### TEST BORING LOG

**CLIENT**

- **IDNR**

**PROJECT NAME**

- **Site 2295**

**PROJECT LOCATION**

- **Booneville, Indiana**

**BORING #**

- **BH-1**

**Northing**

- **1022062.791**

**Easting**

- **2905710.665**

**JOB #**

- **170DR00045**

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#### DRILLING and SAMPLING INFORMATION

<table>
<thead>
<tr>
<th>Date Started</th>
<th>Hammer Wt.</th>
<th>Date Completed</th>
<th>Hammer Drop</th>
<th>Drill Foreman</th>
<th>Spoon Sampler OD</th>
<th>Inspectors</th>
<th>Rock Core Dia.</th>
<th>Boring Method</th>
<th>Shelby Tube OD</th>
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</thead>
<tbody>
<tr>
<td>4/4/17</td>
<td>140 lbs.</td>
<td>4/4/17</td>
<td>30 in.</td>
<td>Gary Lauber</td>
<td>2 in.</td>
<td></td>
<td>1.875 in.</td>
<td>HSA/RC</td>
<td></td>
</tr>
</tbody>
</table>

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#### TEST DATA

<table>
<thead>
<tr>
<th>Depth to Groundwater</th>
<th>Sample Type</th>
<th>Depth</th>
<th>Sample Graphics</th>
<th>Sample No.</th>
<th>Sample Type Graphics</th>
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<td>SS</td>
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<tr>
<td>Bottom of Boring</td>
<td>RC</td>
<td>380.2</td>
<td>41.3</td>
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</tr>
</tbody>
</table>

**Remarks**

- RC #1 from 25.3 ft to 26.3 ft; RQD=0%; Rec.=100% RQD=60%
- RC #2 from 26.3 ft to 31.3 ft; Rec.=98%; RQD=0%
- RC #3 from 31.3 ft to 36.3 ft; Rec.=98%; RQD=16%
- RC #4 from 36.3 ft to 41.3 ft; Rec.=96%; RQD=16%
- Grouted boring at completion.

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### SOIL CLASSIFICATION

#### SURFACE ELEVATION 421.545

- **Topsoil with gravel - 1ft**
- **Silty Clay, brown, moist**
- **Silty Clay, dark brown and brown, mottled with black, plastic, slightly sticky, moist, non-effervescent, trace gravel**
- **Clay, light gray, mottled with brown, plastic, sticky, slightly moist, non-effervescent**
- **Shale, sandy, brown, soft**
- **Shale, gray, highly broken**
- **Shale, dark gray, soft, unweathered**
- **Shale, dark gray, soft and very soft, weathered, highly broken**
- **Shale, dark gray, unweathered, moderately broken - decomposed at 35.5 ft**
- **Bottom of Boring at 41.3 ft**
Topsoil - 3"
CLAY, brown and mottled with dark brown, stiff, slightly plastic, slightly sticky, slightly moist, non-eressence, trace gravel
SILTY CLAY, brown with black, stiff, plastic, slightly sticky, slightly moist
SHALE, dark brown and blackish brown, weathered, fissile, dry, light gray and sandy from 9 ft
SHALE, gray, decomposed, dry
SHALE, gray, unweathered, soft and moderately hard, with calcareous and fossiliferous sections
SHALE, dark gray, soft, highly broken
SHALE, gray, soft, dolomite from 31.2 ft to 34.2 with dark gray sandy clay seam from 33.5 ft to 33.8 ft
SHALE, dark gray, unweathered, moderately hard, fossiliferous at 38.4 ft
COAL, black, with pyrite
UNDERCLAY, light gray, sandy

**TEST DATA**

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>Depth to Groundwater</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS</td>
<td>3-4-8</td>
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<tr>
<td>ST</td>
<td>3-5-6</td>
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<tr>
<td>CA</td>
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<td>RC</td>
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<td>CU</td>
<td>35-50/.3</td>
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<td>CT</td>
<td>28-50/.2</td>
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<tr>
<td>RC #1</td>
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<td>Rec.=83%; RQD=33%</td>
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<tr>
<td>RC #4</td>
<td>31.4 ft to 36.4 ft;</td>
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<td></td>
<td>Rec.=100%; RQD=52%</td>
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<tr>
<td>RC #5</td>
<td>36.4 ft to 41.4 ft;</td>
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<tr>
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<td>Rec.=100%; RQD=64%</td>
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<td>RC #6</td>
<td>41.4 ft to 46.4 ft;</td>
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<td>Rec.=100%; RQD=8%</td>
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<tr>
<td>RC #7</td>
<td>46.4 ft to 49.4 ft;</td>
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<tr>
<td></td>
<td>Rec.=93%; RQD=60%</td>
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</tbody>
</table>

**Remarks**

- RC #1 from 20.2 ft to 21.4 ft; Rec.=83%; RQD=33%
- RC #2 from 21.4 ft to 26.4 ft; Rec.=100%; RQD=40%
- RC #3 from 26.4 ft to 31.4 ft; Rec.=34%; RQD=0%
- RC #4 from 31.4 ft to 36.4 ft; Rec.=100%; RQD=52%
- RC #5 from 36.4 ft to 41.4 ft; Rec.=100%; RQD=64%
- RC #6 from 41.4 ft to 46.4 ft; Rec.=100%; RQD=8%
- RC #7 from 46.4 ft to 49.4 ft; Rec.=93%; RQD=60%

**HSA/RC** - hollow stem auger/rock core

**BH-2**

**Test Data**

- Hammer Wt.
- Hammer Drop
- Spoon Sampler OD
- Rock Core Dia.

**Drilling and Sampling Information**

- Date Started: 4/4/17
- Date Completed: 4/4/17
- Drill Foreman: Gary Lauber
- Inspector
- Boring Method: HSA/RC

**Client**

- IDNR

**Project Name**

- Site 2295

**Project Location**

- Booneville, Indiana

**Job #**

- 170DR00045
Grouted boring at completion.

SILTSTONE, light gray, unweathered, moderately hard, unfractured
Bottom of Boring at 49.4 ft

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Elevation, ft</th>
<th>Depth, ft</th>
<th>Scale, ft</th>
<th>Sample No.</th>
<th>Sample Type</th>
<th>Sample Graphics</th>
<th>Groundwater</th>
<th>Standard Penetration Test, Blows per 6 in. Increments</th>
<th>Remarks</th>
</tr>
</thead>
</table>

Grouted boring at completion.

- **Sample Type**
  - SS - Driven Split Spoon
  - ST - Pressed Shelby Tube
  - CA - Continuous Flight Auger
  - RC - Rock Core
  - CU - Cuttings
  - CT - Continuous Tube

- **Depth to Groundwater**
  - @ Noted on Drilling Tools _______ ft.
  - ⊙ At Completion **Ground level** ft.
  - ▼ After _______ hours _______ ft.
  - ☐ Cave Depth _______ ft.

- **Boring Method**
  - HSA - Hollow Stem Augers
  - CFA - Continuous Flight Augers
  - DC - Driving Casing
  - MD - Mud Drilling
  - HA - Hand Auger

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**Drilling and Sampling Information**

- **Date Started**: 4/4/17
- **Date Completed**: 4/4/17
- **Hammer Wt.**: 140 lbs.
- **Hammer Drop**: 30 in.
- **Spoon Sampler OD**: 2 in.
- **Rock Core Dia.**: 1.875 in.
- **Shelby Tube OD**: _______ in.

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**Test Data**

**Noted on Drilling Tools**

- Groundwater
Soils classified based on visual observations during drilling operations.

- **RC #1** from 30.5 ft to 31.7 ft; Rec.=92%; RQD=33%
- **RC #2** from 31.7 ft to 36.7 ft; Rec.=100%; RQD=90%
- **RC #3** from 36.7 ft to 41.7 ft; Rec.=92%; RQD=52%
- **RC #4** from 41.7 ft to 46.7 ft; Rec.=96%; RQD=56%
- **RC #5** from 46.7 ft to 51.7 ft; Rec.=100%; RQD=40%

### SOIL CLASSIFICATION

<table>
<thead>
<tr>
<th>SURFACE ELEVATION</th>
<th>Depth, ft</th>
<th>Sample Type</th>
<th>Notes</th>
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<tbody>
<tr>
<td>469.313</td>
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<tr>
<td>SILTY CLAY, brown, moist</td>
<td>463.3</td>
<td>RC</td>
<td></td>
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<tr>
<td>SAND, with silt and clay, orange brown</td>
<td>457.3</td>
<td>RC</td>
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<tr>
<td>SHALE, sandy, black, soft</td>
<td>454.3</td>
<td>RC</td>
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<tr>
<td>SHALE, gray, weathered</td>
<td>443.8</td>
<td>RC</td>
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<tr>
<td>SHALE, dark gray, unweathered, soft, with moderately hard, calcareous and fossiliferous sections</td>
<td>432.8</td>
<td>RC</td>
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<tr>
<td>SHALE, dark gray, unweathered, soft</td>
<td>426.1</td>
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<tr>
<td>SHALE, black, soft</td>
<td>423.7</td>
<td>RC</td>
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<tr>
<td>SHALE, dark gray, moderately hard, calcareous</td>
<td>423.1</td>
<td>RC</td>
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</tbody>
</table>

### Depth to Groundwater

- **Notes on Drilling Tools:** 4.8 ft
- **At Completion:** 4.8 ft
- **After** __________ hours
- **Cave Depth:** __________ ft

**Boring Method**

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling
- HA - Hand Auger
### Test Boring Log

**Client:** IDNR  
**Project Name:** Site 2295  
**Project Location:** Booneville, Indiana

**Drilling and Sampling Information**

<table>
<thead>
<tr>
<th>Date Started</th>
<th>4/5/17</th>
<th>Hammer Wt.</th>
<th>lbs.</th>
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<tbody>
<tr>
<td>Date Completed</td>
<td>4/5/17</td>
<td>Hammer Drop</td>
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<td>Drill Foreman</td>
<td>Gary Lauber</td>
<td>Spoon Sampler OD</td>
<td>in.</td>
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<tr>
<td>Inspector</td>
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<td>Rock Core Dia.</td>
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<td>Boring Method</td>
<td>HSA/RC</td>
<td>Shelby Tube OD</td>
<td>in.</td>
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**Soil Classification**

<table>
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<tr>
<th>Stratum</th>
<th>Elevation, ft</th>
<th>Sample Graphics</th>
<th>Recovery Graphics</th>
<th>Sample Type</th>
<th>Standard Penetration Test, Blows per 6 in. increments</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>COAL, black, with pyrite</td>
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<td>6</td>
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<td>RC #6 from 51.7 to 56.7 ft; Rec.=100%; RQD=76%</td>
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<tr>
<td>UNDERCLAY, light gray</td>
<td>414.9</td>
<td>54.4</td>
<td>55</td>
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<td>Grouted boring at completion.</td>
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<tr>
<td>SILTSTONE, light gray, unweathered, moderately hard</td>
<td>412.6</td>
<td>56.7</td>
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</tbody>
</table>

**Bottom of Boring at 56.7 ft**
Soils classified based on visual observations during drilling operations.

- **SILTY CLAY**, dark gray, very moist
  - Depth: 433.4 ft
  - Elevation: 436.944 ft

- **SILTY CLAY**, brown, moist
  - Depth: 427.9 ft
  - Elevation: 436.944 ft

- **SILTY CLAY**, brown, moist to slightly moist
  - Depth: 421.9 ft
  - Elevation: 436.944 ft

- **SHALE**, gray, weathered
  - Depth: 417.8 ft
  - Elevation: 436.944 ft

- **SHALE**, black, unweathered
  - limestone lamination from 19.9 ft to 20.2 ft
  - 0.2 ft void at 21.4 ft
  - Depth: 414.5 ft
  - Elevation: 436.944 ft

- **VOID** - OPEN
  - Depth: 411.5 ft
  - Elevation: 436.944 ft

- **VOID** - FILLED

- **UNDERCALY**, gray
  - Depth: 407.0 ft
  - Elevation: 436.944 ft

- **SILTSTONE**, gray, unweathered, moderately hard
  - Depth: 402.9 ft
  - Elevation: 436.944 ft

- **Bottom of Boring at 36.2 ft**

Soils classified based on visual observations during drilling operations.

**RC #1** from 19.1 ft to 21.2 ft; Rec. = 95%; RQD=0%

**RC #2** from 21.2 ft to 26.2 ft; Rec. = 20%; RQD=0%

**RC #3** from 26.2 ft to 31.2 ft; Rec. = 0%

**RC #4** from 31.2 ft to 36.2 ft; Rec. = 94%; RQD=60%

Installed PVC riser with a screen from 23.4 ft to 33.4 ft at completion.
Topsoil - 4"

**CLAY,** sandy, brown to dark brown and reddish brown, mottled, plastic, slightly sticky, moist, non-effervescent, small pieces of coal and shale

**SHALE with COAL spoil, black**

**SHALE, brown and orange brown, moderately weathered**

**SHALE, dark gray and orange, weathered**

**SHALE, gray, unweathered**

**SHALE, gray, unweathered, moderately hard, calcareous**

**SHALE, dark gray and black, slightly weathered, soft**

**SHALE, gray, slightly weathered, soft with 4" calcareous lamination**

**VOID**

**SHALE, gray, unweathered**

Drilling Issues - Low Recovery

**SHALE, black, fissile**

**VOID**

**SHALE, black**

**UNDERCLAY**

**SILTSTONE, light gray, unweathered, moderately hard**

Bottom of Boring at 41.8 ft

**Remarks**

- [RC #1 from 14.5 ft to 16.8 ft; Rec.=54%; RQD=45%]
- [RC #2 from 16.8 ft to 21.8 ft; Rec.=86%; RQD=62%]
- [RC #3 from 21.8 ft to 26.8 ft; Rec.=14%; RQD=0%]
- [RC #4 from 26.8 ft to 31.8 ft; Rec.=0%; RQD=0%]
- [RC #5 from 31.8 ft to 36.8 ft; Rec.=20%; RQD=0%]
- [RC #6 from 36.8 ft to 41.8 ft; Rec.=52%; RQD=0%]

**Installed PVC riser with a screen from 28.4 ft to 38.4 ft at completion.**
Soils classified based on visual observations during drilling operations.

RC#1 from 15.2 ft to 16.3 ft; Rec.=100%; RQD=0%
RC #2 from 16.3 ft to 21.3 ft; Rec.=100%; RQD=0%
RC #3 from 21.3 ft to 26.3 ft; Rec.=90%; RQD=0%
RC #4 from 26.3 ft to 31.3 ft; Rec.=98%; RQD=68%
RC #5 from 31.3 ft to 36.3 ft; Rec.=100%; RQD=32%
RC #6 from 36.3 ft to 41.3 ft; Rec.=78%; RQD=20%
RC #7 from 41.3 ft to 46.3 ft; Rec.=118%; RQD=54%; Recovered 0.9 ft from previous RC
RC #8 from 46.3 ft to 51.3 ft; Rec.=100%; RQD=0%

Remarks
Soils classified based on visual observations during drilling operations.
**TEST BORING LOG**

**SOIL CLASSIFICATION**

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Elevation, ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNDERCALY</td>
<td>403.1</td>
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<tr>
<td>SILTSTONE, gray</td>
<td>402.6</td>
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<tr>
<td>Bottom of Boring at 56.3 ft</td>
<td>400.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>Depth to Groundwater</th>
<th>Boring Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS - Driven Split Spoon</td>
<td>a) Noted on Drilling Tools</td>
<td>HSA - Hollow Stem Augers</td>
</tr>
<tr>
<td>ST - Pressed Shelby Tube</td>
<td>v) At Completion</td>
<td>CFA - Continuous Flight Augers</td>
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<tr>
<td>CA - Continuous Flight Auger</td>
<td>^) After _______ hours</td>
<td>DC - Driving Casing</td>
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<td>RC - Rock Core</td>
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<td>MD - Mud Drilling</td>
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<td>CU - Cuttings</td>
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<td>HA - Hand Auger</td>
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<tr>
<td>CT - Continuous Tube</td>
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</tbody>
</table>

**TEST DATA**

- RC #9 from 51.3 ft to 56.3 ft; Rec.=100%; RQD=44%
- Grouted boring at completion.

**Remarks**

RC #9 from 51.3 ft to 56.3 ft; Rec.=100%; RQD=44%
Grouted boring at completion.
SANDY CLAY, strong brown and beige, mottled, plastic, slightly sticky, moist, non-effervescent

CLAY (decomposed shale), brown and greenish yellow, plastic, slightly sticky, slightly moist, non-effervescent

CLAY (decomposed shale), dark brown and organish brown, plastic, slightly sticky, moist, non-effervescent

SHALE, black, dry, broken - at 15 ft fossiliferous, calcareous, and moderately hard

COAL, black, broken, with pyrite

SILTSTONE, gray, unweathered, moderately hard

Grouted boring at completion.

RC #1 from 15 ft to 16.4 ft; Rec.=100%; RQD=0%

RC #2 from 16.4 ft to 21.4 ft; Rec.=90%; RQD=7%

RC #3 from 21.4 ft to 26.4 ft; Rec.=100%; RQD=44%

Remarks

Standard Penetration Test, Blows per 6 in. increments

Groundwater

Drill Foreman Gary Lauber

Inspector

Boring Method HSA/RC

SILTY CLAY, strong brown and beige, mottled, plastic, slightly sticky, moist, non-effervescent

Bottom of Boring at 26.4 ft
Soils classified based on visual observations during drilling operations.

RC #1 from 10.4 ft to 15.9 ft; Rec.=63%; RQD=49%

RC #2 from 15.9 ft to 20.9 ft; Rec.=98%; RQD=50%

RC #3 from 20.9 ft to 25.9 ft; Rec.=80%; RQD=34%

RC #4 from 25.9 ft to 30.9 ft; Rec.=98%; RQD=34%

RC #5 from 30.9 ft to 35.9 ft; Rec.=96%; RQD=0%

RC #6 from 35.9 ft to 40.9 ft; Rec.=98%; RQD=98%

Grouted boring at completion.

Soil Classification:
- SILTY CLAY, brown, moist, with rock fragments
- SILTY CLAY, brown, slightly moist, with rock fragments
- LIMESTONE, dark gray, unweathered, hard
- SHALE, brown and gray, moderately weathered, soft
- Limestone lamination at 12.2 ft
- SHALE, dark gray, unweathered, calcareous
- SHALE, dark gray, soft with fragments of limestone
- Limestone lamination from 20.6 ft to 20.9 ft
- Calcareous shale from 23 ft to 24 ft
- SHALE, black, moderately hard, highly broken, limestone lamination at 26.6 ft
- LIMESTONE, dark beige gray, unweathered, moderately hard
- SHALE, black, unweathered
- COAL, black, broken, with pyrite
- UNDERCLAY, gray, soft
- SILTSTONE, light gray, unweathered, unfractured, thinly laminated

Bottom of Boring at 40.9 ft