VDMR Well No. 627

Operator: Watkins and Henry
Farm: Pound Dam Proposed Site "D"
Well No.: 3
Location: Dickenson County
Elevation: 1410.00'
Total Depth: 140.13'
Drilling Commenced: 5/13/40
Well Completed: 5/14/40
Result: Test

Geologic log
Samples studied
and described by:
John M. Wilson
Virginia Division
of Mineral Resources
March, 1963

## GEOLOGIC LOG

| Sample | Interval | Description |
|---|---|---|
| 0'-0.48' | 0.48 | No core |
| 0.48-7.33 | 6.85 | Sandstone, white, clear, orange, moderately cemented, very fine-to medium-grained, medium sorted, subrounded to angular, interstitially silty, siliceous, with: abundant biotite, abundant muscovite, rare chlorite, common carbonaceous material, and abundant iron oxide stains (occuring as laminae). Slightly porous to porous. |
| 7.33-7.38 | 0.05 | Shale, silty, light gray, brown-gray, soft, flaky, poor to fair fissility, argillaceous, with: abundant biotite, abundant muscovite, common carbonaceous material, abundant carbonaceous laminae, and abundant iron oxide stains. |
| 7.38-11.13 | 3.75 | Sandstone, as in .48-7.33. |
| 11.13-11.53 | .4 | Sandstone, white, clear, milky white, orange, poorly cemented, fine-to coarse-grained, medium sorted, subrounded to angular, siliceous, with: abundant biotite, abundant muscovite, common carbonaceous material, and abundant iron oxide stains (occurs as streaks). Porous to very porous. |
| 11.53-14.03 | 2.5 | Sandstone as in .48-7.33. |

| | | |
|---|---|---|
| 14.03-15.93 | 1.9 | Sandstone, white, clear, milky white, orange, moderately cemented, fine-to medium-grained, well sorted, subrounded to subangular, interstitially silty, calcareous, with: abundant biotite, abundant muscovite, rare chlorite, abundant carbonaceous material, and abundant iron oxide stains. Slightly porous to porous. |
| 15.93-15.96 | .03 | Shale, carbonaceous, brown-gray, black, soft, flaky, poor to fair fissility, argillaceous, with: abundant biotite, abundant muscovite, abundant carbonaceous material, and abundant coal laminae. |
| 15.96-16.76 | .8 | Sandstone, white, clear, orange, moderately cemented, very fine-to medium-grained, medium sorted, rounded to angular, interstitially silty, siliceous, with: abundant biotite, abundant muscovite, common carbonaceous material, and common iron oxide stains (occur as streaks). Slightly porous to porous. |
| 16.76-18.76 | 2.0 | Sandstone, white, clear, milky white, orange, well cemented, fine-to coarse-grained, medium sorted, subrounded to angular, calcareous, with: abundant biotite, abundant muscovite, common chlorite, abundant carbonaceous material, and abundant iron oxide stains. Slightly porous to porous. |
| 18.76-18.77 | .01 | Coal laminae |
| 18.76-19.01 | .25 | Sandstone as in 16.76-19.00. |
| 19.01-23.16 | 4.15 | Sandstone, white to light gray, well cemented, fine-to very coarse-grained, poorly sorted, subrounded to subangular, interstitially silty, calcareous, with: abundant biotite, rare muscovite, and rare chlorite, rare carbonaceous material(occurs as laminae). Nonporous to slightly porous. |
| 23.16-24.91 | 1.75 | No core |
| 24.91-31.46 | 6.55 | Sandstone as in 19.01-23.16 |

| | | |
|---|---|---|
| 31.46-32.46 | 1.0 | Sandstone, white, clear, orange, moderately cemented, fine-to coarse-grained, medium sorted, well-rounded to subangular, interstitially silty, siliceous, calcareous (slightly), with: abundant biotite, abundant muscovite, common carbonaceous material, and abundant iron oxide stains. Slightly porous. |
| 32.46-34.36 | 1.9 | Sandstone, white, milky white, light gray, well cemented, very fine-to medium-grained, medium-sorted, subrounded to angular, interstitially silty, siliceous, calcareous (locally), with: abundant biotite, rare muscovite, common chlorite, rare carbonaceous material, and rare iron oxide stains. Nonporous to slightly porous. |
| 34.36-36.86 | 2.5 | Sandstone, white, light gray, orange, moderately cemented, very fine-to medium-grained, medium sorted, subrounded to angular, interstitially silty, siliceous, with: abundant biotite, abundant muscovite, rare chlorite, rare carbonaceous material, and abundant iron oxide stains (occurs as stain, and wavy laminations). Nonporous to slightly porous. |
| 36.86-50.66 | 13.80 | Sandstone, white, clear, milky white, well cemented, fine-to coarse-grained, medium sorted, rounded to subangular, siliceous, calcareous (slightly), with: abundant biotite, abundant muscovite, and abundant chlorite, Nonporous to slightly porous. |
| 50.66-51.66 | 1.0 | Sandstone, white, milky white, orange, well cemented, fine-to coarse-grained, medium sorted, subrounded to angular, interstitially silty, with: abundant biotite, abundant muscovite, rare chlorite, rare carbonaceous material, and abundant iron oxide stains. Nonporous to slightly porous. |
| 51.66-56.41 | 4.75 | Sandstone as in 36.86-50.60, with rare pyrite. |
| 56.41-57.16 | .75 | Sandstone as in 51.66-56.41, with a small shale lense, and one siderite pebble, 20mm. in diameter. |

| | | |
|---|---|---|
| 57.16-60.83 | 3.67 | Sandstone, white, clear, milky white, well cemented, very fine-to fine-grained, well sorted, subrounded to subangular, siliceous, with: abundant biotite, abundant muscovite, and abundant coal (occurs as veinlets and thin seams). Nonporous to slightly porous. |
| 60.83-61.38 | .55 | Conglomeratic sandstone, (edgewise conglomerate, pebbles are rounded, brown, composed of siderite), white, light gray, well cemented, very fine-to coarse-grained, abundant pebbles, poorly sorted, subrounded to subangular, interstitially silty, siliceous, with: abundant biotite, abundant muscovite, and rare carbonaceous material. Nonporous to slightly porous. |
| 61.38-61.68 | .6 | Sandstone with abundant coal veinlets and seams, as in 57.16-60.83. |
| 61.68-61.93 | .25 | Sandstone with siderite pebbles, as in 60.83-61.38. |
| 61.93-63.23 | 1.3 | Siltstone, locally shaly, light gray, brown-gray, moderately hard, tough, no apparent bedding to poorly fissile, argillaceous, with: common biotite, common muscovite, and rare carbonaceous laminae. |
| 63.23-64.09 | .86 | Sandstone, white, light gray, well cemented, very fine-to fine-grained, well sorted, subrounded to subangular, interstitially silty, siliceous, with: common biotite, abundant muscovite, common carbonaceous material, common iron oxide stains. Nonporous to slightly porous. With stringers of Siltstone, locally shaly, light gray, brown, moderately hard, brittle, no apparent bedding to poorly fissile, argillaceous, with: common biotite, common muscovite. |
| 64.09-84.14 | 20.05 | Siltstone, locally shaly, light to medium gray, hard, tough, no apparent bedding to poorly fissile, argillaceous, with: common biotite, common muscovite, and rare carbonaceous laminae. With stringers of Sandstone, as in 63.23-64.09. (local) |

| | | |
|---|---|---|
| 84.14-97.14 | 13.00 | Siltstone, brownish-gray, moderately soft, flaky, no apparent bedding to poorly fissile, argillaceous, with: common biotite, abundant muscovite. |
| 97.14-124.94 | 27.80 | Siltstone, calcareous, dolomitic, locally shaly, medium gray, moderately soft, flaky, no apparent bedding to poorly fissile, argillaceous, with: common biotite, common muscovite, and stringers of Siderite, brownish-red, moderately soft, calcareous, dolomitic. (X-ray diffraction check) |
| 124.94-130.34 | 5.4 | Sandstone, white, light gray, well cemented, very fine-grained, well sorted, subrounded to angular, interstitially silty, siliceous, with: rare biotite, rare muscovite, and coal (common laminae). Nonporous. With stringers of Siltstone, carbonaceous, medium to dark gray, moderately soft, flaky, no apparent bedding, argillaceous, with: rare biotite, rare muscovite, and common carbonaceous material. |
| 130.34-136.19 | 5.85 | Siltstone, locally shaly, medium to dark gray, moderately hard, brittle, no apparent bedding to poorly fissile, argillaceous, with: common biotite, common muscovite, common siderite lamanations, with: abundant carbonaceous material, and minor stringers of Sandstone, as in 124.94-130.34. |
| 136.19-137.62 | 1.43 | Shale, carbonaceous, silty, dark gray, moderately soft, flaky, poor to fair fissility, argillaceous, with: common biotite, abundant muscovite, abundant carbonaceous material, and abundant carbonaceous laminae. With: abundant carbonaceous replacements of leaves and stems, and in places, siderite. |
| 137.62-138.77 | 1.15 | Interbedded, Shale, silty, light to dark gray, moderately hard, brittle, no apparent bedding to poorly fissile, argillaceous, with: rare biotite, rare muscovite, and stringers of Coal, vitreous, concoidal fracture. |
| 138.77-140.13 | 1.36 | No core |

Total depth - 140.13

INTERVAL SHEET

Page_____

Date_____

PROP: POUND DAM SITE-D

COMP: HOLE #3
COMP: ADAMS AND HENRY

COUNTY: DICKENSON

VDMR WELL NO.: 627

VDMR Well No.: WELL NO. 627

Sample Interval: from .48 to 138.77

Total depth 140.13

Oil_____Gas_____Water____Exploratory_____

Cuttings_____Core ✓ Other_____

| From-To | From-To | From-To | From-To | From-To |
|---|---|---|---|---|
| 0.48 - | 60.83 - | - | - | - |
| 5.48 - | 61.38 - | - | - | - |
| 7.33 - | 61.68 - | - | - | - |
| 7.38 - | 61.93 - | - | - | - |
| 11.13 - | 63.23 - | - | - | - |
| 11.53 - | 64.09 - | - | - | - |
| 14.03 - | 69.09 - | - | - | - |
| 15.93 - | 74.09 - | - | - | - |
| 15.96 - | 79.09 - | - | - | - |
| 16.76 | 84.14 - | - | - | - |
| 18.76 - | 89.14 - | - | - | - |
| 19.01 - | 94.14 - | - | - | - |
| 23.16 - | 97.14 - | - | - | - |
| 24.91 - | 102.14 - | - | - | - |
| 29.91 - | 107.14 - | - | - | - |
| 31.46 - | 112.14 - | - | - | - |
| 32.46 - | 117.14 - | - | - | - |
| 34.36 - | 122.14 - | - | - | - |
| 36.86 - | 124.94 - | - | - | - |
| 41.86 - | 130.34 - | - | - | - |
| 46.86 - | 136.19 - | - | - | - |
| 50.66 - | 136.20 - | - | - | - |
| 51.66 - | 136.22 - | - | - | - |
| 56.41 - | 136.24 - | - | - | - |
| 57.16 - | 136.25 - | - | - | - |
| - | 136.29 - | - | - | - |
| - | 136.63 - | - | - | - |
| - | 137.62 - | - | - | - |
| - | 138.77 - | - | - | - |
| - | - | - | - | - |

County: Dickenson
VDMR Well No. 627

Well: Proposed Pound (Bartlick) Dam, Site D, hole 3
(John W. Flannagan Dam)

Farm:

Driller: Watkins and Henry (U.S. Corps of Engr., contractor)

Location: Haysi quadrangle – approximate UTM, 380720 m.E and 4121410 m. N; about 3.4 miles northwest of Haysi and adjacent to the Pound River 2.1 miles west of its confluence with Russell Fork of the Big Sandy River.

Elevation: 1410.00 feet

Total depth: 142.00 feet

Started drilling: 5/13/40 Completed drilling: 5/14/40

Sample description by:

References: U.S. Engineer Office, Huntington, W. Va., Report of Core Boring, 5/14/40 and Design Memorandum No. 3 Geology and Soils (2 volumes) for Ohio River Basin Pound Reservoir Project, U.S. Corps of Engineers, Huntington, W. Va., 1959.

## GEOLOGIC SUMMARY

| Depth (feet) | Thickness (feet) | Formation (and remarks) |
|---|---|---|

Well No: Bartlick Dam Hole No. 3 County: Dickenson
Farm: John T. Flannagan Dam VDMR Well No. 627
Location: Site D, Pound River
Driller: Watkins and Henry, U.S. Corps of Engineers
Inclination: Vertical
Elevation: 1410.0
Elevation Top of Rock: 1408.0
Total Depth: 142.1
Date Started: 5/13/40
Date Completed: 5/14/40
Sample Description: R.S. Good February 15, 1967

## Geologic Log

| Depth | Thickness | Description |
|---|---|---|
| 0-2.0 | 2.0 | Overburden |
| 2.0-2.5 | 0.5 | No core |
| 2.5-59.5 | 57.5 | Sandstone, subgraywacke: buff, weathered, slightly porous, medium and even grained, with banded brown iron oxide stains. ~~From ground water movement~~. The quartz (80%) grains are angular to subangular, from 0.1 to 0.5 mm, average about 0.25 mm. The matrix is composed of 0.5 to 1 mm grains and flakes of feldspar, muscovite, biotite, chlorite, chert and carbonaceous detritus. The cement is feldspathic (clay) and slightly calcareous. One detrital siderite fragment (20 x 2 mm) occurs at 56.8' and bituminous clasts. 35 x 10 mm occur at 58.0' |

| | | |
|---|---|---|
| 59.5-64.8 | 5.3 | Sandstone subgraywacke: gray, as above but with abundant (5%) bituminous partings, clasts and detrital siderite. Clastic siderite zone occurs from 63.8'-64.8'. The siderite (20-30%) occurs as bowed, brown, lenticular and discoid clasts 1-2" long by 1/4 - 1/2" and small brown clastic grains, set in an impure, gray, even grained massive sandstone. |
| 64.8-97.1 | 32.3 | Siltstone: dark gray, faintly laminated with sandy lenses, and local slump structures. |
| 97.1-124.9 | 27.8 | Siltstone: dark gray, faintly laminated, with occasional 10 mm brownish black dolomitic and ankeritic (?) or sideritic bands. |
| 124.9-137.6 | 12.7 | Siltstone: dark gray, non-calcareous, and faintly laminated |
| 137.6-138.8 | 1.2 | Coal: black, silty with white jarosite stains |
| 138.8-142.1 | 3.3 | No core |

3. Well No. 627

# Geologic Summary

| Depth | Thickness | Description | Age |
|---|---|---|---|
| 0. - 2.5 | 2.5 | No core | |
| 2.5 - 64.8 | 62.3 | Norton formation: subgraywacke with bituminous and siderite clasts from 59.5' - 64.8'. | Pennsylvanian |
| 64.8 - 97.1 | 32.3 | Norton formation: siltstone with sandy laminae | " |
| 97.1 - 124.9 | 27.8 | Norton formation: dolomitic siltstone with sandy laminae | " |
| 124.9 - 137.6 | 12.7 | Norton formation: siltstone, faintly laminated | |
| 137.6 - 138.8 | 1.2 | Norton formation: Upper Banner Coal with ~~powdery~~ white jarosite | " |
| 138.8 - 142.1 | 3.3 | No core | |

UNITED STATES ENGINEER OFFICE
HUNTINGTON, W. VA.
OPERATION DIVISION
SURVEYS SECTION

Date 5-14-40

REPORT OF CORE BORING

Sheet 1 of 6

Project Pound Bartlick Dam, Proposed Site "D" UDMR Well No. 627

Hole No. 3 Dia. 2-1/8 Location See Plan

Date started 5-13-40 Completed 5-14-40

Driller Watkins & Henry Inspector Johnson & Davis

Type of drilling equipment used U.S.E.D. Core Drill

From Elev. 1410.00 To Elev. 1391.00 on this page.

| | | | |
|---|---|---|---|
| Elev. of top of Hole | 1410.00 | Plan depth of Hole | 142.09 |
| Elev. of top of rock | 1408.04 | Total overburden drilled | 1.96 |
| Elev. bottom of Hole | 1267.91 | Total rock drilled | 140.13 |
| Elev. of ground water | None | Total rock recovered | 139.29 |
| Elev. of water lost | 1405.54 | Total depth of Hole | 142.09 |
| Elev. water regained | None | Deviation from plan depth | None |
| Number of Core Boxes | 8 | | |
| Number of jar samples | None | | |

DETAIL OF LOG

| Depth | Elev. | Scale | Legend | Material Classification | Drilling Time Min./Ft. | Box No. | Remarks |
|---|---|---|---|---|---|---|---|
| 0.00 | 1410.00 | | | | | | Top of Hole |
| | | | | Clay, silt and fragments of sandstone & shale | 0:15 | | |
| 1.96 | 1408.04 | | | Top of Rock | | | Change |
| 2.44 | 1407.56 | | | | | 1 | Loss 0.48 |
| 4.46 | 1405.54 | | | | | | Lost Water |
| | | | | Hard coarse grained brown sandstone. | | | |
| | | | | | 2:10 | 1 | |
| 19.00 | 1391.00 | | | | | | |

UNITED STATES ENGINEER OFFICE
HUNTINGTON, W.VA.
OPERATION DIVISION
SURVEYS SECTION

REPORT OF CORE BORING

Date 5-14-40

Sheet 2 of 6

Hole No. 3 From El. 1391.00 To El. 1363.00 on this page.

DETAIL OF LOG

| Depth | Elev. | Scale | Legend | Material Classification | Drilling Time Min./Ft. | Box No. | Remarks |
|---|---|---|---|---|---|---|---|
| 19.00 | 1391.00 | | | | | | |
| | | | | Hard coarse grained brown sandstone | 2:10 | 1 | |
| 20.61 | 1389.39 | | | | | | Change |
| 20.94 | 1389.06 | | | | | 1 | Bottom Box 1 |
| | | | | | | 2 | |
| | | | | Hard Med. fine grained gray sandstone | 4:20 | | |
| 40.15 | 1369.85 | | | | | | Bottom Box 2 |
| | | | | | | 3 | |
| 47.00 | 1363.00 | | | | | | |

UNITED STATES ENGINEER OFFICE
HUNTINGTON, W.VA.
OPERATION DIVISION
SURVEYS SECTION

REPORT OF CORE BORING

Date 5-14-40

Sheet 3 of 6

Hole No. 3 From El. 1363.00 To El. 1335.00 on this page.

DETAIL OF LOG

| Depth | Elev. | Scale | Legend | Material Classification | Drilling Time Min./Ft. | Box No. | Remarks |
|---|---|---|---|---|---|---|---|
| 47.00 | 1363.00 | | | | | | |
| | | | | Hard Med. fine grained gray sandstone | 4:20 | 3 | |
| 59.48 | 1350.52 | | | | | Bottom | Box 3 |
| | | | | Hard fine grained gray sandstone with coal spars | 0:30 | 4 | Change |
| 64.76 | 1345.24 | | | | | | Change |
| | | | | Hard gray silt shale with thin sandstone laminations. | 3:35 | 4 | |
| 75.00 | 1335.00 | | | | | | |

UNITED STATES ENGINEER OFFICE
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OPERATION DIVISION
SURVEYS SECTION

REPORT OF CORE BORING

Date 5-14-40

Sheet 4 of 6

Hole No. 3 From El. 1335.00 To El. 1307.00 on this page.

DETAIL OF LOG

| Depth | Elev. | Scale | Legend | Material Classification | Drilling Time Min./Ft. | Box No. | Remarks |
|---|---|---|---|---|---|---|---|
| 75.00 | 1335.00 | | | | | | |
| | | | | Hard gray silt shale with thin sandstone laminations | | 4 | |
| 78.70 | 1331.30 | | | | 3:35 | | Bottom Box 4 |
| 86.14 | 1323.86 | | | | | | Change |
| | | | | Hard dark gray silt shale. | | 5 | |
| 97.90 | 1312.10 | | | | 6:20 | | Bottom Box 5 |
| | | | | | | 6 | |
| 103.00 | 1307.00 | | | | | | |

UNITED STATES ENGINEER OFFICE
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SURVEYS SECTION

REPORT OF CORE BORING

Date 5-14-40

Sheet 5 of 6

Hole No. 3 From El. 1307.00 To El. 1280.00 on this page.

DETAIL OF LOG

| Depth | Elev. | Scale | Legend | Material Classification | Drilling Time Min./Ft. | Box No. | Remarks |
|---|---|---|---|---|---|---|---|
| 103.00 | 1307.00 | | | | | | |
| | | | | Hard gray silt shale | | | |
| | | | | | | 6 | |
| | | | | | 6:20 | | |
| 117.19 | 1292.81 | | | | | | Bottom Box 6 |
| | | | | | | 7 | |
| 127.04 | 1282.96 | | | | | | Change |
| | | | | Hard gray sandstone & shale interlaminated | 0:45 | 7 | |
| 130.00 | 1280.00 | | | | | | |

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SURVEYS SECTION

REPORT OF CORE BORING

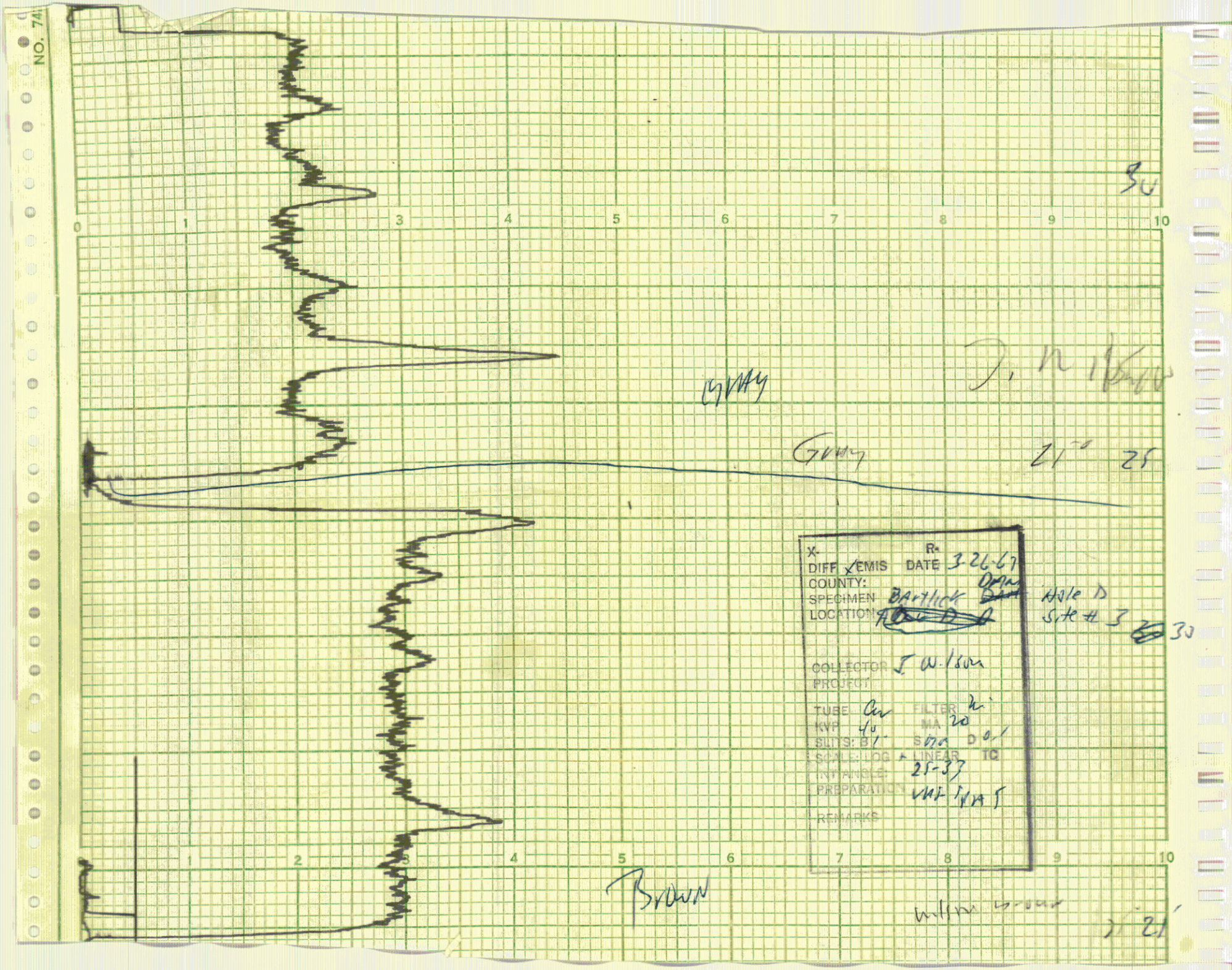
Date 5-14-40

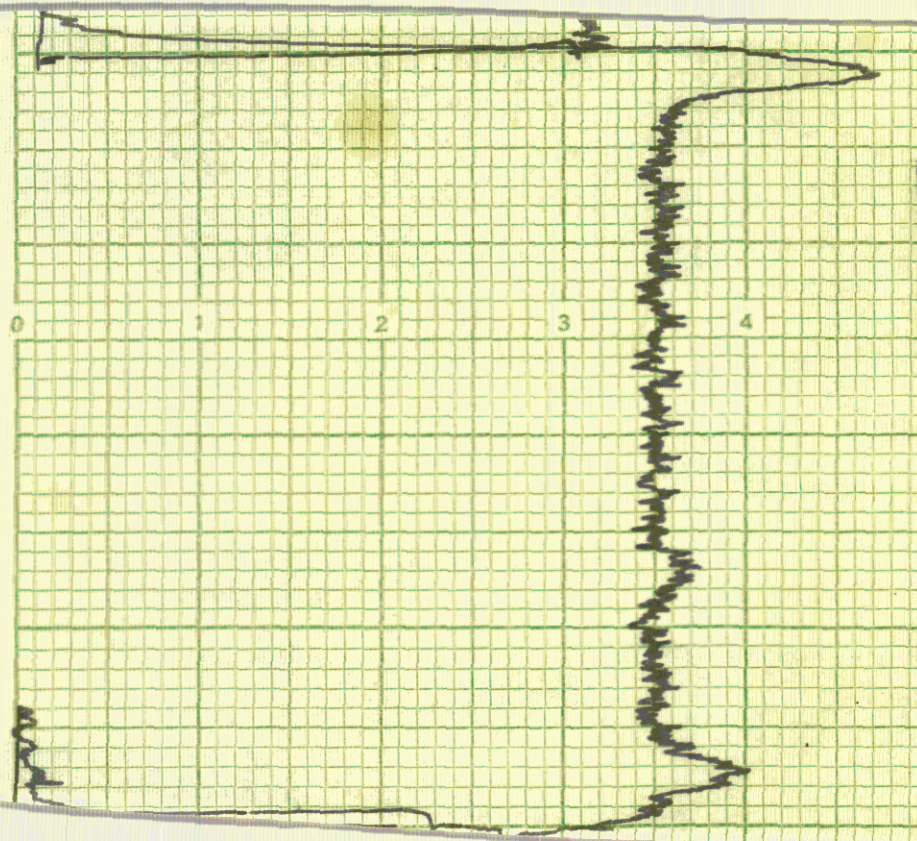
Sheet 6 of 6

Hole No. 3 From El. 1280.00 To El. 1267.91 on this page.

DETAIL OF LOG

| Depth | Elev. | Scale | Legend | Material Classification | Drilling Time Min./Ft. | Box No. | Remarks |
|---|---|---|---|---|---|---|---|
| 130.00 | 1280.00 | | | | | | |
| | | | | Hard gray sandstone and shale interlaminated | | 7 | |
| 132.34 | 1277.66 | | | | | | Change |
| | | | | Hard gray shale with thin sandstone laminations | 1:35 | 7 | |
| 136.33 | 1273.67 | | | | | | Bottom Box 7 |
| | | | | | | 8 | |
| 139.53 | 1270.47 | | | | | | Change |
| 140.73 | 1269.27 | | | Badly broken carbonaceous shale | 0:20 | 8 | |
| | | | | | | 8 | Loss 1.36 |
| 142.09 | 1267.91 | | | | | | Bottom of Hole |


NO. 74
0 1 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9 10
X- R-
DIFF X EMIS DATE 3-26-67
COUNTY:
SPECIMEN Barthick
LOCATION
COLLECTOR J. W. Mon
PROJECT
TUBE Cu FILTER Ni
KVP 40 MA 20
SLITS: B1 S.04 D 0.1
SCALE: LOG LINEAR TC
INT ANGLE: 25-37
PREPARATION
REMARKS
Hole D
Site # 3
30
BROWN



X-
DIFF XEMIS DATE 3-22-67
COUNTY:
SPECIMEN Bartlett Dam
LOCATION Hole D S.H. 3
60.83'
COLLECTOR J. W. Wilson
PROJECT

TUBE Cu FILTER Ni
KVP 40 MA 20
SLITS: B 1° S .1 MM D 0.1°
SCALE: LOG + LINEAR TO
INT ANGLE: 26 - 32
PREPARATION Chs-Sp #7
REMARKS

Bartlett Dam
S.H. 3
Hole D
60.83'

J. Wilson