GEOTECHNICAL BORING LOG

MACTEC



| | | | |
|---|---|---|---|
| **MACTEC PROJECT NO.:** 6468-06-1472 | **COUNTY** Louisa, VA | **GEOLOGIST** J. Wallen/J. Howard | |
| **SITE DESCRIPTION** NORTH ANNA COL | | | **GROUND WATER (ft)** |
| **BORING NO.** B-914 | **DRILL METHOD:** Mud Rotary/Core | **SAMPLE METHODS:** SPT/CORE | **0 HR.** 11.9 |
| **COLLAR ELEV.** 297.5 ft (NAVD88) | **NORTHING** 3,909,940 US ft (NAD83) | **EASTING** 11,685,922 US ft (NAD83) | **24 HR.** 23.5 |
| **TOTAL DEPTH** 200.5 ft | **DRILL MACHINE** CME 550 ATV | **DRILLER:** G. Akins | **HAMMER TYPE** 140 lbs Auto |
| **DATE STARTED** 8/22/06 | **COMPLETED** 8/29/06 | **CORE BARREL TYPE:** HQ 3 triple tube-wireline | |

| ELEV. (ft) | DEPTH (ft) | BLOW COUNT 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT 0 20 40 60 80 100 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|
| 297.5 | | | | | Ground Surface | | | | 297.5 — 0.0 |
| 296.0 | 1.5 | | | | | | | | Silty, fine to medium SAND (SM), reddish brown (5YR 5/4), dry, medium dense (Fill) |
| 294.0 | 3.5 | 8 | 7 | 6 | 13 | 914-1 | | | 294.5 — 3.0 |
| 291.5 | 6.0 | 12 | 4 | 5 | 9 | 914-2 | | | Clayey SAND (SC), yellowish brown (10YR 5/6), moist, stiff (Residual Soil) |
| 289.0 | 8.5 | 4 | 6 | 8 | 14 | 914-3 | | | 292.5 — 5.0 |
| 286.5 | 11.0 | 5 | 7 | 6 | 13 | 914-4 | | | Silty, fine to coarse SAND (SM), yellowish brown (10YR 5/6), moist, medium dense, trace rock fragments (Residual Soil) |
| 284.0 | 13.5 | 4 | 6 | 7 | 13 | 914-5 | ▽ | | |
| 278.5 | 19.0 | 8 | 11 | 9 | 20 | 914-6 | | | |
| 273.6 | 23.9 | 11 | 15 | 9 | 24 | 914-7 | | | 275.5 — 22.0 |
| 261.9 | 35.6 | 50/0.2 | | | 47 | 914-8 | ▼ | | Weathered Rock: Yellowish brown, severely weathered, soft, QUARTZ-BIOTITE GNEISS |
| 256.9 | 40.6 | 8 | 12 | 35 | 73 | 914-9 | | | 272.4 — 25.1 |
| 251.9 | 45.6 | 28 | 30 | 43 | | 914-10 | | | Silty, fine to coarse SAND (SM), yellowish brown (10YR 5/6), moist, dense to very dense, rock fabric (Residual Soil) |
| | | 50/0.1 | | | | 914-11 | | | 255.4 — 42.1 |
| | | | | | | | | | Weathered Rock: Yellowish brown, severely weathered, soft, QUARTZ-BIOTITE GNEISS |
| | | | | | | | | | 253.0 — 44.5 |
| | | | | | | | | | Hard Rock: Dark gray to blue gray with brown Fe staining, moderately severely to moderately weathered, very close to close fracturing, soft to hard, BIOTITE-QUARTZ GNEISS |
| | | | | | | | | | 236.9 — 60.6 |
| | | | | | | | | | Hard Rock: Light blue gray to blue gray with pink, slightly weathered to fresh, close to moderately close fracturing, hard to very hard, QUARTZ GNEISS |

NORTH ANNA COL CORE NORTH ANNA COL DATA REPORT REV0.GPJ NORTH ANNA COL.GDT 1/19/07

MACTEC



| | | | |
|---|---|---|---|
| **MACTEC PROJECT NO.:** 6468-06-1472 | **COUNTY** Louisa, VA | **GEOLOGIST** J. Wallen/J. Howard | |
| **SITE DESCRIPTION** NORTH ANNA COL | | | **GROUND WATER (ft)** |
| **BORING NO.** B-914 | **DRILL METHOD:** Mud Rotary/Core | **SAMPLE METHODS:** SPT/CORE | **0 HR.** 11.9 |
| **COLLAR ELEV.** 297.5 ft (NAVD88) | **NORTHING** 3,909,940 US ft (NAD83) | **EASTING** 11,685,922 US ft (NAD83) | **24 HR.** 23.5 |
| **TOTAL DEPTH** 200.5 ft | **DRILL MACHINE** CME 550 ATV | **DRILLER:** G. Akins | **HAMMER TYPE** 140 lbs Auto |
| **DATE STARTED** 8/22/06 | **COMPLETED** 8/29/06 | **CORE BARREL TYPE:** HQ 3 triple tube-wireline | |

| ELEV. (ft) | DEPTH (ft) | BLOW COUNT 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT 0 20 40 60 80 100 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|
| 222.6 | | | | | Continued from previous page | | | | Hard Rock: Light blue gray to blue gray with pink, slightly weathered to fresh, close to moderately close fracturing, hard to very hard, QUARTZ GNEISS *(continued)* |
| 202.1 | 95.4 | | | | | | | | Hard Rock: Blue gray with green, moderately weathered to fresh, very close to wide fracturing, medium hard to very hard, BIOTITE GNEISS |

GEOTECHNICAL BORING LOG

MACTEC



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|---|---|---|---|
| **MACTEC PROJECT NO.:** 6468-06-1472 | **COUNTY** Louisa, VA | **GEOLOGIST** J. Wallen/J. Howard | |
| **SITE DESCRIPTION** NORTH ANNA COL | | | **GROUND WATER (ft)** |
| **BORING NO.** B-914 | **DRILL METHOD:** Mud Rotary/Core | **SAMPLE METHODS:** SPT/CORE | **0 HR.** 11.9 |
| **COLLAR ELEV.** 297.5 ft (NAVD88) | **NORTHING** 3,909,940 US ft (NAD83) | **EASTING** 11,685,922 US ft (NAD83) | **24 HR.** 23.5 |
| **TOTAL DEPTH** 200.5 ft | **DRILL MACHINE** CME 550 ATV | **DRILLER:** G. Akins | **HAMMER TYPE** 140 lbs Auto |
| **DATE STARTED** 8/22/06 | **COMPLETED** 8/29/06 | **CORE BARREL TYPE:** HQ 3 triple tube-wireline | |

| ELEV. (ft) | DEPTH (ft) | BLOW COUNT 0.5ft | 0.5ft | 0.5ft | BLOWS PER FOOT 0 20 40 60 80 100 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|
| 147.8 | | | | | Continued from previous page | | | | |
| | | | | | | | | | Hard Rock: Blue gray with green, moderately weathered to fresh, very close to wide fracturing, medium hard to very hard, BIOTITE GNEISS *(continued)* |
| | | | | | | | | | 97.0 200.5 Boring and coring terminated at 200.5 ft in Hard Rock: Very hard, BIOTITE GNEISS |

NORTH ANNA COL CORE NORTH ANNA COL DATA REPORT REV0.GPJ NORTH ANNA COL.GDT 1/19/07

GEOTECHNICAL CORING LOG

MACTEC



| | | | |
|---|---|---|---|
| **MACTEC PROJECT NO.:** 6468-06-1472 | **COUNTY** Louisa, VA | **GEOLOGIST** J. Wallen/J. Howard | |
| **SITE DESCRIPTION** NORTH ANNA COL | | | **GROUND WATER (ft)** |
| **BORING NO.** B-914 | **DRILL METHOD:** Mud Rotary/Core | **SAMPLE METHODS:** SPT/CORE | **0 HR.** 11.9 |
| **COLLAR ELEV.** 297.5 ft **(NAVD88)** | **NORTHING** 3,909,940 **US ft (NAD83)** | **EASTING** 11,685,922 **US ft (NAD83)** | **24 HR.** 23.5 |
| **TOTAL DEPTH** 200.5 ft | **DRILL MACHINE** CME 550 ATV | **DRILLER:** G. Akins | **HAMMER TYPE** 140 lbs Auto |
| **DATE STARTED** 8/22/06 | **COMPLETED** 8/29/06 | **CORE BARREL TYPE:** HQ 3 triple tube-wireline | |
| **CORE SIZE** HQ3 | **TOTAL RUN** 172.8 ft | | |

| ELEV. (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN REC. (ft) % | RUN RQD (ft) % | SAMP. NO. | STRATA REC. (ft) % | STRATA RQD (ft) % | LOG | DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Begin Coring @ 24.6 ft |
| 272.9 | 24.6 | 5.9 | 2:47/0.9<br>1:04<br>1:10<br>0:56<br>1:19<br>1:01 | (3.0)<br>51% | (0.0)<br>0% | 1 | | | | 272.4 — Weathered Rock: Yellowish brown, severely weathered, soft, QUARTZ-BIOTITE GNEISS *(continued)* — 25.1<br>Silty, fine to coarse SAND (SM), yellowish brown (10YR 5/6), moist, dense to very dense, rock fabric (Residual Soil) |
| 267.0 | 30.5 | | | | | | | | | |
| | | 5.1 | 1:19<br>1:32<br>1:42<br>0:54<br>1:01/1.1 | (0.8)<br>16% | (0.0)<br>0% | 2 | | | | |
| 261.9 | 35.6 | | | | | | | | | |
| | | | *N=47* | | | *914-9* | | | | |
| 260.4 | 37.1 | 3.5 | 1:12/0.5<br>1:38<br>1:51<br>2:38 | (2.2)<br>63% | (0.0)<br>0% | 3 | | | | |
| 256.9 | 40.6 | | | | | | | | | |
| | | | *N=73* | | | *914-10* | | | | 255.4 — 42.1 |
| 255.4 | 42.1 | 3.5 | 1:54/0.5<br>1:13<br>1:32<br>1:13 | (1.7)<br>49% | (0.4)<br>11% | 4 | | | | Weathered Rock: Yellowish brown, severely weathered, soft, QUARTZ-BIOTITE GNEISS<br>(2 joints at 40°, 1 joint at 5°) — 253.0 — 44.5 |
| 251.9 | 45.6 | | | | | | | | | |
| 251.8 | 45.7 | 4.9 | *N=50/0.1*<br>2:44<br>2:52<br>2:01<br>2:36<br>3:47/0.9 | (1.7)<br>35% | (0.3)<br>6% | *914-11*<br>5 | | | | Hard Rock: Dark gray to blue gray with brown Fe staining, moderately severely to moderately weathered, very close to close fracturing, soft to hard, BIOTITE-QUARTZ GNEISS |
| 246.9 | 50.6 | | | | | | | | | |
| | | 5.0 | 3:20<br>2:43<br>5:48<br>3:27<br>2:07 | (3.7)<br>74% | (1.9)<br>38% | 6 | | | | (4 joints at 5° and 1 joint at 70° with Fe staining; Quartz vein from 51.6-51.9 ft) |
| 241.9 | 55.6 | | | | | | | | | |
| | | 5.0 | 3:00<br>2:06<br>2:55<br>2:58<br>3:22 | (2.4)<br>48% | (0.4)<br>8% | 7 | | | | |
| 236.9 | 60.6 | | | | | | | | | 236.9 — 60.6 |
| | | 5.0 | 2:00<br>2:00<br>2:00<br>2:15<br>2:15 | (5.0)<br>100% | (4.1)<br>82% | UC-63.8' | | | | Hard Rock: Light blue gray to blue gray with pink, slightly weathered to fresh, close to moderately close fracturing, hard to very hard, QUARTZ GNEISS<br>(Joints at 20-40°; Quartz+hornblende+pyrite veins) |
| 231.9 | 65.6 | | | | | | | | | |
| | | 5.0 | 2:00<br>2:30<br>2:30<br>3:00<br>3:15 | (5.0)<br>100% | (4.1)<br>82% | 9 | | | | (Joints at 30-60°) |
| 226.9 | 70.6 | | | | | | | | | |
| | | 5.1 | 2:15<br>3:00<br>4:30<br>6:00<br>8:15/1.1 | (5.0)<br>98% | (4.3)<br>84% | UC-75.3' | | | | (Joints at 20-70°) |
| 221.8 | 75.7 | | | | | | | | | |
| | | 5.1 | 7:30<br>4:00<br>4:15<br>5:30<br>7:00/1.1 | (5.0)<br>98% | (5.0)<br>98% | 11 | | | | -No Joints |
| 216.7 | 80.8 | | | | | | | | | |
| | | 4.6 | 12:00<br>8:00<br>7:15<br>9:30<br>9:00/0.6 | (4.6)<br>100% | (3.8)<br>83% | 12 | | | | (Joints at 20-80°) |
| 212.1 | 85.4 | | | | | | | | | |
| | | 5.0 | 9:15<br>8:30<br>6:45<br>7:15<br>8:00 | (5.0)<br>100% | (5.0)<br>100% | 13 | | | | (Joints at 50-70°) |
| 207.1 | 90.4 | | | | | | | | | |
| | | 5.0 | 6:15<br>4:00<br>4:15<br>5:45<br>8:30 | (4.9)<br>98% | (3.6)<br>72% | 14 | | | | (Joints at 10-80°) |
| 202.1 | 95.4 | | | | | | | | | 202.1 — 95.4 |
| | | 5.1 | 5:00<br>5:30<br>5:00<br>6:00 | (5.1)<br>100% | (5.1)<br>100% | UCS-95.8' | | | | Hard Rock: Blue gray with green, moderately weathered to fresh, very close to wide fracturing, medium hard to very hard, BIOTITE GNEISS<br>(Joints at 40°) |

NORTH ANNA COL_CORE NORTH ANNA COL DATA REPORT REV0.GPJ NORTH ANNA COL.GDT 1/19/07

MACTEC



| | | | |
|---|---|---|---|
| **MACTEC PROJECT NO.:** 6468-06-1472 | **COUNTY** Louisa, VA | **GEOLOGIST** J. Wallen/J. Howard | |
| **SITE DESCRIPTION** NORTH ANNA COL | | **GROUND WATER (ft)** | |
| **BORING NO.** B-914 | **DRILL METHOD:** Mud Rotary/Core | **SAMPLE METHODS:** SPT/CORE | **0 HR.** 11.9 |
| **COLLAR ELEV.** 297.5 ft **(NAVD88)** | **NORTHING** 3,909,940 **US ft (NAD83)** | **EASTING** 11,685,922 **US ft (NAD83)** | **24 HR.** 23.5 |
| **TOTAL DEPTH** 200.5 ft | **DRILL MACHINE** CME 550 ATV | **DRILLER:** G. Akins | **HAMMER TYPE** 140 lbs Auto |
| **DATE STARTED** 8/22/06 | **COMPLETED** 8/29/06 | **CORE BARREL TYPE:** HQ 3 triple tube-wireline | |
| **CORE SIZE** HQ3 | **TOTAL RUN** 172.8 ft | | |

| ELEV. (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN REC. (ft) % | RUN RQD (ft) % | SAMP. NO. | STRATA REC. (ft) % | STRATA RQD (ft) % | LOG | DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Continued from previous page |
| 197.0 | 100.5 | | 7:15/1.1 | | | | | | | Hard Rock: Blue gray with green, moderately weathered to fresh, very close to wide fracturing, medium hard to very hard, BIOTITE GNEISS *(continued)* |
| | | 5.0 | 4:30<br>4:30<br>3:15<br>4:45<br>4:30 | (5.0)<br>100% | (5.0)<br>100% | 16 | | | | (Joints at 10°) |
| 192.0 | 105.5 | | | | | | | | | |
| | | 5.0 | 3:00<br>2:45<br>3:15<br>3:00<br>3:00 | (4.9)<br>98% | (4.9)<br>98% | 17 | | | | (Joints at 0-5°; Quartz vein) |
| 187.0 | 110.5 | | | | | | | | | |
| | | 5.0 | 2:30<br>3:15<br>4:00<br>4:45<br>4:00 | (4.9)<br>98% | (4.9)<br>98% | 18 | | | | (Joints at 80°) |
| 182.0 | 115.5 | | | | | | | | | |
| | | 4.8 | 4:45<br>8:30<br>7:30<br>6:00<br>7:00/0.8 | (4.8)<br>100% | (4.8)<br>100% | 19 | | | | |
| 177.2 | 120.3 | | | | | | | | | |
| | | 5.4 | 5:00<br>4:30<br>4:30<br>3:30<br>5:00/1.4 | (5.4)<br>100% | (4.4)<br>81% | UC-120.6' | | | | (Joints at 20-40°; Quartz+hornblende vein) |
| 171.8 | 125.7 | | | | | | | | | |
| | | 5.0 | 3:30<br>3:00<br>3:15<br>3:15<br>2:45 | (5.0)<br>100% | (5.0)<br>100% | 21 | | | | (Joints at 10-60°) |
| 166.8 | 130.7 | | | | | | | | | |
| | | 4.9 | 2:30<br>2:00<br>2:30<br>2:30<br>2:30/0.9 | (4.7)<br>96% | (4.0)<br>82% | 22 | | | | (Joints at 30-50° with brown Fe staining) |
| 161.9 | 135.6 | | | | | | | | | |
| | | 5.0 | 2:30<br>2:30<br>2:15<br>2:15<br>2:00 | (5.0)<br>100% | (5.0)<br>100% | 23 | | | | -No Joints |
| 156.9 | 140.6 | | | | | | | | | |
| | | 5.0 | 3:00<br>3:00<br>2:45<br>4:00<br>4:45 | (5.0)<br>100% | (4.5)<br>90% | 24 | | | | (Joints at 70°) |
| 151.9 | 145.6 | | | | | | | | | |
| | | 5.0 | 4:15<br>3:15<br>3:00<br>2:15<br>2:30 | (5.0)<br>100% | (5.0)<br>100% | 25 | | | | (Quartz+feldspar veins; No Joints) |
| 146.9 | 150.6 | | | | | | | | | |
| | | 5.0 | 4:00<br>3:00<br>3:30<br>2:00<br>2:45 | (4.8)<br>96% | (4.7)<br>94% | UCS-151.4' | | | | (Joints at 50°) |
| 141.9 | 155.6 | | | | | | | | | |
| | | 5.0 | 2:45<br>2:45<br>2:45<br>2:45<br>2:00 | (4.6)<br>92% | (1.1)<br>22% | 27 | | | | |
| 136.9 | 160.6 | | | | | | | | | |
| | | 5.0 | 2:00<br>3:00<br>3:00<br>3:45<br>3:00 | (4.4)<br>88% | (2.5)<br>50% | 28 | | | | (Joints at 5-40°; quartz vein) |
| 131.9 | 165.6 | | | | | | | | | |
| | | 5.0 | 2:00<br>3:15<br>3:00<br>4:15<br>5:15 | (5.0)<br>100% | (4.2)<br>84% | 29 | | | | |
| 126.9 | 170.6 | | | | | | | | | |
| | | 5.0 | 3:00<br>3:45<br>7:30 | (5.0)<br>100% | (3.4)<br>68% | 30 | | | | (Joints at 50-90°) |

GEOTECHNICAL CORING LOG

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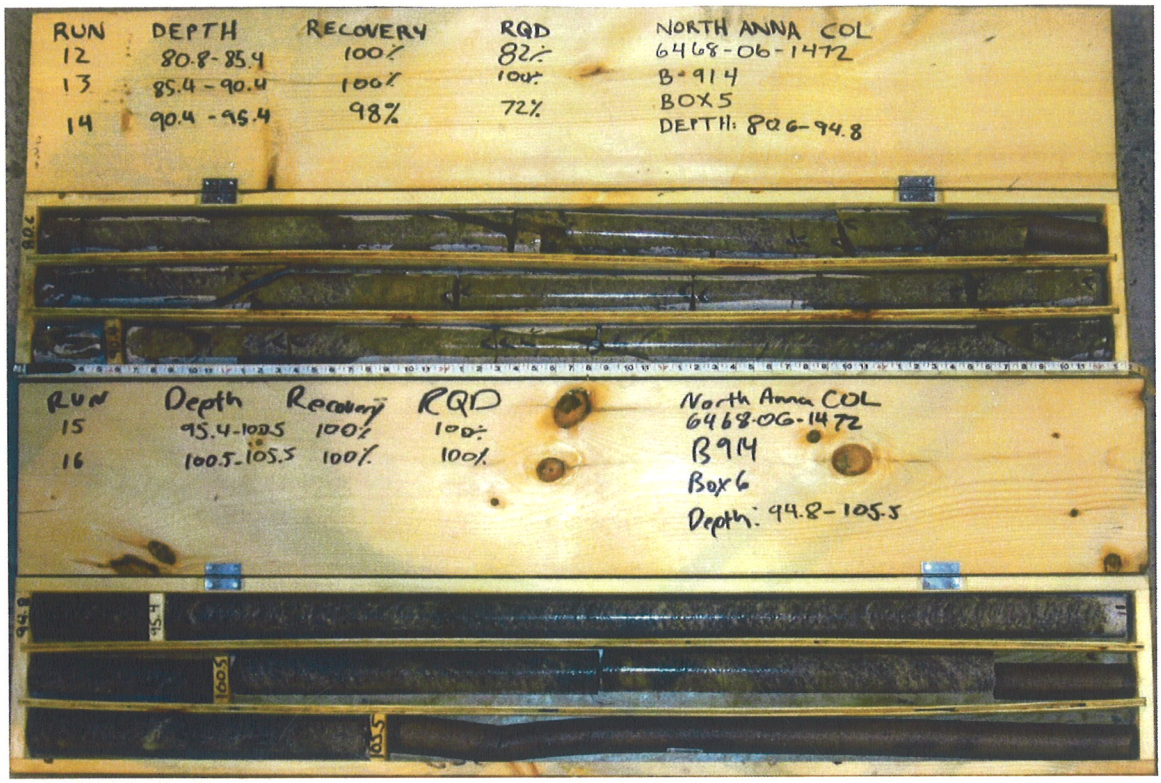
| | | | |
|---|---|---|---|
| **MACTEC PROJECT NO.:** 6468-06-1472 | **COUNTY** Louisa, VA | **GEOLOGIST** J. Wallen/J. Howard | |
| **SITE DESCRIPTION** NORTH ANNA COL | | | **GROUND WATER (ft)** |
| **BORING NO.** B-914 | **DRILL METHOD:** Mud Rotary/Core | **SAMPLE METHODS:** SPT/CORE | **0 HR.** 11.9 |
| **COLLAR ELEV.** 297.5 ft **(NAVD88)** | **NORTHING** 3,909,940 **US ft (NAD83)** | **EASTING** 11,685,922 **US ft (NAD83)** | **24 HR.** 23.5 |
| **TOTAL DEPTH** 200.5 ft | **DRILL MACHINE** CME 550 ATV | **DRILLER:** G. Akins | **HAMMER TYPE** 140 lbs Auto |
| **DATE STARTED** 8/22/06 | **COMPLETED** 8/29/06 | **CORE BARREL TYPE:** HQ 3 triple tube-wireline | |
| **CORE SIZE** HQ3 | **TOTAL RUN** 172.8 ft | | |

| ELEV. (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN REC. (ft) % | RUN RQD (ft) % | SAMP. NO. | STRATA REC. (ft) % | STRATA RQD (ft) % | LOG | DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Continued from previous page |
| 121.9 | 175.6 | | 3:30<br>3:00 | | | | | | | Hard Rock: Blue gray with green, moderately weathered to fresh, very close to wide fracturing, medium hard to very hard, BIOTITE GNEISS *(continued)* |
| | | 4.9 | 3:30<br>4:30<br>4:30<br>4:45<br>8:30/0.9 | (4.9)<br>100% | (4.9)<br>100% | 31 | | | | |
| 117.0 | 180.5 | | | | | | | | | |
| | | 5.0 | 4:00<br>3:00<br>3:00<br>3:00<br>3:00 | (5.0)<br>100% | (4.6)<br>92% | 32 | | | | (joints at 20-70°) |
| 112.0 | 185.5 | | | | | | | | | |
| | | 5.0 | 6:00<br>3:30<br>4:00<br>4:15<br>5:45 | (4.7)<br>94% | (4.2)<br>84% | 33 | | | | |
| 107.0 | 190.5 | | | | | | | | | |
| | | 5.0 | 9:00<br>10:30<br>4:00<br>4:15<br>4:45 | (5.0)<br>100% | (5.0)<br>100% | UC-192.7' | | | | (Joints at 70°) |
| 102.0 | 195.5 | | | | | | | | | |
| | | 5.0 | 5:30<br>5:00<br>6:00<br>5:30<br>6:45 | (5.0)<br>100% | (4.9)<br>98% | 35 | | | | (Joints at 50°) |
| 97.0 | 200.5 | | | | | | | | | 97.0 200.5 |
| | | | | | | | | | | Coring terminated at 200.5 ft in Hard Rock: Very hard, BIOTITE GNEISS |

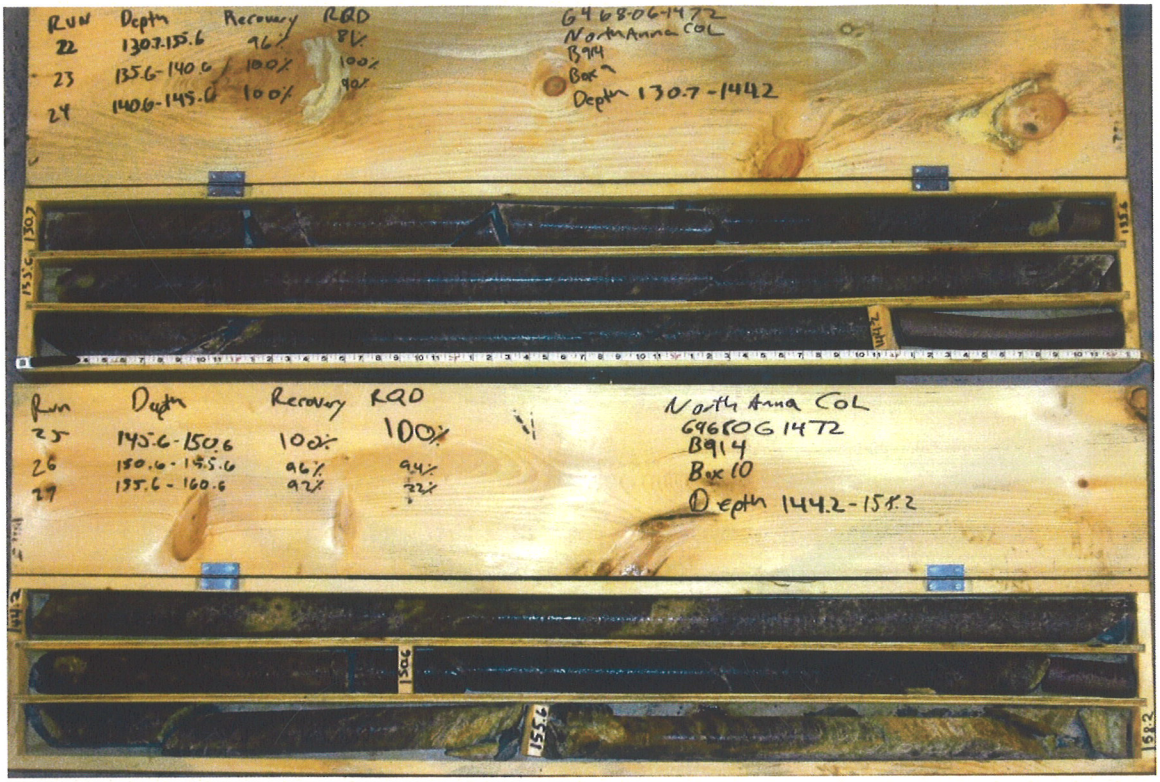
B-914 – Box 1
B-914 – Box 2

B-914 – Box 3
B-914 – Box 4




B-914 – Box 5
B-914 – Box 6

B-914 – Box 7
B-914 – Box 8




B-914 – Box 9
B-914 – Box 10

B-914 – Box 11
B-914 – Box 12

B-914 – Box 13
B-914 – Box 14