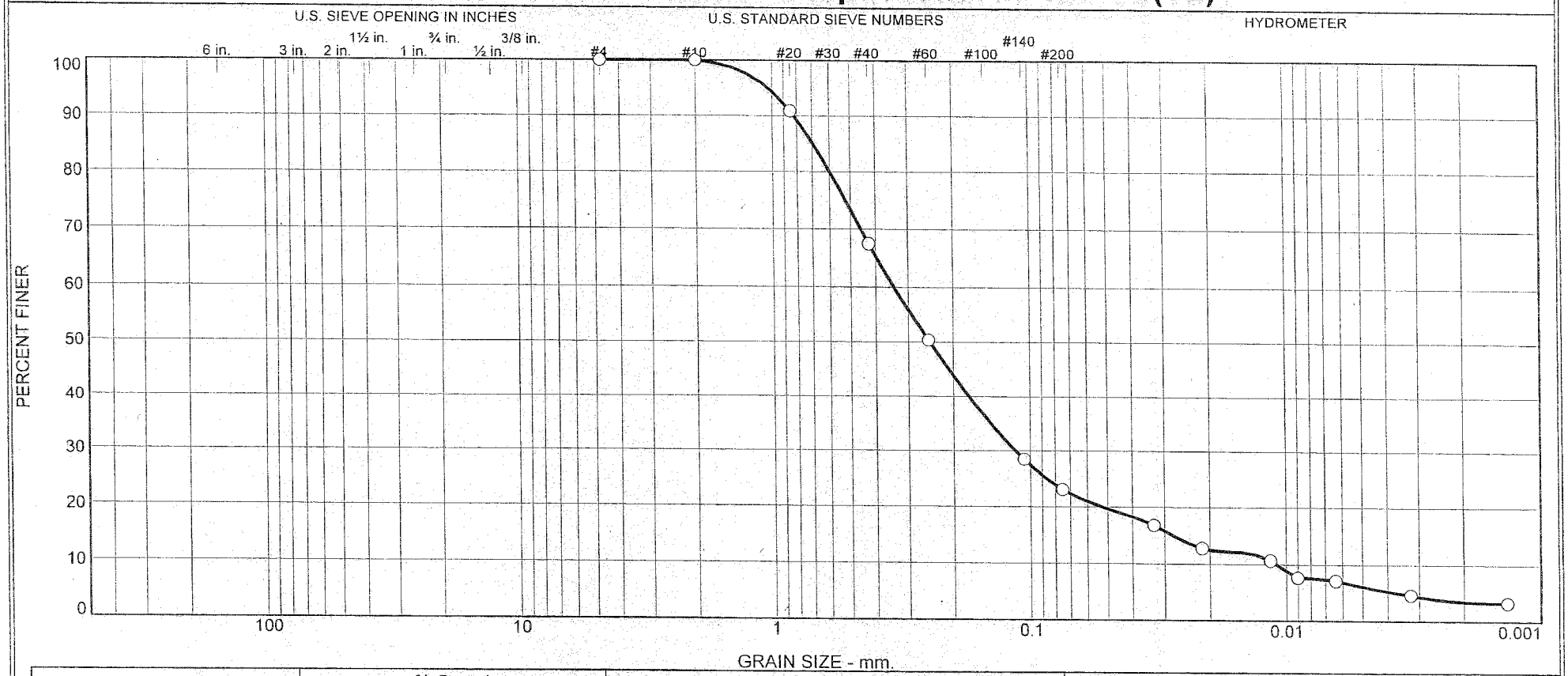
# Particle Size Distribution Report/ASTM-422-63(02)




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0.0 | 0.0 | 0.0 | 0.0 | 32.5 | 44.4 | 17.0 | 6.1 |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-929 | B-929-7 | 23-24.5' | 8/8/06 | ND | Reddish yellow silty sand. | 18.8 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ND=SPECIFIC GRAVITY IS ASSUMED. ENTIRE SAMPLE WAS TESTED.

**Tested By:** JPD **Checked By:** ABS

# GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-929
**Depth:** 23-24.5'
**Sample Number:** B-929-7
**Material Description:** Reddish yellow silty sand.
**Date:** 8/8/06
**Natural Moisture:** 18.8
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** ND=SPECIFIC GRAVITY IS ASSUMED.
ENTIRE SAMPLE WAS TESTED.
**Tested by:** JPD
**Checked by:** ABS

## Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 239.13 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 0.05 | 100.0 |
| 100.43 | 0.00 | 0.00 | #20 | 9.18 | 90.8 |
| | | | #40 | 32.62 | 67.5 |
| | | | #60 | 49.81 | 50.4 |
| | | | #140 | 71.81 | 28.5 |
| | | | #200 | 77.21 | 23.1 |

## Hydrometer Test Data

Hydrometer test uses material passing#10
Percent passing #10 based upon complete sample =100.0
Weight of hydrometer sample =100.43
Hygroscopic moisture correction:
Moist weight and tare = 30.42
Dry weight and tare = 30.26
Tare weight = 15.49
Hygroscopic moisture =1.1%
Table of composite correction values:

| Temp., deg. C: | 12.8 | 28.0 |
|---|---|---|
| Comp. corr.: | -7.0 | -2.5 |

Meniscus correction only =1.0
Specific gravity of solids =2.7
Hydrometer type =152H
Hydrometer effective depth equation: L =16.294964 - 0.164 x Rm

| Elapsed Time (min.) | Temp. (deg. C.) | Actual Reading | Corrected Reading | K | Rm | Eff. Depth | Diameter (mm.) | Percent Finer |
|---|---|---|---|---|---|---|---|---|
| 2.00 | 22.0 | 21.0 | 16.7 | 0.0131 | 22.0 | 12.7 | 0.0330 | 16.6 |
| 5.00 | 22.0 | 17.0 | 12.7 | 0.0131 | 18.0 | 13.3 | 0.0214 | 12.7 |
| 16.00 | 27.0 | 13.5 | 10.7 | 0.0124 | 14.5 | 13.9 | 0.0115 | 10.7 |
| 30.00 | 22.0 | 12.0 | 7.7 | 0.0131 | 13.0 | 14.2 | 0.0090 | 7.7 |
| 60.00 | 22.0 | 11.5 | 7.2 | 0.0131 | 12.5 | 14.2 | 0.0064 | 7.2 |
| 240.00 | 21.9 | 9.0 | 4.7 | 0.0131 | 10.0 | 14.7 | 0.0032 | 4.7 |
| 1440.00 | 20.5 | 8.0 | 3.3 | 0.0134 | 9.0 | 14.8 | 0.0014 | 3.3 |

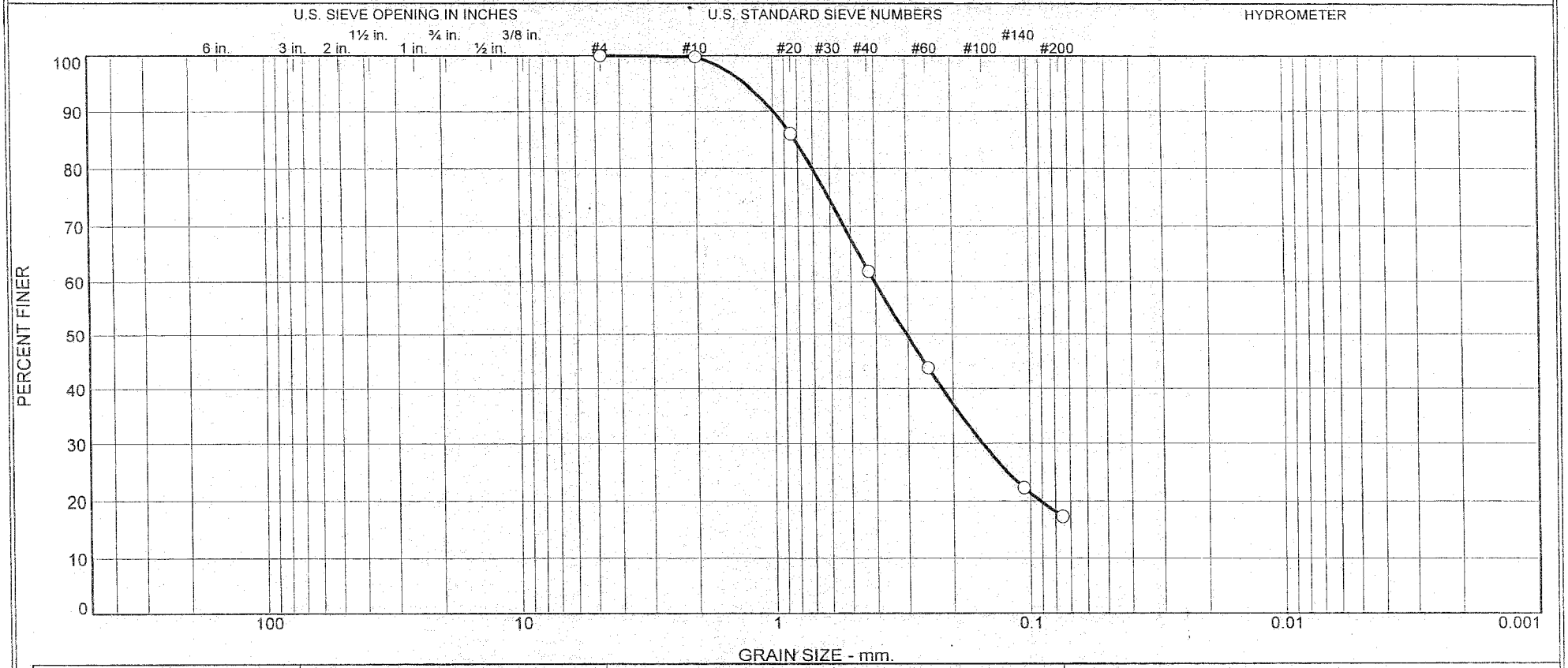
## Fractional Components

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 32.5 | 44.4 | 76.9 | 17.0 | 6.1 | 23.1 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| 0.0109 | 0.0281 | 0.0526 | 0.1144 | 0.2467 | 0.3406 | 0.5994 | 0.6943 | 0.8225 | 1.0418 |

| Fineness Modulus | $C_u$ | $C_c$ |
|---|---|---|
| 1.31 | 31.21 | 3.52 |

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 0.2 | 37.9 | 44.6 | 17.3 | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-929 | B-929-9 | 33-34.5' | 8/8/06 | ND | Reddish yellow silty sand. | 16.9 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ND=NOT DETERMINED.
ENTIRE SAMPLE WAS TESTED.

**Tested By:** JPD **Checked By:** ABS

## GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-929
**Depth:** 33-34.5'
**Sample Number:** B-929-9
**Material Description:** Reddish yellow silty sand.
**Date:** 8/8/06
**Natural Moisture:** 16.9
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** ND=NOT DETERMINED.
ENTIRE SAMPLE WAS TESTED.
**Tested by:** JPD
**Checked by:** ABS

### Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 287.95 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 0.60 | 99.8 |
| 116.91 | 0.00 | 0.00 | #20 | 16.14 | 86.0 |
| | | | #40 | 44.45 | 61.9 |
| | | | #60 | 65.61 | 43.8 |
| | | | #140 | 90.78 | 22.3 |
| | | | #200 | 96.60 | 17.3 |

### Fractional Components

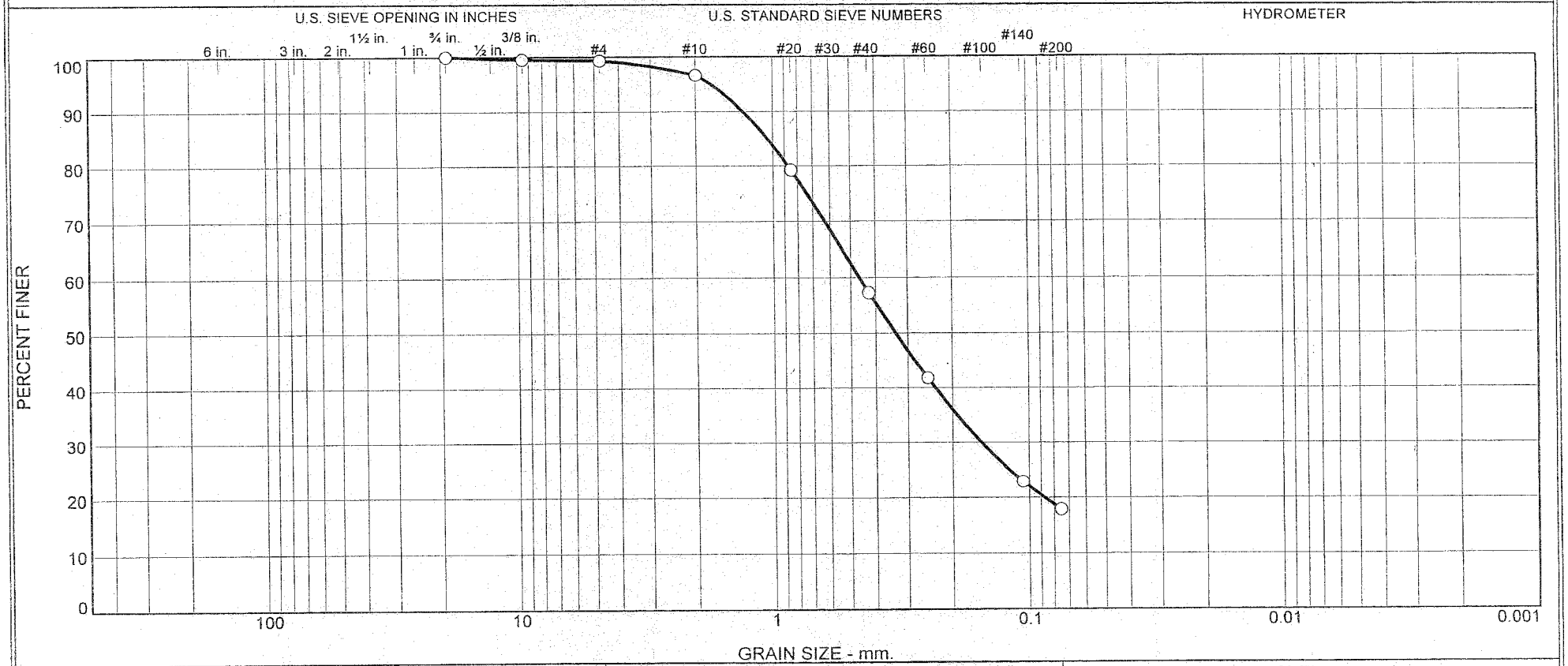
| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 37.9 | 44.6 | 82.7 | | | 17.3 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | 0.0914 | 0.1533 | 0.3029 | 0.4039 | 0.7005 | 0.8206 | 0.9920 | 1.2792 |

| Fineness Modulus |
|---|
| 1.53 |

MACTEC, Inc.

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.7 | 2.7 | 39.3 | 39.4 | 17.9 | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-929 | B-929-11 | 43-44.5' | 8/8/06 | ND | Reddish yellow silty sand. | 17.2 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 | Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ND=NOT DETERMINED.
ENTIRE SAMPLE WAS TESTED.

**Tested By:** JPD **Checked By:** ABS

# GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-929
**Depth:** 43-44.5'
**Sample Number:** B-929-11
**Material Description:** Reddish yellow silty sand.
**Date:** 8/8/06
**Natural Moisture:** 17.2
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** ND=NOT DETERMINED.
ENTIRE SAMPLE WAS TESTED.
**Tested by:** JPD
**Checked by:** ABS

## Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 289.19 | 0.00 | 0.00 | .75 | 0.00 | 100.0 |
| | | | .375 | 1.44 | 99.5 |
| | | | #4 | 2.04 | 99.3 |
| | | | #10 | 9.94 | 96.6 |
| 110.71 | 0.00 | 0.00 | #20 | 19.79 | 79.3 |
| | | | #40 | 45.01 | 57.3 |
| | | | #60 | 62.78 | 41.8 |
| | | | #140 | 84.48 | 22.9 |
| | | | #200 | 90.15 | 17.9 |

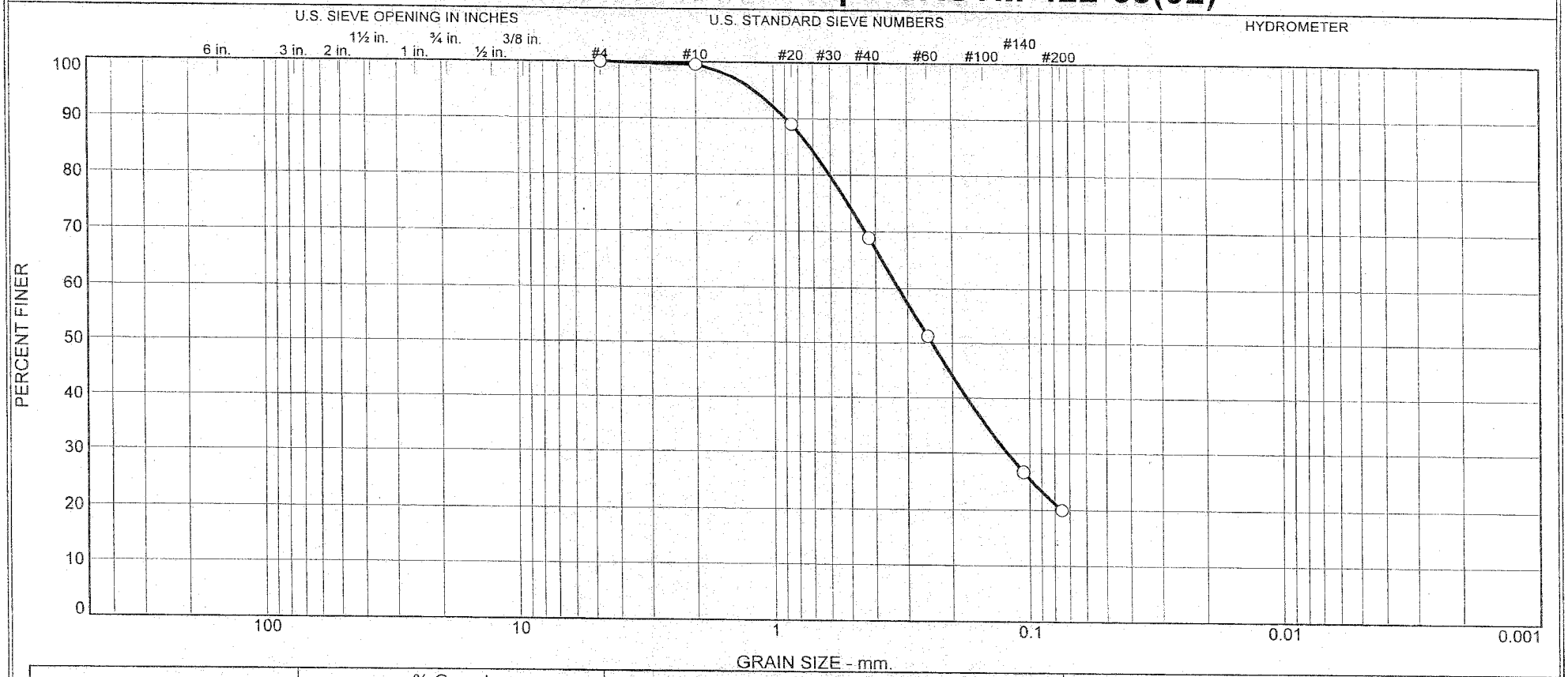
## Fractional Components

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.7 | 0.7 | 2.7 | 39.3 | 39.4 | 81.4 | | | 17.9 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | 0.0874 | 0.1542 | 0.3345 | 0.4624 | 0.8710 | 1.0507 | 1.3100 | 1.7559 |

| Fineness Modulus |
|---|
| 1.71 |

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 0.5 | 30.6 | 48.9 | 20.0 | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-929 | B-929-13 | 53-54.5' | 8/8/06 | ND | Light brown silty sand. | 13.8 | ND | ND |

Client Dominion Nuclear North Anna
Project North Anna COL Project
Project No. 6468061472 Figure

**MACTEC, Inc.**
**Raleigh, North Carolina**

○ ND=NOT DETERMINED.
ENTIRE SAMPLE WAS TESTED.

**Tested By:** JPD **Checked By:** ABS

## GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-929
**Depth:** 53-54.5'
**Sample Number:** B-929-13
**Material Description:** Light brown silty sand.
**Date:** 8/8/06
**Natural Moisture:** 13.8
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** ND=NOT DETERMINED.
ENTIRE SAMPLE WAS TESTED.
**Tested by:** JPD
**Checked by:** ABS

### Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 299.67 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 1.43 | 99.5 |
| 107.68 | 0.00 | 0.00 | #20 | 11.42 | 89.0 |
| | | | #40 | 33.13 | 68.9 |
| | | | #60 | 52.24 | 51.2 |
| | | | #140 | 78.79 | 26.7 |
| | | | #200 | 86.04 | 20.0 |

### Fractional Components

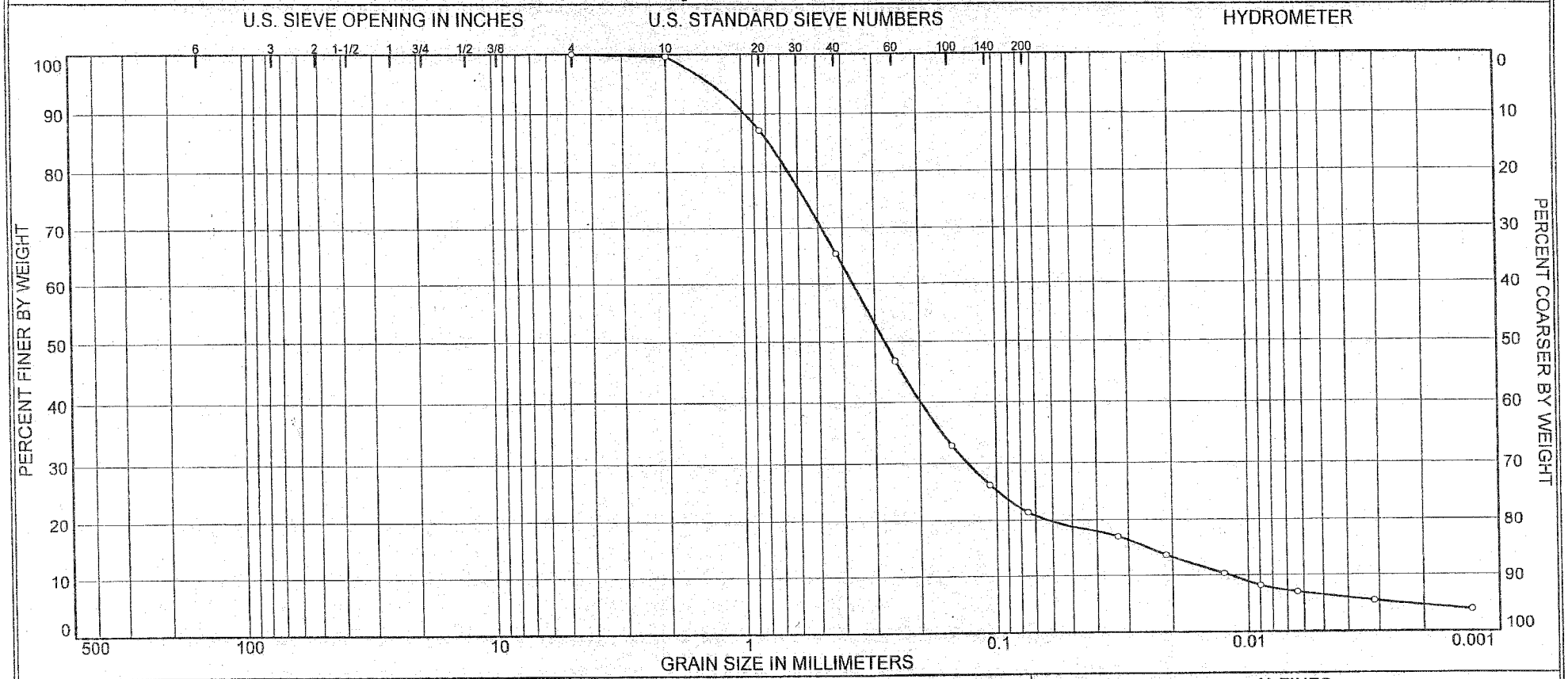
| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 30.6 | 48.9 | 80.0 | | | 20.0 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | 0.1221 | 0.2407 | 0.3253 | 0.6036 | 0.7217 | 0.8918 | 1.1932 |

| Fineness Modulus |
|---|
| 1.33 |

MACTEC, Inc.

# Particle Size Distribution Report ASTM D 422-63 (Reapproved 2002)




| % COBBLES | % GRAVEL | | % SAND | | | % FINES | |
|---|---|---|---|---|---|---|---|
| | COARSE | FINE | COARSE | MEDIUM | FINE | SILT | CLAY |
| 0.0 | 0.0 | 0.0 | 0.4 | 34.3 | 43.9 | 15.1 | 6.3 |

| SOURCE | SAMPLE # | DEPTH/ELEV. | DATE SAMPLED | USCS | MATERIAL DESCRIPTION | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|
| B-929A | UD-1 | 15 Ft. | 12/11/06 | ND | Gray Silty sand | 13.1 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL

Project No. 6468-06-1472 | Lab ID # 6768

**MACTEC ENGINEERING AND CONSULTING, INC.**

○ Tested by: JM 12/11/06 Reviewed by: HJ 1/2/07

ND= NOT DETERMINED

# GRAIN SIZE DISTRIBUTION TEST DATA

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL
**Project Number:** 6468-06-1472

## Sample Data

**Source:** B-929A
**Sample No.:** UD-1
**Elev. or Depth:** 15 Ft.
**Sample Length(in./cm.):** 6768
**Location:** B-929A
**Description:** Gray Silty sand
**Date:** 12/11/06
**Natural Moisture:** 13.1
**Liquid Limit:** ND **Plastic Limit:** ND **USCS Class.:** ND
ND= NOT DETERMINED
**Testing Remarks:** Tested by: JM 12/11/06 Reviewed by: HJ 1/2/07

## Mechanical Analysis Data

| | Initial |
|---|---|
| Dry sample and tare= | 89.66 |
| Tare = | 0.00 |
| Dry sample weight = | 89.66 |

Tare for cumulative weight retained= .00

| Sieve | Cumul. Wt. retained | Percent finer |
|---|---|---|
| # 4 | 0.00 | 100.0 |
| # 10 | 0.35 | 99.6 |
| # 20 | 11.63 | 87.0 |
| # 40 | 31.08 | 65.3 |
| # 60 | 47.67 | 46.8 |
| # 100 | 60.05 | 33.0 |
| # 140 | 66.21 | 26.2 |
| # 200 | 70.48 | 21.4 |

## Hydrometer Analysis Data

Separation sieve is #200
Percent -#200 based upon complete sample= 21.4
Weight of hydrometer sample: 19.18
Calculated biased weight= 89.63
Automatic temperature correction
Composite correction at 20 deg C = -5.4

Meniscus correction only= 0
Specific gravity of solids= 2.7
Specific gravity correction factor= 0.989
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

| Elapsed time, min | Temp, deg C | Actual reading | Corrected reading | K | Rm | Eff. depth | Diameter mm | Percent finer |
|---|---|---|---|---|---|---|---|---|
| 2.00 | 23.3 | 20.0 | 15.3 | 0.0129 | 20.0 | 13.0 | 0.0329 | 16.9 |
| 5.00 | 23.3 | 17.0 | 12.3 | 0.0129 | 17.0 | 13.5 | 0.0212 | 13.6 |
| 15.00 | 23.3 | 14.0 | 9.3 | 0.0129 | 14.0 | 14.0 | 0.0125 | 10.3 |
| 30.00 | 23.2 | 12.0 | 7.3 | 0.0129 | 12.0 | 14.3 | 0.0089 | 8.1 |
| 60.00 | 23.1 | 11.0 | 6.3 | 0.0129 | 11.0 | 14.5 | 0.0064 | 6.9 |

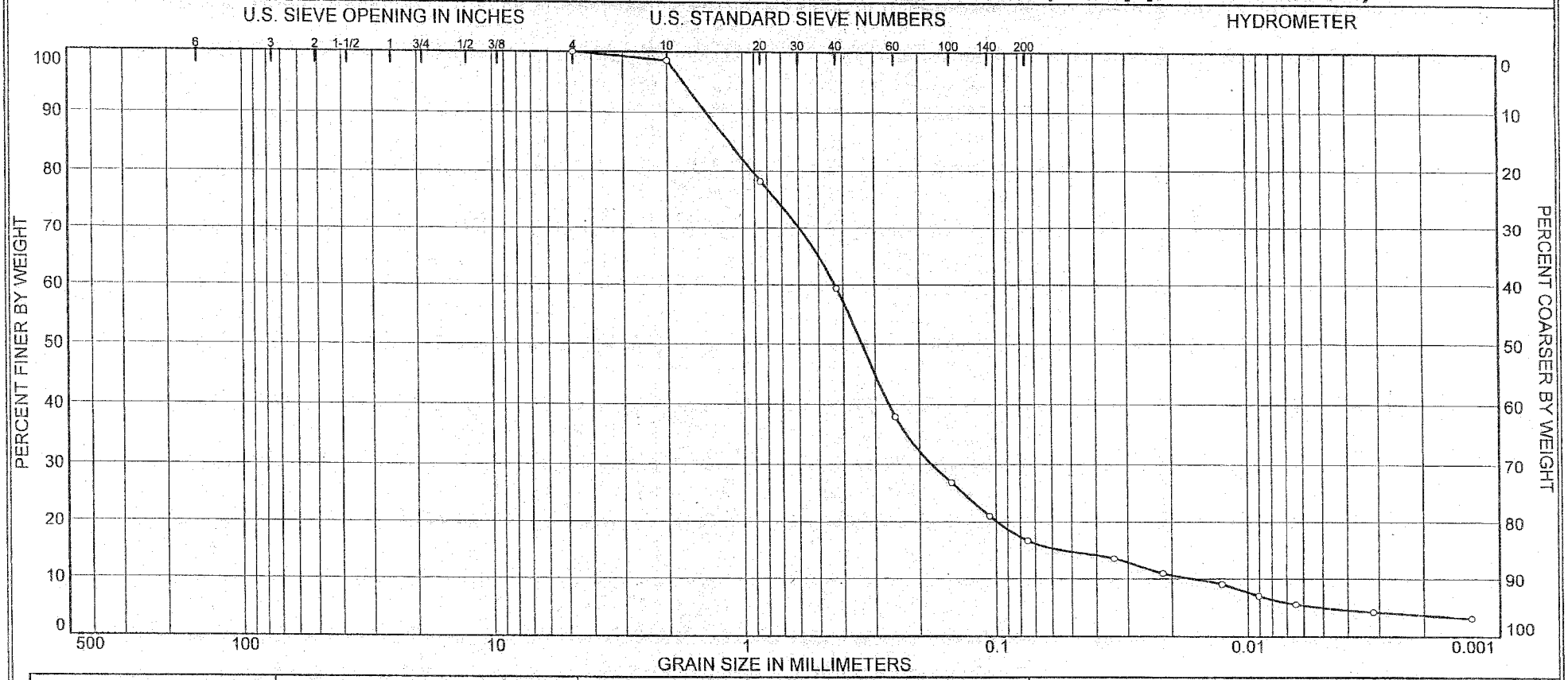
| Elapsed time, min | Temp, deg C | Actual reading | Corrected reading | K | Rm | Eff. depth | Diameter mm | Percent finer |
|---|---|---|---|---|---|---|---|---|
| 250.00 | 23.1 | 9.5 | 4.8 | 0.0129 | 9.5 | 14.7 | 0.0031 | 5.3 |
| 1560.00 | 21.8 | 8.5 | 3.5 | 0.0131 | 8.5 | 14.9 | 0.0013 | 3.8 |

## Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% COBBLES = % GRAVEL =
% SAND = 78.6 (% coarse = 0.4 % medium = 34.3 % fine = 43.9).
% SILT = 15.1 % CLAY = 6.3

$D_{85}$= 0.78 $D_{60}$= 0.37 $D_{50}$= 0.28
$D_{30}$= 0.13 $D_{15}$= 0.03 $D_{10}$= 0.01
$C_C$= 3.8738 $C_u$= 30.7363

# Particle Size Distribution Report ASTM D 422-63 (Reapproved 2002)




| | % COBBLES | % GRAVEL | | % SAND | | | % FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT | CLAY |
| ○ | 0.0 | 0.0 | 0.0 | 1.4 | 39.2 | 42.7 | 11.7 | 5.0 |

| | SOURCE | SAMPLE # | DEPTH/ELEV. | DATE SAMPLED | USCS | MATERIAL DESCRIPTION | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | B-929A | UD-6 | 40 Ft. | 12/11/06 | ND | Tan Silty Sand | 16.9 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL

Project No. 6468-06-1472 | Lab ID # 6770

**MACTEC ENGINEERING AND CONSULTING, INC.**

○ Tested by: JM 12/11/06 Reviewed by: HJ 1/2/07

ND= NOT DETERMINED

## GRAIN SIZE DISTRIBUTION TEST DATA

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL
**Project Number:** 6468-06-1472

### Sample Data

**Source:** B-929A
**Sample No.:** UD-6
**Elev. or Depth:** 40 Ft.
**Location:** B-929A
**Description:** Tan Silty Sand
**Date:** 12/11/06
**Liquid Limit:** ND
**Plastic Limit:** ND
**Testing Remarks:** Tested by: JM 12/11/06 Reviewed by: HJ 1/2/07

**Sample Length(in./cm.):** 6770
**Natural Moisture:** 16.9
**USCS Class.:** ND
ND= NOT DETERMINED

### Mechanical Analysis Data

| | Initial |
|---|---|
| Dry sample and tare= | 75.59 |
| Tare = | 0.00 |
| Dry sample weight = | 75.59 |

Tare for cumulative weight retained= .00

| Sieve | Cumul. Wt. retained | Percent finer |
|---|---|---|
| # 4 | 0.00 | 100.0 |
| # 10 | 1.05 | 98.6 |
| 20 | 16.50 | 78.2 |
| # 40 | 30.70 | 59.4 |
| # 60 | 46.90 | 38.0 |
| # 100 | 55.35 | 26.8 |
| # 140 | 59.78 | 20.9 |
| # 200 | 62.96 | 16.7 |

### Hydrometer Analysis Data

Separation sieve is #200
Percent -#200 based upon complete sample= 16.7
Weight of hydrometer sample: 12.63
Calculated biased weight= 75.63
Automatic temperature correction
Composite correction at 20 deg C = -5.4

Meniscus correction only= 0
Specific gravity of solids= 2.7
Specific gravity correction factor= 0.989
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

| Elapsed time, min | Temp, deg C | Actual reading | Corrected reading | K | Rm | Eff. depth | Diameter mm | Percent finer |
|---|---|---|---|---|---|---|---|---|
| 2.00 | 23.3 | 15.0 | 10.3 | 0.0129 | 15.0 | 13.8 | 0.0340 | 13.5 |
| 5.00 | 23.3 | 13.0 | 8.3 | 0.0129 | 13.0 | 14.2 | 0.0217 | 10.9 |
| 15.00 | 23.3 | 11.5 | 6.8 | 0.0129 | 11.5 | 14.4 | 0.0127 | 9.0 |
| 30.00 | 23.2 | 10.0 | 5.3 | 0.0129 | 10.0 | 14.7 | 0.0090 | 7.0 |
| 60.00 | 23.1 | 9.0 | 4.3 | 0.0129 | 9.0 | 14.8 | 0.0064 | 5.6 |

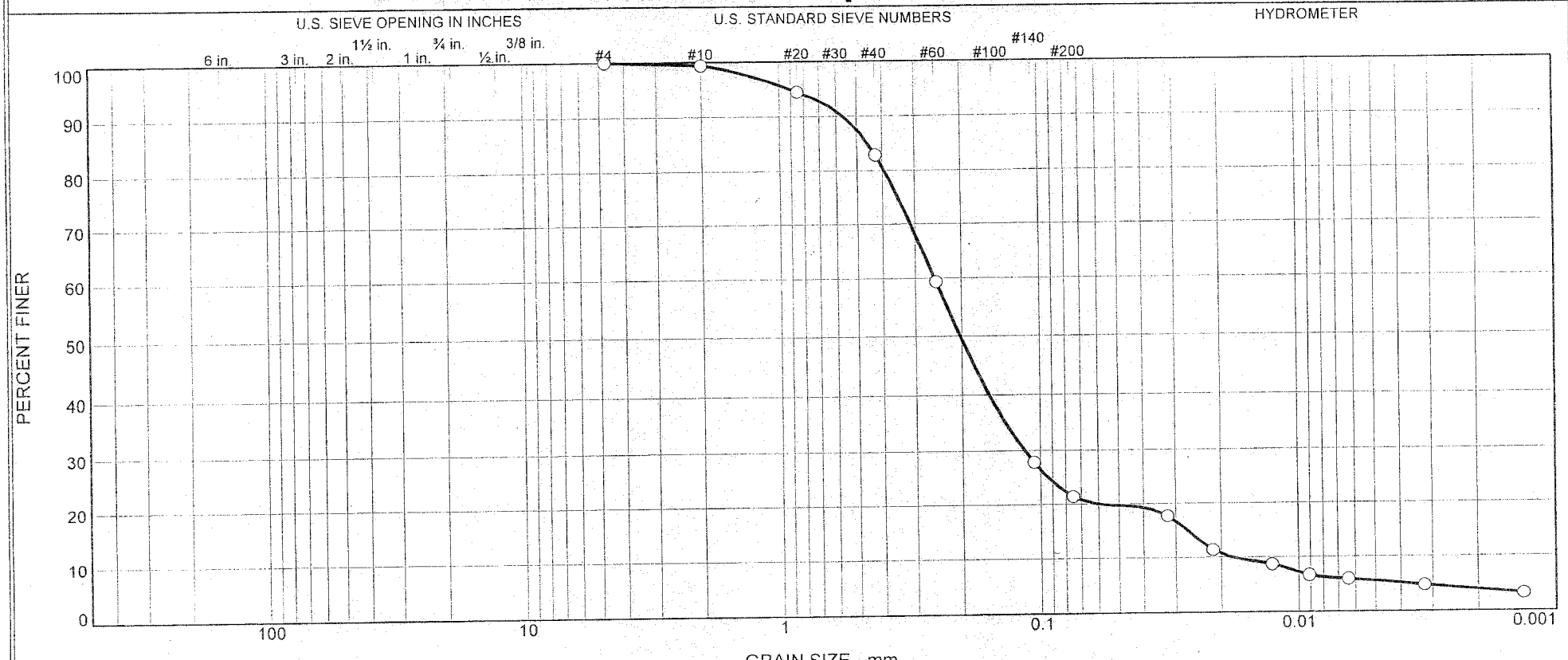
| Elapsed time, min | Temp, deg C | Actual reading | Corrected reading | K | Rm | Eff. depth | Diameter mm | Percent finer |
|---|---|---|---|---|---|---|---|---|
| 250.00 | 23.1 | 8.0 | 3.3 | 0.0129 | 8.0 | 15.0 | 0.0032 | 4.3 |
| 1560.00 | 21.8 | 7.5 | 2.5 | 0.0131 | 7.5 | 15.1 | 0.0013 | 3.2 |

## Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% COBBLES = % GRAVEL =
% SAND = 83.3 (% coarse = 1.4 % medium = 39.2 % fine = 42.7)
% SILT = 11.7 % CLAY = 5.0

$D_{85}$= 1.14 $D_{60}$= 0.43 $D_{50}$= 0.34
$D_{30}$= 0.18 $D_{15}$= 0.06 $D_{10}$= 0.02
$C_C$= 4.46 $C_u$= 25.6522

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 0.6 | 16.5 | 61.4 | 15.9 | 5.6 |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-931 | B-931-10 | 47.3-48.8 | 11-6-06 | ND | Light olive silty sand. | ND | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 | Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

## GRAIN SIZE DISTRIBUTION TEST DATA

1/17/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-931
**Depth:** 47.3-48.8 **Sample Number:** B-931-10
**Material Description:** Light olive silty sand.
**Date:** 11-6-06 **Natural Moisture:** ND
**Liquid Limit:** ND **Plastic Limit:** ND **USCS Class.:** ND
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.
**Tested by:** LBJ **Checked by:** ABS

### Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 310.48 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 1.88 | 99.4 |
| 125.68 | 0.00 | 0.00 | #20 | 6.14 | 94.5 |
| | | | #40 | 20.91 | 82.9 |
| | | | #60 | 50.64 | 59.3 |
| | | | #140 | 90.43 | 27.9 |
| | | | #200 | 98.55 | 21.5 |

### Hydrometer Test Data

Hydrometer test uses material passing#10
Percent passing #10 based upon complete sample =99.4
Weight of hydrometer sample =125.68
Hygroscopic moisture correction:
Moist weight and tare = 27.58
Dry weight and tare = 27.54
Tare weight = 15.48
Hygroscopic moisture =0.3%
Table of composite correction values:

| | | |
|---|---|---|
| Temp., deg. C: | 12.8 | 29.5 |
| Comp. corr.: | -5.0 | -2.0 |

Meniscus correction only =1.0
Specific gravity of solids =2.7
Hydrometer type =152H
Hydrometer effective depth equation: L =16.294964 - 0.164 x Rm

| Elapsed Time (min.) | Temp. (deg. C.) | Actual Reading | Corrected Reading | K | Rm | Eff. Depth | Diameter (mm.) | Percent Finer |
|---|---|---|---|---|---|---|---|---|
| 2.00 | 21.3 | 26.0 | 22.5 | 0.0132 | 27.0 | 11.9 | 0.0322 | 17.7 |
| 5.00 | 21.3 | 18.0 | 14.5 | 0.0132 | 19.0 | 13.2 | 0.0215 | 11.4 |
| 15.00 | 21.4 | 14.5 | 11.0 | 0.0132 | 15.5 | 13.8 | 0.0127 | 8.7 |
| 30.00 | 21.4 | 12.0 | 8.5 | 0.0132 | 13.0 | 14.2 | 0.0091 | 6.7 |
| 61.00 | 21.6 | 11.0 | 7.6 | 0.0132 | 12.0 | 14.3 | 0.0064 | 5.9 |
| 240.00 | 21.9 | 9.5 | 6.1 | 0.0131 | 10.5 | 14.6 | 0.0032 | 4.8 |
| 1440.00 | 21.9 | 7.5 | 4.1 | 0.0131 | 8.5 | 14.9 | 0.0013 | 3.2 |

MACTEC, Inc.

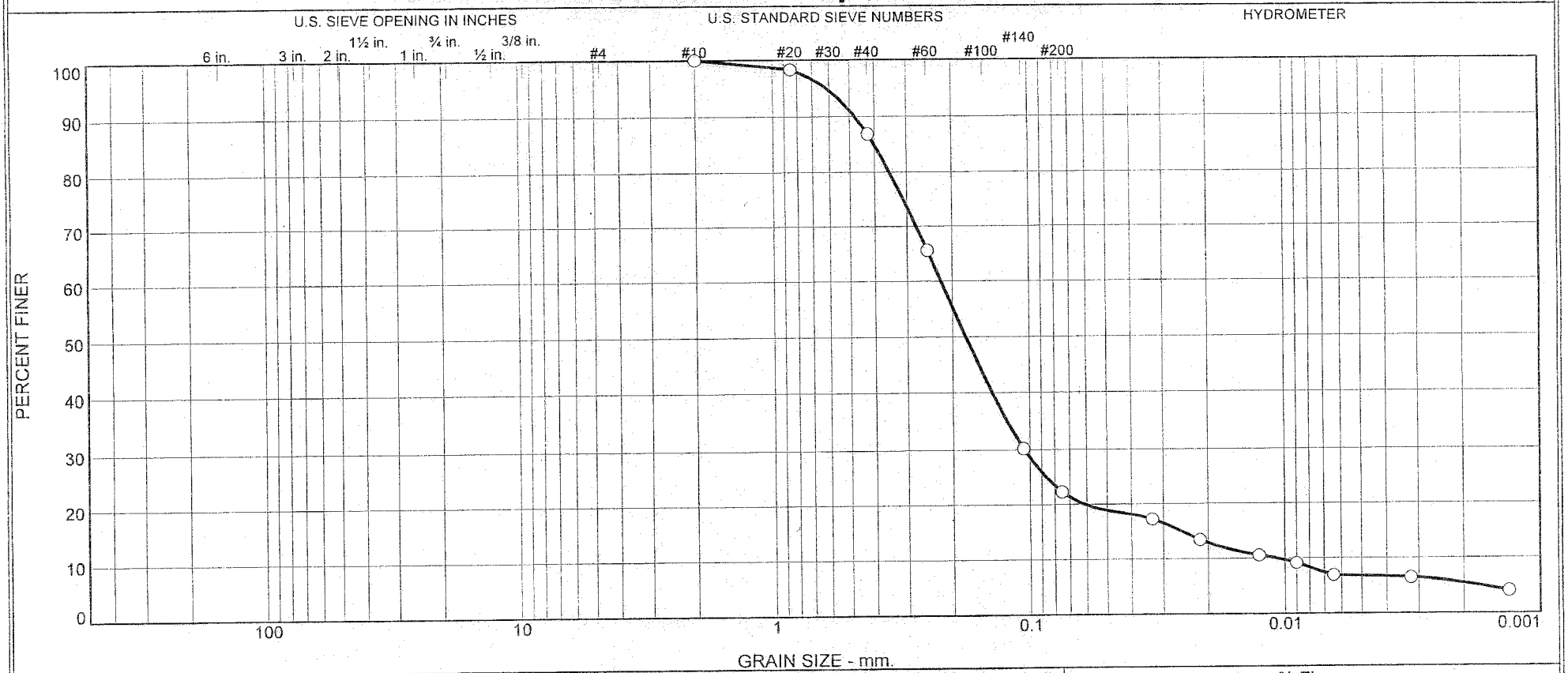
## Fractional Components

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 16.5 | 61.4 | 78.5 | 15.9 | 5.6 | 21.5 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| 0.0183 | 0.0270 | 0.0604 | 0.1150 | 0.2028 | 0.2535 | 0.3928 | 0.4551 | 0.5671 | 0.9024 |

| Fineness Modulus | $C_u$ | $C_c$ |
|---|---|---|
| 1.06 | 13.89 | 2.86 |

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 0.0 | 13.3 | 64.4 | 15.7 | 6.6 |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-932 | B-932-5 | 18.5-19' | 11-8-06 | ND | Yellowish brown silty sand. | 21.5 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

# GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-932
**Depth:** 18.5-19'
**Sample Number:** B-932-5
**Material Description:** Yellowish brown silty sand.
**Date:** 11-8-06
**Natural Moisture:** 21.5
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.
**Tested by:** LBJ
**Checked by:** ABS

## Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 106.40 | 0.00 | 0.00 | #10 | 0.00 | 100.0 |
| | | | #20 | 1.90 | 98.2 |
| | | | #40 | 14.10 | 86.7 |
| | | | #60 | 36.70 | 65.5 |
| | | | #140 | 74.30 | 30.2 |
| | | | #200 | 82.70 | 22.3 |

## Hydrometer Test Data

Hydrometer test uses material passing#10
Percent passing #10 based upon complete sample =100.0
Weight of hydrometer sample =106.4
Hygroscopic moisture correction:
Moist weight and tare = 27.38
Dry weight and tare = 27.08
Tare weight = 15.45
Hygroscopic moisture =2.6%
Table of composite correction values:

| | | |
|---|---|---|
| Temp., deg. C: | 12.8 | 29.5 |
| Comp. corr.: | -5.0 | -2.0 |

Meniscus correction only =1.0
Specific gravity of solids =2.7
Hydrometer type =152H
Hydrometer effective depth equation: L =16.294964 - 0.164 x Rm

| Elapsed Time (min.) | Temp. (deg. C.) | Actual Reading | Corrected Reading | K | Rm | Eff. Depth | Diameter (mm.) | Percent Finer |
|---|---|---|---|---|---|---|---|---|
| 2.00 | 21.5 | 21.5 | 18.1 | 0.0132 | 22.5 | 12.6 | 0.0331 | 17.2 |
| 5.00 | 21.5 | 17.5 | 14.1 | 0.0132 | 18.5 | 13.3 | 0.0215 | 13.4 |
| 15.00 | 21.6 | 14.5 | 11.1 | 0.0132 | 15.5 | 13.8 | 0.0126 | 10.6 |
| 30.00 | 21.6 | 13.0 | 9.6 | 0.0132 | 14.0 | 14.0 | 0.0090 | 9.1 |
| 60.00 | 21.8 | 10.5 | 7.1 | 0.0131 | 11.5 | 14.4 | 0.0064 | 6.8 |
| 240.00 | 22.1 | 10.0 | 6.7 | 0.0131 | 11.0 | 14.5 | 0.0032 | 6.4 |
| 1451.00 | 22.0 | 7.5 | 4.2 | 0.0131 | 8.5 | 14.9 | 0.0013 | 4.0 |

MACTEC, Inc.

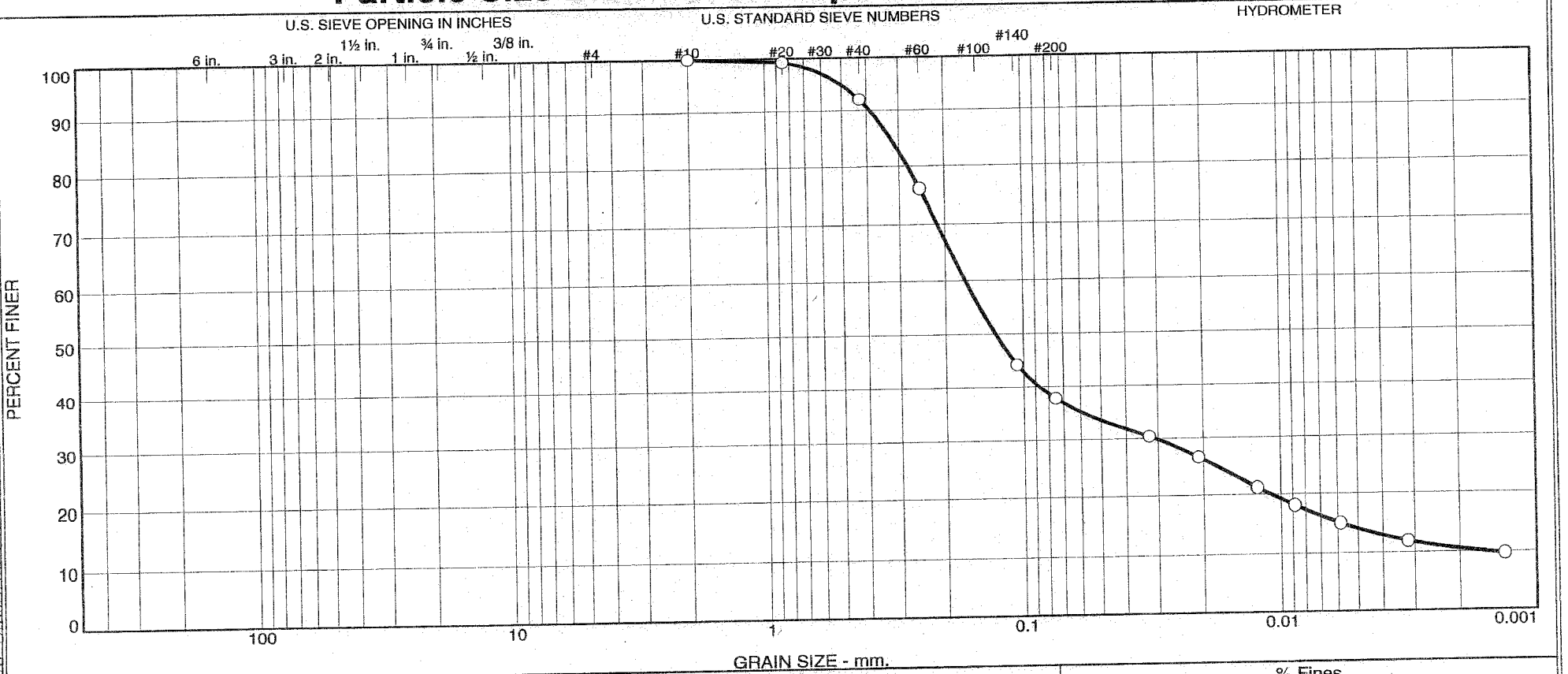
## Fractional Components

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 13.3 | 64.4 | 77.7 | 15.7 | 6.6 | 22.3 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| 0.0108 | 0.0256 | 0.0613 | 0.1054 | 0.1777 | 0.2216 | 0.3502 | 0.4023 | 0.4784 | 0.6202 |

| Fineness Modulus | $C_u$ | $C_c$ |
|---|---|---|
| 0.90 | 20.62 | 4.66 |

# Particle Size Distribution Report/ASTM-422-63(02)




| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0.0 | 0.0 | 0.0 | 0.0 | 7.9 | 54.4 | 23.7 | 14.0 |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-933 | B-933-3 | 6-7.5' | 9/8/06 | SM | REDDISH YELLOW SILTY SAND. | 24.2 | 28 | 25 |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ENTIRE SAMPLE WAS TESTED.

**Tested By:** JPD **Checked By:** ABS

DATA REPORT Rev. 0 MACTEC ENGINEERING & CONSULTING, INC. 1123107

## GRAIN SIZE DISTRIBUTION TEST DATA

12/18/2006

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-933
**Depth:** 6-7.5'
**Sample Number:** B-933-3
**Material Description:** REDDISH YELLOW SILTY SAND.
**Date:** 9/8/06
**Natural Moisture:** 24.2
**Liquid Limit:** 28
**Plastic Limit:** 25
**USCS Class.:** SM
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED.
**Tested by:** JPD
**Checked by:** ABS

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 272.05 | 0.00 | 0.00 | #10 | 0.00 | 100.0 |
| 65.24 | 0.00 | 0.00 | #20 | 0.48 | 99.3 |
| | | | #40 | 5.16 | 92.1 |
| | | | #60 | 15.59 | 76.1 |
| | | | #140 | 36.36 | 44.3 |
| | | | #200 | 40.62 | 37.7 |

**Hydrometer test uses material passing #10**
**Percent passing #10 based upon complete sample =** 100.0
**Weight of hydrometer sample =**65.24
**Hygroscopic moisture correction:**
**Moist weight and tare =** 27.08
**Dry weight and tare =** 26.85
**Tare weight =** 15.59
**Hygroscopic moisture =** 2.0%
**Table of composite correction values:**

| | | |
|---|---|---|
| **Temp., deg. C:** | 12.8 | 28.0 |
| **Comp. corr.:** | -7.0 | -2.5 |

**Meniscus correction only =** 1.0
**Specific gravity of solids =** 2.7
**Hydrometer type =** 152H
**Hydrometer effective depth equation: L =** 16.294964 - 0.164 **x Rm**

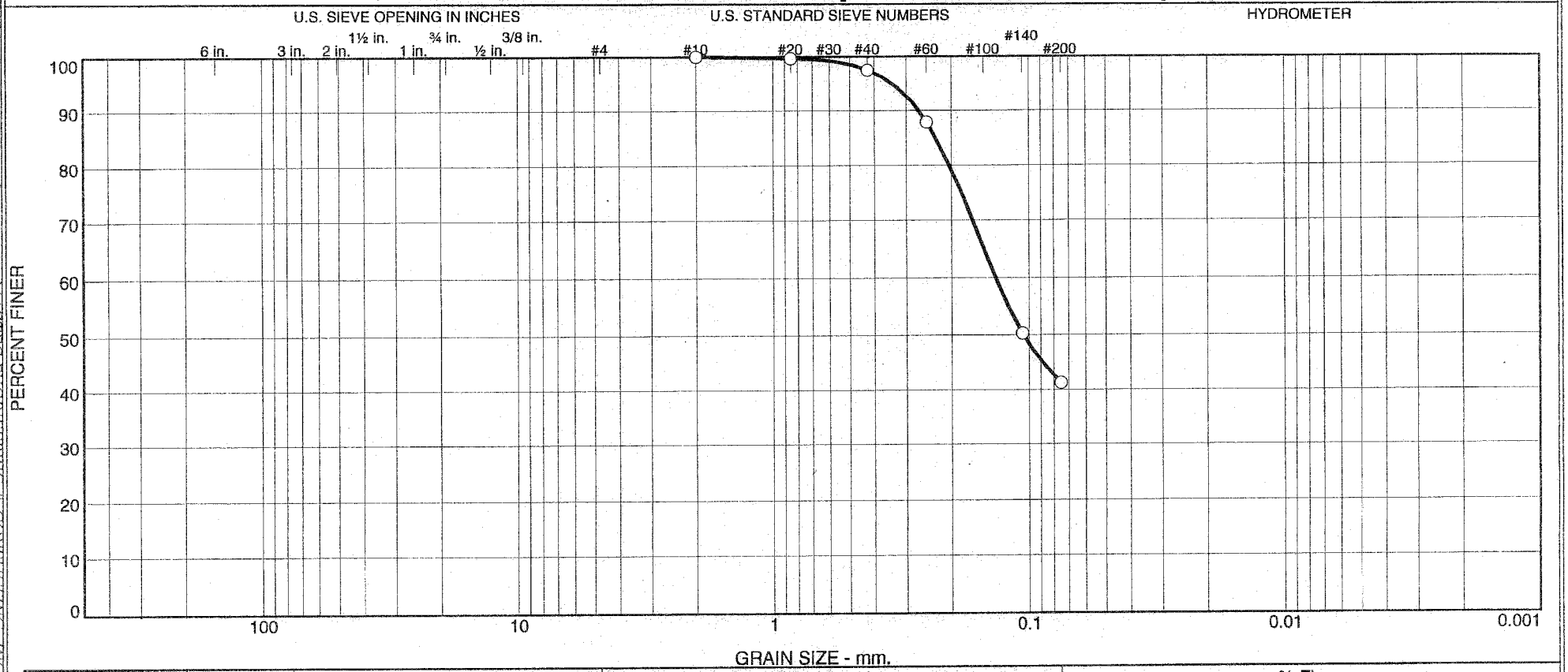
| Elapsed Time (min.) | Temp. (deg. C.) | Actual Reading | Corrected Reading | K | Rm | Eff. Depth | Diameter (mm.) | Percent Finer |
|---|---|---|---|---|---|---|---|---|
| 2.00 | 21.8 | 24.0 | 19.7 | 0.0131 | 25.0 | 12.2 | 0.0325 | 30.4 |
| 5.00 | 21.8 | 21.5 | 17.2 | 0.0131 | 22.5 | 12.6 | 0.0209 | 26.5 |
| 15.00 | 21.8 | 18.0 | 13.7 | 0.0131 | 19.0 | 13.2 | 0.0123 | 21.1 |
| 30.00 | 21.9 | 16.0 | 11.7 | 0.0131 | 17.0 | 13.5 | 0.0088 | 18.1 |
| 70.00 | 21.9 | 14.0 | 9.7 | 0.0131 | 15.0 | 13.8 | 0.0058 | 15.0 |
| 240.00 | 21.9 | 12.0 | 7.7 | 0.0131 | 13.0 | 14.2 | 0.0032 | 11.9 |
| 1445.00 | 20.5 | 11.0 | 6.3 | 0.0134 | 12.0 | 14.3 | 0.0013 | 9.7 |

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.9 | 54.4 | 62.3 | 23.7 | 14.0 | 37.7 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| 0.0015 | 0.0058 | 0.0109 | 0.0308 | 0.1282 | 0.1673 | 0.2782 | 0.3236 | 0.3876 | 0.5009 |

| Fineness Modulus | $C_u$ | $C_c$ |
|---|---|---|
| 0.65 | 108.09 | 3.65 |

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 0.0 | 2.4 | 56.4 | 41.2 | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-933 | B-933-5 | 11.2-12.7' | 9/8/06 | ND | LIGHT GRAY SILTY SAND. | 25.9 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ND=NOT DETERMINED.
ENTIRE SAMPLE WAS TESTED.

**Tested By:** JPD **Checked By:** ABS

DATA REPORT Rev. 0 MACTEC ENGINEERING & CONSULTING, INC. 1/23/07

## GRAIN SIZE DISTRIBUTION TEST DATA

12/18/2006

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-933
**Depth:** 11.2-12.7'
**Sample Number:** B-933-5
**Material Description:** LIGHT GRAY SILTY SAND.
**Date:** 9/8/06
**Natural Moisture:** 25.9
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** ND=NOT DETERMINED.
ENTIRE SAMPLE WAS TESTED.
**Tested by:** JPD
**Checked by:** ABS

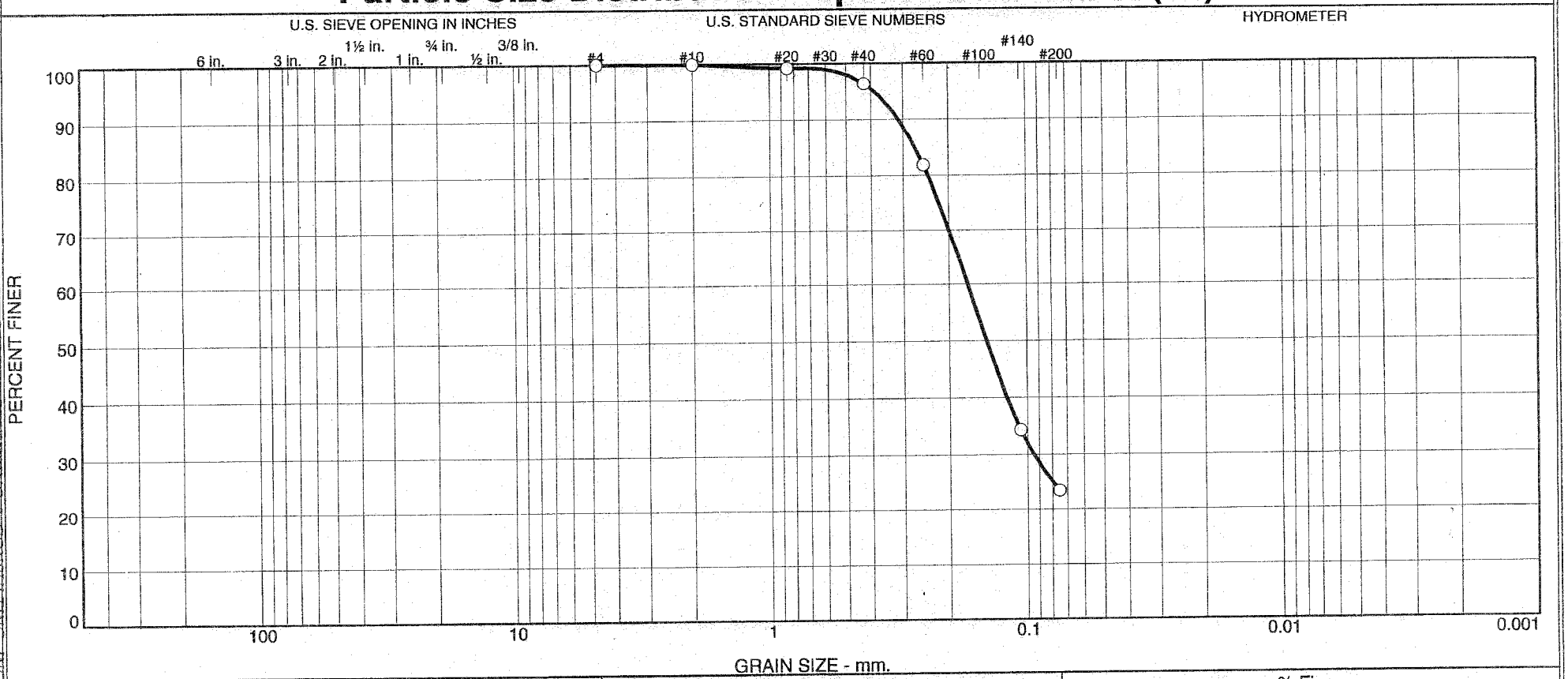
| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 118.74 | 0.00 | 0.00 | #10 | 0.00 | 100.0 |
| 118.74 | 0.00 | 0.00 | #20 | 0.37 | 99.7 |
| | | | #40 | 2.89 | 97.6 |
| | | | #60 | 14.39 | 87.9 |
| | | | #140 | 59.07 | 50.3 |
| | | | #200 | 69.77 | 41.2 |

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.4 | 56.4 | 58.8 | | | 41.2 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.1052 | 0.1345 | 0.2045 | 0.2307 | 0.2679 | 0.3386 |

| Fineness Modulus |
|---|
| 0.43 |

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 0.1 | 3.5 | 73.0 | 23.4 | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-933 | B-933-7 | 19.5-21' | 9/8/06 | ND | BROWN SILTY SAND. | 26.7 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ND=NOT DETERMINED.
ENTIRE SAMPLE WAS TESTED.

**Tested By:** JPD **Checked By:** ABS

DATA REPORT Rev. 0 MACTEC ENGINEERING & CONSULTING, INC. 1/23/07

## GRAIN SIZE DISTRIBUTION TEST DATA

12/18/2006

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-933
**Depth:** 19.5-21'
**Sample Number:** B-933-7
**Material Description:** BROWN SILTY SAND.
**Date:** 9/8/06
**Natural Moisture:** 26.7
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** ND=NOT DETERMINED.
ENTIRE SAMPLE WAS TESTED.
**Tested by:** JPD
**Checked by:** ABS

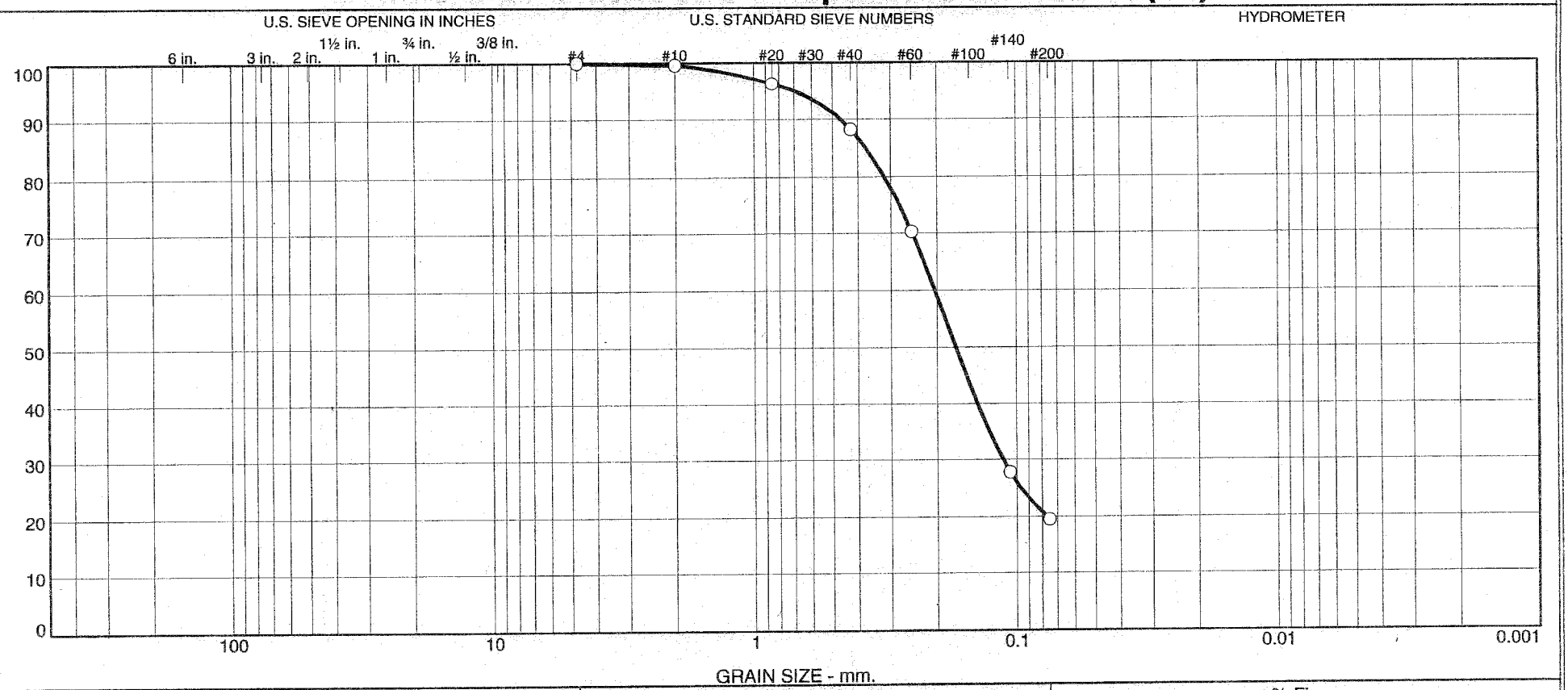
| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 261.79 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 0.14 | 99.9 |
| 105.10 | 0.00 | 0.00 | #20 | 0.76 | 99.2 |
| | | | #40 | 3.72 | 96.4 |
| | | | #60 | 19.06 | 81.8 |
| | | | #140 | 69.01 | 34.3 |
| | | | #200 | 80.49 | 23.4 |

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 3.5 | 73.0 | 76.6 | | | 23.4 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | 0.0944 | 0.1434 | 0.1690 | 0.2404 | 0.2695 | 0.3119 | 0.3874 |

| Fineness Modulus |
|---|
| 0.60 |

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 0.4 | 11.4 | 68.7 | 19.5 | |
| | | | | | | | | |
| | | | | | | | | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-933 | B-933-8 | 24.5-25.0 | 9/8/06 | ND | GRAY SILTY SAND. | 18.7 | ND | ND |
| | | | | | | | | | |
| | | | | | | | | | |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ND=NOT DETERMINED.
ENTIRE SAMPLE WAS TESTED.

**Tested By:** JPD **Checked By:** ABS

DATA REPORT Rev. 0 MACTEC ENGINEERING & CONSULTING, INC. 172301

## GRAIN SIZE DISTRIBUTION TEST DATA

12/18/2006

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-933
**Depth:** 24.5-25.0 **Sample Number:** B-933-8
**Material Description:** GRAY SILTY SAND.
**Date:** 9/8/06 **Natural Moisture:** 18.7
**Liquid Limit:** ND **Plastic Limit:** ND **USCS Class.:** ND
**Testing Remarks:** ND=NOT DETERMINED.
ENTIRE SAMPLE WAS TESTED.
**Tested by:** JPD **Checked by:** ABS

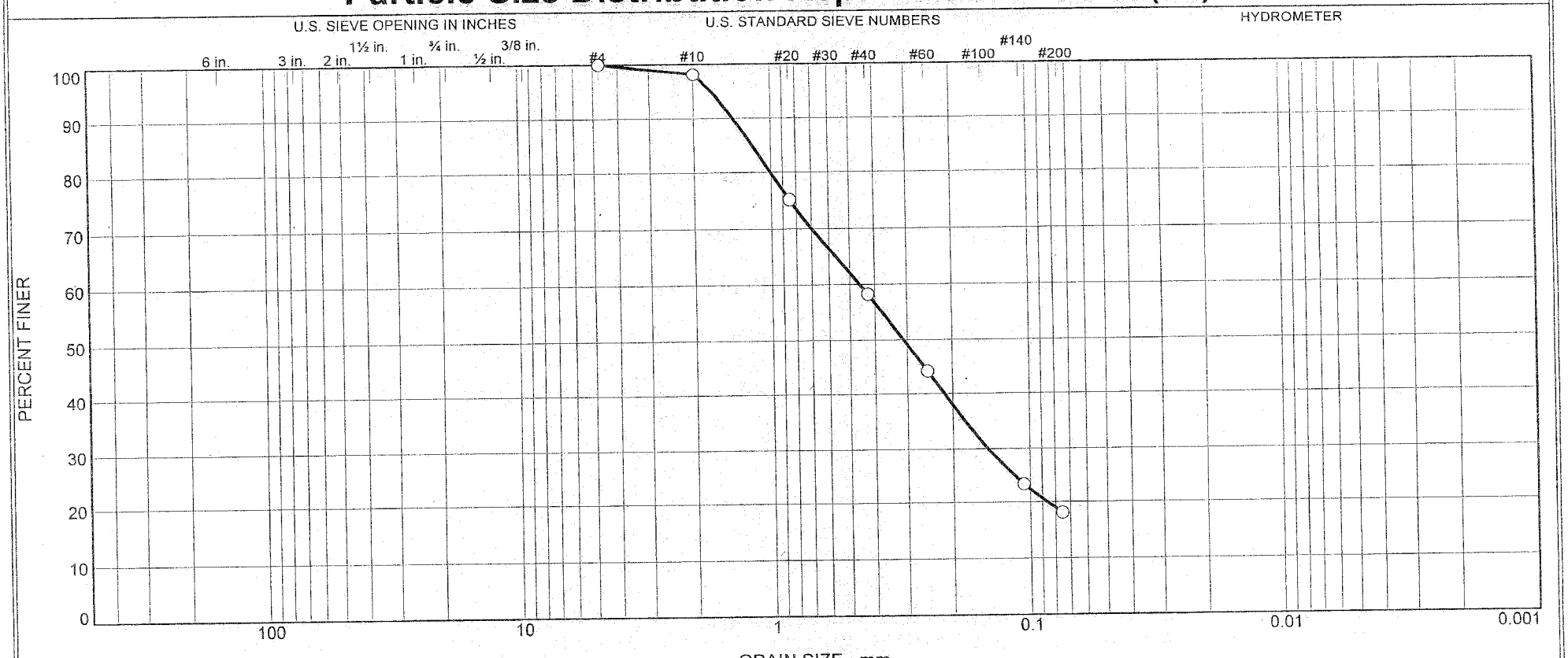
| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 275.01 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 1.03 | 99.6 |
| 114.09 | 0.00 | 0.00 | #20 | 3.80 | 96.3 |
| | | | #40 | 13.05 | 88.2 |
| | | | #60 | 33.60 | 70.3 |
| | | | #140 | 82.20 | 27.8 |
| | | | #200 | 91.80 | 19.5 |

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 11.4 | 68.7 | 80.5 | | | 19.5 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | 0.0771 | 0.1126 | 0.1699 | 0.2040 | 0.3176 | 0.3729 | 0.4641 | 0.6969 |

| Fineness Modulus |
|---|
| 0.87 |

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 1.9 | 39.9 | 40.2 | 18.0 | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-945 | B-945-1 | 1.5-3' | 10/25/06 | ND | Pale brown silty sand. | 14.5 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

## GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-945
**Depth:** 1.5-3'
**Sample Number:** B-945-1
**Material Description:** Pale brown silty sand.
**Date:** 10/25/06
**Natural Moisture:** 14.5
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.
**Tested by:** LBJ
**Checked by:** ABS

### Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 220.89 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 4.21 | 98.1 |
| 108.20 | 0.00 | 0.00 | #20 | 25.37 | 75.1 |
| | | | #40 | 43.96 | 58.2 |
| | | | #60 | 59.58 | 44.1 |
| | | | #140 | 82.52 | 23.3 |
| | | | #200 | 88.30 | 18.0 |

### Fractional Components

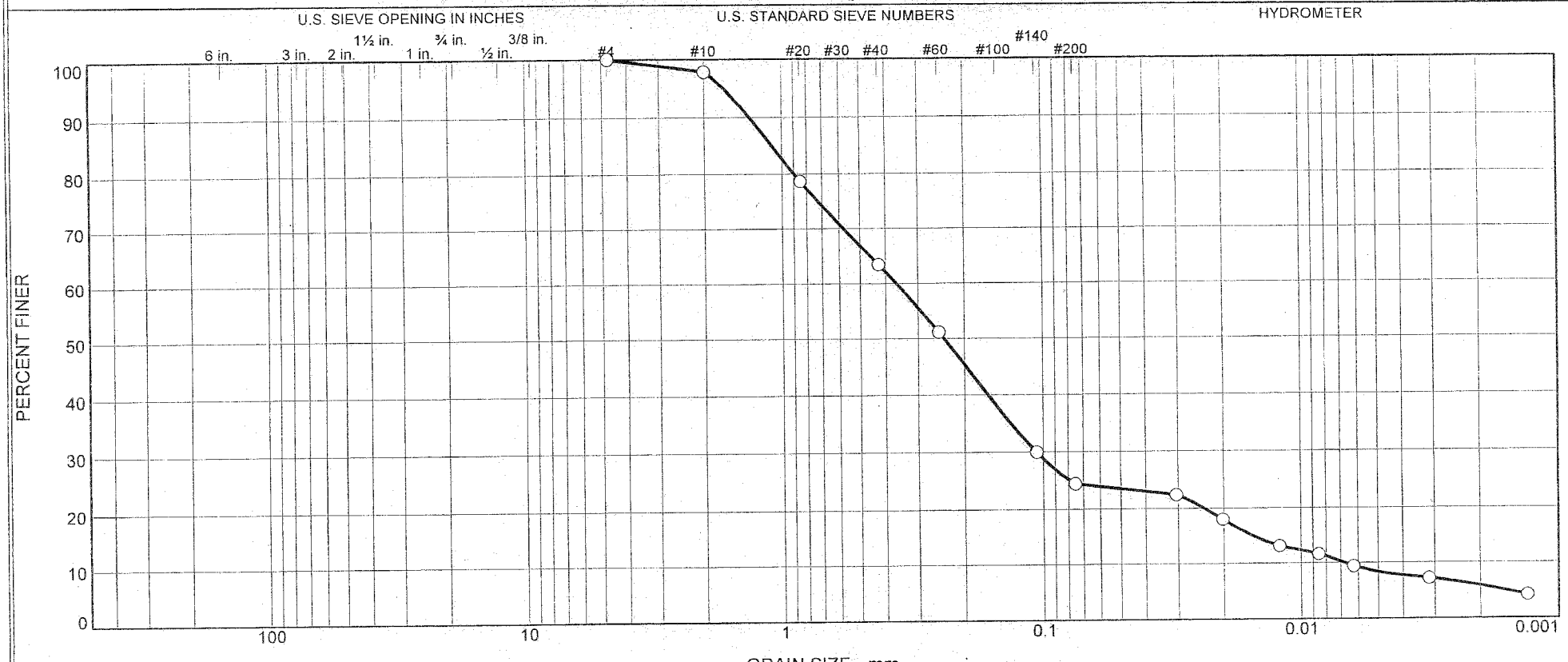
| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 1.9 | 39.9 | 40.2 | 82.0 | | | 18.0 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | 0.0862 | 0.1462 | 0.3100 | 0.4570 | 1.0057 | 1.1855 | 1.4054 | 1.7077 |

| Fineness Modulus |
|---|
| 1.71 |

MACTEC, Inc.

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 2.2 | 34.4 | 38.9 | 16.2 | 8.3 |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-945 | B-945-3 | 4.7-6.2 | 10/25/06 | ND | Pale brown silty sand. | 15.9 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ SPECIFIC GRAVITY WAS ASSUMED.
ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

DATA REPORT Rev. 0 MACTEC ENGINEERING & CONSULTING, INC. 1/23/07

# GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-945
**Depth:** 4.7-6.2 **Sample Number:** B-945-3
**Material Description:** Pale brown silty sand.
**Date:** 10/25/06 **Natural Moisture:** 15.9
**Liquid Limit:** ND **Plastic Limit:** ND **USCS Class.:** ND
**Testing Remarks:** SPECIFIC GRAVITY WAS ASSUMED.
ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.
**Tested by:** LBJ **Checked by:** ABS

## Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 260.70 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 5.70 | 97.8 |
| 130.27 | 0.00 | 0.00 | #20 | 25.50 | 78.7 |
| | | | #40 | 45.80 | 63.4 |
| | | | #60 | 62.20 | 51.1 |
| | | | #140 | 90.40 | 29.9 |
| | | | #200 | 97.70 | 24.5 |

## Hydrometer Test Data

Hydrometer test uses material passing#10
Percent passing #10 based upon complete sample =97.8
Weight of hydrometer sample =130.27
Hygroscopic moisture correction:
Moist weight and tare = 27.06
Dry weight and tare = 27.01
Tare weight = 15.46
Hygroscopic moisture =0.4%
Table of composite correction values:

| Temp., deg. C: | 12.8 | 29.5 |
|---|---|---|
| Comp. corr.: | -5.0 | -2.0 |

Meniscus correction only =1.0
Specific gravity of solids =2.7
Hydrometer type =152H
Hydrometer effective depth equation: L =16.294964 - 0.164 x Rm

| Elapsed Time (min.) | Temp. (deg. C.) | Actual Reading | Corrected Reading | K | Rm | Eff. Depth | Diameter (mm.) | Percent Finer |
|---|---|---|---|---|---|---|---|---|
| 2.00 | 21.5 | 33.5 | 30.1 | 0.0132 | 34.5 | 10.6 | 0.0304 | 22.4 |
| 5.00 | 21.5 | 27.5 | 24.1 | 0.0132 | 28.5 | 11.6 | 0.0201 | 17.9 |
| 15.00 | 21.5 | 21.0 | 17.6 | 0.0132 | 22.0 | 12.7 | 0.0121 | 13.1 |
| 31.00 | 21.6 | 19.0 | 15.6 | 0.0132 | 20.0 | 13.0 | 0.0085 | 11.6 |
| 60.00 | 21.8 | 16.0 | 12.6 | 0.0131 | 17.0 | 13.5 | 0.0062 | 9.4 |
| 240.00 | 22.2 | 13.0 | 9.7 | 0.0131 | 14.0 | 14.0 | 0.0032 | 7.2 |
| 1451.00 | 21.9 | 9.0 | 5.6 | 0.0131 | 10.0 | 14.7 | 0.0013 | 4.2 |

MACTEC, Inc.

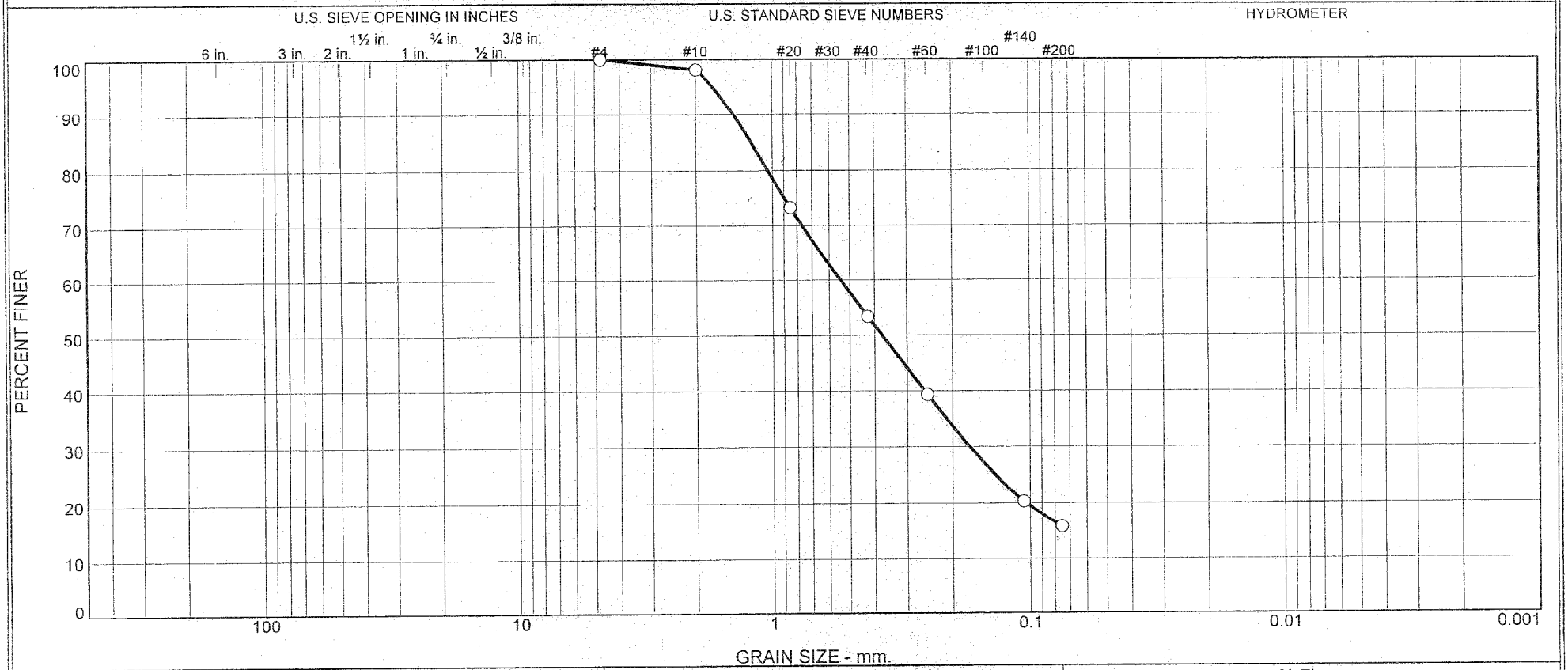
## Fractional Components

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 2.2 | 34.4 | 38.9 | 75.5 | 16.2 | 8.3 | 24.5 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| 0.0068 | 0.0155 | 0.0237 | 0.1063 | 0.2392 | 0.3639 | 0.8974 | 1.0930 | 1.3366 | 1.6835 |

| Fineness Modulus | $C_u$ | $C_c$ |
|---|---|---|
| 1.51 | 53.62 | 4.58 |

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 1.9 | 44.7 | 37.6 | 15.8 | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-945 | B-945-5 | 11.3-12.8" | 10/25/06 | ND | Pale brown silty sand. | 21.6 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ENTIRE SAMPLE WAS TESTED. ND=NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

## GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-945
**Depth:** 11.3-12.8"
**Sample Number:** B-945-5
**Material Description:** Pale brown silty sand.
**Date:** 10/25/06
**Natural Moisture:** 21.6
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED. ND=NOT DETERMINED.
**Tested by:** LBJ
**Checked by:** ABS

### Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 188.23 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 3.50 | 98.1 |
| 93.11 | 0.00 | 0.00 | #20 | 23.57 | 73.3 |
| | | | #40 | 42.40 | 53.4 |
| | | | #60 | 55.75 | 39.4 |
| | | | #140 | 73.82 | 20.3 |
| | | | #200 | 78.15 | 15.8 |

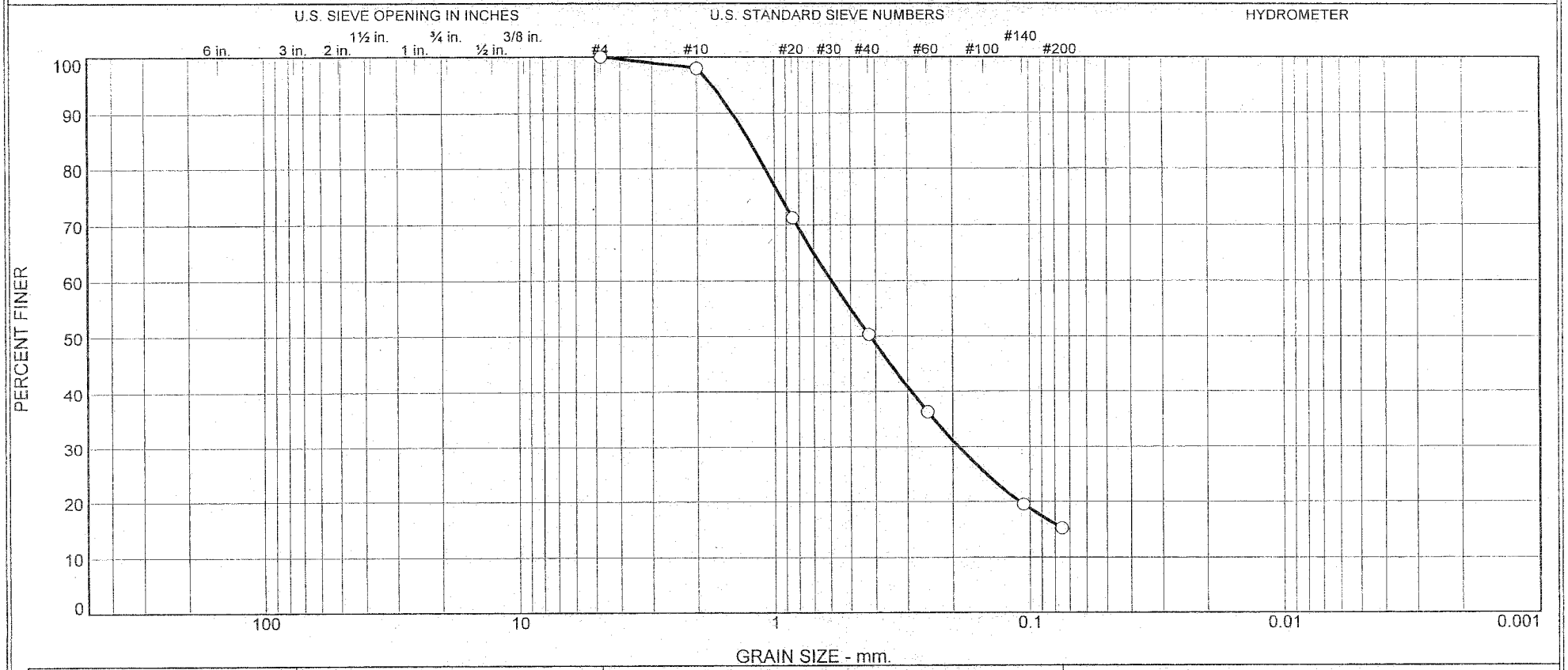
### Fractional Components

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 1.9 | 44.7 | 37.6 | 84.2 | | | 15.8 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | 0.1037 | 0.1718 | 0.3737 | 0.5413 | 1.0413 | 1.2110 | 1.4217 | 1.7135 |

| Fineness Modulus |
|---|
| 1.83 |

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 2.1 | 47.5 | 35.2 | 15.2 | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-945 | B-945-7 | 19.4-20.9 | 10-25-06 | ND | Pale brown silty sand. | 27.6 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 | Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

## GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-945
**Depth:** 19.4-20.9 **Sample Number:** B-945-7
**Material Description:** Pale brown silty sand.
**Date:** 10-25-06 **Natural Moisture:** 27.6
**Liquid Limit:** ND **Plastic Limit:** ND **USCS Class.:** ND
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.
**Tested by:** LBJ **Checked by:** ABS

### Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 161.07 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 3.33 | 97.9 |
| 79.33 | 0.00 | 0.00 | #20 | 21.55 | 71.3 |
| | | | #40 | 38.53 | 50.4 |
| | | | #60 | 49.89 | 36.3 |
| | | | #140 | 63.54 | 19.5 |
| | | | #200 | 66.99 | 15.2 |

### Fractional Components

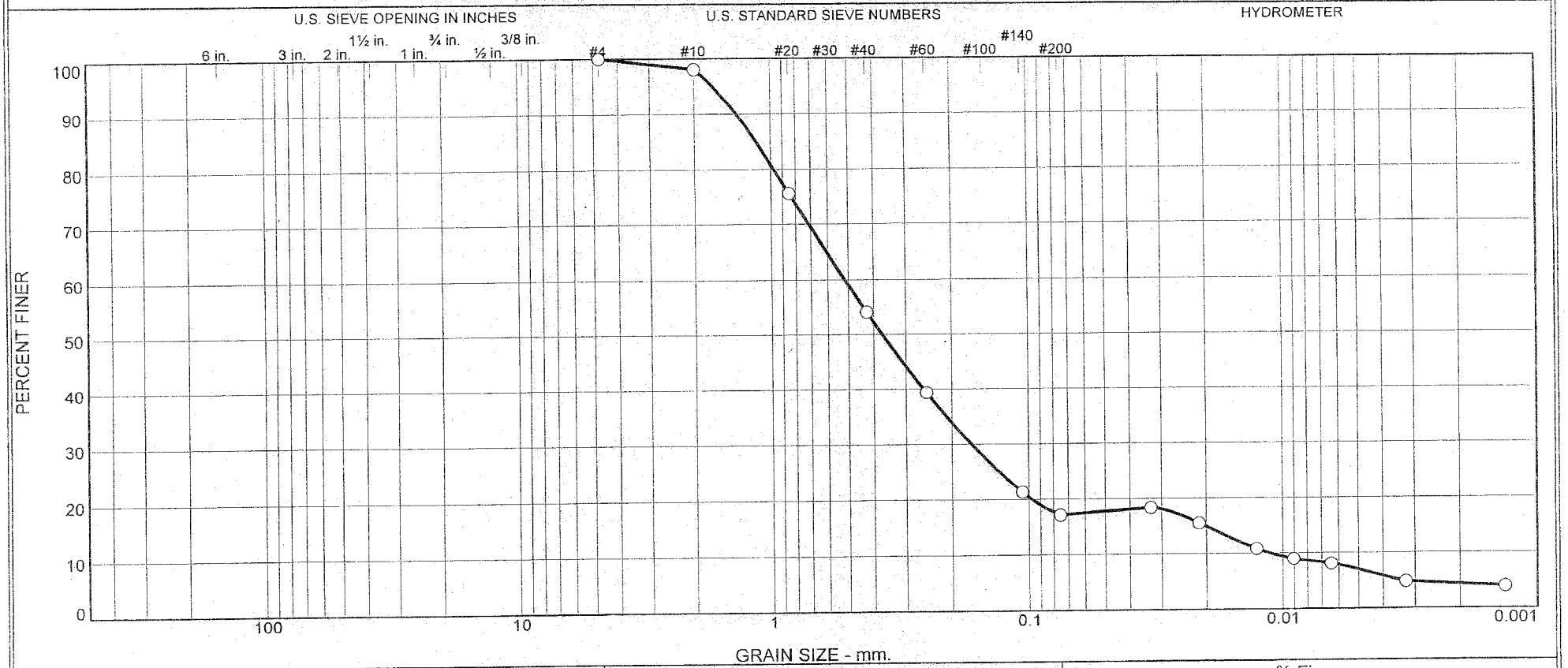
| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 2.1 | 47.5 | 35.2 | 84.8 | | | 15.2 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | 0.1098 | 0.1900 | 0.4194 | 0.5953 | 1.0861 | 1.2522 | 1.4586 | 1.7439 |

| Fineness Modulus |
|---|
| 1.92 |

MACTEC, Inc.

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 1.9 | 44.1 | 36.9 | 10.2 | 6.9 |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-945 | B-945-9 | 27.8-29.4 | 10/25/06 | ND | Pale brown silty sand. | 24.1 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ SPECIFIC GRAVITY WAS ASSUMED.
ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

## GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-945
**Depth:** 27.8-29.4 **Sample Number:** B-945-9
**Material Description:** Pale brown silty sand.
**Date:** 10/25/06 **Natural Moisture:** 24.1
**Liquid Limit:** ND **Plastic Limit:** ND **USCS Class.:** ND
**Testing Remarks:** SPECIFIC GRAVITY WAS ASSUMED.
ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.
**Tested by:** LBJ **Checked by:** ABS

### Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 227.28 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 4.31 | 98.1 |
| 103.31 | 0.00 | 0.00 | #20 | 23.61 | 75.7 |
| | | | #40 | 46.41 | 54.0 |
| | | | #60 | 61.88 | 39.3 |
| | | | #140 | 80.85 | 21.3 |
| | | | #200 | 85.25 | 17.1 |

### Hydrometer Test Data

Hydrometer test uses material passing#10
Percent passing #10 based upon complete sample =98.1
Weight of hydrometer sample =103.31
Hygroscopic moisture correction:
Moist weight and tare = 26.28
Dry weight and tare = 26.24
Tare weight = 15.33
Hygroscopic moisture =0.4%
Table of composite correction values:

| Temp., deg. C: | 12.8 | 29.5 |
|---|---|---|
| Comp. corr.: | -5.0 | -2.0 |

Meniscus correction only =1.0
Specific gravity of solids =2.7
Hydrometer type =152H
Hydrometer effective depth equation: $L = 16.294964 - 0.164 \times Rm$

| Elapsed Time (min.) | Temp. (deg. C.) | Actual Reading | Corrected Reading | K | Rm | Eff. Depth | Diameter (mm.) | Percent Finer |
|---|---|---|---|---|---|---|---|---|
| 2.00 | 21.0 | 23.0 | 19.5 | 0.0133 | 24.0 | 12.4 | 0.0330 | 18.4 |
| 5.00 | 21.0 | 20.0 | 16.5 | 0.0133 | 21.0 | 12.9 | 0.0213 | 15.5 |
| 15.00 | 21.0 | 15.0 | 11.5 | 0.0133 | 16.0 | 13.7 | 0.0127 | 10.8 |
| 30.00 | 21.1 | 13.0 | 9.5 | 0.0133 | 14.0 | 14.0 | 0.0091 | 8.9 |
| 60.00 | 21.3 | 12.0 | 8.5 | 0.0132 | 13.0 | 14.2 | 0.0064 | 8.0 |
| 240.00 | 21.8 | 8.5 | 5.1 | 0.0131 | 9.5 | 14.7 | 0.0033 | 4.8 |
| 1448.00 | 22.0 | 7.5 | 4.2 | 0.0131 | 8.5 | 14.9 | 0.0013 | 3.9 |

MACTEC, Inc.

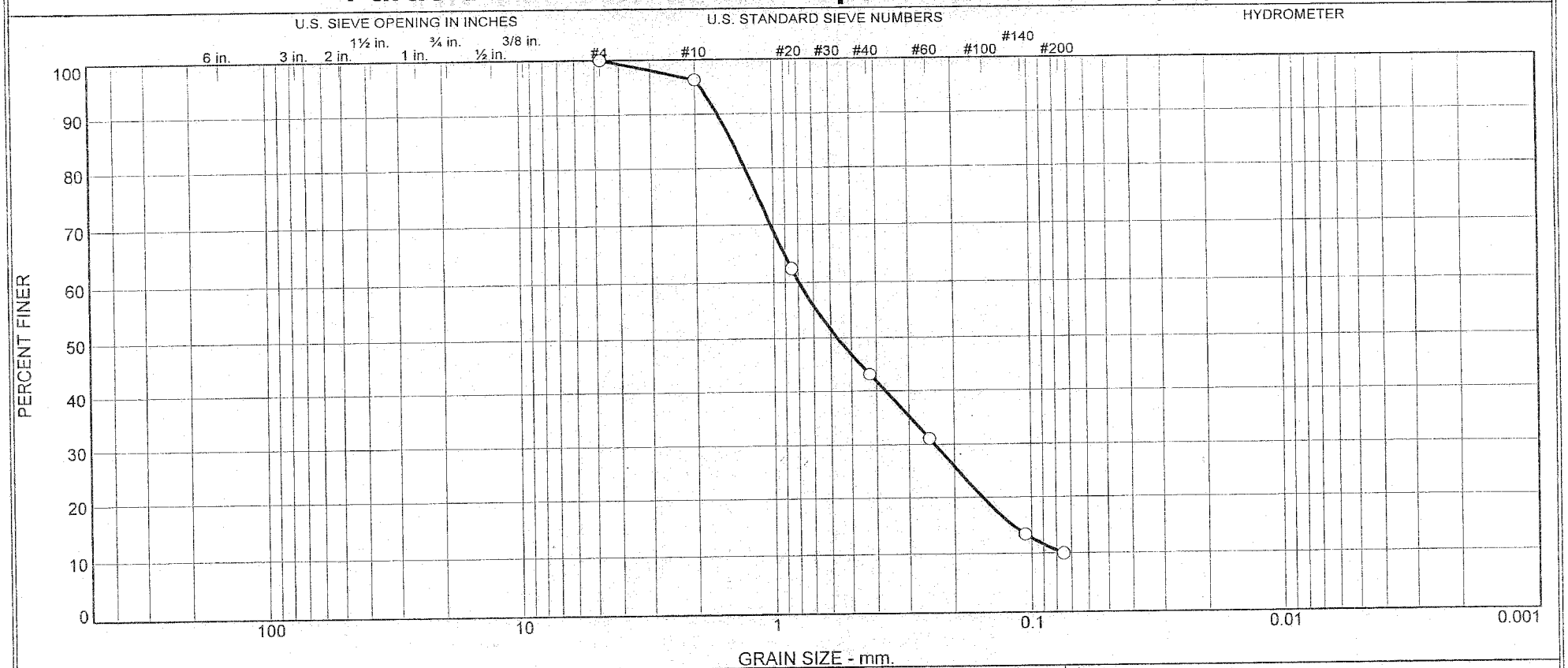
## Fractional Components

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 1.9 | 44.1 | 36.9 | 82.9 | 10.2 | 6.9 | 17.1 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| 0.0113 | 0.0201 | 0.0973 | 0.1680 | 0.3702 | 0.5176 | 0.9729 | 1.1435 | 1.3627 | 1.6785 |

| Fineness Modulus | $C_u$ | $C_c$ |
|---|---|---|
| 1.79 | 45.98 | 4.84 |

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 3.7 | 53.1 | 33.3 | 9.9 | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-945 | B-945-11 | 39.4-40.9 | 10-25-06 | ND | Pale brown sand with silt. | 20.0 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

DATA REPORT Rev. 0 MACTEC ENGINEERING & CONSULTING, INC. 1/23/07

# GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-945
**Depth:** 39.4-40.9
**Sample Number:** B-945-11
**Material Description:** Pale brown sand with silt.
**Date:** 10-25-06
**Natural Moisture:** 20.0
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.
**Tested by:** LBJ
**Checked by:** ABS

## Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 200.39 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 7.45 | 96.3 |
| 94.45 | 0.00 | 0.00 | #20 | 33.22 | 62.4 |
| | | | #40 | 52.09 | 43.2 |
| | | | #60 | 63.97 | 31.1 |
| | | | #140 | 81.38 | 13.3 |
| | | | #200 | 84.69 | 9.9 |

## Fractional Components

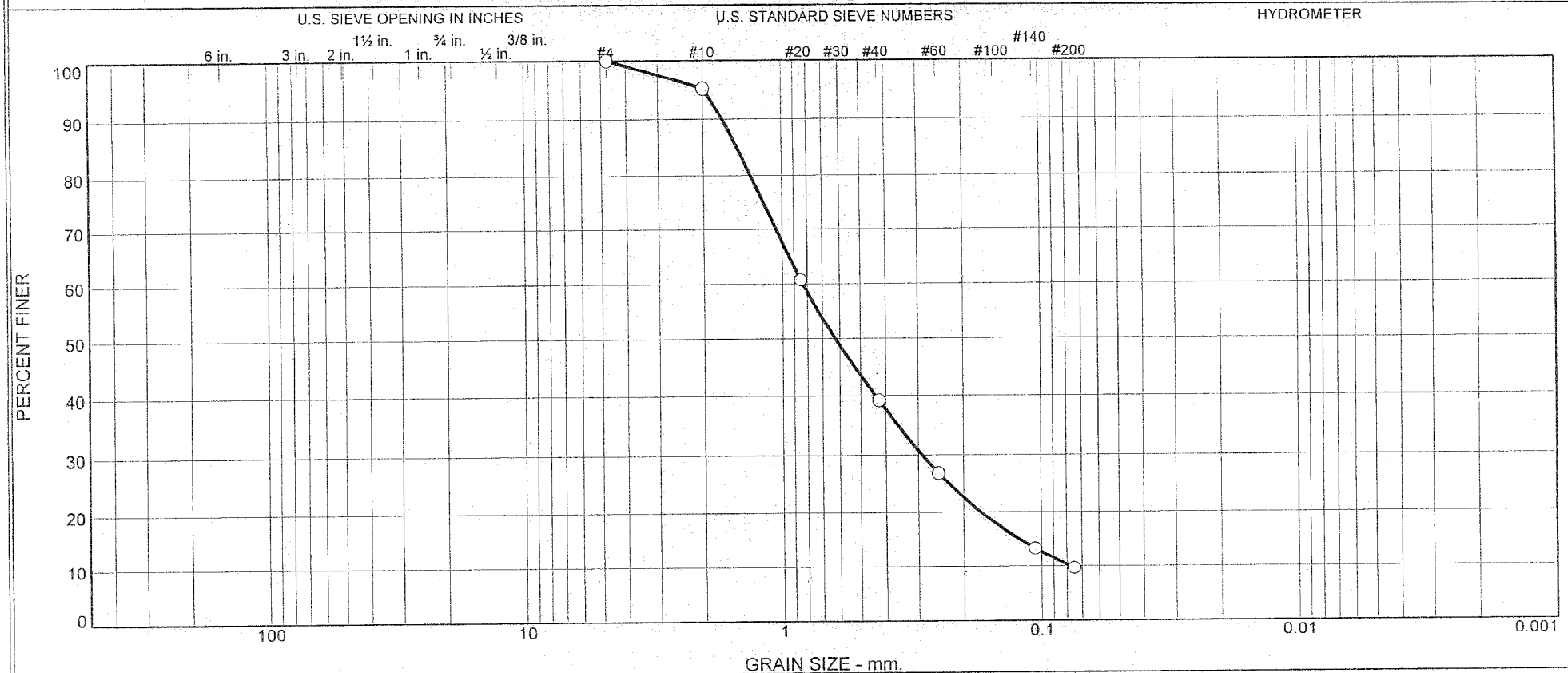
| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 3.7 | 53.1 | 33.3 | 90.1 | | | 9.9 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| 0.0755 | 0.1189 | 0.1549 | 0.2389 | 0.5675 | 0.7953 | 1.2832 | 1.4420 | 1.6374 | 1.9064 |

| Fineness Modulus | $C_u$ | $C_c$ |
|---|---|---|
| 2.21 | 10.54 | 0.95 |

MACTEC, Inc.

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 4.7 | 56.1 | 29.5 | 9.7 | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-945 | B-945-13 | 49.4-50.9 | 10-25-06 | ND | Pale brown sand with silt. | 15.6 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

# GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-945
**Depth:** 49.4-50.9
**Sample Number:** B-945-13
**Material Description:** Pale brown sand with silt.
**Date:** 10-25-06
**Natural Moisture:** 15.6
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.
**Tested by:** LBJ
**Checked by:** ABS

## Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 187.52 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 8.86 | 95.3 |
| 87.27 | 0.00 | 0.00 | #20 | 31.61 | 60.8 |
| | | | #40 | 51.33 | 39.2 |
| | | | #60 | 62.66 | 26.9 |
| | | | #140 | 75.06 | 13.3 |
| | | | #200 | 78.41 | 9.7 |

## Fractional Components

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 4.7 | 56.1 | 29.5 | 90.3 | | | 9.7 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| 0.0775 | 0.1216 | 0.1719 | 0.2893 | 0.6263 | 0.8338 | 1.3166 | 1.4807 | 1.6862 | 1.9789 |

| Fineness Modulus | $C_u$ | $C_c$ |
|---|---|---|
| 2.31 | 10.76 | 1.30 |

MACTEC, Inc.

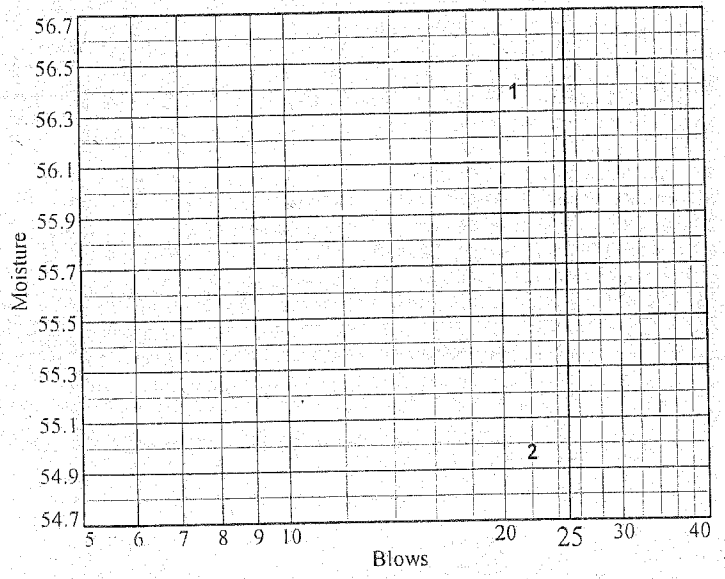
# LIQUID AND PLASTIC LIMIT TEST DATA

1/17/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-947
**Depth:** 1.5-3
**Sample Number:** B-947-1
**Material Description:** LIGHT GREENISH GRAY SILTY CLAY.
**%<#40:** 89.5 **%<#200:** ND **USCS:** ND **AASHTO:** ND
**Tested by:** LBJ **Checked by:** ABS
**Testing Remarks:** NATURAL MOISTURE 16.7.
ENTIRE SAMPLE WAS TESTED.

## Liquid Limit Data

| Run No. | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Wet+Tare | 27.62 | 29.21 | | | | |
| Dry+Tare | 23.29 | 24.34 | | | | |
| Tare | 15.61 | 15.48 | | | | |
| # Blows | 21 | 22 | | | | |
| Moisture | 56.4 | 55.0 | | | | |




**Liquid Limit=** 55
**Plastic Limit=** 30
**Plasticity Index=** 25
**Natural Moisture=** 16.7
**Liquidity Index=** -0.5

## Plastic Limit Data

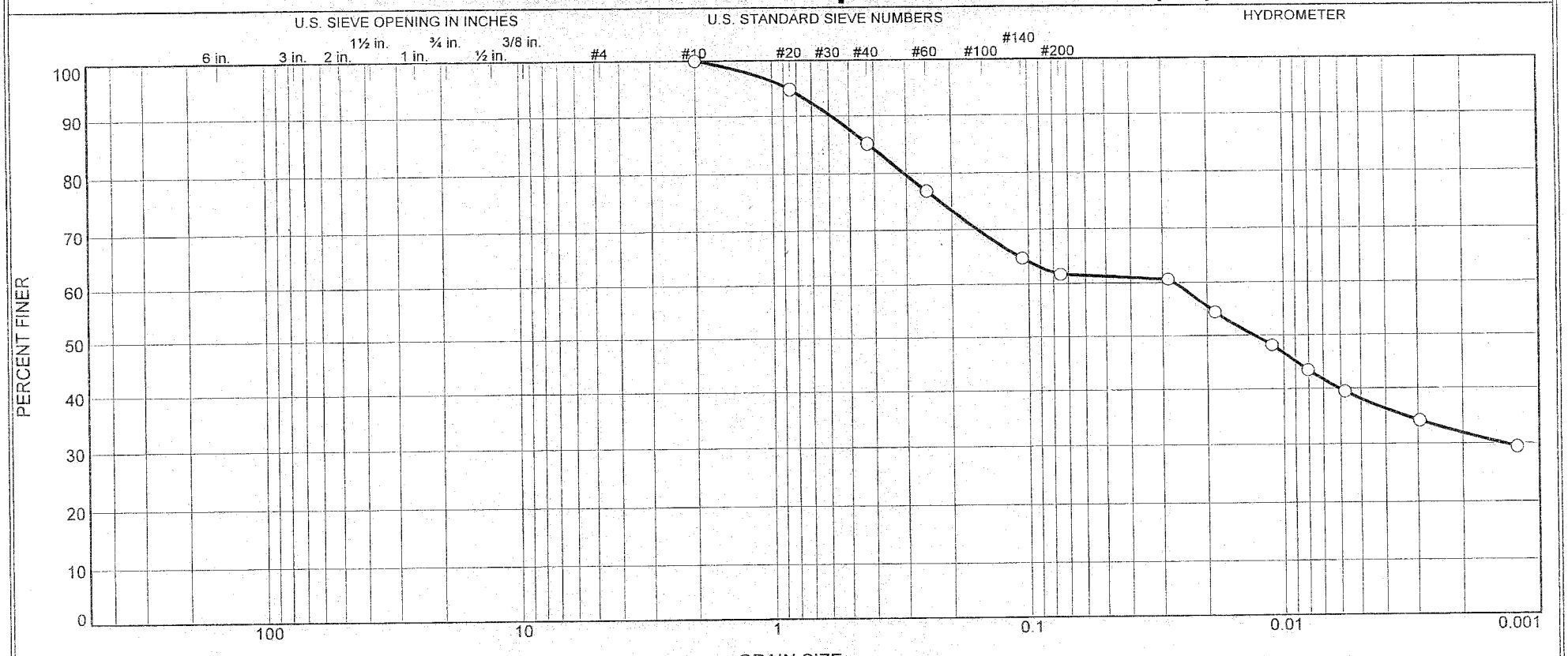
| Run No. | 1 | 2 | 3 | 4 | |
|---|---|---|---|---|---|
| Wet+Tare | 22.09 | 22.29 | | | |
| Dry+Tare | 20.60 | 20.81 | | | |
| Tare | 15.62 | 15.81 | | | |
| Moisture | 29.9 | 29.6 | | | |

## Natural Moisture Data

| Wet+Tare | Dry+Tare | Tare | Moisture |
|---|---|---|---|
| 78.57 | 70.9 | 24.93 | 16.7 |

MACTEC, Inc.

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 0.0 | 15.0 | 23.3 | 23.6 | 38.1 |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-947 | B-947-3 | 4.5-6' | 9-27-06 | MH | Light brown reddish yellow sandy silt. | 36.0 | 56 | 37 |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ENTIRE SAMPLE WAS TESTED.

**Tested By:** LBJ **Checked By:** ABS

## GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-947
**Depth:** 4.5-6'
**Sample Number:** B-947-3
**Material Description:** Light brown reddish yellow sandy silt.
**Date:** 9-27-06
**Natural Moisture:** 36.0
**Liquid Limit:** 56
**Plastic Limit:** 37
**USCS Class.:** MH
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED.
**Tested by:** LBJ
**Checked by:** ABS

### Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 158.89 | 0.00 | 0.00 | #10 | 0.00 | 100.0 |
| | | | #20 | 8.43 | 94.7 |
| | | | #40 | 23.77 | 85.0 |
| | | | #60 | 36.71 | 76.9 |
| | | | #140 | 55.99 | 64.8 |
| | | | #200 | 60.80 | 61.7 |

### Hydrometer Test Data

Hydrometer test uses material passing#10
Percent passing #10 based upon complete sample =100.0
Weight of hydrometer sample =65.04
Hygroscopic moisture correction:
Moist weight and tare = 26.02
Dry weight and tare = 25.65
Tare weight = 15.47
Hygroscopic moisture =3.6%
Table of composite correction values:

| Temp., deg. C: | 12.8 | 29.5 |
|---|---|---|
| Comp. corr.: | -5.0 | -2.0 |

Meniscus correction only =1.0
Specific gravity of solids =2.7
Hydrometer type =152H
Hydrometer effective depth equation: L =16.294964 - 0.164 x Rm

| Elapsed Time (min.) | Temp. (deg. C.) | Actual Reading | Corrected Reading | K | Rm | Eff. Depth | Diameter (mm.) | Percent Finer |
|---|---|---|---|---|---|---|---|---|
| 2.00 | 21.2 | 42.0 | 38.5 | 0.0132 | 43.0 | 9.2 | 0.0285 | 60.7 |
| 5.00 | 21.2 | 38.0 | 34.5 | 0.0132 | 39.0 | 9.9 | 0.0186 | 54.4 |
| 15.00 | 21.1 | 34.0 | 30.5 | 0.0133 | 35.0 | 10.6 | 0.0111 | 48.0 |
| 30.00 | 21.3 | 31.0 | 27.5 | 0.0132 | 32.0 | 11.0 | 0.0080 | 43.4 |
| 60.00 | 21.4 | 28.5 | 25.0 | 0.0132 | 29.5 | 11.5 | 0.0058 | 39.5 |
| 240.00 | 21.8 | 25.0 | 21.6 | 0.0131 | 26.0 | 12.0 | 0.0029 | 34.1 |
| 1446.00 | 22.0 | 22.0 | 18.7 | 0.0131 | 23.0 | 12.5 | 0.0012 | 29.4 |

## Fractional Components

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 15.0 | 23.3 | 38.3 | 23.6 | 38.1 | 61.7 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | 0.0014 | 0.0131 | 0.0268 | 0.3062 | 0.4239 | 0.5889 | 0.8756 |

| Fineness Modulus |
|---|
| 0.63 |

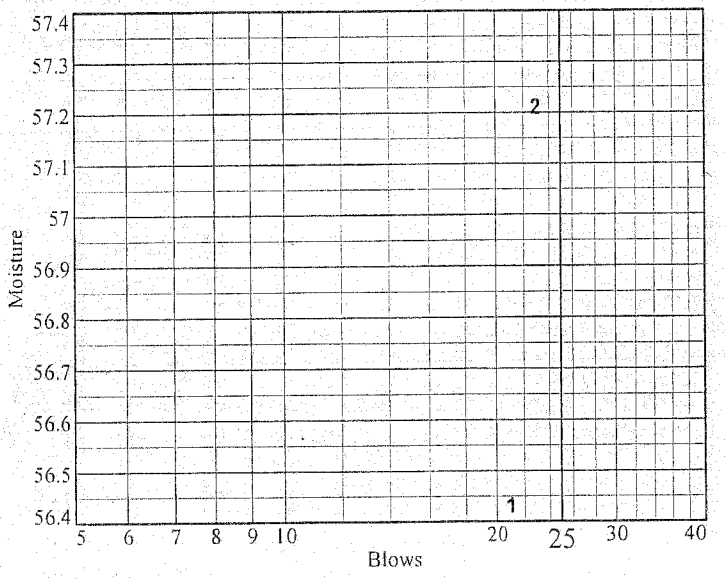
## LIQUID AND PLASTIC LIMIT TEST DATA

1/17/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-947
**Depth:** 4.5-6'
**Sample Number:** B-947-3
**Material Description:** Light brown reddish yellow sandy silt.
**%<#40:** 85.0 **%<#200:** 61.7 **USCS:** MH **AASHTO:** A-7-5(12)
**Tested by:** LBJ **Checked by:** ABS
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED.

### Liquid Limit Data

| Run No. | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Wet+Tare | 26.25 | 25.21 | | | | |
| Dry+Tare | 22.39 | 21.68 | | | | |
| Tare | 15.55 | 15.51 | | | | |
| # Blows | 21 | 23 | | | | |
| Moisture | 56.4 | 57.2 | | | | |




**Liquid Limit=** 56
**Plastic Limit=** 37
**Plasticity Index=** 19
**Natural Moisture=** 36.0
**Liquidity Index=** -0.1

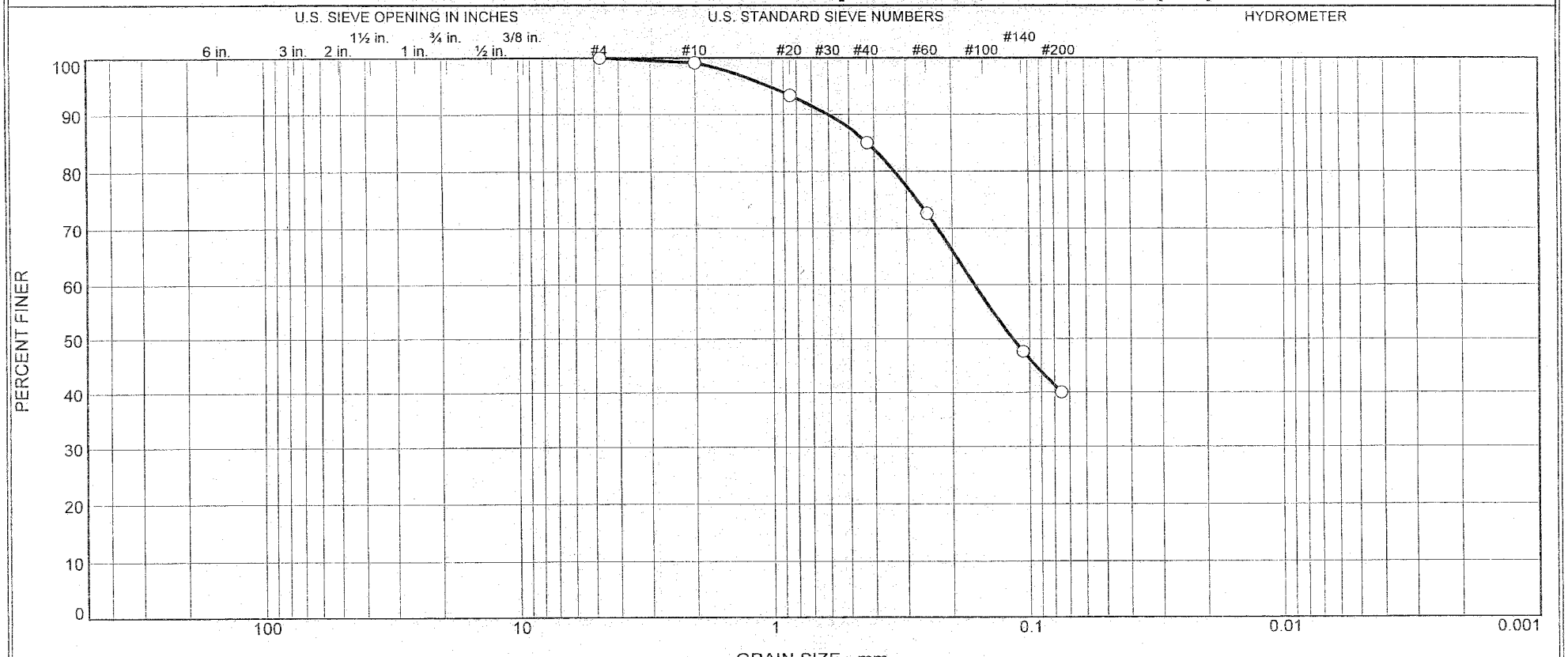
### Plastic Limit Data

| Run No. | 1 | 2 | 3 | 4 | |
|---|---|---|---|---|---|
| Wet+Tare | 21.81 | 20.79 | | | |
| Dry+Tare | 20.09 | 19.40 | | | |
| Tare | 15.62 | 15.59 | | | |
| Moisture | 38.5 | 36.5 | | | |

### Natural Moisture Data

| Wet+Tare | Dry+Tare | Tare | Moisture |
|---|---|---|---|
| 35.34 | 30.10 | 15.56 | 36.0 |

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 0.9 | 14.2 | 44.9 | 40.0 | |
| | | | | | | | | |
| | | | | | | | | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-947 | B-947-4 | 8.5-10.0' | 9/27/06 | SM | Light brown reddish yellow sandy silt. | 20.7 | 38 | 29 |
| | | | | | | | | | |
| | | | | | | | | | |

Client Dominion Nuclear North Anna
Project North Anna COL Project
Project No. 6468061472 | Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ENTIRE SAMPLE WAS TESTED.

**Tested By:** LBJ **Checked By:** ABS

## GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-947
**Depth:** 8.5-10.0'
**Sample Number:** B-947-4
**Material Description:** Light brown reddish yellow sandy silt.
**Date:** 9/27/06
**Natural Moisture:** 20.7
**Liquid Limit:** 38
**Plastic Limit:** 29
**USCS Class.:** SM
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED.
**Tested by:** LBJ
**Checked by:** ABS

### Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 160.59 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 1.40 | 99.1 |
| 76.98 | 0.00 | 0.00 | #20 | 4.51 | 93.3 |
| | | | #40 | 11.02 | 84.9 |
| | | | #60 | 20.55 | 72.7 |
| | | | #140 | 39.99 | 47.6 |
| | | | #200 | 45.89 | 40.0 |

### Fractional Components

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.9 | 14.2 | 44.9 | 60.0 | | | 40.0 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.1162 | 0.1639 | 0.3333 | 0.4265 | 0.6067 | 1.0342 |

| Fineness Modulus |
|---|
| 0.80 |

MACTEC, Inc.

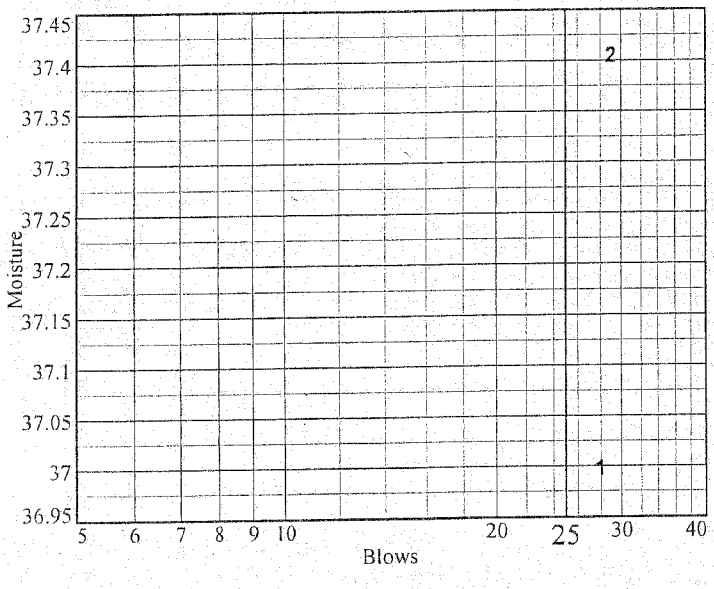
# LIQUID AND PLASTIC LIMIT TEST DATA

1/17/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-947
**Depth:** 8.5-10.0'
**Sample Number:** B-947-4
**Material Description:** Light brown reddish yellow sandy silt.
**%<#40:** 84.9 **%<#200:** 40.0 **USCS:** SM **AASHTO:** A-4(1)
**Tested by:** LBJ **Checked by:** ABS
**Testing Remarks:** SPECIFIC GRAVITY IS ASSUMED.
ENTIRE SAMPLE WAS TESTED.

## Liquid Limit Data

| Run No. | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Wet+Tare | 25.99 | 26.39 | | | | |
| Dry+Tare | 23.13 | 23.42 | | | | |
| Tare | 15.40 | 15.48 | | | | |
| # Blows | 28 | 29 | | | | |
| Moisture | 37.0 | 37.4 | | | | |




**Liquid Limit=** 38
**Plastic Limit=** 29
**Plasticity Index=** 9
**Natural Moisture=** 20.7
**Liquidity Index=** -0.9

## Plastic Limit Data

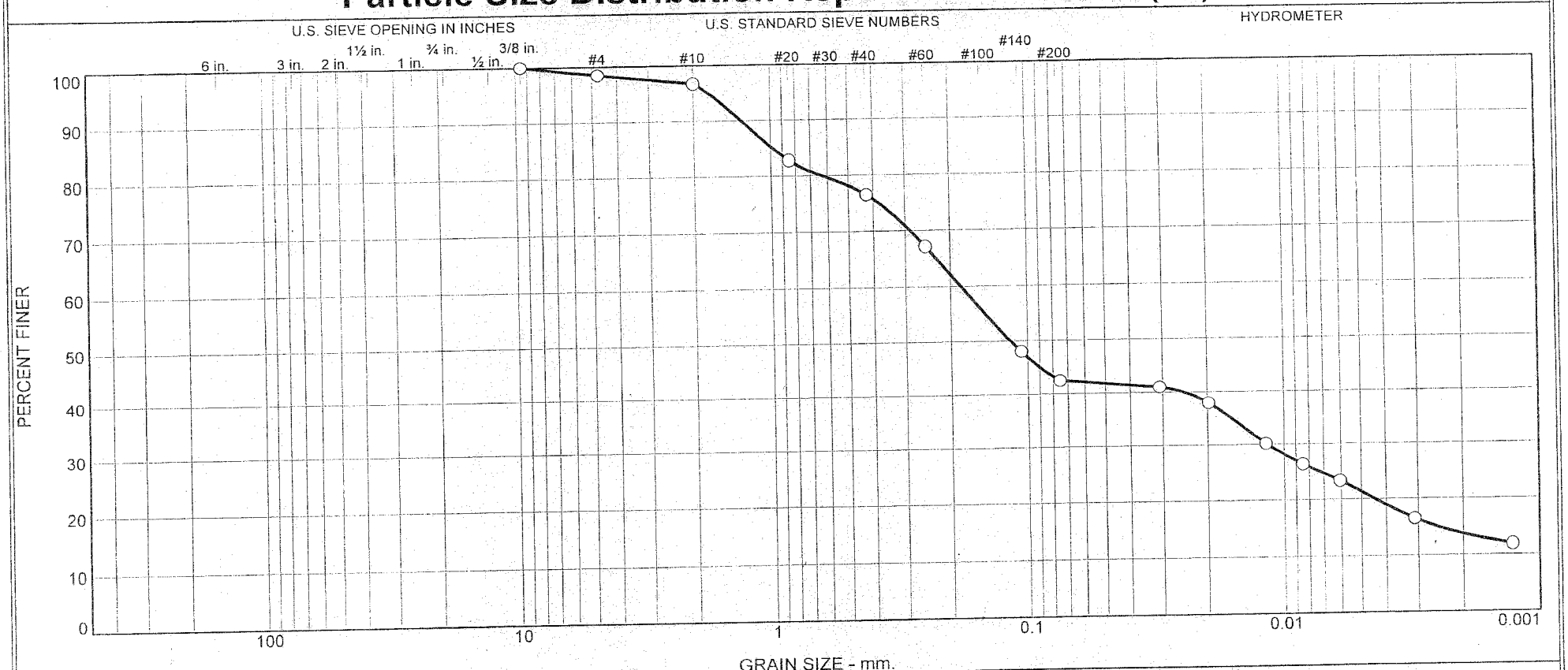
| Run No. | 1 | 2 | 3 | 4 | |
|---|---|---|---|---|---|
| Wet+Tare | 21.81 | 22.2 | | | |
| Dry+Tare | 20.45 | 20.71 | | | |
| Tare | 15.66 | 15.52 | | | |
| Moisture | 28.4 | 28.7 | | | |

## Natural Moisture Data

| Wet+Tare | Dry+Tare | Tare | Moisture |
|---|---|---|---|
| 35.78 | 30.8 | 6.79 | 20.7 |

MACTEC, Inc.

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 1.6 | 1.7 | 20.2 | 34.0 | 21.2 | 21.3 |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-947 | B-947-5 | 9.5-11' | 9/27/06 | ND | Light brown reddish yellow silty sand. | 28.2 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

# GRAIN SIZE DISTRIBUTION TEST DATA

1/17/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-947
**Depth:** 9.5-11'
**Sample Number:** B-947-5
**Material Description:** Light brown reddish yellow silty sand.
**Date:** 9/27/06
**Natural Moisture:** 28.2
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.
**Tested by:** LBJ
**Checked by:** ABS

## Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 175.94 | 0.00 | 0.00 | .375 | 0.00 | 100.0 |
| | | | #4 | 2.83 | 98.4 |
| | | | #10 | 5.86 | 96.7 |
| 64.05 | 0.00 | 0.00 | #20 | 9.18 | 82.8 |
| | | | #40 | 13.36 | 76.5 |
| | | | #60 | 19.53 | 67.2 |
| | | | #140 | 32.23 | 48.0 |
| | | | #200 | 35.88 | 42.5 |

## Hydrometer Test Data

Hydrometer test uses material passing#10
Percent passing #10 based upon complete sample =96.7
Weight of hydrometer sample =64.05
Hygroscopic moisture correction:
Moist weight and tare = 26.49
Dry weight and tare = 25.95
Tare weight = 15.54
Hygroscopic moisture =5.2%
Table of composite correction values:

| Temp., deg. C: | 12.8 | 29.5 |
|---|---|---|
| Comp. corr.: | -5.0 | -2.0 |

Meniscus correction only =1.0
Specific gravity of solids =2.77
Hydrometer type =152H
Hydrometer effective depth equation: L =16.294964 - 0.164 x Rm

| Elapsed Time (min.) | Temp. (deg. C.) | Actual Reading | Corrected Reading | K | Rm | Eff. Depth | Diameter (mm.) | Percent Finer |
|---|---|---|---|---|---|---|---|---|
| 2.00 | 21.2 | 30.0 | 26.5 | 0.0130 | 31.0 | 11.2 | 0.0307 | 41.0 |
| 5.00 | 21.0 | 28.0 | 24.5 | 0.0130 | 29.0 | 11.5 | 0.0198 | 37.9 |
| 15.00 | 21.1 | 23.0 | 19.5 | 0.0130 | 24.0 | 12.4 | 0.0118 | 30.2 |
| 30.00 | 21.2 | 20.5 | 17.0 | 0.0130 | 21.5 | 12.8 | 0.0085 | 26.3 |
| 60.00 | 21.4 | 18.5 | 15.0 | 0.0129 | 19.5 | 13.1 | 0.0060 | 23.3 |
| 240.00 | 21.7 | 14.0 | 10.6 | 0.0129 | 15.0 | 13.8 | 0.0031 | 16.4 |
| 1443.00 | 22.0 | 11.0 | 7.7 | 0.0129 | 12.0 | 14.3 | 0.0013 | 11.8 |

MACTEC, Inc.

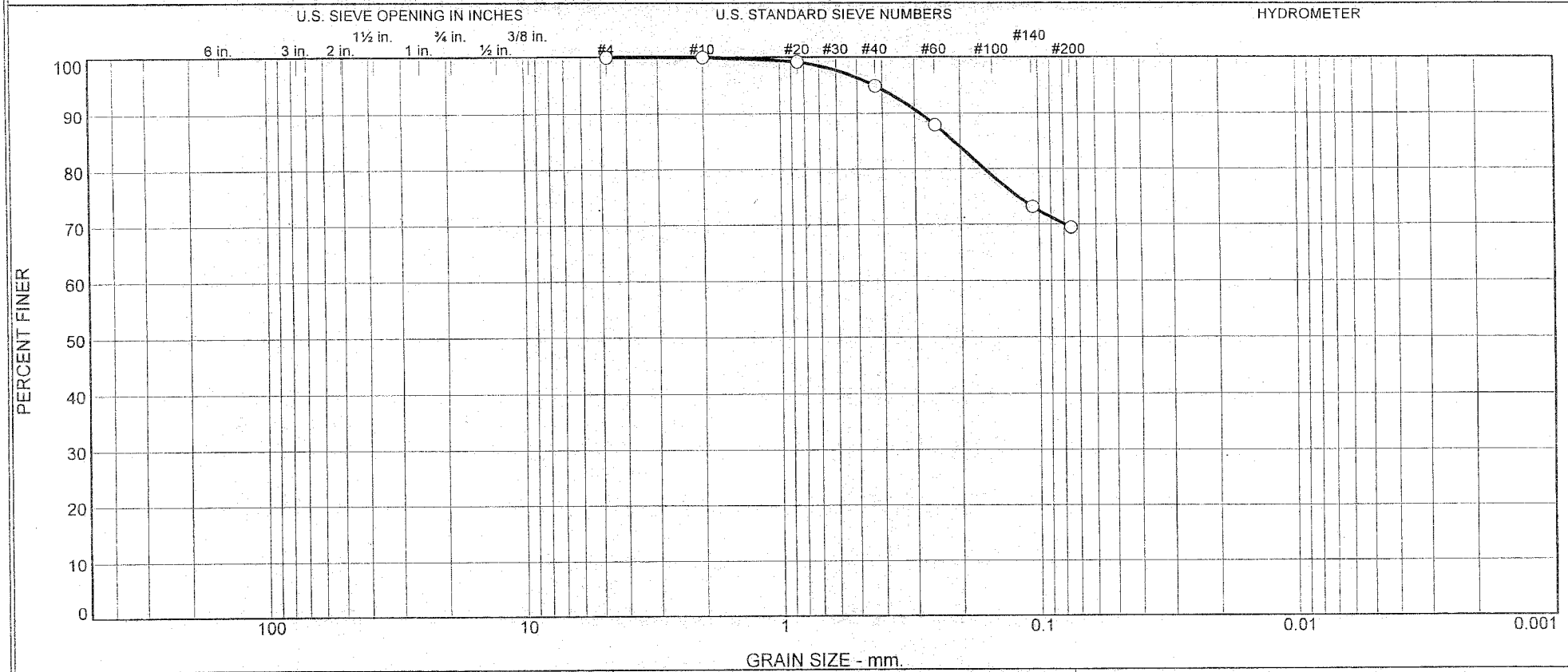
## Fractional Components

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 1.6 | 1.6 | 1.7 | 20.2 | 34.0 | 55.9 | 21.2 | 21.3 | 42.5 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | 0.0026 | 0.0044 | 0.0117 | 0.1168 | 0.1819 | 0.6347 | 0.9866 | 1.3050 | 1.7514 |

| Fineness Modulus |
|---|
| 1.10 |

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 0.0 | 5.1 | 25.4 | 69.5 | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-947 | B-947-6 | 13.5-15' | 9/27/06 | ND | Light brown reddish yellow silty sand. | 22.5 | ND | ND |

Client Dominion Nuclear North Anna
Project North Anna COL Project
Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ SPECIFIC GRAVITY IS ASSUMED.
ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

# GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-947
**Depth:** 13.5-15'
**Sample Number:** B-947-6
**Material Description:** Light brown reddish yellow silty sand.
**Date:** 9/27/06
**Natural Moisture:** 22.5
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** SPECIFIC GRAVITY IS ASSUMED.
ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.
**Tested by:** LBJ
**Checked by:** ABS

## Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 167.59 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 0.05 | 100.0 |
| 81.21 | 0.00 | 0.00 | #20 | 0.63 | 99.2 |
| | | | #40 | 4.08 | 94.9 |
| | | | #60 | 9.85 | 87.8 |
| | | | #140 | 21.78 | 73.2 |
| | | | #200 | 24.79 | 69.5 |

## Fractional Components

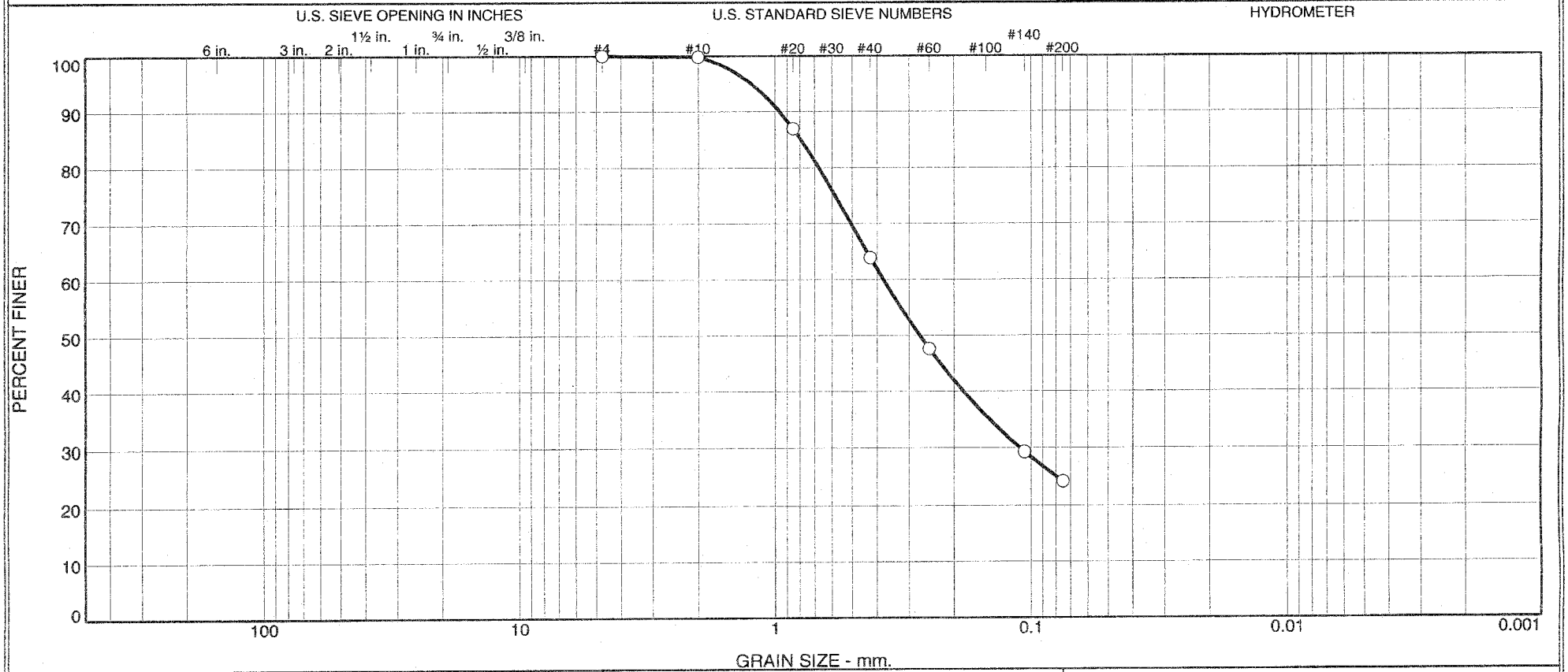
| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.1 | 25.4 | 30.5 | | | 69.5 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.1618 | 0.2124 | 0.2865 | 0.4272 |

| Fineness Modulus |
|---|
| 0.33 |

MACTEC, Inc.

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 0.2 | 35.9 | 39.7 | 24.2 | |
| | | | | | | | | |
| | | | | | | | | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-947 | B-947-7 | 17.2-18.7' | 9/27/06 | ND | Light brown reddish yellow silty sand. | 21.1 | ND | ND |
| | | | | | | | | | |
| | | | | | | | | | |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ SPECIFIC GRAVITY IS ASSUMED.
ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

# GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-947
**Depth:** 17.2-18.7' **Sample Number:** B-947-7
**Material Description:** Light brown reddish yellow silty sand.
**Date:** 9/27/06 **Natural Moisture:** 21.1
**Liquid Limit:** ND **Plastic Limit:** ND **USCS Class.:** ND
**Testing Remarks:** SPECIFIC GRAVITY IS ASSUMED.
ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.
**Tested by:** LBJ **Checked by:** ABS

## Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 148.11 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 0.25 | 99.8 |
| 73.11 | 0.00 | 0.00 | #20 | 9.42 | 87.0 |
| | | | #40 | 26.31 | 63.9 |
| | | | #60 | 38.28 | 47.6 |
| | | | #140 | 51.62 | 29.3 |
| | | | #200 | 55.39 | 24.2 |

## Fractional Components

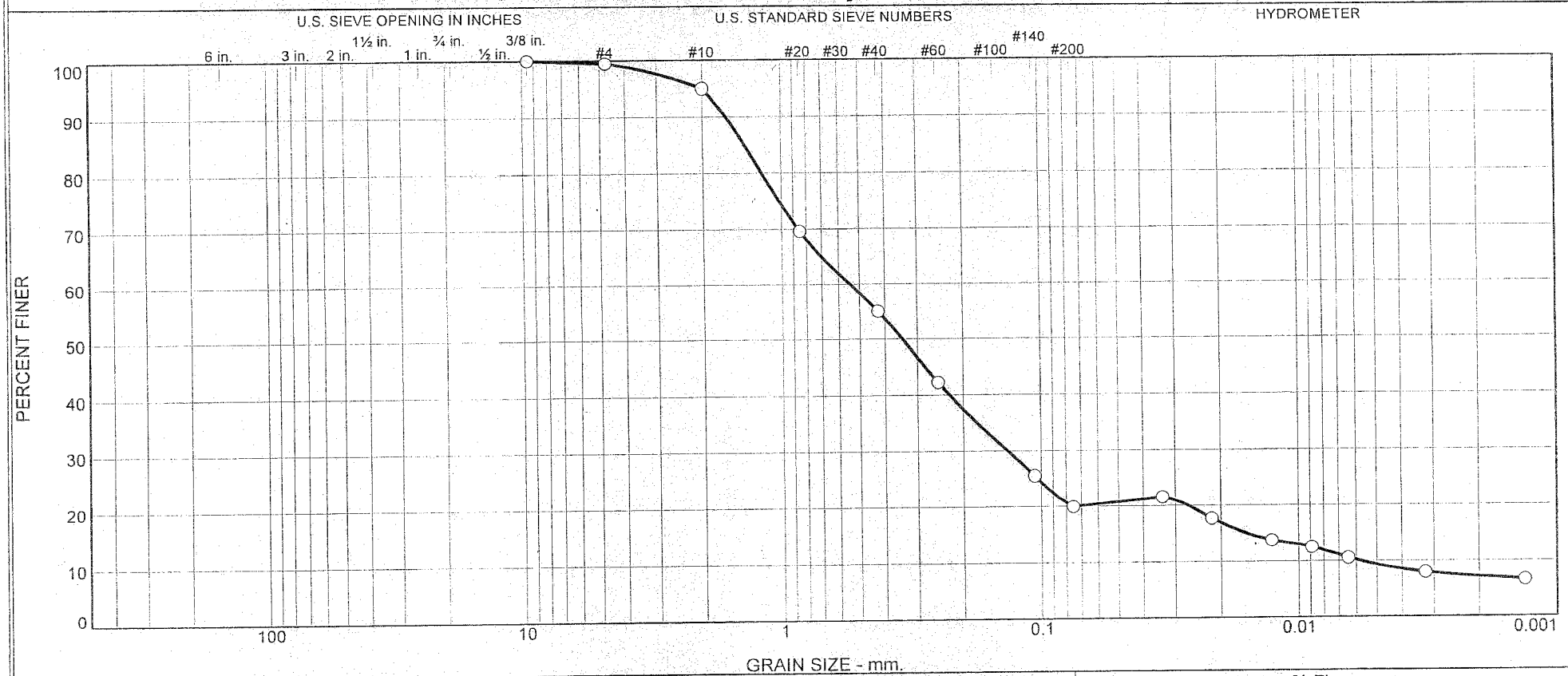
| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 35.9 | 39.7 | 75.8 | | | 24.2 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | 0.1104 | 0.2730 | 0.3783 | 0.6751 | 0.7925 | 0.9594 | 1.2427 |

| Fineness Modulus |
|---|
| 1.42 |

MACTEC, Inc.

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.6 | 4.4 | 39.9 | 35.1 | 10.7 | 9.3 |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-947 | B-947-8 | 22.2-23.7' | 9/27/06 | ND | Light brown reddish yellow silty sand. | 24.3 | ND | NP |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

# GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-947
**Depth:** 22.2-23.7'
**Sample Number:** B-947-8
**Material Description:** Light brown reddish yellow silty sand.
**Date:** 9/27/06
**Natural Moisture:** 24.3
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.
**Tested by:** LBJ
**Checked by:** ABS

## Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 239.25 | 0.00 | 0.00 | .375 | 0.00 | 100.0 |
| | | | #4 | 1.38 | 99.4 |
| | | | #10 | 12.06 | 95.0 |
| 83.47 | 0.00 | 0.00 | #20 | 22.27 | 69.6 |
| | | | #40 | 35.05 | 55.1 |
| | | | #60 | 46.32 | 42.3 |
| | | | #140 | 60.99 | 25.6 |
| | | | #200 | 65.92 | 20.0 |

## Hydrometer Test Data

Hydrometer test uses material passing#10
Percent passing #10 based upon complete sample =95.0
Weight of hydrometer sample =72.19
Hygroscopic moisture correction:
Moist weight and tare = 25.12
Dry weight and tare = 25.05
Tare weight = 15.44
Hygroscopic moisture =0.7%
Table of composite correction values:

| | | |
|---|---|---|
| Temp., deg. C: | 29.5 | 12.8 |
| Comp. corr.: | -2.0 | -5.0 |

Meniscus correction only =1.0
Specific gravity of solids =2.7
Hydrometer type =152H
Hydrometer effective depth equation: L =16.294964 - 0.164 x Rm

| Elapsed Time (min.) | Temp. (deg. C.) | Actual Reading | Corrected Reading | K | Rm | Eff. Depth | Diameter (mm.) | Percent Finer |
|---|---|---|---|---|---|---|---|---|
| 2.00 | 21.2 | 20.0 | 16.5 | 0.0132 | 21.0 | 12.9 | 0.0336 | 21.6 |
| 5.00 | 21.2 | 17.0 | 13.5 | 0.0132 | 18.0 | 13.3 | 0.0216 | 17.7 |
| 15.00 | 21.2 | 14.0 | 10.5 | 0.0132 | 15.0 | 13.8 | 0.0127 | 13.8 |
| 31.00 | 21.3 | 13.0 | 9.5 | 0.0132 | 14.0 | 14.0 | 0.0089 | 12.5 |
| 60.00 | 21.4 | 11.5 | 8.0 | 0.0132 | 12.5 | 14.2 | 0.0064 | 10.5 |
| 240.00 | 21.8 | 9.5 | 6.1 | 0.0131 | 10.5 | 14.6 | 0.0032 | 8.0 |
| 1442.00 | 21.9 | 8.5 | 5.1 | 0.0131 | 9.5 | 14.7 | 0.0013 | 6.7 |

## Fractional Components

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.6 | 0.6 | 4.4 | 39.9 | 35.1 | 79.4 | 10.7 | 9.3 | 20.0 |

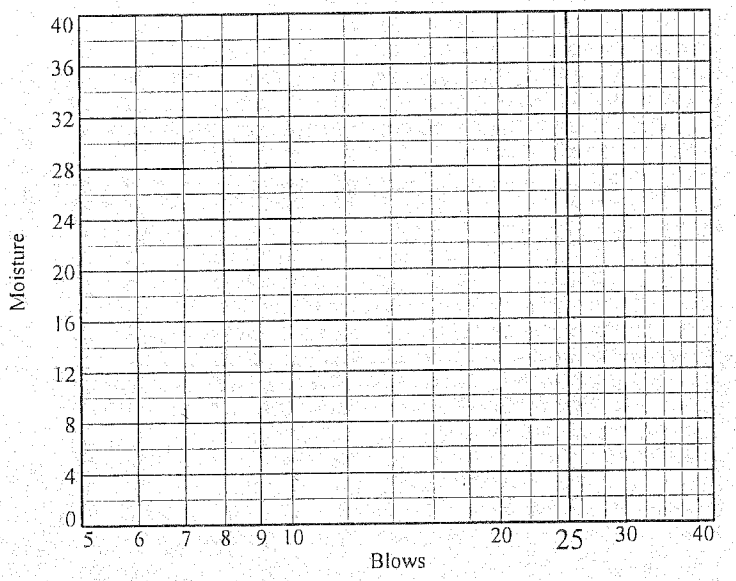
| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| 0.0058 | 0.0159 | 0.0753 | 0.1345 | 0.3425 | 0.5436 | 1.1882 | 1.3837 | 1.6308 | 2.0108 |

| Fineness Modulus | $C_u$ | $C_c$ |
|---|---|---|
| 1.84 | 93.12 | 5.70 |

## LIQUID AND PLASTIC LIMIT TEST DATA

1/17/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-947
**Depth:** 22.2-23.7'
**Sample Number:** B-947-8
**Material Description:** Light brown reddish yellow silty sand.
**%<#40:** 55.1 **%<#200:** 20.0
**USCS:** ND **AASHTO:** ND
**Tested by:** LBJ
**Checked by:** ABS
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED.
SLIDING IN CUP NON-PLASTIC.
LIQUID LIMIT NOT DETERMINED.



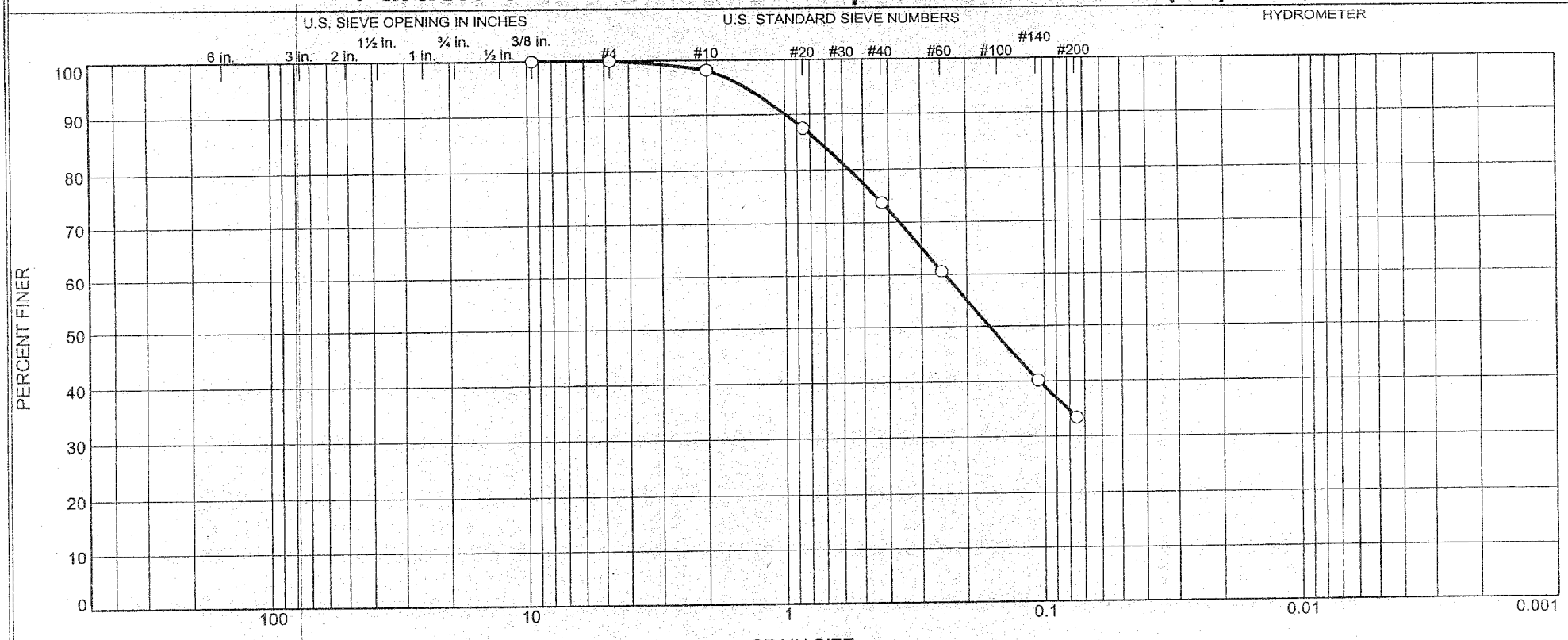

**Liquid Limit=** _____
**Plastic Limit=** NP
**Plasticity Index=** _____
**Natural Moisture=** 24.3

### Plastic Limit Data

| Run No. | 1 | 2 | 3 | 4 | |
|---|---|---|---|---|---|
| Wet+Tare | | | | | |
| Dry+Tare | | | | | |
| Tare | | | | | |
| Moisture | | | | | |

MACTEC, Inc.

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 1.8 | 24.5 | 40.3 | 33.4 | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-947 | B-947-9 | 28.7-30.2' | 9/27/06 | SM | LIGHT YELLOW, OLIVE FINE TO MEDIUM SILTY SAND. | 28.8 | 33 | NP |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ENTIRE SAMPLE WAS TESTED.

**Tested By:** LBJ **Checked By:** ABS

# GRAIN SIZE DISTRIBUTION TEST DATA

12/18/2006

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-947
**Depth:** 28.7-30.2' **Sample Number:** B-947-9
**Material Description:** LIGHT YELLOW, OLIVE FINE TO MEDIUM SILTY SAND.
**Date:** 9/27/06 **Natural Moisture:** 28.8
**Liquid Limit:** 33 **Plastic Limit:** NP **USCS Class.:** SM
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED.
**Tested by:** LBJ **Checked by:** ABS

## Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 153.77 | 0.00 | 0.00 | .375 | 0.00 | 100.0 |
| | | | #4 | 0.05 | 100.0 |
| | | | #10 | 2.80 | 98.2 |
| 75.14 | 0.00 | 0.00 | #20 | 8.20 | 87.5 |
| | | | #40 | 18.70 | 73.7 |
| | | | #60 | 28.80 | 60.5 |
| | | | #140 | 44.40 | 40.2 |
| | | | #200 | 49.60 | 33.4 |

## Fractional Components

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 1.8 | 24.5 | 40.3 | 66.6 | | | 33.4 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.1639 | 0.2447 | 0.5676 | 0.7379 | 0.9928 | 1.4247 |

| Fineness Modulus |
|---|
| 1.15 |

MACTEC, Inc.

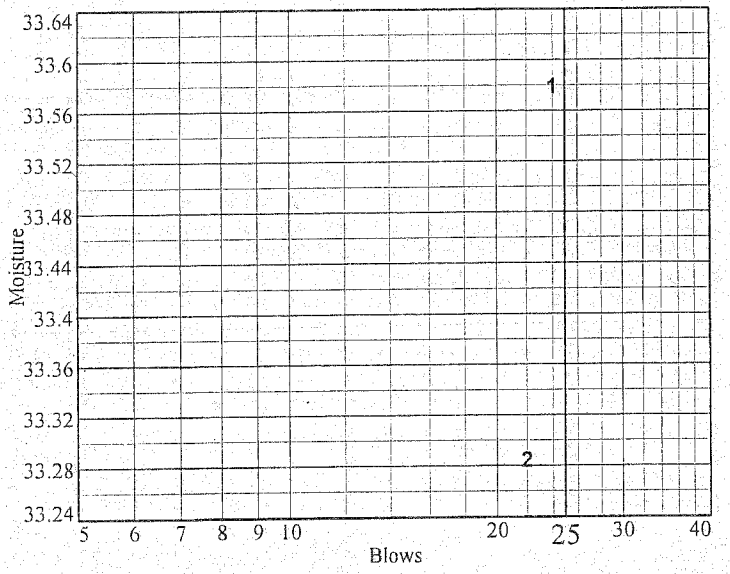
## LIQUID AND PLASTIC LIMIT TEST DATA

1/17/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-947
**Depth:** 28.7-30.2' **Sample Number:** B-947-9
**Material Description:** LIGHT YELLOW, OLIVE FINE TO MEDIUM SILTY SAND.
**%<#40:** 73.7 **%<#200:** 33.4 **USCS:** SM **AASHTO:** A-2-4(0)
**Tested by:** LBJ **Checked by:** ABS
**Testing Remarks:** SPECIFIC GRAVITY IS ASSUMED.
ENTIRE SAMPLE WAS TESTED.

### Liquid Limit Data

| Run No. | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Wet+Tare | 26.49 | 24.69 | | | | |
| Dry+Tare | 23.76 | 22.39 | | | | |
| Tare | 15.63 | 15.48 | | | | |
| # Blows | 24 | 22 | | | | |
| Moisture | 33.6 | 33.3 | | | | |




Liquid Limit= 33
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= 28.8

### Plastic Limit Data

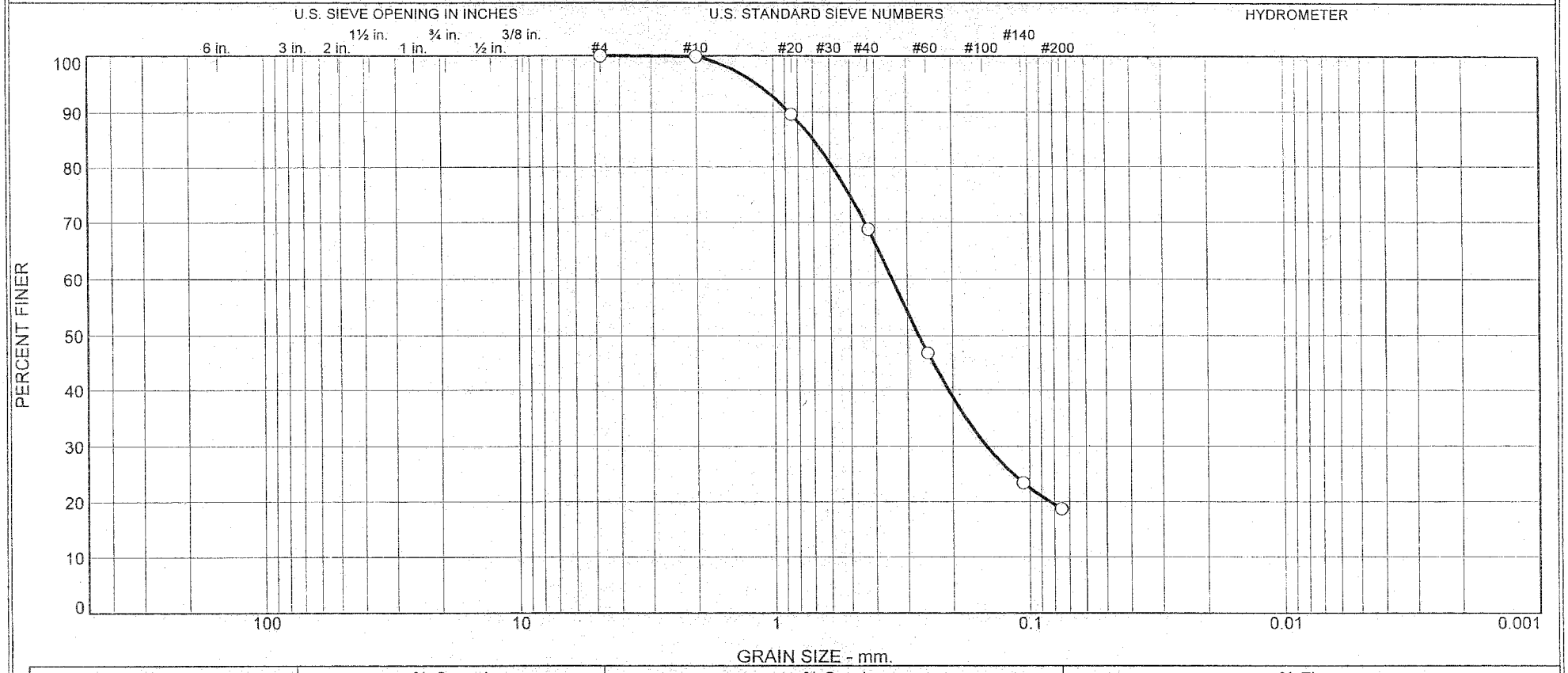
| Run No. | 1 | 2 | 3 | 4 | |
|---|---|---|---|---|---|
| Wet+Tare | | | | | |
| Dry+Tare | | | | | |
| Tare | | | | | |
| Moisture | | | | | |

### Natural Moisture Data

| Wet+Tare | Dry+Tare | Tare | Moisture |
|---|---|---|---|
| 55.25 | 44.4 | 6.70 | 28.8 |

MACTEC, Inc.

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 0.1 | 31.1 | 50.1 | 18.7 | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-947 | B-947-10 | 33.7-52.2 | 9/27/06 | ND | Light yellow olive silty sand. | 20.2 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

# GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-947
**Depth:** 33.7-52.2
**Sample Number:** B-947-10
**Material Description:** Light yellow olive silty sand.
**Date:** 9/27/06
**Natural Moisture:** 20.2
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.
**Tested by:** LBJ
**Checked by:** ABS

## Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 199.86 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 0.22 | 99.9 |
| 99.68 | 0.00 | 0.00 | #20 | 10.26 | 89.6 |
| | | | #40 | 31.04 | 68.8 |
| | | | #60 | 53.05 | 46.7 |
| | | | #140 | 76.39 | 23.3 |
| | | | #200 | 81.00 | 18.7 |

## Fractional Components

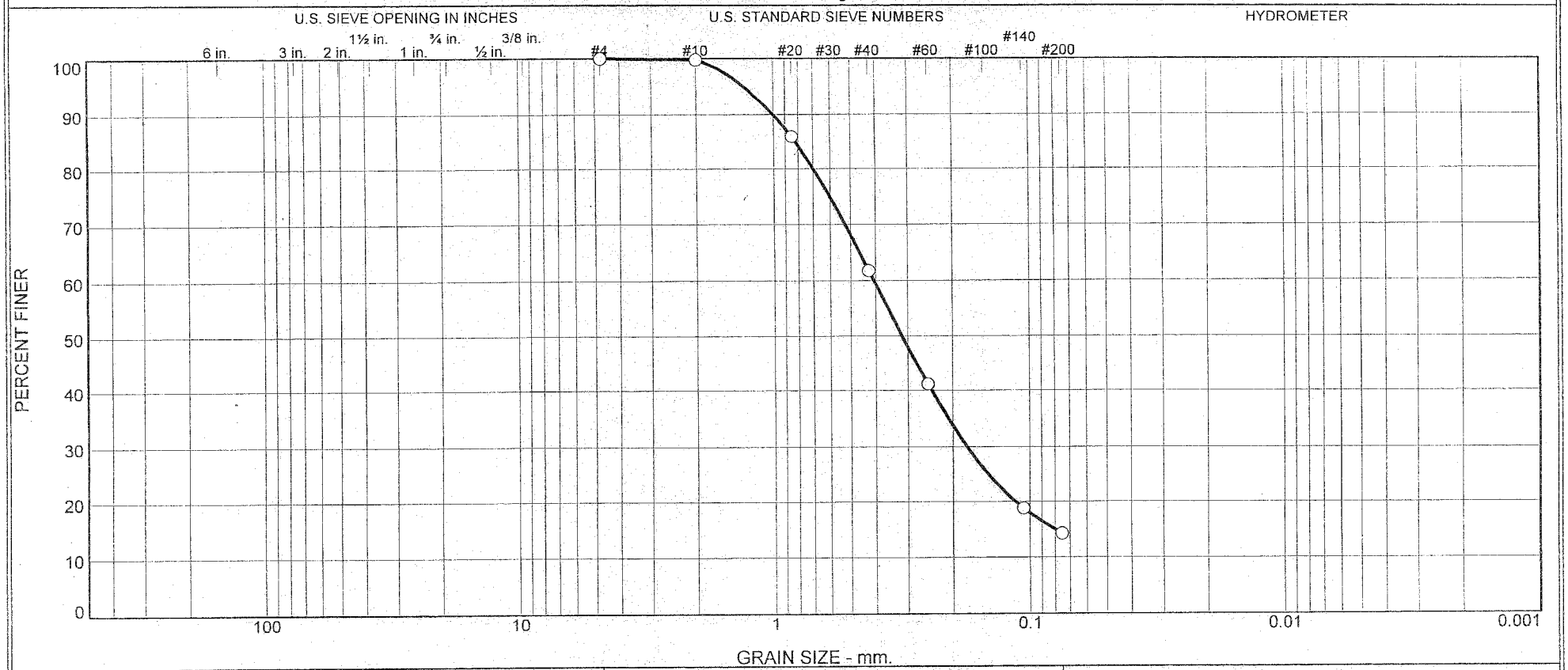
| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 31.1 | 50.1 | 81.3 | | | 18.7 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | 0.0834 | 0.1472 | 0.2713 | 0.3437 | 0.5861 | 0.6992 | 0.8661 | 1.1560 |

| Fineness Modulus |
|---|
| 1.39 |

MACTEC, Inc.

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 0.3 | 37.9 | 47.6 | 14.2 | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-947 | B-947-11 | 38.7-40.2' | 9/27/06 | ND | Light yellow olive silty sand. | 16.9 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

## GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-947
**Depth:** 38.7-40.2'
**Sample Number:** B-947-11
**Material Description:** Light yellow olive silty sand.
**Date:** 9/27/06
**Natural Moisture:** 16.9
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.
**Tested by:** LBJ
**Checked by:** ABS

### Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 260.48 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 0.66 | 99.7 |
| 133.19 | 0.00 | 0.00 | #20 | 18.56 | 85.8 |
| | | | #40 | 50.68 | 61.8 |
| | | | #60 | 78.20 | 41.2 |
| | | | #140 | 108.15 | 18.8 |
| | | | #200 | 114.22 | 14.2 |

### Fractional Components

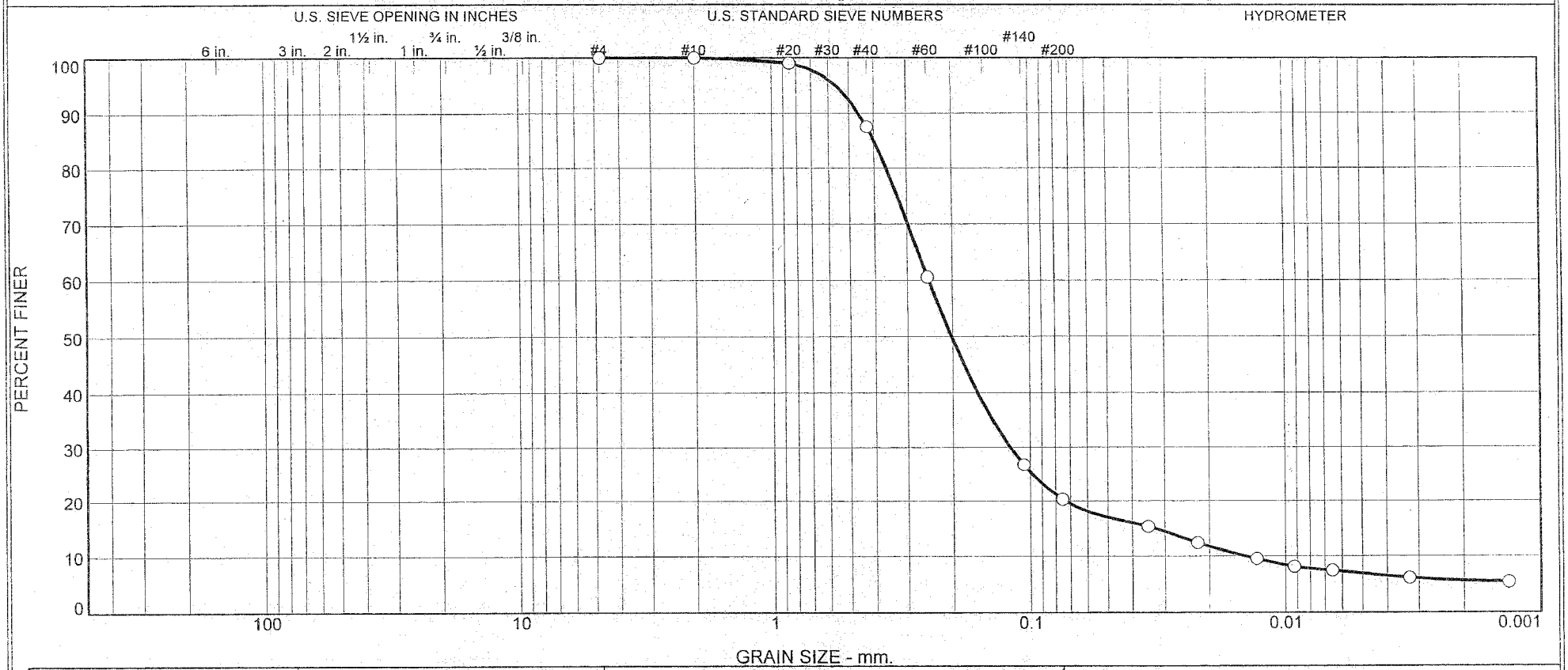
| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 37.9 | 47.6 | 85.8 | | | 14.2 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | 0.0802 | 0.1141 | 0.1762 | 0.3159 | 0.4062 | 0.6992 | 0.8245 | 1.0035 | 1.2997 |

| Fineness Modulus |
|---|
| 1.58 |

MACTEC, Inc.

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 0.0 | 12.6 | 67.1 | 13.4 | 6.9 |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-947 | B-947-12 | 42.2-43.7' | 9/27/06 | ND | Light yellow olive silty sand. | 20.5 | ND | ND |

Client Dominion Nuclear North Anna
Project North Anna COL Project
Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ SPECIFIC GRAVITY IS ASSUMED.
ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

# GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-947
**Depth:** 42.2-43.7'
**Sample Number:** B-947-12
**Material Description:** Light yellow olive silty sand.
**Date:** 9/27/06
**Natural Moisture:** 20.5
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** SPECIFIC GRAVITY IS ASSUMED.
ENTIRE SAMPLE WAS TESTED.
ND=NOT DETERMINED.
**Tested by:** LBJ
**Checked by:** ABS

## Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 267.49 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 0.01 | 100.0 |
| 68.35 | 0.00 | 0.00 | #20 | 0.68 | 99.0 |
| | | | #40 | 8.61 | 87.4 |
| | | | #60 | 26.96 | 60.6 |
| | | | #140 | 50.08 | 26.7 |
| | | | #200 | 54.50 | 20.3 |

## Hydrometer Test Data

Hydrometer test uses material passing#10
Percent passing #10 based upon complete sample =100.0
Weight of hydrometer sample =68.35
Hygroscopic moisture correction:
Moist weight and tare = 27.69
Dry weight and tare = 27.60
Tare weight = 15.57
Hygroscopic moisture =0.7%
Table of composite correction values:

| Temp., deg. C: | 12.8 | 29.5 |
|---|---|---|
| Comp. corr.: | -5.0 | -2.0 |

Meniscus correction only =1.0
Specific gravity of solids =2.7
Hydrometer type =152H
Hydrometer effective depth equation: L =16.294964 - 0.164 x Rm

| Elapsed Time (min.) | Temp. (deg. C.) | Actual Reading | Corrected Reading | K | Rm | Eff. Depth | Diameter (mm.) | Percent Finer |
|---|---|---|---|---|---|---|---|---|
| 2.00 | 21.3 | 14.0 | 10.5 | 0.0132 | 15.0 | 13.8 | 0.0348 | 15.3 |
| 5.00 | 21.2 | 12.0 | 8.5 | 0.0132 | 13.0 | 14.2 | 0.0223 | 12.4 |
| 15.00 | 21.3 | 10.0 | 6.5 | 0.0132 | 11.0 | 14.5 | 0.0130 | 9.5 |
| 30.00 | 21.4 | 9.0 | 5.5 | 0.0132 | 10.0 | 14.7 | 0.0092 | 8.1 |
| 60.00 | 21.5 | 8.5 | 5.1 | 0.0132 | 9.5 | 14.7 | 0.0065 | 7.4 |
| 240.00 | 22.0 | 7.5 | 4.2 | 0.0131 | 8.5 | 14.9 | 0.0033 | 6.1 |
| 1440.00 | 21.9 | 7.0 | 3.6 | 0.0131 | 8.0 | 15.0 | 0.0013 | 5.3 |

MACTEC, Inc.

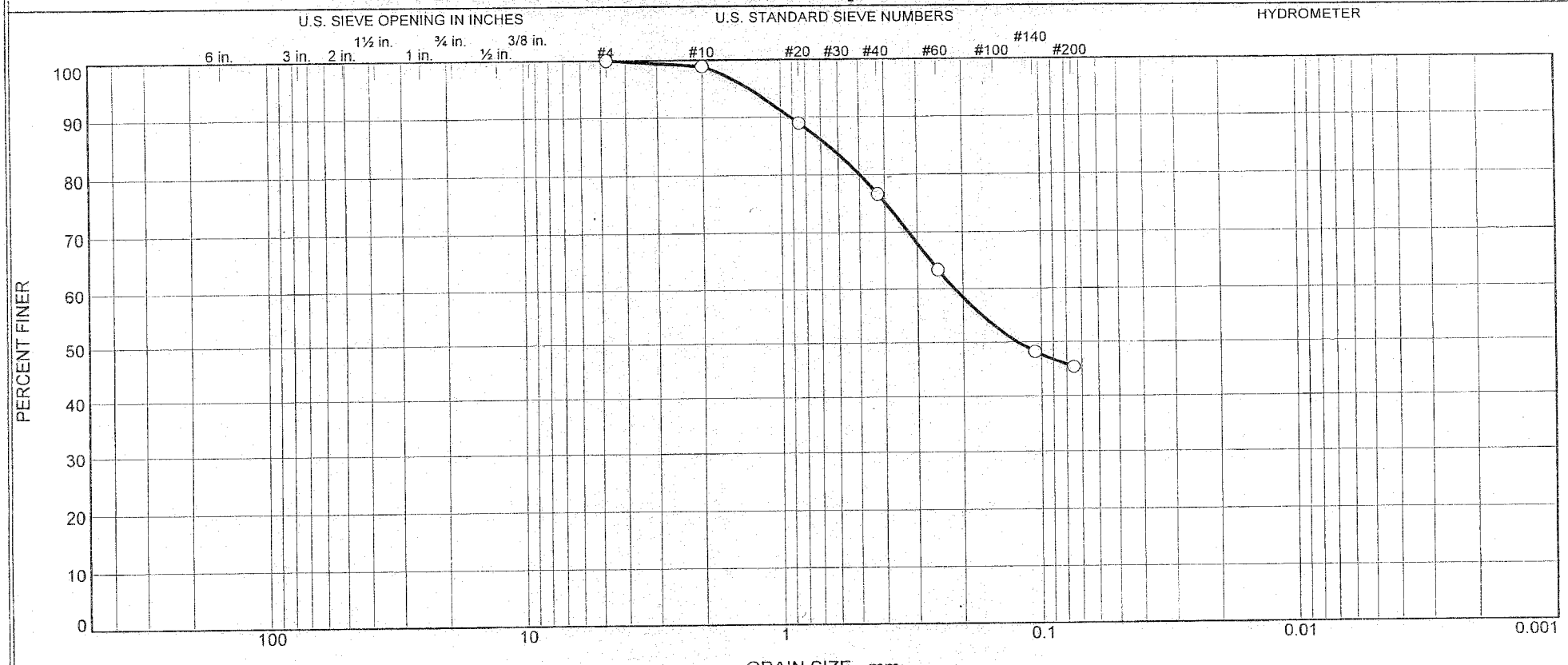
## Fractional Components

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 12.6 | 67.1 | 79.7 | 13.4 | 6.9 | 20.3 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| 0.0144 | 0.0328 | 0.0735 | 0.1197 | 0.2023 | 0.2474 | 0.3594 | 0.4005 | 0.4580 | 0.5611 |

| Fineness Modulus | $C_u$ | $C_c$ |
|---|---|---|
| 0.96 | 17.19 | 4.02 |

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 1.1 | 22.2 | 31.4 | 45.3 | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-948 | B-948-1 | 1.5-3.0' | 9/26/06 | ND | Reddish yellow silty sand. | 18.3 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ SPECIFIC GRAVITY IS ASSUMED.
ENTIRE SAMPLE WAS TESTED.
ND= NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

## GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-948
**Depth:** 1.5-3.0'
**Sample Number:** B-948-1
**Material Description:** Reddish yellow silty sand.
**Date:** 9/26/06
**Natural Moisture:** 18.3
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** SPECIFIC GRAVITY IS ASSUMED.
ENTIRE SAMPLE WAS TESTED.
ND= NOT DETERMINED.
**Tested by:** LBJ
**Checked by:** ABS

### Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 169.41 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 1.90 | 98.9 |
| 83.69 | 0.00 | 0.00 | #20 | 8.49 | 88.8 |
| | | | #40 | 18.78 | 76.7 |
| | | | #60 | 29.99 | 63.4 |
| | | | #140 | 42.90 | 48.2 |
| | | | #200 | 45.32 | 45.3 |

### Fractional Components

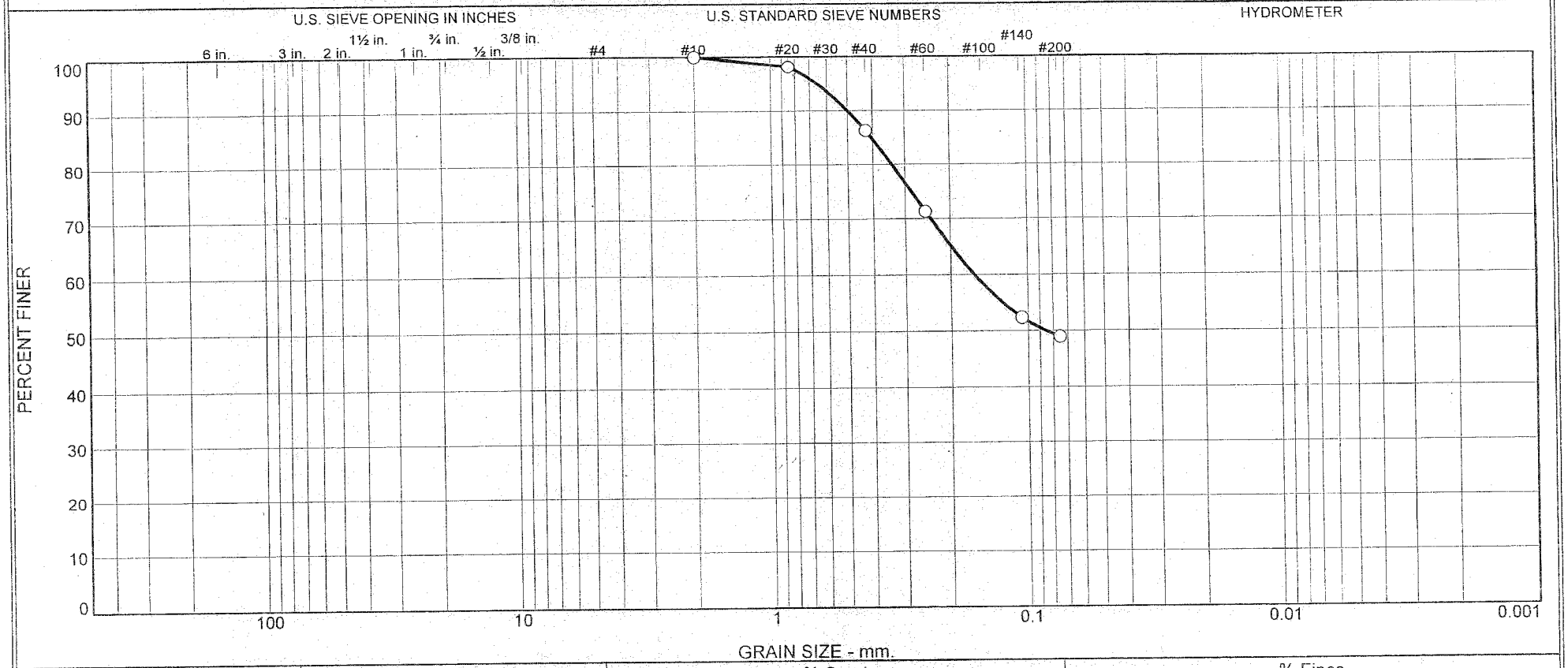
| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 1.1 | 22.2 | 31.4 | 54.7 | | | 45.3 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.1235 | 0.2157 | 0.4976 | 0.6606 | 0.9195 | 1.3303 |

| Fineness Modulus |
|---|
| 1.03 |

MACTEC, Inc.

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 0.0 | 13.7 | 37.4 | 48.9 | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-948 | B-948-3 | 6-7.5' | 9/26/06 | ND | Reddish yellow silty sand. | 16.2 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ SPECIFIC GRAVITY IS ASSUMED.
ENTIRE SAMPLE WAS TESTED.
ND= NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

## GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-948
**Depth:** 6-7.5'
**Sample Number:** B-948-3
**Material Description:** Reddish yellow silty sand.
**Date:** 9/26/06
**Natural Moisture:** 16.2
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** SPECIFIC GRAVITY IS ASSUMED.
ENTIRE SAMPLE WAS TESTED.
ND= NOT DETERMINED.
**Tested by:** LBJ
**Checked by:** ABS

### Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 106.64 | 0.00 | 0.00 | #10 | 0.00 | 100.0 |
| | | | #20 | 2.04 | 98.1 |
| | | | #40 | 14.65 | 86.3 |
| | | | #60 | 30.57 | 71.3 |
| | | | #140 | 50.89 | 52.3 |
| | | | #200 | 54.45 | 48.9 |

### Fractional Components

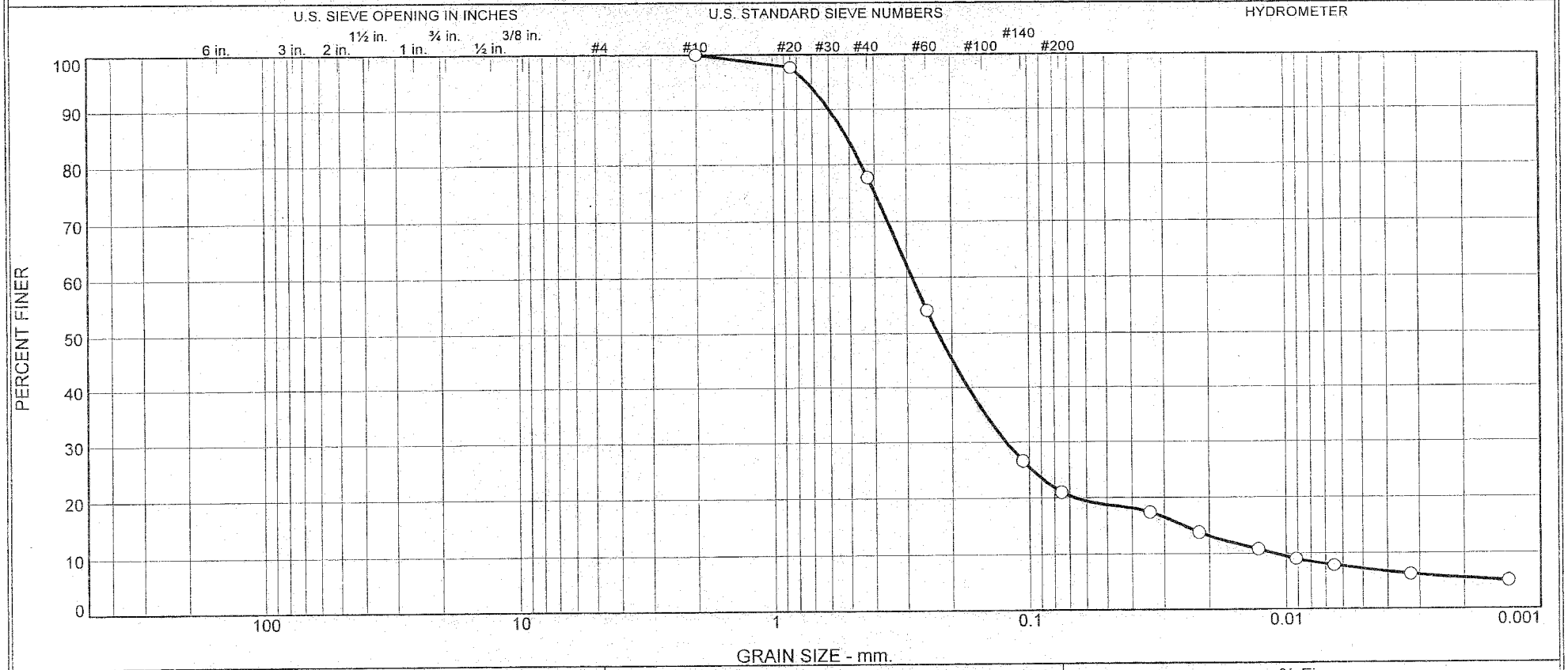
| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 13.7 | 37.4 | 51.1 | | | 48.9 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.0853 | 0.1619 | 0.3370 | 0.4044 | 0.4995 | 0.6576 |

| Fineness Modulus |
|---|
| 0.73 |

MACTEC, Inc.

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 0.0 | 22.2 | 56.8 | 13.9 | 7.1 |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-948 | B-948-5 | 9.5-11' | 9/26/06 | ND | Reddish yellow silty sand. | 13.7 | ND | ND |

Client Dominion Nuclear North Anna
Project North Anna COL Project
Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ENTIRE SAMPLE WAS TESTED.
ND= NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

# GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-948
**Depth:** 9.5-11'
**Sample Number:** B-948-5
**Material Description:** Reddish yellow silty sand.
**Date:** 9/26/06
**Natural Moisture:** 13.7
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED.
ND= NOT DETERMINED.
**Tested by:** LBJ
**Checked by:** ABS

## Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 211.55 | 0.00 | 0.00 | #10 | 0.00 | 100.0 |
| 82.98 | 0.00 | 0.00 | #20 | 1.96 | 97.6 |
| | | | #40 | 18.46 | 77.8 |
| | | | #60 | 38.07 | 54.1 |
| | | | #140 | 60.97 | 26.5 |
| | | | #200 | 65.57 | 21.0 |

## Hydrometer Test Data

Hydrometer test uses material passing#10
Percent passing #10 based upon complete sample =100.0
Weight of hydrometer sample =82.98
Hygroscopic moisture correction:
Moist weight and tare = 30.27
Dry weight and tare = 30.20
Tare weight = 15.44
Hygroscopic moisture =0.5%
Table of composite correction values:

| | | |
|---|---|---|
| Temp., deg. C: | 29.5 | 12.8 |
| Comp. corr.: | -2.0 | -5.0 |

Meniscus correction only =1.0
Specific gravity of solids =2.7
Hydrometer type =152H
Hydrometer effective depth equation: L =16.294964 - 0.164 x Rm

| Elapsed Time (min.) | Temp. (deg. C.) | Actual Reading | Corrected Reading | K | Rm | Eff. Depth | Diameter (mm.) | Percent Finer |
|---|---|---|---|---|---|---|---|---|
| 2.00 | 21.2 | 18.0 | 14.5 | 0.0132 | 19.0 | 13.2 | 0.0340 | 17.4 |
| 5.00 | 21.2 | 15.0 | 11.5 | 0.0132 | 16.0 | 13.7 | 0.0219 | 13.8 |
| 15.00 | 21.2 | 12.5 | 9.0 | 0.0132 | 13.5 | 14.1 | 0.0128 | 10.8 |
| 30.00 | 21.3 | 11.0 | 7.5 | 0.0132 | 12.0 | 14.3 | 0.0091 | 9.0 |
| 60.00 | 21.4 | 10.0 | 6.5 | 0.0132 | 11.0 | 14.5 | 0.0065 | 7.8 |
| 240.00 | 21.9 | 8.5 | 5.1 | 0.0131 | 9.5 | 14.7 | 0.0033 | 6.1 |
| 1440.00 | 22.0 | 7.5 | 4.2 | 0.0131 | 8.5 | 14.9 | 0.0013 | 5.0 |

MACTEC, Inc.

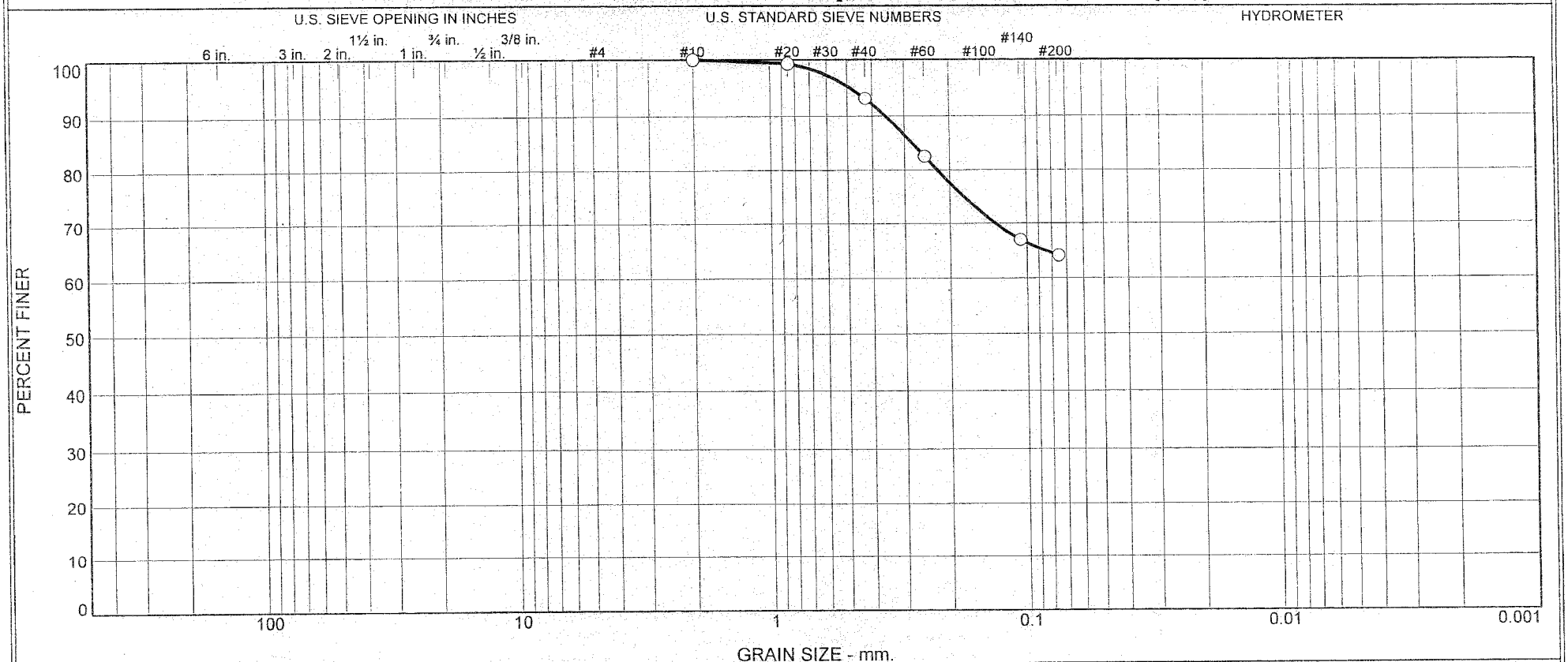
## Fractional Components

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 22.2 | 56.8 | 79.0 | 13.9 | 7.1 | 21.0 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| 0.0111 | 0.0253 | 0.0671 | 0.1233 | 0.2265 | 0.2855 | 0.4495 | 0.5145 | 0.6021 | 0.7348 |

| Fineness Modulus | $C_u$ | $C_c$ |
|---|---|---|
| 1.14 | 25.73 | 4.80 |

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 0.0 | 6.7 | 29.2 | 64.1 | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-948 | B-948-7 | 18.5-20' | 9/26/06 | ND | Reddish yellow sandy silt. | 15.2 | ND | ND |

Client Dominion Nuclear North Anna
Project North Anna COL Project
Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ SPECIFIC GRAVITY IS ASSUMED.
ENTIRE SAMPLE WAS TESTED.
ND= NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

# GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-948
**Depth:** 18.5-20'
**Sample Number:** B-948-7
**Material Description:** Reddish yellow sandy silt.
**Date:** 9/26/06
**Natural Moisture:** 15.2
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** SPECIFIC GRAVITY IS ASSUMED.
ENTIRE SAMPLE WAS TESTED.
ND= NOT DETERMINED.
**Tested by:** LBJ
**Checked by:** ABS

## Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 179.80 | 0.00 | 0.00 | #10 | 0.00 | 100.0 |
| | | | #20 | 1.26 | 99.3 |
| | | | #40 | 12.13 | 93.3 |
| | | | #60 | 31.50 | 82.5 |
| | | | #140 | 59.36 | 67.0 |
| | | | #200 | 64.49 | 64.1 |

## Fractional Components

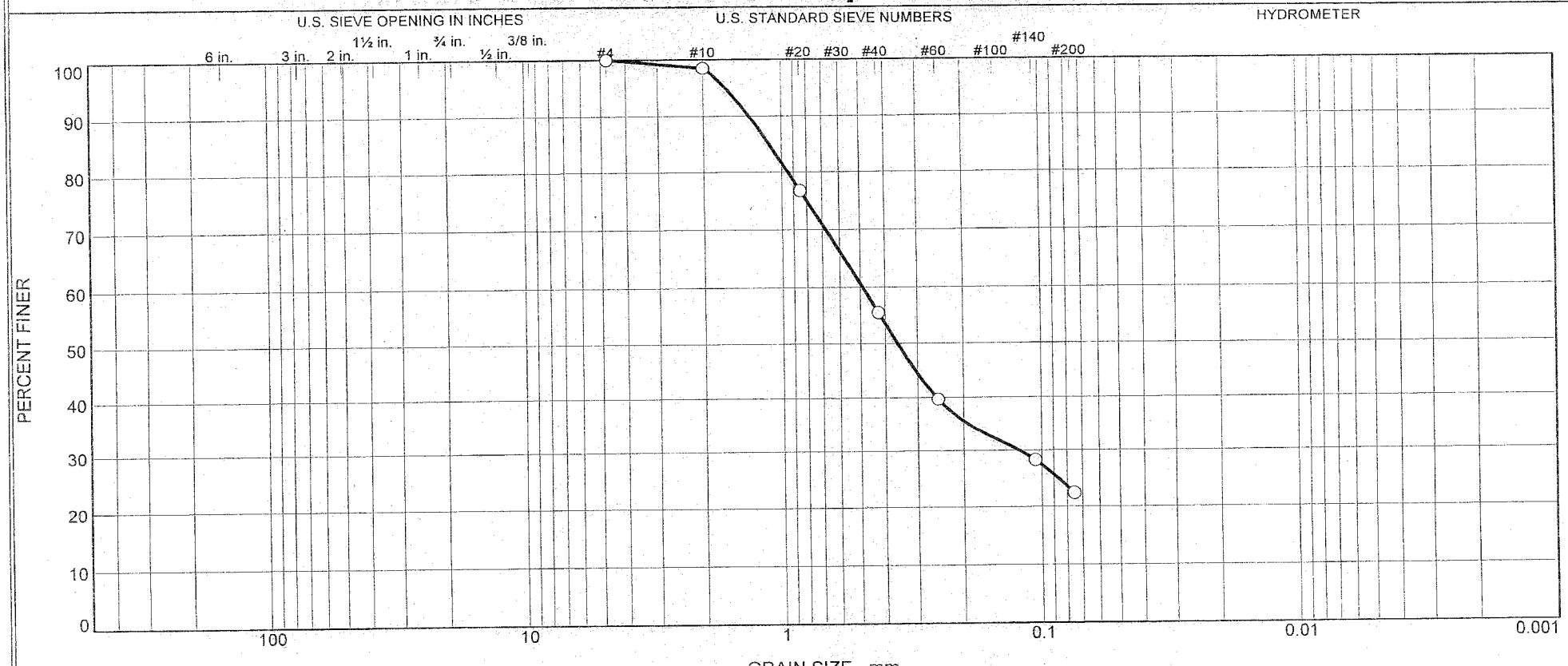
| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 6.7 | 29.2 | 35.9 | | | 64.1 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.2233 | 0.2800 | 0.3546 | 0.4800 |

| Fineness Modulus |
|---|
| 0.45 |

MACTEC, Inc.

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.0 | 1.5 | 42.9 | 33.3 | 22.3 | |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-948 | B-948-8 | 23.5-24.4' | 9/26/06 | ND | Tan gray and brown tan silty sand. | 13.6 | ND | ND |

Client Dominion Nuclear North Anna

Project North Anna COL Project

Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ENTIRE SAMPLE WAS TESTED.
ND= NOT DETERMINED.

**Tested By:** LBJ **Checked By:** ABS

# GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-948
**Depth:** 23.5-24.4'
**Sample Number:** B-948-8
**Material Description:** Tan gray and brown tan silty sand.
**Date:** 9/26/06
**Natural Moisture:** 13.6
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED.
ND= NOT DETERMINED.
**Tested by:** LBJ
**Checked by:** ABS

## Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 246.65 | 0.00 | 0.00 | #4 | 0.00 | 100.0 |
| | | | #10 | 3.77 | 98.5 |
| 124.16 | 0.00 | 0.00 | #20 | 27.36 | 76.8 |
| | | | #40 | 54.09 | 55.6 |
| | | | #60 | 74.21 | 39.6 |
| | | | #140 | 88.62 | 28.2 |
| | | | #200 | 95.98 | 22.3 |

## Fractional Components

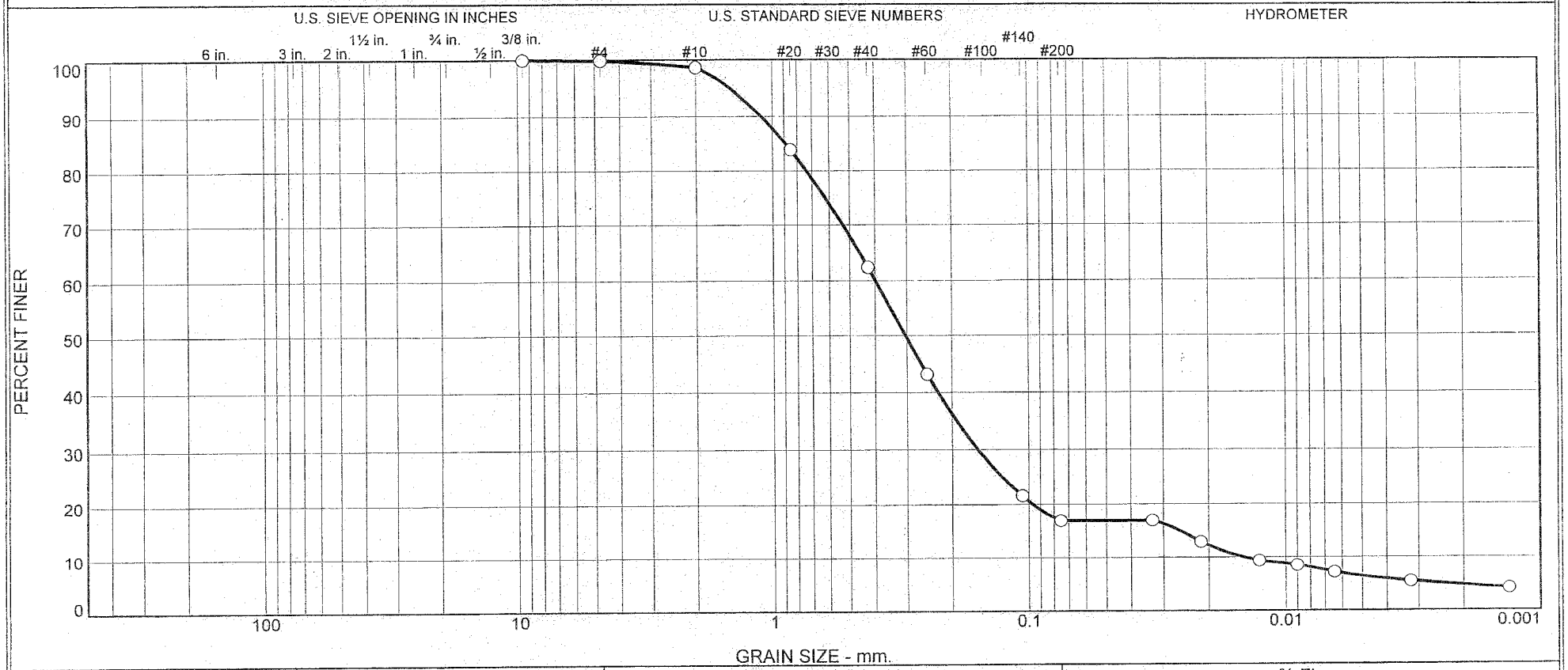
| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.0 | 0.0 | 1.5 | 42.9 | 33.3 | 77.7 | | | 22.3 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | 0.1227 | 0.3585 | 0.4885 | 0.9452 | 1.1167 | 1.3345 | 1.6434 |

| Fineness Modulus |
|---|
| 1.72 |

MACTEC, Inc.

# Particle Size Distribution Report/ASTM-422-63(02)




| | % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| ○ | 0.0 | 0.0 | 0.2 | 1.2 | 36.2 | 45.5 | 10.5 | 6.4 |

| | Source | Sample # | Depth/Elev. | Date Sampled | USCS | Material Description | NM % | LL | PL |
|---|---|---|---|---|---|---|---|---|---|
| ○ | BORING B-951 | B-951-8 | 23-24.5' | 8/16/06 | ND | Dark greenish gray silty sand. | 13.9 | ND | ND |

Client Dominion Nuclear North Anna
Project North Anna COL Project
Project No. 6468061472 Figure

**MACTEC, Inc.**

**Raleigh, North Carolina**

○ ENTIRE SAMPLE WAS TESTED.
ND= NOT DETERMINED.

**Tested By:** JPD **Checked By:** ABS

# GRAIN SIZE DISTRIBUTION TEST DATA

1/15/2007

**Client:** Dominion Nuclear North Anna
**Project:** North Anna COL Project
**Project Number:** 6468061472
**Location:** BORING B-951
**Depth:** 23-24.5'
**Sample Number:** B-951-8
**Material Description:** Dark greenish gray silty sand.
**Date:** 8/16/06
**Natural Moisture:** 13.9
**Liquid Limit:** ND
**Plastic Limit:** ND
**USCS Class.:** ND
**Testing Remarks:** ENTIRE SAMPLE WAS TESTED.
ND= NOT DETERMINED.
**Tested by:** JPD
**Checked by:** ABS

## Sieve Test Data

| Dry Sample and Tare (grams) | Tare (grams) | Cumulative Pan Tare Weight (grams) | Sieve Opening Size | Cumulative Weight Retained (grams) | Percent Finer |
|---|---|---|---|---|---|
| 286.00 | 0.00 | 0.00 | .375 | 0.00 | 100.0 |
| | | | #4 | 0.50 | 99.8 |
| | | | #10 | 3.90 | 98.6 |
| 110.19 | 0.00 | 0.00 | #20 | 16.50 | 83.9 |
| | | | #40 | 40.50 | 62.4 |
| | | | #60 | 62.00 | 43.1 |
| | | | #140 | 86.10 | 21.6 |
| | | | #200 | 91.30 | 16.9 |

## Hydrometer Test Data

Hydrometer test uses material passing#10
Percent passing #10 based upon complete sample =98.6
Weight of hydrometer sample =110.19
Hygroscopic moisture correction:
Moist weight and tare = 26.36
Dry weight and tare = 26.31
Tare weight = 15.54
Hygroscopic moisture =0.5%
Table of composite correction values:

| Temp., deg. C: | 12.8 | 29.5 |
|---|---|---|
| Comp. corr.: | -5.0 | -2.0 |

Meniscus correction only =1.0
Specific gravity of solids =2.7
Hydrometer type =152H
Hydrometer effective depth equation: L =16.294964 - 0.164 x Rm

| Elapsed Time (min.) | Temp. (deg. C.) | Actual Reading | Corrected Reading | K | Rm | Eff. Depth | Diameter (mm.) | Percent Finer |
|---|---|---|---|---|---|---|---|---|
| 2.00 | 21.3 | 22.5 | 19.0 | 0.0132 | 23.5 | 12.4 | 0.0330 | 16.9 |
| 5.00 | 21.4 | 18.0 | 14.5 | 0.0132 | 19.0 | 13.2 | 0.0215 | 12.9 |
| 15.00 | 21.3 | 14.0 | 10.5 | 0.0132 | 15.0 | 13.8 | 0.0127 | 9.4 |
| 30.00 | 21.4 | 13.0 | 9.5 | 0.0132 | 14.0 | 14.0 | 0.0090 | 8.5 |
| 60.00 | 21.6 | 11.5 | 8.1 | 0.0132 | 12.5 | 14.2 | 0.0064 | 7.2 |
| 240.00 | 22.0 | 9.5 | 6.2 | 0.0131 | 10.5 | 14.6 | 0.0032 | 5.5 |
| 1447.00 | 22.0 | 8.0 | 4.7 | 0.0131 | 9.0 | 14.8 | 0.0013 | 4.1 |

MACTEC, Inc.

## Fractional Components

| Cobbles | Gravel | | | Sand | | | | Fines | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Total | Coarse | Medium | Fine | Total | Silt | Clay | Total |
| 0.0 | 0.0 | 0.2 | 0.2 | 1.2 | 36.2 | 45.5 | 82.9 | 10.5 | 6.4 | 16.9 |

| $D_{10}$ | $D_{15}$ | $D_{20}$ | $D_{30}$ | $D_{50}$ | $D_{60}$ | $D_{80}$ | $D_{85}$ | $D_{90}$ | $D_{95}$ |
|---|---|---|---|---|---|---|---|---|---|
| 0.0147 | 0.0260 | 0.0967 | 0.1584 | 0.3037 | 0.3980 | 0.7358 | 0.8891 | 1.1064 | 1.4598 |

| Fineness Modulus | $C_u$ | $C_c$ |
|---|---|---|
| 1.58 | 27.08 | 4.29 |