# SIEVE ANALYSIS

(ASTM C136-96a)

**Company Name:** Birmingham Coal & Coke Co., Inc.
**Location:** Knight Mine, P-39--
**Sample I.D.:** Basin 038
**Description:** Dam Material

**Sample Date:** 5/23/12
**Analyzed By:** KF/BP
**Date Analyzed:** 5/23/12
**Requested By:** Z.B.W.

**Weight of Oven Dry Sample (W):** **1091.3 Grams**

| Sieve No. | Sieve + Sample Weight | Sieve Weight | Sample Weight Retained | Percent of Total Retained | Cumulative Weight Percent | Percent Retained | Percent Finer |
|---|---|---|---|---|---|---|---|
| **1"** | 867.2 | 792.1 | 75.1 | 7.0 | 7.0 | 7.0 | 93.0 |
| **3/4"** | 850.3 | 796.0 | 54.3 | 5.1 | 12.1 | 12.1 | 87.9 |
| **1/2"** | 838.2 | 778.5 | 59.7 | 5.6 | 17.7 | 17.7 | 82.3 |
| **4** | 871.3 | 763.2 | 108.1 | 10.1 | 27.9 | 27.9 | 72.1 |
| **10** | 807.1 | 724.6 | 82.5 | 7.7 | 35.6 | 35.6 | 64.4 |
| **40** | 710.3 | 558.7 | 151.6 | 14.2 | 49.8 | 49.8 | 50.2 |
| **200** | 911.5 | 509.1 | 402.4 | 37.8 | 87.6 | 87.6 | 12.4 |
| **Pan** | 615.7 | 483.5 | 132.2 | 12.4 | 100.0 | 100.0 | 0.0 |
| | **Total Weight (W1):** | | 1065.9 | | | | |

# SOIL CLASSIFICATION

Unified System (ASTM D-2487)

**Liquid Limit:** 19.8
**Plastic Limit:** 18.4
**Plasticity Index:** 1.4

**Soil Classification:** **SM**

Coarse Grained
Silty Sand

**Effective Cohesion:** 1.8750 psi
**Total Cohesion:** 6.528 psi
**Permeability:** 12.30 ft/yr
**Maximum Dry Density:** 115.0 pcf
**Optimum Moisture:** 14.9 %
**Effective Cohesion:** 270.0 psf
**Angle of Internal Friction:** 33.02 degrees
**Mass Unit Weight:** 132.14 pcf

## STANDARD PROCTOR COMPACTION TEST (ASTM D-698)

**Company Name:** Birmingham Coal & Coke Co., Inc
**Location:** Knight Mine, P-39--
**Sample I.D.:** Basin 038
**Description:** Dam Material

**Sample Date:** 05/23/12
**Analyzed By:** KF/BP
**Date Analyzed:** 05/23/12
**Requested By:** ZBW

Weight of Mold (W1): 4,238 Grams

| Test No. | Wt. of Mold & Wet Soil (w2) grams | Wt. of wet Soil (w2-w1) grams | Wet Unit Wt. (w2-w1)/C lb/cu-ft | Moisture Content (w) % | Dry Unit Weight lb/cu-ft |
|---|---|---|---|---|---|
| 1 | 5,874 | 1,636 | 108.2 | 7.4 | 100.7 |
| 2 | 5,961 | 1,723 | 114.0 | 10.3 | 103.3 |
| 3 | 6,035 | 1,797 | 118.8 | 12.0 | 106.1 |
| 4 | 6,087 | 1,849 | 122.3 | 14.0 | 107.2 |
| 5 | 6,052 | 1,814 | 120.0 | 16.3 | 103.2 |
| 6 | | | | | |
| 7 | | | | | |

Constant C = 15.12 (conversion factor)

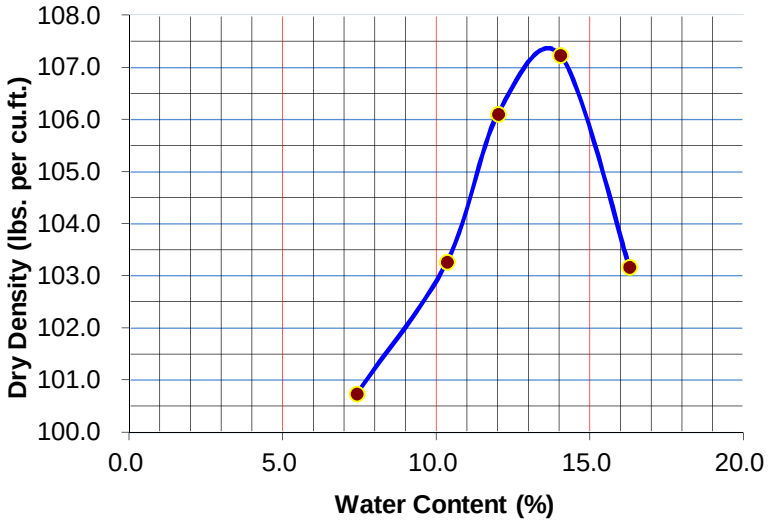
### MOISTURE CONTENT DETERMINATION

| Test No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Can No. | 1 | 2 | 3 | 4 | 5 | | |
| Wt. of Can, a, (g) | 20.5 | 20.5 | 20.6 | 20.5 | 20.6 | | |
| Wt. of Can + Wet Soil, b, (g) | 81.4 | 83.4 | 69.1 | 69.2 | 80.6 | | |
| Wt. of Can + Dry Soil, c, (g) | 77.2 | 77.5 | 63.9 | 63.2 | 72.2 | | |
| * Moisture Content, w, (%) | 7.4 | 10.3 | 12.0 | 14.0 | 16.3 | | |

* Moisture Content, w = (b - c)/(c - a) x 100

Maximum Dry Density (Lb/Cu-Ft) 107.4
Optimum Moisture Content (%): 13.5

Birmingham Coal & Coke Co., Inc
Knight Mine, P-39--, Basin 038, Dam Material
Moisture Density Relationship
(Proctor Method)




| ASTM D-698 Method C | Water Content % | Specific Gravity | %> No. 4 | %< No. 200 | LL % | PL % | PI % |
|---|---|---|---|---|---|---|---|
| | | | 27.90 | 12.40 | 19.8 | 18.4 | 1.4 |

| Sample Description, Classification and Location | Sample No.: Basin 038 Dam Material |
|---|---|
| **Coarse Grained Silty Sand (SM)** | Optimum Moisture Content= 13.5<br>Maximum Dry Density = 107.4 |