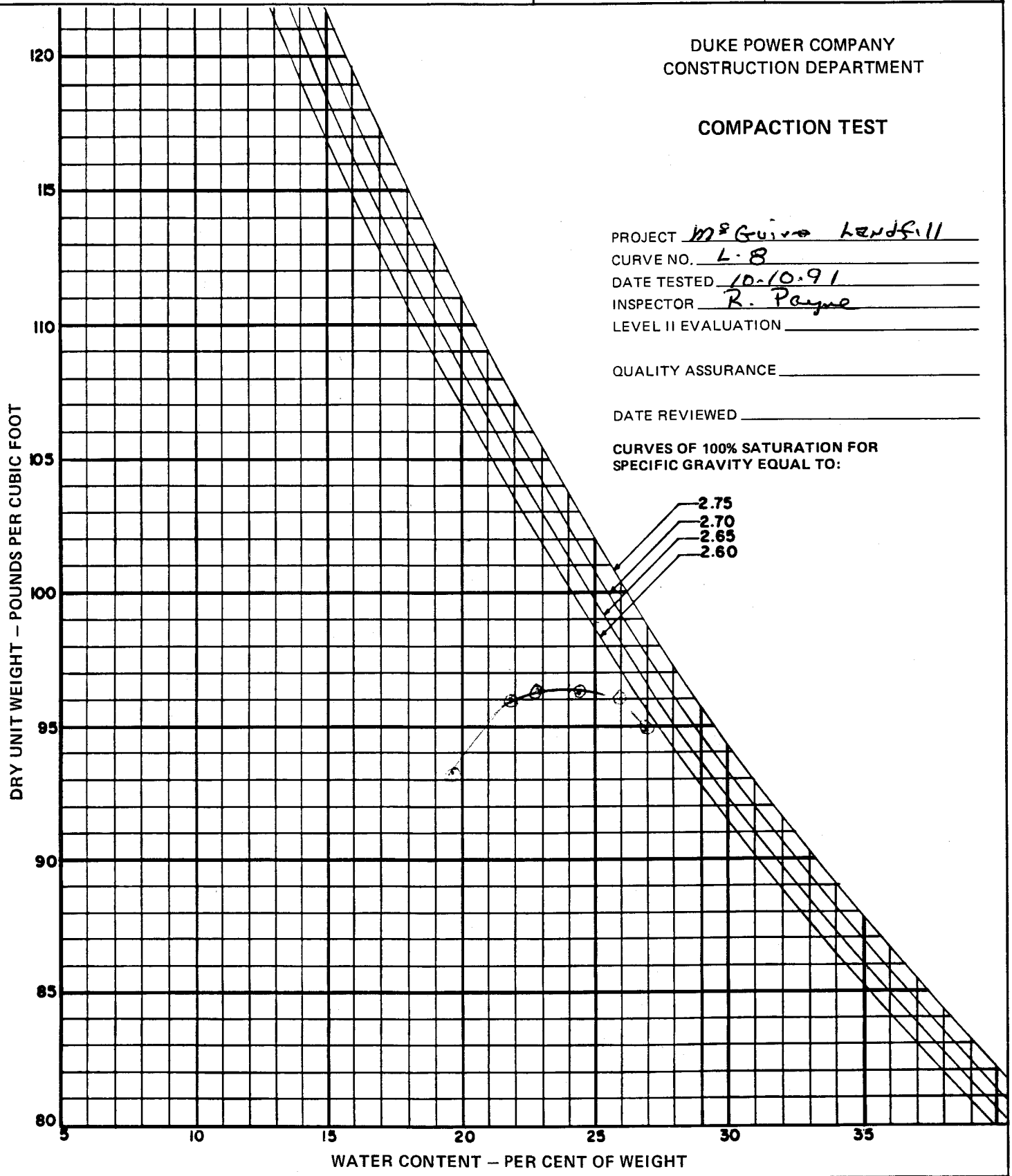
COMPACTION TEST

PROJECT McGuire Landfill
CURVE NO. L-8
DATE TESTED 10-10-91
INSPECTOR R. Payne
LEVEL II EVALUATION _____

QUALITY ASSURANCE _____

DATE REVIEWED _____

CURVES OF 100% SATURATION FOR SPECIFIC GRAVITY EQUAL TO:



MOISTURE DENSITY RELATION	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
N/A	Standard Method A	96.4	24.0	Reddish Brn. Micaceous Sandy Silt

25570 (R9-85) | FORM M-1S | REVISION 6

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

PROJECT Mc Guire

PROCTOR COMPACTION TEST DATA

LOCATION Landfill DATE 10-16-91

STANDARD A MODIFIED _____ 5 LAYER _____ PROCTOR _____ CBR _____

SAMPLE DESCRIPTION _____ SAMPLE NO. L-9

WATER CONTENT

QUICK DRY NO.	SAMPLE & CAN WT.	SCALE SER. NO.	CAN WT.	SAMPLE WET WT.	SAMPLE DRY WT.	WT. OF WATER	% MOISTURE	
							ACTUAL	CORRECTED
mcQUA 32765		mcQUA 32765		100.14	83.25	16.89	20.3	F
	N/A		N/A	100.29	80.83	19.46	24.1	20
				100.14	79.22	20.92	26.4	30
				100.35	81.85	18.50	22.6	10
				100.20	78.65	21.55	27.4	35

COMPACTED SAMPLE

SAMPLE & MOLD WEIGHT	MOLD WEIGHT	SCALE SER. NO.	SAMPLE WET WEIGHT	WEIGHT PER CUBIC FT.	SAMPLE DRY WEIGHT	WATER ADDED
13.03	9.41	mcQUB 32764	3.62	109.7	91.2	F
13.26			3.85	116.7	94.0	20
13.30			3.89	117.9	93.3	30
13.16			3.75	113.6	92.7	10
13.32			3.91	118.5	93.0	35

OPTIMUM MOISTURE 25.2 MAXIMUM DENSITY 94.5

INSPECTOR Richard O Payne

LEVEL II EVALUATION _____

Q. A. APPROVAL _____ DATE _____

25560 (R9-85)

FORM M-1F	REV. 4

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

COMPACTION TEST

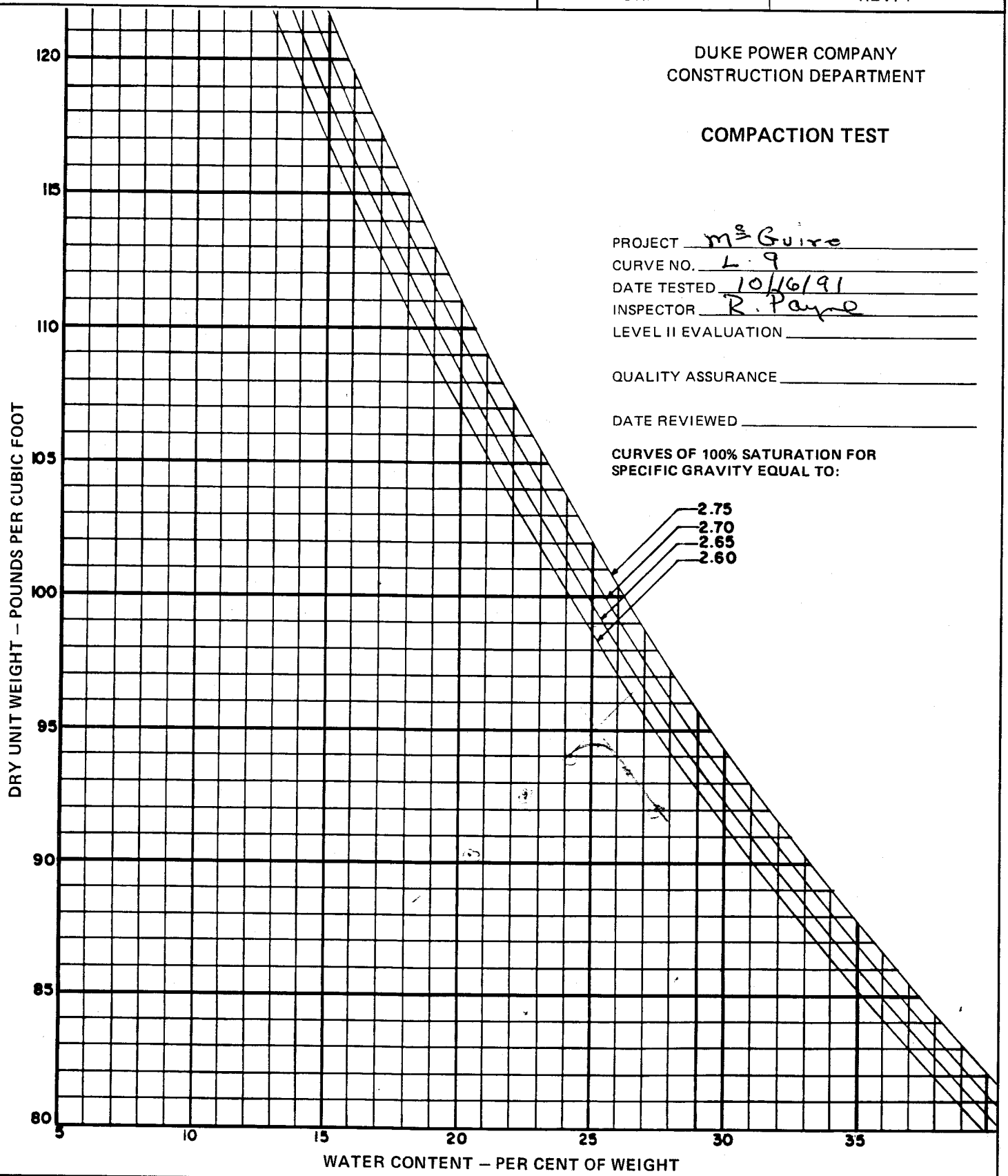
PROJECT McGuire
CURVE NO. L-9
DATE TESTED 10/16/91
INSPECTOR R. Payne
LEVEL II EVALUATION _____

QUALITY ASSURANCE _____

DATE REVIEWED _____

CURVES OF 100% SATURATION FOR SPECIFIC GRAVITY EQUAL TO:

2.75
2.70
2.65
2.60



MOISTURE DENSITY RELATION	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
N/A	Standard Method A	94.5	25.2	

25570 (R9-85) | FORM M-1S | REVISION 6

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

PROJECT McGuire

PROCTOR COMPACTION TEST DATA

LOCATION Landfill DATE 10-17-91

STANDARD A MODIFIED _____ 5 LAYER _____ PROCTOR _____ CBR _____

SAMPLE DESCRIPTION _____ SAMPLE NO. L-10

WATER CONTENT

QUICK DRY NO.	SAMPLE & CAN WT.	SCALE SER. NO.	CAN WT.	SAMPLE WET WT.	SAMPLE DRY WT.	WT. OF WATER	% MOISTURE ACTUAL	% MOISTURE CORRECTED
mcqua 32765				100.37	84.01	16.36	19.5	F
	N/A		N/A	100.23	81.22	19.01	23.4	20
				100.16	80.05	20.11	25.1	30
				100.23	78.65	21.58	27.4	40
				100.45	82.98	17.47	21.1	10
				100.25	78.23	22.02	28.1	50

Vol. .0330

COMPACTED SAMPLE

SAMPLE & MOLD WEIGHT	MOLD WEIGHT	SCALE SER. NO.	SAMPLE WET WEIGHT	WEIGHT PER CUBIC FT.	SAMPLE DRY WEIGHT	WATER ADDED
12.91	9.41	mcqua 32764	3.50	106.1	88.8	F
13.18			3.77	114.2	92.5	20
13.24			3.83	116.1	92.8	30
13.27			3.86	117.0	91.8	40
13.06			3.65	110.6	91.3	10
13.27			3.86	117.0	91.3	50

OPTIMUM MOISTURE 25.1 MAXIMUM DENSITY 92.8

INSPECTOR Richard Payne

LEVEL II EVALUATION _____

Q. A. APPROVAL _____ DATE _____

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT

COMPACTION TEST

PROJECT McGuire
CURVE NO. 1-10
DATE TESTED 10-17-91
INSPECTOR R. Payne
LEVEL II EVALUATION _____

QUALITY ASSURANCE _____

DATE REVIEWED _____

CURVES OF 100% SATURATION FOR SPECIFIC GRAVITY EQUAL TO:

2.75
2.70
2.65
2.60

DRY UNIT WEIGHT – POUNDS PER CUBIC FOOT

120
115
110
105
100
95
90
85
80

5 10 15 20 25 30 35

WATER CONTENT – PER CENT OF WEIGHT

MOISTURE DENSITY RELATION	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
1	Std. Mthd C	92.8	25.1	

25557 (R9-85) | Form M-1C | Revision 7

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT _____

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill _____

*Indicates Failing Test **Indicates Retest

A	Test Number	41	42	43	44	45	46	47
B	Date	10/3/91	10/3/91	10/3/91	10/3/91	10/3/91	10/7/91	10/7/91
C	Elevation							
D	Station							
E	Scale Ser. No.	MCQUA BRQUA						
F	W W Sample & Mold	5.20	5.18	5.10	5.03	5.06	5.15	4.89
G	Wt. & Volume Of Mold	1.33 29.9	1.35 29.9	1.35 29.9	1.35 29.9	1.35 29.9	1.38 29.9	1.33 29.9
H	W W Sample (F–G)	3.87	3.83	3.75	3.68	3.71	3.82	3.56
I	W W/CU Ft. (H ÷ Vol)	115.7	114.5	112.1	110.0	110.9	114.2	106.4
J	W W Moist Sample	100.12	100.34	100.02	100.58	100.26	100.36	100.21
K	Quick Dry Number/ Oven Ser. No.	3690	3658	3690	3658	3690	3658	3690
L	D W Moist Sample	80.51	80.86	81.13	80.75	83.4	82.55	81.68
M	Wt. Water (J–L)	19.61	19.48	18.89	19.83	16.86	17.81	18.53
N	% Moisture (M ÷ L) X 100	24.4	24.1	23.3	24.6	20.2	21.6	22.7
O	Dry Density [I ÷ (N + 100)] X 100	93.0	92.3	90.9	88.3	92.3	93.9	86.7
P	Max. Density	96.6	96.6	95.9	96.6	95.3	95.9	95.9
Q	Optimum Moisture	24.3	24.3	21.8	24.3	21.2	21.8	21.8
R	Proctor Comparison No.	L5	L5	L3	L5	L1	L-3	L-3
S	% Compaction (O ÷ P) X 100	96.3	95.5	94.9	91.4	96.9	97.9 ~~98.0~~ R.P.	90.4
T	% Compaction Required	90.0	90.0	90.0	90.0	90.0	90.0	90.0
U	Inspector's Initial	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.	R.P.
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

25557 (R9-85) | Form M-1C | Revisi

DUKE POWER COMPANY

CONSTRUCTION DEPARTMENT

PROJECT _____

FIELD DENSITY TESTS (SHELBY TUBE METHOD)

Location Of Fill _____

*Indicates Failing Test ** **Indicates Retest

A	Test Number	35	36	31A	37	38	39	40
B	Date	10-2-91	10-2-91	10-2-91	10/2/91	10/2/91	10/2/91	10/2/91
C	Elevation							
D	Station							
E	Scale Ser. No.	MCQUA 32765 / MCQUA32769						
F	W W Sample & Mold	5.07	5.14	5.10	5.23	5.08	5.17	5.27
G	Wt. & Volume Of Mold	1.33 / 29.9	1.41 / 29.9	1.33 / 29.9	1.35 / 29.9	1.33 / 29.9	1.41 / 29.9	1.41 / 29.9
H	W W Sample (F–G)	3.74	3.73	3.77	3.88	3.75	3.71	3.86
I	W W/CU Ft. (H – Vol)	111.8	111.5	112.7	116.0	112.1	110.9	115.4
J	W W Moist Sample	100.52	100.30	100.41	100.42	100.13	100.48	100.12
K	Quick Dry Number/ Oven Ser. No.	3690	3688	3690	3688	3690	3688	3690
L	D W Moist Sample	78.28	80.50	80.26	81.41	77.71	80.63	78.69
M	Wt. Water (J–L)	22.22	19.80	20.15	19.01	22.42	19.85	21.43
N	% Moisture (M – L) X 100	28.4	24.60	25.1	23.4	28.9	24.6	27.2
O	Dry Density [I – (N + 100)] X 100	87.1	89.5	90.1	94.0	87.0	89.0	90.7
P	Max. Density	91.0	95.9	95.9	95.9	91.0	95.9	91.0 ~~99.7~~
Q	Optimum Moisture	25.4	21.8	21.8	21.8	25.4	21.8	25.4
R	Proctor Comparison No.	L-4	L-3	L3	L3	L4	L3	L4
S	% Compaction (O – P) X 100	95.7	93.7	94.0	98.0	95.6	92.8	99.7
T	% Compaction Required	~~95.7~~ 90.0 R.P.	90.0	90.0	90.0	90.0	90.0	90.0
U	Inspector's Initial	R.P	R P	R P	R P	R.P.	R.P.	R.P.
V	Level II Evaluator's Initial							

QA APPROVAL _____ DATE _____

NUCLEAR ENV. COMPLIANCE
RECEIVED
MAY 9 1990
TECHNICAL SERVICES, G. O.

State of North Carolina
Department of Environment, Health, and Natural Resources
Division of Environmental Management
512 North Salisbury Street • Raleigh, North Carolina 27611

James G. Martin, Governor
William W. Cobey, Jr., Secretary

George T. Everett, Ph.D.
Director

May 7, 1990

Mr. H. B. Tucker
P.O. Box 33189
Charlotte, N.C. 28242

Subject: Permit No. NC0024392
Duke Power Company
Mecklenburg County

Dear Mr. Tucker:

In accordance with your application for discharge permit received on October 26, 1989, we are forwarding herewith the subject State - NPDES permit. This permit is issued pursuant to the requirements of North Carolina General Statute 143-215.1 and the Memorandum of Agreement between North Carolina and the US Environmental Protection Agency dated December 6, 1983.

If any parts, measurement frequencies or sampling requirements contained in this permit are unacceptable to you, you have the right to an adjudicatory hearing upon written request within thirty (30) days following receipt of this letter. This request must be in the form of a written petition, conforming to Chapter 150B of the North Carolina General Statutes, and filed with the Office of Administrative Hearings, Post Office Drawer 11666, Raleigh, North Carolina 27604. Unless such demand is made, this decision shall be final and binding.

Please take notice that this permit is not transferable. Part II, D.3. addresses the requirements to be followed in case of change in ownership or control of this discharge.

This permit does not affect the legal requirements to obtain other permits which may be required by the Division of Environmental Management or permits required by the Division of Land Resources, Coastal Area Management Act or any other Federal or Local governmental permit that may be required.

If you have any questions concerning this permit, please contact Mrs. Rosanne Barona at telephone number 919/733-5083.

Sincerely,

George T. Everett
Director

cc: Mr. Jim Patrick, EPA
Mooresville Regional Office

Permit No. NC0024392

STATE OF NORTH CAROLINA
DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
DIVISION OF ENVIRONMENTAL MANAGEMENT

P E R M I T

To Discharge Wastewater Under the
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of North Carolina General Statute 143-215.1, other lawful standards and regulations promulgated and adopted by the North Carolina Environmental Management Commission, and the Federal Water Pollution Control Act, as amended,

Duke Power Company

is hereby authorized to discharge wastewater from a facility located at

McGuire Nuclear Station
off NC Highway 73
northwest of Charlotte
Mecklenburg County

to receiving waters designated as Catawba River in the Catawba River Basin

in accordance with effluent limitations, monitoring requirements, and other conditions set forth in Parts I, II, and III hereof.

This permit shall become effective May 7, 1990

This permit and the authorization to discharge shall expire at midnight on January 31, 1995

Signed this day 7th day of May, 1990

George T. Everett, Director
Division of Environmental Management
By Authority of the Environmental Management Commission

Permit No. NC0024392

SUPPLEMENT TO PERMIT COVER SHEET

Duke Power Company

is hereby authorized to:

1. Continue to operate wastewater treatment facilities necessary to comply with final effluent limitations contained in this permit located at the McGuire Nuclear Station (See Part III of this Permit), and

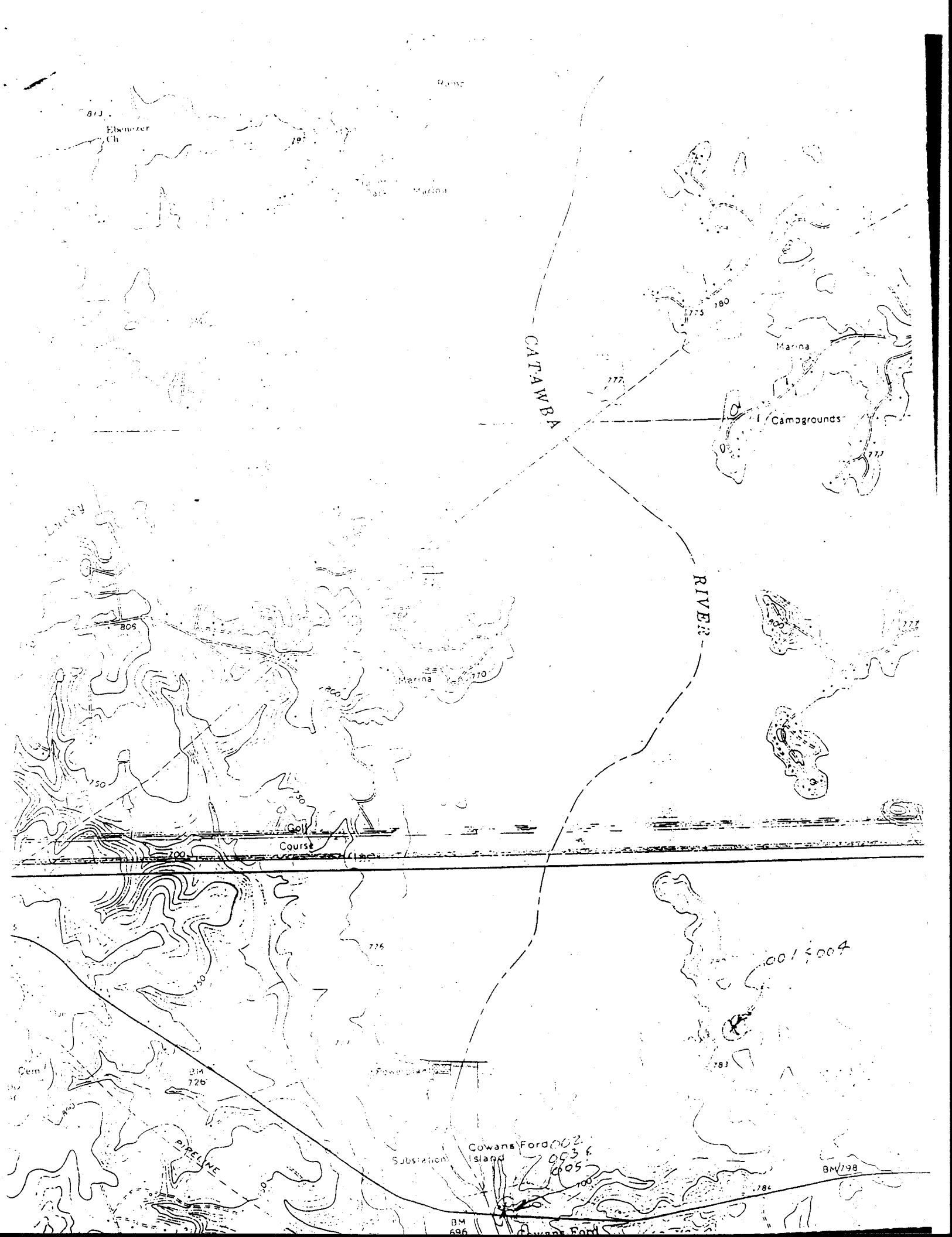
2. Continue to discharge condenser cooling water, conventional low pressure service water, nuclear service water, and turbine building sumps (outfall 001) at the location specified on the attached map into Lake Norman which is classified Class "WS-III" and "B" waters in the Catawba River Basin, and

3. Continue to discharge steam generator blowdown, condensate demineralizer backwash, waste treatment system backwash, demineralizer backwash, building drains, metal cleaning wastes, turbine building sumps, and landfill leachate after treatment in the wastewater treatment system consisting of an initial holding pond, two settling ponds, a final holding pond, and effluent pH adjustment consisting of automated C02 addition (outfall 002) at the location specified on the attached map into the Catawba River which is classified Class "WS-III" waters in the Catawba River Basin, and

4. Continue to discharge domestic waste, vehicle maintenance washdown, construction and maintenance building and shop drains, and Quality Assurance and medical facility photographic wastes from the sanitary wastewater treatment plant consisting of a multicellular aerated-facultative lagoon, a chlorine contact chamber, and a parshall flume (outfall 003) via the Wastewater Collection Basin (outfall 005) at the location specified on the attached map into the Catawba River which is classified Class "WS-III" waters in the Catawba River Basin, and

5. Continue to discharge low level liquid radwaste with occasional oxidation treatment from the radwaste system consisting of filters, evaporators, and demineralizers (outfall 004) via outfall 001 at the location specified on the attached map into Lake Norman which is classified Class "WS-III" and Class "B" waters in the Catawba River Basin, and

6. Continue to discharge effluent from the sanitary waste treatment system, overflow from the standby nuclear service water pond, a laboratory sink, and floor drain, building drains, and condenser cooling water system unwatering from a large settling pond with a surface baffle (outfall 005) at the location specified on the attached map into the Catawba River which is classified Class "WS-III" waters in the Catawba River Basin.


Ebenezer Ch
Marina
CATAWBA
RIVER
Marina
Campgrounds
Lucky
Marina
Golf
Course
Cem
BM 726
PIPELINE
Substation
Cowans Ford
Island
BM 696
Cowans Ford
BM 798
001
004
002
003
005

A. (1). UENT LIMITATIONS AND MONITORING REQUIREMENTS NPDES No. N 32

During the period beginning on the effective date of the permit and lasting until expiration, the Permittee is authorized to discharge from outfall(s) serial number(s)001 - Once through cooling water. Such discharges shall be limited and monitored by the Permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Lbs/day	Other Units (Specify)			
	Monthly Avg. Daily Max.	Monthly Avg. Daily Max.	Measurement Frequency	Sample Type	*Sample Location
Intake Flow - m^3/day (BGD)		Report Report	Daily	Pump Logs	
Temperature (October through June)		95 degrees F	Daily	Recorder	
Temperature (July, August, September)		99 degrees F	Daily	Recorder	
Total Residual Chlorine (mg/l)***		0.20 mg/l**	Weekly	Multiple Grabs**	
Time of Chlorine Addition*****					
Hydrazine		0.06 mg/l	****	Calculations	
Acute Toxicity******			Quarterly	Composite	

Simultaneous chlorination of units is permitted.

Discharge of any product registered under the Federal Insecticide, Fungicide, and Rodenticide Act is prohibited unless specifically authorized elsewhere in this Permit.

* Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Flow shall be monitored at the intake; temperature, acute toxicity, and hydrazine shall be monitored at the discharge canal bridge; chlorine shall be monitored at the discharge structure corresponding to an individual unit.

** Multiple grabs shall consist of grab samples collected at the approximate beginning of TRC discharge and once every 15 minutes thereafter until the TRC is no longer detectable. "Daily maximum" as it applies to TRC means the instantaneous maximum at any time.

*** Monitoring of TRC is not required except during and subsequent to chlorination. Monitoring shall begin immediately upon start-up of chlorination and shall discontinue when TRC is no longer detected. Total residual chlorine may not be discharged from any single generating unit for more than two hours per day unless the discharger demonstrates to the State that discharge for more than two hours is required for macroinvertebrate control.

**** The hydrazine limit shall be calculated once on any day on which a discharge of hydrazine occurs from the Radwaste System and turbine building sumps (based on process knowledge). The calculations shall take into account flows from the Once Through Cooling Water and the Radwaste System or turbine building sumps. There shall be no discharge of floating solids or visible foam in other than trace amounts outside of an area five meters from the discharge point.

***** The permittee shall maintain a log on file at the plant of any chlorination events within each unit. The log shall contain a listing of each system that is chlorinated, the volume (flow in GPM) of the system, the total minutes for the chlorination event, and the beginning and ending time for each chlorination event. The log shall be kept on file for review by DEM representatives and copies must be submitted to the DEM upon request by any representative of this Division. Chlorination events in closed loop systems that result in a non detectable level of Total Residual Chlorine are allowed to be discharged without maintaining a log or conducting sampling at the effluent.

****** Acute Toxicity (Daphnid 24 hr.) No Significant Mortality at 90%; February, May, August and November; See Part III, Condition W.

A. (2). **EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS** Final NPDES No. NC0024392

During the period beginning on the effective date and lasting until expiration the Permittee is authorized to discharge from outfall(s) serial number(s)002 - Conventional Wastewater Treatment Facility. **Such discharges shall be limited and monitored by the Permittee as specified below:**

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Lbs/day	Other Units (Specify)	Measurement	Sample	*Sample
	Monthly Avg. Daily Max.	Monthly Avg. Daily Max.	Frequency	Type	Location
Flow			Daily	Instantaneous	E
Oil & Grease		15.0 mg/l 20.0 mg/l	Monthly	Grab	E
NH3 as N			Monthly	Grab	E
Total Suspended Solids		30.0 mg/l 100.0 mg/l	Monthly	Grab	E
Total Residual Chlorine***			Monthly	Grab	E
pH			Monthly	Grab	E
Hydrazine		4.4 mg/l	Weekly	Grab	E
Total Phosphorus			Quarterly	Grab	E
Total Nitrogen			Quarterly	Grab	E
MBAS			Monthly	Grab	E
Sulfate			Monthly	Grab	E
Lead****				Grab	E
Acute Toxicity **			Quarterly	Grab	E
Pollutant Analysis*****			Annually		E

Sample locations: E - Effluent

* Effluent sampling shall be conducted at the discharge prior to mixing with any other waste stream.

** Acute Toxicity (Daphid 48 hr) LC50 79%; February, May, August and November; See Part III, Condition X.

*** Total residual chlorine shall be monitored once per batch within 24 hours of injection when chlorine is used for treatment purposes.

The pH shall not be less than 6.0 **standard units nor greater than** 9.0 standard units and shall be monitored as indicated above.

**** Lead shall be monitored once per month for a period of twelve months. Monitoring for lead may be discontinued after the twelfth month unless specified in other correspondence by the DEM.

There shall be no discharge of floating solids or visible foam in other than trace amounts outside an area five meters from the discharge point.

***** See Part III, Condition Z.

A. (3). **EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS** Final NPDES No. NC0024392

During the period beginning on the effective date of the permit and lasting until expiration, the Permittee is authorized to discharge from outfall(s) serial number(s) 003 Domestic Wastewater Treatment Facility. Such discharges shall be limited and monitored by the Permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Lbs/day	Other Units (Specify)	Measurement	Sample	*Sample
	Monthly Avg. Daily Max.	Monthly Avg. Daily Max.	Frequency	Type	Location
Flow			Weekly	Instantaneous	E
BOD,5Day, 20°C		30.0 mg/l 45.0 mg/l	2/month	Grab	E
TSS		90.0 mg/l 135.0 mg/l	2/month	Grab	E
Fecal Coliform (geometric mean)		200.0/100 ml 400.0/100 ml	2/month	Grab	E
Total Residual Chlorine			Weekly	Grab	E
Oil and Grease		30.0 mg/l 60.0 mg/l	2/month	Grab	E
MBAS			Monthly	Grab	E

* Sample locations: E - Effluent

The pH shall not be less than n/a **standard units nor greater than** n/a **standard units and shall be monitored** monthly at the effluent by grab sample.

M3

A. (4). **EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS** Final NPDES No. NC0024392

During the period beginning on the effective date of the permit and lasting until expiration **the Permittee is authorized to discharge from outfall(s) serial number(s)** 004 Radwaste Processing System **. Such discharges shall be limited and monitored by the Permittee as specified below:**

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Lbs/day	Other Units (Specify)			
	Monthly Avg. Daily Max.	Monthly Avg. Daily Max.	Measurement Frequency	Sample Type	*Sample Location
Flow			Weekly	Instantaneous	Effluent
TSS		30.0 mg/l 100.0 mg/l	Quarterly	Grab	Effluent
Oil and Grease		15.0 mg/l 20.0 mg/l	Quarterly	Grab	Effluent
Hydrazine			***	Grab	Effluent

* Effluent - Monitoring will be required after radwaste treatment but prior to any dilution with cooling water.

** In the event the turbine building sumps are discharged to Lake Norman and are not treated in the radwaste processing system, the above discharge limitations shall also apply to the turbine building sump discharge. Each discharge from the turbine building sumps shall be monitored for flow, TSS, oil and grease, and hydrazine, if applicable, as specified above by grab samples.

*** Each batch that contains hydrazine that is collected in the Radwaste System or turbine building sumps shall be monitored.

M3

A. (5). **EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS** Final NPDES No. NC0024392

During the period beginning on the effective date of the permit **and lasting until** expiration **the Permittee is authorized to discharge from outfall(s) serial number(s)** Wastewater Collection Basin 005. Such discharges shall be limited and monitored by the Permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Lbs/day Monthly Avg. Daily Max.	Other Units (Specify) Monthly Avg. Daily Max.	Measurement Frequency	Sample Type	*Sample Location
Flow			Daily	Instantaneous	E
BOD,5-day, 20 degrees C			Monthly	Grab	E
Total Suspended Solids			Monthly	Grab	E
Fecal Coliform (geometric mean)			Monthly	Grab	E
Oil and Grease		15.0 mg/l 20.0 mg/l	2/month	Grab	E
Total Copper			Monthly	Grab	E
Total Iron			Monthly	Grab	E
Chronic Toxicity **			Quarterly	Grab	E
Alkalinity			Monthly	Grab	E
Total Phosphorus			Monthly	Grab	E
TKN			Monthly	Grab	E
NO2 + NO3			Monthly	Grab	E
NH3 as N			Monthly	Grab	E

* Sample locations: E-Effluent, I-Influent

** Chronic Toxicity (Ceriodaphnia) P/F at 12%; January, April, July, October; See Part III, Condition R.

The pH shall be monitored monthly at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

M3

A. (6). **EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS** Final NPDES No. NC0024392

During the period beginning on the effective date of the permit **and lasting until** expiration, **the Permittee is authorized to discharge from outfall(s) serial number(s)** 006 - Chemical Metal Cleaning Wastes. **Such discharges shall be limited and monitored by the Permittee as specified below:**

Effluent Characteristics	Discharge Limitations			Monitoring Requirements		
	Lbs/day		Other Units (Specify)			
	Monthly Avg.	Daily Max.	Monthly Avg.	Daily Max.	Measurement Frequency	Sample Type	*Sample Location
Flow					1/batch	Instantaneous	E
Total Copper **			1.0 mg/l	1.0 mg/l	1/batch	Grab	E
Total Iron **			1.0 mg/l	1.0 mg/l	1/batch	Grab	E

These limitations apply to all chemical metal cleaning wastes treated at the facility.

The treated wastewater from the chemical metal cleaning wastes operation is allowed to be discharged through any other permitted outfall. All limitations on outfall No. 006 must be met prior to intermixing with any other wastes streams except for pH when the waste is sent through the Conventional Wastewater Treatment Facility. The pH must be met at the outfall from the Conventional Wastewater Treatment Facility when discharged through the facility.

* Sample location: E - Effluent

** Monitoring and reporting for flow, pH, iron and copper are required only when chemical metal cleaning is performed.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored once per batch by grab samples at the effluent.

Part I

B. Schedule of Compliance

1. The permittee shall comply with Final Effluent Limitations specified for discharges in accordance with the following schedule:

   Permittee shall comply with Final Effluent Limitations by the effective date of the permit.

2. Permittee shall at all times provide the operation and maintenance necessary to operate the existing facilities at optimum efficiency.

3. No later than 14 calendar days following a date identified in the above schedule of compliance, the permittee shall submit either a report of progress or, in the case of specific actions being required by identified dates, a written notice of compliance or noncompliance. In the latter case, the notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next schedule requirements.

PART II
STANDARD CONDITIONS FOR NPDES PERMITS

SECTION A. GENERAL CONDITIONS

1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

2. Penalties for Violations of Permit Conditions

Any person who violates a permit condition is subject to a civil penalty not to exceed $10,000 per day of such violation. Any person who willfully or negligently violates a permit condition is guilty of a misdemeanor punishable by a fine not to exceed $15,000 per day of violation, or by imprisonment not to exceed six months or both.

3. Duty to Mitigate

The permittee shall take all reasonable steps to minimize any adverse impact to navigable waters resulting from noncompliance with any effluent limitations specified in this permit, including accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

4. Permit Modification

After notice and opportunity for a hearing pursuant to NCGS 143-215.1(b)(3) and NCGS 143-215.1(e) respectively, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:

a. Violation of any terms or conditions of this permit;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge; or

d. Information newly acquired by the Division indicating the discharge poses a threat to human health or welfare.

If the permittee believes that any past or planned activity would be cause for modification or revocation and reissuance, the permittee must report such information to the Permit Issuing Authority. The submittal of a new application

may be required of the permittee. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliances, does not stay any permit condition.

5. Toxic Pollutants

Notwithstanding Part II, A-4 above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Act for a toxic pollutant which is present in the discharge, if such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be revised or modified in accordance with the toxic effluent standard prohibition and the permittee so notified.

The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

6. Civil and Criminal Liability

Except as provided in permit conditions on "Bypassing" (Part II, B-3) and "Power Failures" (Part II, B-6), nothing in this permit shall be construed to relieve the permittee from any responsibilities, liabilities, or penalties for noncompliance pursuant to NCGS 143-215.3, 143-215.6 or Section 309 of the Federal Act, 33 USC 1319. Furthermore, the permittee is responsible for consequential damages, such as fish kills, even though the responsibility for effective compliance may be temporarily suspended.

7. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject to under NCGS 143-215.75 et seq. or Section 311 of the Federal Act, 33 USC 1321. Furthermore, the permittee is responsible for consequential damages, such as fish kills, even though the responsibility for effective compliance may be temporarily suspended.

8. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

9. Onshore of Offshore Construction

This permit does not authorize or approve the construction of any onshore or offshore physical structures or facilities or the undertaking of any work in any navigable waters.

10. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstances, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

11. Duty to Provide Information

The permittee shall furnish to the Permit Issuing Authority, within a reasonable time, any information which the Permit Issuing Authority may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Permit Issuing Authority upon request, copies of records required to be kept by this permit.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The permittee shall at all times maintain in good working order and operate as efficiently as possible all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit.

2. Need to Halt or Reduce not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the condition of this permit.

3. Bypassing

Any diversion from or bypass of facilities is prohibited, except (i) where unavoidable to prevent loss of life or severe property damage, or (ii) where excessive storm drainage or runoff would damage any facilities necessary for compliance with the effluent limitations and prohibitions of this permit. All permittees who have such sewer bypasses or overflows of this discharge shall submit, not later than six months from the date of issuance of this permit, detailed data or engineering estimates which identify:

a. The location of each sewer system bypass or overflow;

b. The frequency, duration and quantity of flow from each sewer system bypass or overflow.

This requirement is waived where infiltration/inflow analyses are scheduled to be performed as part of an Environmental Protection Agency facilities planning project.

The permittee shall report by telephone to either the central office or appropriate regional office of the Division as soon as possible, but in no case more than 24 hours or on the next working day following the occurrence or first knowledge of the occurrence of any division from or bypass of facilities.

4. Upsets

"Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit limitation if the requirements of 40 CFR S 122.41(n)(3) are met.

5. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in accordance with NCGS 143-215.1 and in a manner such as to prevent any pollutant from such materials from entering waters of the State or navigable waters of the United States.

6. Power Failures

The permittee is responsible for maintaining adequate safeguards as required by DEM Regulation, Title 15, North Carolina Administrative Code, Subchapter 2H, .0124 Reliability, to prevent the discharge of untreated or inadequately treated wastes during electrical power failures either by means of alternate power sources, standby generators or retention of inadequately treated effluent.

SECTION C. MONITORING AND RECORDS

1. Representative Sampling

Samples collected and measurements taken, as required herein, shall be characteristic of the volume and nature of the permitted discharge. Samples collected at a frequency less than daily shall be taken on a day and time that is characteristic of the discharge over the entire period which the sample represents. All samples shall be taken at the monitoring points specified in this permit and, unless otherwise specified , before the effluent joins or is diluted by any other wastestream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Permit Issuing Authority.

2. Reporting

Monitoring results obtained during the previous month(s) shall be summarized for each month and reported on a monthly Discharge Monitoring Report (DMR) Form (DEM No. MR 1, 1.1, 2, 3) or alternative forms approved by the Director, DEM, postmarked no later than the 30th day following the completed reporting period.

The first DMR is due on the last day of the month following the issuance of the permit or in the case of a new facility, on the last day of the month following the commencement of discharge. Duplicate signed copies of these, and all other reports required herein, shall be submitted to the following address:

Division of Environmental Management
Water Quality Section
ATTENTION: Central Files
Post Office Box 27687
Raleigh, North Carolina 27611

3 Flow Measurements

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to insure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to insure that the accuracy of the measurements are consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than + 10% from the true discharge rates throughout the range of expected discharge volumes. Once-through condenser cooling water flow which is monitored by pump logs, or pump hour meters as specified in Part I of this permit and based on the manufacturer's pump curves shall not be subject to this requirement.

4. Test Procedures

Test procedures for the analysis of pollutants shall conform to the EMC regulations published pursuant to NCGS 143-215.63 et seq, the Water and Air Quality Reporting Acts, and to regulations published pursuant to Section 304(g), 33 USC 1314, of the Federal Water Pollution Control Act, as Amended, and Regulation 40 CFR 136.

To meet the intent of the monitoring required by this permit, all test procedures must produce minimum detection and reporting levels that are below the permit discharge requirements and all data generated must be reported down to the minimum detection or lower reporting level of the procedure. If no approved methods are determined capable of achieving minimum detection and reporting levels below permit discharge requirements, then the most sensitive (method with the lowest possible detection and reporting level) approved method must be used.

5. Penalties for Tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, by punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both.

6. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation shall be retained for a minimum of three (3) years by the permittee. This period of retention shall be extended during the course of any unresolved litigation or if requested by the Division of Environmental Management or the Regional Administrator of the Environmental Protection Agency.

7. Recording Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date, and time of sampling;

b. The dates the analyses were performed;

c. The person(s) who performed the analyses; and

d. The results of such analyses.

8. Right of Entry

The permittee shall allow the Director of the Division of Environmental Management, the Regional Administrator, and/or their authorized representatives, upon the presentations of credentials:

a. To enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit; and

b. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect any monitoring equipment or monitoring method required in this permit; and to sample any discharge of pollutants.

SECTION D. REPORTING REQUIREMENTS

1. Change in Discharge

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit. Any anticipated facility expansions, production increases, or process modifications which will result in new, different, or increased discharges of pollutants must be reported by submission of a new NPDES application or, if such changes will not violate the effluent limitations specified in this permit, by notice to the DEM of such changes. Following such notice, the permit may be modified to specify and limit any pollutants not previously limited.

2. Anticipated Noncompliance

The permittee shall give notice to the Permit Issuing Authority of any planned change in the permitted facility or activity which may result in noncompliance with permit requirements. Any maintenance of facilities, which might necessitate unavoidable interruption of operation and degradation of effluent quality, shall be scheduled during noncritical water quality periods and carried out in a manner approved by the Permit Issuing Authority.

3. Transfer of Ownership or Control

This permit is not transferable. In the event of any change in name, control or ownership of facilities from which the authorized discharge emanates or is contemplated, the permittee shall notify the prospective owner or controller by letter of the existence of this permit and of the need to obtain a permit in the name of the prospective owner. A copy of the letter shall be forwarded to the Division of Environmental Management.

4. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values is required in the DMR. Such increased frequency shall also be indicated. The DEM may require more frequent monitoring or the monitoring of other pollutants not required in this permit by written notification.

5. Averaging of Measurements

Calculations for limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Permit Issuing Authority in the permit.

6. Noncompliance Notification

The permittee shall report by telephone to either the central office or the appropriate regional office of the Division as soon as possible, but in no case more than 24 hours or on the next working day following the occurrence or first knowledge of the occurrence of any of the following:

a. Any occurrence at the water pollution control facility which results in the discharge of significant amounts of wastes which are abnormal in quantity or characteristic, such as the dumping of the contents of a sludge digester; the known passage of a slug of hazardous substance through the facility; or any other unusual circumstances.

b. Any process unit failure, due to known or unknown reasons, that render the facility incapable of adequate wastewater treatment such as mechanical or electrical failures of pumps, aerators, compressors, etc.

c. Any failure of a pumping station, sewer line, or treatment facility resulting in a by-pass directly to receiving waters without treatment of all or any portion of the influent to such station or facility.

d. Any time that self-monitoring information indicates that the facility has gone out of compliance with its NPDES permit limitations.

Persons reporting such occurrences by telephone shall also file a written report in letter form within 15 days following first knowledge of the occurrence.

7. Changes in Discharges of Toxic Substances:

The permittee shall notify the Permit Issuing Authority as soon as it knows or has reason to believe:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic substance(s) (listed at 40 CFR S 122, Appendix D, Table II and III) which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels".

(1) One hundred micrograms per liter (100 ug/l);

(2) Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony; or

(3) Five (5) times the maximum concentration value reported for that pollutant(s) in the permit application.

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant (listed at 40 CFR S 122, Appendix D. Table II and III) which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) Five hundred micrograms per liter (500 ug/1);

(2) One milligram per liter (1 mg/1) for antimony; or

(3) Ten (10) times the maximum concentration value reported for that pollutant(s) in the permit application.

8. Expiration of Permit

Permittee is not authorized to discharge after the expiration date. In order to receive authorization to discharge beyond the expiration date, the permittee shall submit such information, forms, and fees as are required by the agency authorized to issue permits no later than 180 days prior to the expiration date. Any discharge without a permit after the expiration will subject the permittee to enforcement procedures as provided in NCGS 143-215.6 and 33 USC 1251 et seq.

9. Signatory Requirements

All applications, reports, or information submitted to the Permit Issuing Authority shall be signed and certified.

a. All permit applications shall be signed as follows:

(1) For a corporation: by a responsible corporate officer. For the purpose of this Section, a responsible corporate officer means: (a) a president, secretary, treasurer or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation, or (b) the manager of one or more manufacturing production or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding 25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

b. All reports required by the permit and other information requested by the Permit Issuing Authority shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described above;

(2) The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or well field, superintendent, a position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and

(3) The written authorization is submitted to the Permit Issuing Authority.

c. Certification. Any person signing a document under paragraphs a. or b. of this section shall making the following certification:

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and believe, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations."

10. Availability of Reports

Except for data determined to be confidential under NCGS 143-215.3(a) (2) or Section 308 of the Federal Act, 33 USC 1318, all reports prepared in accordance with the terms shall be available for public inspection at the offices of the Division of Environmental Management. As required by the Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in NCGS 143-215.1(b) (2) or in Section 309 of the Federal Act.

11. Penalties for Falsification of Reports

The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both.

SECTION E. DEFINITION

1. Permit Issuing Authority

The Director of the Division of Environmental Management.

2. DEM or Division

Means the Division of Environmental Management, Department of Natural Resources and Community Development. 3. EMC:

Used herein means the North Carolina Environmental Management Commission.

3. EMC

Used herein means the North Carolina Environmental Management Commission.

4. Act or "the Act"

The Federal Water Pollution Control Act, also known as the Clean Water Act, as amended, 33 USC 1251, et. seq.

5. Mass/Day Measurements

a. The "monthly average discharge: is defined as the total mass of all daily discharges sampled and/or measured during a calendar month on which daily discharges are sample and measured, divided by the number of daily discharges samples and/or measured during such month. It is therefore, an arithmetic mean found by adding the weights of the pollutant found each day of the month and then dividing this sum by the number of days the tests were reported. The limitation is identified as "Monthly Average" in Part I of the permit.

b. The "weekly average discharge" is defined as the total mass of all daily discharges sampled and/or measured during the calendar week (Sunday-Saturday) on which daily discharges are sampled and measured, divided by the number of daily discharges samples and/or measured during such week. It is, therefore, an arithmetic mean found by adding the weights of pollutants found each day of the week and then dividing this sum by the number of days the tests were reported. This limitation is identified as "Weekly Average" in Part I of the permit.

c. The "maximum daily discharge" is the total mass (weight) of a pollutant discharged during a calendar day. If only one sample is taken during any calendar day the weight of pollutant calculated from it is the "maximum daily discharge." This limitation is identified as "Daily Maximum," in Part I of the permit.

d. The "average annual discharge" is defined as the total mass of all daily discharges sample and/or measured during the calendar year on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during such year. It is, therefore, an arithmetic mean found by adding the weights of pollutants found each day of the year and then dividing this sum by the number of days the tests were reported. This limitation is defined as "Annual Average" in Part I of the permit.

6. Concentration Measurement

a. The "average monthly concentration," other than for fecal coliform bacteria, is the sum of the concentrations of all daily discharges samples and/or measured during a calendar month on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during such month (arithmetic mean of the daily concentration values). The daily concentration value is equal to the concentration of a composite sample or in the case of grab samples is the arithmetic mean (weighted by flow value) of all the samples collected during that calendar day. The average monthly count for fecal coliform bacteria is the geometric mean of the counts for samples collected during a calendar month. This limitation is identified as "Monthly Average" under "Other Limits" in Part I of the permit.

b. The "average weekly concentration," other than for fecal coliform bacteria, is the sum of the concentrations of all daily discharges sampled and/or measured during a calendar week (Sunday/Saturday) on which daily discharges are sampled and measured divided by the number of daily discharges sampled and/or measured during such week (arithmetic mean of the daily concentration values). The daily concentration value is equal to the concentration of a composite sample or in the case of grab samples is the arithmetic mean (weighted by flow value) of all the samples collected during that calendar day. The average weekly count for fecal coliform bacteria is the geometric mean of the counts for samples collected during a calendar week. This limitation is identified as "Weekly Average" under "Other Limits" in Part I of the permit.

c. The "maximum daily concentration" is the concentration of a pollutant discharge during a calendar day. If only one sample is taken during any calendar day the concentration of pollutant calculated from it is the "Maximum Daily Concentration". It is identified as "Daily Maximum" under "Other Limits" in Part I of the permit.

d. The "average annual concentration," other than for fecal coliform bacteria, is the sum of the concentrations of all daily discharges sampled and/or measured during a calendar year on which daily discharges are sampled and measured divided by the number of daily discharges sampled and/or measured during such year (arithmetic mean of the daily concentration values). The daily concentration value is equal to the concentration of a composite sample or in the case of grab samples is the arithmetic mean (weighted by flow value) of all the samples collected during that calendar day. The average yearly count for fecal coliform bacteria is the geometric mean of the counts for samples collected during a calendar year. This limitation is identified as "Annual Average" under "Other Limits" in Part I of the permit.

e. The "daily minimum concentration" (for dissolved oxygen only) is the minimum allowable amount of dissolved oxygen required to be available in the effluent prior to discharge. It is identified as "Daily Minimum" under "Other Limits" in Part III of the permit.

7. Other Measurements

a. Flow, (MGD): The flow limit expressed in this permit is the 24 hours average flow, averaged monthly. It is determined as the arithmetic mean of the total daily flows recorded during the calendar month.

b. An "instantaneous flow measurement" is a measure of flow taken at the time of sampling, when both the sample and flow will be representative of the total discharge.

8. Types of Samples

a. Composite Sample: These samples consist of grab samples collected at equal intervals and combined proportional to flow, a sample continuously collected proportionally to flow, or equal volumes taken at varying time intervals. If a composite sample is obtained from grab samples, the following requirements apply. The intervals between influent grab samples shall be no greater than hourly. Intervals between effluent grab samples shall be no greater than hourly except where the detention time of the wastewater in the facility is greater than 24 hours, in which case, the interval between grab samples shall be no greater in number of hours than the detention time in number of days; provided, however, in no case may the time between effluent grab samples be greater than six hours nor the number of grab samples less than four during any discharge period of 24 hours or less.

b. Grab Sample: Grab samples are individual samples collected over a period of time not exceeding 15 minutes; the grab sample can be taken manually.

9. Calculation of Means

a. Arithmetic Mean: The arithmetic mean of any set of values is the summation of the individual values divided by the number of individual values.

b. Geometric Mean: The geometric mean of any set of values is the Nth root of the product of the individual values where N is equal to the number of individual values. The geometric mean is equivalent to the antilog of the arithmetic mean of the logarithms of the individual values. For purposes of calculating the geometric mean, values of zero (0) shall be considered to be one (1).

c. Weighted by Flow Value: Weighted by flow value means the summation of each concentration times its respective flow divided by the summation of the respective flows.

10. Calendar Day

A calendar day is defined as the period from midnight of one day until midnight of the next day. However, for purposes of this permit, any consecutive 24-hour period that reasonably represents the calendar day may be used for sampling.

11. Hazardous Substance

A hazardous substance means any substance designated under 40 CFR Part 116 pursuant to Section 311 of the Clean Water Act.

12. Toxic Pollutant

A toxic pollutant is any pollutant listed as toxic under Section 307(a)(1) of the Clean Water Act.

PART III
OTHER REQUIREMENTS

A. Previous Permits

All previous State water quality permits issued to this facility, whether for construction or operation or discharge, are hereby revoked by issuance of this permit. The conditions, requirements, terms, and provisions of this permit authorizing discharge under the National Pollutant Discharge Elimination System govern discharges from this facility.

B. Construction

No construction of wastewater treatment facilities or additions thereto shall be begun until Final Plans and Specifications have been submitted to the Division of Environmental Management and written approval and Authorization to Construct has been issued.

C. Certified Operator

Pursuant to Chapter 90A-44 of North Carolina General Statutes, the permittee shall employ a certified wastewater treatment plant operator in responsible charge (ORC) of the wastewater treatment facilities. Such operator must hold a certification of the grade equivalent to or greater than the classification assigned to the wastewater treatment facilities. The permittee shall notify the Division's Operator Training and Certification Unit within five days of any change in the ORC status.

D. Groundwater Monitoring

The permittee shall, upon written notice from the Director of the Division of Environmental Management, conduct groundwater monitoring as may be required to determine the compliance of this NPDES permitted facility with the current groundwater standards.

E. Limitations Reopener

This permit shall be modified or alternatively, revoked and reissued, to comply with any applicable effluent guideline or water quality standard issued or approved under Sections 302(b) (2) (c), and (d), 304(b) (2), and 307(a) (2) of the Clean Water Act, if the effluent guideline or water quality standard so issued or approved:

1. contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or

2. controls any pollutant not limited in the permit.

The permit as modified or reissued under this paragraph shall also contain any other requirements in the Act then applicable.

F. Toxicity Reopener

This permit shall be modified, or revoked and reissued to incorporate toxicity limitations and monitoring requirements in the event toxicity testing or other studies conducted on the effluent or receiving stream indicate that detrimental effects may be expected in the receiving stream as a result of this discharge.

G. In the event that waste streams from various sources are combined for treatment or discharge, the quantity of each pollutant or pollutant property attributable to each controlled waste source shall not exceed the specified limitation for that waste source.

H. There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

I. The permittee shall not use any biocides except these approved in conjunction with the permit application. The permittee shall notify the Director in writing not later than ninety (90) days prior to instituting use of any additional biocide used in cooling systems which may be toxic to aquatic life other than those previously reported to the Division of Environmental Management. Such notification shall include completion of Biocide Worksheet Form 101 and a map locating the discharge point and receiving stream.

J. Continued intake screen backwash discharge is permitted without limitations or monitoring requirements. However, the discharge of oil and grease is prohibited from this discharge.

K. Nothing contained in this permit shall be construed as a waiver by the permittee of any right to a hearing it may have pursuant to State or Federal Laws or regulations.

L. The term "low volume waste sources" means the waste is taken collectively as if from one source except those for which specific limitations are otherwise established in this part. Low volume wastes sources include but are not limited to: wastewaters from wet scrubber air pollution control systems, ion exchange water treatment system, water treatment evaporator blowdown, laboratory and sampling streams, boiler blowdown, floor drains, cooling tower basin cleaning wastes, and recirculating house service water systems. Sanitary and air conditioning wastes are not included.

M. The term "chemical metal cleaning waste" means any wastewater resulting from the cleaning of any metal process equipment with chemical compounds including, but not limited to, boiler tube cleaning.

N. It has been determined from information submitted that the plans and procedures in place at McGuire Nuclear Station are equivalent to that of a BMP.

O. Yard drains may be discharged without limitations or monitoring requirements.

P. The Division of Environmental Management has approved the submitted 316(a) demonstration and has concluded that the existing thermal limitations are sufficient to protect the aquatic environment of Lake Norman.

Q. Mixing Zone

A mixing zone has been defined containing an area of no more that 3500 acres and lying upstream of the dam and south of a line originating on the west bank of NC Coordinates E-1, 416,900 and N-633,600 and extending south 70 -00 east intersecting the point of land on the eastern shore. Water quality stream standards for temperature shall be met outside the mixing zone.

R. Chronic Toxicity Testing Requirement

The effluent discharge shall at no time exhibit chronic toxicity in any two consecutive toxicity tests, using test procedures outlined in:

1). The North Carolina Ceriodaphnia chronic effluent bioassay procedure (North Carolina Chronic Bioassay Procedure - Revised *April 1989) or subsequent version.

The effluent concentration at which there may be no observable inhibition of reproduction or significant mortality is 12% (defined as treatment two in the North Carolina procedure document). The permit holder shall perform quarterly monitoring using this procedure to establish compliance with the permit condition. The first test will be performed after thirty days from issuance of this permit during the months of January, April, July, and October. Effluent sampling for this testing shall be performed at the NPDES permitted final effluent discharge below all treatment processes.

All toxicity testing results required as part of this permit condition will be entered on the Effluent Discharge Monitoring Form (MR-1) for the month in which it was performed, using the parameter code TGP3B. Additionally, DEM Form AT-1 (original) is to be sent to the following address:

Attention: Technical Services Branch
North Carolina Division of
Environmental Management
P.O. Box 27687
Raleigh, N.C. 27611

Test data shall be complete and accurate and include all supporting chemical/physical measurements performed in association with the toxicity tests, as well as all dose/response data. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should any single quarterly monitoring indicate a failure to meet specified limits, then monthly monitoring will begin immediately until such time that a single test is passed. Upon passing, this monthly test requirement will revert to quarterly in the months specified above.

Should any test data from this monitoring requirement or tests performed by the North Carolina Division of Environmental Management indicate potential impacts to the receiving stream, this permit may be reopened and modified to include alternate monitoring requirements or limits.

"Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival and appropriate environmental controls, shall constitute an invalid test and will require immediate retesting (within 30 days of initial monitoring event). Failure to submit suitable test results will constitute non-compliance with monitoring requirements, but will not subject the permittee to civil penalty if the permittee has demonstrated a diligent attempt to conduct a suitable retest and has engaged the services of a laboratory with valid certification under North Carolina's laboratory certification program.

S. Releases of radioactive materials shall be monitored and conducted in accordance with all conditions and limitations required by NRC and as specified in the Final Safety Analysis Report, Technical Specifications and Environmental Statement for the McGuire Nuclear Station.

T. The Lake Norman aquatic environment maintenance monitoring program approved by the Division of Environmental Management shall be continued. The monitoring results shall be submitted annually.

U. Discharge of any product registered under the Federal Insecticide, Fungicide, and Rodenticide Act to any waste stream which may ultimately be released to lakes, rivers, streams or other waters of the United States is prohibited unless specifically authorized elsewhere in this permit. This requirement is not applicable to products used for lawn and agricultural purposes. Discharge of chlorine from the use of chlorine gas, sodium hypochlorite, or other similar chlorination compounds for disinfection in plant potable and service water systems and in sewage treatment is authorized.

V. The permittee is hereby authorized to discharge as follows:

a. The Cowans Ford Dam Underdrain discharge to the Catawba River which includes uncontaminated bearing lubrication and gland seal water, and possibly silt from the cyclone separators, and

b. Fire protection water (approved biocide) to Lake Norman (Catawba River).

W. Acute Toxicity Testing Requirement

The permittee shall conduct acute toxicity tests on a quarterly basis using protocols defined in the North Carolina Procedure Document entitled "Pass/Fail Methodology For Determining Acute Toxicity In A Single Effluent Concentration". The monitoring shall be performed as a Daphnia pulex or Ceriodaphnia 48 hour static test, using effluent collected as a 24 hour composite. The effluent concentration at which there may be at no time significant acute mortality in any two consecutive toxicity tests is 90% (defined as treatment two in the North Carolina procedure document). Effluent samples for self-monitoring purposes must be obtained during representative effluent discharge below all waste treatment. The first test will be performed after thirty days from issuance of this permit during the months of February, May, August, and November.

The parameter code for this test if using Daphnia pulexis TGA3D. The parameter code for this test if using Ceriodaphia is TGA3B.
All toxicity testing results required as part of this permit condition will be entered on the Effluent Discharge Monitoring Form (MR-1) for the month in which it was performed, using the parameter code TGE3D. Additionally, DEM Form AT-2 (original) is to be sent to the following address:

Environmental Sciences Branch
North Carolina Division of Environmental Management
PO Box 27687
Raleigh, North Carolina 27611-7687

Test data shall be complete and accurate and include all supporting chemical/physical measurements performed in association with the toxicity tests, as well as all dose/response data. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should any single quarterly monitoring indicate a failure to meet specified limits, then monthly monitoring will begin immediately until such time that a single test is passed. Upon passing, this monthly test requirement will revert to quarterly in the months specified above.

Should any test data from either these monitoring requirement or tests performed by the North Carolina Division of Environmental Management indicate potential impacts to the receiving stream, this permit may be re-opened and modified to include alternate monitoring requirements or limits.

"Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival and appropriate environmental controls, shall constitute an invalid test and will require immediate retesting (within 30 days of initial monitoring event). Failure to submit suitable test results will constitute non-compliance with monitoring requirements, but will not subject the permittee to civil penalty if the permittee has demonstrated a diligent attempt to conduct a suitable retest and has engaged the services of a laboratory with valid certification under North Carolina's laboratory certification program.

X. Acute Toxicity Testing Requirement

The permittee shall conduct acute toxicity tests on a quarterly basis using protocols defined as definitive in EPA Document 600/4-85/013 entitled "The Acute Toxicity of Effluents to Freshwater and Marine Organisms". The monitoring shall be performed as a Daphnia pulex or Ceriodaphnia 48 hour static test, using effluent collected as a grab sample. The LC50 of this effluent using the previously stated methodology may at no time in any two consecutive toxicity tests be less than 79%. Effluent samples for self-monitoring purposes must be obtained during representative effluent discharge below all waste treatment. The first test will be performed after thirty days from issuance of this permit during the months of February, May, August and November.

The parameter code for this test if using Daphnia pulex is TAA3D. The parameter code for this test if using Ceriodaphnia is TAA3B. All toxicity testing results required as part of this permit condition will be entered on the Effluent Discharge Monitoring Form (MR-1) for the month in which it was performed, using the appropriate parameter code. Additionally, DEM Form AT-1 (original) is to be sent to the following address:

Environmental Sciences Branch
North Carolina Division of Environmental Management
PO Box 27687
Raleigh, North Carolina 27611-7687

Test data shall be complete and accurate and include all supporting chemical/physical measurements performed in association with the toxicity tests, as well as all dose/response data. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should any single quarterly monitoring indicate a failure to meet specified limits, then monthly monitoring will begin immediately until such time that a single test is passed. Upon passing, this monthly test requirement will revert to quarterly in the months specified above.

Should any test data from either this monitoring requirement or tests performed by the North Carolina Division of Environmental Management indicate potential impacts to the receiving stream, this permit may be reopened and modified to include alternate monitoring requirements or limits.

"Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival and appropriate environmental controls, shall constitute an invalid test and will require immediate retesting (within 30 days of initial monitoring event). Failure to submit suitable test results will constitute non-compliance with monitoring requirements, but will not subject the permittee to civil penalty if the permittee has demonstrated a diligent attempt to conduct a suitable retest and has engaged the services of a laboratory with valid certification under North Carolina's laboratory certification program.

Y. Duke Power must perform the following as part of the 316(a) variance:

1. Duke monitoring shall include a sampling program whose intent is to determine the abundance and distribution over the critical summer period, both in time and space, of fish species in the mixing zone. The use of hydroacoustical sampling equipment is suitable for these purposes and is to be performed in conjunction with vertical temperature and dissolved oxygen profiles. In addition, these datea will be analyzed, where appropriate (using other lake specific information collected either by Duke Power Company or other agencies) with regard to striped bass usage of the mixing zone.

2. Duke shall remodel and assess the impact of 100% load factor during the months of June-August and 90% for the remainder of the year.

3. Duke shall address maximum discharge temperatures from McGuire which will occur each month when the units are operating at maximum output. This discussion shall entail the possible effect on swimmers/fallen skiers in the thermal plume area during the summer months.

Z. The permittee shall conduct a test for priority pollutants annually at the effluent from the treatment plant. The discharge shall be evaluated as follows:

1) A pollutant analysis of the effluent must be completed annually using EPA approved methods for the following analytic fractions: (a) purgeables (i.e., volatile organic compounds); (b) acid extractables; (c) base/neutral extractables; (d) organochlorine pesticides and PCB's (e) herbicides; and (f) metals and other inorganics. The Annual Pollutant Analysis (APA) Monitoring Requirement Reporting Form A, to be provided to all discharges affected by this monitoring requirement, describes the sampling and analysis requirements and lists chemicals to be included in the pollutant analysis. This monitoring requirement is to be referred to as the "Annual Pollutant Analysis" (APA).

2) Other significant levels of synthetic organic chemicals must be identified and approximately quantified. For the purpose of implementing this requirement, the largest 10 GC/MS peaks in each organic chemical analytic fraction (or fewer than 10, if less than 10 unidentified peaks) occur for chemicals other than those specified on the APA Monitoring Requirement Reporting Form A should be identified and approximately quantified as stated in the APA Reporting Form A instructions. This part (item 2) of the APA monitoring requirement is to be referred to as the "10 significant peaks rule".

PART IV
ANNUAL ADMINISTERING AND COMPLIANCE FEE REQUIREMENTS

A. The permittee must pay the annual administering and compliance fee within 30 (thirty) days after being billed by the Division. Failure to pay the fee in a timely manner in accordance with 15 NCAC 2H .0105(b)(4) may cause this Division to initiate action to revoke the permit.

Carmen Johnson

Fac/Perm/Co ID # Date Doc ID#
60-04 4/17/12 DIN

Form 01077 (R7-89)

FORM 101.1	REVISION 13

CERTIFICATION OF ENGINEERING CALCULATION

STATION AND UNIT NUMBER McGUIRE NUCLEAR STATION

TITLE OF CALCULATION LANDFILL

SOLID WASTE SECTION
APR 12 1991

CALCULATION NUMBER MCC-1114.02-00-0001

ORIGINALLY CONSISTING OF:

PAGES 1 THROUGH 53

TOTAL ATTACHMENTS 4 TOTAL MICROFICHE ATTACHMENTS 0

TOTAL VOLUMES 1 TYPE I CALCULATION/ANALYSIS YES ☐ NO ☒

TYPE I REVIEW FREQUENCY N/A

THESE ENGINEERING CALCULATIONS COVER QA CONDITION Non-QA ITEMS. IN ACCORDANCE WITH ESTABLISHED PROCEDURES, THE QUALITY HAS BEEN ASSURED AND I CERTIFY THAT THE ABOVE CALCULATION HAS BEEN ORIGINATED, CHECKED OR APPROVED AS NOTED BELOW:

ORIGINATED BY C.B. Thom DATE 7/6/90

CHECKED BY P. Michael Sanford DATE 8/29/90

APPROVED BY _____ DATE _____

ISSUED TO TECHNICAL SERVICES DIVISION _____ DATE _____

RECEIVED BY TECHNICAL SERVICES DIVISION _____ DATE _____

MICROFICHE ATTACHMENT LIST: ☐ Yes ☐ No SEE FORM 101.4

REV. NO.	CALCULATION PAGES (VOL)			ATTACHMENTS (VOL)			VOLUMES		ORIG	CHKD	APPR	ISSUE DATE
	REVISED	DELETED	ADDED	REVISED	DELETED	ADDED	DELETED	ADDED	DATE	DATE	DATE	REC'D DATE

Form 101.2 Revision 1
26164 (R9-89)

File/Calculation No. MCC-1114.02-00-0001

REVISION DOCUMENTATION SHEET

Revision Number	Review Frequency Changed Yes/No	Revision Description
0	N/A	ORIGINAL RELEASE

Station McGuire N.S. Unit — Rev. 0 File No MC-1114.02-00-0001 Sheet 1 Of

Subject Landfill

By CB Thom Date 7/25/90

Prob No. Checked By P.M. Sanford Date 8-29-90

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Subject LANDFILL

By JB Date 5/25/90

Prob No. Checked By P.M. Sanford Date 8-29-90

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Station McGuire N.S Unit – Rev. 0 File No. MCC-1114.02-00-0001 Sheet 3 Of

Subject LANDFILL

By [illegible] Date 5/25/90

Prob No. Checked By P.M. Sanford Date 8-8-90

1.1 STATEMENT OF PROBLEM

THIS CALCULATION DOCUMENTS THE DESIGN OF THE McGUIRE NUCLEAR STATION BRC LANDFILL WHICH IS LOCATED SOUTH OF THE PLANT DIRECTLY OFF CASHION ROAD.

1.2 RELATION TO NUCLEAR SAFETY

THE LANDFILL IS NON-SAFETY RELATED. THE McGUIRE LANDFILL IS A TYPICAL SANITARY LANDFILL LOCATED OFF THE STATION "PROPER" SITE.

1.3 DESIGN METHOD

THE LANDFILL HAS BEEN DESIGNED IN ACCORDANCE WITH THE NORTH CAROLINA SOLID WASTE MANAGEMENT RULES. THE PRIMARY REFERENCE SOURCES UTILIZED WERE THE "GEOSYNTHETIC DESIGN GUIDANCE FOR HAZARDOUS WASTE LANDFILL CELLS AND SURFACE IMPOUNDMENTS" AND DESIGN, CONSTRUCTION & MONITORING OF SANITARY LANDFILL BOOK *

* FOR EXACT REF. SEE P. 4

Form 00184 (R4-88)

DUKE POWER COMPANY

Station McGUIRE N.S. Unit — Rev. — File No. MCC-1114.02-00-0001 Sheet 4 Of

Subject LANDFILL

By CB Rhen Date 5/25/90

Prob No. Checked By P.M. Sanford Date 8-8-90

1.4 REFERENCES

1. BAGCHI, AMALENDU, (1990) "DESIGN, CONSTRUCTION, & MONITORING OF SANITARY LANDFILL," WILEY, NEW YORK.

2. RICHARDSON, G.N., AND KOERNER, R.M. (1987) "GEOSYNTHETIC DESIGN GUIDANCE FOR HAZARDOUS WASTE LANDFILL CELLS AND SURFACE IMPOUNDMENT, EPA.

3. KOERNER, R.M., (1986) "DESIGNING WITH GEOSYNTHETICS," PRENTICE-HALL.

4. BAUMEISTER, THEODORE, (1958) "MECHANICAL ENGINEERS' HANDBOOK", McGRAW-HILL.

5. SOWERS, GEORGE F., (1979) "INTRODUCTORY SOIL MECHANICS AND FOUNDATIONS: GEOTECHNICAL ENGINEERING", MACMILLAN.

6. THE STATE OF NORTH CAROLINA EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL. (1988)

7. REPORT OF GEOLOGIC & HYDROGEOLOGIC ASSESSMENT PHASE I PROPOSED LANDFILL DISPOSAL SITE. (JUNE 1, 1990) LAW ENGINEERING.

8. DRAWINGS: CFD-MG-6433C-0010 LANDFILL ACCESS ROAD LAYOUT
- 0020 LANDFILL EARTHWORK EXCAVATION PLA
- 0030 LANDFILL SECTIONS & DETAILS
- 0040 LANDFILL SECTIONS & DETAILS
- 0050 LANDFILL FABRICATION DETAILS
- 0060 LANDFILL OPERATIONS
- 0070 LANDFILL EROSION CONTROL

1.5 ASSUMPTIONS

ALL ASSUMPTIONS WILL BE STATED WITHIN THE BODY OF THE CALCULATION.

1.6 CALCULATIONS

ALL CALCULATIONS NECESSARY TO DOCUMENT THE ADEQUACY OF THE DESIGN ARE SHOWN ON THE FOLLOWING PAGES. 7 TO 53.

1.7 CONCLUSION

THE LANDFILL WILL PERFORM IN ACCORDANCE W/ THE STATE REGULATIONS OVER THE FULL 25 TO 30 YEAR LIFE.

1.3 DISCUSSION

THE McGUIRE LANDFILL HAD TO BE DESIGNED TO COLLECT & TREAT THE LEACHATE. LEACHATE IS DEFINED AS ANY FLUID DRAINING OUT OF AN ACTIVE AREA. AN ACTIVE AREA IS ANY AREA WHERE WASTE HAS ALREADY BEEN DISPOSED.

DUE TO THE HIGH COST & MAINTENANCE PROBLEMS ASSOCIATED W/ AN ON SITE TREATMENT FACILITY IT WAS DECIDED TO PUMP THE LEACHATE APPROX. 2 MILES TO THE WC TREATMENT FACILITY AT McGUIRE NUCLEAR STATION.

IN ORDER TO MINIMIZE THE AMOUNT OF LEACHATE COLLECTED DUE TO RAINFALL, (ANY RAIN THAT FALLS ON THE ACTIVE AREA IS CONSIDERED LEACHATE), THE LANDFILL WAS DIVIDED UP INTO 4 CELLS. EACH

Form 00184 (R4-88)

DUKE POWER COMPANY

Station [illegible] Unit — Rev. 0 File No. MCC-1114.02-00-0001 Sheet 6 Of

Subject [illegible]

By CB Thorn Date 5/25/90

Prob No. Checked By P.M. Sanford Date 8-14-90

1.8 DISCUSSION

OF THE 4 CELLS ARE ISOLATED BY A CLAY BERM AND A HDPE WATER STOP. THE WC TREATMENT FACILITY COULD NOT TREAT THE VOLUME OF WATER GENERATED BY A SINGLE CELL LANDFILL. ALSO, NOTE THAT THE PIPING SYSTEM INSTALLED WILL DELIVER THE LEACHATE AT A RATE OF 300 GPM. (NOTE: THE STATION HAS AGREED TO RECEIVE FLOW RATES UP TO 500 gpm).

THE LEACHATE COLLECTION SYSTEM CONSISTS OF TWO HDPE 8" ϕ PIPES WHICH RUN PARALLEL TO EACH OTHER ONE OF THE PIPES IS SOLID THE OTHER IS PERFORATED. THE PERFORATED PIPE COLLECTS LEACHATE ON THE ACTIVE SIDE OF THE BERM AND IS SWITCHED OVER TO THE SOLID PIPE ON THE INACTIVE SIDE OF THE BERM AND ROUTED TO THE LEACHATE BASIN BY GRAVITY FROM WHICH IT WILL BE PUMPED TO THE WC TREATMENT FACILITY. THE PERFORATED PIPE ON THE INACTIVE SIDE OF THE BERM COLLECTS THE STORMWATER AND ROUTES IT TO A EROSION CONTROL SEDIMENT BASIN. THE LEACHATE COLLECTION SYSTEM IS DESCRIBED SCHEMATICALLY IN THE OPERATIONAL DRAWING.

Station McGUIRE N.S Unit — Rev. 0 File No. MC-11M.02-00-2001 Sheet 1 Of

Subject LANDFILL

By C B Jackson Date 6/5/90

Prob No. Checked By P.M. Sanford Date 8-14-90

STABILITY OF INTERIOR & EXTERIOR SLOPES

THE McGUIRE LANDFILL HAS A INTERIOR SLOPE OF 2½ H : 1V AND AN EXTERIOR SLOPE OF 3H : 1V. BASED ON DISCUSSIONS W/ *GARY WEEKLY & HIS EXPERIENCE W/ SOIL IN THIS REGION HE FELT THAT WE SHOULD NOT HAVE ANY TROUBLE W/ SLOPE STABILITY.

*SOILS ENGR. @ LAW ENG.

EVENTHOUGH GARY WEEKLY FELT THAT OUR SLOPES WOULD BE ADEQUATE, A SLOPE STABILITY ANALYSIS HAS BEEN RUN TO VERIFY THE STABILITY OF THE SLOPE.

THE SLOPE ANALYZED IS SHOWN ON THE NEXT PAGE. THE SLOPE ANALYZED IS THE WORST CASE SLOPE ON THE LANDFILL ∴ IF THE COMPUTOR ANALYSIS SHOWS THIS SLOPE TO BE ADEQUATE THEN ALL OTHER PORTIONS OF THE SLOPE ARE OK BY COMPARISON.

THE PROGRAM USED IS CALLED "STABR" THE PROGRAM CALCULATES THE FACTOR OF SAFETY FOR SPECIFIED CIRCLES, OR SEARCHES FOR THE CIRCULAR SLIP SURFACE HAVING THE MIN. FACTOR OF SAFETY. THE FACTOR OF SAFETY IS CALCULATED BY THE ORDINARY METHOD OF SLICES AND BISHOP'S MODIFIED METHOD.

THE FOLLOWING SOIL VALUES REPRESENT THE MOST CONSERVATIVE VALUES OF ALL THE SOIL BORING DATA:

*REF. LAW SOIL REPORT (SEE ATTACH. III) Appendix E

* $C = .01$

$\phi = 26.4°$

$\gamma = 95\ lb/ft^3$

Form 00184 (R4-88)

DUKE POWER COMPANY

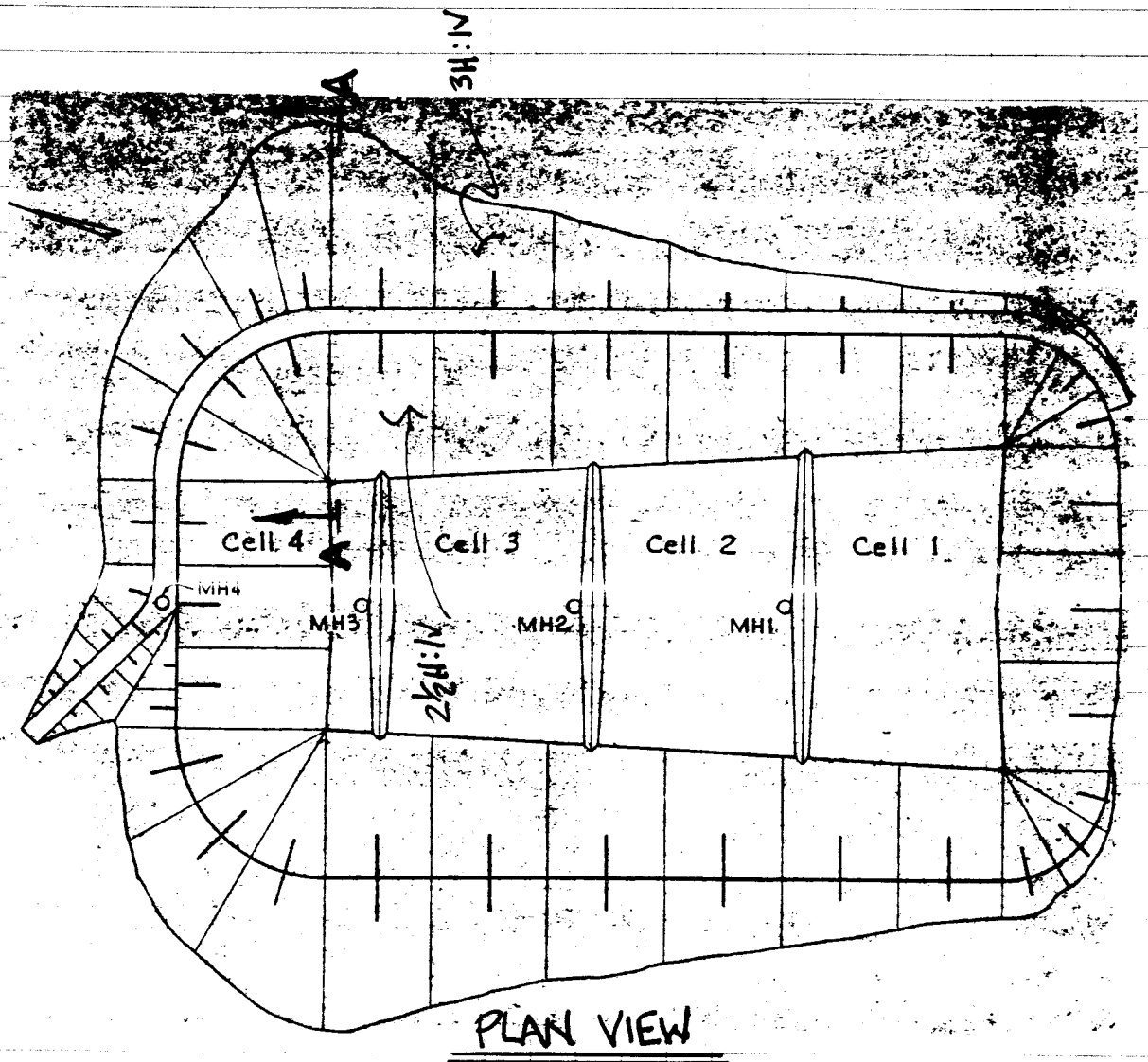
Station McGuire N.S. Unit - Rev. 0 File No MCC-[illegible] Sheet 8 Of

Subject [illegible]

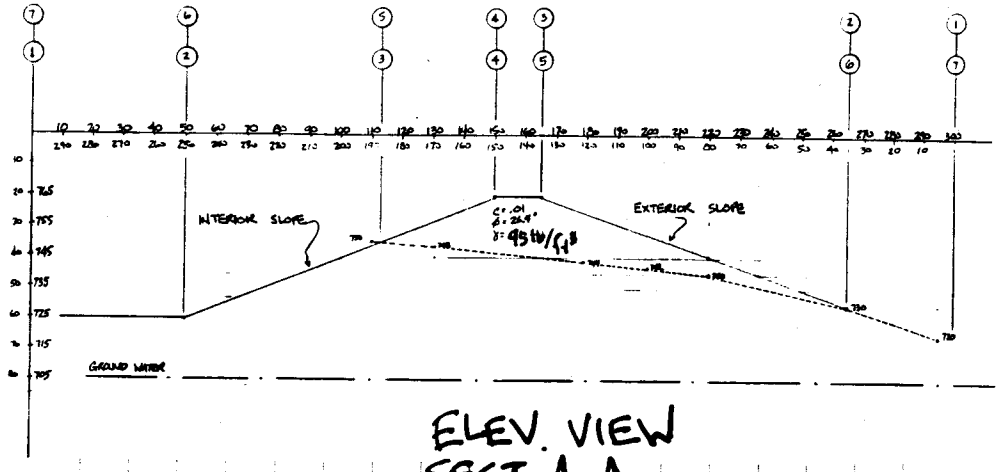
By CB [illegible] Date 6/5/90

Prob No. Checked By P.M. Sanford Date 8-14-90

STABILITY OF INTERIOR & EXTERIOR SLOPES



PLAN VIEW



ELEV. VIEW
SECT A-A

Form 00184 (R4-88)

DUKE POWER COMPANY

Station McGUIRE N.S. Unit - Rev. 0 File No. MC-1IN.02-00-0001 Sheet 9 Of

Subject LANDFILL

By CB Date 6/15/90

Prob No. Checked By P.M. Sanford Date 8-14-90

STABILITY OF INTERIOR & EXTERIOR SLOPES

NOTE THE STABR PROGRAM ONLY ANALYZES ONE SLOPE AT A TIME. IN OTHER WORDS, THERE IS AN ANALYSIS FOR THE INTERIOR SLOPE & ONE FOR THE EXTERIOR SLOPE.

*REF. APPENDIX A

* THE MINIMUM F.S. (INTERIOR) : 1.243
* THE MINIMUM F.S. (EXTERIOR) : 1.431

BASED ON REVIEW OF THE COMPUTER RESULTS THE SLOPES AT THE McGUIRE LANDFILL ARE STABLE.

Form 00184 (R4-88)

DUKE POWER COMPANY

Station McGuire N.S. Unit Rev. File No. MCC-1114.02-00-0001 Sheet 10 Of

Subject LANDFILL

By B. [illegible] Date 5/25/90

Prop No. Checked By P.M. Sanford Date 8-14-90

STABILITY OF THE SOIL BERMS

SINCE THE MATERIAL PLACED IN THE LANDFILL IS HETEROGENEOUS THE CONVENTIONAL THEORIES OF SLOPE STABILITY DO NOT APPLY.

THE BERMS IN THE LANDFILL WILL BE INSTALLED USING A 3H:1V SLOPE.

*REF. 1 P. 165

BASED ON OBSERVATION OF OTHER LANDFILLS A 3H:1V WASTE SLOPE IS STABLE.* THE PREVIOUS STATEMENT REFERS TO THE SLOPE OF THE WASTE ONLY. IN THE McGUIRE LANDFILL A SOIL BERM WILL ALSO BE PLACED IN FRONT OF THE WASTE TO SEPARATE EACH OF THE 4 CELLS. (SEE SKETCH ON P. 17.) THIS SOIL BERM WILL INCREASE THE STABILITY OF THE SLOPE.

EROSION CONTROL OF THE EXPOSED SLOPE WILL BE PROVIDED BY SEEDING THE SLOPES IN GRASS OR BY THE USE OF GEOTEXTILES.

Form 00184 (R4-88)

DUKE POWER COMPANY

Station McGuire N.S. Unit — Rev. 0 File No. MCC-1114.02-00-0001 Sheet 11 Of

Subject Landfill

By [illegible] Date [illegible]

Prob No. Checked By P.M. Sanford Date 8-15-90

HDPE LINER

REF. 2
EPA III-10

THE MINIMUM TECHNOLOGY GUIDANCE PROVIDED BY EPA (1985) REQUIRES A LINER THICKNESS OF 30 MILS. THE INDUSTRY STANDARD FOR SANITARY LANDFILLS SEEMS TO BE 60 MIL HDPE.

SIZE LINER THICKNESS USING CONSERVATIVE ASSUMPTIONS W/ FOLLOWING FORMULA:

* REF. 3
DESIGNING W/ GEO. SYNTHETICS P. 250 249

$$(*)\quad t = \frac{p}{\cos\beta}\,\frac{x}{\sigma_u}\,(\tan\delta_u + \tan\delta_L)$$

Δ WT. OF GARBAGE

$\square$ HEIGHT OF LANDFILL

$p = \Delta\, 80\ lb/ft^3\ (\square\, 45') = 3600\ lb/ft^2$ (*)

$\beta = 0°$ to $45°$

$x = .5$ to 3.0 in

(*) NOTE: THAT THE WEIGHT OF THE SOIL ON THE LINER CONTROLS OVER THE WEIGHT OF EQUIPMENT

$$\sigma_u = \frac{140\ \#/in\ \text{of width}\ (12'')}{\left(\frac{60\ MIL}{1000\ MIL/in}\right)\left(\frac{1}{12''}\right)(1')} = 336{,}000\ lb/ft^2$$

$\delta_u = 20°$ to $40°$ FOR LANDFILL CONTAINMENT

$\delta_L = 20°$ to $40°$

$$t = \frac{3600\ lb/ft^2}{(\cos 20°)}\,\frac{(3)}{336{,}000\ lb/ft^2}\,(\tan 40° + \tan 40°) = .0574\ in =$$

57.4 MIL

$\therefore$ USE 60 MIL.

Form 00184 (R4-88)

DUKE POWER COMPANY

Station McGUIRE N.S. Unit — Rev. 0 File No. MCC-1114.02-00-0001 Sheet 12 Of

Subject LANDFILL

By CB [illegible] Date [illegible]

Prob No. Checked By P.M. Sanford Date 8-15-90

LINER ANCHORAGE

THE PURPOSE OF THE ANCHOR IS TO PREVENT MOVEMENT OF THE LINER INTO THE LANDFILL. THE ANCHOR MUST PROVIDE SUFFICIENT RESTRAINT TO PREVENT THIS MOVEMENT, BUT SHOULD NOT BE SO STRONG THAT THE LINER TEARS BEFORE ANCHOR YIELDS. THE ANCHOR SHOULD THEREFORE BE DESIGNED TO PROVIDE A REACTION FORCE THAT IS GREATER THAN THAT REQ'D TO STABILIZE THE LINER AND LESS THAN THE ULTIMATE STRENGTH OF THE LINER.

MOST ANCHOR TRENCHES ARE CURRENTLY CONSTRUCTED TO MEET GENERAL RECOMMENDATIONS PROVIDED BY THE LINER INSTALLER. THIS RECOMMENDATIONS ARE BASED ON PAST EXPERIENCE AND ARE PURELY EMPIRICAL. AS LONG AS THE McGUIRE DESIGN GEOMETRIES ARE SIMILAR TO THE DETAILS RECOMMENDED BY GUNDLE THEN THE TYPICAL ANCHORAGES PROVIDED BY GUNDLE ARE ACCEPTABLE.

DETERMINE STRENGTH OF ANCHOR PER FT.

SEE NOTE on pg. 13

Δ REF. 1. DESIGN, CONSTRUCTION & MONT. OF SANIT. LANDFILL. p. 160

$$\Delta F_{RG} = \gamma_s (h + h') b \tan\delta + \gamma_s L_a (h) \tan\delta$$

γ_s = 85 lb/ft^3

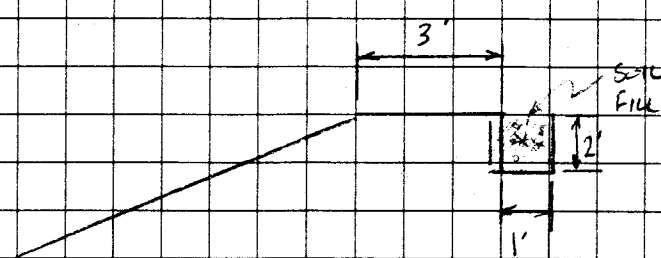
h = 2'

h' = 1'

b = 1'

δ = 38

L_a = 3'



TRENCH ANCHOR

Form 00184 (R4-88)

DUKE POWER COMPANY

Station McGuire N.S. Unit — Rev. 0 File No. MCC-1114.02-00-0001 Sheet 13 Of

Subject LANDFILL

By B. Tom Date 5/25/90

Prob No. Checked By P.M. Sanford Date 8-15-90

LINER ANCHORAGE CONT.

$F_{RL} = 85\#/ft^3 (2+1)(1)(\tan 38) + 85\#/ft^3 (3\,ft)(1\,ft)(\tan 38)$

$F_{RL} = 398\#/FT$

NOTE: THE FORMULA SHOWN ON PREVIOUS PAGE SIMPLY TAKES THE WEIGHT OF SOIL THAT IS ACTUALLY ON TOP OF LINER & REDUCES IT BY THE TANGET OF THE ANGLE OF INTERNAL FRICTION. THE FORMULA SHOWN ON P. 160 OF AMALENDU BAGCHI'S, DESIGN, CONSTRUCTION & MONITORING OF SANITARY LANDFILL PUBLISHED 1990, IS INCORRECT, THIS CAN BE CONFIRMED BY REVIEWING UNITS & BY REVIEWING THE EXAMPLE PROBLEM ON THE SAME PAGE.

REF. 2 GEOSYNTHETIC DESIGN GUIDANCE FOR HAZARDOUS WASTE LANDFILL CELLS & SURFACE IMPOUNDMENTS. p. EPA/TTT-21

* ALSO, NOTE THAT BAGHI RECOMMENDS SIZING THE TRENCH ANCHOR BASED ON THE TENSILE CAPACITY OF THE LINER. EPA'S APPROACH DIFFERS, EPA RECOMMENDS THAT THE ANCHOR NOT BE STRONGER THAN THE LINER. THE RATIONAL BEHIND THIS RECOMMENDATION IS THAT IT IS BETTER FOR THE ANCHOR TO SHIFT THAN FOR THE LINER TO TEAR.

TENSILE STRENGTH FOR 60 MIL:

$126\ \frac{lb}{in^2} \times 12''/ft = 1512\#/FT$

$398\#/FT < 1512\#/FT$

∴ ANCHOR WILL YIELD FIRST ∴ OK

Form 00184 (R4-88)

DUKE POWER COMPANY

Station McGuire N.S. Unit — Rev. 0 File No. MCC-1114.02-00-0001 Sheet 14 Of

Subject LANDFILL

By [illegible] Date 5/25/91

Prob No. Checked By P.M. Sanford Date 8-22-90

CHECK LINER FOR WEIGHT OF EQUIPMENT

*REF # 2 EXAMPLE 4.3

*ASSUME 55 TON PAN W/4 WHEELS → 27.5 K/WHEEL

GROUND CONTACT PRESSURE = 55 psi = σ_c

THICKNESS OF COVER ABOVE HDPE LINER: D = 2'

DEFINE FIELD CONTACT STRESS, σ_c'

R = EFFECTIVE RADIUS OF TIRE CONTACT = $\left[\frac{P}{\pi \sigma_c}\right]^{1/2}$

$$R = \left[\frac{27{,}500}{\pi \times 55}\right]^{1/2} = 12.6 \text{ in.}$$

$$\sigma_c' = \sigma_c \left[\frac{R^2}{(R+D)^2}\right] = 55 \left[\frac{12.6^2}{(12.6+24)^2}\right] = 6.5 \text{ psi}$$

∴ EQUIPMENT PLACES 6.5 psi OF PRESSURE ON THE HDPE LINER.

*REF. P 11

*3600 lb/ft² ÷ 144 in²/ft² = 25 psi > 6.5 psi

∴ LOAD DUE TO EQUIPMENT DOES NOT CONTROL THICKNESS.

Form 00184 (R4-88)

DUKE POWER COMPANY

Station McGuire N.S. Unit — Rev. 0 File No. MCC-1114.02-00-0001 Sheet 15 Of

Subject LANDFILL

By B. [illegible] Date 5/25/90

Prob No. Checked By P.M. Sanford Date 8-22-90

DETERMINE LEACHATE VOLUME

ALL LEACHATE COLLECTED WILL BE PUMPED TO THE WC TREATMENT FACILITY WHICH IS LOCATED ON THE OTHER SIDE OF HIGHWAY 73 AJACENT TO McGUIRE NUCLEAR STATION.

DETERMING THE ANTICIPATED VOLUME OF LEACHATE IS IMPORTANT FOR THE FOLLOWING REASONS:

(1) THE LEACHATE HOLDING BASIN SIZE IS DEPENDANT ON THIS VOLUME.

(2) THE PUMPING RATE WILL BE DETERMINED BY THIS VOLUME.

(3) THE STORAGE CAPACITY WITHIN A CELL WILL BE DETERMINED BY THIS VOLUME.

(4) THE WC TREATMENT OPERATIONAL PROCEDURES WILL BE DETERMINED BY THIS VOLUME.

THE LANDFILL HAS BEEN DIVIDED INTO 4 ACTIVE CELLS TO MINIMIZE LEACHATE VOLUME, EACH CELL WILL BE COMPLETELY FULL & CAPPED OFF BEFORE USING THE NEXT CELL.

THE VOLUME OF WATER FALLING INTO AN ACTIVE CELL IS BASED WORST CASE PROJECTED AREA.

Form 00184 (R4-88)

DUKE POWER COMPANY

Station [illegible] Unit — Rev. 0 File No MC-1114.02-00-0001 Sheet 1 of

Subject LANDFILL

By [illegible] Date 8/23/90

Prob No. Checked By P.M. Sanford Date 8-23-90

POST CLOSURE LEACHATE VOLUME

*BASED ON SOME LONG TERM PERCOLATION STUDIES AT SEVERAL EXISTING LANDFILLS IT CAN BE CONSERVATIVELY ASSUMED THAT LONG TERM LEACHATE GENERATION WILL BE NO MORE THAN (*) 20% OF THE AVERAGE ANNUAL RAINFALL.

*REF 1. DESIGN CONST. & MAINT. OF SANIT. LANDFILL p 33

AREA USED TO CALCULATE POST CLOSURE LEACHATE VOL.:

□ 200' × □ 350' = 210,000 ft²

(*) NOTE: THIS VALUE BASED ON LANDFILL W/ SILTY LOAM COVER, NOT RED CLAY.

AV. ANNUAL RAINFALL = 45" (A)

20% of AV. RAINFALL: .2(45") = 9"/YEAR

CONSERVATIVELY ASSUME THAT THE 9"/YEAR GETS INTO THE LEACHATE COLLECTION SYSTEM IN 1 WEEK.

(A) BASED ON DATA THAT J.R. HENDRICKS PEOPLE HAVE,

$$\therefore \frac{9"}{12"/ft}\left(210{,}000\right) = 157{,}500\ ft^3 = 1{,}178{,}100\ \text{gallons/WEEK}$$

□ REF. CFD-MG-6433C-C-00360, SECT. AA & BB

CONVERT TO GALLONS PER MINUTE:

$$1{,}178{,}100\ \frac{\text{gallons}}{\text{wk}}\left(\frac{1\text{wk}}{7\text{days}}\right)\left(\frac{1\text{day}}{24\text{hrs}}\right)\left(\frac{1\text{hr}}{60\text{min}}\right) = 116.9\ \text{gpm}$$

∴ VOLUME GENERATED DURING A 1 HOUR STORM =

$$116.9\ \text{gpm}\ (60\ \text{min}) = \underline{7014\ \text{gallons}}$$

DUKE POWER COMPANY

Form 00184 (R4-88)

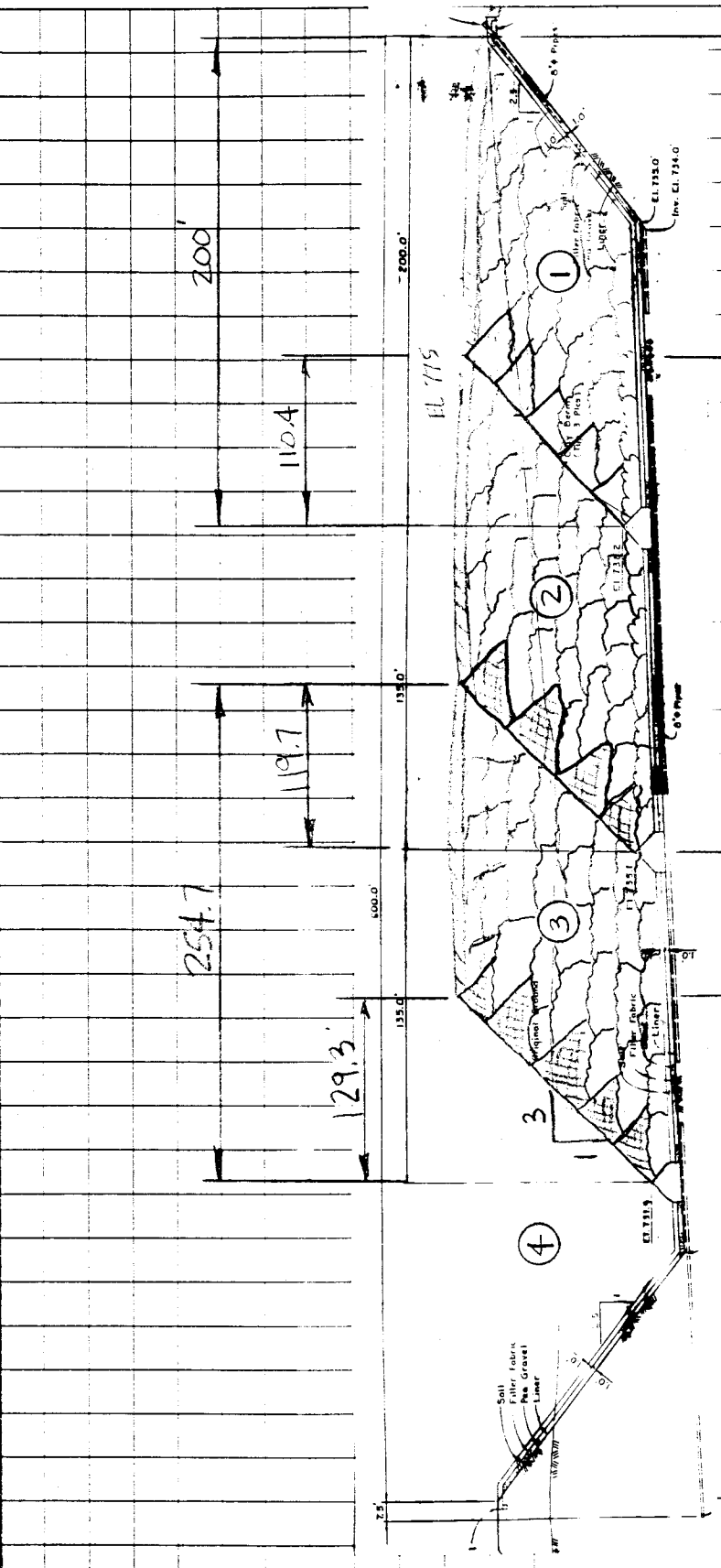
Station McGuire N.S. Unit — Rev. — File No MC-1114.02-00-0001 Sheet 1 Of —

Subject LANDFILL

By J.B. Horn Date 5/25/90

Prob No. — Checked By P.M. Sanford Date 8-23-90

775 - 733.2 = 36.3 36.3(B) = 110.4
775 - 735.1 = 39.9 (B) = 119.7
775 - 731.9 = 43.1 (B) = 129.3



SUMMARY OF SURFACE AREA FOR EACH CELL (NOTE: LANDFILL IS 85' WIDE)

1 :: 200' x 350' : 70,000 ft²
2 :: 245.4 x 350' : 85,890 ft²
3 :: 254.7 x 350' : 89,145 ft²
4 :: 259.3 x 350' : 90,755 ft²

Form 00184 (R4-88)

DUKE POWER COMPANY

Station McGUIRE N.S. Unit – Rev. 0 File No. MCC-1114.02-00-0001 Sheet 18 Of

Subject ANDFILL

By [signature] Date 5/25/90

Prop. No. Checked By P.M. Sanford Date 8-23-90

LEACHATE VOLUME DUE TO DIRECT RAINFALL FALLING ON ACTIVE CELL

MAX. SURFACE AREA = 90,755 ft^2

RAINFALL

REF. 6
EROSION & SEDIMENT CONTROL MANNUAL P. 8.03.7

* 100 YEAR 1 HR STORM = 3"
100 YEAR 24 HR STORM = 7.0"

STORM	VOLUME (GALLONS)
100 YEAR 1 HR	$\frac{3''}{12''/'}(90{,}755\ ft^2)(7.48\ \frac{gal}{ft^3}) = 169{,}712$ gallons
100 YEAR 24 HR	$\frac{7}{12}(90{,}755\ ft^2)(7.48\ \frac{gal}{ft^3}) = 395{,}994$ gallons

Station MCGUIRE N.S. Unit — Rev. 0 File No. MCC-1114.02-00-0001 Sheet 19 Of

Subject LANDFILL

By CB Thom Date 5/25/90

Prob No. Checked By P.M. Sanford Date 8-23-90

DETERMINE MAX. FLOWRATE OF LEACHATE DISCHARGE PIPE

THE MANNING EQUATION WILL BE USED.

ASSUMPTIONS:

(1) CLOSED CHANNEL FLOW WILL BE USED TO CALCULATE FLOW RATE BECAUSE CLOSED CHANNEL WILL PROVIDE HIGHEST FLOW RATES.
(2) STORMWATER IMMEDIATELY GETS INTO THE LEACHATE COLLECTION SYSTEM.
(3) MINOR LOSSES WILL BE NEGLECTED.

NOTE: AFTER A CELL BECOMES ACTIVE OVER THE ENTIRE BOTTOM PORTION OF THE CELL THE LEACHATE COLLECTION SYSTEM WILL SLOW DOWN AND THE FLOW WILL BECOME OPEN, SINCE THE LEACHATE COLLECTION POND MUST BE DESIGNED FOR THE WORST CASE FLOW THE OPEN CHANNEL FLOW FORMULA'S WILL BE USED.

TWO CASES WILL BE ANALYZED:
(1) HIGH ELEV. 730.2 W/ STORMWATER VOLUME FROM CELL 1.
(2) HIGH ELEV. 731.9 W/ STORMWATER VOLUME FROM CELL 4.

Form 00184 (R4-88)

DUKE POWER COMPANY

Station Mc GUIRE N.S. Unit — Rev. 0 File No. MCC-1114.02-00-0001 Sheet 20 Of

Subject LANDFILL

By GB Thom Date 5/25/90

Prob No. Checked By P.M. Sanford Date 8-29-90

DETERMINE MAX FLOWRATE OF LEACHATE DISCHARGE PIPE

CASE I

$g = 32.2\ ft/sec^2$

$n = .009$ (PLASTIC PIPE)

$L = 520 + 410 + 7.5 = 937.5$

$d = 8" = .667'$

(SCALED FROM DRAWING)

FLOW IS CLOSED CHANNEL

*MANNING EQUATION

$$\Delta ELEV. = \frac{V^2}{2g} + h_{Loss}$$

$$*h_L = \frac{2.87 n^2 L V^2}{d^{4/3}}$$

$$738.2 - 717.72 = \frac{V^2}{2(32.2)} + \frac{2.87(.009)^2(937.5)V^2}{(.6667)^{1.333}}$$

$$20.48 = .0155V^2 + .374V^2$$

$$V = 7.25\ fps$$

$$Q = VA = 7.25\left(\frac{\pi(.6667)^2}{4}\right) = 2.53\ cfs = 1135\ gpm$$

CASE II

$g = 32.2\ ft/sec^2$

$n = .009$

$L = 520 + 110 = 630'$

$d = .667'$

$$731.9 - 717.72 = \frac{V^2}{2(32.2)} + \frac{2.87(.009)^2(630)V^2}{(.6667)^{1.333}}$$

$$14.18 = .0155V^2 + .251V^2$$

$$V = 7.29\ fps$$

$$Q = VA = 7.29\left(\frac{\pi(.6667)^2}{4}\right) = 2.5\ cfs = 1123\ gpm$$

Station McGUIRE N.S. Unit — Rev. 0 File No. MCC-1114.02-00-0001 Sheet 21 Of

Subject LANDFILL

By GBK Date 5/25/90

Prob No. Checked By P.M. Sanford Date 8-27-90

DETERMINE TIME REQD FOR LANDFILL TO EMPTY:

SINCE CASE 2 HAS THE LARGEST STORMWATER VOL. & HIGHEST FLOW POND WILL BE SIZED BASED ON CASE 2 (CELL #4).

$$\text{TIME}_{(\text{EMPTY})} = \frac{\text{TOT. VOL. OF STORMWATER FOR 100 YR STORM}}{\text{DISCHARGE FLOWRATE}}$$

$$\text{TIME}_{(\text{EMPTY})} = \frac{169,712 \text{ gallons} + 7014 \text{ gallons}}{1135 \text{ gpm}} = 156 \text{ min.}$$

*PUMP RATE OF LEACHATE SYSTEM. REF. MECHANICAL SECT. OF PROJECT MANUAL

DEFICIT FLOW RATE: 1135 gpm - 300* gpm = 835 gpm

∴ VOL. OF STORAGE REQ'D = DEFICIT FLOWRATE (TIME REQD TO EMPTY)

VOL. = 835 gpm (156 min) = 130,260 gallons.

∴ STORAGE MUST BE PROVIDED FOR 130,260 gallons.

NOTE: ALSO MUST ACCOUNT FOR VOLUME OF RAIN THAT FALLS DIRECTLY INTO POND.

Form 00184 (R4-88)

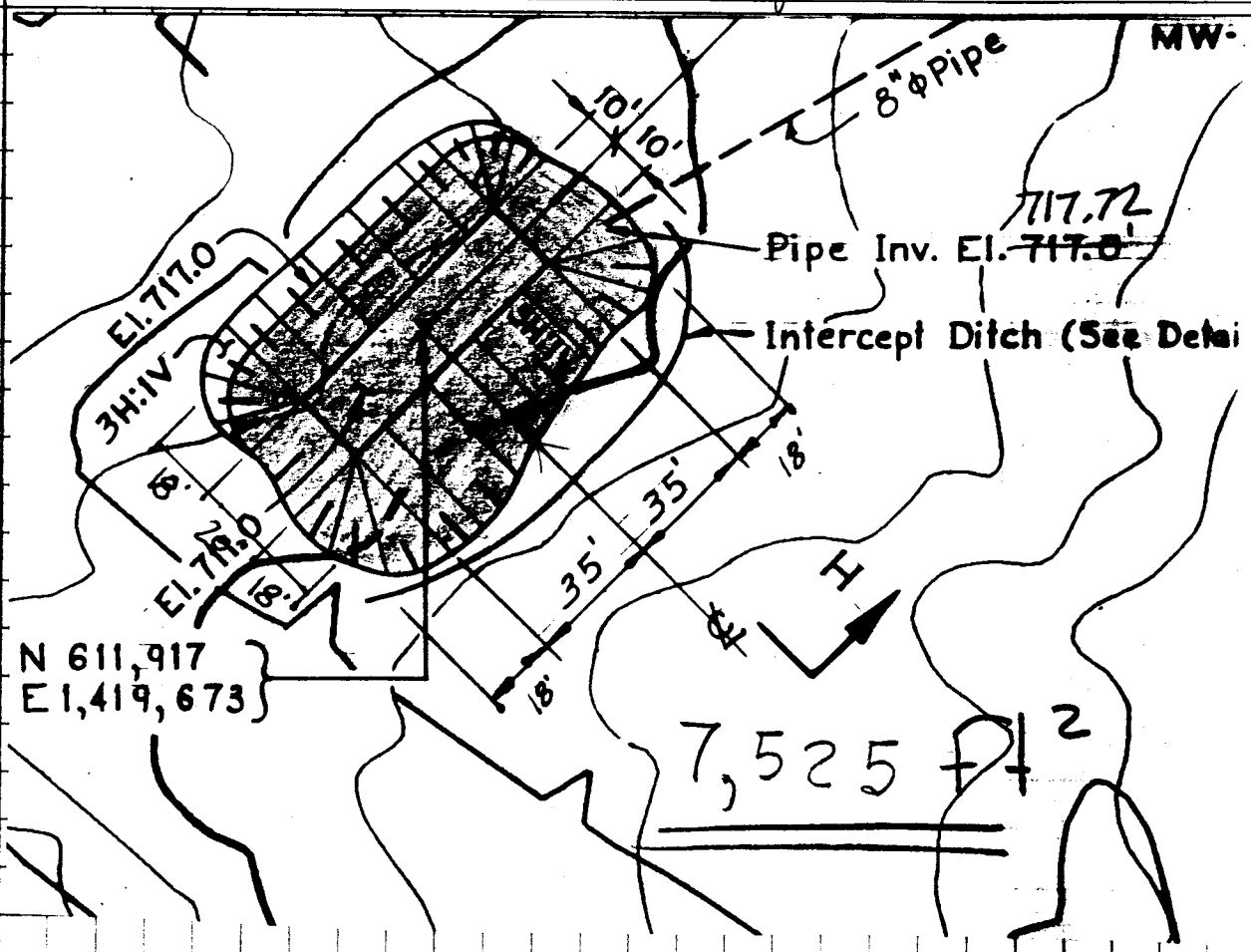
DUKE POWER COMPANY

Station McGUIRE N.S. Unit — Rev. 0 File No. MCC-1114.02-00-0001 Sheet ____ Of ____

Subject LANDFILL

By CB Thor Date 5/25/90

Prob No. ____ Checked By P.M. Sanford Date 8-27-90



*REF 4
P. 2-20

$*Vol = \frac{1}{6} h\left[ab + (a+a_1)(b+b_1) + a_1 b_1\right]$: OR $V = \frac{H}{3}\left(A_1 + A_2 + \sqrt{A_1 A_2}\right)$

$a = 56$ $b = 106$ $h = 6'$

$a_1 = 20$ $b_1 = 70$

Using THIS eq. Vol = 20,438 FT³

$Vol = \frac{1}{6}(6)\left[56(106) + (56+20)(106+70) + 20(70)\right] = 20,712\ ft^3$

$20,712\ ft^3 \left(7.48\ gal/ft^3\right) = 154,925\ gallons$

DETERMINE VOLUME OF WATER COLLECTED DUE TO DIRECT RAINFALL

SURFACE AREA: $7525\ ft^2 \times \frac{3''}{12''/ft} = 1882\ ft^3 = 14,072\ gallons$

Station McGuire Unit ____ Rev. ____ File No. MCC-1114.02-00-0001 Sheet 23 Of ____

Subject ____

By ____ Date ____

Prob No. ____ Checked By P.M. Sanford Date 8-27-90

TOTAL VOLUME REQUIRED FOR LEACHATE POND

VOLUME REQD. DUE TO DIRECT RAINFALL = 14,072 gallons
VOLUME REQD. DUE TO LEACHATE = 130,260 gallons

∴ TOTAL = 144,332 gallons

VOLUME OF LEACHATE POND PROVIDED = 154,925 gallons
VOLUME OF TOTAL LEACHATE + Rainfall = 144,332 gallons

EXCESS CAPACITY = 154,925 - 144,332 = 10,593 gallons

Station _____ Unit ____ Rev. ____ File No. MCC-1114.02-20-0001 Sheet 24 Of ____
Subject LANDFILL

By JB [illegible] Date [illegible]
Proo No. _____ Checked By P.M. Sanford Date 8-23-90

LEACHATE COLLECTION SYSTEM

*REF: L
P. EPA III-2

*MINIMUM TECHNOLOGY GUIDANCE PROVIDED BY EPA.

A. A GRANULAR DRAINAGE LAYER SHOULD BE AT LEAST 12" THICK W/ MIN. HYDRAULIC CONDUCTIVITY OF 1×10^{-2} cm/sec AND MINIMUM BOTTOM SLOPE OF 2%.

B. THE DRAINAGE LAYER SHOULD INCLUDE A PIPE NETWORK WHICH IS DESIGNED TO EFFICIENTLY COLLECT LEACHATE. THE PIPE AND DRAINAGE LAYER MATERIALS SHOULD BE CHEMICALLY RESISTANT TO THE WASTE AND LEACHATE. THE PIPE SHOULD ALSO BE STRONG ENOUGH TO WITHSTAND EXPECTED LOADING.

C. A FILTER LAYER (GRANULAR OR SYNTHETIC) SHOULD BE USED ABOVE THE DRAINAGE LAYER TO PREVENT CLOGGING.

D. THE DRAINAGE SYSTEM MUST COVER THE BOTTOM AND SIDEWALLS OF THE UNIT.

DRAINAGE BLANKET

IN ORDER TO REMOVE THE LEACHATE FROM THE LANDFILL AS QUICKLY AS POSSIBLE #67 STONE WILL BE UTILIZED. STONE WILL BE LESS LIKELY TO BECOME CLOGGED, WILL MOVE LEACHATE QUICKER AND PROVIDES A HIGHER VOID RATIO BETWEEN PARTICLES WHICH PROVIDE ADDITIONAL LEACHATE STORAGE.

DESIRED HYDRAULIC CONDUCTIVITY: 1×10^{-2} cm/sec (Permeabilit

*REF. 5 INTROD. SOIL MECHANICS & FOUNDATIONS: SOWERS. p.97

*HYDRAULIC CONDUCTIVITY OF GRAVEL: 1×10^{-1} cm/sec

1.0×10^{-1} cm/sec > 1×10^{-2} cm/sec ∴ OK

MINIMUM BOTTOM SLOPE : 2%

ACTUAL BOTTOM SLOPE : 3.4%

3.4% > 2.0% ∴ OK

Form 00184 (R4-88)

DUKE POWER COMPANY

Station [illegible] Unit — Rev. 2 File No. MLL-1114.02-00-0001 Sheet 24 Of

Suoject [illegible]

By [illegible] Date [illegible]

Prob No. Checked By P.M. Sanford Date 8-27-90

DRAINAGE BLANKET ON SLOPE

THE INTERIOR SLOPE OF THE McGUIRE LANDFILL IS 2½ HORIZ. TO 1 VERT. THE DRAINAGE BLANKET ON THE SLOPES IS PEA GRAVEL (#78M WASHED STONE) IT IS SAFE TO ASSUME THAT THE PEA GRAVEL HAS AN ANGLE OF REPOSE ≥ TO THE CONCRETE SAND SHOW IN CHART BELOW.

Gundle

SIDE SLOPES AND FRICTION ANGLES

Friction Surfaces

Sliding Surface	Angle of Friction (degrees) Gundline HD	Textured Gundline HD
Gundline HD/H.R. Clay	17.0	25.8
Gundline HD/Ottawa Sand	18.0	34.0
Gundline HD/Concrete Sand	25.0	38.0
Gundline HD/Geotextile (Mirafi 140N)	9.0	32.0

Slopes Corresponding to Friction Angle

Slope	Angle of Friction
8:1	7.1°
6:1	9.5°
5:1	11.3°
4:1	14.0°
3.5:1	15.9°
3:1	18.4°
2.5:1	21.8°
2:1	26.6°
1.5:1	33.7°
1:1	45.0°

[illegible]

∴ 21.8° > 38°

∴ THE CONCRETE SAND IS STABLE

GEOTEXTILE FILTER

TO ENSURE THAT THE LEACHATE CAN FREELY FLOW INTO THE LEACHATE COLLECTION SYSTEM AND THAT THE SYSTEM DOES NOT BECOME CLOGGED DUE TO THE INFLOW OF FINES FROM THE SURROUNDING WASTE AND SOIL LAYERS, THE GEOTEXTILE FILTER WILL BE SIZED BASED ON THE FOLLOWING FORMULAS:

*REF. #2
P. EPA III-7

*TASK FORCE 25 1983

1. SOIL < 50% PASSING THE No. 200 SIEVE
   AOS OF FABRIC > No. 30 SIEVE (.59mm)
2. SOIL > 50% PASSING THE No. 200 SIEVE
   AOS OF THE FABRIC > No. 50 SIEVE (.297mm)

*CARROLL / CHEN

$$\frac{O_{95} \text{ OF THE GEOTEXTILE}}{d_{85} \text{ OF THE SOIL}} < 2$$

$$\frac{O_{95} \text{ OF THE GEOTEXTILE}}{d_{15} \text{ OF THE SOIL}} > 2$$

*GIROUD

RELATIVE DENSITY	$1 < CU < 3$	$CU > 3$
LOOSE (DR < 50%)	$O_{95} < CU(d_{50})$	$O_{95} < (9d_{50})$
INTERMEDIATE (50% < DR > 80%)	$O_{95} < 1.5(CU)(d_{50})$	$O_{95} < (13.5d_{50})$
DENSE (DR > 80%)	$O_{95} < 2(CU)(d_{50})$	$O_{95} < (18d_{50})$

CHECK ACCEPTABILITY = POLYFELT 650

AOS: .15-.21

* REF. # 7 GRAIN SIZE REPORT App. C

CHECK OW* BETWEEN 3'-10'

TASK FORCE 25

70% PASSES THROUGH # 200 ; USE d_{95} > .297mm

.297 > .21 mm → CHECK

CARROLL / CHEN

O_{95} : .21

$\frac{O_{95}}{d_{95}} = \frac{.21}{.25} = .84 < 2$

$\frac{O_{95}}{d_{15}} = \frac{.21}{.0015} = 140 > 2$ OK

GIROUD

ASSUME: DENSE COMPACTION

$CU = \frac{d_{60}}{d_{10}} = \frac{.03}{.0015} = 20$

$\frac{18(.018)}{20} = .0162 < .21$ mm → CHECK

Form 00184 (R4-88)

DUKE POWER COMPANY

Station McGUIRE N.C. Unit ____ Rev. ____ File No. MCC-1114.02-00-0001 Sheet 29 Of ____

Subject ____

By [illegible] Date ____

Proj. No. ____ Checked By P.M. Sanford Date 8-27-90

CHECK OWI BETWEEN 28.5 - 30'

TASK FORCE 25

38% PASSES THROUGH #200 ∴ USE AOS > .59

∴ 59 > .15 ⟶ CHECK

CARROLL / CHEN

$O_{95} = .15$ to $.21$

$\frac{O_{95}}{d_{85}} = \frac{.21}{.40} = .53 < 2$

$\frac{O_{95}}{d_{15}} = \frac{.15}{.015} = 10 > 2$ ∴ OK

GIROUD

$CU = \frac{d_{60}}{d_{10}} = \frac{.18}{.01} = 18$ $d_{50} = .15$

$\frac{18(.15)}{18}$ $.15 < .21$ mm ⟶ CHECK

CHECK OW2 BETWEEN 3-10'

TASK FORCE 25

70% PASSES THROUGH # 200 ∴ USE AOS > .297 mm

.297 mm > .15 mm ⟶ CHECK

CARROLL | CHEN

O_{95} = .15 to .21

$\frac{O_{95}}{d_{85}} = \frac{.21}{.25} = .84 < 2$

$\frac{O_{95}}{d_{15}} = \frac{.15}{.0015} \cdot 100 > 2$ ∴ ok

GIROUD

ASSUME: DENSE COMPACTION

$CU = \frac{d_{60}}{d_{10}} = \frac{.03}{.0015} = 20$

$\frac{18(.015)}{20} = .0135 < .21$ mm ⟶ CHECK

Form 30184 (R4-88)

DUKE POWER COMPANY

Station [illegible] Unit [illegible] Rev. [illegible] File No. MCC-1114.02-00-0001 Sheet 31 Of

Subject LANDFILL

By [illegible] Date [illegible]

Prob No. Checked By P.M. Sanford Date 8-27-90

CHECK OW2 BETWEEN 18.5 - 20'

TASK FORCE 25'

60% PASSES THROUGH # 200 ∴ AOS = .297mm

.297mm > .15 → CHECK

CARROLL / CHEN

O_{95} = .15 to .21

$\frac{O_{95}}{d_{85}} = \frac{.21}{.25} = .84 < 2$

$\frac{O_{95}}{d_{15}} = \frac{.15}{.0015} = 100 > 2$ ∴ OK

GIROUD

ASSUME: DENSE COMPACTION

$CU = \frac{d_{60}}{d_{10}} = \frac{.075}{.0015} = 50$

$\frac{18(.07)}{50} = .025 < .15$ mm → CHECK

CHECK OW-4 3'-10'

TASK FORCE 25

78 % PASSES THROUGH # 200 ∴ AOS > .297mm

.297m > .15 → CHECK

CARROLL / CHEN

$O_{95} = .15$ to $.21$

$\frac{O_{95}}{d_{25}} = \frac{.21}{.15} = 1.4 < 2$ OK

$\frac{O_{95}}{d_{15}} = \frac{.15}{.0015}$ 100 > 2 OK

GROUND

ASSUME: DENSE COMPACTION

$CU = \frac{d_{60}}{d_{10}} = \frac{.025}{.0015} = 16.7$

$\frac{18(.015)}{16.7} = .016 < .15$ mm → CHECK

CHECK OWL 3.5 to 15.0

TASK FORCE 25

78% PASSES THROUGH #200 ∴ AOS ≥ .297mm

.297 > .15 → CHECK

CARROLL / CHEN

O_{95} : .15 to .21

$\frac{O_{95}}{d_{85}} = \frac{.21}{.1} : 2.1 > 2$ → CHECK

$\frac{O_{95}}{d_{15}} = \frac{.15}{.0015} : 100 > 2$

GIROUD

ASSUME: DENSE COMPACTION

$CU = \frac{d_{60}}{d_{10}} = \frac{.04}{.0015} = 26$

$\frac{18(.028)}{26} = .019 < .15$ mm → CHECK

CHECK OWS [illegible]

TASK FORCE 25

55% PASSES THROUGH #200 ∴ AOS > .297mm

.297mm > .15 mm → CHECK

CARROLL / CHEN

O_{95} = .15 to .21

$\frac{O_{95}}{d_{85}} = \frac{.21}{.075} = 2.8 > 2$ CHECK

$\frac{O_{95}}{d_{15}} = \frac{.15}{.0015} = 100 > 2$

GIROUD

ASSUME: DENSE COMPACTION

$CU = \frac{d_{60}}{d_{10}} = \frac{.015}{.0015} = 10$

$\frac{18(.009)}{10} = .0162 < .15$ mm → CHECK

CHECK CWS 13.5 to 15.0

TASK FORCE 25

60% PASSES THROUGH # 200 ∴ AOS > .297 mm

.297 > .15 mm ⟶ CHECK

CARROLL CHEN

O_{95} : .15 to .21

$\frac{O_{95}}{d_{85}} = \frac{.21}{.25} = .84 < 2$ OK

$\frac{O_{95}}{d_{15}} = \frac{.15}{.007} = 21 > 2$ OK

GIROUD

ASSUME: DENSE COMPACTION

$CU = \frac{d_{60}}{d_{10}} = \frac{.08}{.0035} = 22.9$

$\frac{18(.035)}{22.9} = .028 < .15 mm$ ⟶ CHECK

Station [illegible] Unit [illegible] Rev. [illegible] File No MC-1114.02-00-0001 Sheet 36 Of [illegible]

Subject [illegible]

By [illegible] Date [illegible]

Prob No. [illegible] Checked By P.M. Sanford Date 8-27-90

GEOTEXTILE FILTER

FOR CALCULATION PURPOSES THE GEOTEXTILE FILTER FABRIC USED IS POLYFELT TS 650 W/ AOS OF .15mm to .21 mm. THREE FORMULAS HAVE BEEN UTILIZED TO DETERMINE THE ACCEPTABILITY OF A GEOTEXTILE W/ AN AOS OF .15 mm to .21 mm.

TASK FORCE 25

THIS IS THE SIMPLEST OF THE THREE FORMULAS. BASICALLY THIS APPROACH JUST PROVIDES A MINIMUM AOS FOR SOILS THAT ARE PREDOMINANTLY LARGE GRAIN AND A MINIMUM AOS THAT ARE PREDOMINANTLY SMALL GRAIN.

CARROLL / CHEN

THESE FORMULAS ARE SLIGHTLY MORE RESTRICTIVE THAN THE TASK FORCE 25. THERE ARE TWO FORMULAS, THE FIRST IS TO CHECK FLOWING THROUGH THE SECOND IS TO CHECK CLOGGING

GIROUND

THIS FORMULA IS THE MOST CONSERVATIVE WHICH TAKES INTO ACCOUNT THE GRADING. THE FORMULA CHECKS THE FLOWING THROUGH FACTOR ONLY.

Station [illegible] Unit [illegible] Rev. [illegible] File No MLC-1114.02-00-0001 Sheet 37 Of [illegible]
Subject LANDFILL

By [illegible] Date 8/25/90
Prob No. [illegible] Checked By P. M. Sanford Date 8-27-90

GEOTEXTILE FILTER

AFTER CHECKING ALL THE SOIL BORINGS AGAINST EACH OF THE THREE APPROACHES AND KNOWING THAT THE PRIMARY OBJECTIVE IS TO PREVENT CLOGGING OF THE GEOTEXTILE, A GEOTEXTILE W/ AN AOS BETWEEN .15 & .21 IS ACCEPTABLE.

THE TASK FORCE 25 CRITERIA WAS NOT MET FOR ANY OF THE SOIL BORINGS THIS IS OK BY ENGINEERING JUDGEMENT SINCE THIS CRITERIA DOES NOT ACCOUNT FOR MATERIAL W/ A LOT OF FINES.

PRIMARILY THE CARROLL/CHEN FORMULAS WERE MET EXCEPT IN THE FLOW THROUGH CRITERIA WAS SLIGHLY EXCEEDED. AS PREVIOUSLY MENTIONED FLOW THROUGH OF FINES INTO LEACHATE PIPE CAN EASILY BE CORRECTED BY USING THE CLEANOUTS; HOWEVER, A CLOGGED FILTER FABRIC CAN NOT BE CORRECTED.

THE GROUND CRITERIA WAS NOT MET FOR ANY OF THE SOIL BORINGS. THIS CRITERIA IS VERY CONSERVATIVE, AS WELL AS IT IS ONLY CHECKING FLOW THROUGH AS OPPOSED TO CLOGGING.

CONCLUSION: A POLYESTER GEOTEXTILE W/ AOS OF BETWEEN .15 & .21 IS ACCEPTABLE AS A FILTER BLANKET BETWEEN 12" OF SOIL & 12" OF LEACHATE COLLECTION SYSTEM.

Station MCGUIRE N.S. Unit — Rev. — File No. MCC-1114.02-00-0001 Sheet 38 Of —
Subject GEOTEXTILE

By [illegible] Date 5/25/90
Prob No. — Checked By P.M. Sanford Date 5-28-90

GEOTEXTILE FABRIC FOR STRENGTH

REF 3 DESIGNING W/ GEOSYNTHETICS, R.M KOERNER P. 67

* BURST RESISTANCE

ASSUME PRESSURE AT GEOTEXTILE/STONE BASE INTERFACE IS 200psi. THIS IS CONSERVATIVE, MOST TRUCKS HAVE TIRE PRESSURE OF 100psi.

$p' = .75\,p_a$ $p_a = 200$psi.

$p' = .75(200\text{psi}) = 150$ psi.

STONE SIZE #67 RANGES FROM 3/4 ON DOWN

∴ USE 1" ON CHART

∴ BURST PRESSURE PLACED ON FABRIC = 45 psi.

▽ REF 3. P. 84

▽ TENSILE STRENGTH

$T = p'(\varepsilon)^2$ $p' = .75\,p_a$ p_a = SAME AS ABOVE

ε = STRAIN OF FABRIC BETWEEN CONTACT POINTS, USE 75%

$T = .75(200\text{psi})(.75)^2 = 84$ lb.

∴ TENSILE STRENGTH REQUIRED = 84#

Form 00184 (R4-88)

DUKE POWER COMPANY

Station McGuire N.S. Unit — Rev. 0 File No. MCC-1114.02-00-0001 Sheet 39 Of

Subject [illegible]

By [illegible] Date [illegible]

Prob No. Checked By P.M. Sanford Date 8-28-90

REF. 3 P.[illegible]

* PUNCTURE (TEAR) RESISTANCE

$p' = .75 P_a$

S' = SHAPE FACTOR, $S' = 1 - S$ WHERE S FOR CRUSHED STONE = .4

AOS OF GEOTEXTILE = .21mm = d_i

STONE SIZE = 1" = d_a

TIRE PRESSURE = 200 psi = P_a

$T_{REQD} = \pi d_i d_a p' S'$

$\therefore T_{REQD} = 3.14(.21mm)(3.937 \times 10^{-2} \frac{in}{mm})(1")(.75)(200psi)(1-.4) =$

$T_{REQD} = 2.33\#$

SUMMARY

CHECK F.S. FOR POLYFELT 650 & 1000 (using min avg ROLL Properties

	650	1000
BURST RESISTANCE	$\frac{260}{45} = 5.7$	$\frac{450}{45} = 10$
TENSILE	$\frac{170}{84} = 2.0$	$\frac{320}{84} = 3.8$
PUNCTURE	$\frac{85}{2.33} = 36$	$\frac{140}{2.33} = 60$ *

* Puncture for 1000 would be a little different since AOS of 1000 is different

Station MCGUIRE N.S. Unit ____ Rev. ____ File No MCC-1114.02-00-0001 Sheet 45 Of ____

Subject LEACHATE

By [illegible] Date [illegible]

Prob No. ____ Checked By P.M. Sanford Date 8-28-90

LEACHATE PIPE

CHECK PIPE FOR CRUSHING

(*) REF FLEXCO DESIGN MANUAL SEE ATTACH II

USE IOWA FORMULA (*)

$$\% \text{ DEFLECTION} = \frac{\text{CALCULATED DEFLECTION} \times 100}{\text{OUTSIDE DIAMETER OF PIPE}}$$

X = CALCULATED DEFLECTION

$$X = \frac{K \times D \times W}{(.149 \times PS) + (.061 \times E')} \qquad t = \frac{OD \times 1.06}{SDR}$$

$$W = \frac{DC \times OD \times SD}{144} \qquad R = \frac{(OD - t)}{2}$$

$$P.S. = \frac{E \times I}{.149 \times R^3}$$

OD = OUTSIDE DIAMETER OF PIPE (INCH) = 8.625 inches

K = BEDDING FACTOR = .1

D = DEFLECTION LAG FACTOR = 1.5

W = WEIGHT PER LINEAL INCH (#/INCH)

PS = PIPE STIFFNESS (PSI)

E' = SOIL MODULUS

E = FLEXURAL MODULUS

DC = DEPTH OF COVER = 50'

SD = SOIL DENSITY = $90\#/ft^3$

SDR = STANDARD DIMENTIONAL RATIO

t = AVERAGE WALL THICKNESS (INCH)

I = MOMENT OF INERTIA = $\frac{t^3}{12}$

R = $\frac{(OD - t)}{2}$

CHECK PIPE FOR CRUSHING

$$W = \frac{50' \times 3.625 \text{ inches} \times 90 \text{ lb/ft}^3}{144 \frac{\text{in}^2}{\text{ft}^2}} = 269.5 \text{ \#/inch}$$

$$t = \frac{8.625(1.06)}{17} = .538$$

$$I = \frac{(.538)^3}{12} = .0129$$

$$R = \frac{(8.625 - .538)}{2} = 4.04$$

$$PS = \frac{133{,}000 \times .0129}{.149 \times 4.04^3} = 174.6$$

$$X = \frac{.1(1.5)(269.5 \text{ \#/inch})}{.149(174.6) + .061(3000)^*} = .193 \text{ inch deflection}$$

* ASSUMING GRAVEL BACKFILL PACKED.

$$\% \text{ DEFLECTION} = \frac{.193 \text{ inch} \times 100}{8.625} = 2.24\%$$

2.24% IS DUE TO WEIGHT OF SOIL ONLY

Form 00184 (R4-88) DUKE POWER COMPANY

Station McGuire N.S. Unit - Rev. 0 File No. MCC-1114.02-00-0001 Sheet 42 Of
Subject LANDFILL
By CB [signature] Date 5/25/90
Prop No. Checked By P.M. Sanford Date 8-28-90

CHECK LIVE LOAD DUE TO EQUIP

(A) REF. 2 P. EPA 17-15

(A) $\sigma_c' = \sigma_c \left(\frac{R^2}{(R+D)^2} \right)$

D: THICKNESS ABOVE PIPE
R: EFFECTIVE RADIUS OF TIRE CONTACT
P: AXLE LOAD
σ_c: TIRE CONTACT PRESS

$R = \left(\frac{P}{\pi \sigma_c} \right)^{1/2}$

* ASSUME 55 TON PAN W/4 WHEELS

* $P = 27.5^k$
$\sigma_c = 55$ psi
D: 2'

$R = \left[\frac{27{,}500}{\pi (55)} \right]^{1/2} = 12.6$ inch

$\sigma_c' = 55 \text{ psi} \left[\frac{(12.6 \text{ inch})^2}{(12.6 + 24)^2} \right]$

$\sigma_c' = 6.5$ psi

∴ W IN FORMULA ON P. 41 WOULD BE

$W = 6.5 \frac{lb}{in^2} (8.625 in) = 56.1$ #/in

SINCE 56.1 #/in << 269.5 #/in IT IS APPARENT THAT WEIGHT OF SOIL CONTROLS SINCE L.L. DISIPATES AS SOIL COVER INCREASES.

Station [illegible] N.S. Unit — Rev. — File No. MCC-1114.02-00-1001 Sheet 43 Of —

Subject [illegible]

By [illegible] Date 8/25/90

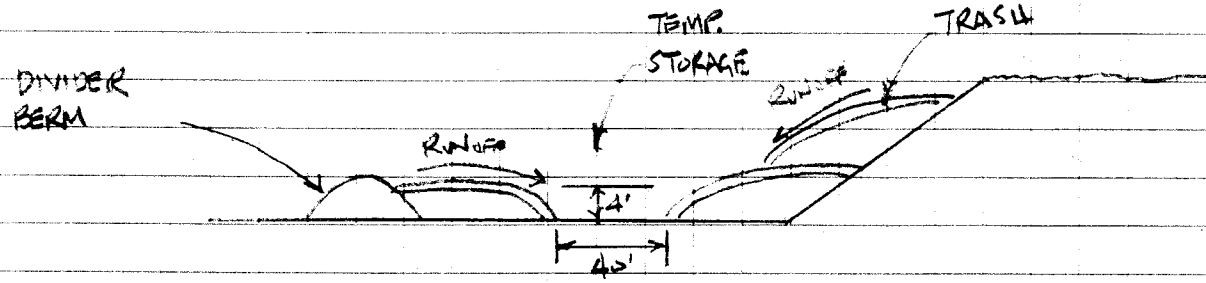
Prob No. — Checked By P.M. Sanford Date 8-23-90

SIZE LEACHATE TRENCH WITHIN ACTIVE CELL

DURING A 100 YEAR 1 HR STORM THERE WILL BE A NEED TO PROVIDE TEMPORARY STORAGE OF THE RAINFALL UNTIL IT HAS HAD A CHANCE TO BE ABSORBED INTO THE LEACHATE COLLECTION SYSTEM. NOTE, CELL 4 DOES NOT REQUIRE ANY STORAGE FOR LEACHATE ABSORBTION BECAUSE IT IS THE LAST CELL.

AS CELLS 1 to 3 RISE IN ELEVATION THE LEACHATE DUE TO RAINFALL DECREASES BECAUSE THE PROJECTED SURFACE AREA IS DECREASING. THEREFORE, THE PROJECTED SURFACE AREA FOR VARIOUS ELEVATIONS WILL BE CALCULATED AND THEN REQUIRED STORAGE VOLUMES WILL BE GENERATED.

CELL 3 HAS THE LARGEST PROJECTED AREAS SINCE IT IS THE DEEPEST OF THE CELLS 1 to 3.



ELEV. VIEW

Station McGuire N.S. Unit — Rev. — File No. MCL-11M.02-00-0001 Sheet 44 Of

Subject LANDFILL

By [illegible] Date 5/25/90

Prob No. Checked By P.M. Sanford Date 8-28-90

PROJECTED AREAS FROM CELL 3

INTIAL ELEVATION

*REF. P. 17 PROJECTED AREA = 91,145 ft² *

WIDTH OF BOTTOM OF LANDFILL AT THIS LOCATION:

765 - 731.9 = 33.1 (Δ in ELEV)

* SIDE SLOPE 2.5H : 1V 350 - 33.1 (2.5*)(2) = 184.5 = WIDTH OF CELL

∴ WIDTH @ ELEV. 765.1 = 184.5'

ELEVATION 750

AT INTIAL ELEV. THE LENGTH OF CELL 3 IS 254.7' (↑ that catches rainfall.)

750 - 731.9 = 18.1'

* BERM SLOPE 3H : 1V 254.7 - 18.1(3*) = 200.4' : LENGTH OF CELL

WIDTH OF LANDFILL AT EL. 750:

765 - 750 = 15'

350 - 15(2.5*)(2) = 275'

ELEVATION 760

AT INTIAL ELEV. THE LENGTH OF CELL 3 IS 254.7 (Tilnot cutches Rainfall)

760 - 731.9 = 28.1'

* BERM SLOPE 3H : 1V

254.7 - 29.1 (3*) = 170.4' = LENGTH OF CELL

WIDTH OF LANDFILL AT EL. 760':

765 - 760 = 5'

Δ SIDE SLOPE 2.5H : 1V

350 - 5(2.5 Δ)(2) = 325'

SUMMARY

ELEV.	PROJECTED AREA	VOL. OF LEACHATE DUE TO 1 HR 100 YR ST
INITIAL	39,145 ft²	$\frac{3}{12}(89{,}145\ ft^2) = 22{,}287\ ft^3$
750	200.4 (350) = 70,140 ft²	$\frac{3}{12}(70{,}140\ ft^2) = 17{,}535\ ft^3$
760	170.4 (350) = 59,640 ft²	$\frac{3}{12}(59{,}640\ ft^2) = 14{,}910\ ft^3$

Station McGuire N.S. Unit - Rev. 0 File No MCG114-02-00-0001 Sheet 46 Of
Subject LANDFILL
By [illegible] Date 8/25/90
Prob No. Checked By P.M. Sanford Date 8-29-90

EXAMPLES OF TRENCH SIZES

INITIAL ELEV. TO ELEV. 750.

LENGTH (SAME AS WIDTH OF CELL @ INITIAL ELEV.) = 184.5'
WIDTH = 41
HEIGHT = 3'

∴ VOLUME PROVIDED = 184.5 x 41' x 3' = 22,694

22,694 > 22,287 ∴ OK

ELEV. 750 to ELEV. 760

LENGTH (SAME AS WIDTH OF CELL @ EL. 750') = 275'
WIDTH = 32'
HEIGHT = 2'

∴ VOLUME PROVIDED = 275 x 32 x 2 = 17,600

17,600 > 17,535 ∴ OK

ELEV 760 to TOP

LENGTH (SAME AS WIDTH OF CELL @ EL 760) = 325'
WIDTH = 31
HEIGHT = 1.5

∴ VOLUME PROVIDED = 325(31)(1.5) = 15,113

15,113 > 14910 ∴ OK

Form 00184 (R4-88)

DUKE POWER COMPANY

Station ALLEN N.S. Unit — Rev. 0 File No. MCC1114.02.00-0001 Sheet 47 Of

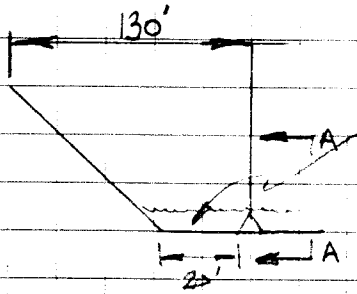
Subject LANDFILL

By [illegible] Date 5/25/90

Prob No. Checked By P.M. Sanford Date 8-29-90

CHECK VOLUME OF CELL 4

DURING A 100 YEAR 1 HR STORM CELL 4 COULD POTENTIALLY OVERFLOW BERM INTO CELL 3 IF NOT SIZED CORRECTLY. CELL 4 IS VERY SENSITIVE TO THIS ISSUE SINCE IT DOES NOT HAVE MUCH OF A BOTTOM. (ONLY 2' WIDE)



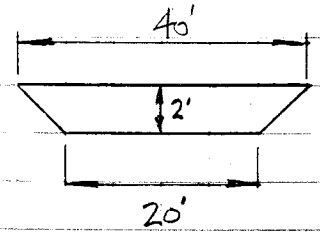
DETERMINE THE VOLUME OF RAIN THAT MAY BE GENERATED BY CELL 4 BEFORE IT BECOMES ACTIVE.

$\frac{3''}{12''/'}(350')(130') = 11,375\ ft^3 = 85,085$ gallons

DETERMINE VOLUME PROVIDED:

DIVIDE VOLUME INTO TWO SHAPES:

SHAPE 1:

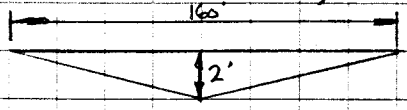


AREA: $\frac{1}{2}(40+20)(2') = 60\ ft^2$

VOL: AREA x LENGTH

VOL: $60 \times 160' = 9600\ ft^3$

SHAPE 2 (CUT LKG. THROUGH SECT A-A ABOVE)



AREA: $\frac{1}{2}(160)(2) = 80\ ft^2$

VOL: AREA x WIDTH

VOL: $80\ ft^2(20\ ft) = 1600\ ft^3$

Form 00184 (R4-88)

DUKE POWER COMPANY

Station McGuire N.S. Unit – Rev. 0 File No. MCC-1114.02-00-0001 Sheet 48 Of

Subject LANDFILL

By [illegible] Date 5/25/90

Prob No. Checked By P.M. Sanford Date 8-29-90

CHECK VOL. OF CELL 4 CONT.

TOTAL STORAGE PROVIDED 9600 ft³ + 1600 ft³ = 11,200 ft³

11,200 ft³ = 83,776 gallons

TOTAL STORAGE REQD = 85,985 gallons − (1123 gpm)(60 min) = (Pg 20)

17,705 gallons

83,776 > 17,705

∴ CELL 4 WILL NOT OVERFLOW INTO CELL 3. NOTE, THIS IS ONLY A CONCERN WHEN CELL 3 BECOMES ACTIVE.

Station McGuire N.S. Unit — Rev. 0 File No. MCC-1114.02.00-0001 Sheet 49 Of
Subject LANDFILL

By [illegible] Date 5/25/90

Prob No. Checked By P.M. Sanford Date 8-29-90

CALCULATE VOLUME OF LANDFILL

*REF 4 p. 2-20

Obelisk (frustum of a rectangular pyramid in Fig. 75).
Volume $= \frac{1}{6}h[(2a + a_1)b + (2a_1 + a)b_1] = \frac{1}{6}h[ab + (a + a_1)(b + b_1) + a_1b_1]$.

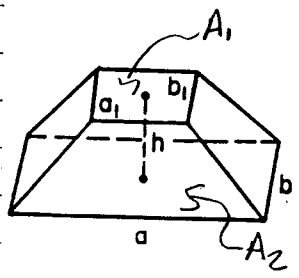


FIG. 75

HEIGHT - 765-735 = 30'

CHECKED USING EQ. C9 FROM ENGINEERING FORMULAS 2ND ED. KURT GIECK

$V = \frac{h}{3}(A_1 + A_2 + \sqrt{A_1 A_2})$

$A_1 = a_1 b_1 = 200(450) = 90{,}000$

$A_2 = a\,b = 350(600) = 210{,}000$

$V_{check} = \frac{30}{3}(90000 + 210000 + \sqrt{90000 \cdot 210000}) = 4{,}374{,}773\ FT^3$

(*) 220 IS THE WIDTH WHEN THE ENTIRE BOTTOM OF LANDFILL IS AT ELEV. 737

(*) b = 425 + 25: 450, 25 IS THE INCREASED LENGTH BASED ON INTERIOR SLOPE 2½H : 1V.

DETERMINE VOLUME OF THE TWO PARTS:

(1) VOLUME OF OBELISK AS STATED ABOVE

(2.) VOLUME OF WEDGE

a = 350 (*) a_1 200 (*) b = 600 b_1 450

VOL. (1) : (OBELISK) h = 30'

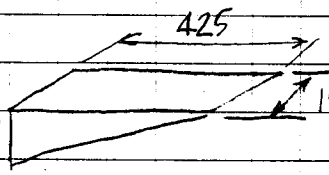
$$V = \frac{1}{6}(30)\left[(350)(600) + (350 + 200)(600 + 450) + 200(450)\right] =$$

$4{,}387{,}500\ ft^3$

less than ½% difference of 4,387,500 ∴ OK ALT. CHECK.

*NOTE: VOL. 2 IS APPROXIMATE.

*VOL. (2)



$\frac{1}{2}(10')(425')(150')$ (*) $= 318{,}750\ ft^3$

Δ160 IS THE SMALLEST WIDTH.

∴ TOTAL VOL. = $318{,}750\ ft^3 + 4387{,}500\ ft^3 = 4706250\ ft^3 =$

$174{,}306\ yd^3$

Form 00184 (R4-88)

DUKE POWER COMPANY

Station McGuire Nuc. Unit — Rev. 0 File No. MC-1114.02-00-0001 Sheet 50 Of

Subject LANDFILL

By [illegible] Date 5/25/90

Prob No. Checked By P.M. Sanford Date 8-29-90

CALCULATE LANDFILL VOLUME CONT

REF. 1 P. 9

A WASTE TO DAILY COVER RATIO OF 4:1 TO 5:1 IS REASONABLE

ASSUMING 4:1 RATIO

∴ CAPACITY OF LANDFILL = .80 (174,306 yd^3) =

139,445 yd^3

ESTIMATED LIFE ASSUMING 5200 yd^3/YR.

$$\text{LIFE} = \frac{139{,}445\ yd^3}{5200\ yd^3/yr} = 26.8 \text{ YEARS}$$

DUE TO THE FACT THAT MCGUIRE DOES NOT USE A COMPACTOR, BUT JUST USES A BULL DOZER I WOULD ANTICIPATE THAT OUR DAILY COVER RATIO MAY BE MORE LIKE 3:1.

∴ CAPACITY OF LANDFILL = .75 (174,306 yd^3)

130,729 yd^3

ESTIMATED LIFE ASSUMING 5200 yd^3/yr

$$\text{LIFE} = \frac{130{,}729\ yd^3}{5200\ yd^3/yr} = 25.1 \text{ YEARS}$$

CONCLUSION: LANDFILL HAS AN APPROX. LIFE ≥ 30 YEAR

Station McGuire N.S. Unit — Rev. 0 File No. MCC-1114.02-00-0001 Sheet 51 Of

Subject LANDFILL

By [illegible] Date 5/25/90

Prob No. Checked By P.M. Sanford Date 8-29-90

CALCULATE VOLUME OF OPERATIONAL COVER REQD.

USING A 4:1 WASTE TO COVER RATIO

VOL OF OPERATIONAL COVER: .20 (174,306. yd^3) = 34,861 yd^3

USING A 3:1 WASTE TO COVER RATIO

VOL. OF OPERATIONAL COVER = .25 (174,306 yd^3) = 43576 yd^3

∴ OPERATIONAL COVER REQ'D WILL RANGE BETWEEN:

30,000 yd^3 to 50,000 yd^3

CALCULATE VOLUME OF SOIL REQ'D FOR FINAL COVER

FINAL COVER WILL BE 2.5' THICK

2' WILL BE SOIL W/ LOW PERMEABILITY
6" WILL BE TOP SOIL

Vol. : *650' x *370 x 2 = 481,000 ft^3 = 17,815 yd^3

650 x 370 x $\frac{2}{12}$ = 120,250 ft^3 = 4454 yd^3

*650 & 370 RATHER THAN 600 TO ENSURE OVERLAP.

Station McGuire N.S. Unit — Rev. 0 File No. MCL-1114.02-00-0001 Sheet 52 Of

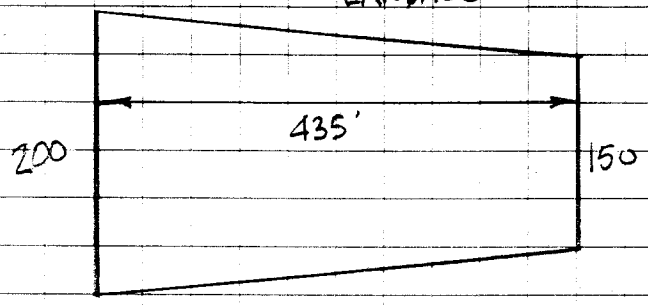
Subject LANDFILL

By [signature] Date 8/25/90

Prob No. Checked By P.M. Sanford Date 8-29-90

CALCULATE OPERATIONAL SURFACE SOIL VOLUME.

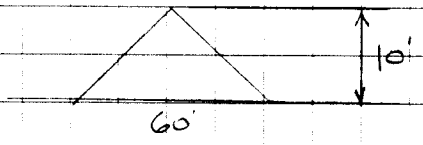
PLAN OF BOTTOM OF LANDFILL



AREA = (200 + 150)(.5)(435) = 76,125 ft^2

SINCE 1' THICK VOL = 76,125 ft^3 = 2819 yd^3

CALCULATE VOLUME OF SOIL REQ'D FOR PRIVACY BERM



VOL: 240' x 60' x 10' x ½ = 72,000 ft^3 : 2667 yd^3

Form 00184 (R4-88)

DUKE POWER COMPANY

Station McGuire N.S. Unit — Rev. — File No. MGC-1114.02-00-0001 Sheet 53 Of

Subject LANDFILL

By [illegible] Date 5/25/

Prob No. Checked By P.M. Sanford Date 8-29-90

EARTHWORK SUMMARY

CUT: 124,317 yd^3 *

FILL: 30,216 yd^3 *

*REF. ATTACH. IV

SOIL AVAILABLE FOR OPERATION = *124,317 − 30,216 = 94,101 yd^3

VOL. OF OPERATIONAL COVER REQ'D: 50,000 yd^3

VOL OF SOIL FOR FINAL COVER (TOPSOIL): 4454 yd^3

VOL OF SOIL FOR FINAL COVER (LOW PERMEABILITY): 17,815 yd^3

VOL OF SOIL FOR OPERATING SURFACE: 2819 yd^3

VOL OF SOIL FOR PRIVACY BERM: 2667 yd^3

TOTAL: 77,755 yd^3

94,101 yd^3 > 77,755 yd^3 ∴

OK PLENTY OF SOIL FOR OPERATION.

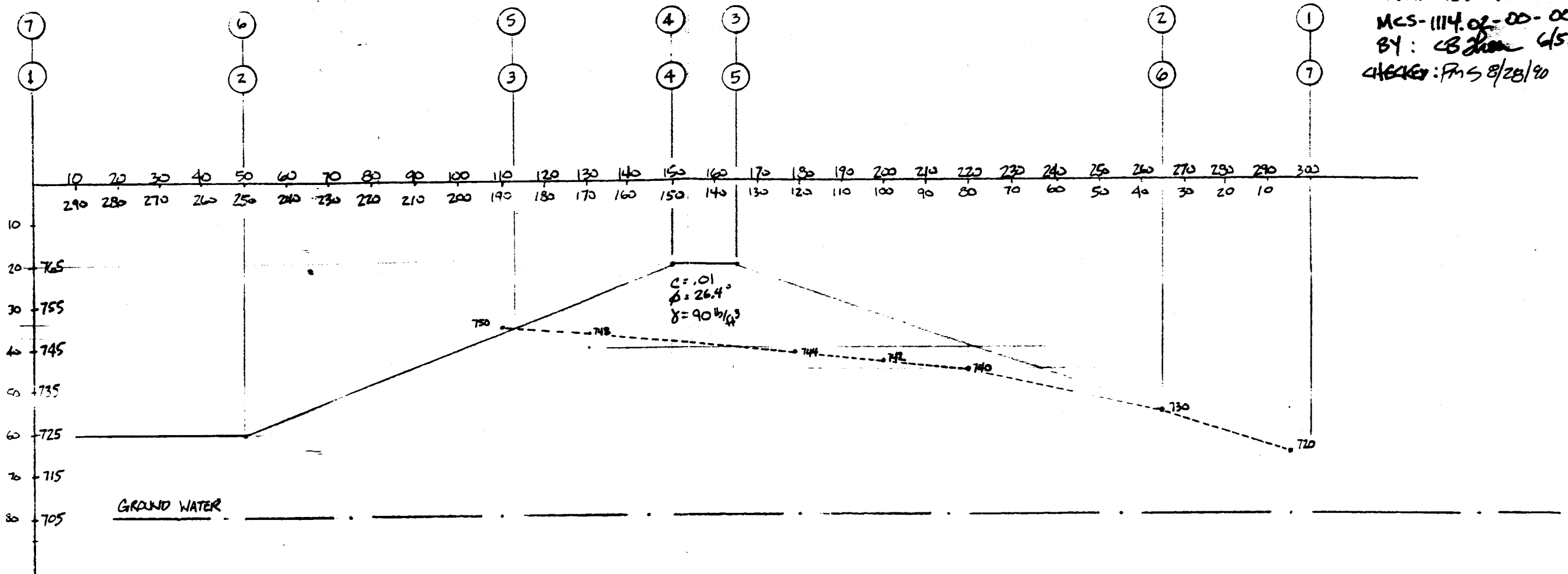
Attachment I

STABR

Slope Stability Analysis

MCS-1114.02-00-0001

ATTACHMENT 1 (1 of 3)
MCS-1114.02-00-0001
BY: CB 4/5/90
CHECKED: FMS 8/28/90



DEPT. _____

DRW'N BY _____ DATE _____

CHK'D BY _____ DATE _____

UNIT NO. _____

STATION: _____

SYSTEM: _____

SPECIFICATION: _____

KEY:

------ : DESIGNATES ORIGINAL GROUND ELEV.

_____ : DESIGNATES FINAL GROUND ELEV.

DWG. NO. _____

ATTACHMENT I (2 of 3)

MCS-1114.02-00-0001

BY: CB Thom 6/5/90

CHECKED: PMS 8/20/90

```
ANALYSIS FOR INTERIOR SLOPE
MCGUIRE LANDFILL STABILITY I
0,4,7,3,1,0,0,0,62.4 I,
 152,20,5 II
30,45,35,30 II,
0,65,65,65,65,80 I,
05,55,55,55,55,80I,
 35,20,20,20,41,80I,
 50,20,20,20,37,80I,
 88,35,35,35,35,80I,
250,60,60,60,60,80I,
999,60,60,60,60,80 I,
 ,,01,26.4,95II
 ,,01,26.4,95II
 .80 II
 5.80 II
 35,90 II
 50,90 II
 80,80 II
 50,80 II
999,80 II
```

File: MCGCBT.DAT Line: 1 Col: 1 Rep

Program STABR -- Version 2.84 (MS-DOS)

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

MCGUIRE LANDFILL STABILITY

CONTROL DATA

NUMBER OF SPECIFIED CENTERS	0
NUMBER OF DEPTH LIMITING TANGENTS	4
NUMBER OF VERTICAL SECTIONS	7
NUMBER OF SOIL LAYER BOUNDARIES	3
NUMBER OF PORE PRESSURE LINES	1
NUMBER OF POINTS DEFINING COHESION PROFILE	0

SEISMIC COEFFICIENT S1,S2 = .00, .00

UNIT WEIGHT OF WATER = 62.40

SEARCH IS BASED ON BISHOP MODIFIED METHOD

SEARCH STARTS AT CENTER (152.0, 20.0) WITH FINAL GRID OF 5.0

ALL CIRCLES TANGENT TO DEPTH, 60.0, 45.0, 35.0, 30.0,

GEOMETRY

SECTIONS	.0	35.0	135.0	150.0	188.0	250.0	999.0
T. CRACKS	65.0	55.0	20.0	20.0	35.0	60.0	60.0
W IN CRACK	65.0	55.0	20.0	20.0	35.0	60.0	60.0
BOUNDARY 1	65.0	55.0	20.0	20.0	35.0	60.0	60.0
BOUNDARY 2	65.0	55.0	41.0	37.0	35.0	60.0	60.0
BOUNDARY 3	80.0	80.0	80.0	80.0	80.0	80.0	80.0

SOIL PROPERTIES

LAYER	COHESION	FRICTION ANGLE	DENSITY
1	0	26.4	95.0

2 0 26.4 [illegible]

ORE PRESSURE DATA
COORDINATES OF EQUI-PRESSURE LINES

SECTIONS	.0	35.0	135.0	150.0	198.0	250.0	999.0
LINE 1	80.0	80.0	80.0	80.0	80.0	80.0	60.0

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

MCGUIRE LANDFILL STABILITY

NUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	FS(BISHOP)	FS(OMS)
1	60.0	40.0	152.0	20.0	8.827	6.731
2	60.0	40.0	142.0	20.0	148.246	113.050
3	60.0	50.0	152.0	10.0	8.538	6.990
4	60.0	40.0	162.0	20.0	4.641	3.524
5	60.0	30.0	152.0	30.0	CENTER BELOW INTERPOLATED CRA	
6	60.0	40.0	157.0	20.0	6.048	4.604
7	60.0	45.0	162.0	15.0	4.511	3.566
8	60.0	40.0	167.0	20.0	3.811	2.886
9	60.0	35.0	162.0	25.0	CENTER BELOW INTERPOLATED CRA	
10	60.0	45.0	167.0	15.0	3.683	2.903
11	60.0	40.0	172.0	20.0	3.234	2.483
12	60.0	35.0	167.0	25.0	CENTER BELOW INTERPOLATED CRA	
13	60.0	45.0	172.0	15.0	3.144	2.471
14	60.0	40.0	177.0	20.0	2.933	2.224
15	60.0	35.0	172.0	25.0	CENTER BELOW INTERPOLATED CRA	
16	60.0	45.0	177.0	15.0	2.780	2.181
17	60.0	40.0	182.0	20.0	2.673	2.036
18	60.0	35.0	177.0	25.0	CENTER BELOW INTERPOLATED CRA	
19	60.0	45.0	182.0	15.0	2.526	1.987
20	60.0	40.0	187.0	20.0	2.480	1.902
21	60.0	35.0	182.0	25.0	CENTER BELOW INTERPOLATED CRA	
22	60.0	45.0	187.0	15.0	2.333	1.844
23	60.0	40.0	192.0	20.0	2.339	1.817
24	60.0	35.0	187.0	25.0	CENTER BELOW INTERPOLATED CRA	
25	60.0	45.0	182.0	15.0	2.526	1.987
26	60.0	50.0	187.0	10.0	2.249	1.825
27	60.0	45.0	192.0	15.0	2.188	1.741
28	60.0	50.0	192.0	10.0	2.099	1.710
29	60.0	45.0	197.0	15.0	2.082	1.678
30	60.0	40.0	192.0	20.0	2.339	1.817
31	60.0	50.0	197.0	10.0	1.986	1.630
32	60.0	45.0	202.0	15.0	1.986	1.626
33	60.0	40.0	197.0	20.0	2.213	1.748
34	60.0	50.0	202.0	10.0	1.903	1.583
35	60.0	45.0	207.0	15.0	1.896	1.578
36	60.0	40.0	202.0	20.0	2.097	1.685
37	60.0	50.0	207.0	10.0	1.826	1.542
38	60.0	45.0	212.0	15.0	1.811	1.532
39	60.0	40.0	207.0	20.0	1.988	1.626
40	60.0	50.0	212.0	10.0	1.753	1.502
41	60.0	45.0	217.0	15.0	1.732	1.489
42	60.0	40.0	212.0	20.0	1.887	1.571
43	60.0	50.0	217.0	10.0	1.685	1.465
44	60.0	45.0	222.0	15.0	1.657	1.449
45	60.0	40.0	217.0	20.0	1.793	1.521
46	60.0	50.0	222.0	10.0	1.619	1.430
47	60.0	45.0	227.0	15.0	1.588	1.413
48	60.0	40.0	222.0	20.0	1.707	1.474
49	60.0	50.0	227.0	10.0	1.558	1.398
50	60.0	45.0	232.0	15.0	1.523	1.379
51	60.0	40.0	227.0	20.0	1.626	1.432

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

MCGUIRE LANDFILL STABILITY

NUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	FS(BISHOP)	FS(OMS)
1	45.0	25.0	227.0	20.0	CIRCLE OUTSIDE SLOPE	
2	45.0	25.0	217.0	20.0	1.243	1.238
3	45.0	35.0	227.0	10.0	CIRCLE OUTSIDE SLOPE	
4	45.0	25.0	237.0	20.0	CIRCLE OUTSIDE SLOPE	
5	45.0	15.0	227.0	30.0	CIRCLE OUTSIDE SLOPE	
6	45.0	25.0	212.0	20.0	1.332	1.282
7	45.0	30.0	217.0	15.0	1.254	1.243
8	45.0	25.0	222.0	20.0	CIRCLE OUTSIDE SLOPE	
9	45.0	20.0	217.0	25.0	CIRCLE OUTSIDE SLOPE	
10	45.0	30.0	212.0	15.0	1.330	1.281
11	45.0	30.0	222.0	15.0	CIRCLE OUTSIDE SLOPE	
12	45.0	20.0	222.0	25.0	CIRCLE OUTSIDE SLOPE	
13	45.0	20.0	212.0	25.0	1.336	1.284

F.S. MINIMUM= 1.243 FOR THE CIRCLE OF CENTER (217.0, 20.0)

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

MCGUIRE LANDFILL STABILITY

NUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	FS(BISHOP)	FS(OMS)
1	35.0	10.0	212.0	25.0	CIRCLE OUTSIDE SLOPE	
2	35.0	10.0	202.0	25.0	CIRCLE OUTSIDE SLOPE	
3	35.0	20.0	212.0	15.0	CIRCLE OUTSIDE SLOPE	
4	35.0	10.0	222.0	25.0	CIRCLE OUTSIDE SLOPE	
5	35.0	.0	212.0	35.0	CIRCLE OUTSIDE SLOPE	
6	35.0	.0	207.0	35.0	CIRCLE OUTSIDE SLOPE	
7	35.0	5.0	212.0	30.0	CIRCLE OUTSIDE SLOPE	
8	35.0	.0	217.0	35.0	CIRCLE OUTSIDE SLOPE	
9	35.0	-5.0	212.0	40.0	CIRCLE OUTSIDE SLOPE	
10	35.0	-5.0	207.0	40.0	CIRCLE OUTSIDE SLOPE	
11	35.0	-5.0	217.0	40.0	CIRCLE OUTSIDE SLOPE	
12	35.0	-10.0	212.0	45.0	CIRCLE OUTSIDE SLOPE	
13	35.0	-10.0	207.0	45.0	CIRCLE OUTSIDE SLOPE	
14	35.0	-10.0	217.0	45.0	CIRCLE OUTSIDE SLOPE	
15	35.0	-15.0	212.0	50.0	CIRCLE OUTSIDE SLOPE	
16	35.0	-15.0	207.0	50.0	CIRCLE OUTSIDE SLOPE	
17	35.0	-15.0	217.0	50.0	CIRCLE OUTSIDE SLOPE	
18	35.0	-20.0	212.0	55.0	CIRCLE OUTSIDE SLOPE	
19	35.0	-20.0	207.0	55.0	CIRCLE OUTSIDE SLOPE	
20	35.0	-20.0	217.0	55.0	CIRCLE OUTSIDE SLOPE	
21	35.0	-25.0	212.0	60.0	CIRCLE OUTSIDE SLOPE	
22	35.0	-25.0	207.0	60.0	CIRCLE OUTSIDE SLOPE	
23	35.0	-25.0	217.0	60.0	CIRCLE OUTSIDE SLOPE	
24	35.0	-30.0	212.0	65.0	CIRCLE OUTSIDE SLOPE	
25	35.0	-30.0	207.0	65.0	CIRCLE OUTSIDE SLOPE	
26	35.0	-30.0	217.0	65.0	CIRCLE OUTSIDE SLOPE	
27	35.0	-35.0	212.0	70.0	CIRCLE OUTSIDE SLOPE	
28	35.0	-35.0	207.0	70.0	CIRCLE OUTSIDE SLOPE	
29	35.0	-35.0	217.0	70.0	CIRCLE OUTSIDE SLOPE	
30	35.0	-40.0	212.0	75.0	CIRCLE OUTSIDE SLOPE	
31	35.0	-40.0	207.0	75.0	CIRCLE OUTSIDE SLOPE	
32	35.0	-40.0	217.0	75.0	CIRCLE OUTSIDE SLOPE	
33	35.0	-45.0	212.0	80.0	CIRCLE OUTSIDE SLOPE	
34	35.0	-45.0	207.0	80.0	CIRCLE OUTSIDE SLOPE	
35	35.0	-45.0	217.0	80.0	CIRCLE OUTSIDE SLOPE	

37	35.0	-80.0	207.0	85.0	CIRCLE OUTSIDE SLOPE
38	35.0	-80.0	217.0	85.0	CIRCLE OUTSIDE SLOPE
39	35.0	-85.0	212.0	90.0	CIRCLE OUTSIDE SLOPE
40	35.0	-85.0	207.0	90.0	CIRCLE OUTSIDE SLOPE
41	35.0	-85.0	217.0	90.0	CIRCLE OUTSIDE SLOPE
42	35.0	-90.0	212.0	95.0	CIRCLE OUTSIDE SLOPE
43	35.0	-90.0	207.0	95.0	CIRCLE OUTSIDE SLOPE
44	35.0	-90.0	217.0	95.0	CIRCLE OUTSIDE SLOPE
45	35.0	-95.0	212.0	100.0	CIRCLE OUTSIDE SLOPE
46	35.0	-95.0	207.0	100.0	CIRCLE OUTSIDE SLOPE
47	35.0	-95.0	217.0	100.0	CIRCLE OUTSIDE SLOPE
48	35.0	-70.0	212.0	105.0	CIRCLE OUTSIDE SLOPE
49	35.0	-70.0	207.0	105.0	CIRCLE OUTSIDE SLOPE
50	35.0	-70.0	217.0	105.0	CIRCLE OUTSIDE SLOPE
51	35.0	-75.0	212.0	110.0	CIRCLE OUTSIDE SLOPE

SEARCH IS ABANDONED AFTER 51CIRCLES

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

MCGUIRE LANDFILL STABILITY

NUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	FS(BISHOP)	FS(OMS)
1	30.0	-80.0	212.0	110.0	CIRCLE OUTSIDE SLOPE	
2	30.0	-30.0	202.0	110.0	CIRCLE OUTSIDE SLOPE	
3	30.0	-70.0	212.0	100.0	CIRCLE OUTSIDE SLOPE	
4	30.0	-80.0	222.0	110.0	CIRCLE OUTSIDE SLOPE	
5	30.0	-90.0	212.0	120.0	CIRCLE OUTSIDE SLOPE	
6	30.0	-90.0	207.0	120.0	CIRCLE OUTSIDE SLOPE	
7	30.0	-85.0	212.0	115.0	CIRCLE OUTSIDE SLOPE	
8	30.0	-90.0	217.0	120.0	CIRCLE OUTSIDE SLOPE	
9	30.0	-95.0	212.0	125.0	CIRCLE OUTSIDE SLOPE	
10	30.0	-95.0	207.0	125.0	CIRCLE OUTSIDE SLOPE	
11	30.0	-95.0	217.0	125.0	CIRCLE OUTSIDE SLOPE	
12	30.0	-100.0	212.0	130.0	CIRCLE OUTSIDE SLOPE	
13	30.0	-100.0	207.0	130.0	CIRCLE OUTSIDE SLOPE	
14	30.0	-100.0	217.0	130.0	CIRCLE OUTSIDE SLOPE	
15	30.0	-105.0	212.0	135.0	CIRCLE OUTSIDE SLOPE	
16	30.0	-105.0	207.0	135.0	CIRCLE OUTSIDE SLOPE	
17	30.0	-105.0	217.0	135.0	CIRCLE OUTSIDE SLOPE	
18	30.0	-110.0	212.0	140.0	CIRCLE OUTSIDE SLOPE	
19	30.0	-110.0	207.0	140.0	CIRCLE OUTSIDE SLOPE	
20	30.0	-110.0	217.0	140.0	CIRCLE OUTSIDE SLOPE	
21	30.0	-115.0	212.0	145.0	CIRCLE OUTSIDE SLOPE	
22	30.0	-115.0	207.0	145.0	CIRCLE OUTSIDE SLOPE	
23	30.0	-115.0	217.0	145.0	CIRCLE OUTSIDE SLOPE	
24	30.0	-120.0	212.0	150.0	CIRCLE OUTSIDE SLOPE	
25	30.0	-120.0	207.0	150.0	CIRCLE OUTSIDE SLOPE	
26	30.0	-120.0	217.0	150.0	CIRCLE OUTSIDE SLOPE	
27	30.0	-125.0	212.0	155.0	CIRCLE OUTSIDE SLOPE	
28	30.0	-125.0	207.0	155.0	CIRCLE OUTSIDE SLOPE	
29	30.0	-125.0	217.0	155.0	CIRCLE OUTSIDE SLOPE	
30	30.0	-130.0	212.0	160.0	CIRCLE OUTSIDE SLOPE	
31	30.0	-130.0	207.0	160.0	CIRCLE OUTSIDE SLOPE	
32	30.0	-130.0	217.0	160.0	CIRCLE OUTSIDE SLOPE	
33	30.0	-135.0	212.0	165.0	CIRCLE OUTSIDE SLOPE	
34	30.0	-135.0	207.0	165.0	CIRCLE OUTSIDE SLOPE	
35	30.0	-135.0	217.0	165.0	CIRCLE OUTSIDE SLOPE	
36	30.0	-140.0	212.0	170.0	CIRCLE OUTSIDE SLOPE	
37	30.0	-140.0	207.0	170.0	CIRCLE OUTSIDE SLOPE	
38	30.0	-140.0	217.0	170.0	CIRCLE OUTSIDE SLOPE	
39	30.0	-145.0	212.0	175.0	CIRCLE OUTSIDE SLOPE	
40	30.0	-145.0	207.0	175.0	CIRCLE OUTSIDE SLOPE	
41	30.0	-145.0	217.0	175.0	CIRCLE OUTSIDE SLOPE	

42	30.0	-150.0	212.0	180.0	CIRCLE OUTSIDE SLOPE
43	30.0	-150.0	207.0	180.0	CIRCLE OUTSIDE SLOPE
44	30.0	-150.0	217.0	180.0	CIRCLE OUTSIDE SLOPE
45	30.0	-155.0	212.0	185.0	CIRCLE OUTSIDE SLOPE
46	30.0	-155.0	207.0	185.0	CIRCLE OUTSIDE SLOPE
47	30.0	-155.0	217.0	185.0	CIRCLE OUTSIDE SLOPE
48	30.0	-160.0	212.0	190.0	CIRCLE OUTSIDE SLOPE
49	30.0	-160.0	207.0	190.0	CIRCLE OUTSIDE SLOPE
50	30.0	-160.0	217.0	190.0	CIRCLE OUTSIDE SLOPE
51	30.0	-165.0	212.0	195.0	CIRCLE OUTSIDE SLOPE

SEARCH IS ABANDONED AFTER 51CIRCLES

ATTACHMENT # I (3 of 3)

MCS - 1114.02-00-0001

BY: CB Thom 6/5/90

CHECKED: RMS 8/28/90

ANALYSIS FOR EXTERIOR SLOPE

MCGUIRE LANDFILL STABILITY I

0,4,7,3,1.0,0.0,62.4 II

1,170,20,5 III

60,45,35,30 IV

0,60,60,60,60,80 V

50,60,60,60,30,30 V

112,35,35,35,35,80 V

150,20,20,20,37,80 V

165,20,20,20,41,80 VI

265,55,55,55,55,80 VI

399,65,65,65,65,80 VI

1,,01,26,4,95 II

1,,01,26,4,95 II

,80 III

0,80 III

12,80 III

150,80 III

165,80 III

265,80 III

399,80 III

File: MCCCBT.DAT Line: 1 Col: 1 Rep

Program STABR -- Version 2.84 (MS-DOS)

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

MCGUIRE LANDFILL STABILITY

CONTROL DATA

NUMBER OF SPECIFIED CENTERS	0
NUMBER OF DEPTH LIMITING TANGENTS	4
NUMBER OF VERTICAL SECTIONS	7
NUMBER OF SOIL LAYER BOUNDARIES	3
NUMBER OF PORE PRESSURE LINES	1
NUMBER OF POINTS DEFINING COHESION PROFILE	0

SEISMIC COEFFICIENT S1,S2 = .00, .00

UNIT WEIGHT OF WATER = 62.40

SEARCH IS BASED ON BISHOP MODIFIED METHOD

SEARCH STARTS AT CENTER (170.0, 20.0) WITH FINAL GRID OF 5.0

ALL CIRCLES TANGENT TO DEPTH, 60.0, 45.0, 35.0, 30.0,

GEOMETRY

SECTIONS	.0	50.0	112.0	150.0	165.0	265.0	999.0
T. CRACKS	60.0	60.0	35.0	20.0	20.0	55.0	65.0
W IN CRACK	60.0	60.0	35.0	20.0	20.0	55.0	65.0
BOUNDARY 1	60.0	60.0	35.0	20.0	20.0	55.0	65.0
BOUNDARY 2	60.0	60.0	35.0	37.0	41.0	55.0	65.0
BOUNDARY 3	80.0	80.0	80.0	80.0	80.0	80.0	80.0

SOIL PROPERTIES

LAYER	COHESION	FRICTION ANGLE	DENSITY

2	.0	26.4	95.0

PORE PRESSURE DATA
COORDINATES OF EQUI-PRESSURE LINES

SECTIONS	.0	50.0	112.0	150.0	185.0	265.0	999.0
LINE 1	30.0	30.0	80.0	80.0	80.0	80.0	80.0

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

MCGUIRE LANDFILL STABILITY

NUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	FS(BISHOP)	FS(OMS)
1	60.0	40.0	170.0	20.0	8.495	6.437
2	60.0	40.0	160.0	20.0	69.009	52.595
3	60.0	50.0	170.0	10.0	8.490	6.920
4	60.0	40.0	180.0	20.0	4.753	3.569
5	60.0	30.0	170.0	30.0	CENTER BELOW INTERPOLATED CRA	
6	60.0	40.0	175.0	20.0	6.026	4.547
7	60.0	45.0	180.0	15.0	4.622	3.619
8	60.0	40.0	185.0	20.0	4.005	2.994
9	60.0	35.0	180.0	25.0	CENTER BELOW INTERPOLATED CRA	
10	60.0	45.0	185.0	15.0	3.847	2.998
11	60.0	40.0	190.0	20.0	3.542	2.647
12	60.0	35.0	185.0	25.0	CENTER BELOW INTERPOLATED CRA	
13	60.0	45.0	190.0	15.0	3.351	2.601
14	60.0	40.0	195.0	20.0	3.224	2.419
15	60.0	35.0	190.0	25.0	CENTER BELOW INTERPOLATED CRA	
16	60.0	45.0	195.0	15.0	3.027	2.349
17	60.0	40.0	200.0	20.0	2.987	2.253
18	60.0	35.0	195.0	25.0	CENTER BELOW INTERPOLATED CRA	
19	60.0	45.0	200.0	15.0	2.795	2.177
20	60.0	40.0	205.0	20.0	2.820	2.146
21	60.0	35.0	200.0	25.0	CENTER BELOW INTERPOLATED CRA	
22	60.0	45.0	195.0	15.0	3.027	2.349
23	60.0	50.0	200.0	10.0	2.681	2.147
24	60.0	45.0	205.0	15.0	2.621	2.052
25	60.0	50.0	205.0	10.0	2.504	2.012
26	60.0	45.0	210.0	15.0	2.497	1.973
27	60.0	40.0	205.0	20.0	2.820	2.146
28	60.0	50.0	210.0	10.0	2.369	1.914
29	60.0	45.0	215.0	15.0	2.396	1.920
30	60.0	40.0	210.0	20.0	2.686	2.074
31	60.0	50.0	205.0	10.0	2.504	2.012
32	60.0	55.0	210.0	5.0	2.292	1.892
33	60.0	50.0	215.0	10.0	2.274	1.857
34	60.0	55.0	215.0	5.0	2.187	1.815
35	60.0	50.0	220.0	10.0	2.195	1.815
36	60.0	45.0	215.0	15.0	2.396	1.920
37	60.0	55.0	210.0	5.0	2.292	1.892
38	60.0	60.0	215.0	.0	2.133	1.800
39	60.0	55.0	220.0	5.0	2.113	1.773
40	60.0	60.0	220.0	.0	2.050	1.741
41	60.0	55.0	225.0	5.0	2.048	1.739
42	60.0	50.0	220.0	10.0	2.195	1.815
43	60.0	60.0	225.0	.0	1.991	1.710
44	60.0	55.0	230.0	5.0	1.986	1.707
45	60.0	50.0	225.0	10.0	2.119	1.776
46	60.0	60.0	230.0	.0	1.936	1.681
47	60.0	55.0	235.0	5.0	1.926	1.676
48	60.0	50.0	230.0	10.0	2.047	1.739
49	60.0	60.0	235.0	.0	1.883	1.654
50	60.0	55.0	240.0	5.0	1.869	1.647
51	60.0	50.0	235.0	10.0	1.978	1.703

SEARCH IS ABANDONED AFTER 51CIRCLES

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

MCGUIRE LANDFILL STABILITY

NUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	FS(BISHOP)	FS(OMS)
1	45.0	35.0	235.0	10.0	1.510	1.465
2	45.0	25.0	225.0	10.0	1.650	1.535
3	45.0	45.0	235.0	.0	1.506	1.463
4	45.0	35.0	245.0	10.0	CIRCLE OUTSIDE SLOPE	
5	45.0	25.0	235.0	20.0	1.518	1.469
6	45.0	45.0	230.0	.0	1.558	1.489
7	45.0	50.0	235.0	-5.0	1.505	1.462
8	45.0	45.0	240.0	.0	1.457	1.438
9	45.0	40.0	235.0	5.0	1.508	1.463
10	45.0	50.0	240.0	-5.0	1.460	1.440
11	45.0	45.0	245.0	.0	CIRCLE OUTSIDE SLOPE	
12	45.0	40.0	240.0	5.0	1.452	1.436
13	45.0	40.0	235.0	5.0	1.508	1.463
14	45.0	40.0	245.0	5.0	CIRCLE OUTSIDE SLOPE	
15	45.0	35.0	240.0	10.0	1.447	1.433
16	45.0	35.0	235.0	10.0	1.510	1.465
17	45.0	35.0	245.0	10.0	CIRCLE OUTSIDE SLOPE	
18	45.0	30.0	240.0	15.0	1.440	1.430
19	45.0	30.0	235.0	15.0	1.514	1.466
20	45.0	30.0	245.0	15.0	CIRCLE OUTSIDE SLOPE	
21	45.0	25.0	240.0	20.0	1.431	1.426
22	45.0	25.0	235.0	20.0	1.518	1.469
23	45.0	25.0	245.0	20.0	CIRCLE OUTSIDE SLOPE	
24	45.0	20.0	240.0	25.0	CIRCLE OUTSIDE SLOPE	
25	45.0	30.0	235.0	15.0	1.514	1.466
26	45.0	30.0	245.0	15.0	CIRCLE OUTSIDE SLOPE	
27	45.0	20.0	245.0	25.0	CIRCLE OUTSIDE SLOPE	
28	45.0	20.0	235.0	25.0	1.525	1.472

F.S. MINIMUM= 1.431 FOR THE CIRCLE OF CENTER (240.0, 20.0)

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

MCGUIRE LANDFILL STABILITY

NUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	FS(BISHOP)	FS(OMS)
1	35.0	10.0	235.0	25.0	CIRCLE OUTSIDE SLOPE	
2	35.0	10.0	225.0	25.0	CIRCLE OUTSIDE SLOPE	
3	35.0	20.0	235.0	15.0	CIRCLE OUTSIDE SLOPE	
4	35.0	10.0	245.0	25.0	CIRCLE OUTSIDE SLOPE	
5	35.0	.0	235.0	35.0	CIRCLE OUTSIDE SLOPE	
6	35.0	.0	230.0	35.0	CIRCLE OUTSIDE SLOPE	
7	35.0	5.0	235.0	30.0	CIRCLE OUTSIDE SLOPE	
8	35.0	.0	240.0	35.0	CIRCLE OUTSIDE SLOPE	
9	35.0	-5.0	235.0	40.0	CIRCLE OUTSIDE SLOPE	
10	35.0	-5.0	230.0	40.0	CIRCLE OUTSIDE SLOPE	
11	35.0	-5.0	240.0	40.0	CIRCLE OUTSIDE SLOPE	
12	35.0	-10.0	235.0	45.0	CIRCLE OUTSIDE SLOPE	
13	35.0	-10.0	230.0	45.0	CIRCLE OUTSIDE SLOPE	
14	35.0	-10.0	240.0	45.0	CIRCLE OUTSIDE SLOPE	
15	35.0	-15.0	235.0	50.0	CIRCLE OUTSIDE SLOPE	
16	35.0	-15.0	230.0	50.0	CIRCLE OUTSIDE SLOPE	
17	35.0	-15.0	240.0	50.0	CIRCLE OUTSIDE SLOPE	
18	35.0	-20.0	235.0	55.0	CIRCLE OUTSIDE SLOPE	
19	35.0	-20.0	230.0	55.0	CIRCLE OUTSIDE SLOPE	

21	35.0	-25.0	235.0	60.0	CIRCLE OUTSIDE SLOPE
22	35.0	-25.0	230.0	60.0	CIRCLE OUTSIDE SLOPE
23	35.0	-25.0	240.0	60.0	CIRCLE OUTSIDE SLOPE
24	35.0	-30.0	235.0	65.0	CIRCLE OUTSIDE SLOPE
25	35.0	-30.0	230.0	65.0	CIRCLE OUTSIDE SLOPE
26	35.0	-30.0	240.0	65.0	CIRCLE OUTSIDE SLOPE
27	35.0	-35.0	235.0	70.0	CIRCLE OUTSIDE SLOPE
28	35.0	-35.0	230.0	70.0	CIRCLE OUTSIDE SLOPE
29	35.0	-35.0	240.0	70.0	CIRCLE OUTSIDE SLOPE
30	35.0	-40.0	235.0	75.0	CIRCLE OUTSIDE SLOPE
31	35.0	-40.0	230.0	75.0	CIRCLE OUTSIDE SLOPE
32	35.0	-40.0	240.0	75.0	CIRCLE OUTSIDE SLOPE
33	35.0	-45.0	235.0	80.0	CIRCLE OUTSIDE SLOPE
34	35.0	-45.0	230.0	80.0	CIRCLE OUTSIDE SLOPE
35	35.0	-45.0	240.0	80.0	CIRCLE OUTSIDE SLOPE
36	35.0	-50.0	235.0	85.0	CIRCLE OUTSIDE SLOPE
37	35.0	-50.0	230.0	85.0	CIRCLE OUTSIDE SLOPE
38	35.0	-50.0	240.0	85.0	CIRCLE OUTSIDE SLOPE
39	35.0	-55.0	235.0	90.0	CIRCLE OUTSIDE SLOPE
40	35.0	-55.0	230.0	90.0	CIRCLE OUTSIDE SLOPE
41	35.0	-55.0	240.0	90.0	CIRCLE OUTSIDE SLOPE
42	35.0	-60.0	235.0	95.0	CIRCLE OUTSIDE SLOPE
43	35.0	-60.0	230.0	95.0	CIRCLE OUTSIDE SLOPE
44	35.0	-60.0	240.0	95.0	CIRCLE OUTSIDE SLOPE
45	35.0	-65.0	235.0	100.0	CIRCLE OUTSIDE SLOPE
46	35.0	-65.0	230.0	100.0	CIRCLE OUTSIDE SLOPE
47	35.0	-65.0	240.0	100.0	CIRCLE OUTSIDE SLOPE
48	35.0	-70.0	235.0	105.0	CIRCLE OUTSIDE SLOPE
49	35.0	-70.0	230.0	105.0	CIRCLE OUTSIDE SLOPE
50	35.0	-70.0	240.0	105.0	CIRCLE OUTSIDE SLOPE
51	35.0	-75.0	235.0	110.0	CIRCLE OUTSIDE SLOPE

SEARCH IS ABANDONED AFTER 51CIRCLES

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

MCGUIRE LANDFILL STABILITY

NUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	FS(BISHOP)	FS(OMS)
1	30.0	-80.0	235.0	110.0	CIRCLE OUTSIDE SLOPE	
2	30.0	-80.0	225.0	110.0	CIRCLE OUTSIDE SLOPE	
3	30.0	-70.0	235.0	100.0	CIRCLE OUTSIDE SLOPE	
4	30.0	-80.0	245.0	110.0	CIRCLE OUTSIDE SLOPE	
5	30.0	-90.0	235.0	120.0	CIRCLE OUTSIDE SLOPE	
6	30.0	-90.0	230.0	120.0	CIRCLE OUTSIDE SLOPE	
7	30.0	-85.0	235.0	115.0	CIRCLE OUTSIDE SLOPE	
8	30.0	-90.0	240.0	120.0	CIRCLE OUTSIDE SLOPE	
9	30.0	-95.0	235.0	125.0	CIRCLE OUTSIDE SLOPE	
10	30.0	-95.0	230.0	125.0	CIRCLE OUTSIDE SLOPE	
11	30.0	-95.0	240.0	125.0	CIRCLE OUTSIDE SLOPE	
12	30.0	-100.0	235.0	130.0	CIRCLE OUTSIDE SLOPE	
13	30.0	-100.0	230.0	130.0	CIRCLE OUTSIDE SLOPE	
14	30.0	-100.0	240.0	130.0	CIRCLE OUTSIDE SLOPE	
15	30.0	-105.0	235.0	135.0	CIRCLE OUTSIDE SLOPE	
16	30.0	-105.0	230.0	135.0	CIRCLE OUTSIDE SLOPE	
17	30.0	-105.0	240.0	135.0	CIRCLE OUTSIDE SLOPE	
18	30.0	-110.0	235.0	140.0	CIRCLE OUTSIDE SLOPE	
19	30.0	-110.0	230.0	140.0	CIRCLE OUTSIDE SLOPE	
20	30.0	-110.0	240.0	140.0	CIRCLE OUTSIDE SLOPE	
21	30.0	-115.0	235.0	145.0	CIRCLE OUTSIDE SLOPE	
22	30.0	-115.0	230.0	145.0	CIRCLE OUTSIDE SLOPE	
23	30.0	-115.0	240.0	145.0	CIRCLE OUTSIDE SLOPE	
24	30.0	-120.0	235.0	150.0	CIRCLE OUTSIDE SLOPE	
25	30.0	-120.0	230.0	150.0	CIRCLE OUTSIDE SLOPE	

27	30.0	-125.0	235.0	155.0	CIRCLE OUTSIDE SLOPE
28	30.0	-125.0	230.0	155.0	CIRCLE OUTSIDE SLOPE
29	30.0	-125.0	240.0	155.0	CIRCLE OUTSIDE SLOPE
30	30.0	-130.0	235.0	160.0	CIRCLE OUTSIDE SLOPE
31	30.0	-130.0	230.0	160.0	CIRCLE OUTSIDE SLOPE
32	30.0	-130.0	240.0	160.0	CIRCLE OUTSIDE SLOPE
33	30.0	-135.0	235.0	165.0	CIRCLE OUTSIDE SLOPE
34	30.0	-135.0	230.0	165.0	CIRCLE OUTSIDE SLOPE
35	30.0	-135.0	240.0	165.0	CIRCLE OUTSIDE SLOPE
36	30.0	-140.0	235.0	170.0	CIRCLE OUTSIDE SLOPE
37	30.0	-140.0	230.0	170.0	CIRCLE OUTSIDE SLOPE
38	30.0	-140.0	240.0	170.0	CIRCLE OUTSIDE SLOPE
39	30.0	-145.0	235.0	175.0	CIRCLE OUTSIDE SLOPE
40	30.0	-145.0	230.0	175.0	CIRCLE OUTSIDE SLOPE
41	30.0	-145.0	240.0	175.0	CIRCLE OUTSIDE SLOPE
42	30.0	-150.0	235.0	180.0	CIRCLE OUTSIDE SLOPE
43	30.0	-150.0	230.0	180.0	CIRCLE OUTSIDE SLOPE
44	30.0	-150.0	240.0	180.0	CIRCLE OUTSIDE SLOPE
45	30.0	-155.0	235.0	185.0	CIRCLE OUTSIDE SLOPE
46	30.0	-155.0	230.0	185.0	CIRCLE OUTSIDE SLOPE
47	30.0	-155.0	240.0	185.0	CIRCLE OUTSIDE SLOPE
48	30.0	-160.0	235.0	190.0	CIRCLE OUTSIDE SLOPE
49	30.0	-160.0	230.0	190.0	CIRCLE OUTSIDE SLOPE
50	30.0	-160.0	240.0	190.0	CIRCLE OUTSIDE SLOPE
51	30.0	-165.0	235.0	195.0	CIRCLE OUTSIDE SLOPE

SEARCH IS ABANDONED AFTER 51CIRCLES

Attachment II

PLEXCO Information

MCS-1114.02-00-0001

ATTACHMENT II (1 of 3)
MCS-1114.02-00-0001
BY: CB Thom 7/6/90
CHECKED: P.M. Sanford 8/28/90

PLEXCO®

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Figure 1
BUREAU OF RECLAMATION VALUES OF E^1 FOR IOWA FORMULA
(For Initial Flexible Pipe Deflection)

	E^1 for degree of compaction of bedding (lb/in²)4/			
Soil type-pipe bedding material (Unified Classification System 1/)	Dumped	Slight <85% Procter <40% rel. den.	Moderate 85-95% Proctor 40-70% rel. den.	High >95% Proctor >70% rel. den.
Fine-grained Soils (LL > 50)2/ Soils with medium to high plasticity CH, MH, CH-MH	No data available; consult a competent Soils Engineer; Otherwise use $E^1 = 0$			
Fine-grained Soils (LL < 50) Soils with medium to no plasticity CL, ML, ML-CL, with less than 25 percent coarse-grained particles	50	200	400	1,000
Fine-grained Soils (LL < 50) Soils with medium to no plasticity CL, ML, ML-CL, with more than 25 percent coarse-grained particles Coarse-grained Soils with Fines GM, GC, SM, SC3/ contains more than 12 percent fines	100	400	1,000	2,000
Coarse-grained Soils with Little or No Fines GW, GP, SW, SP3/ contains less than 12 percent fines	200	1,000	2,000	3,000
Crushed Rock	1,000	3,000		

1/ ASTM Designation D-2487, USBR Designation E-3.

2/ LL = Liquid limit.

3/ Or any borderline soil beginning with one of these symbols (i.e., GM-GC, GC-SC.).

4/ 1 lb/in² = 0.07 kg/cm².

FIGURE 2
Variation In Soil Stress With Cover Depth Below H-20 Wheel Load

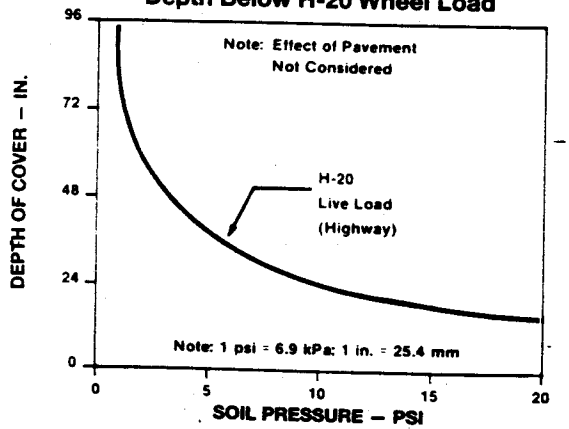
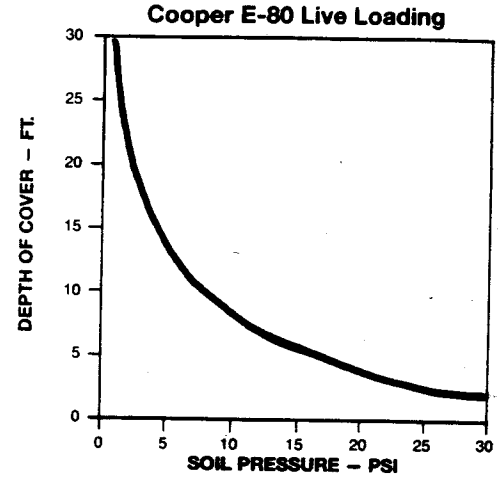


FIGURE 3
Cooper E-80 Live Loading



ATTACHMENT II (2 of 3)
MCS-1114.02-00-0001
BY: CB Thon 7/6/90
CHECKED: Tim Sanford 7/20/90

ESTIMATED DEFLECTION

$$\% \text{ deflection} = \frac{\text{Calculated deflection} \times 100}{\text{Outside diameter of pipe}}$$

X = Calculated deflection

$$X = \frac{K \times D \times W}{(0.149 \times PS + 0.061 \times E^1)}$$

$$W = \frac{DC \times OD \times SD}{144}$$

$$PS = \frac{E \times I}{0.149 \times R^3}$$

Where
- OD = Outside diameter of pipe (inch)
- K = Bedding Factor = 0.1
- D = Deflection Lag Factor = 1.5
- W = Weight per Lineal Inch (#/inch)
- PS = Pipe Stiffness (PSI)
- E^1 = Soil Modulus (See Figure 1)
- E = Flexural Modulus (PSI)
  - = 133,000 PSI for PE 3408
  - = 100,000 PSI for PE 2406
- DC = Depth of cover (feet)
- SD = Soil Density (#/ft^3)
- SDR = Standard Dimentional Ratio
- t = Average Wall Thickness (inch)

$$t = \frac{OD \times 1.06}{SDR}$$

- I = Moment of Inerta = $t^3/12$
- R = Mean Radii of the pipe (inch)

$$R = \frac{(OD - t)}{2}$$

Safe design limits for the allowable deflection of polyethylene pipe of different dimension ratios have been determined[1] and are given below:

DIMENSION RATIO (SDR)	SAFE DEFLECTION AS % OF DIAMETER
32.5	8.5
26.0	7.0
21.0	6.0
17.0	5.0
11.0	3.0
9.0	2.5

EXAMPLE

As an example, assume a PLEXCO 12 inch SDR 11 PE 3408 polyethylene pipe is to be buried 25 feet in the ground. This pipe is to be buried in a coarse grained soil with little or no fines and compacted to a proctor density of 90%. From Figure 1 a value of 2000 PSI is obtained for E^1. Soil density is assumed to be 120 #/ft^3.

OD = 12.75 inches
t = $(12.75 \times 1.06)/11 = 1.229$
I = $(1.229)^3/12 = 0.1547$
R = $(12.75 - 1.229)/2 = 5.761$
PS = $(133{,}000 \times 0.1547)/(0.149 \times 5.761^3)$
= 722.4
W = $(25 \times 12.75 \times 120)/144 = 265.6$

$$X = \frac{1.5 \times 0.1 \times 265.6}{(0.149 \times 722.4 + 0.061 \times 2000)}$$

X = 0.173 inch deflection

$$\% \text{ deflection} = \frac{0.173 \times 100}{12.75} = 1.36\%$$

Since 1.36% is less than the allowable 3.0%, this would be an adequate burial situation.

The method presented for calculating deflection represents one of many methods and should be adequate in most cases. However, when special installation conditions exist, other methods of calculating deflection may need to be used. The final design is left to the discretion of the responsible engineer.

PE 3408 Industrial Piping System
Pipe Data and Pressure Ratings

PLEXCO

(Pipe weights are calculated in accordance with PPI TR-7)

Pressure Ratings are for water at 73°F. For other fluids and service temperatures refer to Application Note No. 6 Chemical and Environmental Considerations.

IPS* PIPE SIZE	O.D. SIZE (INCHES)	MIN. WALL (INCHES)	WEIGHT LB/FT	MIN. WALL (INCHES)	WEIGHT LB/FT	MIN. WALL (INCHES)	WEIGHT LB/FT	MIN. WALL (INCHES)	WEIGHT LB/FT	MIN. WALL (INCHES)	WEIGHT LB/FT	MIN. WALL (INCHES)	WEIGHT LB/FT	MIN. WALL (INCHES)	WEIGHT LB/FT	MIN. WALL (INCHES)	WEIGHT LB/FT	MIN. WALL (INCHES)	WEIGHT LB/FT
1½"	1.900	—	—	—	—	.173	.41	—	—	—	—	—	—	—	—	—	—	—	—
2"	2.375	.325	.91	.264	.76	.216	.64	—	—	—	—	—	—	—	—	—	—	—	—
3"	3.500	.479	1.98	.389	1.65	.318	1.39	.259	1.15	.226	1.02	.206	.93	—	—	—	—	—	—
4"	4.500	.616	3.27	.500	2.74	.409	2.30	.333	1.90	.290	1.67	.265	1.54	.214	1.26	—	—	—	—
†5"	5.563	.762	5.00	.618	4.18	.506	3.50	.412	2.91	.359	2.57	.327	2.35	.265	1.93	.214	1.58	—	—
6"	6.625	.908	7.09	.736	5.93	.602	4.97	.491	4.13	.427	3.64	.390	3.34	.316	2.74	.255	2.23	.204	1.80
7"	7.125	—	—	—	—	—	—	—	—	—	—	.420	3.87	.340	3.17	.274	2.58	.220	2.09
8"	8.625	1.182	12.01	.958	10.05	.785	8.43	.639	7.00	.556	6.16	.508	5.66	.411	4.64	.332	3.79	.265	3.05
10"	10.750	1.473	18.66	1.194	15.62	.978	13.10	.797	10.89	.694	9.59	.633	8.80	.512	7.21	.413	5.87	.331	4.75
12"	12.750	1.747	26.25	1.417	21.97	1.160	18.43	.945	15.31	.823	13.47	.750	12.36	.608	10.14	.490	8.26	.392	6.67
14"	14.000	1.918	31.64	1.556	26.49	1.273	22.20	1.037	18.44	.903	16.24	.824	14.91	.667	12.22	.538	9.96	.431	8.05
16"	16.000	2.192	41.34	1.778	34.61	1.455	29.00	1.185	24.09	1.032	21.21	.941	19.46	.762	15.97	.615	13.02	.492	10.51
18"	18.000	2.466	52.31	2.000	43.79	1.636	36.69	1.333	30.48	1.161	26.85	1.059	24.65	.857	20.19	.692	16.48	.554	13.29
20"	20.000	2.740	64.57	2.222	54.05	1.818	45.30	1.481	37.64	1.290	33.13	1.176	30.42	.952	24.92	.769	20.34	.615	16.41
22"	22.000	—	—	2.444	65.41	2.000	54.82	1.630	45.56	1.419	40.09	1.294	36.81	1.048	30.19	.846	24.62	.677	19.87
24"	24.000	—	—	2.667	77.85	2.182	65.24	1.778	54.22	1.548	47.72	1.412	43.82	1.143	35.92	.923	29.29	.738	23.62
†26"	26.000	—	—	2.889	91.35	2.364	76.58	1.926	63.63	1.677	56.02	1.529	51.40	1.238	42.13	1.000	34.39	.800	27.74
†28"	28.000	—	—	—	—	2.545	88.79	2.074	73.76	1.806	64.94	1.647	59.62	1.333	48.86	1.077	39.89	.862	32.20
†30"	30.000	—	—	—	—	2.727	101.94	2.222	84.68	1.935	74.56	1.765	68.45	1.429	56.13	1.154	45.78	.923	36.92
†32"	32.000	—	—	—	—	2.909	115.99	2.370	96.35	2.065	84.88	1.882	77.86	1.524	63.83	1.231	52.10	.985	42.04
†34"	34.000	—	—	—	—	3.090	130.92	2.519	108.80	2.194	95.83	2.000	87.91	1.619	72.06	1.308	58.79	1.046	47.44
†36"	36.000	—	—	—	—	—	—	—	—	2.323	107.40	2.118	98.56	1.714	80.79	1.385	65.93	1.108	53.18

*Industrial PE (polyethylene) pipe sizes are identified by IPS (iron pipe size) diameters which designate the nominal diameter for 12" IPS AND SMALLER PIPE, AND O.D. (outside diameter) for 14" IPS and larger pipe.

Check with your PLEXCO sales office for availability of dimensions not listed.

† SUBJECT TO MINIMUM ORDER QUANTITIES, AND AVAILABILITY OF TOOLING.

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ATTACHMENT H (3 of 3)
MCS-1114.02-00-0001
BY: CBT CHECKED: MJ 3/9/00

ATTACHMENT III

SOILS REPORT

(SEE APPENDIX D IN PREVIOUSLY SUBMITTED "PROJECT MANUAL")

ATTACHMENT IV

CUT AND FILL SECTIONS

(SEE ATTACHMENT #9 IN PREVIOUSLY SUBMITTED "PERMIT APPLICATION REPORT")