APPENDIX D

S&ME

September 12, 2007

South Carolina Department Of
Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

Attention: Ms. Jan Cooke

Reference: **GROUNDWATER MONITORING WELL APPLICATION AND VARIANCE REQUEST**
Duke Energy Oconee Nuclear Station
155 East Pickens Highway
Seneca, South Carolina 29672
DHEC Facility ID 00535
S&ME Project No. 1264-07-234

Dear Ms. Cooke:

Attached is the *SCDHEC Monitoring Well Application* for the installation of twenty-eight (28) groundwater monitoring wells at Duke Energy's Oconee Nuclear Station located near Seneca, South Carolina. S&ME, Inc. is submitting this application on behalf of Duke Energy. The groundwater monitoring wells will be installed at the approximate locations depicted/described on the attached Drawings GM-O-1 (Revision 4) and GM-O-2 (Revision 3). The groundwater monitoring wells will be constructed in accordance with the attached Drawings GM-O-3 (Revision 2) and GM-O-4 (Revision 1).

These monitoring wells will be installed as part of a groundwater protection monitoring system at each of Duke Energy's nuclear power plants. The purpose of the environmental groundwater protection monitoring system is to provide detection of radioactive leaks to minimize the potential for migration of radioactive isotopes (particularly tritium) in groundwater.

The installation of these wells is scheduled to begin on September 17, 2007 and is anticipated to be completed in December 2007. The wells will be installed to monitor the groundwater in the zone above bedrock (13 wells), in the upper bedrock region (13 wells, designated with "R" after the well number), and in the deeper rock region (2 wells, designated with "DR" after the well number).

On behalf of Duke Energy, S&ME also requests a variance from the South Carolina Well Standard R.61-71 for the wells installed at this site, as noted below:

Variance Request

S&ME requests a variance from Rule R.61-71 H. 2. a. (1) for wells installed at this site with flush mount well vaults. Due to site traffic in areas where these wells are to be located, all of the wells at Catawba Nuclear Station will be installed with flush mount well vaults. This rule states that permanent conventionally installed monitoring wells shall be grouted from the top of the bentonite seal to the land surface. Detail C on the attached DrawingGM-O-3 shows the construction details for the Flush Mount Well Vault. This detail shows the grout terminating one (1) foot to one and one-half (1½) feet below the bottom of the concrete pad. The borehole space in this region would be filled with a washed river-rock to the bottom of the concrete pad. The purpose of this rock is to provide a pathway for rainfall that may leak past the well vault cap to drain out of the vault.

On behalf of Duke Energy, we appreciate your consideration and look forward to your response. If you have questions on this request, please contact me at your convenience.

Sincerely,

S&ME, Inc.

William M. Miller
Project Engineer/Project Manager
wmiller@smeinc.com

Larry Armstrong, P.E.
Senior Engineer/Project Director
larmstrong@smeinc.com

cc: Mr. Steve LeRoy, Duke Energy
Mr. Ed Sullivan, P.E., Duke Energy
Mr. John Estridge, Duke Energy

S:\ENVIRON\2007\1264\6407234 Oconee Nuclear Groundwater Study\Well Permits\MW Application Letter.doc

D H E C

PROMOTE PROTECT PROSPER

SCDHEC Monitoring Well Application

1. Proposed location of monitoring wells(s)

Duke Energy Oconee Nuclear Station

Street Address:

155 East Pickens Highway

City:

Seneca

County:

Oconee

Please attach scaled map or plat.

2. Well Owner's Name (last name, first name):

Duke Energy (Attention: Mr. John T. Estridge)

Address:

155 East Pickens Highway, Seneca SC, 29672

Telephone No.: (803) 831-3656

3. Property owner's name (if different from well owner):

Same

(Last name, first name)

Address:

Same

Telephone No.: (864) 885-3979

4. Proposed Drilling Date:(MM/DD/YYYY)

09/17/2007

5. Intended purpose of monitoring well(s):

- Pre-Purchase ☐
- Investigation ☑

6. Proposed number of monitoring wells: 28

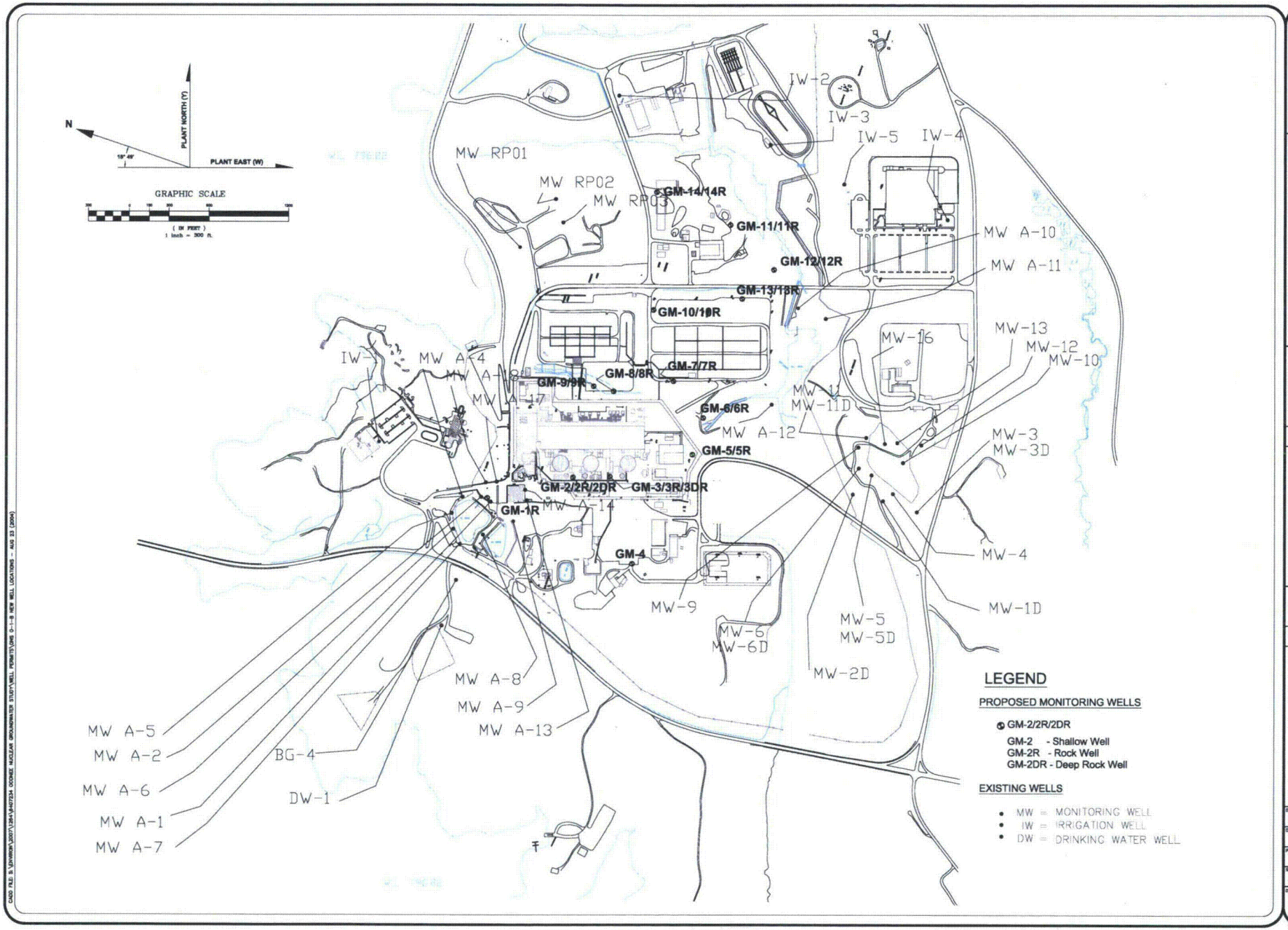
7. Proposed parameters to be analyzed (check as many that apply):

- BTEX ☐
- MTBE ☐
- Naphthalene ☐
- PAHs ☐
- Metals ☐
- Nitrates ☐
- Base, Neutral & Acid Ex. ☐
- Pesticides/Herbicides ☐
- Phenols ☐
- Radionuclides ☐
- PCBs ☐
- Other ☑

8. Proposed construction details (complete and attach proposed monitoring well schematics):

See:

Drawing GM-O-1 (Revision 4)
Drawing GM-O-2 (Revision 3)
Drawing GM-O-3 (Revision 2)
Drawing GM-O-4 (Revision 1)



NO.	DATE	DESCRIPTION	BY
4	SEPT 12, 2007	ADDED GRAPHIC SCALE	LTA
3	AUG. 23, 2007	CORRECTED PLANT NORTH & PLANT EAST ORIENTATION	LTA
2	AUG. 21, 2007	FOR MODIFICATION PACKAGE AND WELL PERMITS	LTA
1	JUL 18, 2007	PROPOSED WELL LOCATIONS BASED ON FIELD TRIP	MAM
0	JAN. 29, 2007	PROPOSED WELL LOCATIONS TO DATE	MAM

GROUNDWATER MONITORING PROJECT
PROPOSED MONITORING WELL LOCATIONS

GROUNDWATER PROTECTION PROJECT
DUKE ENERGY
OCONEE NUCLEAR STATION UNITS 1, 2, 3
SENECA, SOUTH CAROLINA

DRAWN BY: MAM
CHECKED BY: LTA
DESIGNED BY: N/A
APPROVED BY: LTA
PROJECT NUMBER: 1284-07-234
SCALE: AS SHOWN
DATE: 06-28-2007
DRAWING: GM-O-1

S&ME
135 TRADE STREET
GREENVILLE, S.C. 29601
TEL (864) 370-1180
FAX (864) 370-1181
WWW.SMEINC.COM

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY LARRY ARMSTRONG, S.C. P.E. REGISTRATION NUMBER 15,893. THIS DOCUMENT SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT.

CADD FILE: S:\ENVIRON\2007\1284\1-847234 OCONEE NUCLEAR GROUNDWATER STUDY\WELL PERMITS\GMO 0-1-8 NEW WELL LOCATIONS - AUG 23 (2004)

PROPOSED MONITORING WELL LOCATIONS									
WELL NUMBER	STATION "Y" (Plant North) (feet)	STATION "W" (Plant East) (feet)	GROUND ELEV. (feet)	Top of Casing Elev. (ft)	Depth of Well (feet)	Screen Interval (feet)	Flush Mount	Standpipe	Comments
GM-1R	740.70	1242.30	LATER	LATER	LATER	LATER	-	YES	
GM-2	895.90	1887.90	LATER	LATER	LATER	LATER	YES	-	
GM-2R	895.90	1887.90	LATER	LATER	LATER	LATER	YES	-	
GM-2DR	895.90	1887.90	LATER	LATER	LATER	LATER	YES	-	
GM-3	902.80	2169.30	LATER	LATER	LATER	LATER	YES	-	
GM-3R	902.80	2169.30	LATER	LATER	LATER	LATER	YES	-	
GM-3DR	902.80	2169.30	LATER	LATER	LATER	LATER	YES	-	
GM-4	247.30	2337.80	LATER	LATER	LATER	LATER	YES	-	
GM-5	1067.78	2788.57	LATER	LATER	LATER	LATER	YES	-	
GM-5R	1067.78	2788.57	LATER	LATER	LATER	LATER	YES	-	
GM-6	1343.37	2868.24	LATER	LATER	LATER	LATER	-	YES	
GM-6R	1343.37	2868.24	LATER	LATER	LATER	LATER	-	YES	
GM-7	1618.20	2846.40	LATER	LATER	LATER	LATER	-	YES	
GM-7R	1618.20	2846.40	LATER	LATER	LATER	LATER	-	YES	
GM-8	1542.80	2196.80	LATER	LATER	LATER	LATER	TBD	TBD	
GM-8R	1542.80	2196.80	LATER	LATER	LATER	LATER	TBD	TBD	
GM-9	1580.30	2045.10	LATER	LATER	LATER	LATER	YES	-	
GM-9R	1580.30	2045.10	LATER	LATER	LATER	LATER	YES	-	
GM-10	2153.20	2496.80	LATER	LATER	LATER	LATER	-	YES	
GM-10R	2153.00	2496.80	LATER	LATER	LATER	LATER	-	YES	
GM-11	2790.00	3070.80	LATER	LATER	LATER	LATER	-	YES	
GM-11R	2790.00	3070.80	LATER	LATER	LATER	LATER	-	YES	
GM-12	2454.79	3395.98	LATER	LATER	LATER	LATER	-	YES	
GM-12R	2454.79	3395.98	LATER	LATER	LATER	LATER	-	YES	
GM-13	2236.30	3158.20	LATER	LATER	LATER	LATER	-	YES	
GM-13R	2236.30	3158.20	LATER	LATER	LATER	LATER	-	YES	
GM-14	3036.80	2519.90	LATER	LATER	LATER	LATER	YES	-	
GM-14R	3036.80	2519.90	LATER	LATER	LATER	LATER	YES	-	

TBD - To Be Determined

PROPOSED MONITORING WELLS DESIGNATIONS

Example: GM-2/2R/2DR

GM-2 - Shallow Well

GM-2R - Rock Well

GM-2DR - Deep Rock Well

CADD FILE: S:\ENVIRON\2007\1264\407234 OCONEE NUCLEAR GROUNDWATER STUDY\WELL PERMITS\DWG 0-1-B NEW WELL LOCATIONS - AUG 23 (2004)

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY LARRY A. THOMPSON, S.C. P.E. NO. 13613 ON AUGUST 23, 2007. THIS MEDIUM SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT.

S&ME

13 TECH CIRCLE
NATICK, MA 01760
PH. (508) 653-9500
FAX (508) 653-9505

WWW.SMEINC.COM

NO.	DATE	DESCRIPTION	BY
3	AUG. 23, 2007	ADDED "PLANT NORTH" & "PLANT EAST" TO TABLE HEADING	LTA
2	AUG. 16, 2007	FOR INCORPORATION PACKAGE AND WELL PERMITS	LTA
1	AUG. 6, 2007	REVISED WELL LOCATIONS BASED ON FIELD TRIP	WMM
0	JUN. 28, 2007	PROPOSED WELL LOCATIONS TO DUKE	WMM

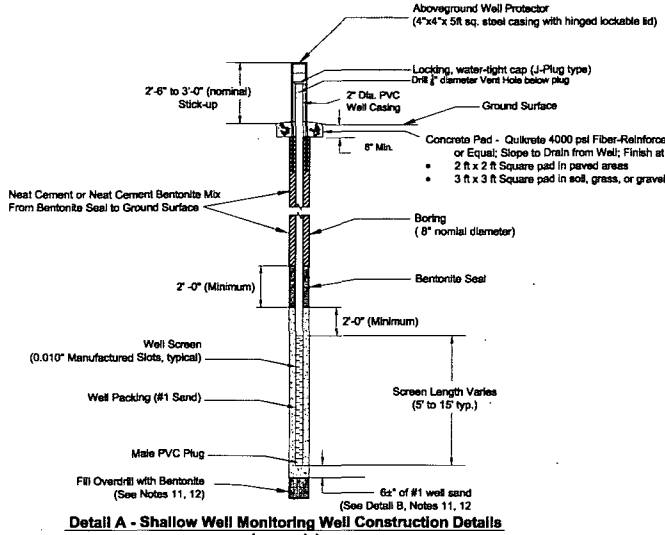
GROUNDWATER PROTECTION PROJECT
PROPOSED MONITORING WELL LOCATIONS

GROUNDWATER PROTECTION PROJECT
DUKE ENERGY
OCONEE NUCLEAR STATION UNITS 1, 2, 3
SENECA, SOUTH CAROLINA

DRAWN BY: WMM	CHECKED BY: LTA
DESIGNED BY: N/A	APPROVED BY: LTA
PROJECT NUMBER: 1264-07-234	
SCALE: None	DATE: 06-28-2007

DRAWING:

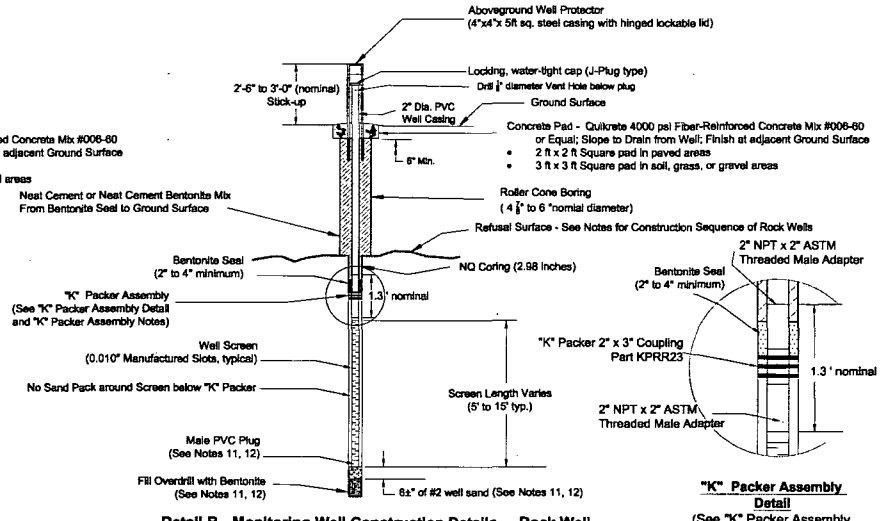
GM-O-2



Detail A - Shallow Well Monitoring Well Construction Details
(no scale)

General Notes:

1. Construction details shown are for well installed in unconsolidated material.
2. All construction materials and installation methods shall be in accordance with SCDHEC Regulation R.61-71.
3. All well casing material shall be flush jointed, threaded (with O-rings) Sch 40 PVC.
4. Well screen material shall be flush jointed, threaded (with O-rings) Sch 40 PVC.
5. Well screen to be 0.010-inch manufactured slots.
6. Well Tag with information required by SCDHEC Regulation R.61-71.H.2.c shall be attached to above-grade well cover with rivets.
7. For Flush Mount Well Vaults, see Detail C.



Detail B - Monitoring Well Construction Details - Rock Well
(no scale)

"K" Packer Assembly Detail
(See "K" Packer Assembly Notes)

General Notes:

1. Construction details shown are for well installed in rock material.
2. All construction materials and installation methods shall be in accordance with SCDHEC Regulation R.61-71.
3. All well casing material shall be flush jointed, threaded (with O-rings) Sch 40 PVC.
4. Well screen material shall be flush jointed, threaded (with O-rings) Sch 40 PVC.
5. Well screen to be 0.010-inch manufactured slots.
6. Well Tag with information required by SCDHEC Regulation R.61-71.H.2.c shall be attached to above-grade well cover with rivets.
7. For Flush Mount Well Vaults, see Detail C.

Notes for Construction Sequence of Rock Wells:

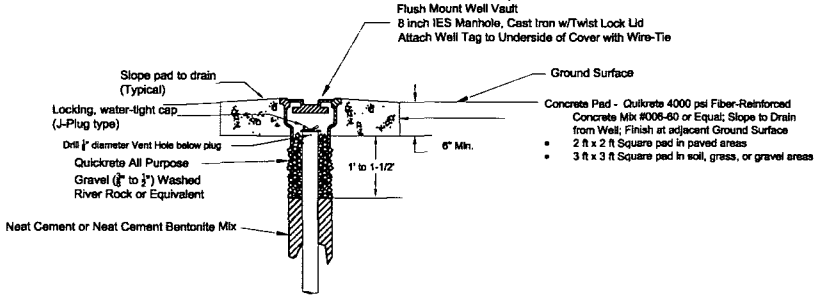
8. Boring above refusal to be performed with roller cone bit.
9. At refusal surface, screw in temporary NW steel casing and seal casing into rock.
10. Complete NQ coring to desired depth.
11. If core hole is not overdrilled, Male PVC Plug at end of well shall rest on bottom of corehole.
12. If corehole is overdrilled, fill overdrilled void to within approximately 6" of well completion level with bentonite and cap with approximately 6" of #2 sand; male PVC Plug at end of well shall rest on sand.
13. Install PVC well casing with "K" Packer assembly into core hole at desired depth.
14. Place 2 inches to 4 inches (minimum) bentonite seal directly above "K" Packer.
15. Remove temporary NW steel casing.
16. Grout with neat cement or neat cement bentonite mix to complete well.

"K" Packer Assembly Notes:

1. "K" Packer is Western Rubber & MFG. Part KPRR23 2" x3" Coupling, neoprene rubber.
2. Install 2" NPT x2" ASTM thread male adapter above and below "K" Packer Coupling.
3. Male adapters are approx. 6 inches in length. Ensure threads are fully engaged.

Concrete Pad Reinforcing Notes:

1. Fiber-Reinforcing in Concrete Well Pads is provided for crack control only.
2. Slope finished surface of concrete pad to drain away from well.
3. Finish edges of concrete pad to be no higher than existing adjacent ground.



Detail C - Flush Mount Well Vault Detail
(no scale)

THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY: LARRY ARMSTRONG, S.C. P.E. REG. 13613 ON AUGUST 31, 1987. THIS COPY IS NOT TO BE CONSIDERED A CERTIFIED DOCUMENT.

S&ME

NO.	DATE	DESCRIPTION	BY
2	08-21-2007	FOR MODIFICATION PACKAGE AND WELL PERMITS	LTA
1	08-16-2007	FOR OWNER REVIEW AND COMMENT	LTA
0	06-03-2007	FOR MODIFICATION PACKAGE	WMM

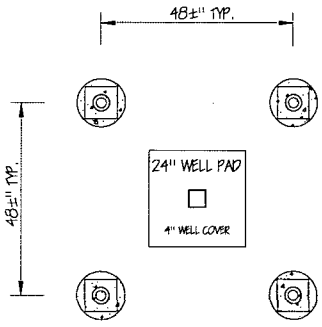
GROUNDWATER PROTECTION PROJECT
MONITORING WELL CONSTRUCTION DETAILS

GROUNDWATER PROTECTION PROJECT
DUKE ENERGY
OCONEE NUCLEAR STATION UNITS 1, 2, 3
OCONEE COUNTY, SC

DRAWN BY: WMM	CHECKED BY: LTA
DESIGNED BY: N/A	APPROVED BY: LTA
PROJECT NUMBER: 1264-07-234	
SCALE: NO SCALE	DATE: 06-07-07

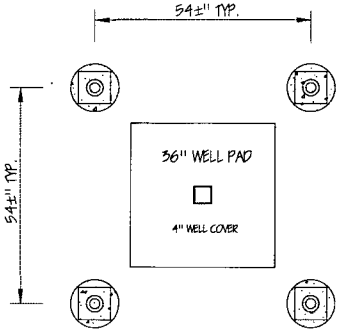
DRAWING: GM-O-3

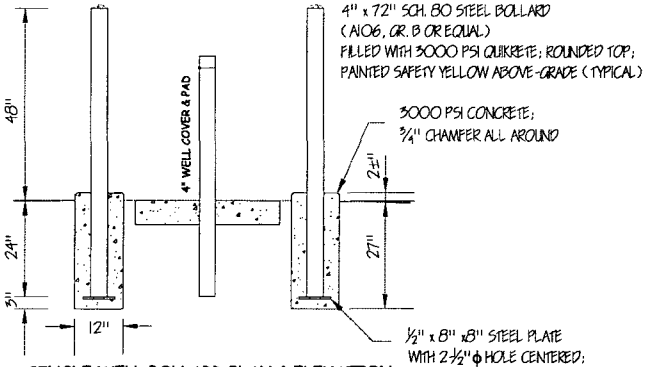
CAD FILE: S:\LANWORK\2007\1264\07234\OCONEE NUCLEAR GROUNDWATER STUDY\WELL PERMITS\GMS WELL DETAILS SHEET 1.DWG



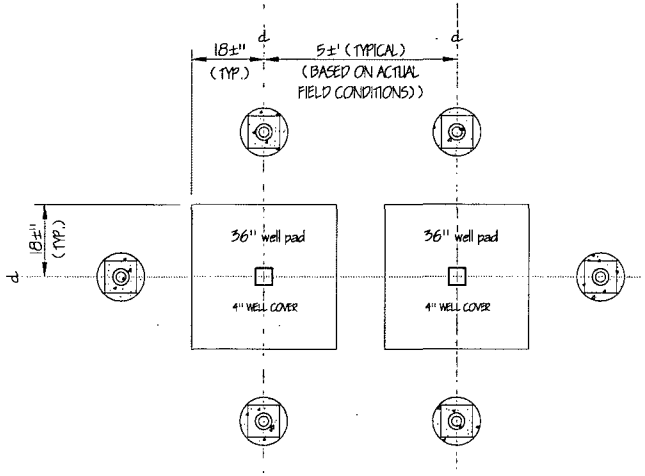
SINGLE WELL BOLLARD PLAN
FOR 2'x2' WELL PAD
NOT TO SCALE

NOTE: SEE TYPICAL ELEVATION THIS SHEET



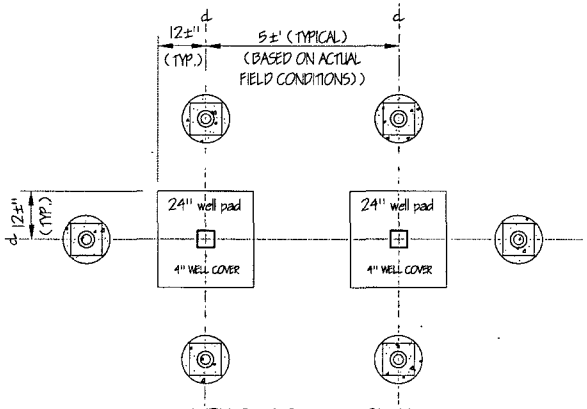


SINGLE WELL BOLLARD PLAN & ELEVATION
FOR 3'x3' WELL PAD
NOT TO SCALE



WELL PAIR BOLLARD PLAN
FOR 3'x3' WELL PADS
NOT TO SCALE

NOTE: SEE TYPICAL ELEVATION THIS SHEET



WELL PAIR BOLLARD PLAN
FOR 2'x2' WELL PADS
NOT TO SCALE

NOTE: SEE TYPICAL ELEVATION THIS SHEET

TYPICAL WELL TAG DETAIL
NOT TO SCALE

NOTE: INFORMATION FOR EXAMPLE ONLY

SIEVE NUMBER	#1 SAND % PASSING	#2 SAND % PASSING
#8	---	100
#10	---	94 - 98
#12	---	78 - 80
#14	100	47 - 52
#16	92 - 100	22 - 32
#18	85 - 99	8 - 17
#20	72 - 93	2 - 4
#25	48 - 70	0.5 - 1.5
#30	17 - 34	0 - 0.5
#35	6 - 12	---
#40	2 - 4	---
#50	0.4 - 0.5	---
#60	0 - 0.1	---

WELL SAND PACK GRAIN SIZE DISTRIBUTION
(REF: SOUTHERN PRODUCTS & SILICA CO., INC.)

EROSION & SEDIMENT CONTROL NOTES

1. EROSION & SEDIMENT CONTROL TO BE PROVIDED BY DUKE ENERGY AND/OR S&ME IN ACCORDANCE WITH DUKE ENERGY'S EROSION & SEDIMENT CONTROL PLAN FOR THE GROUNDWATER PROTECTION PROJECT.
2. IN GENERAL, EROSION & SEDIMENT CONTROL WILL COMPRISE THE FOLLOWING BEST MANAGEMENT PRACTICES (BMP'S) IN THE FOLLOWING AREAS NEARBY THE DRILLING OPERATIONS:

PAVED AREAS:
ENCIRCLE STORMWATER CATCH BASINS WITH BURRITO-TYPE WRAP OF GEOTEXTILE FABRIC AND APS 700 SERIES SILT STOP. STABILIZE BURRITO-WRAP WITH SAND BAGS.

GRAVEL AREAS:
ENCIRCLE STORMWATER CATCH BASINS WITH #67 WASHED STONE.

GRASS/SOIL AREAS:
CONTAIN/FILTER SEDIMENT-LADEN RUNOFF FROM DRILLING OPERATIONS WITH SILT FENCE, STRAW BALES, AND/OR OTHER MATERIAL(S) APPROVED BY OWNER IN PROXIMITY OF DRILLING OPERATIONS. ENCIRCLE STORMWATER CATCH BASINS WITH STRAW BALES AND/OR SILT FENCE.

3. DISTURBED GRASS/SOIL AREAS TO BE RAKED SMOOTH; SEEDED WITH SEEDING MIXTURE, FERTILIZER, AND/OR LIME AS SPECIFIED IN OWNER'S EROSION & SEDIMENT CONTROL PLAN AND APPROPRIATE FOR PLACEMENT SEASON; AND COVERED WITH STRAW.

THIS DOCUMENT CREATED BY LARRY ARMSTRONG, P.E. LARRY ARMSTRONG, S.C. P.E. REG. 18613 OR AUGUST 31, 1977. THIS DOCUMENT WAS CREATED OR CONVERTED A CERTIFIED DOCUMENT.

S&ME
1536 BOND STREET
SUITE 100
ANTHEM, S.C. 29201
PH. (803) 799-9201
FAX (803) 799-9215
WWW.SMEINC.COM

NO.	DATE	DESCRIPTION	BY
1	08-21-07	FOR MODIFICATION PACKAGE AND WELL PERMITS	LTA
0	08-14-07	FOR OWNER REVIEW AND COMMENT	LTA

GROUNDWATER PROTECTION PROJECT
MONITORING WELL CONSTRUCTION DETAILS

GROUNDWATER PROTECTION PROJECT
DUKE ENERGY
OCONEE NUCLEAR STATION UNITS 1, 2, 3
OCONEE COUNTY, SC

DRAWN BY: LTA
CHECKED BY: WMM
DESIGNED BY: N/A
APPROVED BY: LTA
PROJECT NUMBER: 1264-07-234
SCALE: NO SCALE
DATE: 08-14-07
DRAWING: GM-O-4

CAD FILE S:\LANDON\2007\1264\264-07-234\OCONEE NUCLEAR GROUNDWATER STUDY\WELL PERMITS\ONS WELL DETAILS SHEET 2.DWG

BOARD:
Elizabeth M. Hagood
Chairman

Edwin H. Cooper, III
Vice Chairman

Steven G. Kisner
Secretary

D H E C

PROMOTE PROTECT PROSPER

C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment.

BOARD:
Henry C. Scott

Paul C. Aughtry, III

Glenn A. McCall

Coleman F. Buckhouse, MD

September 13, 2007

Mr. John Estridge
Duke Energy
155 East Pickens Highway
Seneca, SC 29672

RE: Oconee Nuclear Station
Site ID #00535
Monitoring Well Approval request received September 12, 2007
Oconee

Dear Mr. Estridge:

The Department has reviewed and approved the installation of 28 monitoring wells submitted by S&ME. A monitoring well approval for 28 monitoring wells has been issued. The original has been sent to S&ME and a copy is enclosed for your records.

On all correspondence regarding this site, please reference Site ID #00535. If you have any questions concerning this correspondence, contact me at (803) 898-4248.

Sincerely,

Jan T. Cooke, Hydrogeologist
Groundwater Quality Section
Water Monitoring, Assessment and Protection Division
Bureau of Water

enc: Copy of Monitoring Well Approval

cc: Region 1- Anderson
Larry Armstrong, S&ME; 155 Tradd St. Spartanburg, SC 29301 (with original monitoring well approval)

SCDHEC/BOW/JTC/June 18, 2007

BOARD:
Elizabeth M. Hagood
Chairman

Edwin H. Cooper, III
Vice Chairman

Steven G. Kisner
Secretary

D H E C

PROMOTE PROTECT PROSPER

C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment.

BOARD:
Henry C. Scott

Paul C. Aughtry, III

Glenn A. McCall

Coleman F. Buckhouse, MD

Monitoring Well Approval

Approval is hereby granted to:	S&ME- Duke Energy
Facility Name:	Duke Energy Oconee Nuclear Station
BoW Site ID	00535
County:	Oconee

This approval is for the installation of 28 permanent groundwater-monitoring wells. The monitoring wells are to be installed in the locations as illustrated on Figure # 1, and per the proposed construction details provided in the September 12, 2007 correspondence. These monitoring wells are to be installed following all of the applicable requirements of R.61-71. A variance is granted from Rule R.61-71 H. 2. a (1), to allow for one and one-half foot of washed river rock from the bottom of the concrete pad to the top of the grout to provide a pathway for rainfall that may leak past the well vault cap to drain of the vault.

Please note that R.61-71 requires the following:

1. All wells shall be drilled, constructed, and abandoned by a South Carolina certified well driller per R.61-71.D.1.

2. All wells shall be properly developed per R.61-71.H.2.d. A Water Well Record Form or other form provided or approved by the Department shall be completed and submitted within 30 days of well completion or abandonment unless the Department has approved another schedule. The form should contain the "as-built" construction details and all other information required by R.61-71.H.1.f

3. All analytical data and water levels obtained from each monitoring well shall be submitted to the Department within 30 days of receipt of laboratory results unless another schedule has been approved by the Department as required by R.61-71.H.1.d.

4. All monitoring wells shall be labeled as required by R.61-71.H.2.e.

5. If any of the information provided to the Department changes, Jan T. Cooke (803.898.4248) shall be notified a minimum of twenty-four hours prior to well construction as required by R.61-71.H.1.a.

This approval is pursuant to the provisions of Section 44-55-40 of the 1976 South Carolina Code of Laws and R.61-71 of the South Carolina Well Standards and Regulations, dated April 26, 2002.

Date of Issuance: September 13, 2007 **Approval #: 3159**

Jan T.Cooke, Hydrogeologist
Groundwater Quality Section
Water Monitoring, Assessment and Protection Division
Bureau of Water

BUREAU OF WATER
Water Monitoring, Assessment and Protection Division

D H E C
PROMOTE PROTECT PROSPER

Fax Message

Date: 9/13/07

Number of Pages Including Cover Sheet: 3

Please Deliver This Fax Message

TO: Larry
Name

Organization/Department

( ) Fax Number ( ) Office Phone

FROM: Jon
Name

Bureau/Division/Section

(803) 898-2893 Fax Number ( ) Office Phone

SUBJECT/COMMENTS:

South Carolina
Department of Health
and
Environmental Control

2600 Bull Street
Columbia, SC 29201

DHEC 24-052 (1/91)

S&ME

November 1, 2007

South Carolina Department of Health and Environmental Control
Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201-1708

Reference: **Non-Residential Water Well Records – Submittal #1**
Oconee Nuclear Station
7800 Rochester Highway
Seneca, South Carolina
S&ME Project No. 1264-07-234

Ladies and Gentlemen:

On behalf of Duke Energy, S&ME, Inc. (S&ME) is submitting the enclosed completed and signed *Water Well Records* for the following twelve (12) groundwater monitoring wells installed at the Oconee Nuclear Station (ONS) site:

- GM-2R
- GM-2DR
- GM-5
- GM-5R
- GM-8
- GM-8R
- GM-9
- GM-9R
- GM-11
- GM-11R
- GM-12
- GM-12R.

Duke Energy is voluntarily installing groundwater monitoring wells at ONS as part of a site-wide hydrogeologic evaluation. S&ME will submit these *Water Well Records* on a periodic basis as well installations are completed, this being the first submittal (i.e., *Submittal #1*).

On behalf of Duke Energy, S&ME thanks you for your receipt of these records. Should you have any questions or need additional information, please contact us.

Sincerely,
S&ME, Inc.

Mary Beth Cline, E.I.T.
Staff Professional

Larry Armstrong, P. E.
Senior Engineer/Project Director

Enclosures

cc: Messrs. Steve LeRoy, Ed Sullivan, John Estridge, L. Curtis Arnold; Duke Energy

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DHEC
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy (last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 39.63" Longitude: W82 53' 56.86"

3. PUBLIC SYSTEM NAME: PUBLIC SYSTEM NUMBER:

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Asphalt	0.50 ft	0.50 ft
Silty sand	9.8 ft	10.30 ft
Refusal at 10.30 ft		
Cored rock to 30.30 ft		
Granitic Gneiss with fractures		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-2R
K Packer installed as seal above screen
K packer: 24.45 ft - 24.65 ft

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 10/11/07
30.30 ft. Date Completed: 10/16/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 25.30 ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 5 feet
Set Between: 25.30 ft. and 30.30 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 25.00 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☑ No
Installed from see remarks ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 1 ft. to 22.50 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: _____ ft. _____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe _____ ft. Capacity _____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A. Little Date: 10-12-07
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy (last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 39.65" Longitude: W82 53' 56.79"

3. PUBLIC SYSTEM NAME: PUBLIC SYSTEM NUMBER:

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from ____ ft. to ____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Asphalt	0.50 ft	0.50 ft
Silty sand	9.8 ft	10.30 ft
Refusal at 10.30 ft		
Cored rock to 55.20 ft		
Granitic Gneiss with fractures		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-2DR
K Packer installed as seal above screen
K packer: 49.20 ft - 49.40 ft

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) 55.00 ft. Date Started: 10/11/07 Date Completed: 10/15/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 50.00 ft. depth
____ in. to ____ ft. depth
Height: Above ☐ Below ☐
Surface ____ ft.
Weight ____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 5 feet
Set Between: 50.00 ft. and 55.00 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 25.50 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: ____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☑ No
Installed from see remarks ft. to ____ ft.
Effective size ____ Uniformity Coefficient ____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other ____
Depth: From 1 ft. to 47.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type ____
Well Disinfected ☐ Yes ☐ No Type: ____ Amount: ____

18. PUMP: Date installed: ____ Not installed ☐
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A. Little (Well Driller) Date: 10-17-07

If D Level Driller, provide supervising driller's name:

DHEC
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy (last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 31.92" Longitude: W82 53' 51.19"

3. PUBLIC SYSTEM NAME: PUBLIC SYSTEM NUMBER:

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Asphalt	0.25 ft	0.25 ft
Micaceous silty sand - fill	13.75 ft	14.00 ft
Micaceous silty clay - fill	4.50 ft	18.50 ft
Micaceous clayey silty sand - fill	24.25 ft	42.75 ft

*Indicate Water Bearing Zones
(Use a 2nd sheet if needed)

5. REMARKS:
GM-5

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 10/17/07
42.75 ft. Date Completed: 10/18/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 27.75 ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 27.75 ft. and 42.75 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 31.90 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 25.00 ft. to 42.75 ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 23.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: _____ ft. _____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe _____ ft. Capacity _____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A. Little Date: 10-19-07
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy (last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 31.88" Longitude: W82 53' 51.17"

3. PUBLIC SYSTEM NAME: PUBLIC SYSTEM NUMBER:

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from ____ ft. to ____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Asphalt	0.25 ft	0.25 ft
Micaceous silty sand - fill	13.75 ft	14.00 ft
Micaceous silty clay - fill	4.50 ft	18.50 ft
Micaceous clayey silty sand - fill	56.20 ft	74.70 ft
Silty sand with rock fragments-fill	4.30 ft	79.00 ft
Fine to coarse sand with quartz		
fragments - alluvium	0.25 ft	79.25 ft
Micaceous silty sand - saprolite	4.05 ft	83.30 ft
Refusal at 83.3 ft		
Cored rock to 98.30 ft		
Granitic Gneiss with fractures		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-5R
K Packer installed as seal above screen
K packer: 92.43 ft - 92.60 ft

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 10/11/07
98.00 ft. Date Completed: 10/17/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 93.00 ft. depth
____ in. to ____ ft. depth
Height: Above ☐ Below ☐
Surface ____ ft.
Weight ____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 5 feet
Set Between: 93.00 ft. and 98.00 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 37.40 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: ____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☑ No
Installed from see remarks ft. to ____ ft.
Effective size ____ Uniformity Coefficient ____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other ____
Depth: From 0 ft. to 90.50 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type ____
Well Disinfected ☐ Yes ☐ No Type: ____ Amount: ____

18. PUMP: Date Installed: ____ Not installed ☐
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A. Little Date: 10-16-07
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy (last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 38.98" Longitude: W82 53' 48.22"

3. PUBLIC SYSTEM NAME: PUBLIC SYSTEM NUMBER:

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from ____ ft. to ____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Micaceous silty clayey sand - fill	28.84 ft	28.84 ft
Micaceous silty sand - saprolite	10.86 ft	39.70 ft
Mafic rich silty sand with rock		
fragments - saprolite	0.10 ft	39.80 ft
Micaceous silty sand - saprolite	5.2 ft	45.0 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-8

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 10/9/07
43.06 ft. Date Completed: 10/10/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 28.06 ft. depth
____ in. to ____ ft. depth
Height: Above ☐ Below ☐
Surface ____ ft.
Weight ____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 28.06 ft. and 43.06 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 29.15 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: ____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 28.0 ft. to 45.0 ft.
Effective size #1 Uniformity Coefficient ____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other ____
Depth: From 1 ft. to 26.0 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type ____
Well Disinfected ☐ Yes ☐ No Type: ____ Amount: ____

18. PUMP: Date installed: ____ Not installed ☐
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A. Little Date: 10-11-07
Well Driller

If D Level Driller, provide supervising driller's name:

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy (last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 39.06" Longitude: W82 53' 48.06"

3. PUBLIC SYSTEM NAME: PUBLIC SYSTEM NUMBER:

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Micaceous silty clayey sand - fill	28.84 ft	28.84 ft
Micaceous silty sand - saprolite	10.86 ft	39.70 ft
Mafic rich silty sand with rock		
fragments - saprolite	0.10 ft	39.80 ft
Micaceous silty sand - saprolite	8.5 ft	48.30 ft
Mafic rich silty sand - saprolite	5.34 ft	53.64 ft
Micaceous silty sand - saprolite	8.46 ft	62.10 ft
Auger refusal at 62.1 ft		
Cored rock to 82.07 ft		
Granitic Gneiss with fractures		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-8R
K Packer installed as seal above screen
K packer: 63.03 ft - 63.20 ft

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) 73.61 ft. Date Started: 10/2/07 Date Completed: 10/9/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 63.61 ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 10 feet
Set Between: 63.61 ft. and 73.61 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 29.15 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☑ No
Installed from see remarks ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 1 ft. to 63.03 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A. Little Date: 10-11-07
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy (last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 40.52" Longitude: W82 53' 48.39"

3. PUBLIC SYSTEM NAME: PUBLIC SYSTEM NUMBER:

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Asphalt	0.20 ft	0.20 ft
Gravel	0.40 ft	0.60 ft
Micaceous silty sand - fill	8.00 ft	8.60 ft
Biotite gneiss rock fragments and		
boulders - fill	21.30 ft	29.90 ft
Sandy silty clay w/ rock fragments,		
roots, wood - fill	5.50 ft	35.40 ft
Micaceous silty sandy clay - fill	7.90 ft	43.30 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-9

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 10/2/07
43.00 ft. Date Completed: 10/9/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 28.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 28.00 ft. and 43.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 33.32 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 26.00 ft. to 43.30 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 1 ft. to 24.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: _____ ft. _____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A. Little Date: 10-11-07
Well Driller

If D Level Driller, provide supervising driller's name:

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy (last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 40.46" Longitude: W82 53' 48.36"

3. PUBLIC SYSTEM NAME: PUBLIC SYSTEM NUMBER:

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Asphalt	0.20 ft	0.20 ft
Gravel	0.40 ft	0.60 ft
Micaceous silty sand - fill	8.00 ft	8.60 ft
Biotite gneiss rock fragments and		
boulders - fill	21.30 ft	29.90 ft
Sandy silty clay w/ rock fragments,		
roots, wood - fill	5.50 ft	35.40 ft
Micaceous silty sandy clay - fill	25.00 ft	60.40 ft
Refusal at 60.40 ft		
Cored rock to 80.30 ft		
Granitic Gneiss with fractures		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-9R
K Packer installed as seal above screen
K packer: 67.90 ft - 68.10 ft

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 10/2/07
73.70 ft. Date Completed: 10/8/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 68.70 ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 5 feet
Set Between: 68.70 ft. and 73.70 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 30.43 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☑ No
Installed from see remarks ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 1 ft. to 66.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: _____ ft. _____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A. Little Date: 10-9-07
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy (last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 35.02" Longitude: W82 53' 30.62"

3. PUBLIC SYSTEM NAME: PUBLIC SYSTEM NUMBER:

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Grass and topsoil with gravel	0.35 ft	0.35 ft
Clayey silt and sandy silt- fill	19.58 ft	19.93 ft
Micaceous silty sand - residuum	14.78 ft	34.71 ft
Micaceous silty sand - saprolite	5.29 ft	40.00 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-11

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 9/20/07
38.5 ft. Date Completed: 9/25/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 28.5 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 2.85 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 10 feet
Set Between: 28.5 ft. and 38.5 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 30.34 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 26.5 ft. to 40.0 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 23.0 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one)
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A. Little Date: 9-26-07
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy (last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 35.05" Longitude: W82 53' 30.57"

3. PUBLIC SYSTEM NAME: PUBLIC SYSTEM NUMBER:

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from ____ ft. to ____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Grass and topsoil with gravel	0.35 ft	0.35 ft
Clayey silt and sandy silt- fill	19.58 ft	19.93 ft
Micaceous silty sand - residuum	14.78 ft	34.71 ft
Micaceous silty sand - saprolite	15.89 ft	50.60 ft
Auger refusal at 50.60 ft		
Cored rock 50.6 ft to 70.2 ft		
Granitic Gneiss with fractures		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-11R
K Packer installed as seal above screen
K packer: 60.8 ft - 61.0 ft

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 9/20/07
66.5 ft. Date Completed: 9/25/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 61.5 ft. depth
____ in. to ____ ft. depth
Height: Above ☑ Below ☐
Surface 2.82 ft.
Weight ____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 5 feet
Set Between: 61.5 ft. and 66.5 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 29.15 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: ____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☑ No
Installed from see remarks ft. to ____ ft.
Effective size ____ Uniformity Coefficient ____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other ____
Depth: From 0 ft. to 58.0 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type ____
Well Disinfected ☐ Yes ☐ No Type: ____ Amount: ____

18. PUMP: Date Installed: ____ Not installed ☐
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A. Little Date: 9-26-07
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy (last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 30.94" Longitude: W82 53' 33.02"

3. PUBLIC SYSTEM NAME: PUBLIC SYSTEM NUMBER:

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from ____ ft. to ____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Silty sand	7.0 ft	7.0 ft
Silty sand with quartz gravel	2.0 ft	9.0 ft
Silty sand	10.2 ft	19.2 ft
Micaceous silty sand - saprolite	3.8 ft	23.0 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-12

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 9/26/07
20.0 ft. Date Completed: 9/26/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 5.0 ft. depth
____ in. to ____ ft. depth
Height: Above ☑ Below ☐
Surface 3.0 ft.
Weight ____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 5.0 ft. and 20.0 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 10.91 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: ____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 4.0 ft. to 20.0 ft.
Effective size #1 Uniformity Coefficient ____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other ____
Depth: From 0 ft. to 2.0 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type ____
Well Disinfected ☐ Yes ☐ No Type: ____ Amount: ____

18. PUMP: Date installed: ____ Not installed ☐
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A. Little Date: 9-27-07
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy (last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 30.90" Longitude: W82 53' 33.00"

3. PUBLIC SYSTEM NAME: PUBLIC SYSTEM NUMBER:

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Silty sand	7.0 ft	7.0 ft
Silty sand with quartz gravel	2.0 ft	9.0 ft
Silty sand	10.2 ft	19.2 ft
Micaceous silty sand - saprolite	8.1 ft	27.3 ft
Auger refusal at 27.3 ft		
Cored rock to 54.3 ft		
Granitic Gneiss		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		
5. REMARKS: GM-12R K-packer installed as seal above screen.	K-packer: 36.2 ft - 36.5 ft	

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 9/20/07
42.0 ft. Date Completed: 9/25/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 37.0 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 2.90 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 5 feet
Set Between: 37.0 ft. and 42.0 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 10.49 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☑ No
Installed from _____ ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 35.0 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: _____ ft. _____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date Installed: _____ Not Installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A. Little Date: 9-26-07
Well Driller

If D Level Driller, provide supervising driller's name:

S&ME

November 19, 2007

South Carolina Department of Health and Environmental Control
Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201-1708

Reference: **Non-Residential Water Well Records – Submittal #2**
Oconee Nuclear Station
7800 Rochester Highway
Seneca, South Carolina
S&ME Project No. 1264-07-234

Ladies and Gentlemen:

On behalf of Duke Energy, S&ME, Inc. (S&ME) is submitting the enclosed completed and signed *Water Well Records* for the following ten (10) groundwater monitoring wells installed at the Oconee Nuclear Station (ONS) site:

- GM-1R
- GM-4
- GM-6
- GM-6R
- GM-7
- GM-7R
- GM-10
- GM-10R
- GM-13
- GM-13R.

Duke Energy is voluntarily installing groundwater monitoring wells at ONS as part of a site-wide hydrogeologic evaluation. S&ME will submit these *Water Well Records* on a periodic basis as well installations are completed, this being the second submittal (i.e., *Submittal #2*).

On behalf of Duke Energy, S&ME thanks you for your receipt of these records. Should you have any questions or need additional information, please contact us.

Sincerely,
S&ME, Inc.

Mary Beth Cline
Mary Beth Cline, E.I.T.
Staff Professional

Larry Armstrong, P. E.
Senior Engineer/Project Director

Enclosures

cc: Messrs. Steve LeRoy, Ed Sullivan, John Estridge, L. Curtis Arnold; Duke Energy

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D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 45.15" Longitude: W82 54' 01.21"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Asphalt	0.30 ft	0.30 ft
Micaceous silty sand - saprolite	23.50 ft	23.80 ft
Micaceous silty sand - weathered		
rock	3.30 ft	27.10 ft
Refusal at 27.10 ft		
Cored rock to 50.1 ft		
Granitic Gneiss with fractures		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-1R
K Packer installed as seal above screen
K packer: 31.50 ft - 31.70 ft

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 10/22/07
37.10 ft. Date Completed: 10/25/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 32.10 ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 5 feet
Set Between: 32.10 ft. and 37.10 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 7.82 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☑ No
Installed from see remarks ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 30.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A Little Date: 11-15-07
Well Driller

If D Level Driller, provide supervising driller's name:

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 33.32" Longitude: W82 54' 02.15"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Asphalt	0.40 ft	0.40 ft
Silty sand with gravel - fill	21.10 ft	21.50 ft
Refusal at 21.50 ft		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-4

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 10/18/07
21.50 ft. Date Completed: 10/18/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 6.50 ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 6.50 ft. and 21.50 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 11.40 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 4.50 ft. to 21.50 ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 1 ft. to 3.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A. Little Date: 11-15-07
Well Driller

If D Level Driller, provide supervising driller's name:

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 32.09" Longitude: W82 53' 47.87"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Micaceous sandy silt - fill	5.00 ft	5.00 ft
Rock lense - fill	0.50 ft	5.50 ft
Micaceous sandy silt and		
silty sand - saprolite	19.50 ft	25.00 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-6

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 10/30/07
23.00 ft. Date Completed: 10/31/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 8.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 3.03 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 8.00 ft. and 23.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 17.36 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 6.00 ft. to 23.00 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 4.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P._____ Volts_____ Length of drop pipe ___ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little **CERT. NO.:** 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: _____ Date: 11-15-07
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) **COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)**

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 32.09" Longitude: W82 53' 47.82"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Micaceous sandy silt - fill	5.00 ft	5.00 ft
Rock lense - fill	0.50 ft	5.50 ft
Micaceous sandy silt and		
silty sand - saprolite	23.00 ft	28.50 ft
Silty sand - weathered rock	6.20 ft	34.70 ft
Refusal at 34.70 ft		
Cored rock to 54.7 ft		
Granitic Gneiss with fractures		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-6R
K Packer installed as seal above screen
K packer: 41.40 ft - 41.60 ft

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 10/29/07
47.00 ft. Date Completed: 10/30/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 42.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 3.03 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 10 feet
Set Between: 42.00 ft. and 47.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 16.61 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☑ No
Installed from see remarks ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 40.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one)
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/523-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A. Little Date: 11-15-07
Well Driller

If D Level Driller, provide supervising driller's name:

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 34.18" Longitude: W82 53' 45.14"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Sandy silt and silty sand -saprolite	23.00 ft	23.00 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-7

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 11/7/07
23.00 ft. Date Completed: 11/8/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 8.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 8.00 ft. and 23.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 8.54 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 6.00 ft. to 23.00 ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 4.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A. Little Date: 11-15-07
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 34.23" Longitude: W82 53' 45.16"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Sandy silt and silty sand -saprolite	48.90 ft	48.90 ft
Silty sand - weathered rock	7.70 ft	56.60 ft
Refusal at 56.60 ft		
Cored to 100.30 ft: zones of		
weathred rock and sound rock		
Granitic gneiss with fractures		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-7R

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 11/5/07
70.00 ft. Date Completed: 11/7/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 60.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 10 feet
Set Between: 60.00 ft. and 70.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 9.91 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 58.00 ft. to 72.00 ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 56.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A. Little Date: 11-15-07
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy (last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 38.22" Longitude: W82 53' 40.23"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Micaceous clayey silty sand - fill	14.52 ft	14.52 ft
Micaceous sandy silt - saprolite	14.28 ft	28.80 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-10

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 10/25/07
28.80 ft. Date Completed: 10/25/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 13.80 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 2.51 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 13.80 ft. and 28.80 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 6.35 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 11.80 ft. to 28.80 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 9.80 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/523-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A. Little Date: 11-15-07
Well Driller

If D Level Driller, provide supervising driller's name:

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy (last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 38.23" Longitude: W82 53' 40.18"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Micaceous clayey silty sand - fill	14.52 ft	14.52 ft
Micaceous sandy silt - saprolite	43.48 ft	58.00 ft
Refusal at 58.00 ft		
Cored rock to 88.00 ft		
Granitic Gneiss with fractures		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-10R
K Packer installed as seal above screen
K packer: 82.43 ft - 82.60 ft

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 10/22/07
88.00 ft. Date Completed: 10/25/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 83.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 2.45 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 5 feet
Set Between: 83.00 ft. and 88.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 7.30 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☑ No
Installed from see remarks ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 80.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: _____ ft. _____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P._____ Volts_____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A. Little Date: 11-15-07
Well Driller

If D Level Driller, provide supervising driller's name:

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy (last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 32.37" Longitude: W82 53' 36.49"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Micaceous silty clay - fill	13.50 ft	13.50 ft
Micaceous clayey silt - fill	10.00 ft	23.50 ft
Micaceous silty clay - fill	5.00 ft	28.50 ft
Micaceous silty sand - saprolite	17.70 ft	46.20 ft
Refusal at 46.20 ft		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-13

6. TYPE: ☑ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: 3159

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 11/2/07
45.80 ft. Date Completed: 11/5/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 30.80 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 2.75 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 30.80 ft. and 45.80 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 40.16 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 28.80 ft. to 45.80 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 26.80 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little **CERT. NO.:** 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay E. Little Date: 11-15-07
Well Driller

If D Level Driller, provide supervising driller's name:

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 32.42" Longitude: W82 53' 36.51"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Micaceous silty clay - fill	13.50 ft	13.50 ft
Micaceous clayey silt - fill	10.00 ft	23.50 ft
Micaceous silty clay - fill	5.00 ft	28.50 ft
Micaceous silty sand - saprolite	17.60 ft	46.10 ft
Refusal at 46.10 ft		
Cored rock to 68.15 ft		
Granitic Gneiss with fractures		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-13R
K Packer installed as seal above screen
K packer: 57.58 ft - 57.75 ft

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 10/30/07
68.15 ft. Date Completed: 11/1/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 58.15 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 2.76 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 10 feet
Set Between: 58.15 ft. and 68.15 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 36.56 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☑ No
Installed from see remarks ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 55.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little CERT. NO.: 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: [signature] Date: 11-15-07
Well Driller

If D Level Driller, provide supervising driller's name:

S&ME

December 10, 2007

South Carolina Department of Health and Environmental Control
Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201-1708

Reference: **Non-Residential Water Well Records – Submittal #3**
Oconee Nuclear Station
7800 Rochester Highway
Seneca, South Carolina
S&ME Project No. 1264-07-234

Ladies and Gentlemen:

On behalf of Duke Energy, S&ME, Inc. (S&ME) is submitting the enclosed completed and signed *Water Well Records* for the following two (2) groundwater monitoring wells installed at the Oconee Nuclear Station (ONS) site:

- GM-14
- GM-14R.

Duke Energy is voluntarily installing groundwater monitoring wells at ONS as part of a site-wide hydrogeologic evaluation. S&ME will submit these *Water Well Records* on a periodic basis as well installations are completed, this being the third submittal (i.e., *Submittal #3*).

On behalf of Duke Energy, S&ME thanks you for your receipt of these records. Should you have any questions or need additional information, please contact us.

Sincerely,
S&ME, Inc.

Mary Beth Cline

Mary Beth Cline, E.I.T.
Staff Professional

Larry Armstrong, P. E.
Senior Engineer/Project Director

Enclosures

cc: Messrs. Steve LeRoy, Ed Sullivan, John Estridge, L. Curtis Arnold; Duke Energy

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D H E C

PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: **COUNTY:** Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 41.31" Longitude: W82 53' 30.31"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Gravel- fill	1.50 ft	1.50 ft
Silty clay - fill	13.10 ft	14.60 ft
Micaceous silty sand - fill	4.58 ft	19.18 ft
Clayey silt - fill	5.01 ft	24.19 ft
Micaceous silty sand - saprolite	4.24 ft	28.43 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-14

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 11/12/07
28.43 ft. Date Completed: 11/13/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 13.43 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 3.07 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 13.43 ft. and 28.43 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 18.43 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 11.43 ft. to 28.43 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 9.43 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P._____ Volts_____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little **CERT. NO.:** 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay A. Little (Well Driller) Date: 12-6-07

If D Level Driller, provide supervising driller's name:

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy (last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: **COUNTY:** Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 41.29" Longitude: W82 53' 30.36"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Gravel- fill	13.50 ft	13.50 ft
Silty clay - fill	10.00 ft	14.60 ft
Micaceous silty sand - fill	4.58 ft	19.18 ft
Clayey silt - fill	5.01 ft	24.19 ft
Micaceous silty sand - saprolite	15.61	39.80 ft
Refusal at 39.80 ft		
Cored rock to 68.00 ft		
Granitic Gneiss with fractures		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-14R
K Packer installed as seal above screen
K packer: 56.93 ft - 57.10 ft

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 11/7/07
67.50 ft. Date Completed: 11/9/07

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 57.50 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 2.95 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 10 feet
Set Between: 57.50 ft. and 58.50 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 4.85 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☑ No
Installed from see remarks ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 54.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P._____ Volts_____ Length of drop pipe ___ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Jay Little **CERT. NO.:** 1575
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
9751 Southern Pine Blvd, Charlotte, NC
Telephone No.: 704/525-4720 Fax No.: 704/525-3953

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Jay G. Little (Well Driller) Date: 12-6-07

If D Level Driller, provide supervising driller's name:

S&ME

February 19, 2008

South Carolina Department of Health and Environmental Control
Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201-1708

Reference: **Non-Residential Water Well Records – Submittal #4**
Oconee Nuclear Station
7800 Rochester Highway
Seneca, South Carolina
S&ME Project No. 1264-07-234

Ladies and Gentlemen:

On behalf of Duke Energy, S&ME, Inc. (S&ME) is submitting the enclosed completed and signed *Water Well Records* for the following two (2) groundwater monitoring wells installed at the Oconee Nuclear Station (ONS) site:

- GM-3R
- GM-3DR.

Duke Energy has voluntarily installed groundwater monitoring wells at ONS as part of a site-wide hydrogeologic evaluation. The above two (2) wells represent the last planned wells for this project at ONS. Therefore, we anticipate this submittal (*Submittal #4)* to be the last for this project, at this time.

On behalf of Duke Energy, S&ME thanks you for your receipt of these records. Should you have any questions or need additional information, please contact us.

Sincerely,
S&ME, Inc.

Mary Beth Cline

Mary Beth Cline, E.I.T.
Staff Professional

Larry Armstrong, P. E.
Senior Engineer/Project Director

Enclosures

cc: Messrs. Greg Robison, Ed Sullivan, John Estridge, L. Curtis Arnold; Duke Energy

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Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy (last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 36.93" Longitude: W82 53' 55.48"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Asphalt	0.27 ft	0.27 ft
Micaceous fine to medium sand	16.53 ft	16.80 ft
Refusal at 16.80 ft		
Cored rock to 35.04 ft		
Granitic Gneiss with fractures		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-3R

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 1/10/08
34.00 ft. Date Completed: 1/24/08

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 24.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 10 feet
Set Between: 24.00 ft. and 34.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 25.91 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 21.00 ft. to 35.04 ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 1 ft. to 19.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Justin Millwood CERT. NO.: 01840
Address: (Print) Level: A B C D (circle one)
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Justin Millwood Date: 2/11/08
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: **COUNTY:** Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 37.02" Longitude: W82 53' 55.51"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Asphalt	0.27 ft	0.27 ft
Micaceous fine to medium sand	17.27 ft	17.54 ft
Refusal at 17.54 ft		
Cored rock to 60.30 ft		
Granitic Gneiss with fractures		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GM-3DR
K Packer installed as seal above screen
K packer: 54.73 ft - 54.90 ft

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3159

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 1/8/08
60.30 ft. Date Completed: 1/24/08

10. CASING: ☑ Threaded ☐ Welded
Diam.: 2 inches
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 55.30 ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 2 inches
Slot/Gauge: 0.01 inches Length: 5 feet
Set Between: 55.30 ft. and 60.30 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 25.63 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☑ No
Installed from see remarks ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☑ Bentonite/Cement ☐ Other _____
Depth: From 1 ft. to 54.73 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Justin Millwood **CERT. NO.:** 01840
Address: (Print) Level: A B C D (circle one)
155 Tradd Street, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Justin Millwood Date: 2/11/08
Well Driller

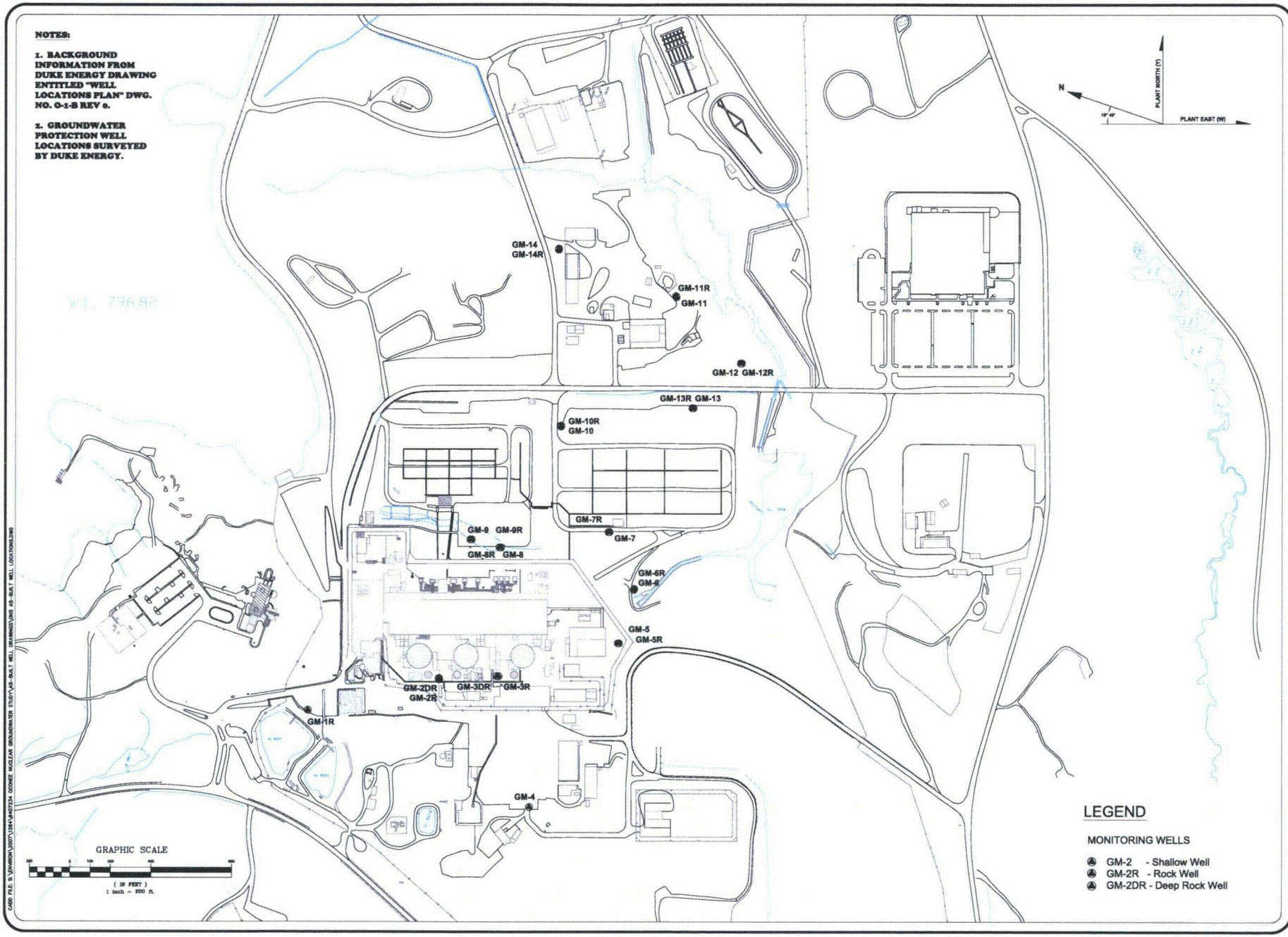
If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

NOTES:

1. BACKGROUND INFORMATION FROM DUKE ENERGY DRAWING ENTITLED "WELL LOCATIONS PLAN" DWG. NO. O-1-B REV 0.

2. GROUNDWATER PROTECTION WELL LOCATIONS SURVEYED BY DUKE ENERGY.



S&ME, INC.
NO. C00473
SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION

S&ME
WWW.SMEINC.COM

SOUTH CAROLINA PROFESSIONAL ENGINEER
NO. 13213

NO.	DATE	DESCRIPTION	BY
5	APRIL 28, 2008	AS-BUILT WELL LOCATIONS	LTA
4	SEPT 12, 2007	ADDED GRAPHIC SCALE	LTA
3	AUG. 23, 2007	CORRECTED PLANT NORTH & PLANT EAST ORIGINATION	LTA
2	AUG. 21, 2007	FOR MODIFICATION PACKAGE AND WELL PERMITS	LTA
1	AUG. 7, 2007	REVISED WELL LOCATIONS BASED ON FIELD TRIP	WMM
0	JULY 26, 2007	PROPOSED WELL LOCATIONS TO SCALE	WMM

GROUNDWATER MONITORING WELL LOCATIONS

GROUNDWATER PROTECTION INITIATIVE
DUKE ENERGY
OCONEE NUCLEAR STATION UNITS 1, 2, 3
SENECA, SOUTH CAROLINA

DRAWN BY: WMM	CHECKED BY: LTA
DESIGNED BY: N/A	APPROVED BY: LTA
PROJECT NUMBER: 1264-07-234	
SCALE: AS SHOWN	DATE: 06-28-2007
DRAWING: GM-O-1	

CADD FILE: S:\PHVRON\2007\1264\P407234 OCONEE NUCLEAR GROUNDWATER STUDY\AS-BUILT WELL DRAWINGS\AS-BUILT WELL LOCATIONS.DWG

AS-BUILT MONITORING WELL DOCUMENTATION

WELL NUMBER	STATION "Y" (Plant North) (feet)	STATION "W" (Plant East) (feet)	GROUND ELEV. (feet)	Top of Casing Elev. (ft)	Depth of Well (feet below land surface)	Screen Interval (feet below land surface)	Screen Interval (feet)	Flush Mount	Standpipe
GM-1R	733.49	1241.51	801.63	801.40	37.1	32.1 - 37.1	5	YES	-
GM-2R	885.07	1890.23	796.12	795.84	30.3	25.3 - 30.3	5	YES	-
GM-2DR	891.12	1890.28	796.20	795.96	55.0	50.0 - 55.0	5	YES	-
GM-3R	900.59	2186.09	796.04	795.83	34.0	24.0 - 34.0	10	YES	-
GM-3DR	901.31	2176.76	796.19	795.89	60.3	55.3 - 60.3	5	YES	-
GM-4	252.74	2340.10	798.16	797.95	21.5	6.5 - 21.5	15	YES	-
GM-5	1064.75	2783.59	796.05	795.79	42.7	27.7 - 42.7	15	YES	-
GM-5R	1064.72	2788.41	796.09	795.87	98.0	93.0 - 98.0	5	YES	-
GM-6	1330.44	2861.45	742.27	745.46	23.0	8.0 - 23.0	15	-	YES
GM-6R	1334.93	2863.45	742.05	745.16	47.0	42.0 - 47.0	5	-	YES
GM-7	1616.84	2741.06	736.44	736.21	23.0	8.0 - 23.0	15	YES	-
GM-7R	1616.78	2735.86	736.47	736.16	70.0	60.0 -70.0	10	YES	-
GM-8	1539.93	2196.53	777.94	777.73	43.0	28.0 - 43.0	15	YES	-
GM-8R	1540.49	2189.10	778.18	777.99	73.6	63.6 - 73.6	10	YES	-
GM-9	1579.90	2045.39	780.60	780.36	43.0	28.0 - 43.0	15	YES	-
GM-9R	1579.82	2051.89	780.42	780.19	73.7	68.7 - 73.7	5	YES	-
GM-10	2140.97	2496.13	735.27	737.89	28.8	13.8 - 28.8	15	-	YES
GM-10R	2145.19	2496.61	735.29	737.91	88.0	83.0 - 88.0	5	-	YES
GM-11	2784.13	3073.17	720.37	723.31	38.5	28.5 -38.5	10	-	YES
GM-11R	2788.85	3071.12	720.49	723.48	66.5	61.5 - 66.5	5	-	YES
GM-12	2455.53	3392.26	695.09	698.02	20.0	5.0 - 20.0	15	-	YES
GM-12R	2455.39	3397.32	695.22	698.18	42.0	37.0 - 42.0	5	-	YES
GM-13	2232.21	3158.51	736.25	739.10	45.8	30.8 - 45.8	15	-	YES
GM-13R	2232.69	3153.14	736.33	739.18	68.1	58.1 - 68.1	10	-	YES
GM-14	3024.98	2484.29	719.56	722.62	28.4	13.4 - 28.4	15	-	YES
GM-14R	3020.08	2483.78	719.63	722.59	67.5	57.5 - 67.5	10	-	YES

MONITORING WELLS DESIGNATIONS

GM-2 - Shallow Well
GM-2R - Rock Well
GM-2DR - Deep Rock Well

S&ME, INC. NO. C00473
SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION

S&ME
WWW.SMEINC.COM

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER NO. 13013 LARRY TAYLOR ARMSTRONG

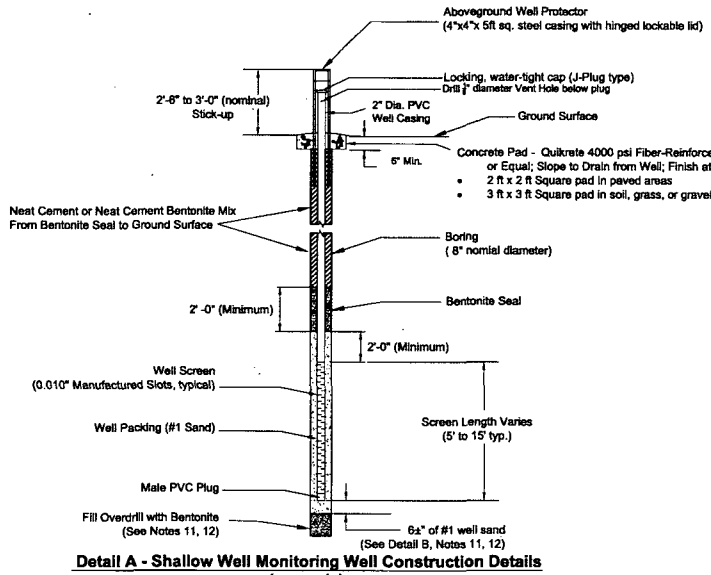
NO.	DATE	DESCRIPTION	BY
4	APRIL 28, 2006	AS-BUILT WELL DOCUMENTATION	LTA
3	AUG. 13, 2007	ADDED "PLANT NORTH" & "PLANT EAST" TO TABLE HEADINGS	LTA
2	AUG. 21, 2007	FOR MODIFICATION PACKAGE AND WELL PERMITS	LTA
1	AUG 8,2007	REVISED WELL LOCATIONS BASED ON FIELD TRIP	WMM
0	JAN 28, 2007	PROPOSED WELL LOCATIONS TO DUKE	WMM

GROUNDWATER MONITORING WELL LOCATIONS

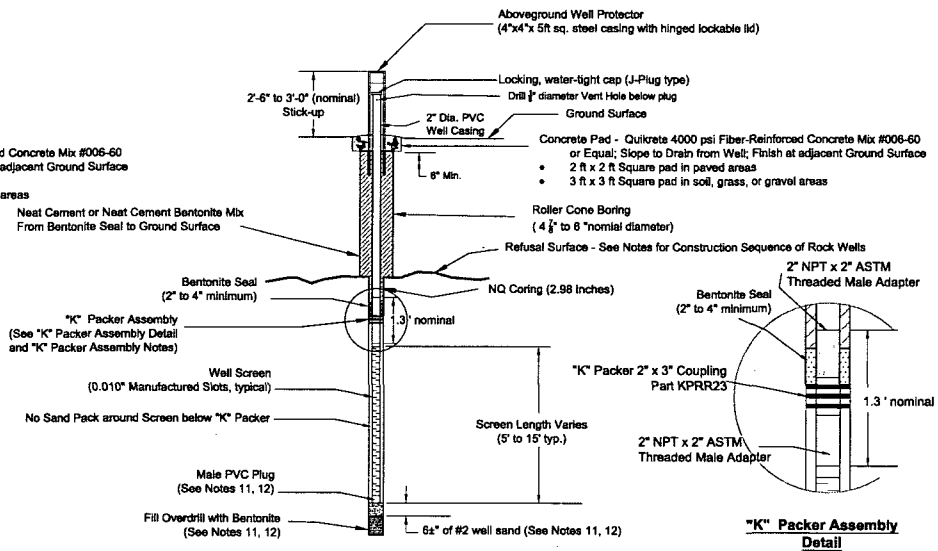
GROUNDWATER PROTECTION INITIATIVE
DUKE ENERGY
OCONEE NUCLEAR STATION UNITS 1, 2, 3
SENECA, SOUTH CAROLINA

DRAWN BY: WMM	CHECKED BY: LTA
DESIGNED BY: N/A	APPROVED BY: LTA
PROJECT NUMBER: 1264-07-234	
SCALE: None	DATE: 08-28-2007
DRAWING: GM-O-2	

CAD FILE: S:\DRAWINGS\2007\1264\1264072341 OCONEE NUCLEAR GROUNDWATER STUDY\AS-BUILT WELL DRAWINGS\GM2 AS-BUILT WELL LOCATIONS.DWG



Detail A - Shallow Well Monitoring Well Construction Details
(no scale)

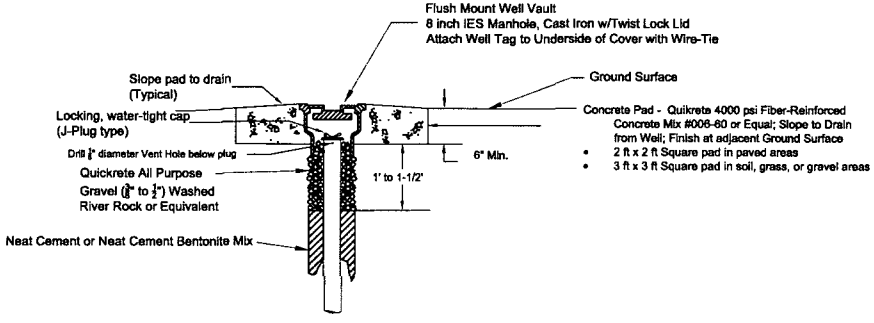


Detail B - Monitoring Well Construction Details - Rock Well
(no scale)

"K" Packer Assembly Detail
(See "K" Packer Assembly Notes)

General Notes:

1. Construction details shown are for well installed in unconsolidated material.
2. All construction materials and installation methods shall be in accordance with SCDHEC Regulation R.61-71.
3. All well casing material shall be flush jointed, threaded (with O-rings) Sch 40 PVC.
4. Well screen material shall be flush jointed, threaded (with O-rings) Sch 40 PVC.
5. Well screen to be 0.010-inch manufactured slots.
6. Well Tag with information required by SCDHEC Regulation R.61-71.H.2.c shall be attached to above-grade well cover with rivets.
7. For Flush Mount Well Vaults, see Detail C.



Detail C - Flush Mount Well Vault Detail
(no scale)

General Notes:

1. Construction details shown are for well installed in rock material.
2. All construction materials and installation methods shall be in accordance with SCDHEC Regulation R.61-71.
3. All well casing material shall be flush jointed, threaded (with O-rings) Sch 40 PVC.
4. Well screen material shall be flush jointed, threaded (with O-rings) Sch 40 PVC.
5. Well screen to be 0.010-inch manufactured slots.
6. Well Tag with information required by SCDHEC Regulation R.61-71.H.2.c shall be attached to above-grade well cover with rivets.
7. For Flush Mount Well Vaults, see Detail C.

Notes for Construction Sequence of Rock Wells:

8. Boring above refusal to be performed with roller cone bit.
9. At refusal surface, screw in temporary NW steel casing and seal casing into rock.
10. Complete NQ coring to desired depth.
11. If core hole is not overdrilled, Male PVC Plug at end of well shall rest on bottom of corehole.
12. If corehole is overdrilled, fill overdrilled void to within approximately 6" of well completion level with bentonite and cap with approximately 6" of #2 sand; male PVC Plug at end of well shall rest on sand.
13. Install PVC well casing with "K" Packer assembly into core hole at desired depth.
14. Place 2 inches to 4 inches (minimum) bentonite seal directly above "K" Packer.
15. Remove temporary NW steel casing.
16. Grout with neat cement or neat cement bentonite mix to complete well.

"K" Packer Assembly Notes:

1. "K" Packer is Western Rubber & MFG. Part KPRR23 2" x3" Coupling, neoprene rubber.
2. Install 2" NPT x2" ASTM thread male adapter above and below "K' Packer Coupling.
3. Male adapters are approx. 6 inches in length. Ensure threads are fully engaged.

Concrete Pad Reinforcing Notes:

1. Fiber-Reinforcing in Concrete Well Pads is provided for crack control only.
2. Slope finished surface of concrete pad to drain away from well.
3. Finish edges of concrete pad to be no higher than existing adjacent ground.

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION S&ME, INC. NO. C00473

S&ME
1108 WEST BYPASS, SUITE 100
SUMTER, SC 29150
PH. (803) 775-9115
FAX. (803) 775-9116
WWW.SMEINC.COM

SOUTH CAROLINA PROFESSIONAL ENGINEER NO. 12213

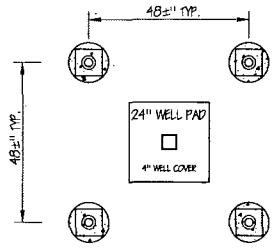
NO.	DATE	DESCRIPTION	BY
3	APRIL 25, 2006	G-BUILT WELL DOCUMENTATION	LTA
2	06-21-2007	FOR MODIFICATION PACKAGE AND WELL PERMITS	LTA
1	06-14-2007	FOR OWNER REVIEW AND COMMENT	LTA
0	06-07-2007	FOR MODIFICATION PACKAGE	WMM

GROUNDWATER PROTECTION PROJECT
MONITORING WELL CONSTRUCTION DETAILS

GROUNDWATER PROTECTION PROJECT
DUKE ENERGY
OCONEE NUCLEAR STATION UNITS 1, 2, 3
SENECA, SOUTH CAROLINA

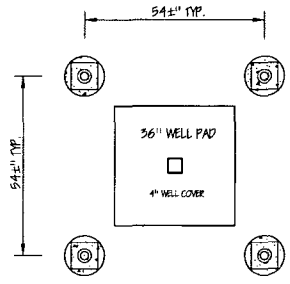
DRAWN BY: WMM	CHECKED BY: LTA
DESIGNED BY: N/A	APPROVED BY: LTA
PROJECT NUMBER: 1264-07-234	
SCALE: NO SCALE	DATE: 06-07-07
DRAWING: GM-O-3	

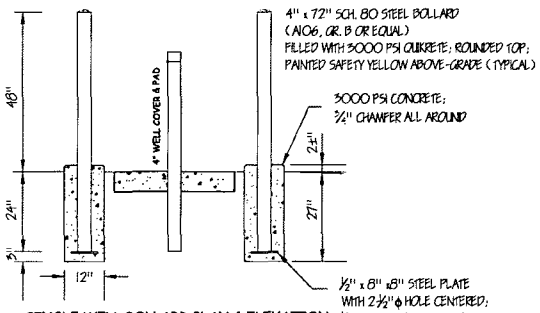
CAD FILE: \DRAWING\2007\264\#07234 OCONEE NUCLEAR GROUNDWATER STUDY\G-BUILT WELL DRAWINGS\GMS WELL DETAILS SHEET 1.DWG



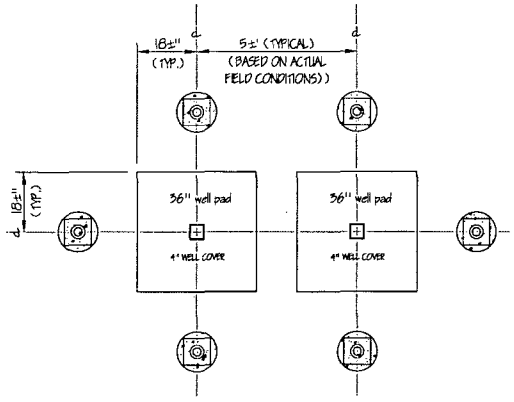
SINGLE WELL BOLLARD PLAN
FOR 2'x2' WELL PAD
NOT TO SCALE

NOTE: SEE TYPICAL ELEVATION THIS SHEET



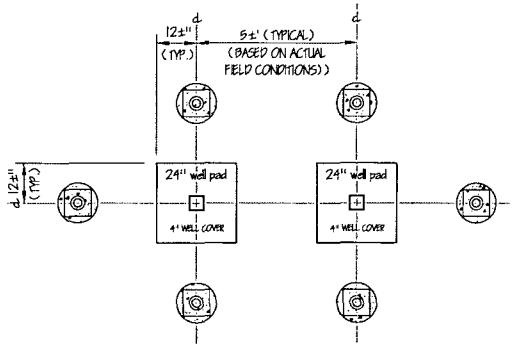


SINGLE WELL BOLLARD PLAN & ELEVATION
FOR 3'x3' WELL PAD
NOT TO SCALE



WELL PAIR BOLLARD PLAN
FOR 3'x3' WELL PADS
NOT TO SCALE

NOTE: SEE TYPICAL ELEVATION THIS SHEET

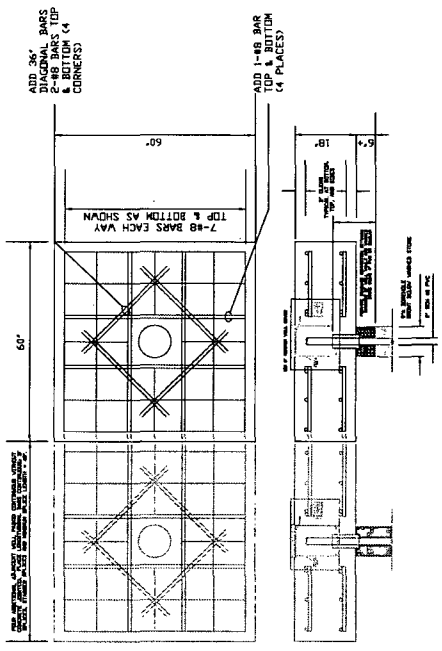


WELL PAIR BOLLARD PLAN
FOR 2'x2' WELL PADS
NOT TO SCALE

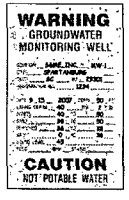
NOTE: SEE TYPICAL ELEVATION THIS SHEET

NOTES:

1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS.
2. REINFORCING SHALL CONFORM TO ASTM A-615, GRADE 60.
3. WELL PAD EXCAVATION SHALL BE CLEAR AND FREE OF UNSUITABLE MATERIALS (TOPSOIL, ORGANIC MATERIAL, TIMBER, DEBRIS, ETC.) AT CONCRETE PLACEMENT.
4. WELL PAD DESIGN IS PRESENTED AS A COMMERCIAL DESIGN ONLY. IT IS NOT REPRESENTED AS SAFETY RELATED DESIGN UNDER NUCLEAR QUALITY ASSURANCE PROTOCOL(S).



WELL PAD FOR GM-3 WELL GROUP
NOT TO SCALE



TYPICAL WELL TAG DETAIL
NOT TO SCALE

NOTE: INFORMATION FOR EXAMPLE ONLY

EROSION & SEDIMENT CONTROL NOTES

1. EROSION & SEDIMENT CONTROL TO BE PROVIDED BY DUKE ENERGY AND/OR S&ME IN ACCORDANCE WITH DUKE ENERGY'S EROSION & SEDIMENT CONTROL PLAN FOR THE GROUNDWATER PROTECTION PROJECT.
2. IN GENERAL, EROSION & SEDIMENT CONTROL WILL COMPRISE THE FOLLOWING BEST MANAGEMENT PRACTICES (BMP'S) IN THE FOLLOWING AREAS NEARBY THE DRILLING OPERATIONS.

PAVED AREAS:
ENCIRCLE STORMWATER CATCH BASINS WITH BURRITO-TYPE WRAP OF GEOTEXTILE FABRIC AND APS 700 SERIES SILT STOP. STABILIZE BURRITO-WRAP WITH SAND BAGS.

GRAVEL AREAS:
ENCIRCLE STORMWATER CATCH BASINS WITH #67 WASHED STONE.

GRASS/SOIL AREAS:
CONTAIN/FILTER SEDIMENT-LADEN RUNOFF FROM DRILLING OPERATIONS WITH SILT FENCE, STRAW BALES, AND/OR OTHER MATERIAL(S) APPROVED BY OWNER IN PROXIMITY OF DRILLING OPERATIONS. ENCIRCLE STORMWATER CATCH BASINS WITH STRAW BALES AND/OR SILT FENCE.

3. DISTURBED GRASS/SOIL AREAS TO BE RAKED SMOOTH, SEEDED WITH SEEDING MIXTURE, FERTILIZER, AND/OR LIME AS SPECIFIED IN OWNER'S EROSION & SEDIMENT CONTROL PLAN AND APPROPRIATE FOR PLACEMENT SEASON, AND COVERED WITH STRAW.

SIEVE NUMBER	#1 SAND % PASSING	#2 SAND % PASSING
#8	—	100
#10	—	94 - 98
#12	---	78 - 80
#14	100	47 - 52
#16	92 - 100	22 - 32
#18	85 - 99	8 - 17
#20	72 - 93	2 - 4
#25	48 - 70	0.5 - 1.5
#30	17 - 34	0 - 0.5
#35	6 - 12	—
#40	2 - 4	—
#50	0.4 - 0.5	—
#60	0 - 0.1	—

WELL SAND PACK GRAIN SIZE DISTRIBUTION
(REF: SOUTHERN PRODUCTS & SILICA CO., INC.)

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION S&ME, INC. NO. C00473

S&ME
1536 BOOS STREET
WHITEVILLE, N.C. 28472
PH. (910) 642-2000
FAX. (910) 642-8070
WWW.SMEINC.COM

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER NO. 12213 ARMSTRONG

NO.	DATE	DESCRIPTION	BY
2	APRIL 30, 2008	AS-BUILT WELL LOCATIONS	LTA
1	08-21-07	FOR MODIFICATION PACKAGE AND WELL PERMITS	LTA
0	08-14-07	FOR OWNER REVIEW AND COMMENT	LTA

GROUNDWATER PROTECTION PROJECT
MONITORING WELL CONSTRUCTION DETAILS

GROUNDWATER PROTECTION PROJECT
DUKE ENERGY
OCONEE NUCLEAR STATION UNITS 1, 2, 3
SENECA, SOUTH CAROLINA

DRAWN BY: LTA	CHECKED BY: WMM
DESIGNED BY: N/A	APPROVED BY: LTA
PROJECT NUMBER: 1264-07-234	
SCALE: NO SCALE	DATE: 08-14-07

DRAWING: GM-O-4

CAD FILE: \\SNVMSRV\DATA\1264\1264-07-234 OCONEE NUCLEAR GROUNDWATER STUDY\AS-BUILT WELL DRAWINGS\GM WELL DETAILS SHEET 2.DWG

Scott Dacus

From: Janice T. Cooke [COOKEJT@dhec.sc.gov]
Sent: Tuesday, April 22, 2008 4:14 PM
To: Scott Dacus
Subject: Re: Temporary Monitoring Well Application

I'll sent it to you in the morning

>>> "Scott Dacus" <SDacus@smeinc.com> 4/22/2008 3:06 PM >>>

Hello Jan,

Here is the application for temporary monitoring wells at Oconee Nuclear Station per you discussions with Larry Armstrong.

Call if you have any questions.

Thanks

Scott E. Dacus, P.G.

Project Geologist

<http://www.smeinc.com>
ENGINEERING INTEGRITY.

S&ME, Inc.
155 Tradd Street
Spartanburg SC 29301 Map
<http://maps.google.com/maps?f=q&hl=en&q=155+Tradd+Street+Spartanburg+SC+29301&layer=&sll=33.813046,-79.017094&sspn=0.006302,0.013561&ie=UTF8&z=16&om=1&iwloc=addr>
Ph: 864-574-2360
Fax: 864-576-8730
Mobile: 864-590-6113
sdacus@smeinc.com <mailto:sdacus@smeinc.com> www.smeinc.com <http://www.smeinc.com/>

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1 -- 031207

S&ME

April 22, 2008

South Carolina Department Of
Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

Attention: Ms. Jan Cooke

Reference: **TEMPORARY GROUNDWATER MONITORING WELL APPLICATION AND VARIANCE REQUEST**
Duke Energy Oconee Nuclear Station
7800 Rochester Highway
Seneca, South Carolina 29672
DHEC Facility ID 00535
S&ME Project No. 1264-08-195

Dear Ms. Cooke:

Attached is the *SCDHEC Monitoring Well Application* for the installation of up to 15 temporary groundwater monitoring wells at Duke Energy's Oconee Nuclear Station located near Seneca, South Carolina. S&ME, Inc. is submitting this application on behalf of Duke Energy.

These monitoring wells will be installed, supplemental to the Groundwater Protection Initiative of 2007, to further evaluate site conditions. In particular, the focus of these temporary wells is to evaluate (1) potential source and/or (2) extent of tritium detected in well GM-7. The temporary groundwater monitoring wells are planned at the approximate locations depicted on the attached Figure 1. Actual locations may be adjusted in the field based on field conditions. The wells will be installed to monitor shallow groundwater at the site and will be installed as temporary wells by direct-push technology. Figure 2, *Temporary Saprolite Monitoring Well Construction Detail Installed by Direct-Push Technology* is also attached.

The installation of the 15 temporary wells is scheduled to begin on April 28, 2008 and will require approximately two (2) weeks. The temporary wells will be sampled upon installation. Laboratory analysis for tritium will require approximately two (2) weeks. Upon receipt of laboratory results, a second round of sampling/analysis from the temporary wells is planned, which will require approximately two (2) weeks. During this

period, Duke Energy will also survey locations and top-of-casing elevations of the temporary wells to allow for water level information to be incorporated into groundwater potentiometric mapping for the site. Upon receipt of the laboratory results from the second sampling round, we anticipate abandoning the temporary wells, which will require approximately one (1) week. In support of this planned schedule, we respectfully request, on behalf of Duke Energy, a variance from the South Carolina Well Standards R.61-71, as noted below:

Variance Request

S&ME requests a variance from Rule R.61-71 H. 4. c. (1) for abandonment of temporary wells installed at this site. This rule states that temporary monitoring wells shall be abandoned within five (5) days of borehole completion. In support of the schedule outlined above, we respectfully request allowance for the temporary wells to remain in-place approximately 45 days. During this period, the wells will be protected by placement of a water tight cap and covered with a protective traffic cone. Further, we offer that these temporary wells are installed inside the outer protective perimeter of the Oconee Nuclear Station.

On behalf of Duke Energy, we appreciate your consideration and look forward to your response. If you have questions on this request, please contact me at your convenience.

Sincerely,

S&ME, Inc.

Scott E. Dacus, P.G.
Project Geologist
sdacus@smeinc.com

Larry Armstrong, P.E.
Senior Engineer/Project Director
larmstrong@smeinc.com

cc: Mr. Greg Robison, Duke Energy
Mr. Ed Sullivan, P.E., Duke Energy
Mr. John Estridge, Duke Energy

S:\ENVIRON\2008\1264\6408195 Oconee Nuclear Station Temp Wells\Well Permits\Temp MW Application Letter.doc

D H E C

PROMOTE PROTECT PROSPER

SCDHEC Monitoring Well Application

1. Proposed location of monitoring wells(s)

Duke Energy Oconee Nuclear Station

Street Address:

7800 Rochester Highway

City:

Seneca

County:

Oconee

Please attach scaled map or plat.

2. Well Owner's Name (last name, first name):

Duke Energy (Attention: Mr. John Estridge)

Address:

7800 Rochester Highway, Seneca, SC, 29672

Telephone No.: (864) 885-3979

3. Property owner's name (if different from well owner):

Same

(Last name, first name)

Address:

Same

Telephone No.:

4. Proposed Drilling Date:(MM/DD/YYYY)

04/28/2008

5. Intended purpose of monitoring well(s):

- Pre-Purchase ☐
- Investigation ☑

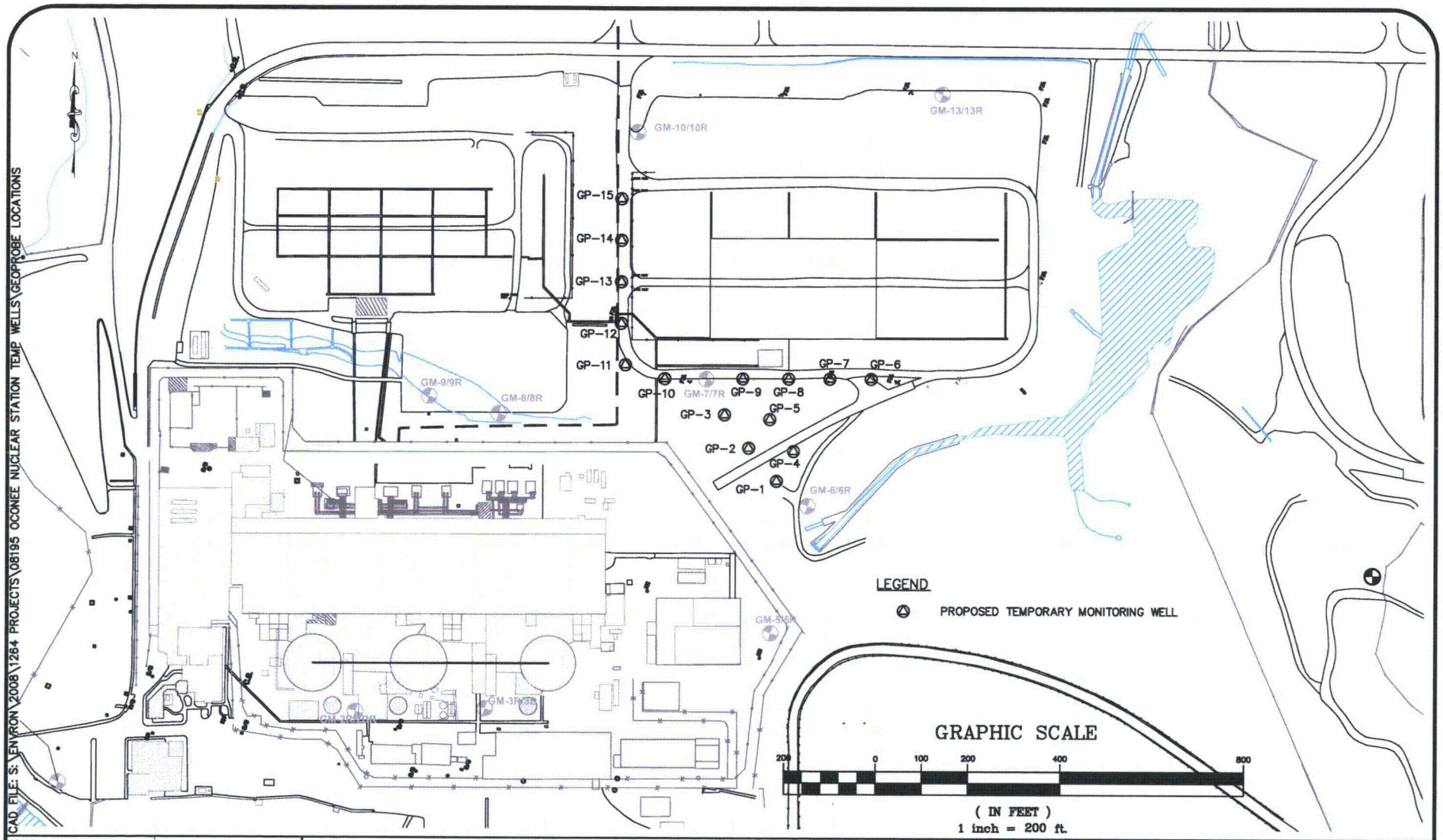
6. Proposed number of monitoring wells: 15

7. Proposed parameters to be analyzed (check as many that apply):

- BTEX ☐
- MTBE ☐
- Naphthalene ☐
- PAHs ☐
- Metals ☐
- Nitrates ☐
- Base, Neutral & Acid Ex. ☐
- Pesticides/Herbicides ☐
- Phenols ☐
- Radionuclides ☑
- PCBs ☐
- Other ☐

8. Proposed construction details (complete and attach proposed monitoring well schematics):

See included temporary monitoring well schematic.



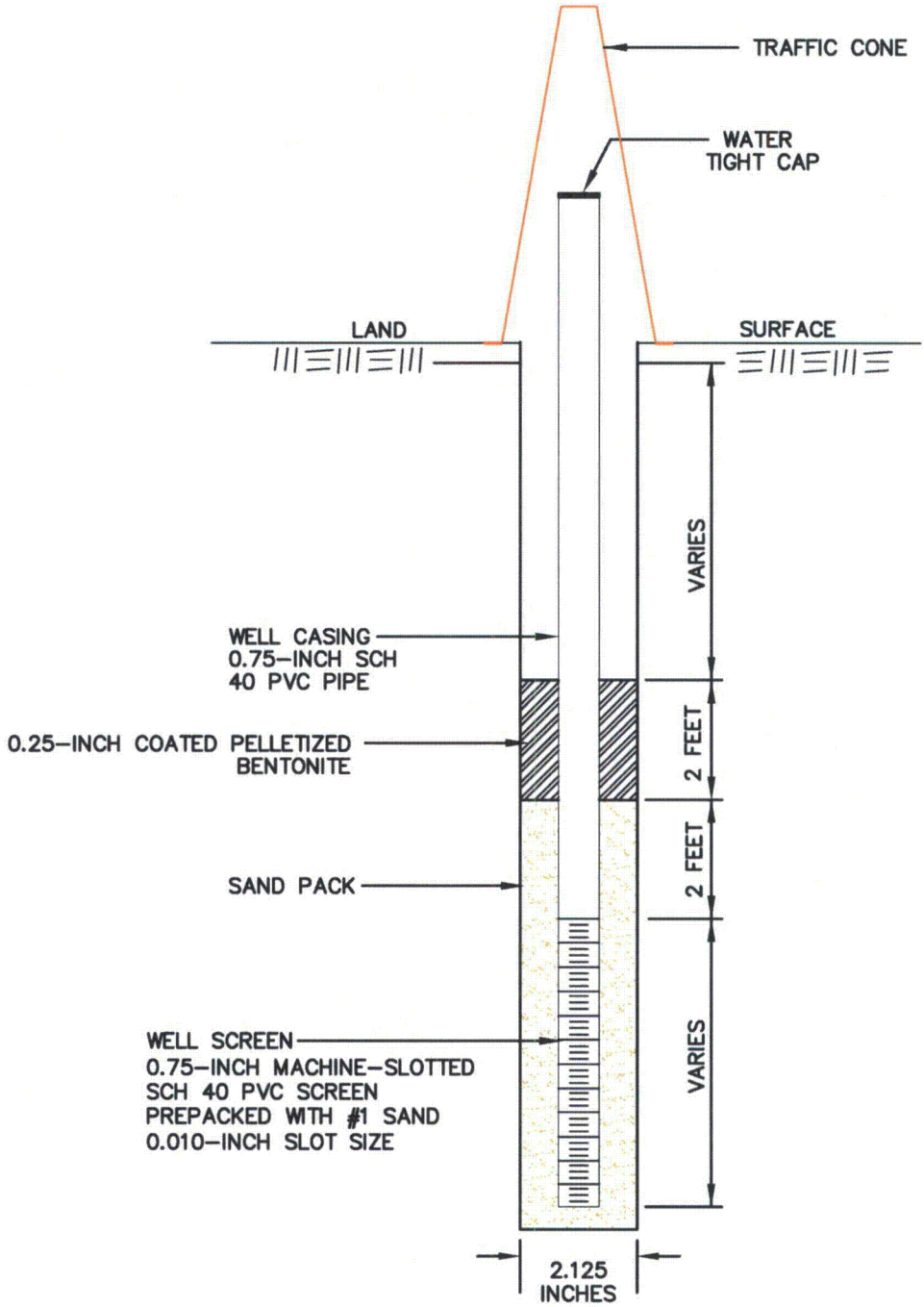
SCALE:	DATE:
AS SHOWN	04-14-08
PROJECT NO.	DRAWN BY:
1264-08-195	S. BROCK
	CHECKED BY:

S&ME

155 TRADD STREET 29301
PH. (864) 574-2360
FAX. (864) 576-8730
WWW.SMEINC.COM

PROPOSED TEMPORARY MONITORING WELL LOCATIONS
GROUNDWATER PROTECTION PROJECT
OCONEE NUCLEAR STATION
SENECA, SOUTH CAROLINA

FIGURE NO.
1



TEMPORARY SAPROLITE MONITORING WELL CONSTRUCTION DETAIL INSTALLED BY DIRECT-PUSH TECHNOLOGY

CAD FILE:S:\ENVIRON\2008\1264 PROJECTS\8409165 OCONEE NUCLEAR STATION TEMP WELLS\TEMP SAPROLITE WELL SCHEMATIC

SCALE: NOT TO SCALE	S&ME	OCONEE NUCLEAR STATION SENECA, SOUTH CAROLINA	FIGURE NO: 2
CHECKED BY:			
DRAWN BY: SB/LA			
DATE: APRIL, 2008		JOB NO: 1264-08-195	

BOARD:
Paul C. Aughtry, III
Chairman

Edwin H. Cooper, III
Vice Chairman

Steven G. Kisner
Secretary

D H E C

PROMOTE PROTECT PROSPER

C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment

BOARD:
Henry C. Scott

M. David Mitchell, MD

Glenn A. McCall

Coleman F. Buckhouse, MD

04/23/2008

RECEIVED
APR 2 6 2008

Mr. John Estridge
Duke Energy
155 East Pickens Highway
Seneca, SC 29672

RE: Oconee Nuclear Station
Site ID #00535
Monitoring Well Approval request received September 12, 2007
Oconee

Dear Mr. Estridge:

The Department has reviewed and approved the installation of 15 monitoring wells submitted by S&ME. A monitoring well approval for 15 monitoring wells has been issued. The original has been sent to S&ME and a copy is enclosed for your records. The report should be sent to my attention on or before June 28, 2008.

On all correspondence regarding this site, please reference Site ID #00535. If you have any questions concerning this correspondence, contact me at (803) 898-4248.

Sincerely,

Jan T. Cooke, Hydrogeologist
Groundwater Quality Section
Water Monitoring, Assessment and Protection Division
Bureau of Water

enc: Copy of Monitoring Well Approval

cc: Region 1- Anderson
Larry Armstrong, S&ME; 155 Tradd St. Spartanburg, SC 29301 (with original monitoring well approval)

BOARD:
Paul C. Aughtry, III
Chairman

Edwin H. Cooper, III
Vice Chairman

Steven G. Kisner
Secretary

D H E C

PROMOTE PROTECT PROSPER

C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment

BOARD:
Henry C. Scott

M. David Mitchell, MD

Glenn A. McCall

Coleman F. Buckhouse, MD

Temporary Monitoring Well Approval

Approval is hereby granted to:	S&ME
(On behalf of):	Duke Energy
Facility:	Oconee Nuclear
Site Identification:	00535
County:	Oconee

This approval is for the installation of 15 temporary groundwater-monitoring wells. The temporary wells are to be installed in the locations as illustrated on Figure #1 and per the proposed construction details provided by S&ME in correspondence dated April 22, 2008. The temporary wells are to be installed following all of the applicable requirements of R.61-71.

Please note that R.61-71 requires the following:

1. All wells shall be drilled, constructed, and abandoned by a South Carolina certified well driller per R.61-71.D.1.

2. A Water Well Record Form or other form provided or approved by the Department shall be completed and submitted to the Department within 30 days after well completion or abandonment unless the Department has approved another schedule. The form should contain the "as-built" construction details and all other information required by R.61-71.H.1.f

3. All analytical data and water levels obtained from each monitoring well shall be submitted to the Department within 30 days of receipt of laboratory results unless another schedule has been approved by the Department as required by R.61-71.H.1.d.

4. All temporary monitoring wells shall be abandoned within 5 days of borehole completion using appropriate methods as required by R.61-71.H.4.c. A variance is granted for abandonment within 45 days from borehole completion.

5. If any of the information provided to the Department changes, Jan Cooke, 803-898-4248 shall be notified a minimum of twenty-four hours prior to well construction as required by R.61-71.H.1.a.

This approval is pursuant to the provisions of Section 44-55-40 of the 1976 South Carolina Code of Laws and R.61-71 of the South Carolina Well Standards and Regulations, dated April 26, 2002.

Date of Issuance: April 23, 2008 **Approval #: 3340**

Jan T. Cooke

Jan T. Cooke, Hydrogeologist
Groundwater Quality Section
Water Monitoring, Assessment and Protection Division
Bureau of Water

Mary Beth Cline

From: Larry Armstrong
Sent: Friday, June 06, 2008 4:46 PM
To: Janice T. Cooke
Cc: Scott Dacus; Mary Beth Cline; William Miller; Robison, Gregory D; Martinec, Cynthia D; Ed Sullivan; Starnes, Luie J Jr; John Estridge; Curtis L. Arnold (lcarnold@dukeenergy.com)
Subject: Water Well Records
Attachments: Water Well Records.pdf

Dear Jan:

On behalf of Duke Energy, please accept the attached completed and signed Water Well Records for the 15 temporary monitoring wells installed at Oconee Nuclear Station (Site ID #00535) by S&ME. This submittal will satisfy item 2. of Temporary Monitoring Well Approval #3340 of April 23, 2008.

Additional information from the above wells will be provided to you by Duke Energy and/or S&ME next week.

Thank you for your continued cooperation on this project!

Larry Armstrong, P.E.
Senior Engineer/Vice-President

S&ME
ENGINEERING INTEGRITY.

S&ME, Inc.
155 Tradd Street
Spartanburg SC 29301 Map
Ph: 864-574-2360
Fax: 864-576-8730
Mobile: 864-303-1260
larmstrong@smeinc.com
www.smeinc.com

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D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: **COUNTY:** Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 32.98" Longitude: W82 53' 47.68"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Silt and sand -saprolite	30.00 ft	30.00 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-1

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3340

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 5/5/08
30.00 ft. Date Completed: 5/5/08

10. CASING: ☑ Threaded ☐ Welded
Diam.: 3/4 inch
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 15.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 2.82 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 3/4 inch
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 15.00 ft. and 30.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 19.61 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 13.00 ft. to 30.00 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 13.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus **CERT. NO.:** 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: _____ Date: 6/4/08
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) **COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)**

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: **COUNTY:** Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 33.73" Longitude: W82 53' 47.03"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Silt and sand -saprolite	30.00 ft	30.00 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-2

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3340

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 5/5/08
30.00 ft. Date Completed: 5/5/08

10. CASING: ☑ Threaded ☐ Welded
Diam.: 3/4 inch
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 15.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 2.73 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 3/4 inch
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 15.00 ft. and 30.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 18.26 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 13.00 ft. to 30.00 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 13.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P._____ Volts_____ Length of drop pipe ___ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus **CERT. NO.:** 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: [signature] Date: 6/4/08
Well Driller

If D Level Driller, provide supervising driller's name:

D H E C

PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: **COUNTY:** Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 34.32" Longitude: W82 53' 46.64"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Silt and sand -saprolite	40.00 ft	40.00 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-3

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3340

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 5/6/08
40.00 ft. Date Completed: 5/6/08

10. CASING: ☑ Threaded ☐ Welded
Diam.: 3/4 inch
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 25.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 0.13 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 3/4 inch
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 25.00 ft. and 40.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 27.36 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 23.00 ft. to 40.00 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 23.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus **CERT. NO.:** 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: S H Dacus Date: 6/4/08
Well Driller

If D Level Driller, provide supervising driller's name:

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: **COUNTY:** Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 32.77" Longitude: W82 53' 46.86"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Silt and sand -saprolite	30.00 ft	30.00 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-4

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3340

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 5/5/08
30.00 ft. Date Completed: 5/5/08

10. CASING: ☑ Threaded ☐ Welded
Diam.: 3/4 inch
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 15.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 2.68 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 3/4 inch
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 15.00 ft. and 30.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 19.41 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 13.00 ft. to 30.00 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 13.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P._____ Volts_____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus **CERT. NO.:** 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: _____ Date: 6/4/08
Well Driller

If D Level Driller, provide supervising driller's name:

D H E C

PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: **COUNTY:** Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 33.43" Longitude: W82 53' 46.17"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Silt and sand -saprolite	36.00 ft	36.00 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-5

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3340

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 5/6/08
36.00 ft. Date Completed: 5/6/08

10. CASING: ☑ Threaded ☐ Welded
Diam.: 3/4 inch
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 21.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 2.43 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 3/4 inch
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 21.00 ft. and 36.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 23.48 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 19.00 ft. to 36.00 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 19.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date Installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus **CERT. NO.:** 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: _____ Date: 6/4/08
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) **COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)**

D H E C

PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: **COUNTY:** Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 31.50" Longitude: W82 53' 44.50"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Clayey sandy silt - saprolite	9.10 ft	9.10 ft
Clayey silt - saprolite	2.90 ft	12.00 ft
Silty sand - saprolite	8.00 ft	20.00 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-6

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3340

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 5/5/08
20.00 ft. Date Completed: 5/5/08

10. CASING: ☑ Threaded ☐ Welded
Diam.: 3/4 inch
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 5.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☑
Surface 0.02 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 3/4 inch
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 5.00 ft. and 20.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 14.85 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 3.00 ft. to 20.00 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 3.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P._____ Volts_____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus **CERT. NO.:** 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: _____ Date: 6/4/08
Well Driller

If D Level Driller, provide supervising driller's name:

D H E C

PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: **COUNTY:** Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 32.43" Longitude: W82 53' 44.79"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Silty sand - saprolite	12.00 ft	12.00 ft
Clayey silty sand - saprolite	4.00 ft	16.00 ft
Silty sand - saprolite	4.00 ft	20.00 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-7

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3340

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 5/6/08
20.00 ft. Date Completed: 5/6/08

10. CASING: ☑ Threaded ☐ Welded
Diam.: 3/4 inch
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 5.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 2.42 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 3/4 inch
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 5.00 ft. and 20.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 12.90 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 3.00 ft. to 20.00 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 3.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: _____ ft. _____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P._____ Volts_____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus **CERT. NO.:** 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Scott Edwards Date: 6/4/08
Well Driller

If D Level Driller, provide supervising driller's name:

D H E C

PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy (last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: **COUNTY:** Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 33.25" Longitude: W82 53' 45.03"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Sandy silt - saprolite	10.00 ft	10.00 ft
Sandy clayey silt - saprolite	10.00 ft	20.00 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-8

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3340

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 5/1/08
20.00 ft. Date Completed: 5/1/08

10. CASING: ☑ Threaded ☐ Welded
Diam.: 3/4 inch
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 5.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 2.59 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 3/4 inch
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 5.00 ft. and 20.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 10.14 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 3.00 ft. to 20.00 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 3.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus **CERT. NO.:** 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: _____ Date: 6/4/08
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) **COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)**

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: **COUNTY:** Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 34.97" Longitude: W82 53' 45.55"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Clayey silt - saprolite	8.40 ft	8.40 ft
Sandy silt - saprolite	1.60 ft	10.00 ft
Clayey sand - saprolite	1.60 ft	11.60 ft
Silty sand - saprolite	8.40 ft	20.00 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-9

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3340

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 4/29/08
20.00 ft. Date Completed: 4/29/08

10. CASING: ☑ Threaded ☐ Welded
Diam.: 3/4 inch
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 5.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☑
Surface 2.19 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 3/4 inch
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 5.00 ft. and 20.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 6.98 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 3.00 ft. to 20.00 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 3.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus **CERT. NO.:** 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: _____ Date: 6/4/08
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) **COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)**

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: **COUNTY:** Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 35.85" Longitude: W82 53' 45.80"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Sandy silt - saprolite	9.40 ft	9.40 ft
Claycy silt - saprolite	0.40 ft	9.80 ft
Sandy silt - saprolite	0.70 ft	10.50 ft
Clayey sand - saprolite	3.15 ft	13.65 ft
Silty sand - saprolite	4.35 ft	18.00 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-10

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3340

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 4/29/08
18.00 ft. Date Completed: 4/29/08

10. CASING: ☑ Threaded ☐ Welded
Diam.: 3/4 inch
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 8.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 2.14 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 3/4 inch
Slot/Gauge: 0.01 inches Length: 10 feet
Set Between: 8.00 ft. and 18.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 6.53 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 6.00 ft. to 18.00 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 6.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus **CERT. NO.:** 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: _____ Date: 6/4/08
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) **COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)**

D H E C

PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: **COUNTY:** Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 36.74" Longitude: W82 53' 45.68"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Sandy silt - saprolite	8.00 ft	8.00 ft
Clayey sandy silt - saprolite	10.00 ft	18.00 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-11

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3340

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 4/30/08
18.00 ft. Date Completed: 4/30/08

10. CASING: ☑ Threaded ☐ Welded
Diam.: 3/4 inch
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 8.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 2.16 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 3/4 inch
Slot/Gauge: 0.01 inches Length: 10 feet
Set Between: 8.00 ft. and 18.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 5.76 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 6.00 ft. to 18.00 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 6.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: _____ ft. _____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus **CERT. NO.:** 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: _____ Date: 6/4/08
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) **COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)**

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 37.03" Longitude: W82 53' 44.66"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Sandy silt - saprolite	18.00 ft	18.00 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-12

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3340

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 4/30/08
18.00 ft. Date Completed: 4/30/08

10. CASING: ☑ Threaded ☐ Welded
Diam.: 3/4 inch
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 8.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 2.07 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 3/4 inch
Slot/Gauge: 0.01 inches Length: 10 feet
Set Between: 8.00 ft. and 18.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 6.23 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 6.00 ft. to 18.00 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 6.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus CERT. NO.: 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: S H Davis Date: 6/4/08
Well Driller

If D Level Driller, provide supervising driller's name:

D H E C

PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: **COUNTY:** Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 37.24" Longitude: W82 53' 43.61"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Sandy silt - saprolite	8.00 ft	8.00 ft
Clayey silt - saprolite	10.00 ft	18.00 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-13

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3340

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 4/30/08
18.00 ft. Date Completed: 4/30/08

10. CASING: ☑ Threaded ☐ Welded
Diam.: 3/4 inch
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 8.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 2.14 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 3/4 inch
Slot/Gauge: 0.01 inches Length: 10 feet
Set Between: 8.00 ft. and 18.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 4.39 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 6.00 ft. to 18.00 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 6.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus **CERT. NO.:** 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: _____ Date: 6/4/08
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) **COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)**

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: **COUNTY:** Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 37.45" Longitude: W82 53' 42.55"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Sandy silt - saprolite	8.00 ft	8.00 ft
Clayey silt - saprolite	7.30 ft	15.30 ft
Clayey sand - saprolite	4.70 ft	20.00 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-14

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3340

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 5/1/08
20.00 ft. Date Completed: 5/1/08

10. CASING: ☑ Threaded ☐ Welded
Diam.: 3/4 inch
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 5.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 2.56 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 3/4 inch
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 5.00 ft. and 20.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 3.80 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 3.00 ft. to 20.00 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 3.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus **CERT. NO.:** 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: _____ Date: 6/4/08
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) **COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)**

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: **COUNTY:** Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 37.66" Longitude: W82 53' 41.51"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Silty sand - saprolite	12.00 ft	12.00 ft
Silty sandy clay - saprolite	8.00 ft	20.00 ft
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-15

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☑ Other

7. PERMIT NUMBER: 3340

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 5/1/08
20.00 ft. Date Completed: 5/1/08

10. CASING: ☑ Threaded ☐ Welded
Diam.: 3/4 inch
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 5.00 ft. depth
_____ in. to _____ ft. depth
Height: Above ☑ Below ☐
Surface 2.38 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 3/4 inch
Slot/Gauge: 0.01 inches Length: 15 feet
Set Between: 5.00 ft. and 20.00 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 2.51 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☑ Yes ☐ No
Installed from 3.00 ft. to 20.00 ft.
Effective size #1 Uniformity Coefficient _____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 3.00 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus **CERT. NO.:** 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: _____ Date: 6/4/08
Well Driller

If D Level Driller, provide supervising driller's name:

Scott Dacus

From: Scott Dacus
Sent: Tuesday, June 17, 2008 10:01 AM
To: 'cookejt@dhec.sc.gov'
Cc: Larry Armstrong; Mary Beth Cline; William Miller; 'Robison, Gregory D'; 'Martinec, Cynthia D'; 'Ed Sullivan'; 'Starnes, Luie J Jr'; John Estridge; Curtis L. Arnold (lcarnold@dukeenergy.com)
Subject: Water Well Records - Abandonment
Attachments: ons mw aband_20080618100027.pdf

Jan,

On behalf of Duke Energy, please find attached the completed and signed Water Well Records for the abandonment of 15 temporary monitoring wells at the Oconee Nuclear Station (Site ID # 00535) by S&ME. This submittal will satisfy Item 4. of Temporary Monitoring Well Approval #3340 of April 23, 2008.

Thank you

Scott E. Dacus, P.G.
Project Geologist

S&ME
ENGINEERING INTEGRITY.

S&ME, Inc.
155 Tradd Street
Spartanburg SC 29301 Map
Ph: 864-574-2360
Fax: 864-576-8730
Mobile: 864-590-6113
sdacus@smeinc.com
www.smeinc.com

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D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 32.98" Longitude: W82 53' 47.68"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☑ Yes ☐ No
Grouted Depth: from 30.00 ft. to 0.00 ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-1: Abandoned 6/9/08 per R.61-71.H.4.c

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: 3340

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☐ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started:
_____ ft. Date Completed:

10. CASING: ☐ Threaded ☐ Welded
Diam.: _____
Type: ☐ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to _____ ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: _____ Diam.: _____
Slot/Gauge: _____ Length: _____
Set Between: _____ ft. and _____ ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL _____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☐ No
Installed from _____ ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From _____ ft. to _____ ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus CERT. NO.: 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: S H E Dacus Date: 6/17/08
Well Driller

If D Level Driller, provide supervising driller's name:

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 33.73" Longitude: W82 53' 47.03"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☑ Yes ☐ No
Grouted Depth: from 30.00 ft. to 0.00 ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-2: Abandoned 6/9/08 per R.61-71.H.4.c

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: 3340

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☐ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started:
_____ ft. Date Completed:

10. CASING: ☐ Threaded ☐ Welded
Diam.: _____
Type: ☐ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to _____ ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: _____ Diam.: _____
Slot/Gauge: _____ Length: _____
Set Between: _____ ft. and _____ ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL _____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☐ No
Installed from _____ ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From _____ ft. to _____ ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus CERT. NO.: 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Scott E Dacus Date: 6/17/08
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

D H E C

PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 34.32" Longitude: W82 53' 46.64"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☑ Yes ☐ No
Grouted Depth: from 40.00 ft. to 0.00 ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-3: Abandoned 6/9/08 per R.61-71.H.4.c

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: 3340

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☐ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started:
_____ ft. Date Completed:

10. CASING: ☐ Threaded ☐ Welded
Diam.: _____
Type: ☐ PVC ☐ Galvanized ☐ Steel ☐ Other
_____ in. to _____ ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: _____ Diam.: _____
Slot/Gauge: _____ Length: _____
Set Between: _____ ft. and _____ ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL _____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☐ No
Installed from _____ ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From _____ ft. to _____ ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P._____ Volts_____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus CERT. NO.: 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: S H E Davis Date: 6/17/08
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 32.77" Longitude: W82 53' 46.86"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☑ Yes ☐ No
Grouted Depth: from 30.00 ft. to 0.00 ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-4: Abandoned 6/9/08 per R.61-71.H.4.c

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: 3340

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☐ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started:
_____ ft. Date Completed:

10. CASING: ☐ Threaded ☐ Welded
Diam.: _____
Type: ☐ PVC ☐ Galvanized ☐ Steel ☐ Other
_____ in. to _____ ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: _____ Diam.: _____
Slot/Gauge: _____ Length: _____
Set Between: _____ ft. and _____ ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL _____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☐ No
Installed from _____ ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From _____ ft. to _____ ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus **CERT. NO.:** 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: S H E Dacus Date: 6/17/08
Well Driller

If D Level Driller, provide supervising driller's name:

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 33.43" Longitude: W82 53' 46.17"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☑ Yes ☐ No
Grouted Depth: from 36.00 ft. to 0.00 ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-5: Abandoned 6/9/08 per R.61-71.H.4.c

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: 3340

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☐ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started:
_____ ft. Date Completed:

10. CASING: ☐ Threaded ☐ Welded
Diam.: _____
Type: ☐ PVC ☐ Galvanized ☐ Steel ☐ Other
_____ in. to _____ ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: _____ Diam.: _____
Slot/Gauge: _____ Length: _____
Set Between: _____ ft. and _____ ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL _____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☐ No
Installed from _____ ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☐ Yes ☐ No
☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From _____ ft. to _____ ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P._____ Volts_____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus **CERT. NO.:** 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Scott E Dacus Date: 6/17/08
Well Driller

If D Level Driller, provide supervising driller's name:

D H E C

PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 31.50" Longitude: W82 53' 44.50"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☑ Yes ☐ No
Grouted Depth: from 20.00 ft. to 0.00 ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-6: Abandoned 6/9/08 per R.61-71.H.4.c

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: 3340

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☐ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started:
_____ ft. Date Completed:

10. CASING: ☐ Threaded ☐ Welded
Diam.: _____
Type: ☐ PVC ☐ Galvanized ☐ Steel ☐ Other
_____ in. to _____ ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: _____ Diam.: _____
Slot/Gauge: _____ Length: _____
Set Between: _____ ft. and _____ ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL _____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☐ No
Installed from _____ ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From _____ ft. to _____ ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P._____ Volts_____ Length of drop pipe ___ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus **CERT. NO.:** 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2300 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Scott E Dacus Date: 6/17/08
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

D H E C

PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 32.43" Longitude: W82 53' 44.79"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☑ Yes ☐ No
Grouted Depth: from 20.00 ft. to 0.00 ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-7: Abandoned 6/9/08 per R.61-71.H.4.c

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: 3340

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☐ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started:
_____ ft. Date Completed:

10. CASING: ☐ Threaded ☐ Welded
Diam.: _____
Type: ☐ PVC ☐ Galvanized ☐ Steel ☐ Other
_____ in. to _____ ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: _____ Diam.: _____
Slot/Gauge: _____ Length: _____
Set Between: _____ ft. and _____ ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL _____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☐ No
Installed from _____ ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From _____ ft. to _____ ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: _____ ft. _____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P._____ Volts_____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus **CERT. NO.:** 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Scott E Dacus Date: 6/17/08
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 33.25" Longitude: W82 53' 45.03"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☑ Yes ☐ No
Grouted Depth: from 20.00 ft. to 0.00 ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-8: Abandoned 6/9/08 per R.61-71.H.4.c

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: 3340

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☐ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started:
_____ ft. Date Completed:

10. CASING: ☐ Threaded ☐ Welded
Diam.: _____
Type: ☐ PVC ☐ Galvanized ☐ Steel ☐ Other
_____ in. to _____ ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: _____ Diam.: _____
Slot/Gauge: _____ Length: _____
Set Between: _____ ft. and _____ ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL _____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☐ No
Installed from _____ ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From _____ ft. to _____ ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus CERT. NO.: 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: S H E Dacus Date: 6/17/08
Well Driller

If D Level Driller, provide supervising driller's name:

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: **COUNTY:** Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 34.97" Longitude: W82 53' 45.55"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☑ Yes ☐ No
Grouted Depth: from 20.00 ft. to 0.00 ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-9: Abandoned 6/9/08 per R.61-71.H.4.c

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: 3340

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☐ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started:
_____ ft. Date Completed:

10. CASING: ☐ Threaded ☐ Welded
Diam.: _____
Type: ☐ PVC ☐ Galvanized ☐ Steel ☐ Other
_____ in. to _____ ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: _____ Diam.: _____
Slot/Gauge: _____ Length: _____
Set Between: _____ ft. and _____ ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL _____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☐ No
Installed from _____ ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From _____ ft. to _____ ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: _____ ft. _____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe _____ ft. Capacity _____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus **CERT. NO.:** 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Scott E Dacus Date: 6/17/08
Well Driller

If D Level Driller, provide supervising driller's name:

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 35.85" Longitude: W82 53' 45.80"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☑ Yes ☐ No
Grouted Depth: from 18.00 ft. to 0.00 ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-10: Abandoned 6/9/08 per R.61-71.H.4.c

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: 3340

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☐ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started:
_____ ft. Date Completed:

10. CASING: ☐ Threaded ☐ Welded
Diam.: _____
Type: ☐ PVC ☐ Galvanized ☐ Steel ☐ Other
_____ in. to _____ ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: _____ Diam.: _____
Slot/Gauge: _____ Length: _____
Set Between: _____ ft. and _____ ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL _____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☐ No
Installed from _____ ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From _____ ft. to _____ ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus CERT. NO.: 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: S H E Dacus Date: 6/17/08
Well Driller

If D Level Driller, provide supervising driller's name:

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 36.74" Longitude: W82 53' 45.68"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☑ Yes ☐ No
Grouted Depth: from 18.00 ft. to 0.00 ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-11: Abandoned 6/9/08 per R.61-71.H.4.c

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: 3340

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☐ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started:
_____ ft. Date Completed:

10. CASING: ☐ Threaded ☐ Welded
Diam.: _____
Type: ☐ PVC ☐ Galvanized ☐ Steel ☐ Other
_____ in. to _____ ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: _____ Diam.: _____
Slot/Gauge: _____ Length: _____
Set Between: _____ ft. and _____ ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL _____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☐ No
Installed from _____ ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From _____ ft. to _____ ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus CERT. NO.: 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Scott E Dacus Date: 6/17/08
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 37.03" Longitude: W82 53' 44.66"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☑ Yes ☐ No
Grouted Depth: from 18.00 ft. to 0.00 ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-12: Abandoned 6/9/08 per R.61-71.H.4.c

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: 3340

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☐ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started:
_____ ft. Date Completed:

10. CASING: ☐ Threaded ☐ Welded
Diam.: _____
Type: ☐ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to _____ ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: _____ Diam.: _____
Slot/Gauge: _____ Length: _____
Set Between: _____ ft. and _____ ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL _____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☐ No
Installed from _____ ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From _____ ft. to _____ ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus CERT. NO.: 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: S.H.E. Dacus Date: 6/17/08
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 37.24" Longitude: W82 53' 43.61"

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☑ Yes ☐ No
Grouted Depth: from 18.00 ft. to 0.00 ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-13: Abandoned 6/9/08 per R.61-71.H.4.c

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: 3340

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☐ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started:
_____ ft. Date Completed:

10. CASING: ☐ Threaded ☐ Welded
Diam.: _____
Type: ☐ PVC ☐ Galvanized ☐ Steel ☐ Other
_____ in. to _____ ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: _____ Diam.: _____
Slot/Gauge: _____ Length: _____
Set Between: _____ ft. and _____ ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL _____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☐ No
Installed from _____ ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From _____ ft. to _____ ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P._____ Volts_____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus CERT. NO.: 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Scott E Dacus Date: 6/17/08
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

D H E C

PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 37.45" Longitude: W82 53' 42.55"

3. PUBLIC SYSTEM NAME: PUBLIC SYSTEM NUMBER:

4. ABANDONMENT: ☑ Yes ☐ No
Grouted Depth: from 20.00 ft. to 0.00 ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-14: Abandoned 6/9/08 per R.61-71.H.4.c

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: 3340

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☐ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started:
ft. Date Completed:

10. CASING: ☐ Threaded ☐ Welded
Diam.:
Type: ☐ PVC ☐ Galvanized ☐ Steel ☐ Other
in. to ft. depth
in. to ft. depth
Height: Above ☐ Below ☐
Surface ft.
Weight lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: Diam.:
Slot/Gauge: Length:
Set Between: ft. and ft.
ft. and ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
ft. after hrs. Pumping G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield:

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☐ No
Installed from ft. to ft.
Effective size Uniformity Coefficient

16. WELL GROUTED? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other
Depth: From ft. to ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ft. direction
Type
Well Disinfected ☐ Yes ☐ No Type: Amount:

18. PUMP: Date installed: Not installed ☐
Mfr. Name: Model No.:
H.P. Volts Length of drop pipe ft. Capacity gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus CERT. NO.: 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2360 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: S H E Dacus Date: 6/17/08
Well Driller

If D Level Driller, provide supervising driller's name:

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Estridge, John - Duke Energy
(last) (first)
Address: 7800 Rochester Highway
City: Seneca State: SC Zip:
Telephone: Work: (864) 885-3979 Home:

2. LOCATION OF WELL: COUNTY: Oconee
Name: Oconee Nuclear Station
Street Address: 7800 Rochester Highway
City: Seneca Zip:
Latitude: N34 47' 37.66" Longitude: W82 53' 41.51"

3. PUBLIC SYSTEM NAME: PUBLIC SYSTEM NUMBER:

4. ABANDONMENT: ☑ Yes ☐ No
Grouted Depth: from 20.00 ft. to 0.00 ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
GP-15: Abandoned 6/9/08 per R.61-71.H.4.c

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: 3340

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☐ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started:
ft. Date Completed:

10. CASING: ☐ Threaded ☐ Welded
Diam.:
Type: ☐ PVC ☐ Galvanized ☐ Steel ☐ Other
in. to ft. depth
in. to ft. depth
Height: Above ☐ Below ☐
Surface ft.
Weight lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: Diam.:
Slot/Gauge: Length:
Set Between: ft. and ft.
ft. and ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
ft. after hrs. Pumping G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield:

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☐ No
Installed from ft. to ft.
Effective size Uniformity Coefficient

16. WELL GROUTED? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other
Depth: From ft. to ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ft. direction
Type
Well Disinfected ☐ Yes ☐ No Type: Amount:

18. PUMP: Date installed: Not installed ☐
Mfr. Name: Model No.:
H.P. Volts Length of drop pipe ft. Capacity gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Scott E. Dacus CERT. NO.: 1600
Address: (Print) Level: A B C D (circle one) ☐ ☑ ☐ ☐
155 Tradd St, Spartanburg, SC
Telephone No.: 864/574-2300 Fax No.: 864/576-8730

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: S.H E Dacus Date: 6/17/08
Well Driller

If D Level Driller, provide supervising driller's name:

APPENDIX E

LEGEND TO SOIL CLASSIFICATION AND SYMBOLS

SOIL TYPES

(Shown in Graphic Log)

- Fill
- Asphalt
- Concrete
- Topsoil
- Gravel
- Sand
- Silt
- Clay
- Organic
- Silty Sand
- Clayey Sand
- Sandy Silt
- Clayey Silt
- Sandy Clay
- Silty Clay
- Partially Weathered Rock
- Cored Rock

WATER LEVELS

(Shown in Water Level Column)

▽ = Water Level At Termination of Boring
▼ = Water Level Taken After 24 Hours
◄ = Loss of Drilling Water
HC = Hole Cave

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	STD. PENETRATION RESISTANCE BLOWS/FOOT
Very Soft	0 to 2
Soft	3 to 4
Firm	5 to 8
Stiff	9 to 15
Very Stiff	16 to 30
Hard	31 to 50
Very Hard	Over 50

RELATIVE DENSITY OF COHESIONLESS SOILS

RELATIVE DENSITY	STD. PENETRATION RESISTANCE BLOWS/FOOT
Very Loose	0 to 4
Loose	5 to 10
Medium Dense	11 to 30
Dense	31 to 50
Very Dense	Over 50

SAMPLER TYPES

(Shown in Samples Column)

- Shelby Tube
- Split Spoon
- Rock Core
- No Recovery

TERMS

Standard Penetration Resistance - The Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in. I.D. Split Spoon Sampler 1 Foot. As Specified in ASTM D-1586.

REC - Total Length of Rock Recovered in the Core Barrel Divided by the Total Length of the Core Run Times 100%.

RQD - Total Length of Sound Rock Segments Recovered that are Longer Than or Equal to 4" (mechanical breaks excluded) Divided by the Total Length of the Core Run Times 100%.

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Charlotte, North Carolina 28273
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Fax: 704-525-3953

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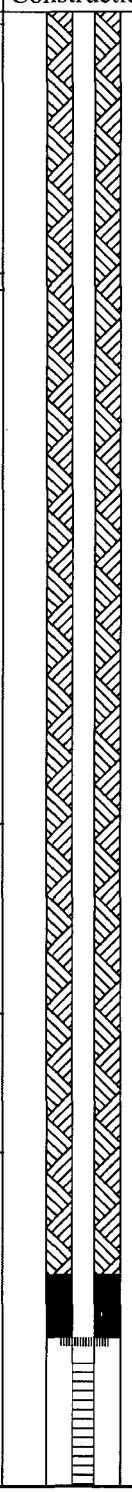
1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

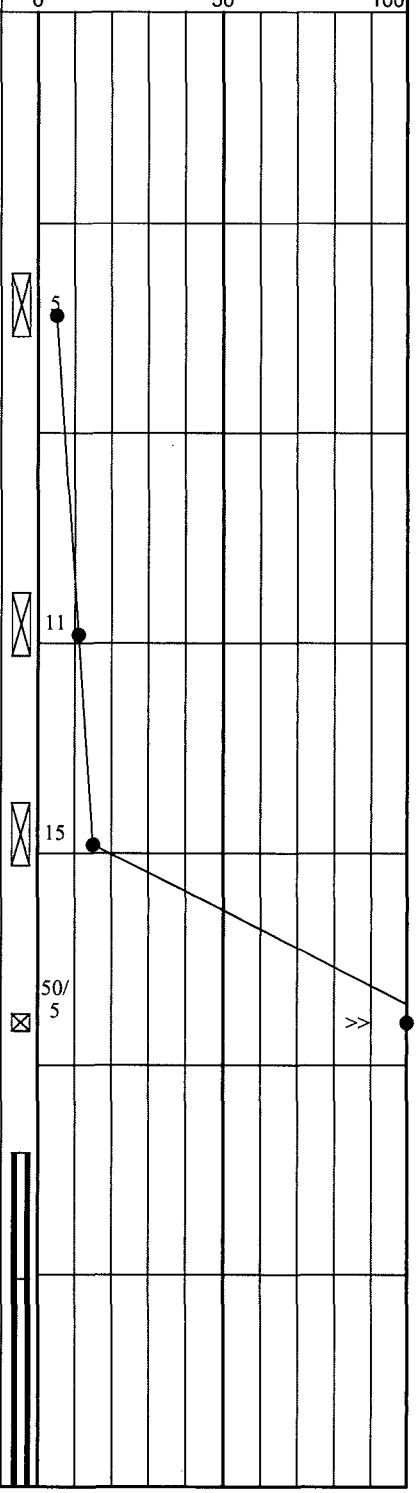
Project: **Oconee Nuclear Station**			**Boring No. GM-1R**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 1 of 2
Boring Depth (ft): **50.1**	Elevation (ft): **801.6**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **10/22/07**
Logged By: **Julie Petersen**	Water Level: **Stabilized Water Level at 7.75 ft bls**		Drilling Method: **Mud Rotary**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description
800			**ASPHALT**
			PRE-DUG HOLE FOR UTILITY CLEARANCE: Red, Silty, **CLAY**
	5		
795			SOIL/SAPROLITE (M1): Brown, Micaceous, Silty, Medium to Fine **SAND**
			SOIL/SAPROLITE (M1): Tan and White, Micaceous, Silty, Medium to Fine **SAND** (Gneissic)
	10		
790			
	15		
785			
	20		SOIL/SAPROLITE (M1): Brown, Micaceous, Fine Sandy, **SILT** (Schistose)
780			
	25		WEATHERED ROCK (M2): When Sampled Becomes Brown, Micaceous, Fine Sandy, **SILT** (Schistose)
775			**Roller Cone Refusal at 27.10 ft bls**
			SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS**; Moderately Fractured, High and Low Angle Joints With Slight Staining
	30		
770			

Well Construction



Penetration Resistance (Blows/Foot)



BORING LOG WITH WELL RECOVERED ONS LOG.GPJ LAGWGN01.GDT 7/23/08

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2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-1R**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 2 of 2
Boring Depth (ft): **50.1**	Elevation (ft): **801.6**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **10/22/07**
Logged By: **Julie Petersen**	Water Level: **Stabilized Water Level at 7.75 ft bls**		Drilling Method: **Mud Rotary**

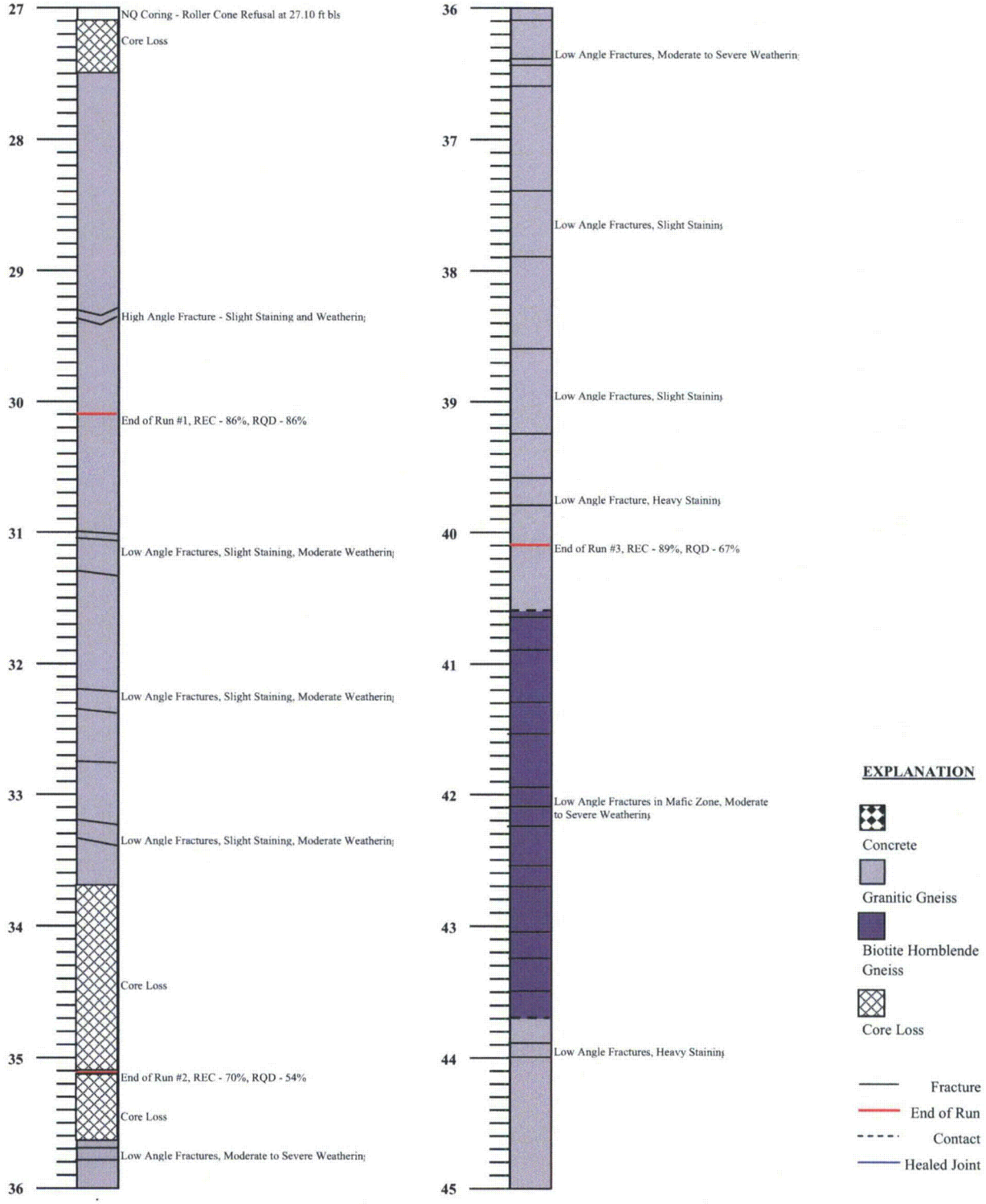
Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
765					
	40		PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **BIOTITE HORNBLENDE GNEISS**; Highly Weathered, Low Angle Joints With No Staining		
760			SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS**; Moderately Fractured, Low Angle Joints With Slight to Heavy Staining		
	45				
755					
	50		**Boring Terminated at 50.10 ft bls**		

FIELD ROCK CORE LOG

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-1R

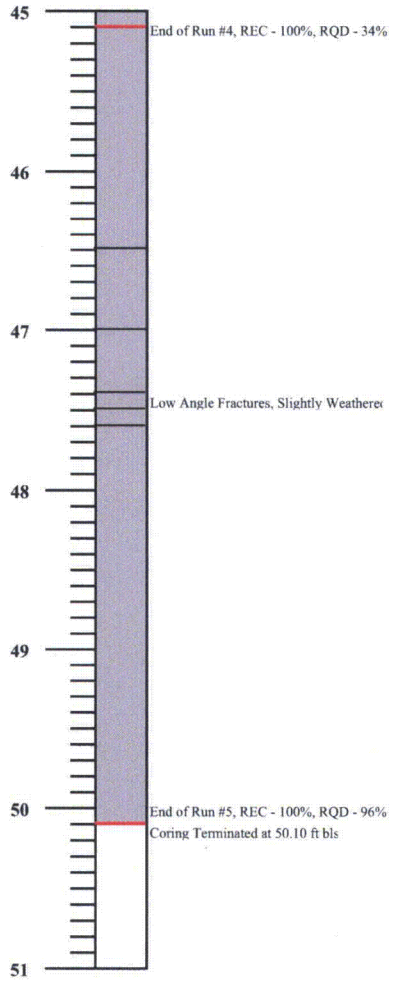


FIELD ROCK CORE LOG

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-1R



EXPLANATION

Concrete

Granitic Gneiss

Biotite Hornblende Gneiss

Core Loss

Fracture

End of Run

Contact

Healed Joint

COMPLETION REPORT OF WELL No. GM-1R

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

WATER LEVEL: **Stabilized Water Level at 7.75 ft bls**

LATITUDE: **34°47'45.152"**
LONGITUDE: **82°54'01.212"**
TOP OF CASING ELEVATION: **801.40**
DATUM: **MSL**
LOGGED BY: **Julie Petersen**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **Mud Rotary**
DATE DRILLED: **10/22/07**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
				0.00	GS	801.63
ASPHALT		0				
PRE-DUG HOLE FOR UTILITY CLEARANCE: Red, Silty, **CLAY**		5				
SOIL/SAPROLITE (M1): Brown, Micaceous, Silty, Medium to Fine **SAND**						
SOIL/SAPROLITE (M1): Tan and White, Micaceous, Silty, Medium to Fine **SAND** (Gneissic)		10, 15				
SOIL/SAPROLITE (M1): Brown, Micaceous, Fine Sandy, **SILT** (Schistose)		20				
WEATHERED ROCK (M2): When Sampled Becomes Brown, Micaceous, Fine Sandy, **SILT** (Schistose)		25				
SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** Moderately Fractured, High and Low Angle Joints With Slight Staining		30		30.00		771.63
				31.50		770.13
				31.70		769.93
				32.10		769.53

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter:
Type:
Interval:

RISER CASING
Diameter: **2"**
Type: **Sch. 40 PVC**
Interval: **0 to 32.1 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 30 ft bls**

SEAL
Type: **K-packer**
Interval: **31.5 to 31.7 ft bls**

FILTERPACK
Type:
Interval:

SCREEN
Diameter: **2"**
Type: **0.010 Slotted PVC**
Interval: **32.1 to 37.1 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

MONITORING WELL RECOVERED ONS LOG.GPJ S&ME.GDT 7/23/08

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COMPLETION REPORT OF WELL No. GM-1R

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

GROUND SURFACE ELEVATION:
LOGGED BY: **801.6**
CHECKED BY: **Julie Petersen**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)	WELL CONSTRUCTION DETAILS
							(See Page 1)
SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS**; Moderately Fractured, High and Low Angle Joints With Slight Staining *(continued)*		35		36.60 37.10 39.00		765.03 764.53 762.63	
		40					
PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **BIOTITE HORNBLENDE GNEISS**; Highly Weathered, Low Angle Joints With No Staining		45					
SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS**; Moderately Fractured, Low Angle Joints With Slight to Heavy Staining		50		50.10		751.53	

LEGEND

	FILTER PACK	TOC	TOP OF CASING
	BENTONITE	GS	GROUND SURFACE
	CEMENT GROUT	BS	BENTONITE SEAL
	CUTTINGS / BACKFILL	FP	FILTER PACK
	STATIC WATER LEVEL	TSC	TOP OF SCREEN
		BSC	BOTTOM OF SCREEN
		TD	TOTAL DEPTH
		CG	CEMENT GROUT

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COMPLETION REPORT OF WELL No. GM-1R

MONITORING WELL RECOVERED_ONS.LOG.GPJ S&ME.GDT 7/23/08

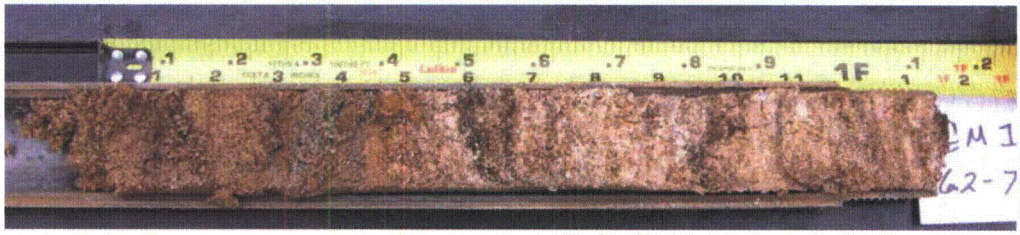
SPLIT SPOON SAMPLE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

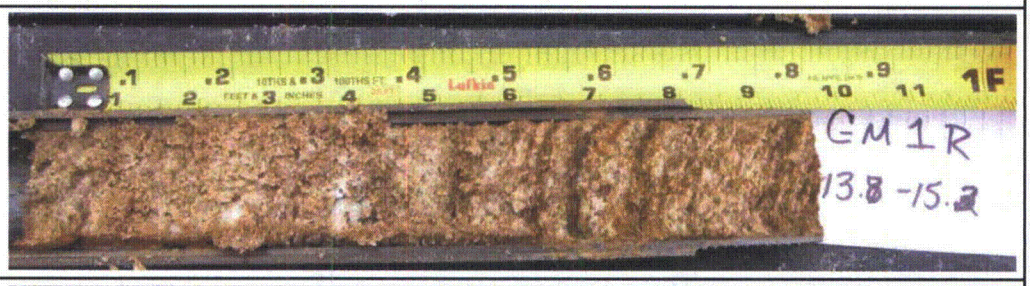
S&ME Project No: 1264-07-234

Boring Number: GM-1R

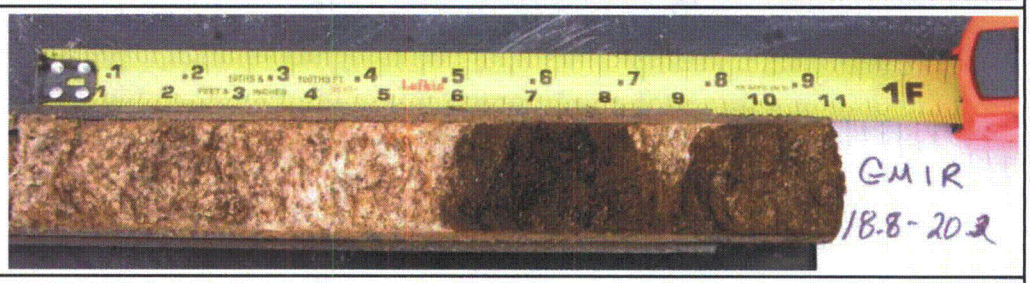
Sample No: 1
Depth (ft-bls): 6.2 - 7.7
Blow Count: 2 * 2 * 3



Sample No: 2
Depth (ft-bls): 13.8 - 15.3
Blow Count: 4 * 5 * 6



Sample No: 3
Depth (ft-bls): 18.8 - 20.3
Blow Count: 7 * 6 * 9



Sample No: 4
Depth (ft-bls): 23.8 - 25.3
Blow Count: 50/5

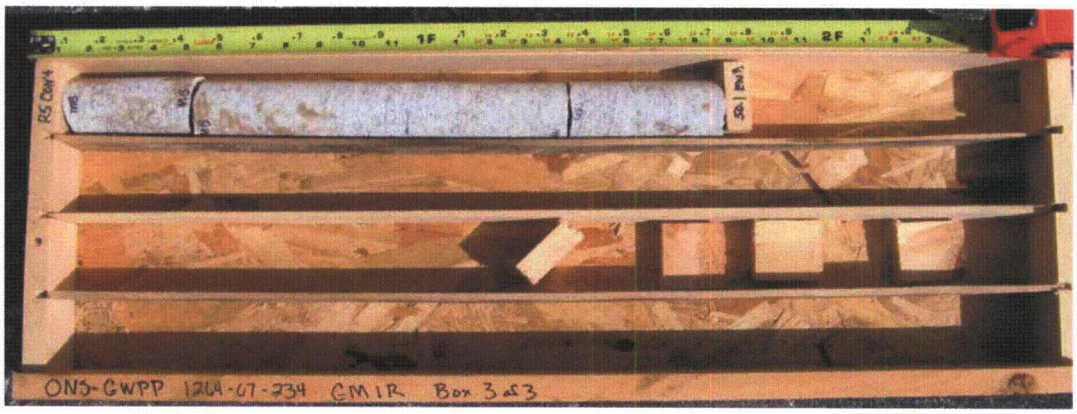
No Recovery

ROCK CORE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-1R



CLASSIFICATION:

27.10' to 40.60': Medium-Grained Granitic Gneiss

40.60' to 43.70': Biotite Hornblende Gneiss

43.70' to 50.10': Medium-Grained Granitic Gneiss

CALCULATION OF PERMEABILITY BY THE FALLING HEAD METHOD
(Open Hole in Uniform Material)

S&ME

Site Name:	ONS - GWPP	
Date:	10/23/2007	
Boring I.D.	GM-1R	
Test Interval:	27.1 to 30.1	(Sound Rock)
Total Depth of Hole:	30.1 ft	917.68 cm
Length of Open Hole:	3 ft	91.46 cm
Transformation Ratio m=	1	
Performed by:	Julie Petersen	

Time (sec)	Head (cm)	Permeability (cm/sec)
0	895.61	
3	849.39	4.45E-03
6	819.45	3.02E-03
9	793.90	2.66E-03
12	773.38	2.20E-03
15	755.43	1.98E-03
18	740.27	1.70E-03
21	727.96	1.41E-03
24	717.32	1.24E-03
27	707.99	1.10E-03
30	700.00	9.54E-04

Calculations

$$K_h = \frac{d^2 \cdot \ln\left(\frac{2mL}{D}\right)}{8 \cdot L \cdot (t_2 - t_1)} \cdot \ln\frac{H_1}{H_2}$$

for $\frac{mL}{D} > 4$

Where:

K_h	is the Horizontal Coefficient of Permeability (cm/sec)
H_1	is the Piezometric Head for time; $t = t_1$ (cm)
H_2	is the Piezometric Head for time; $t = t_2$ (cm)
D	is the Diameter of the Standpipe (cm)
d	is the diameter of the Open Length (cm),
m	is the Transformation Ratio, Where

$m = \sqrt{K_h / K_v}$ K_h is the Horizontal Permeability; K_v is the Vertical Permeability

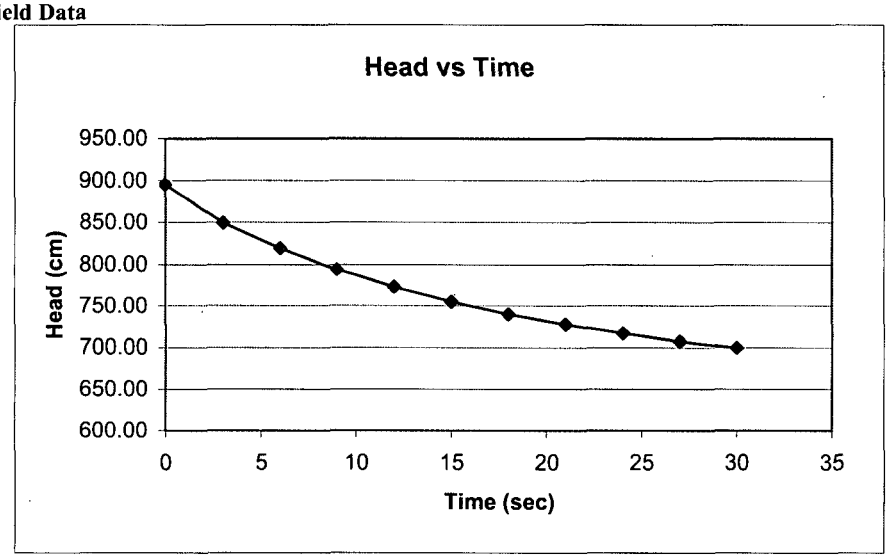
L	is the Open Length of Hole (cm)

Spreadsheet assumes 3" ID Pipe; NQ Hole, OD = 3"

MEAN PERMEABILITY (cm/sec)

2.07E-03

Graph of Field Data



CALCULATION OF PERMEABILITY BY THE FALLING HEAD METHOD
(Open Hole in Uniform Material)

S&ME

Site Name:	ONS - GWPP	
Date:	10/23/2007	
Boring I.D.	GM-1R	
Test Interval:	27.1 to 35.1	(Sound Rock)
Total Depth of Hole:	35.1 ft	1070.12 cm
Length of Open Hole:	8 ft	243.9 cm
Transformation Ratio m=	1	
Performed by:	Julie Petersen	

Time (sec)	Head (cm)	Permeability (cm/sec)
0	896.65	
3	836.04	2.89E-03
6	800.91	1.77E-03
9	777.38	1.23E-03
12	759.57	9.56E-04
15	745.46	7.74E-04
18	734.79	5.95E-04
21	725.67	5.15E-04
24	718.26	4.23E-04
27	711.98	3.62E-04
30	706.98	2.91E-04

Calculations

$$K_h = \frac{d^2 \cdot \ln\left(\frac{2mL}{D}\right)}{8 \cdot L \cdot (t_2 - t_1)} \cdot \ln\frac{H_1}{H_2}$$

for $\frac{mL}{D} > 4$

Where:

K_h	is the Horizontal Coefficient of Permeability (cm/sec)
H_1	is the Piezometric Head for time; $t = t_1$ (cm)
H_2	is the Piezometric Head for time; $t = t_2$ (cm)
D	is the Diameter of the Standpipe (cm)
d	is the diameter of the Open Length (cm),
m	is the Transformation Ratio, Where

$$m = \sqrt{K_h / K_v}$$

K_h is the Horizontal Permeability
K_v is the Vertical Permeability

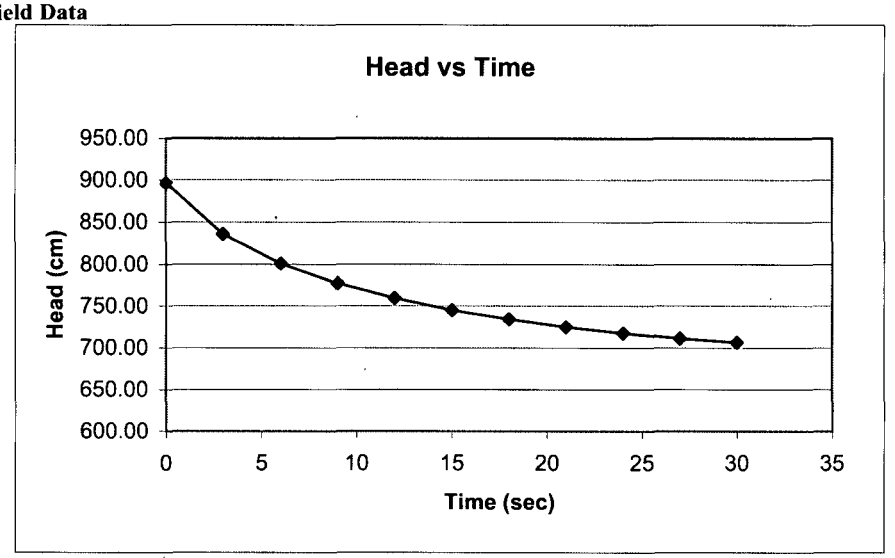
L	is the Open Length of Hole (cm)

Spreadsheet assumes 3" ID Pipe; NQ Hole, OD = 3"

MEAN PERMEABILITY (cm/sec)

9.80E-04

Graph of Field Data



BOREHOLE PERMEABILITY TEST USING PACKERS CALCULATIONS

PROJECT NAME AND NO.:	ONS - GWPP	**BOREHOLE NO.:**	GM-1R
LOCATION:	Seneca, SC	**TEST INTERVAL:**	32.0 to 37.0 bgs
TEST DATE:	10/24/2007	**TEST INTERVAL:**	769.6 to 764.6 EL
TESTED BY:	Jay Little and Julie Petersen		
GROUND ELEV (ft MSL):	801.6		

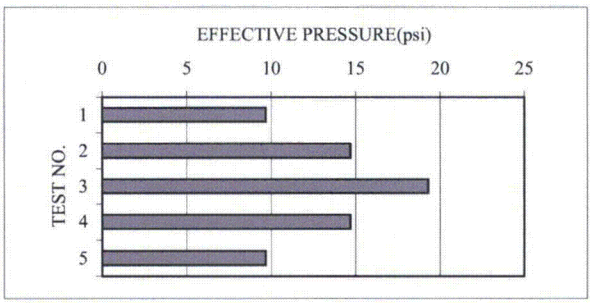
TEST METHOD: Double Packer Method using Multiple Pressure Tests
METHOD REFERENCE: Ground Water Manual, US Bureau of Reclamation, 1995, Chapter 10

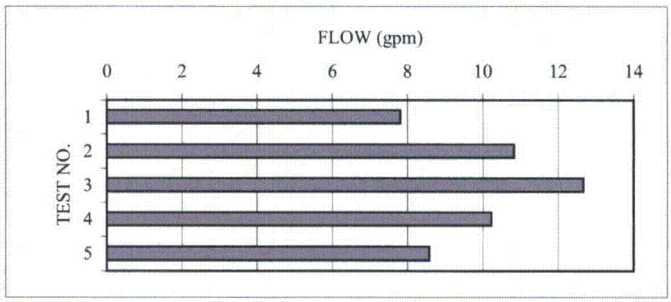
RESULTS OF PERMEABILITY CALCULATIONS
MULTIPLE STEP TEST

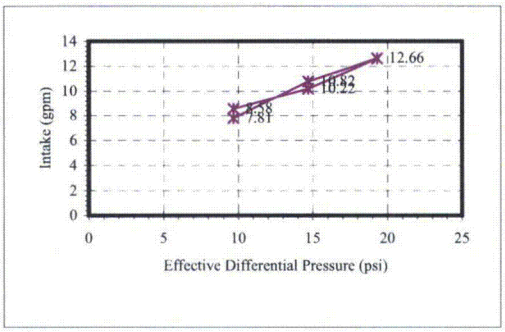
Step	Flow (Q) (gpm)	Pressure (psi) Gauge	Pressure (psi) Effective	Lugeons	Permeability (ft/sec)	Permeability (cm/sec)
1	7.81	5	10	290	9.73E-05	3.0E-03
2	10.82	10	15	265	8.9E-05	2.7E-03
3	12.66	15	19	236	7.9E-05	2.4E-03
4	10.22	10	15	251	8.4E-05	2.6E-03
5	8.58	5	10	319	1.1E-04	3.3E-03
			AVERAGE	272	9.1E-05	2.8E-03
			SELECTED VALUES			

Rock Description of Tested Interval:
Moderately Fractured Granitic Gneiss

TEST INTERPRETATION







PERMEABILITY CALCULATIONS FOR EACH STEP OF TEST

S&ME

CALCULATED PERMEABILITY FOR STEP 1

Gauge Pressure, **h2**:	5	psi	11.5	feet of water
Flow Rate, **Q**:	7.81	gpm	0.017	ft^3/sec
Head loss per TEN foot section of pipe:	0.1	psi		(per tables)
Head Loss, ***L*** :	0.4	psi	0.9	feet of water
Distance from pressure gauge to bottom of test section, h_1:	11.7	feet		
Value of h_1:	11.7	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	22.4	feet	9.7	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	-6.7	feet		
X = (H/Tu)*100	-331.9	%		
Tu/A	-1.3			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	40		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	64		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	9.73E-05	ft/sec	2.96E-03	cm/sec

Is this step valid?

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 3.9 square feet

Is Q/a * (estimated porosity) > 10?? True, Test Valid

CALCULATED PERMEABILITY FOR STEP 2

Gauge Pressure, **h2**:	10	psi	23.1	feet of water
Flow Rate, **Q**:	10.82	gpm	0.024	ft^3/sec
Head loss per TEN foot section of pipe:	0.1	psi		(per tables)
Head Loss, ***L*** :	0.4	psi	0.9	feet of water
Distance from pressure gauge to bottom of test section, h_1:	11.7	feet		
Value of h_1:	11.7	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	33.9	feet	14.7	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	4.8	feet		
X = (H/Tu)*100	705.0	%		
Tu/A	1.0			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	40		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	64		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	8.89E-05	ft/sec	2.71E-03	cm/sec

Is this step valid?

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 3.9 square feet

Is Q/a * (estimated porosity) > 10?? True, Test Valid

CALCULATED PERMEABILITY FOR STEP 3

Gauge Pressure, **h2**:	15	psi	34.6	feet of water
Flow Rate, **Q**:	12.66	gpm	0.028	ft^3/sec
Head loss per TEN foot section of pipe:	0.2	psi		(per tables)
Head Loss, ***L*** :	0.8	psi	1.8	feet of water
Distance from pressure gauge to bottom of test section, $\mathbf{h_1}$:	11.7	feet		
Value of h_1:	11.7	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	44.6	feet	19.3	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	15.5	feet		
X = (H/Tu)*100	288.1	%		
Tu/A	3.1			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	40		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	64		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	7.91E-05	ft/sec	2.41E-03	cm/sec

Is this step valid?

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 3.9 square feet

Is Q/a * (estimated porosity) > 10?? True, Test Valid

CALCULATED PERMEABILITY FOR STEP 4

Gauge Pressure, **h2**:	10	psi	23.1	feet of water
Flow Rate, **Q**:	10.22	gpm	0.023	ft^3/sec
Head loss per TEN foot section of pipe:	0.1	psi		(per tables)
Head Loss, ***L*** :	0.4	psi	0.9	feet of water
Distance from pressure gauge to bottom of test section, $\mathbf{h_1}$:	11.7	feet		
Value of h_1:	11.7	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	33.9	feet	14.7	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	4.8	feet		
X = (H/Tu)*100	705.0	%		
Tu/A	1.0			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	40		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	64		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	8.39E-05	ft/sec	2.56E-03	cm/sec

Is this step valid?

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 3.9 square feet

Is Q/a * (estimated porosity) > 10?? True, Test Valid

CALCULATED PERMEABILITY FOR STEP 5				
Gauge Pressure, **h2**	5	psi	11.5	feet of water
Flow Rate, **Q**:	8.58	gpm	0.019	ft^3/sec
Head loss per TEN foot section of pipe:	0.1	psi		(per tables)
Head Loss, ***L*** :	0.4	psi	0.9	feet of water
Distance from pressure gauge to bottom of test section, $\mathbf{h_1}$:	11.7	feet		
Value of h_1:	11.7	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	22.4	feet	9.7	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	-6.7	feet		
X = (H/Tu)*100	-331.9	%		
Tu/A	-1.3			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	40		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	64		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	1.07E-04	ft/sec	3.26E-03	cm/sec

Is this step valid?

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 3.9 square feet

Is Q/a * (estimated porosity) > 10?? True, Test Valid

BOREHOLE PERMEABILITY TEST USING PACKERS CALCULATIONS

PROJECT NAME AND NO.:	ONS - GWPP	**BOREHOLE NO.:**	GM-1R
LOCATION:	Seneca, SC	**TEST INTERVAL:**	40.0 to 45.0 bgs
TEST DATE:	10/24/2007	**TEST INTERVAL:**	761.6 to 756.6 EL
TESTED BY:	Jay Little and Julie Petersen		
GROUND ELEV (ft MSL):	801.6		

TEST METHOD: Double Packer Method using Multiple Pressure Tests
METHOD REFERENCE: Ground Water Manual, US Bureau of Reclamation, 1995, Chapter 10

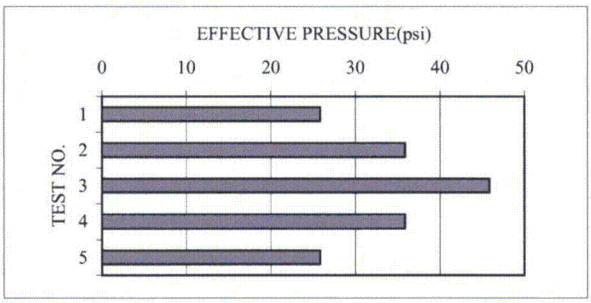
RESULTS OF PERMEABILITY CALCULATIONS
MULTIPLE STEP TEST

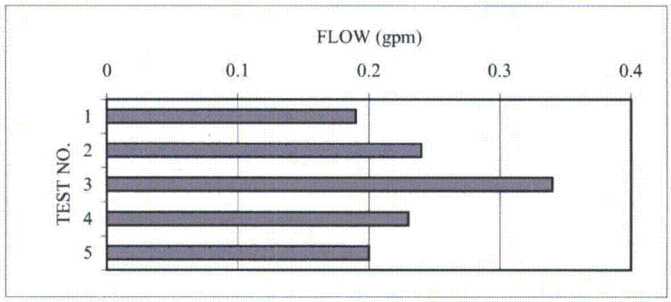
Step	Flow (Q) (gpm)	Pressure (psi) Gauge	Pressure (psi) Effective	Lugeons	Permeability (ft/sec)	Permeability (cm/sec)
1	0.19	20	26	3	8.87E-07	2.7E-05
2	0.24	30	36	2	8.1E-07	2.5E-05
3	0.34	40	46	3	8.9E-07	2.7E-05
4	0.23	30	36	2	7.7E-07	2.4E-05
5	0.2	20	26	3	9.3E-07	2.8E-05
			AVERAGE	3	8.6E-07	2.6E-05
			SELECTED VALUES			

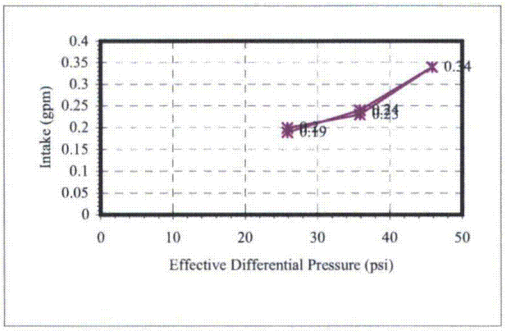
Rock Description of Tested Interval:

Intensely fractured Biotite Hornblende Gneiss

TEST INTERPRETATION







PERMEABILITY CALCULATIONS FOR EACH STEP OF TEST

S&ME

CALCULATED PERMEABILITY FOR STEP 1

Gauge Pressure, **h2**:	20	psi	46.2	feet of water
Flow Rate, **Q**:	0.19	gpm	0.000	ft^3/sec
Head loss per TEN foot section of pipe:	0.0	psi		(per tables)
Head Loss, ***L*** :	0.0	psi	0.0	feet of water
Distance from pressure gauge to bottom of test section, $\mathbf{h_1}$:	13.5	feet		
Value of $\mathbf{h_1}$:	13.5	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	59.7	feet	25.8	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	22.6	feet		
X = (H/Tu)*100	264.2	%		
Tu/A	4.5			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	40		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	64		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	8.87E-07	ft/sec	2.70E-05	cm/sec

Is this step valid?

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 3.9 square feet

Is Q/a * (estimated porosity) > 10?? True, Test Valid

CALCULATED PERMEABILITY FOR STEP 2

Gauge Pressure, **h2**:	30	psi	69.3	feet of water
Flow Rate, **Q**:	0.24	gpm	0.001	ft^3/sec
Head loss per TEN foot section of pipe:	0.0	psi		(per tables)
Head Loss, ***L*** :	0.0	psi	0.0	feet of water
Distance from pressure gauge to bottom of test section, $\mathbf{h_1}$:	13.5	feet		
Value of h_1:	13.5	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	82.8	feet	35.8	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	45.7	feet		
X = (H/Tu)*100	181.2	%		
Tu/A	9.1			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	40		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	64		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	8.07E-07	ft/sec	2.46E-05	cm/sec

Is this step valid?

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 3.9 square feet

Is Q/a * (estimated porosity) > 10?? True, Test Valid

CALCULATED PERMEABILITY FOR STEP 3

Gauge Pressure, **h2**:	40	psi	92.4	feet of water
Flow Rate, **Q**:	0.34	gpm	0.001	ft^3/sec
Head loss per TEN foot section of pipe:	0.0	psi		(per tables)
Head Loss, ***L*** :	0.0	psi	0.0	feet of water
Distance from pressure gauge to bottom of test section, $\mathbf{h_1}$:	13.5	feet		
Value of h_1:	13.5	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	105.9	feet	45.8	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	68.8	feet		
X = (H/Tu)*100	153.9	%		
Tu/A	13.8			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	40		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	64		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	8.94E-07	ft/sec	2.73E-05	cm/sec

Is this step valid?

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 3.9 square feet

Is Q/a * (estimated porosity) > 10?? True, Test Valid

CALCULATED PERMEABILITY FOR STEP 4

Gauge Pressure, **h2**:	30	psi	69.3	feet of water
Flow Rate, **Q**:	0.23	gpm	0.001	ft^3/sec
Head loss per TEN foot section of pipe:	0.0	psi		(per tables)
Head Loss, ***L*** :	0.0	psi	0.0	feet of water
Distance from pressure gauge to bottom of test section, $\mathbf{h_1}$:	13.5	feet		
Value of h_1:	13.5	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	82.8	feet	35.8	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	45.7	feet		
X = (H/Tu)*100	181.2	%		
Tu/A	9.1			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	40		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	64		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	7.74E-07	ft/sec	2.36E-05	cm/sec

Is this step valid?

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 3.9 square feet

Is Q/a * (estimated porosity) > 10?? True, Test Valid

CALCULATED PERMEABILITY FOR STEP 5

Gauge Pressure, **h2**:	20	psi	46.2	feet of water
Flow Rate, **Q**:	0.20	gpm	0.000	ft^3/sec
Head loss per TEN foot section of pipe:	0.0	psi		(per tables)
Head Loss, ***L*** :	0.0	psi	0.0	feet of water
Distance from pressure gauge to bottom of test section, h_1:	13.5	feet		
Value of h_1:	13.5	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	59.7	feet	25.8	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	22.6	feet		
X = (H/Tu)*100	264.2	%		
Tu/A	4.5			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	40		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	64		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	9.33E-07	ft/sec	2.84E-05	cm/sec

Is this step valid?

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 3.9 square feet

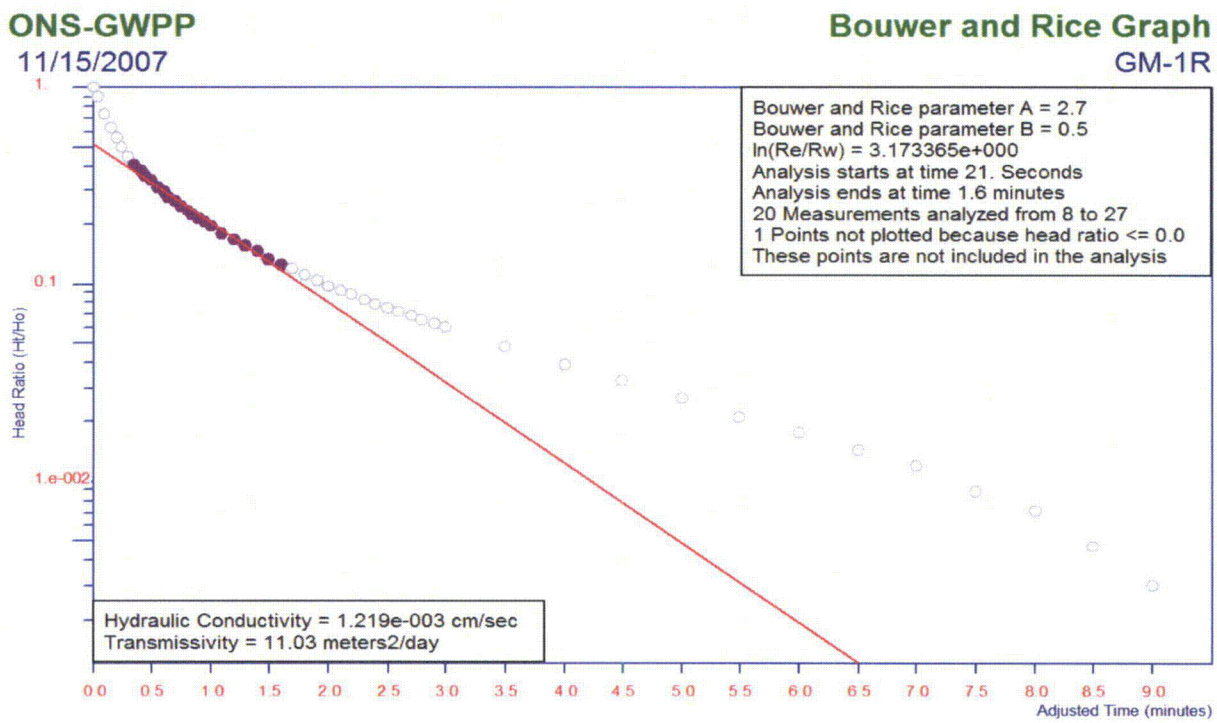
Is Q/a * (estimated porosity) > 10?? True, Test Valid

Calculation of Permeability By The Rising Head Method (Slug Test)

Site Name:	ONS-GWPP
Test Date:	11/15/2007
Well Label:	GM-1R
Aquifer Thickness:	34.35 feet
Screen Length:	5. feet
Casing Radius:	1. Inches
Effective Radius:	1.5 Inches
Static Water Level:	7.75 feet
Water Table to Screen Bottom:	29.35 feet
Anisotropy Ratio:	1

Time Adjustment: 0. Seconds
Test starts with trial 0
There are 54 time and drawdown measurements
Maximum head is 1.686 feet
Minimum head is 0. feet

Calculation by Bouwer and Rice Graphical Method



Analysis by Julie Petersen of S&ME, Inc.

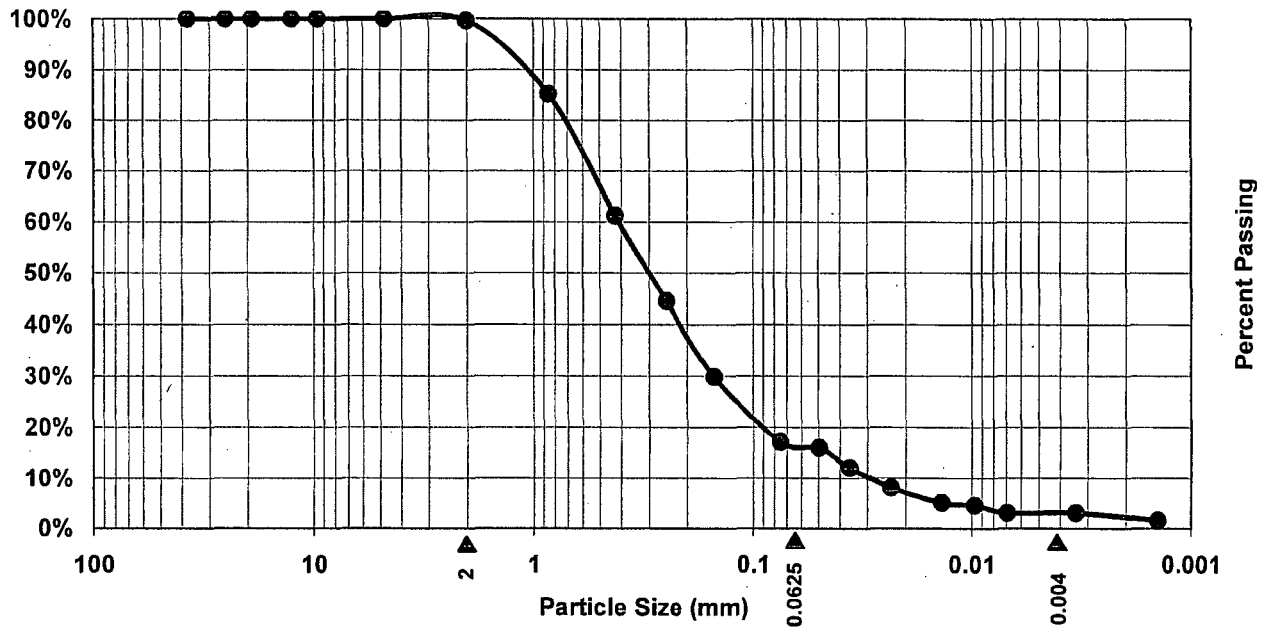
PERMEABILITY

1.22×10^{-3} cm/sec

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring No.:	Sample No.:	Depth:
GM-1R	SS-2	13.8 to 15.3 ft bls

Sample Description:
M1: Tan and White, Silty, Medium to Fine Sand (SM)



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 0.4%	% Sand 82.9%	% Silt 13.7%	% Clay 3.0%
Adjusted for Calculations	**0%**	**83%**	**14%**	**3%**

Notes:
Grain size distribution taken from grain size with hydrometer data located in Appendix II.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

S&ME Project:
Oconee Nuclear Station - GWPP

S&ME Project No.:
1264-07-234

S&ME

FETTER AND BEAR DIAGRAMS

S&ME PROJECT: Oconee Nuclear Station - GWPP
S&ME PROJECT NO.: 1264-07-234

Boring No. GM-1R

Boring Depth: 13.8 to 15.3 ft bls

% Sand: 83%

% Silt: 14%

% Clay: 3%

Estimated Specific Yield: 30%

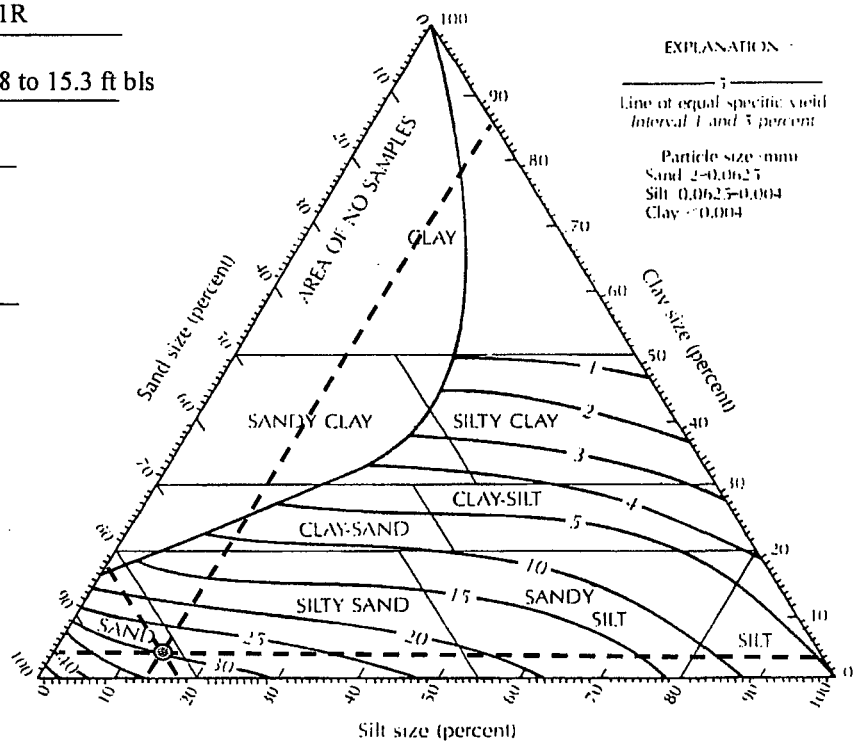
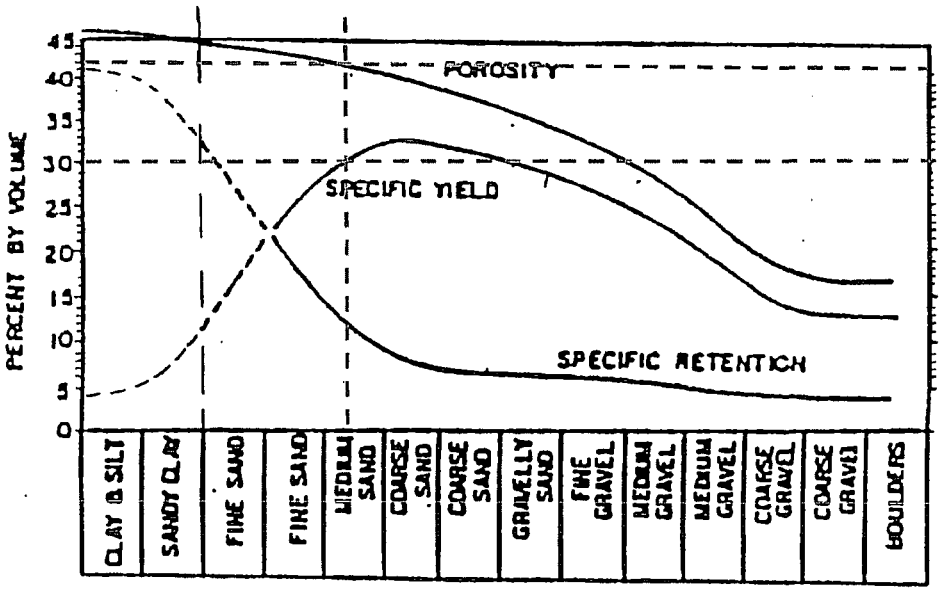


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



Estimated Porosity: 42%

Variation of Porosity, Specific Yield, and Specific Retention with Grain Size (after Bear, 1972)

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ENGINEERING • TESTING
ENVIRONMENTAL SERVICES

S&ME, Inc.
9751 Southern Pine Boulevard
Charlotte, North Carolina 28273
Telephone: 704-523-4726
Fax: 704-525-3953

1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-2R**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 1 of 1
Boring Depth (ft): **30.3**	Elevation (ft): **796.1**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **10/16/07**
Logged By: **Julie Petersen**	Water Level: **Stabilized Water Level at 27.23 ft bls**		Drilling Method: **Mud Rotary**

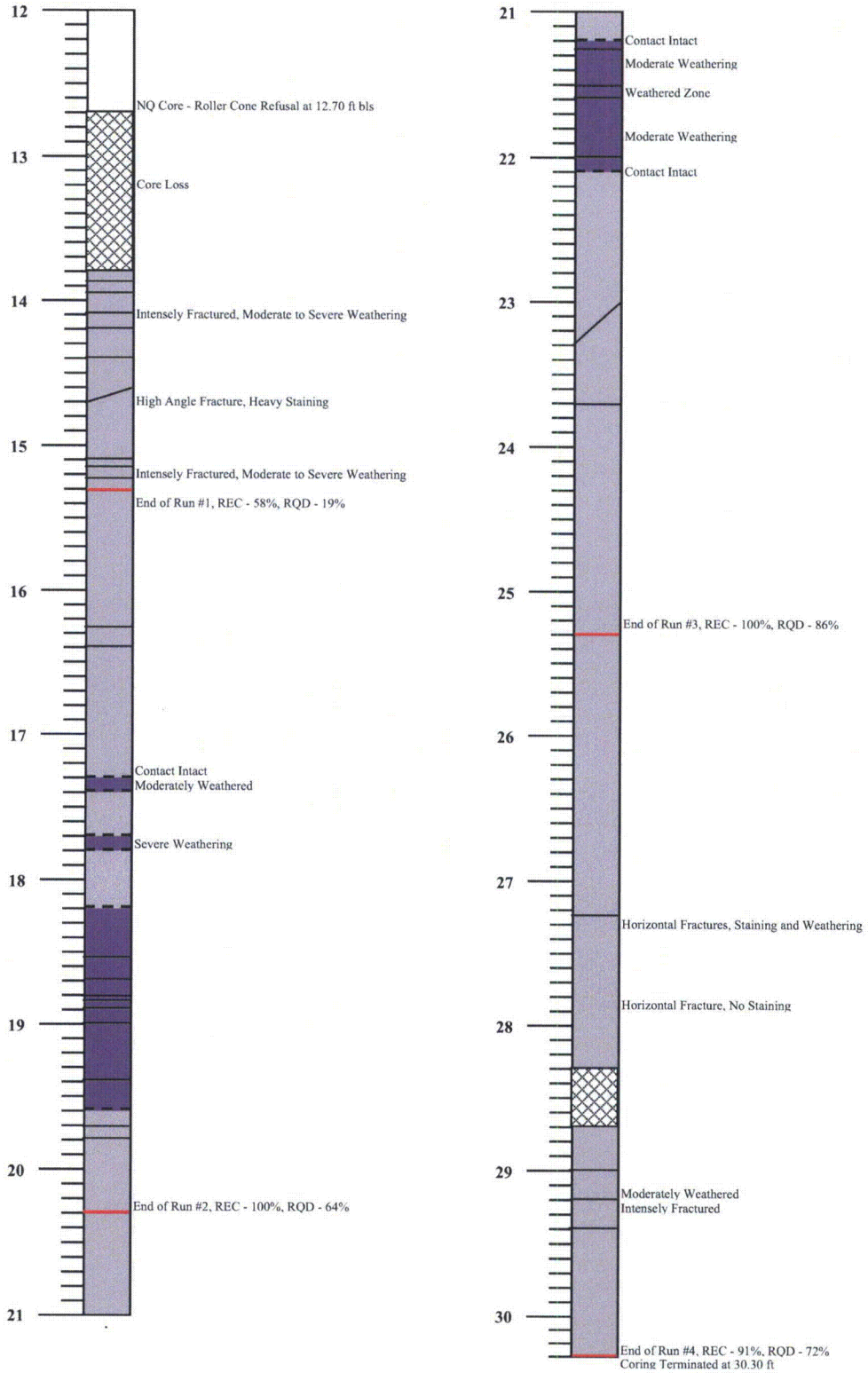
Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
795			**ASPHALT**		
			PRE-DUG HOLE FOR UTILITY CLEARANCE: **FILL**		
	5				
790			SOIL/SAPROLITE (M1): Brown and White, Silty, Coarse to Fine **SAND**		
	10				
785			**Roller Cone Refusal at 12.70 ft bls**		
			PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **GRANITIC GNEISS**; Intensely Fractured, Low Angle and High Angle Joints With Heavy to No Staining		
	15				
780			SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** With Intermittent **BIOTITE HORNBLENDE GNEISS**; Intensely Fractured, Horizontal and High Angle Joints With Heavy to No Staining		
	20		PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **BIOTITE HORNBLENDE GNEISS**; Intensely Fractured, Low Angle Joints With No Staining		
775			SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS**; Slightly Fractured, Horizontal Joints With No Staining		
	25		PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **BIOTITE HORNBLENDE GNEISS**; Intensely Fractured, Low Angle Joints With No Staining		
770			SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS**; Moderately Fractured, Vertical and Low Angle Joints With No Staining		
	30				
			Soil Descriptions Obtained From GM-2DR **Boring Terminated at 30.30 ft bls**		

FIELD ROCK CORE LOG

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-2R



EXPLANATION

- Concrete
- Granitic Gneiss
- Biotite Hornblende Gneiss
- Core Loss
- Fracture
- End of Run
- Contact
- Healed Joint

COMPLETION REPORT OF WELL No. GM-2R

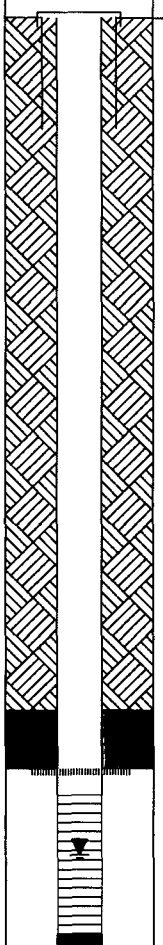
PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

WATER LEVEL: **Stabilized Water Level at 27.23 ft bls**

LATITUDE: **34°47'39.628"**
LONGITUDE: **82°53'56.857"**
TOP OF CASING ELEVATION: **795.84**
DATUM: **MSL**
LOGGED BY: **Julie Petersen**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **Mud Rotary**
DATE DRILLED: **10/16/07**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
				0.00	GS	796.12
ASPHALT		0				
PRE-DUG HOLE FOR UTILITY CLEARANCE: **FILL**		5				
SOIL/SAPROLITE (M1): Brown and White, Silty, Coarse to Fine **SAND**		10				
PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **GRANITIC GNEISS** Intensely Fractured, Low Angle and High Angle Joints With Heavy to No Staining		15				
SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** With Intermittent **BIOTITE HORNBLENDE GNEISS**; Intensely Fractured, Horizontal and High Angle Joints With Heavy to No Staining		20		22.50		773.62
		25		24.45		771.67
				24.65		771.47
				25.30		770.82
PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **BIOTITE HORNBLENDE GNEISS**; Intensely Fractured, Low Angle Joints With No Staining		30		29.80		766.32
				30.30		765.82



WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter:
Type:
Interval:

RISER CASING
Diameter: **2"**
Type: **Sch. 40 PVC**
Interval: **0 to 25.3 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 22.5 ft bls**

SEAL
Type: **K-packer**
Interval: **24.45 to 24.65 ft bls**

FILTERPACK
Type:
Interval:

SCREEN
Diameter: **2"**
Type: **0.010 Slotted PVC**
Interval: **25.3 to 30.3 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

MONITORING WELL RECOVERED ONS LOG.GPJ S&ME.GDT 7/23/08

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Charlotte, North Carolina 28273

COMPLETION REPORT OF WELL No. GM-2R

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

GROUND SURFACE ELEVATION:
LOGGED BY: **796.1**
CHECKED BY: **Julie Petersen**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)	WELL CONSTRUCTION DETAILS
							(See Page 1)
SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS**; Slightly Fractured, Horizontal Joints With No Staining							
PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **BIOTITE HORNBLENDE GNEISS**; Intensely Fractured, Low Angle Joints With No Staining							
SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS**; Moderately Fractured, Vertical and Low Angle Joints With No Staining							

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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COMPLETION REPORT OF WELL No. GM-2R

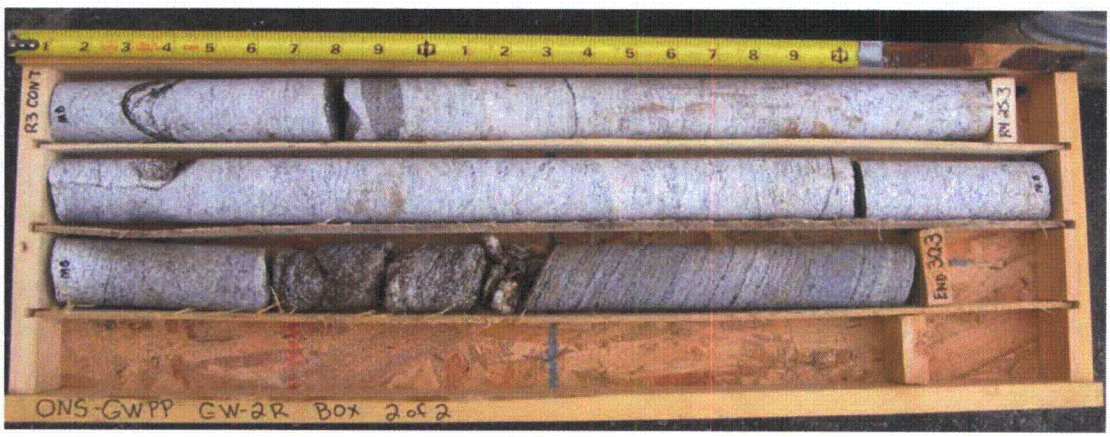
MONITORING WELL RECOVERED_ONS.LOG.GPJ S&ME.GDT 7/23/08

ROCK CORE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-2R



CLASSIFICATION:

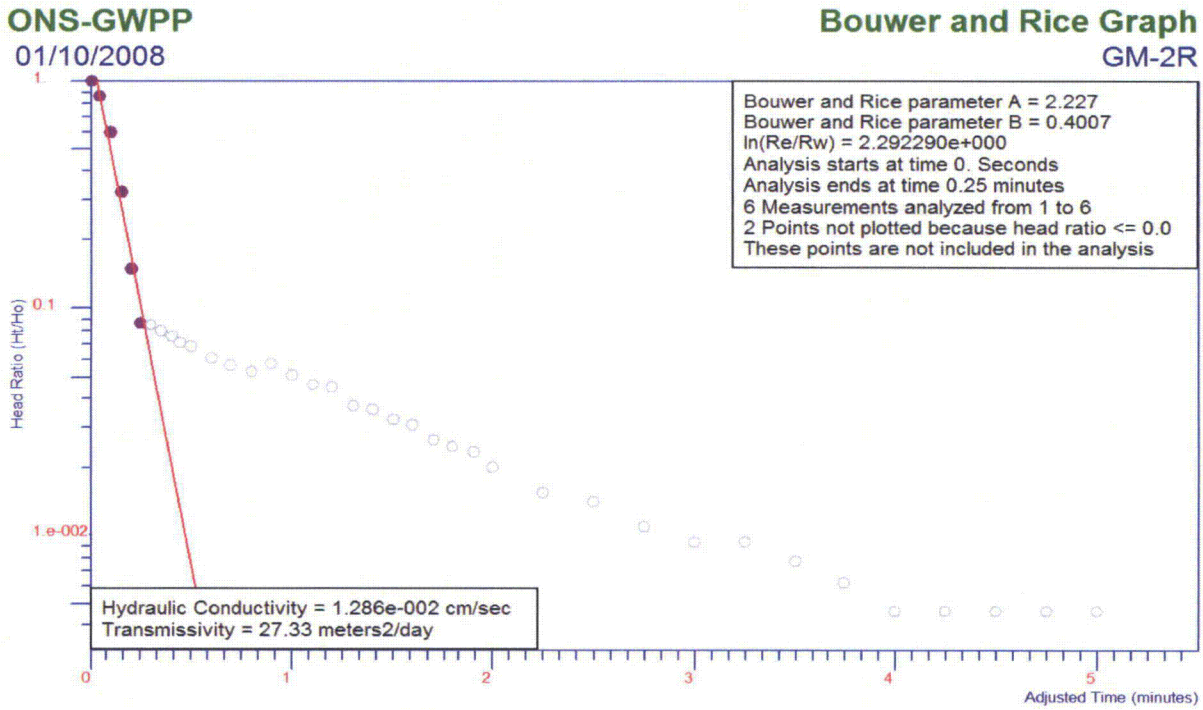
12.70' to 30.30': Medium-Grained Granitic Gneiss With Intermittent Biotite Hornblende Gneiss

Calculation of Permeability By The Rising Head Method (Slug Test)

Site Name:	ONS-GWPP
Test Date:	1/10/2008
Well Label:	GM-2R
Aquifer Thickness:	8.07 feet
Screen Length:	5. feet
Casing Radius:	1. Inches
Effective Radius:	1.5 Inches
Static Water Level:	27.23 feet
Water Table to Screen Bottom:	3.07 feet
Anisotropy Ratio:	1

Time Adjustment: 0. Seconds
Test starts with trial 0
There are 40 time and drawdown measurements
Maximum head is 0.646 feet
Minimum head is 0. feet

Calculation by Bouwer and Rice Graphical Method



Analysis by Julie Petersen of S&ME, Inc.

PERMEABILITY

1.29×10^{-2} cm/sec

S&ME, Inc.
9751 Southern Pine Boulevard
Charlotte, North Carolina 28273
Telephone: 704-523-4726
Fax: 704-525-3953

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1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-2DR**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 1 of 2
Boring Depth (ft): **55.2**	Elevation (ft): **796.2**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **10/11/07**
Logged By: **Julie Petersen**	Water Level: **Stabilized Water Level at 37.42 ft bls**		Drilling Method: **Mud Rotary**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
			ASPHALT		
795			PRE-DUG HOLE FOR UTILITY CLEARANCE: **FILL**		
	5				
790			SOIL/SAPROLITE (M1): Brown and White, Silty, Coarse to Fine **SAND**		88
	10		**Roller Cone Refusal at 10.30 ft bls**		
785			SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS**; Moderately Fractured, High Angle and Low Angle Joints With Heavy to No Staining		
	15		PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **GRANITIC GNEISS** With Intermittent **BIOTITE HORNBLENDE GNEISS** Lenses; Intensely Weathered and Fractured, Horizontal, High Angle, and Low Angle Joints With Heavy to No Staining		
780			SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** With Intermittent Medium-Grained **BIOTITE HORNBLENDE GNEISS**; Moderately Fractured, Horizontal, High Angle, and Low Angle Joints With No Staining		
	20				
775					
	25				
770					
	30				
765			PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **MICA SCHIST**; Very Intensely Fractured		
			SOUND ROCK (D): Medium-Grained **GRANITIC**		

BORING LOG WITH WELL RECOVERED ONS LOG.GPJ LAGWGN01.GDT 7/23/08

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Telephone: 704-523-4726
Fax: 704-525-3953

1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-2DR**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 2 of 2
Boring Depth (ft): **55.2**	Elevation (ft): **796.2**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **10/11/07**
Logged By: **Julie Petersen**	Water Level: **Stabilized Water Level at 37.42 ft bls**		Drilling Method: **Mud Rotary**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
760			**GNEISS** With Intermittent **BIOTITE HORNBLENDE GNEISS** and **MICA SCHIST**; Moderately Fractured, Low Angle Joints With No Staining		
	40				
755					
	45				
750					
	50				
745			PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **MICA SCHIST**; Intensely Weathered and Fractured, Horizontal Joints With No Staining		
	55		PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **GRANITIC GNEISS**; Intensely Weathered and Fractured, Low Angle and High Angle Joints With No Staining		
			Boring Terminated at 55.20 ft bls		

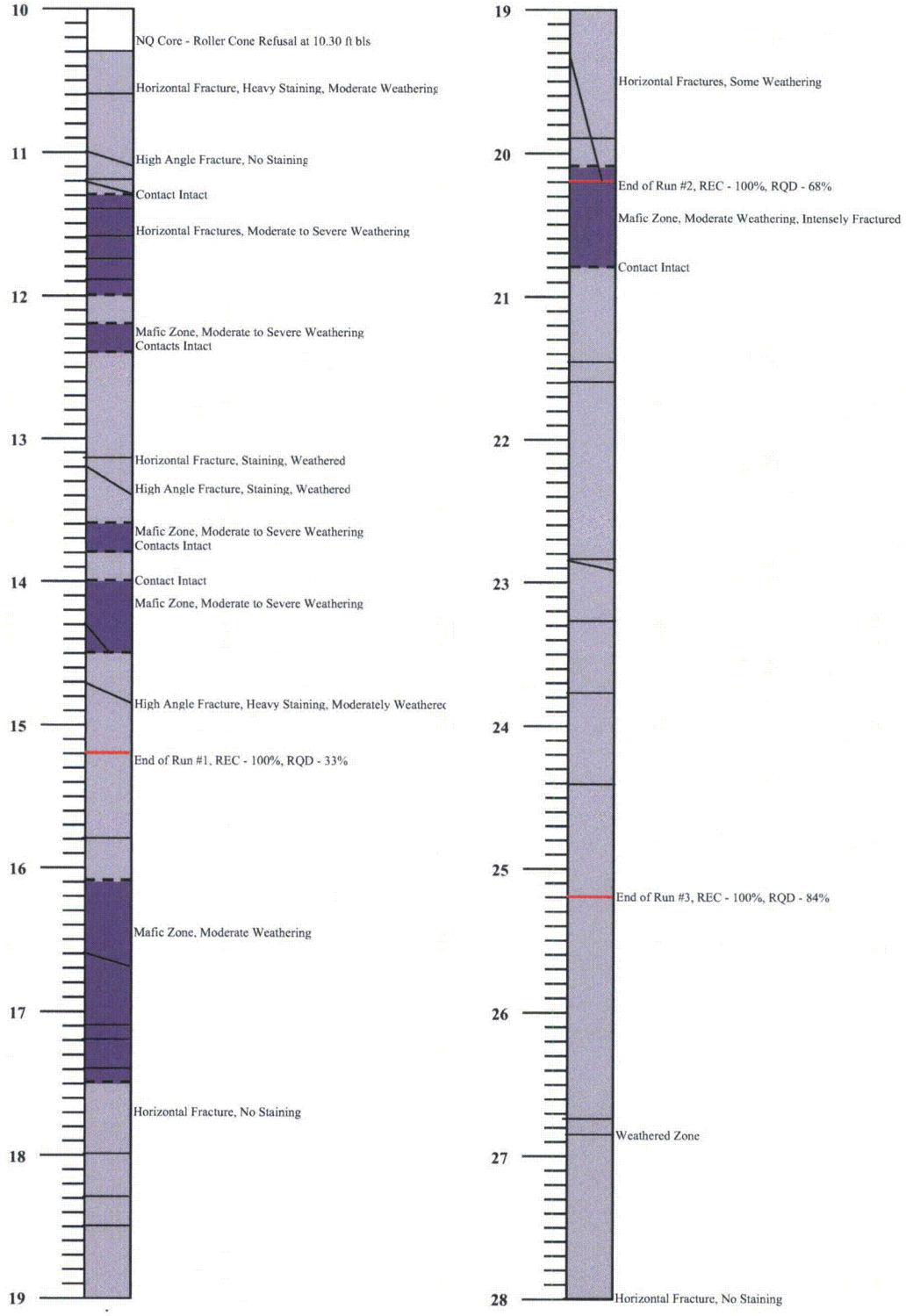
BORING LOG WITH WELL RECOVERED ONS LOG.GPJ LAGWGN01.GDT 7/23/08

FIELD ROCK CORE LOG

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-2DR



EXPLANATION

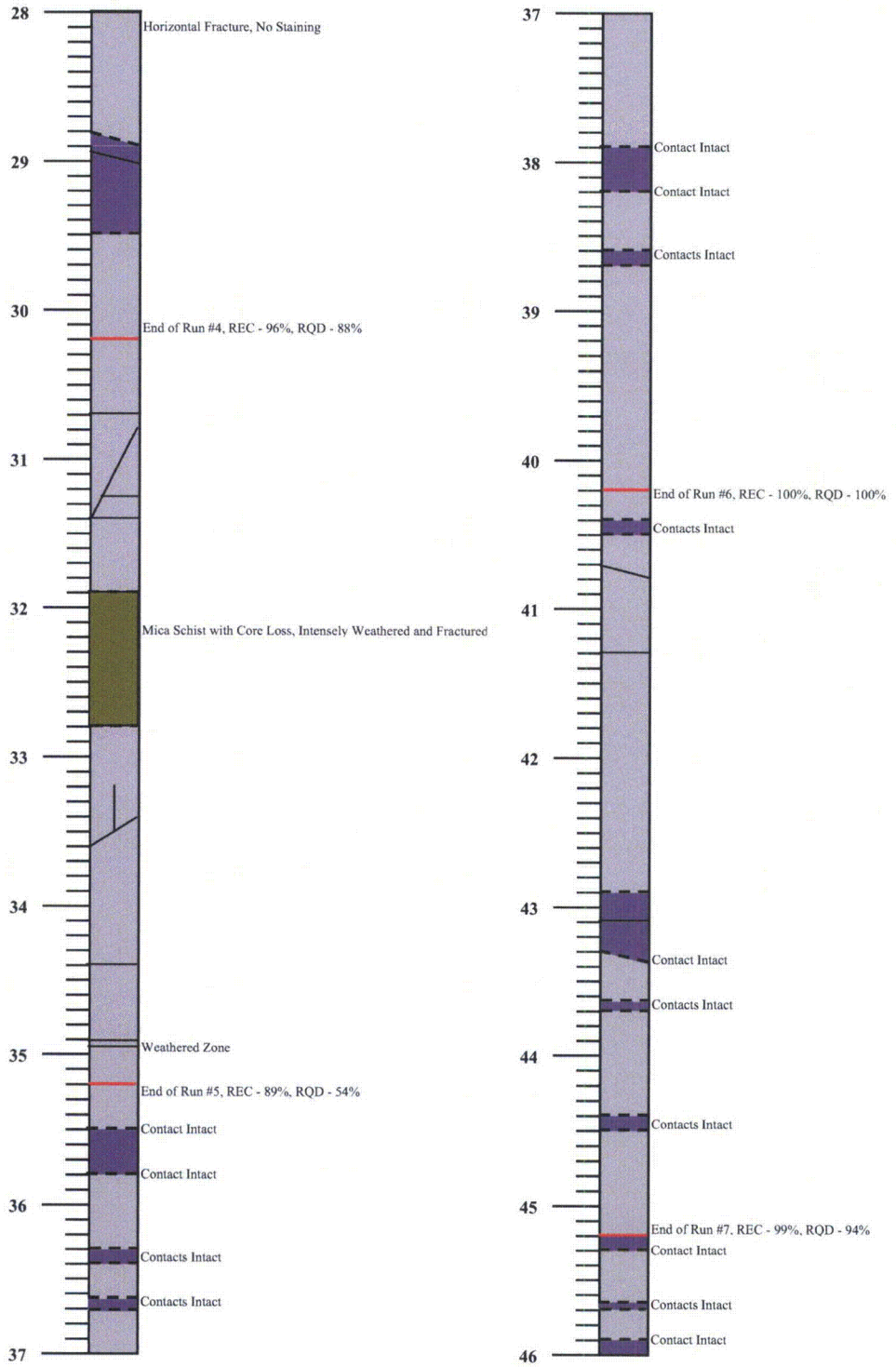
- Concrete
- Mica Schist
- Granitic Gneiss
- Biotite Hornblende Gneiss
- Core Loss
- Fracture
- End of Run
- Contact
- Healed Joint

FIELD ROCK CORE LOG

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-2DR



EXPLANATION

- Concrete
- Mica Schist
- Granitic Gneiss
- Biotite Hornblende Gneiss
- Core Loss

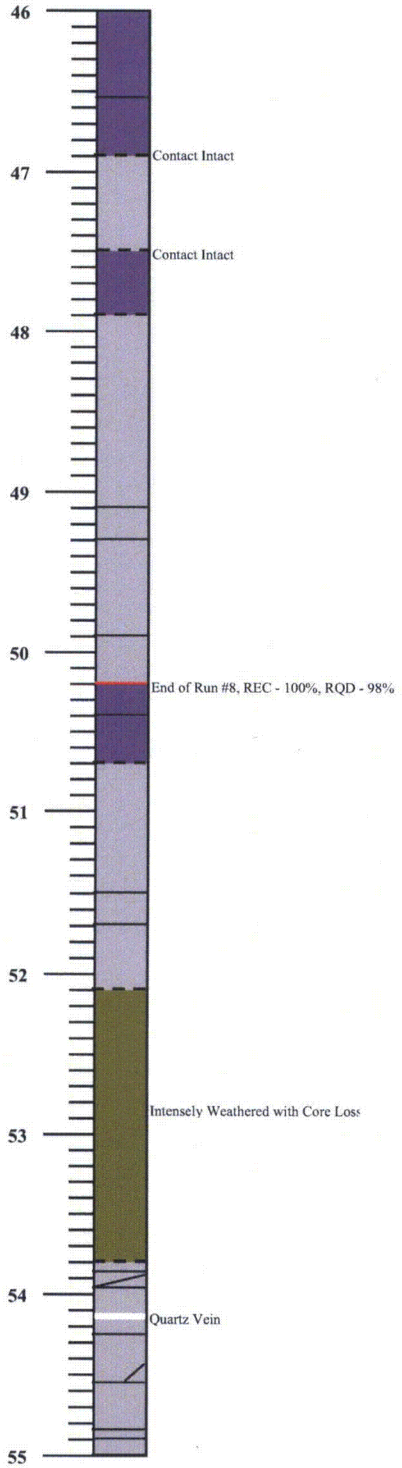
- Fracture
- End of Run
- Contact
- Healed Joint

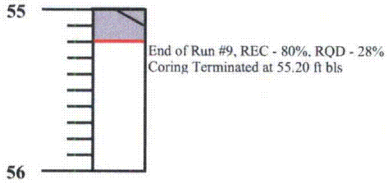
FIELD ROCK CORE LOG

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-2DR





EXPLANATION

- Concrete
- Mica Schist
- Granitic Gneiss
- Biotite Hornblende Gneiss
- Core Loss

- Fracture
- End of Run
- Contact
- Healed Joint

COMPLETION REPORT OF WELL No. GM-2DR

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

WATER LEVEL: **Stabilized Water Level at 37.42 ft bls**

LATITUDE: **34°47'39.648"**
LONGITUDE: **82°53'56.788"**
TOP OF CASING ELEVATION: **795.96**
DATUM: **MSL**
LOGGED BY: **Julie Petersen**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **Mud Rotary**
DATE DRILLED: **10/11/07**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
				0.00	GS	796.20
ASPHALT		0				
PRE-DUG HOLE FOR UTILITY CLEARANCE: **FILL**		5				
SOIL/SAPROLITE (M1): Brown and White, Silty, Coarse to Fine **SAND**		10				
SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** Moderately Fractured, High Angle and Low Angle Joints With Heavy to No Staining		15				
PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **GRANITIC GNEISS** With Intermittent **BIOTITE HORNBLENDE GNEISS** Lenses; Intensely Weathered and Fractured, Horizontal, High Angle, and Low Angle Joints With Heavy to No Staining		20				
SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** With Intermittent Medium-Grained **BIOTITE HORNBLENDE GNEISS**; Moderately Fractured, Horizontal, High Angle, and Low Angle Joints With No		25 30				

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter:
Type:
Interval:

RISER CASING
Diameter: **2"**
Type: **Sch. 40 PVC**
Interval: **0 to 50 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 47 ft bls**

SEAL
Type: **K-Packer**
Interval: **49.2 to 49.4 ft bls**

FILTERPACK
Type:
Interval:

SCREEN
Diameter: **2"**
Type: **0.010 Slotted PVC**
Interval: **50 to 55 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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Charlotte, North Carolina 28273

COMPLETION REPORT OF WELL No. GM-2DR

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

GROUND SURFACE ELEVATION:
LOGGED BY: **796.2**
CHECKED BY: **Julie Petersen**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)	WELL CONSTRUCTION DETAILS
							(See Page 1)
Staining PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **MICA SCHIST**, Very Intensely Fractured		35 40					
SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** With Intermittent **BIOTITE HORNBLENDE GNEISS** and **MICA SCHIST**, Moderately Fractured, Low Angle Joints With No Staining *(continued)*		45 50		47.00 49.20 49.40 50.00		749.20 747.00 746.80 746.20	
PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **MICA SCHIST**, Intensely Weathered and Fractured, Horizontal Joints With No Staining		55		54.50 55.00 55.20		741.70 741.20 741.00	
PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **GRANITIC GNEISS**, Intensely Weathered and Fractured, Low Angle and High Angle Joints With No Staining							

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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COMPLETION REPORT OF WELL No. GM-2DR

MONITORING WELL RECOVERED ONS LOG.GPJ S&ME.GDT 7/23/08

SPLIT SPOON SAMPLE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

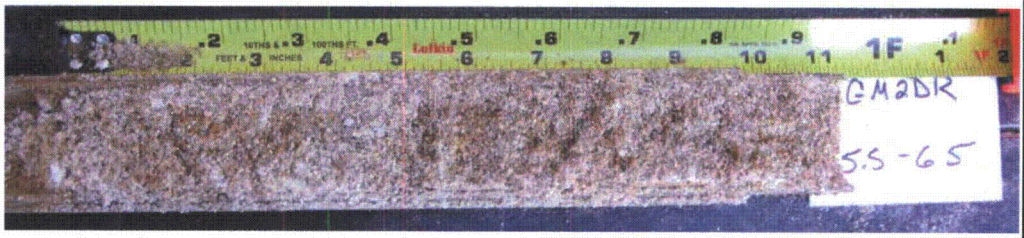
S&ME Project No: 1264-07-234

Boring Number: GM-2DR

Sample No: 1

Depth (ft-bls): 5.5 - 6.5

Blow Count: 22 * 43



ROCK CORE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

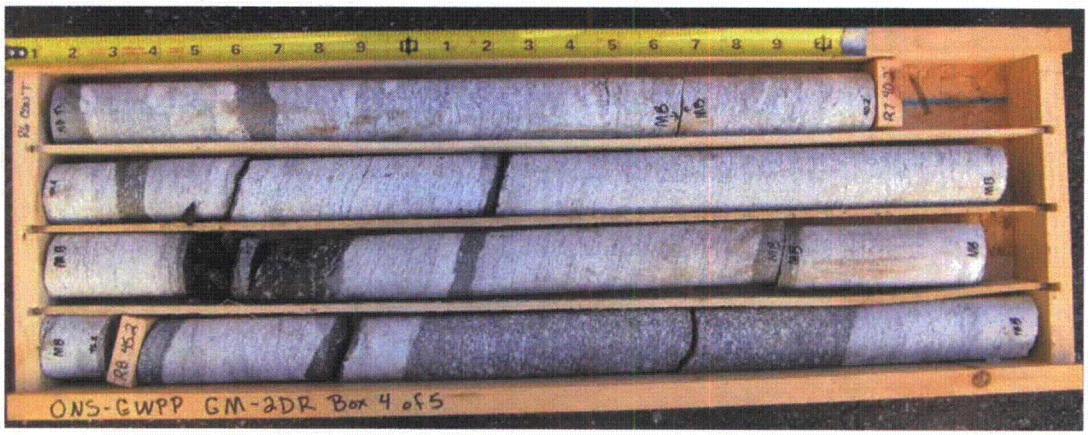
Core Location: GM-2DR

ROCK CORE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-2DR



CLASSIFICATION:

10.30' to 31.90': Medium-Grained Granitic Gneiss With Intermittent Biotite Hornblende Gneiss

31.90' to 32.80': Medium-Grained Mica Schist

32.80' to 52.05': Medium-Grained Granitic Gneiss With Intermittent Biotite Hornblende Gneiss

52.05' to 53.75': Medium-Grained Mica Schist

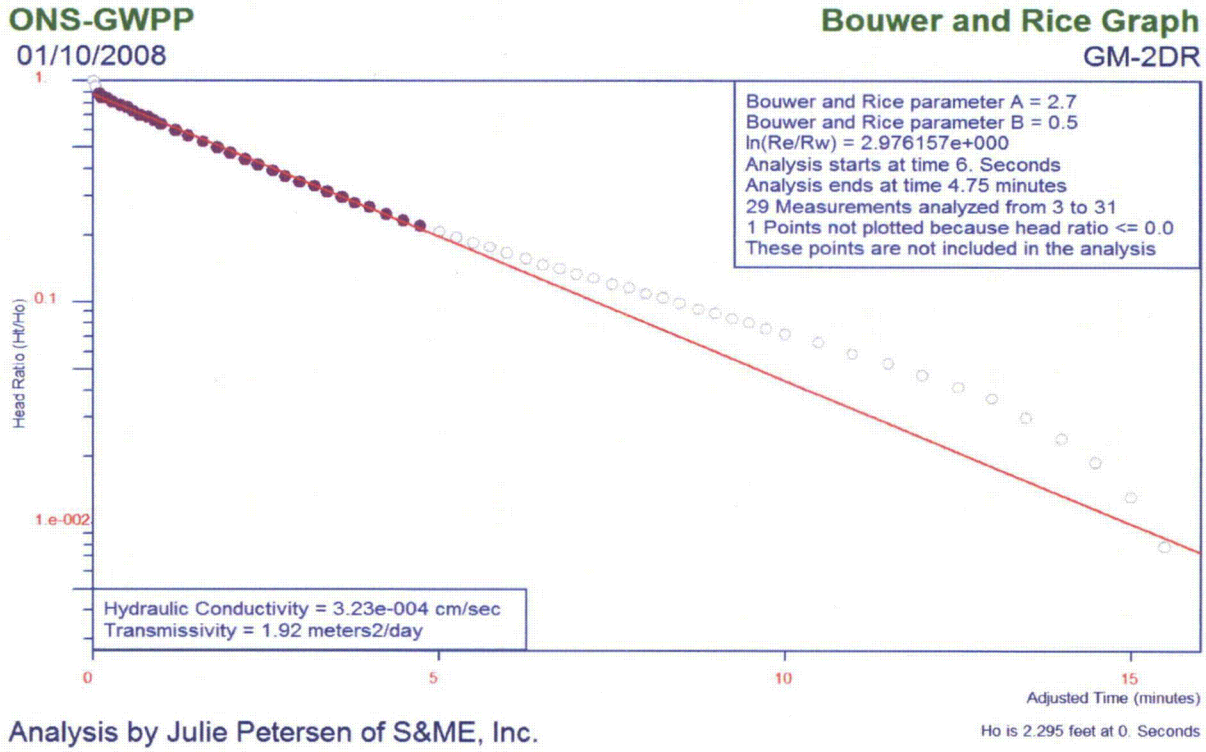
53.75' to 55.20': Medium-Grained Granitic Gneiss

Calculation of Permeability By The Rising Head Method (Slug Test)

Site Name:	ONS-GWPP
Test Date:	1/10/2008
Well Label:	GM-2DR
Aquifer Thickness:	22.58 feet
Screen Length:	5. feet
Casing Radius:	1. Inches
Effective Radius:	1.5 Inches
Static Water Level:	37.42 feet
Water Table to Screen Bottom:	17.58 feet
Anisotropy Ratio:	1

Time Adjustment: 0. Seconds
Test starts with trial 0
There are 64 time and drawdown measurements
Maximum head is 2.295 feet
Minimum head is 0. feet

Calculation by Bouwer and Rice Graphical Method



Analysis by Julie Petersen of S&ME, Inc.

Ho is 2.295 feet at 0. Seconds

PERMEABILITY

3.23×10^{-4} cm/sec

S&ME, Inc.
9751 Southern Pine Boulevard
Charlotte, North Carolina 28273
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Fax: 704-525-3953

ENGINEERING • TESTING
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1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-3R**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 1 of 1
Boring Depth (ft): **35.0**	Elevation (ft): **796.0**	Driller: **Justin Millwood, SC Cert. No. C1840**	Date Drilled: **1/14/08**
Logged By: **Scott Dacus**	Water Level: **Stabilized Water Level at 25.91 ft bls**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
795			**ASPHALT**		
			SOIL/SAPROLITE (M1): Tan, Micaceous, Medium to Fine **SAND**		
	5				
790					
	10				
785					
	15				
780			**Auger Refusal at 17.54 ft bls**		
			PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **GRANITIC GNEISS**; Intensely Weathered and Fractured, Low Angle Joints With Moderate to No Staining; Core Loss		
	20				
775					
	25				
770					
	30				
765					
	35		SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS**; Slightly Fractured, Low Angle Joint With No Staining		
			Soil Descriptions Obtained From GM-3DR		
			Boring Terminated at 35.04 ft bls		

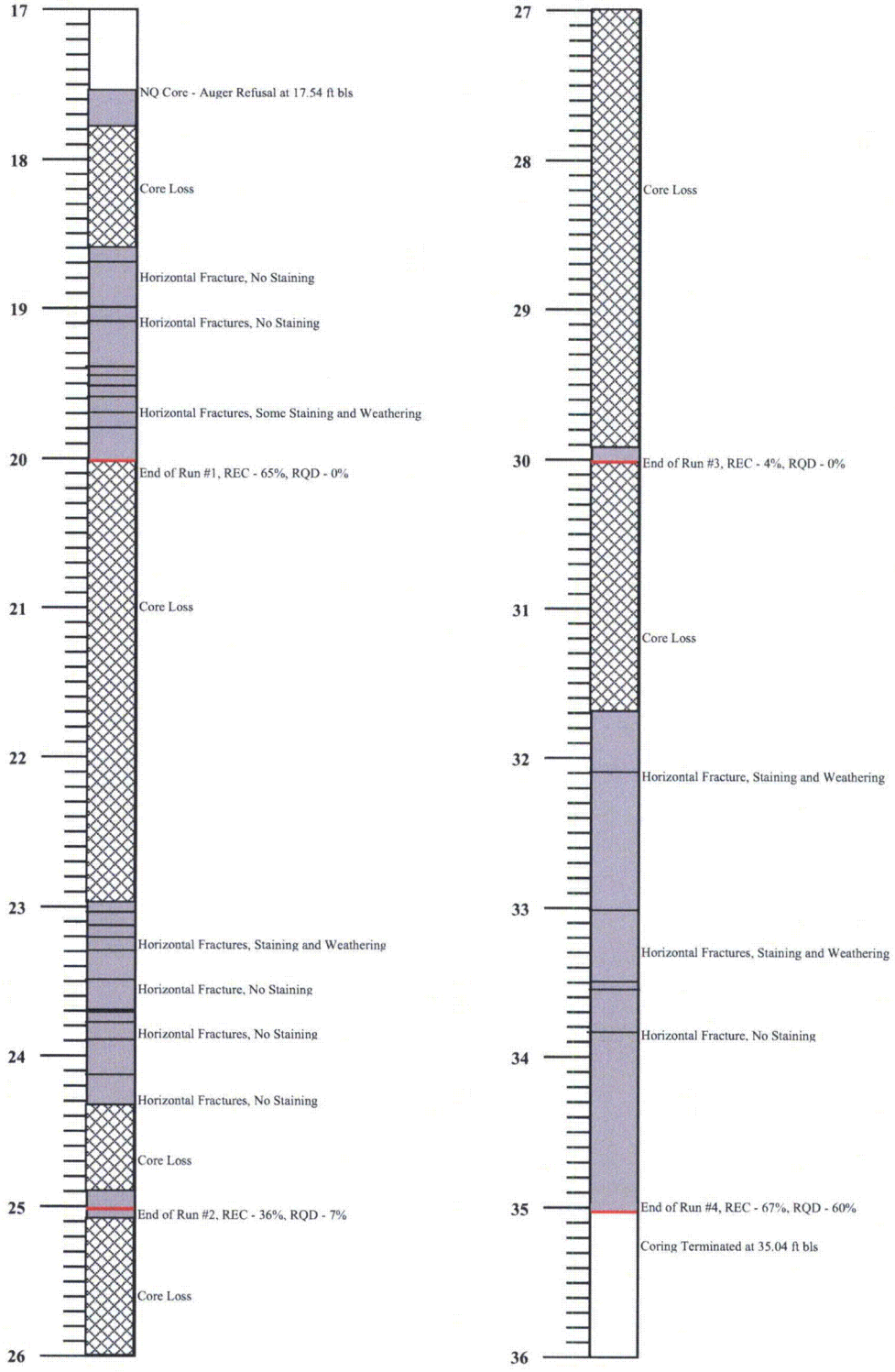
BORING LOG WITH WELL RECOVERED ONS LOG.GPJ LAGWGN01.GDT 7/23/08

FIELD ROCK CORE LOG

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-3R



EXPLANATION

- Concrete
- Granitic Gneiss
- Biotite Hornblende Gneiss
- Core Loss
- Fracture
- End of Run
- Contact
- Healed Joint

COMPLETION REPORT OF WELL No. GM-3R

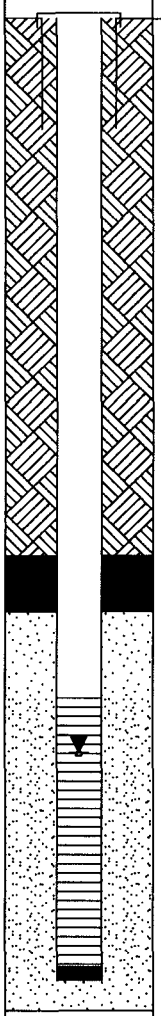
PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

WATER LEVEL: **Stabilized Water Level at 25.91 ft bls**

LATITUDE: **34°47'36.929"**
LONGITUDE: **82°53'55.475"**
TOP OF CASING ELEVATION: **795.83**
DATUM: **MSL**
LOGGED BY: **Scott Dacus**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **4¼" H.S.A.**
DATE DRILLED: **1/14/08**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
				0.00	GS	796.04
ASPHALT		0				
SOIL/SAPROLITE (M1): Tan, Micaceous, Medium to Fine **SAND**		5, 10, 15				
PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **GRANITIC GNEISS** Intensely Weathered and Fractured, Low Angle Joints With Moderate to No Staining; Core Loss		20, 25, 30		19.00 21.00		777.04 775.04
SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** Slightly Fractured, Low Angle Joint With No		35		33.50 34.00 35.04		762.54 762.04 761.00



WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter:
Type:
Interval:

RISER CASING
Diameter: **2"**
Type: **Sch. 40 PVC**
Interval: **0 to 24 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 19 ft bls**

SEAL
Type: **Bentonite**
Interval: **19 to 21 ft bls**

FILTERPACK
Type: **#1 Silica Sand**
Interval: **21 to 35.04 ft bls**

SCREEN
Diameter: **2"**
Type: **0.010 Slotted PVC**
Interval: **24 to 34 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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COMPLETION REPORT OF WELL No. GM-3R

MONITORING WELL RECOVERED ONS LOG.GPJ S&ME.GDT 7/23/08

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

GROUND SURFACE ELEVATION: **796.0**
LOGGED BY: **Scott Dacus**
CHECKED BY:

STRATA			WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)	WELL CONSTRUCTION DETAILS
DESCRIPTION	SYMBOL	DEPTH (ft.)					
							(See Page 1)
Staining							

LEGEND

FILTER PACK	TOC	TOP OF CASING
BENTONITE	GS	GROUND SURFACE
CEMENT GROUT	BS	BENTONITE SEAL
CUTTINGS / BACKFILL	FP	FILTER PACK
STATIC WATER LEVEL	TSC	TOP OF SCREEN
	BSC	BOTTOM OF SCREEN
	TD	TOTAL DEPTH
	CG	CEMENT GROUT

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COMPLETION REPORT OF WELL No. GM-3R

ROCK CORE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-3R

CLASSIFICATION:

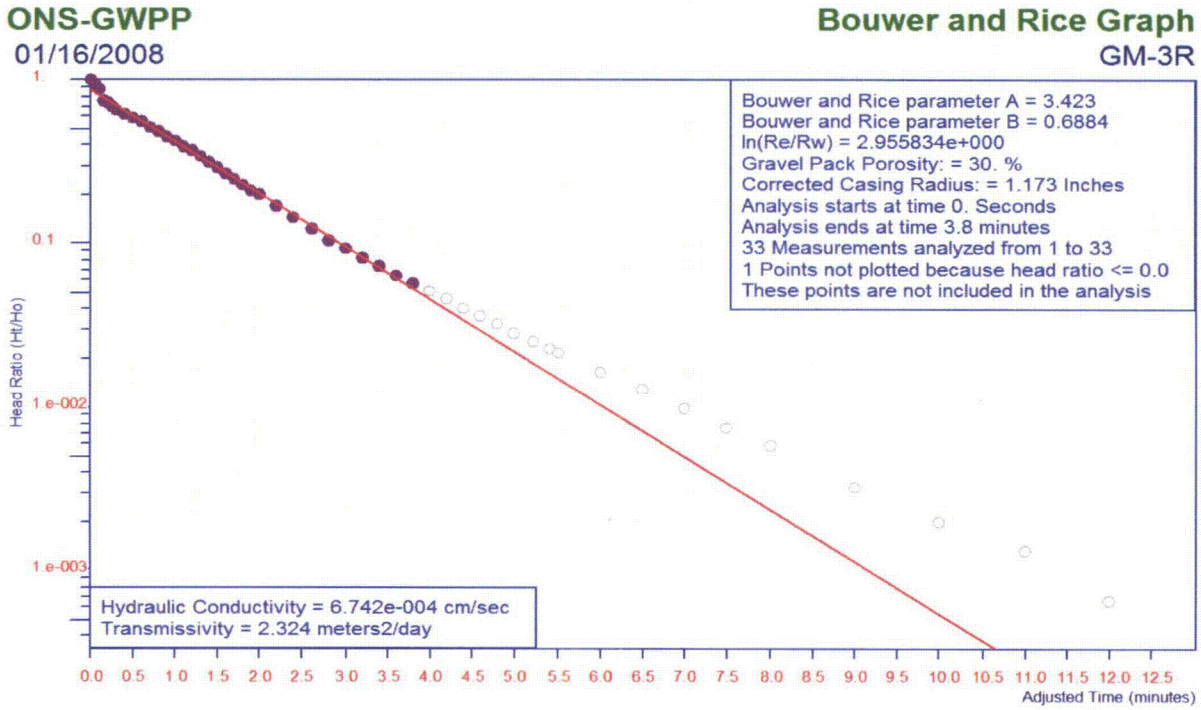
17.54' to 35.04': Medium-Grained Granitic Gneiss

Calculation of Permeability By The Rising Head Method (Slug Test)

Site Name:	ONS-GWPP
Test Date:	1/16/2008
Well Label:	GM-3R
Aquifer Thickness:	13.09 feet
Screen Length:	10. feet
Casing Radius:	1. Inches
Effective Radius:	1.5 Inches
Gravel Pack Porosity:	30.00%
Corrected Casing Radius:	1.173 Inches
Static Water Level:	25.91 feet
Water Table to Screen Bottom:	8.09 feet
Anisotropy Ratio:	1

Time Adjustment: 0. Seconds
Test starts with trial 0
There are 52 time and drawdown measurements
Maximum head is 3.04 feet
Minimum head is 0. feet

Calculation by Bouwer and Rice Graphical Method



Analysis by Julie Petersen of S&ME, Inc.

PERMEABILITY

6.74×10^{-4} cm/sec

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1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-3DR**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 1 of 2
Boring Depth (ft): **60.3**	Elevation (ft): **796.2**	Driller: **Justin Millwood, SC Cert. No. C1840**	Date Drilled: **1/8/08**
Logged By: **Scott Dacus**	Water Level: **Stabilized Water Level at 25.63 ft bls**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
			ASPHALT		
795			SOIL/SAPROLITE (M1): Tan, Micaceous, Medium to Fine **SAND**		
	5				
790					
	10				
785					
	15				
780			**Auger Refusal at 16.80 ft bls**		
			SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS**; Unfractured		
			PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **GRANITIC GNEISS** Intensely Weathered and Fractured, Low Angle Joints With No Staining; Core Loss		
	20				
775			SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS**; Unfractured		
			PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **GRANITIC GNEISS** With Medium-Grained **BIOTITE HORNBLENDE GNEISS** Intensely Weathered and Fractured, Low Angle Joints With No Staining; Core Loss		
	25				
770					
	30				
765			SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** With Intermittent Medium-Grained **BIOTITE HORNBLENDE GNEISS** Moderately Fractured, Low Angle Joints With Moderate to No Staining		

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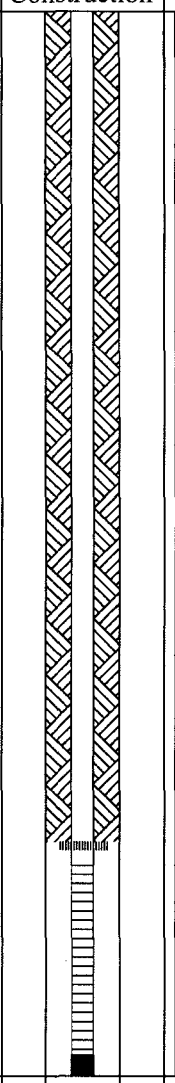
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-3DR**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 2 of 2
Boring Depth (ft): **60.3**	Elevation (ft): **796.2**	Driller: **Justin Millwood, SC Cert. No. C1840**	Date Drilled: **1/8/08**
Logged By: **Scott Dacus**	Water Level: **Stabilized Water Level at 25.63 ft bls**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
760					
	40				
755					
	45				
750					
	50				
745					
	55				
740					
	60				
			Boring Terminated at 60.30 ft bls		

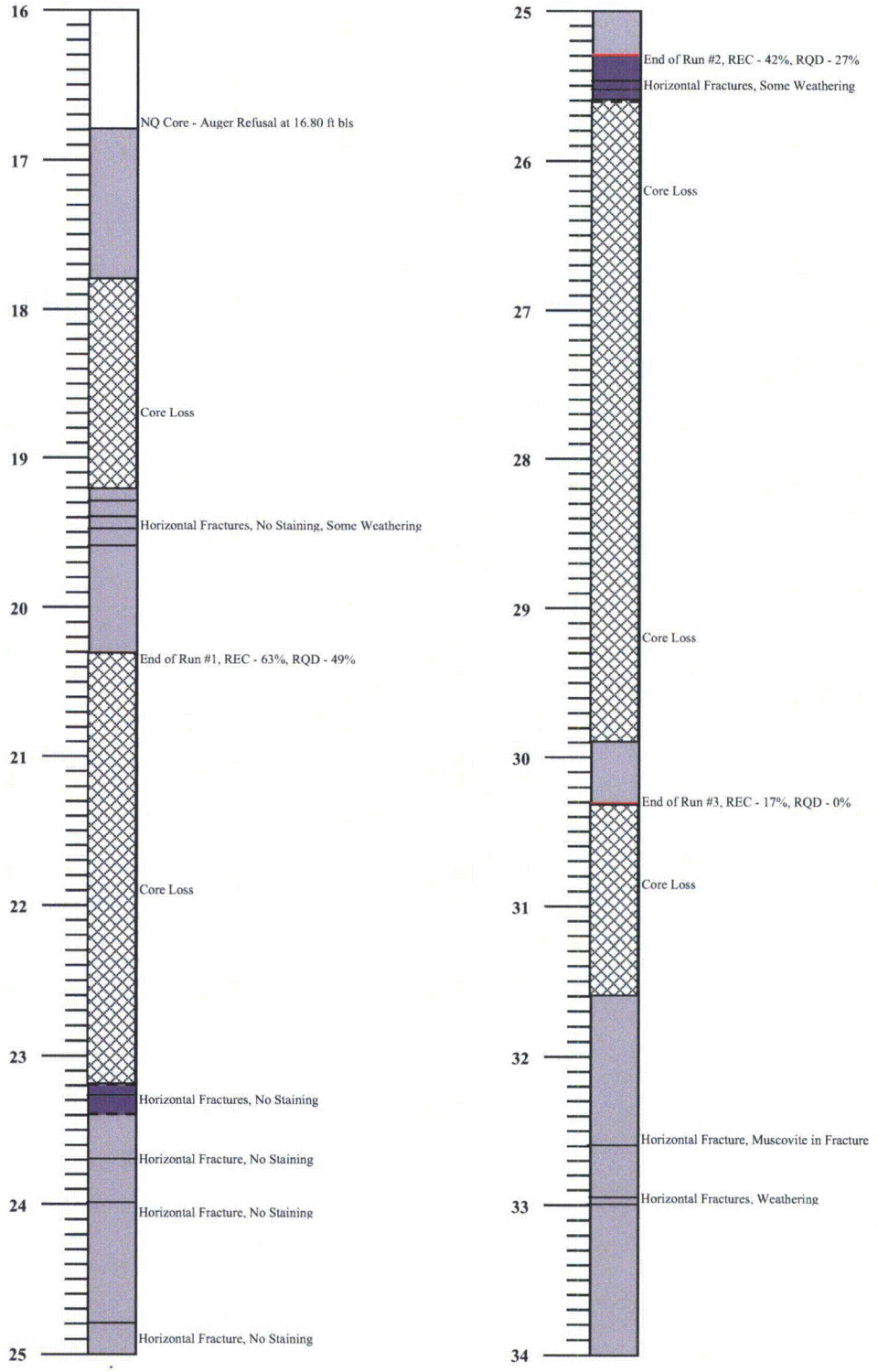


FIELD ROCK CORE LOG

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-3DR



EXPLANATION

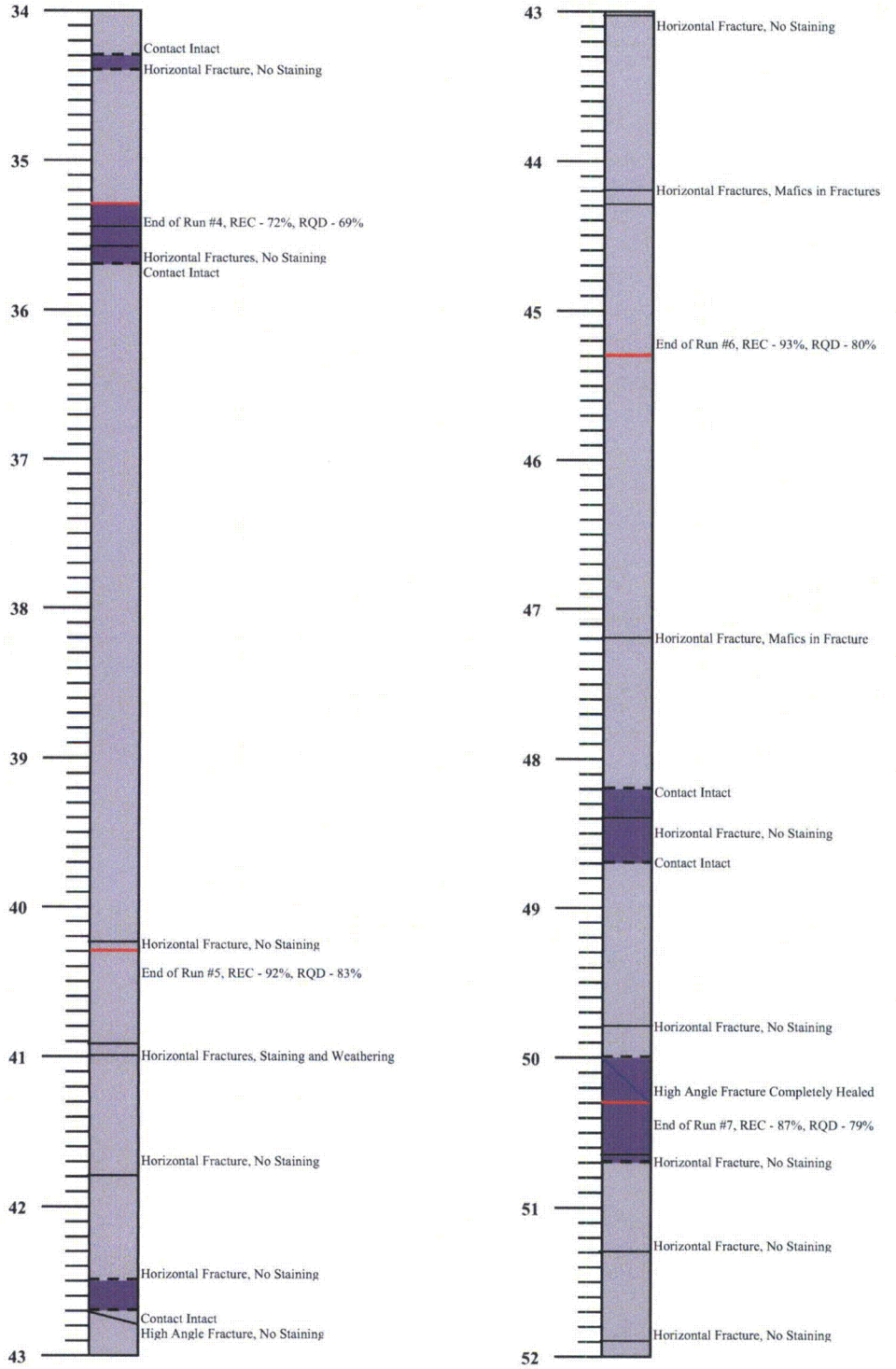
- Concrete
- Granitic Gneiss
- Biotite Hornblende Gneiss
- Core Loss
- Fracture
- End of Run
- Contact
- Healed Joint

FIELD ROCK CORE LOG

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-3DR



EXPLANATION

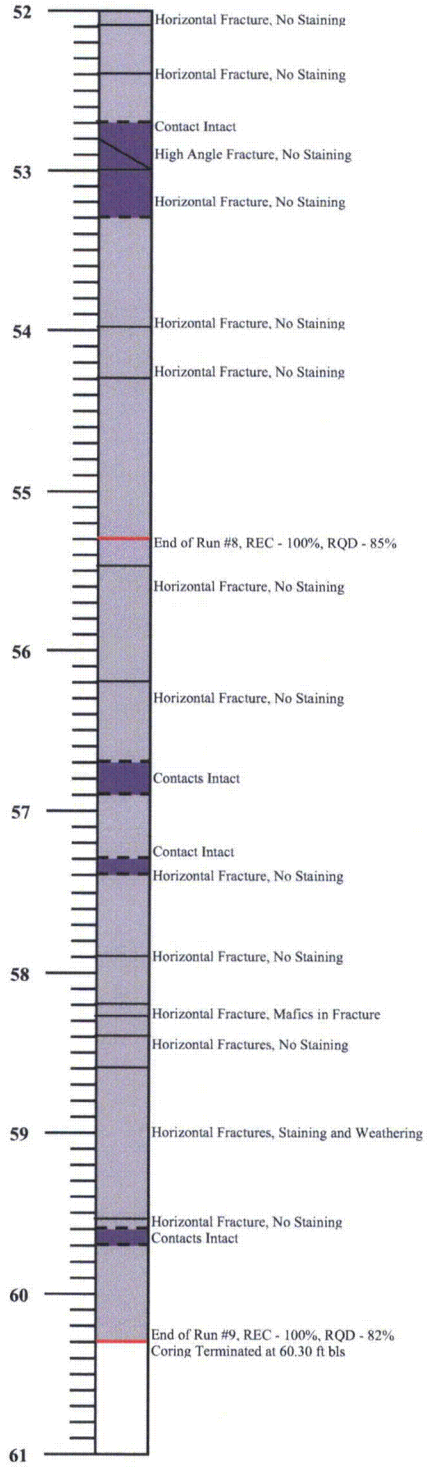
- Concrete
- Granitic Gneiss
- Biotite Hornblende Gneiss
- Core Loss
- Fracture
- End of Run
- Contact
- Healed Joint

FIELD ROCK CORE LOG

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-3DR



EXPLANATION

- Concrete
- Granitic Gneiss
- Biotite Hornblende Gneiss
- Core Loss

- Fracture
- End of Run
- Contact
- Healed Joint

COMPLETION REPORT OF WELL No. GM-3DR

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **4¼" H.S.A.**
DATE DRILLED: **1/8/08**

WATER LEVEL: **Stabilized Water Level at 25.63 ft bls**
LATITUDE: **34°47'37.018"**
LONGITUDE: **82°53'55.505"**
TOP OF CASING ELEVATION: **795.89**
DATUM: **MSL**
LOGGED BY: **Scott Dacus**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
				0.00	GS	796.19
ASPHALT		0				
SOIL/SAPROLITE (M1): Tan, Micaceous, Medium to Fine **SAND**		5, 10, 15				
SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** Unfractured		20				
PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **GRANITIC GNEISS** Intensely Weathered and Fractured, Low Angle Joints With No Staining; Core Loss		25				
SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** Unfractured						
PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **GRANITIC GNEISS** With Medium-Grained **BIOTITE HORNBLENDE**		30				

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter:
Type:
Interval:

RISER CASING
Diameter: **2"**
Type: **Sch. 40 PVC**
Interval: **0 to 55.30 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 54.73 ft bls**

SEAL
Type: **K-packer**
Interval: **54.73 to 54.93 ft bls**

FILTERPACK
Type:
Interval:

SCREEN
Diameter: **2"**
Type: **0.010 Slotted PVC**
Interval: **55.3 to 60.3 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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COMPLETION REPORT OF WELL No. GM-3DR

MONITORING WELL RECOVERED ONS LOG.GPJ S&ME.GDT 7/23/08

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

GROUND SURFACE ELEVATION:
LOGGED BY: **796.2**
CHECKED BY: **Scott Dacus**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)	WELL CONSTRUCTION DETAILS
							(See Page 1)
GNEISS; Intensely Weathered and Fractured, Low Angle Joints With No Staining; Core Loss		35					
SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** With Intermittent Medium-Grained **BIOTITE HORNBLENDE GNEISS**; Moderately Fractured, Low Angle Joints With Moderate to No Staining *(continued)*		40					
		45					
		50					
		55		54.73 54.93 55.30		741.46 741.26 740.89	
		60		59.80 60.30		736.39 735.89	

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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COMPLETION REPORT OF WELL No. GM-3DR

MONITORING WELL_RECOVERED_ONS LOG.GPJ S&ME.GDT 7/23/08

SPLIT SPOON SAMPLE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Boring Number: GM-3DR

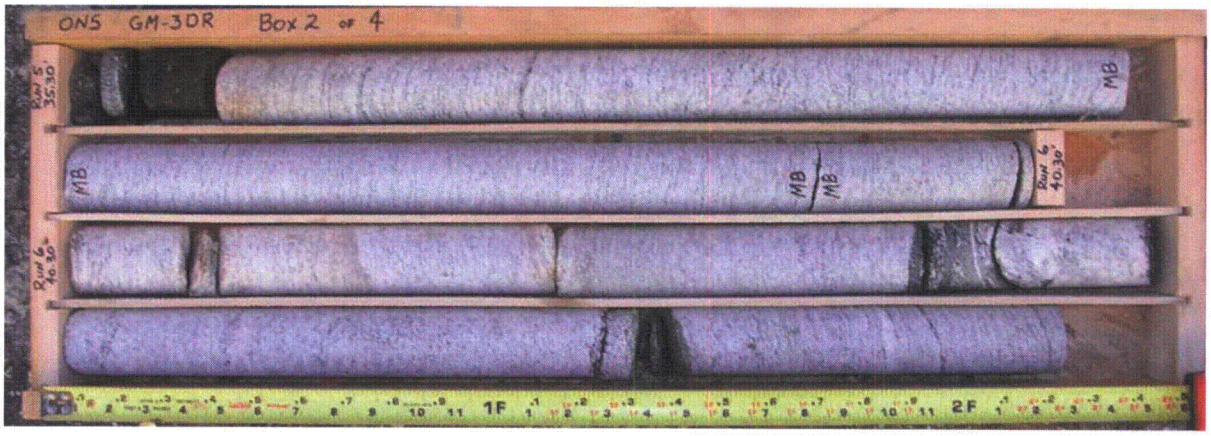
Sample No: 1 **Depth (ft-bls):** 8.5 - 10 **Blow Count:** 10 * 50/2	
Sample No: 2 **Depth (ft-bls):** 13.5 - 15 **Blow Count:** 15 * 50/5	

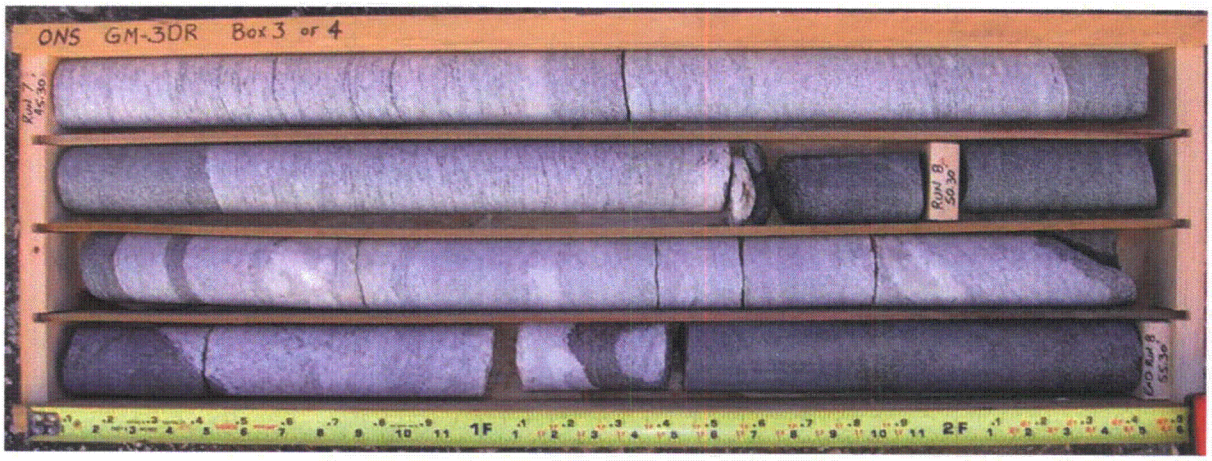
ROCK CORE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-3DR



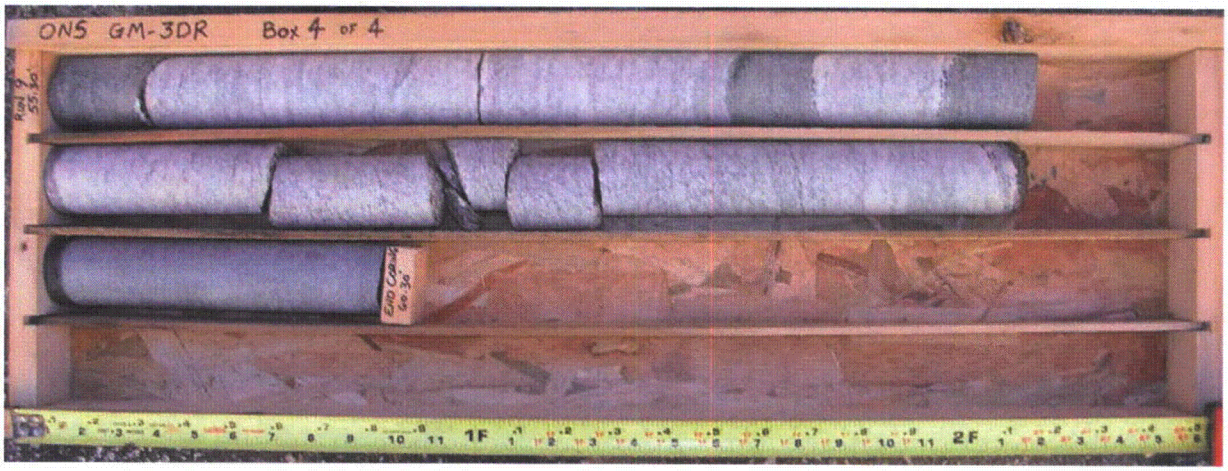


ROCK CORE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-3DR



CLASSIFICATION:

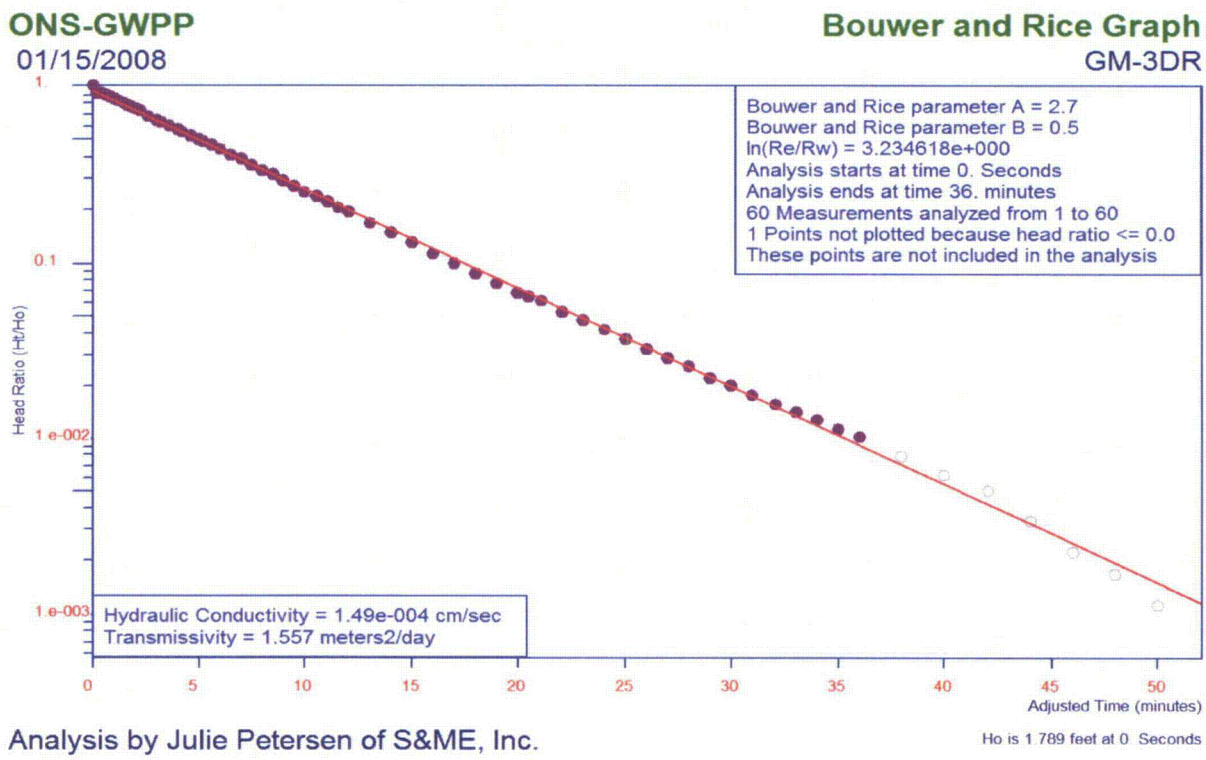
16.80' to 60.30': Medium-Grained Granitic Gneiss With Intermittent Biotite Hornblende Gneiss

Calculation of Permeability By The Rising Head Method (Slug Test)

Site Name:	ONS-GWPP
Test Date:	1/15/2008
Well Label:	GM-3DR
Aquifer Thickness:	39.67 feet
Screen Length:	5. feet
Casing Radius:	1. Inches
Effective Radius:	1.5 Inches
Static Water Level:	25.63 feet
Water Table to Screen Bottom:	34.67 feet
Anisotropy Ratio:	1

Time Adjustment: 0. Seconds
Test starts with trial 0
There are 68 time and drawdown measurements
Maximum head is 1.789 feet
Minimum head is 0. feet

Calculation by Bouwer and Rice Graphical Method



Analysis by Julie Petersen of S&ME, Inc.

PERMEABILITY

1.49×10^{-4} cm/sec

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2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-4**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 1 of 1
Boring Depth (ft): **21.5**	Elevation (ft): **798.2**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **10/18/07**
Logged By: **Julie Petersen**	Water Level: **Stabilized Water Level at 11.52 ft bls**		Drilling Method: **Mud Rotary**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
			ASPHALT		
			PRE-DUG HOLE FOR UTILITY CLEARANCE:**FILL**		
795					
	5		FILL (F): Weathered Rock and Soil		50/1 >>
			Roller Cone Refusal at 5.50 ft bls		
			FILL (F): Weathered Rock and Soil		
790					
	10				
785					
	15		**Set Back Up to Mud Rotary**		
			FILL (F): Red and Gray, Silty, Medium to Fine **SAND** With Gravel		17
780			FILL (F): Brown, Silty, Medium to Fine **SAND** With Gravel		3
	20				
			Roller Cone Refusal at 21.50 ft bls		
			Boring Terminated at 21.50 ft bls		

COMPLETION REPORT OF WELL No. GM-4

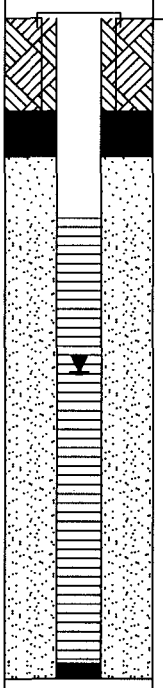
PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

WATER LEVEL: **Stabilized Water Level at 11.52 ft bls**

LATITUDE: **34°47'33.316"**
LONGITUDE: **82°54'02.152"**
TOP OF CASING ELEVATION: **797.95**
DATUM: **MSL**
LOGGED BY: **Julie Petersen**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **Mud Rotary**
DATE DRILLED: **10/18/07**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
				0.00	GS	798.16
ASPHALT		0				
PRE-DUG HOLE FOR UTILITY CLEARANCE: **FILL**				3.00		795.16
				4.50		793.66
		5				
FILL (F): Weathered Rock and Soil **Roller Cone Refusal at 5.50 ft bls**						
FILL (F): Weathered Rock and Soil		10				
		15				
FILL (F): Red and Gray, Silty, Medium to Fine **SAND** With Gravel						
FILL (F): Brown, Silty, Medium to Fine **SAND** With Gravel		20		21.00		777.16
				21.50		776.66



WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter:
Type:
Interval:

RISER CASING
Diameter: **2"**
Type: **Sch. 40 PVC**
Interval: **0 to 6.5 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 3 ft bls**

SEAL
Type: **Bentonite**
Interval: **3 to 4.5 ft bls**

FILTERPACK
Type: **#1 Silica Sand**
Interval: **4.5 to 21.5 ft bls**

SCREEN
Diameter: **2"**
Type: **0.010 Slotted PVC**
Interval: **6.5 to 21.5 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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COMPLETION REPORT OF WELL No. GM-4

Sheet 1 of 1

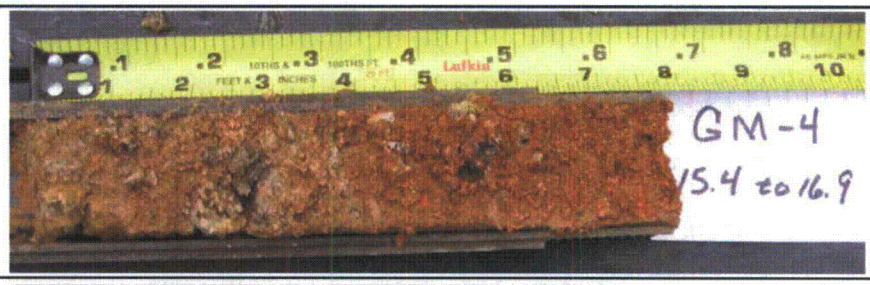
MONITORING WELL RECOVERED ONS LOG.GPJ S&ME.GDT 7/23/08

SPLIT SPOON SAMPLE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Boring Number: GM-4

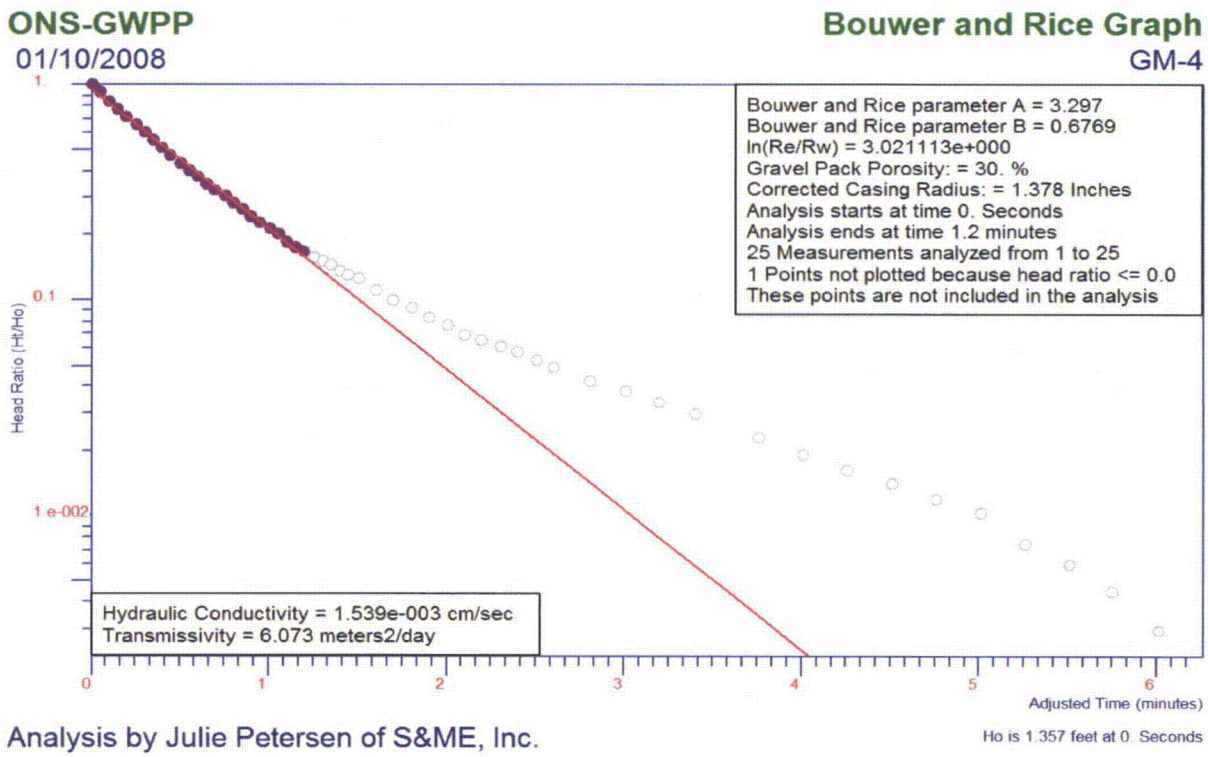
Sample No: 1 **Depth (ft-bls):** 5.3 - 5.4 **Blow Count:** 50/1	**No Recovery**
Sample No: 2 **Depth (ft-bls):** 5.5 - 10.4 **Blow Count:**	**Rock Core**
Sample No: 3 **Depth (ft-bls):** 10.4 -15.4 **Blow Count:**	**Rock Core**
Sample No: 4 **Depth (ft-bls):** 15.4 - 16.9 **Blow Count:** 5 * 9 * 8	
Sample No: 5 **Depth (ft-bls):** 18.9 - 20.4 **Blow Count:** 2 * 1 * 2	

Calculation of Permeability By The Rising Head Method (Slug Test)

Site Name:	ONS-GWPP
Test Date:	1/10/2008
Well Label:	GM-4
Aquifer Thickness:	14.98 feet
Screen Length:	15. feet
Casing Radius:	1. Inches
Effective Radius:	2. Inches
Gravel Pack Porosity:	30.00%
Corrected Casing Radius:	1.378 Inches
Static Water Level:	11.52 feet
Water Table to Screen Bottom:	9.98 feet
Anisotropy Ratio:	1

Time Adjustment: 0. Seconds
Test starts with trial 0
There are 57 time and drawdown measurements
Maximum head is 1.357 feet
Minimum head is 0. feet

Calculation by Bouwer and Rice Graphical Method



Analysis by Julie Petersen of S&ME, Inc.

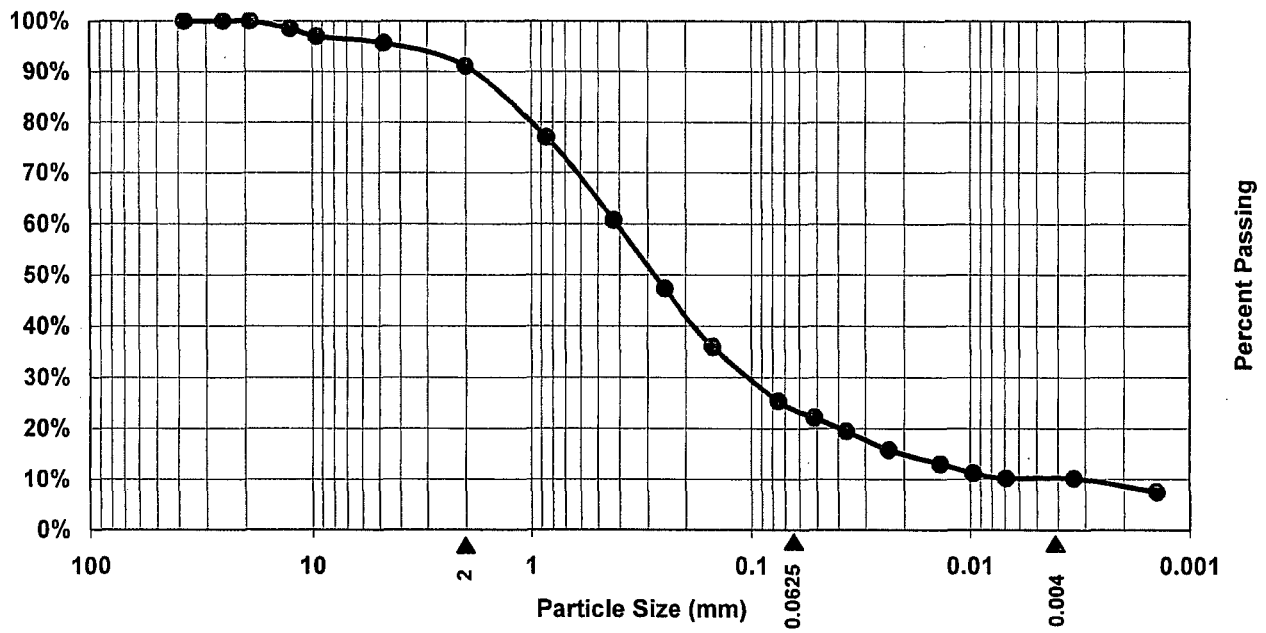
PERMEABILITY

1.54×10^{-3} cm/sec

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring No.:	Sample No.:	Depth:
GM-4	SS-4	15.4 to 16.9 ft bls

Sample Description:
F: Red and Gray, Clayey, Silty, Coarse to Fine Sand (SM)



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 9.0%	% Sand 67.0%	% Silt 13.9%	% Clay 10.1%
Adjusted for Calculations	**0%**	**74%**	**15%**	**11%**

Notes:
Grain size distribution taken from grain size with hydrometer data located in Appendix II.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

S&ME Project:
Oconee Nuclear Station - GWPP

S&ME Project No.:
1264-07-234

S&ME

FETTER AND BEAR DIAGRAMS

S&ME PROJECT: Oconee Nuclear Station - GWPP
S&ME PROJECT NO.: 1264-07-234

Boring No. GM-4

Boring Depth: 15.4 to 16.9 ft bls

% Sand: 74%

% Silt: 15%

% Clay: 11%

Estimated Specific Yield: 19%

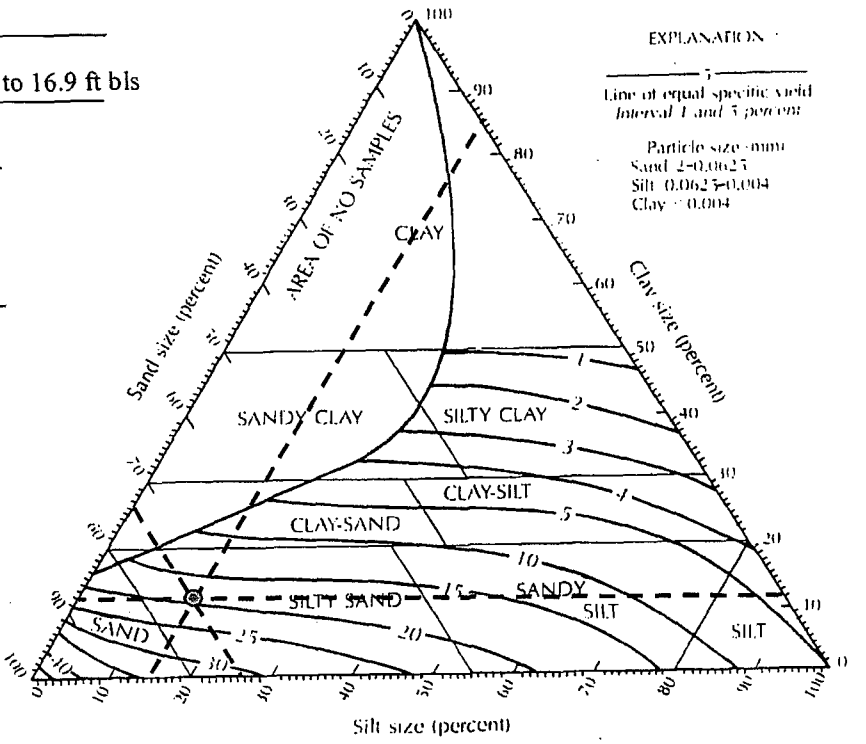
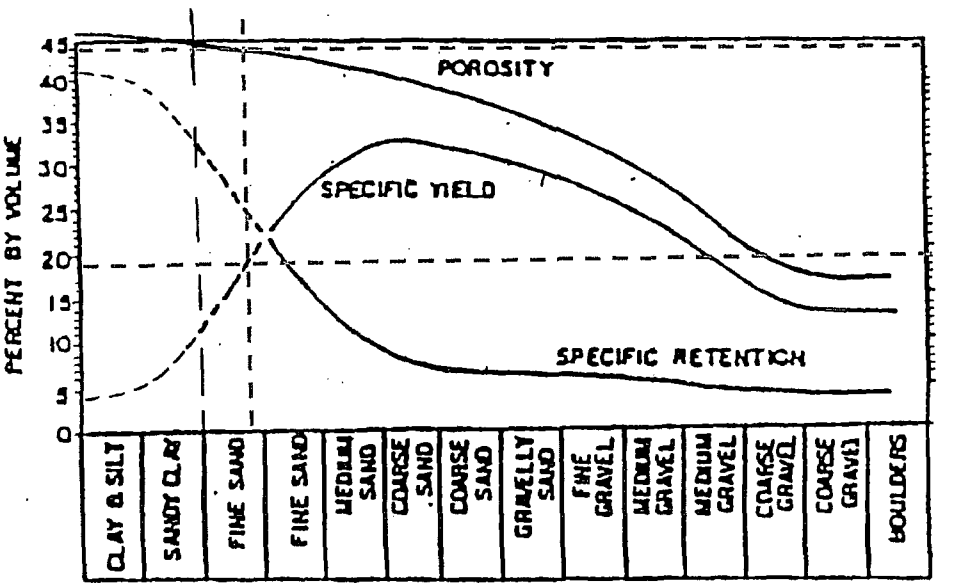


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



Estimated Porosity: 44%

Variation of Porosity, Specific Yield, and Specific Retention with Grain Size (after Bear, 1972)

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1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-5**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 1 of 2
Boring Depth (ft): **42.8**	Elevation (ft): **796.1**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **10/18/07**
Logged By: **Scott Dacus**	Water Level: **Stabilized Water Level at 33.87 ft bls**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
795			**ASPHALT**		
			PRE-DUG HOLE FOR UTILITY CLEARANCE: **FILL**		
	5				
790			FILL (F): Brown, Micaceous, Silty, Medium to Fine **SAND**		
	10				
785					
			FILL (F): Reddish-Brown, Micaceous, Silty, **CLAY**		
	15				
780					
			FILL (F): Brown and Reddish-Brown, Micaceous, Clayey, Silty, Medium to Fine **SAND**		
	20				
775					
	25		FILL (F): White and Gray, Medium **SAND**		
770					
			FILL (F): Brown and Reddish-Brown, Micaceous, Clayey, Silty, Medium to Fine **SAND**. Gray, Silty, Medium to Fine **SAND** With Rock Fragments at 74.70 ft bls.		
	30				
765					

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2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-5**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 2 of 2
Boring Depth (ft): **42.8**	Elevation (ft): **796.1**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **10/18/07**
Logged By: **Scott Dacus**	Water Level: **Stabilized Water Level at 33.87 ft bls**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
760					
	40				
755					
			Lithologic Descriptions Obtained From GM-5R **Boring Terminated at 42.75 ft bls**		

BORING LOG WITH WELL RECOVERED_ONS LOG.GPJ LAGWGN01.GDT 7/23/08

COMPLETION REPORT OF WELL No. GM-5

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

WATER LEVEL: **Stabilized Water Level at 33.87 ft bls**

LATITUDE: **34°47'31.924"**
LONGITUDE: **82°53'51.187"**
TOP OF CASING ELEVATION: **795.79**
DATUM: **MSL**
LOGGED BY: **Scott Dacus**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **4¼" H.S.A.**
DATE DRILLED: **10/18/07**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
				0.00	GS	796.05
ASPHALT		0				
PRE-DUG HOLE FOR UTILITY CLEARANCE: **FILL**						
		5				
FILL (F): Brown, Micaceous, Silty, Medium to Fine **SAND**						
		10				
FILL (F): Reddish-Brown, Micaceous, Silty, **CLAY**		15				
FILL (F): Brown and Reddish-Brown, Micaceous, Clayey, Silty, Medium to Fine **SAND**		20				
				23.00		773.05
				25.00		771.05
FILL (F): White and Gray, Medium **SAND**		25				
FILL (F): Brown and Reddish-Brown, Micaceous, Clayey, Silty, Medium to Fine **SAND**. Gray, Silty, Medium to Fine **SAND** With Rock Fragments at 74.70 ft bls.		30				

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter:
Type:
Interval:

RISER CASING
Diameter: **2"**
Type: **Sch. 40 PVC**
Interval: **0 to 27.75 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 23 ft bls**

SEAL
Type: **Bentonite**
Interval: **23 to 25 ft bls**

FILTERPACK
Type: **#1 Silica Sand**
Interval: **25 to 42.75 ft bls**

SCREEN
Diameter: **2"**
Type: **0.010 Slotted PVC**
Interval: **27.75 to 42.75 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

MONITORING WELL RECOVERED ONS LOG.GPJ S&ME.GDT 7/23/08

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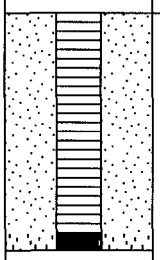
COMPLETION REPORT OF WELL No. GM-5

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

GROUND SURFACE ELEVATION:
LOGGED BY: **796.1**
CHECKED BY: **Scott Dacus**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)	WELL CONSTRUCTION DETAILS
							(See Page 1)
FILL (F): Brown and Reddish-Brown, Micaceous, Clayey, Silty, Medium to Fine **SAND**. Gray, Silty, Medium to Fine **SAND** With Rock Fragments at 74.70 ft bls. *(continued)*		35 40		42.25 42.75		753.80 753.30	



LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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COMPLETION REPORT OF WELL No. GM-5

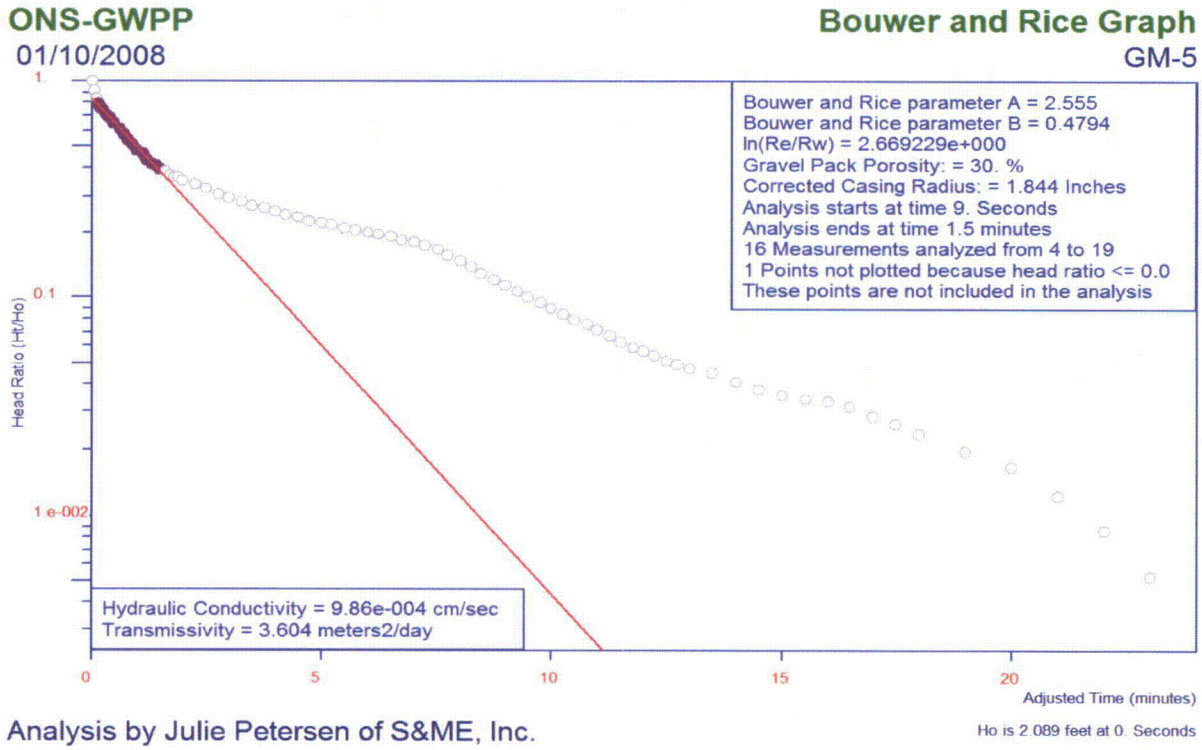
MONITORING WELL RECOVERED ONS LOG.GPJ S&ME.GDT 7/23/08

Calculation of Permeability By The Rising Head Method (Slug Test)

Site Name:	ONS-GWPP
Test Date:	1/10/2008
Well Label:	GM-5
Aquifer Thickness:	13.88 feet
Screen Length:	15. feet
Casing Radius:	1. Inches
Effective Radius:	3. Inches
Gravel Pack Porosity:	30.00%
Corrected Casing Radius:	1.844 Inches
Static Water Level:	33.87 feet
Water Table to Screen Bottom:	8.88 feet
Anisotropy Ratio:	1

Time Adjustment: 0. Seconds
Test starts with trial 0
There are 84 time and drawdown measurements
Maximum head is 2.089 feet
Minimum head is 0. feet

Calculation by Bouwer and Rice Graphical Method



Analysis by Julie Petersen of S&ME, Inc.

PERMEABILITY

9.86×10^{-4} cm/sec

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Project: **Oconee Nuclear Station**			**Boring No. GM-5R**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 1 of 3
Boring Depth (ft): **98.3**	Elevation (ft): **796.1**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **10/11/07**
Logged By: **Scott Dacus**	Water Level: **Stabilized Water Level at 41.36 ft bls**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lithology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
795			**ASPHALT**		
			PRE-DUG HOLE FOR UTILITY CLEARANCE: **FILL**		
	5				
790			FILL (F): Brown, Micaceous, Silty, Medium to Fine **SAND**		13
	10				
785					10
			FILL (F): Reddish-Brown, Micaceous, Silty, **CLAY**		
	15				
780					15
			FILL (F): Brown and Reddish-Brown, Micaceous, Clayey, Silty, Medium to Fine **SAND**		
	20				
775					16
	25		FILL (F): White and Gray, Medium **SAND**		
770					
			FILL (F): Brown and Reddish-Brown, Micaceous, Clayey, Silty, Medium to Fine **SAND**. Gray, Silty, Medium to Fine **SAND** With Rock Fragments at 74.70 ft bls.		19
	30				
765					14

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2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-5R**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 2 of 3
Boring Depth (ft): **98.3**	Elevation (ft): **796.1**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **10/11/07**
Logged By: **Scott Dacus**	Water Level: **Stabilized Water Level at 41.36 ft bls**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
760					
	40				17
755				▼	
	45				18
750					
	50				15
745					
	55				16
740					
	60				18
735					
	65				17
730					
					18

BORING LOG WITH WELL RECOVERED_ONS LOG.GPJ LAGWGN01.GDT 7/23/08

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2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-5R**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 3 of 3
Boring Depth (ft): **98.3**	Elevation (ft): **796.1**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **10/11/07**
Logged By: **Scott Dacus**	Water Level: **Stabilized Water Level at 41.36 ft bls**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
725					
	75				41
720					
			ALLUVIUM (S): White and Gray, Coarse to Fine **SAND** With Quartz Rock Fragments		49
	80		SOIL/SAPROLITE (M1): Gray, White, and Brown, Micaceous, Silty, Medium to Fine **SAND**		
715			**Auger Refusal at 83.50 ft bls**		
			PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **GRANITIC GNEISS** With Intermittent Medium-Grained **BIOTITE HORNBLENDE GNEISS** Intensely Weathered and Fractured, Low Angle Joints With Moderate to No Staining		
	85				
710					
	90				
705					
	95				
700			SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS**; Slightly Fractured, Low Angle and High Angle Joints With No Staining		
			Boring Terminated at 98.30 ft bls		

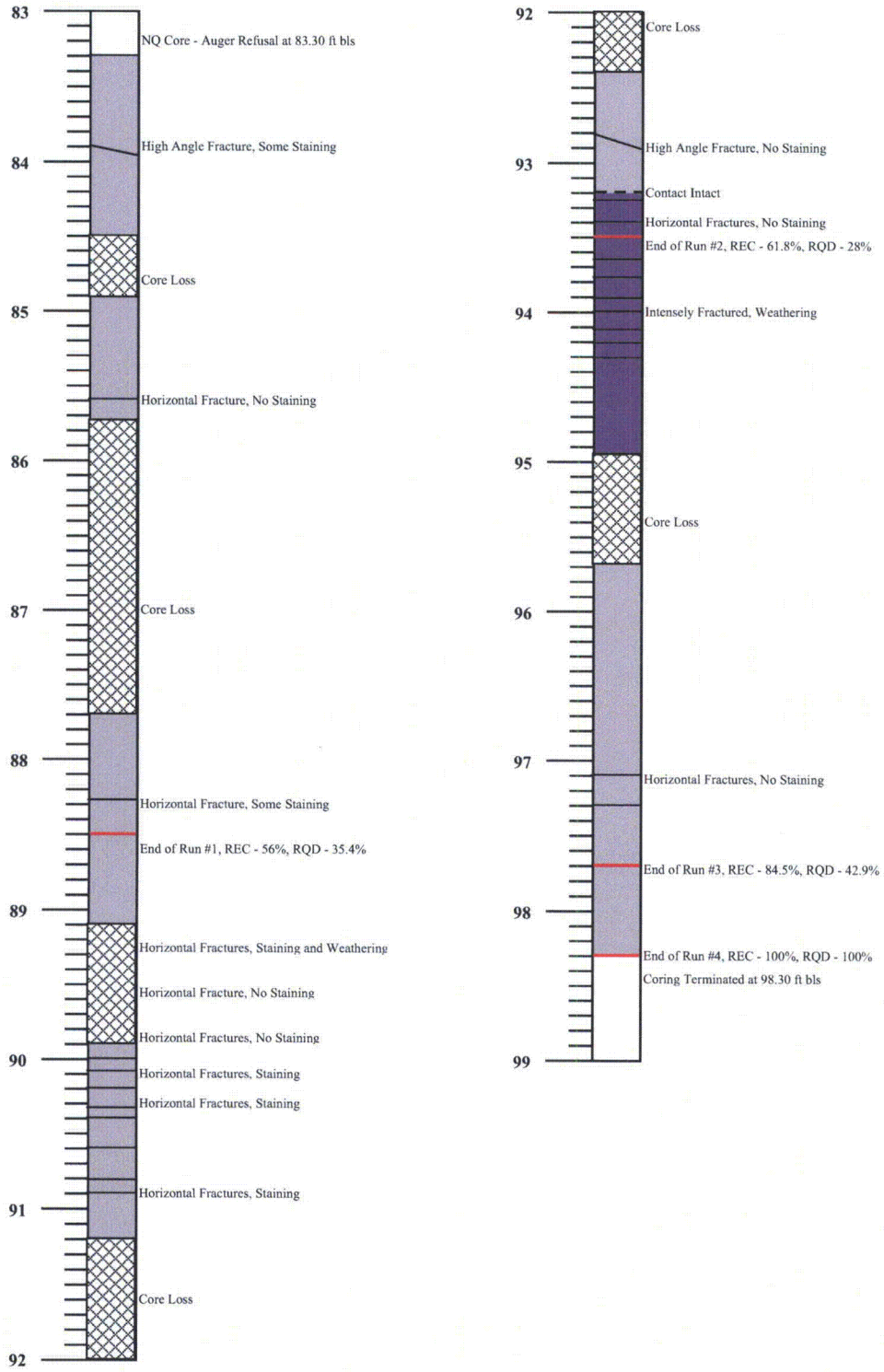
BORING LOG WITH WELL RECOVERED ONS LOG.GPJ LAGWGN01.GDT 7/23/08

FIELD ROCK CORE LOG

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-5R



EXPLANATION

- Concrete
- Granitic Gneiss
- Biotite Hornblende Gneiss
- Core Loss

- Fracture
- End of Run
- Contact
- Healed Joint

COMPLETION REPORT OF WELL No. GM-5R

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

WATER LEVEL: **Stabilized Water Level at 41.36 ft bls**

LATITUDE: **34°47'31.879"**
LONGITUDE: **82°53'51.168"**
TOP OF CASING ELEVATION: **795.87**
DATUM: **MSL**
LOGGED BY: **Scott Dacus**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **4¼" H.S.A.**
DATE DRILLED: **10/11/07**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
				0.00	GS	796.09
ASPHALT		0				
PRE-DUG HOLE FOR UTILITY CLEARANCE: **FILL**						
		5				
FILL (F): Brown, Micaceous, Silty, Medium to Fine **SAND**						
		10				
FILL (F): Reddish-Brown, Micaceous, Silty, **CLAY**		15				
FILL (F): Brown and Reddish-Brown, Micaceous, Clayey, Silty, Medium to Fine **SAND**		20				
FILL (F): White and Gray, Medium **SAND**		25				
FILL (F): Brown and Reddish-Brown, Micaceous, Clayey, Silty, Medium to Fine **SAND**. Gray, Silty, Medium to Fine **SAND** With Rock Fragments at 74.70 ft bls.		30				

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter:
Type:
Interval:

RISER CASING
Diameter: **2"**
Type: **Sch. 40 PVC**
Interval: **0 to 93 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 90.5 ft bls**

SEAL
Type: **K-packer**
Interval: **92.43 to 92.63 ft bls**

FILTERPACK
Type:
Interval:

SCREEN
Diameter: **2"**
Type: **0.010 Slotted PVC**
Interval: **93 to 98 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

MONITORING WELL RECOVERED_ONS LOG.GPJ S&ME.GDT 7/23/08

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COMPLETION REPORT OF WELL No. GM-5R

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

GROUND SURFACE ELEVATION:
LOGGED BY: **796.1**
CHECKED BY: **Scott Dacus**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)	WELL CONSTRUCTION DETAILS
							(See Page 1)
FILL (F): Brown and Reddish-Brown, Micaceous, Clayey, Silty, Medium to Fine **SAND**. Gray, Silty, Medium to Fine **SAND** With Rock Fragments at 74.70 ft bls. *(continued)*		35, 40, 45, 50, 55, 60, 65, 70, 75					

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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COMPLETION REPORT OF WELL No. GM-5R

MONITORING WELL RECOVERED ONS LOG.GPJ S&ME.GDT 7/23/08

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

GROUND SURFACE ELEVATION:
LOGGED BY: **796.1**
CHECKED BY: **Scott Dacus**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)	WELL CONSTRUCTION DETAILS
							(See Page 1)
ALLUVIUM (S): White and Gray, Coarse to Fine **SAND** With Quartz Rock Fragments		80					
SOIL/SAPROLITE (M1): Gray, White, and Brown, Micaceous, Silty, Medium to Fine **SAND**		85					
PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **GRANITIC GNEISS** With Intermittent Medium-Grained **BIOTITE HORNBLENDE GNEISS**; Intensely Weathered and Fractured, Low Angle Joints With Moderate to No Staining		90		90.50		705.59	
				92.43		703.66	
				92.63		703.46	
				93.00		703.09	
		95					
				97.50		698.59	
SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** Slightly Fractured, Low Angle and High Angle Joints With No Staining				98.00		698.09	
				98.30		697.79	

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

MONITORING WELL RECOVERED ONS LOG.GPJ S&ME.GDT 7/23/08

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COMPLETION REPORT OF WELL No. GM-5R

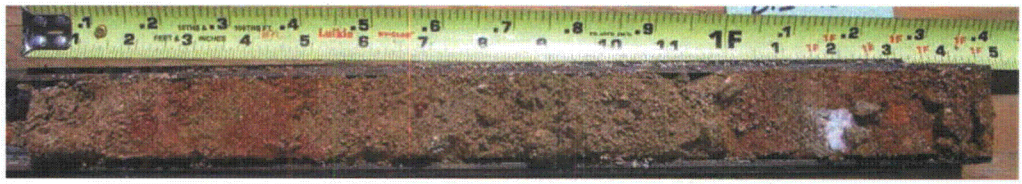
SPLIT SPOON SAMPLE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Boring Number: GM-5R

Sample No: 1
Depth (ft-bls): 8.5 - 10
Blow Count: 5 * 7 * 6

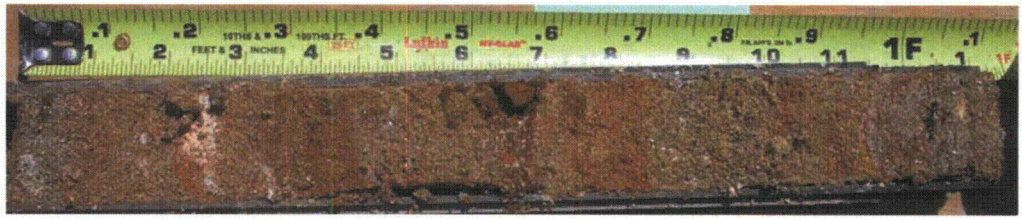


Sample No: 2
Depth (ft-bls): 13.5 - 15
Blow Count: 5 * 4 * 6

Sample No: 3
Depth (ft-bls): 18.5 - 20
Blow Count: 7 * 7 * 8

Sample No: 4
Depth (ft-bls): 23.5 - 25
Blow Count: 3 * 7 * 9

Sample No: 5
Depth (ft-bls): 28.5 - 30
Blow Count: 7 * 8 * 11



Sample No: 6
Depth (ft-bls): 33.5 - 35
Blow Count: 5 * 6 * 8

SPLIT SPOON SAMPLE PICTURES

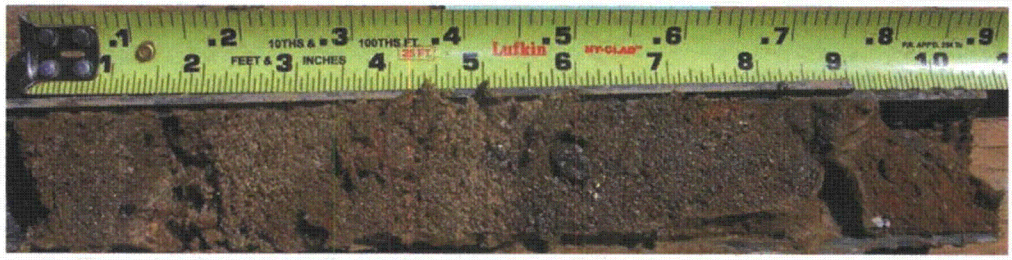
Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

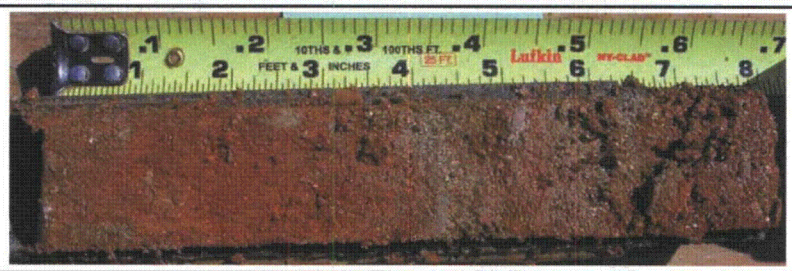
Boring Number: GM-5R

Sample No: 7
Depth (ft-bls): 38.5 - 40
Blow Count: 5 * 7 * 10

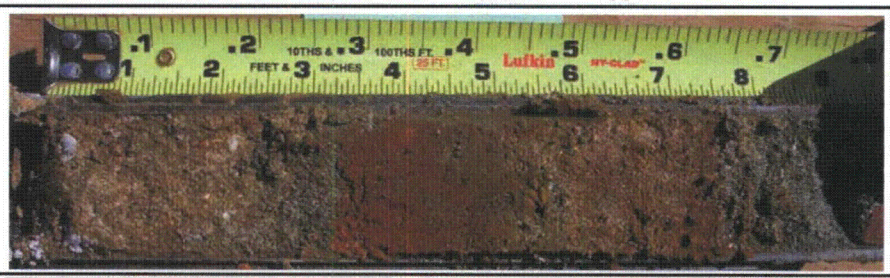
Sample No: 8
Depth (ft-bls): 43.5 - 45
Blow Count: 5 * 8 * 10



Sample No: 9
Depth (ft-bls): 48.5 - 50
Blow Count: 6 * 6 * 9



Sample No: 10
Depth (ft-bls): 53.5 - 55
Blow Count: 6 * 6 * 10



Sample No: 11
Depth (ft-bls): 58.5 - 60
Blow Count: 4 * 7 * 11

Sample No: 12
Depth (ft-bls): 63.5 - 65
Blow Count: 4 * 7 * 10

SPLIT SPOON SAMPLE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

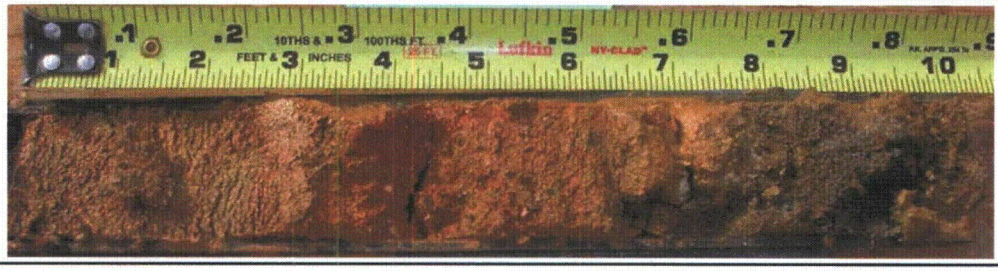
S&ME Project No: 1264-07-234

Boring Number: GM-5R

Sample No: 13
Depth (ft-bls): 68.5 - 70
Blow Count: 4 * 8 * 10

No Recovery

Sample No: 14
Depth (ft-bls): 73.5 - 75
Blow Count: 4 * 10 * 31



Sample No: 15
Depth (ft-bls): 78.5 - 80
Blow Count: 10 * 21 * 28

ROCK CORE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-5R

CLASSIFICATION:

83.50' to 98.30': Medium-Grained Granitic Gneiss With Intermittent Biotite Hornblende Gneiss

CALCULATION OF PERMEABILITY BY THE FALLING HEAD METHOD
(Open Hole in Uniform Material)

S&ME

Site Name:	ONS - GWPP	
Date:	10/16/2007	
Boring I.D.	GM-5R	
Test Interval:	83.5' to 88.5'	(Partially Weathered/Fractured Rock)
Total Depth of Hole:	88.5 ft	2698.17 cm
Length of Open Hole:	5 ft	152.43 cm
Transformation Ratio m=	1	
Performed by:	Scott Dacus	

Time (sec)	Head (cm)	Permeability (cm/sec)
0	1166.68	
60	1088.84	2.02E-04
120	1030.46	1.61E-04
180	981.80	1.42E-04
240	940.52	1.26E-04
300	905.27	1.12E-04
360	874.94	9.98E-05
420	848.51	8.98E-05
480	825.37	8.10E-05
540	805.09	7.28E-05
600	787.23	6.57E-05

Calculations

$$K_h = \frac{d^2 \cdot \ln\left(\frac{2mL}{D}\right)}{8 \cdot L \cdot (t_2 - t_1)} \cdot \ln\frac{H_1}{H_2}$$

for $\frac{mL}{D} > 4$

Where:

K_h	is the Horizontal Coefficient of Permeability (cm/sec)
H_1	is the Piezometric Head for time; $t = t_1$ (cm)
H_2	is the Piezometric Head for time; $t = t_2$ (cm)
D	is the Diameter of the Standpipe (cm)
d	is the diameter of the Open Length (cm),
m	is the Transformation Ratio, Where

$m = \sqrt{K_h / K_v}$ — K_h is the Horizontal Permeability; K_v is the Vertical Permeability

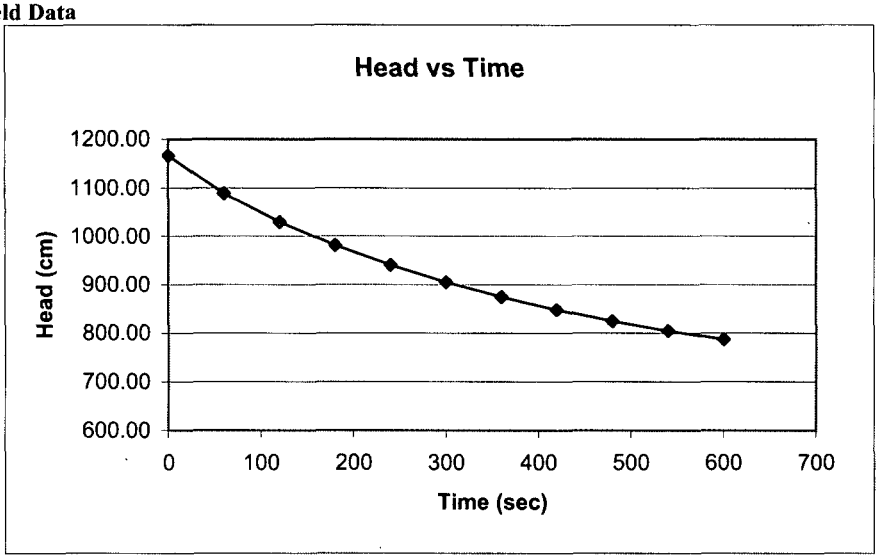
L	is the Open Length of Hole (cm)

Spreadsheet assumes 3" ID Pipe; NQ Hole, OD = 3"

MEAN PERMEABILITY (cm/sec)

1.15E-04

Graph of Field Data



CALCULATION OF PERMEABILITY BY THE FALLING HEAD METHOD
(Open Hole in Uniform Material)

S&ME

Site Name:	ONS - GWPP		
Date:	10/17/2007		
Boring I.D.	GM-5R		
Test Interval:	37 to 41	(Fill)	
Total Depth of Hole:	41 ft		1250 cm
Length of Open Hole:	4 ft		121.95 cm
Transformation Ratio m=	1		
Performed by:	Scott Dacus		

Time (sec)	Head (cm)	Permeability (cm/sec)
0	573.60	
60	560.37	8.02E-05
120	550.12	6.34E-05
180	543.35	4.26E-05
240	538.11	3.33E-05
300	533.51	2.95E-05
360	529.12	2.84E-05
420	524.54	2.98E-05
480	519.88	3.07E-05
540	515.30	3.04E-05
600	510.95	2.92E-05
900	490.12	2.86E-05
1200	471.01	2.74E-05
1500	453.26	2.64E-05
1800	436.74	2.55E-05
2400	406.62	2.46E-05
3000	380.06	2.32E-05
3600	357.20	2.13E-05

Calculations

$$K_h = \frac{d^2 \cdot \ln\left(\frac{2mL}{D}\right)}{8 \cdot L \cdot (t_2 - t_1)} \cdot \ln\frac{H_1}{H_2}$$

for $\frac{mL}{D} > 4$

Where:

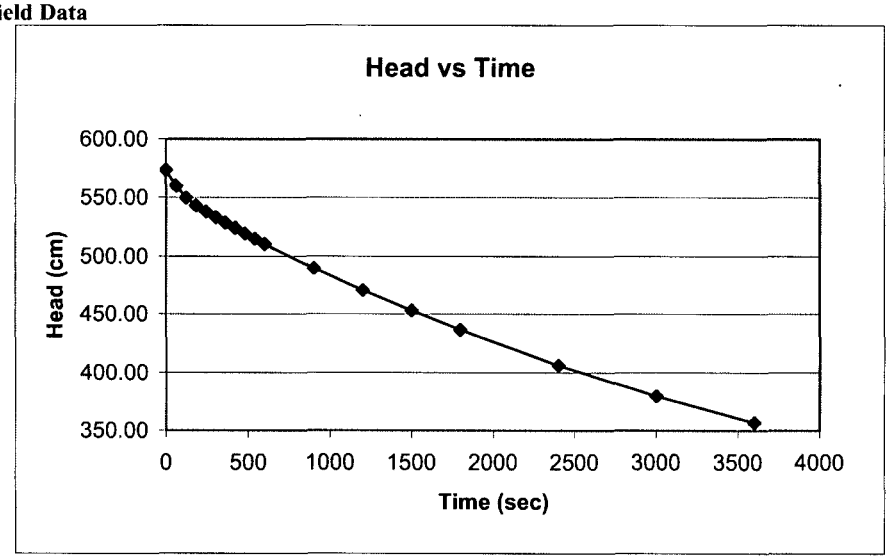
K_h	is the Horizontal Coefficient of Permeability (cm/sec)
H_1	is the Piezometric Head for time; $t = t_1$ (cm)
H_2	is the Piezometric Head for time; $t = t_2$ (cm)
D	is the Diameter of the Standpipe (cm)
d	is the diameter of the Open Length (cm),
m	is the Transformation Ratio, Where
	$m = \sqrt{K_h / K_v}$ — K_h is the Horizontal Permeability; K_v is the Vertical Permeability
L	is the Open Length of Hole (cm)

Spreadsheet assumes 3" ID Pipe; NQ Hole, OD = 3"

MEAN PERMEABILITY (cm/sec)

3.38E-05

Graph of Field Data



CALCULATION OF PERMEABILITY BY THE FALLING HEAD METHOD
(Open Hole in Uniform Material)

S&ME

Site Name:	ONS - GWPP	
Date:	10/16/2007	
Boring I.D.	GM-5R	
Test Interval:	83.5' to 93.5'	(Weathered Rock)
Total Depth of Hole:	93.5 ft	2850.61 cm
Length of Open Hole:	10 ft	304.88 cm
Transformation Ratio m=	1	
Performed by:	Julie Petersen	

Time (sec)	Head (cm)	Permeability (cm/sec)
0	1171.31	
15	1091.80	4.89E-04
30	1030.21	4.04E-04
45	980.34	3.45E-04
60	939.60	2.95E-04
75	906.10	2.53E-04
90	878.63	2.14E-04
105	856.31	1.79E-04
120	838.08	1.50E-04

Calculations

$$K_h = \frac{d^2 \cdot \ln\left(\frac{2mL}{D}\right)}{8 \cdot L \cdot (t_2 - t_1)} \cdot \ln\frac{H_1}{H_2}$$

for $\frac{mL}{D} > 4$

Where:

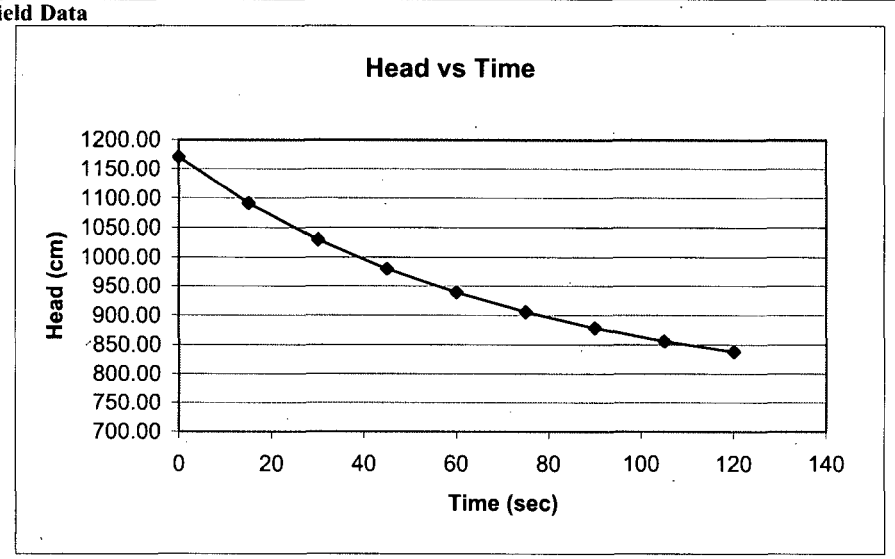
K_h	is the Horizontal Coefficient of Permeability (cm/sec)
H_1	is the Piezometric Head for time; $t = t_1$ (cm)
H_2	is the Piezometric Head for time; $t = t_2$ (cm)
D	is the Diameter of the Standpipe (cm)
d	is the diameter of the Open Length (cm),
m	is the Transformation Ratio, Where
	$m = \sqrt{K_h / K_v}$ — K_h is the Horizontal Permeability; K_v is the Vertical Permeability
L	is the Open Length of Hole (cm)

Spreadsheet assumes 3" ID Pipe; NQ Hole, OD = 3"

MEAN PERMEABILITY (cm/sec)

2.91E-04

Graph of Field Data

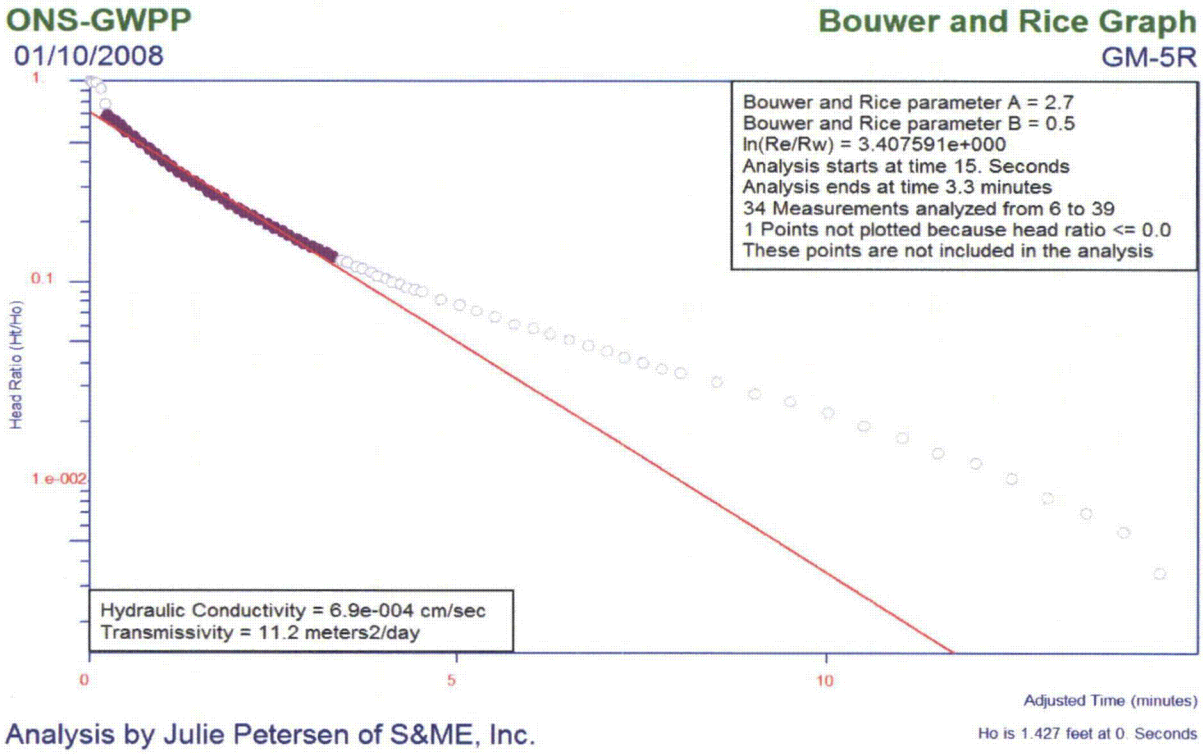


Calculation of Permeability By The Rising Head Method (Slug Test)

Site Name:	ONS-GWPP
Test Date:	1/10/2008
Well Label:	GM-5R
Aquifer Thickness:	61.64 feet
Screen Length:	5. feet
Casing Radius:	1. Inches
Effective Radius:	1.5 Inches
Static Water Level:	41.36 feet
Water Table to Screen Bottom:	56.64 feet
Anisotropy Ratio:	1

Time Adjustment: 0. Seconds
Test starts with trial 0
There are 79 time and drawdown measurements
Maximum head is 1.427 feet
Minimum head is 0. feet

Calculation by Bouwer and Rice Graphical Method



Analysis by Julie Petersen of S&ME, Inc.

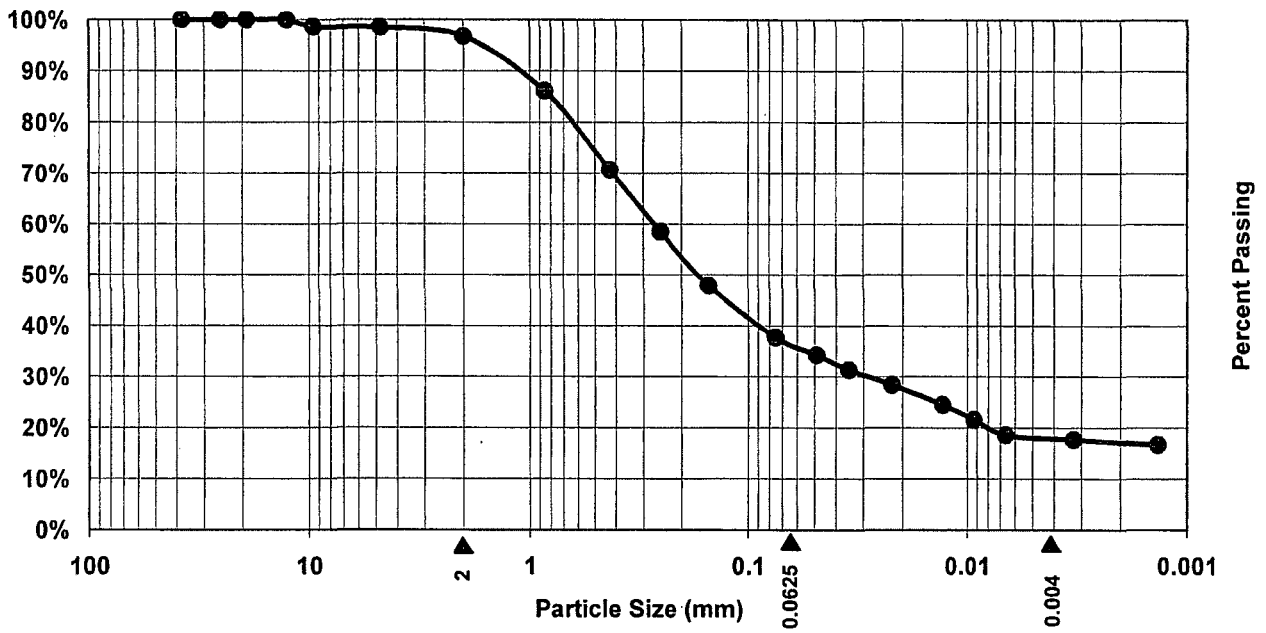
PERMEABILITY

6.90×10^{-4} cm/sec

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring No.:	Sample No.:	Depth:
GM-5R	SS-3	18.5 to 20 ft bls

Sample Description:
F: Brown and Reddish-Brown, Clayey, Silty, Coarse to Fine Sand (SM)



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 3.3%	% Sand 60.3%	% Silt 18.6%	% Clay 17.8%
Adjusted for Calculations	**0%**	**62%**	**19%**	**18%**

Notes:
Grain size distribution taken from grain size with hydrometer data located in Appendix II.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

S&ME Project:
Oconee Nuclear Station - GWPP

S&ME Project No.:
1264-07-234

S&ME

FETTER AND BEAR DIAGRAMS

S&ME PROJECT: Oconee Nuclear Station - GWPP
S&ME PROJECT NO.: 1264-07-234

Boring No. GM-5R

Boring Depth: 18.5 to 20 ft bls

% Sand: 62%

% Silt: 19%

% Clay: 18%

Estimated Specific Yield: 19%

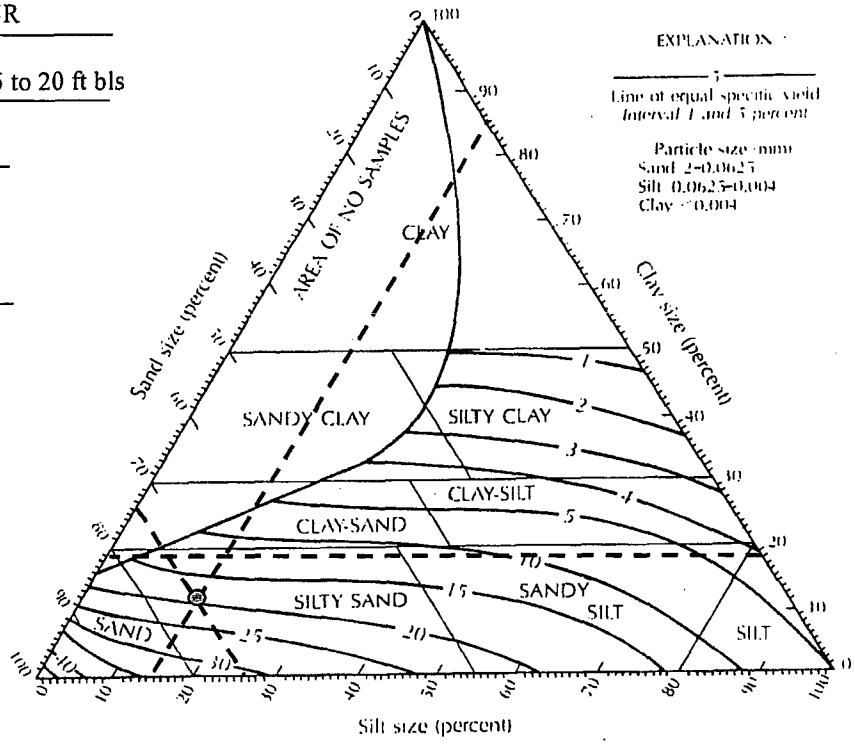
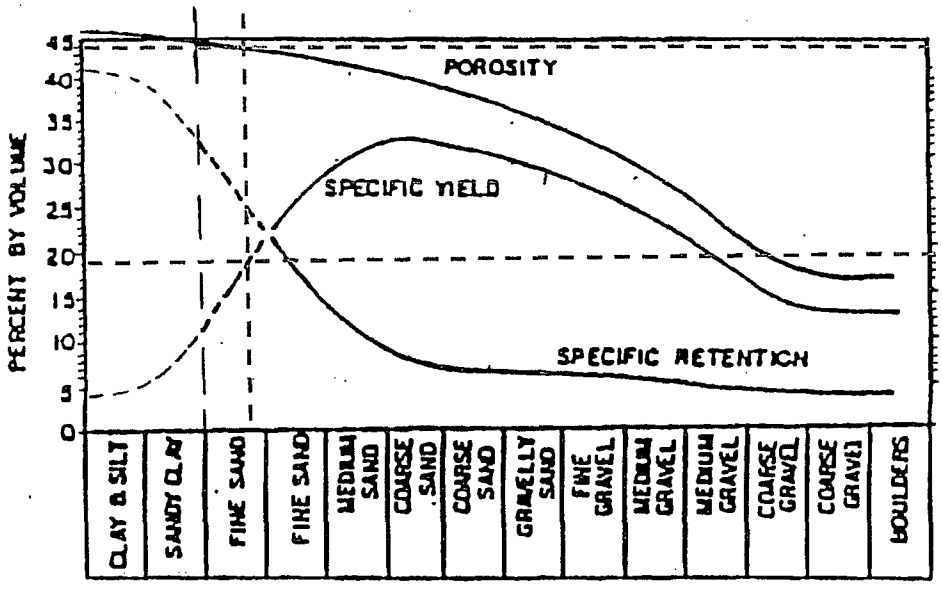


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



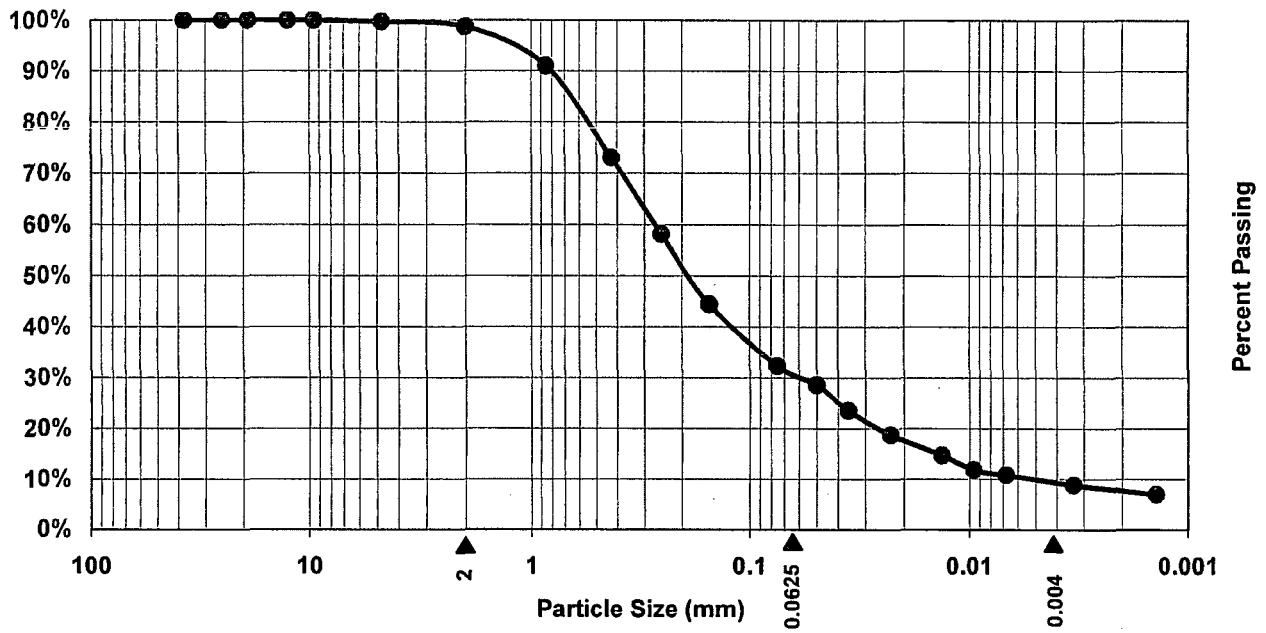
Estimated Porosity: 44%

Variation of Porosity, Specific Yield, and Specific Retention with Grain Size (after Bear, 1972)

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring No.:	Sample No.:	Depth:
GM-5R	SS-12	63.5 to 65 ft bls

Sample Description:
F: Brown and Reddish-Brown, Clayey, Silty, Coarse to Fine Sand (SM)



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 1.3%	% Sand 67.9%	% Silt 21.6%	% Clay 9.2%
Adjusted for Calculations	**0%**	**69%**	**22%**	**9%**

Notes:
Grain size distribution taken from grain size with hydrometer data located in Appendix II.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

S&ME Project:
Oconee Nuclear Station - GWPP

S&ME Project No.:
1264-07-234

S&ME

FETTER AND BEAR DIAGRAMS

S&ME PROJECT: Oconee Nuclear Station - GWPP
S&ME PROJECT NO.: 1264-07-234

Boring No. GM-5R

Boring Depth: 63.5 to 65 ft bls

% Sand: 69%

% Silt: 22%

% Clay: 9%

Estimated Specific Yield: 23%

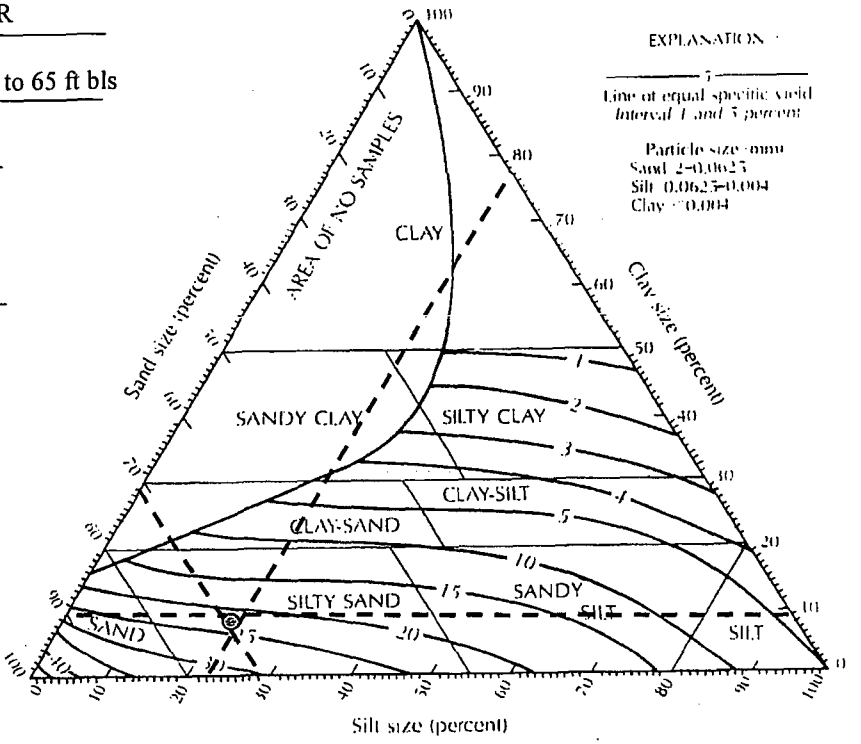
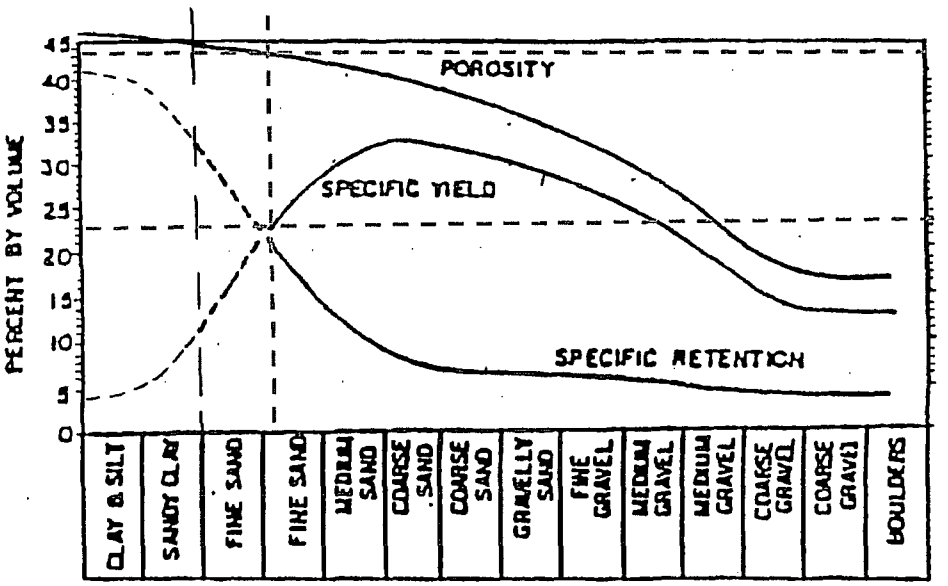


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



Estimated Porosity: 43.5%

Variation of Porosity, Specific Yield, and Specific Retention with Grain Size (after Bear, 1972)

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9751 Southern Pine Boulevard
Charlotte, North Carolina 28273
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Fax: 704-525-3953

1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-6**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 1 of 1
Boring Depth (ft): **25.0**	Elevation (ft): **742.3**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **10/31/07**
Logged By: **Julie Petersen**	Water Level: **Stabilized Water Level at 14.35 ft bls**		Drilling Method: **Mud Rotary**

Elev. (Feet)	Depth (Feet)	Lithology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
740			PRE-DUG HOLE FOR UTILITY CLEARANCE: **FILL**		
	5		FILL (F): **ROCK LENSE**		
735			SOIL/SAPROLITE (M1): Red, Micaceous, Mediun to Fine Sandy, **SILT** With Manganese Banding		
	10		SOIL/SAPROLITE (M1): White and Brown, Micaceous, Silty, Medium to Fine **SAND**		
730			SOIL/SAPROLITE (M1): Red, Micaceous, Medium to Fine Sandy, **SILT** With Manganese Staining		
	15		SOIL/SAPROLITE (M1): White and Brown, Micaceous, Silty, Medium to Fine **SAND** With Intermittent, Weathered, Brown, Mica Schist Layers		
725					
	20				
720					
	25		**Lithologic Information Obtained From GM-6R Boring.Terminated at 25.00 ft bls**		

COMPLETION REPORT OF WELL No. GM-6

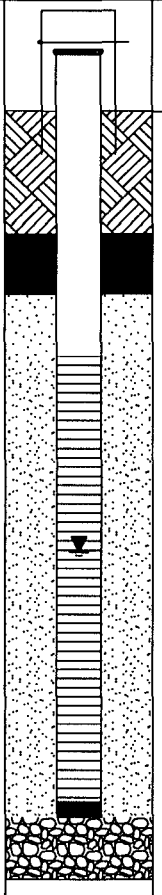
PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

WATER LEVEL: **Stabilized Water Level at 14.35 ft bls**

LATITUDE: **34°47'32.094"**
LONGITUDE: **82°53'47.874"**
TOP OF CASING ELEVATION: **745.46**
DATUM: **MSL**
LOGGED BY: **Julie Petersen**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **Mud Rotary**
DATE DRILLED: **10/31/07**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
				0.00	GS	742.27
PRE-DUG HOLE FOR UTILITY CLEARANCE: **FILL**		0				
				4.00		738.27
FILL (F): **ROCK LENSE**		5		6.00		736.27
SOIL/SAPROLITE (M1): Red, Micaceous, Mediun to Fine Sandy, **SILT** With Manganese Banding		10				
SOIL/SAPROLITE (M1): White and Brown, Micaceous, Silty, Medium to Fine **SAND**						
SOIL/SAPROLITE (M1): Red, Micaceous, Medium to Fine Sandy, **SILT** With Manganese Staining		15				
SOIL/SAPROLITE (M1): White and Brown, Micaceous, Silty, Medium to Fine **SAND** With Intermittent, Weathered, Brown, Mica Schist Layers		20		22.50		719.77
				23.00		719.27
		25		25.00		717.27



WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter:
Type:
Interval:

RISER CASING
Diameter: **2"**
Type: **Sch. 40 PVC**
Interval: **0 to 8 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 4 ft bls**

SEAL
Type: **Bentonite**
Interval: **4 to 6 ft bls**

FILTERPACK
Type: **#1 Silica Sand**
Interval: **6 to 23 ft bls**

SCREEN
Diameter: **2"**
Type: **0.010 Slotted PVC**
Interval: **8 to 23 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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COMPLETION REPORT OF WELL No. GM-6

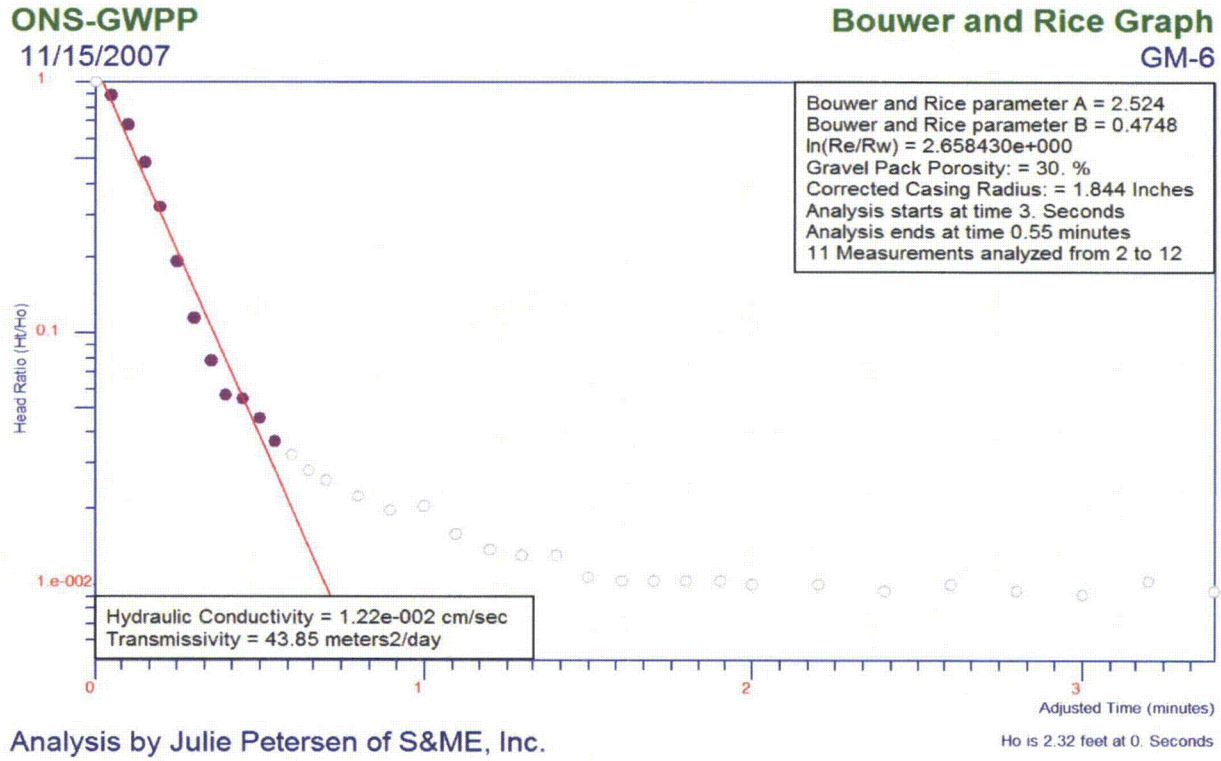
MONITORING WELL RECOVERED_ONS LOG.GPJ S&ME.GDT 8/28/08

Calculation of Permeability By The Rising Head Method (Slug Test)

Site Name:	ONS-GWPP
Test Date:	11/15/2007
Well Label:	GM-6
Aquifer Thickness:	13.65 feet
Screen Length:	15. feet
Casing Radius:	1. Inches
Effective Radius:	3. Inches
Gravel Pack Porosity:	30.00%
Corrected Casing Radius:	1.844 Inches
Static Water Level:	14.35 feet
Water Table to Screen Bottom:	8.65 feet
Anisotropy Ratio:	1

Time Adjustment: 0. Seconds
Test starts with trial 0
There are 35 time and drawdown measurements
Maximum head is 2.32 feet
Minimum head is 0. feet

Calculation by Bouwer and Rice Graphical Method



Analysis by Julie Petersen of S&ME, Inc.

PERMEABILITY

1.22×10^{-2} cm/sec

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ENGINEERING • TESTING
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2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-6R**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 1 of 2
Boring Depth (ft): **54.7**	Elevation (ft): **742.1**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **10/29/07**
Logged By: **Julie Petersen**	Water Level: **Stabilized Water Level at 13.66 ft bls**		Drilling Method: **Mud Rotary**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
740			PRE-DUG HOLE FOR UTILITY CLEARANCE: **FILL**		50/0
	5		FILL (F): **ROCK LENSE**		>>
735			SOIL/SAPROLITE (M1): Red, Micaceous, Mediun to Fine Sandy, **SILT** With Manganese Banding		
	10		SOIL/SAPROLITE (M1): White and Brown, Micaceous, Silty, Medium to Fine **SAND**		6
730			SOIL/SAPROLITE (M1): Red, Micaceous, Medium to Fine Sandy, **SILT** With Manganese Staining		
	15		SOIL/SAPROLITE (M1): White and Brown, Micaceous, Silty, Medium to Fine **SAND** With Intermittent Brown, Weathered, Mica Schist Layers		15
725					18
	20				
720					47
	25				
715					50/4
	30		WEATHERED ROCK (M2): When Sampled Becomes White and Brown, Micaceous, Silty, Medium to Fine **SAND** With Intermittent, Weathered, Brown, Mica Schist Layers		>>
710			**Roller Cone Refusal at 34.70 ft bls**		50/5
					>>

BORING LOG WITH WELL RECOVERED_ONS LOG.GPJ LAGWGN01.GDT 8/28/08

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2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-6R**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 2 of 2
Boring Depth (ft): **54.7**	Elevation (ft): **742.1**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **10/29/07**
Logged By: **Julie Petersen**	Water Level: **Stabilized Water Level at 13.66 ft bls**		Drilling Method: **Mud Rotary**

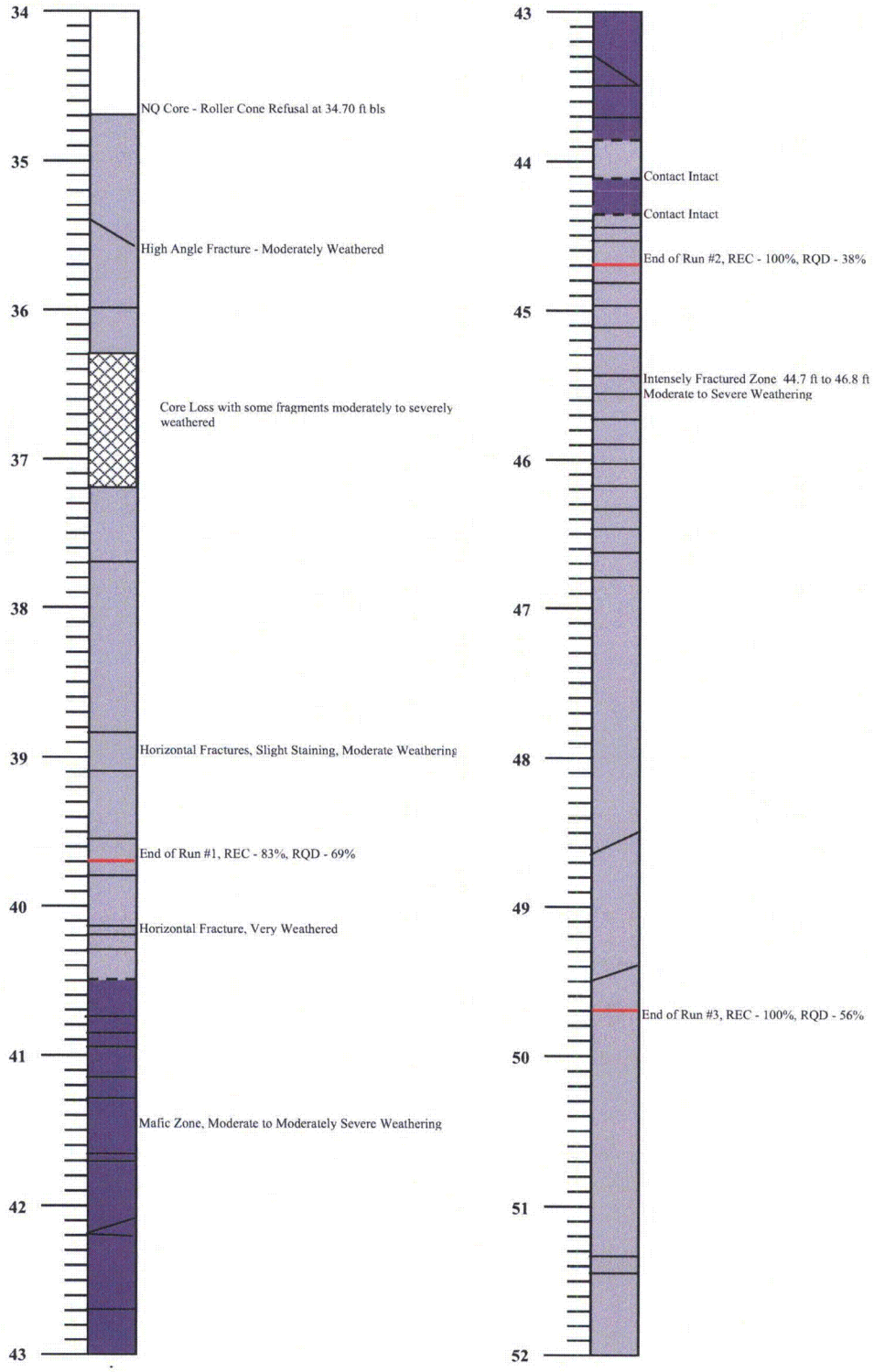
Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
705	40		SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS**; Moderately Fractured, High and Low Angle Joints With Slight to No Staining		
700			PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **BIOTITE HORNBLENDE GNEISS**; Intensely Fractured, High Angle, Low Angle, and Vertical Joints With No Staining		
695	45		PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **GRANITIC GNEISS** With Intermittent Medium-Grained **BIOTITE HORNBLENDE GNEISS**; Intensely Fractured, High Angle and Low Angle Joints With No Staining		
690	50		SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS**; Moderately Fractured High Angle and Low Angle Joints With No Staining		
			Boring Terminated at 54.70 ft bls		

FIELD ROCK CORE LOG

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-6R



EXPLANATION

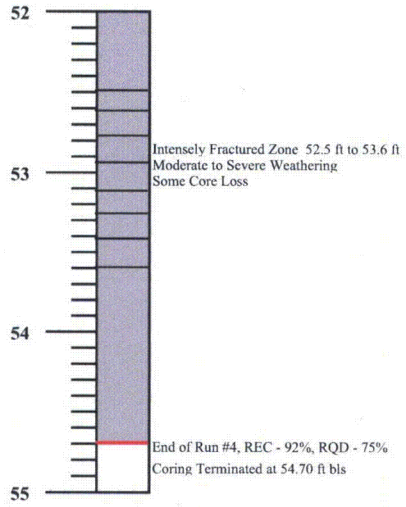
- Concrete
- Granitic Gneiss
- Biotite Hornblende Gneiss
- Core Loss
- Fracture
- End of Run
- Contact
- Healed Joint

FIELD ROCK CORE LOG

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-6R



EXPLANATION

Concrete

Granitic Gneiss

Biotite Hornblende Gneiss

Core Loss

Fracture

End of Run

Contact

Healed Joint

COMPLETION REPORT OF WELL No. GM-6R

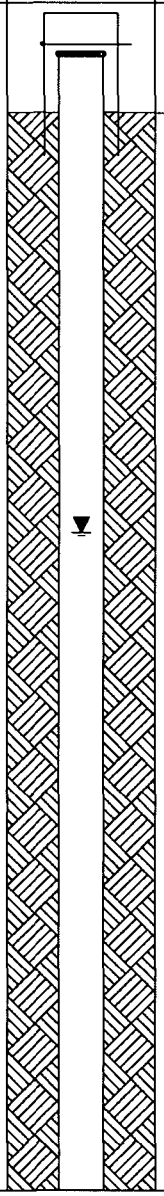
PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

WATER LEVEL: **Stabilized Water Level at 13.66 ft bls**

LATITUDE: **34°47'32.090"**
LONGITUDE: **82°53'47.815"**
TOP OF CASING ELEVATION: **745.16**
DATUM: **MSL**
LOGGED BY: **Julie Petersen**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **Mud Rotary**
DATE DRILLED: **10/29/07**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
				0.00	GS	742.05
PRE-DUG HOLE FOR UTILITY CLEARANCE: **FILL**		0				
FILL (F): **ROCK LENSE**		5				
SOIL/SAPROLITE (M1): Red, Micaceous, Mediun to Fine Sandy, **SILT** With Manganese Banding		10				
SOIL/SAPROLITE (M1): White and Brown, Micaceous, Silty, Medium to Fine **SAND**						
SOIL/SAPROLITE (M1): Red, Micaceous, Medium to Fine Sandy, **SILT** With Manganese Staining		15				
SOIL/SAPROLITE (M1): White and Brown, Micaceous, Silty, Medium to Fine **SAND** With Intermittent Brown, Weathered, Mica Schist Layers		20 25				
WEATHERED ROCK (M2): When Sampled Becomes White and Brown, Micaceous, Silty, Medium to Fine **SAND** With Intermittent, Weathered, Brown,		30				



WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter:
Type:
Interval:

RISER CASING
Diameter: **2"**
Type: **Sch. 40 PVC**
Interval: **0 to 42 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 40 ft bls**

SEAL
Type: **K-packer**
Interval: **41.4 to 41.6 ft bls**

FILTERPACK
Type:
Interval:

SCREEN
Diameter: **2"**
Type: **0.010 Slotted PVC**
Interval: **42 to 47 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

MONITORING WELL RECOVERED ONS LOG.GPJ S&ME.GDT 8/28/08

S&ME
ENGINEERING • TESTING
ENVIRONMENTAL SERVICES

9751 Southern Pine Boulevard
Charlotte, North Carolina 28273

COMPLETION REPORT OF WELL No. GM-6R

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

GROUND SURFACE ELEVATION: **742.1**
LOGGED BY: **Julie Petersen**
CHECKED BY:

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)	WELL CONSTRUCTION DETAILS
							(See Page 1)
Mica Schist Layers SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** Moderately Fractured, High and Low Angle Joints With Slight to No Staining *(continued)*		35					
		40		40.00		702.05	
				41.40		700.65	
PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **BIOTITE HORNBLENDE GNEISS**; Intensely Fractured, High Angle, Low Angle, and Vertical Joints With No Staining				41.60		700.45	
				42.00		700.05	
		45		46.50		695.55	
				47.00		695.05	
				49.00		693.05	
PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **GRANITIC GNEISS** With Intermittent Medium-Grained **BIOTITE HORNBLENDE GNEISS**; Intensely Fractured, High Angle and Low Angle Joints With No Staining		50		54.70		687.35	
SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** Moderately Fractured High Angle and Low Angle Joints With No Staining							

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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Charlotte, North Carolina 28273

COMPLETION REPORT OF WELL No. GM-6R

MONITORING WELL RECOVERED ONS LOG.GPJ S&ME.GDT 8/28/08

SPLIT SPOON SAMPLE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

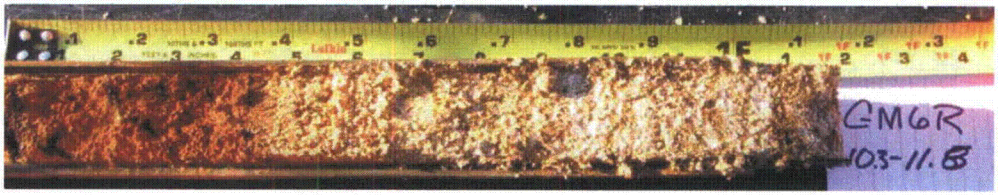
S&ME Project No: 1264-07-234

Boring Number: GM-6R

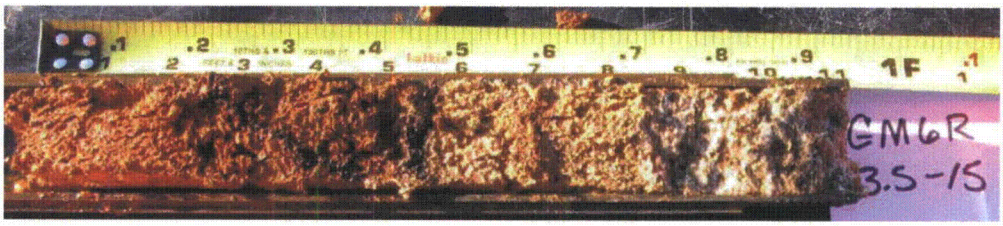
Sample No: 1
Depth (ft-bls): 5 - 6.5
Blow Count: 50/0

No Recovery

Sample No: 2
Depth (ft-bls): 10.3 - 11.8
Blow Count: 2 * 3 * 3

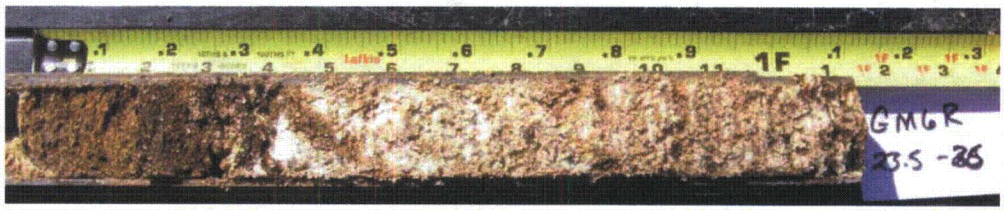


Sample No: 3
Depth (ft-bls): 13.5 - 15
Blow Count: 3 * 5 * 10

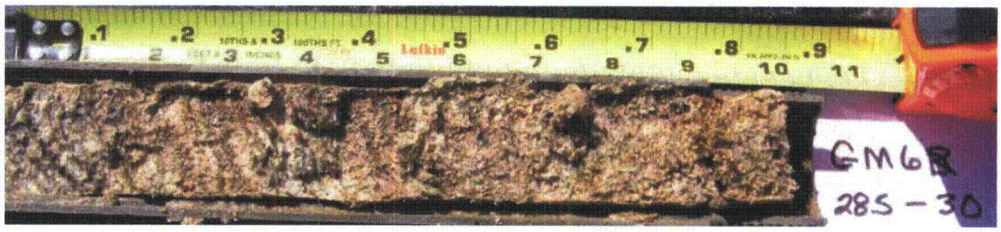


Sample No: 4
Depth (ft-bls): 18.5 - 20
Blow Count: 8 * 10 * 8

Sample No: 5
Depth (ft-bls): 23.5 - 25
Blow Count: 6 * 18 * 29



Sample No: 6
Depth (ft-bls): 28.5 - 30
Blow Count: 26 * 48 * 50/4



SPLIT SPOON SAMPLE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Boring Number: **GM-6R**

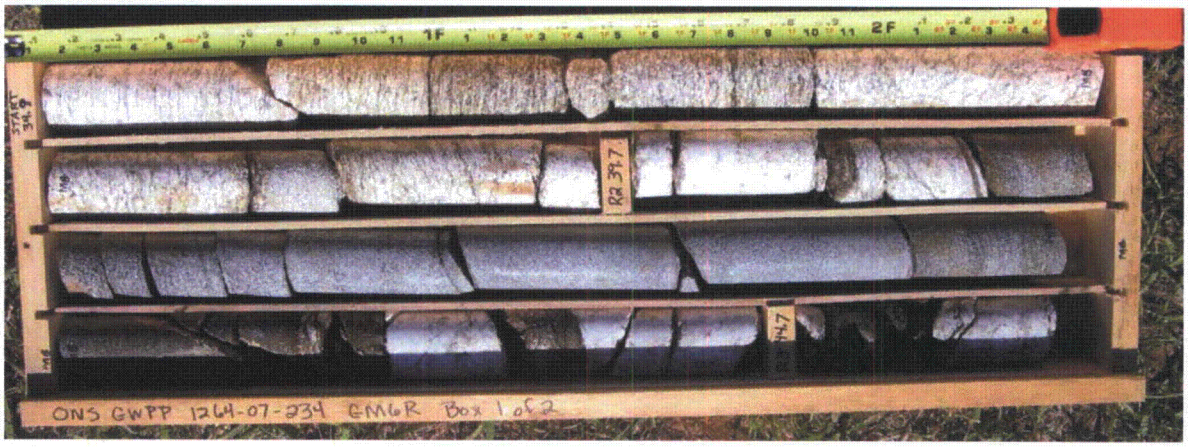
Sample No:	**7**
Depth (ft-bls):	**33.5 - 35**
Blow Count:	**6 * 50/5**

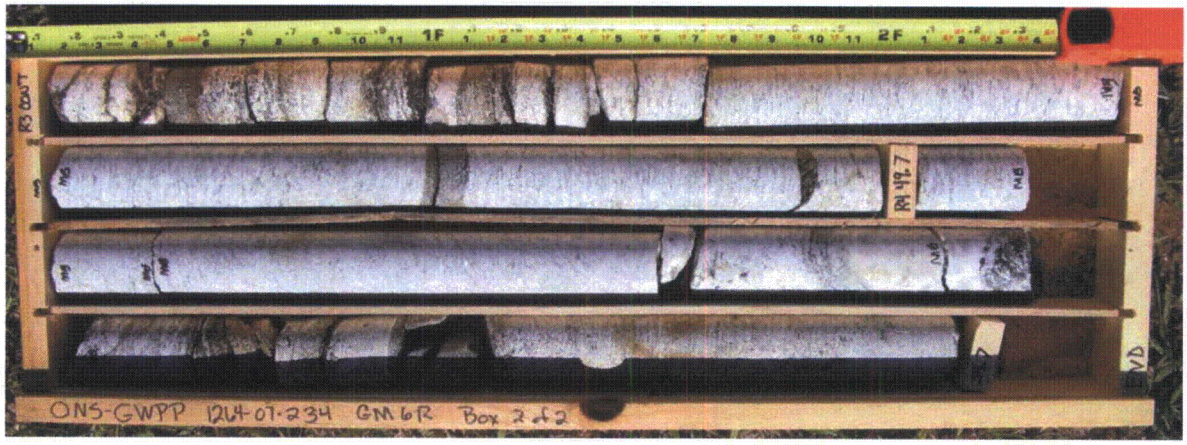
ROCK CORE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-6R





CLASSIFICATION:

34.70' to 40.50': Medium-Grained Granitic Gneiss

40.50' to 43.85': Medium-Grained Biotite Hornblende Gneiss

43.85' to 54.70': Medium-Grained Granitic Gneiss With Intermittent Biotite Hornblende Gneiss

CALCULATION OF PERMEABILITY BY THE FALLING HEAD METHOD
(Open Hole in Uniform Material)

S&ME

Site Name:	ONS - GWPP	
Date:	10/29/2007	
Boring I.D.	GM-6R	
Test Interval:	34.9' to 39.7'	(Sound Rock)
Total Depth of Hole:	39.7 ft	1210.37 cm
Length of Open Hole:	4.8 ft	146.34 cm
Transformation Ratio m=	1	
Performed by:	Julie Petersen	

Time (sec)	Head (cm)	Permeability (cm/sec)
0	1217.23	
60	1166.98	1.27E-04
120	1126.40	1.07E-04
180	1094.15	8.76E-05
240	1065.82	7.91E-05
300	1041.31	7.02E-05
360	1020.03	6.23E-05
420	1001.19	5.62E-05
480	984.42	5.09E-05
540	969.57	4.58E-05
600	956.04	4.24E-05

Calculations

$$K_h = \frac{d^2 \cdot \ln\left(\frac{2mL}{D}\right)}{8 \cdot L \cdot (t_2 - t_1)} \cdot \ln\frac{H_1}{H_2}$$

for $\frac{mL}{D} > 4$

Where:

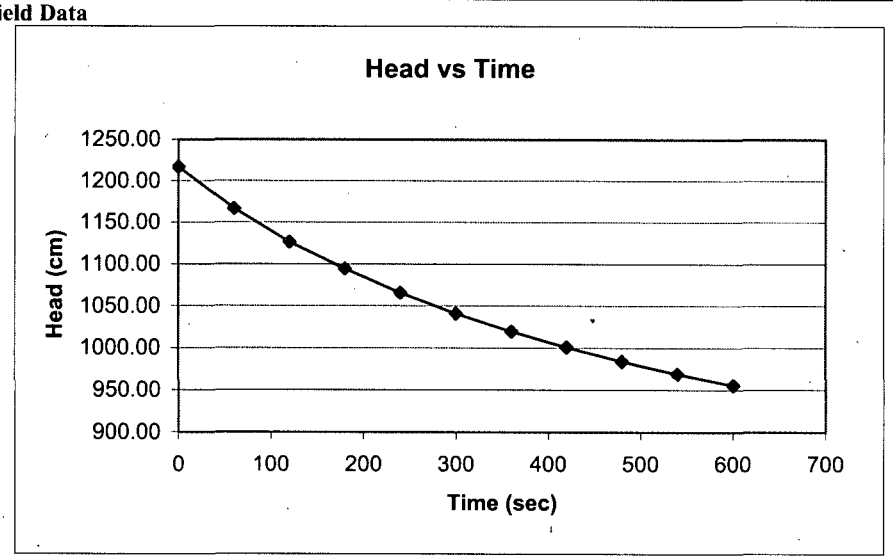
- K_h is the Horizontal Coefficient of Permeability (cm/sec)
- H_1 is the Piezometric Head for time; $t = t_1$ (cm)
- H_2 is the Piezometric Head for time; $t = t_2$ (cm)
- D is the Diameter of the Standpipe (cm)
- d is the diameter of the Open Length (cm),
- m is the Transformation Ratio, Where $m = \sqrt{K_h / K_v}$ — K_h is the Horizontal Permeability, K_v is the Vertical Permeability
- L is the Open Length of Hole (cm)

Spreadsheet assumes 3" ID Pipe; NQ Hole, OD = 3"

MEAN PERMEABILITY (cm/sec)

7.28E-05

Graph of Field Data



CALCULATION OF PERMEABILITY BY THE FALLING HEAD METHOD
(Open Hole in Uniform Material)

S&ME

Site Name:	ONS - GWPP	
Date:	10/29/2007	
Boring I.D.	GM-6R	
Test Interval:	20' to 23'	(Soil/Saprolite)
Total Depth of Hole:	23 ft	701.22 cm
Length of Open Hole:	3 ft	91.46 cm
Transformation Ratio m=	1	
Performed by:	Julie Petersen	

Time (sec)	Head (cm)	Permeability (cm/sec)
0	702.77	
60	607.10	6.15E-04
120	540.18	4.91E-04
180	488.72	4.21E-04
240	448.87	3.58E-04
300	415.98	3.20E-04
360	389.88	2.72E-04
420	368.05	2.42E-04
480	350.34	2.07E-04

Calculations

$$K_h = \frac{d^2 \cdot \ln\left(\frac{2mL}{D}\right)}{8 \cdot L \cdot (t_2 - t_1)} \cdot \ln\frac{H_1}{H_2}$$

for $\frac{mL}{D} > 4$

Where:

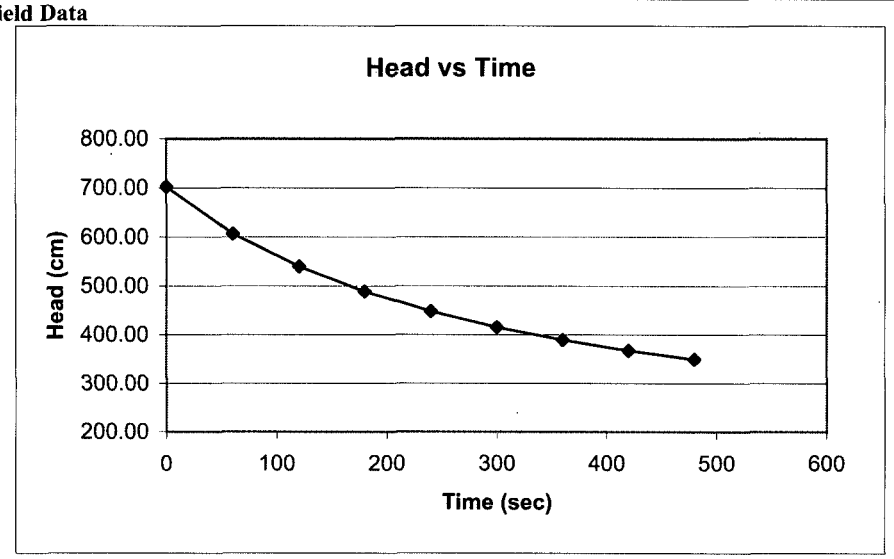
K_h	is the Horizontal Coefficient of Permeability (cm/sec)
H_1	is the Piezometric Head for time; $t = t_1$ (cm)
H_2	is the Piezometric Head for time; $t = t_2$ (cm)
D	is the Diameter of the Standpipe (cm)
d	is the diameter of the Open Length (cm),
m	is the Transformation Ratio, Where
	$m = \sqrt{K_h / K_v}$ — K_h is the Horizontal Permeability; K_v is the Vertical Permeability
L	is the Open Length of Hole (cm)

Spreadsheet assumes 3" ID Pipe; NQ Hole, OD = 3"

MEAN PERMEABILITY (cm/sec)

3.66E-04

Graph of Field Data



CALCULATION OF PERMEABILITY BY THE FALLING HEAD METHOD
(Open Hole in Uniform Material)

S&ME

Site Name:	ONS - GWPP	
Date:	10/29/2007	
Boring I.D.	GM-6R	
Test Interval:	34.9' to 44.7'	(Sound and Partially Weathered/Fractured Rock)
Total Depth of Hole:	44.7 ft	1362.8 cm
Length of Open Hole:	9.8 ft	298.78 cm
Transformation Ratio m=	1	
Performed by:	Julie Petersen	

Time (sec)	Head (cm)	Permeability (cm/sec)
0	1380.79	
60	1345.34	4.59E-05
120	1316.89	3.77E-05
180	1292.26	3.33E-05
240	1269.88	3.09E-05
300	1248.96	2.93E-05
360	1229.88	2.72E-05
420	1212.74	2.48E-05
480	1196.16	2.43E-05
540	1179.88	2.42E-05
600	1165.88	2.11E-05
900	1104.27	1.92E-05
1200	1058.41	1.50E-05
1500	1023.41	1.19E-05

Calculations

$$K_h = \frac{d^2 \cdot \ln\left(\frac{2mL}{D}\right)}{8 \cdot L \cdot (t_2 - t_1)} \cdot \ln\frac{H_1}{H_2}$$

for $\frac{mL}{D} > 4$

Where:

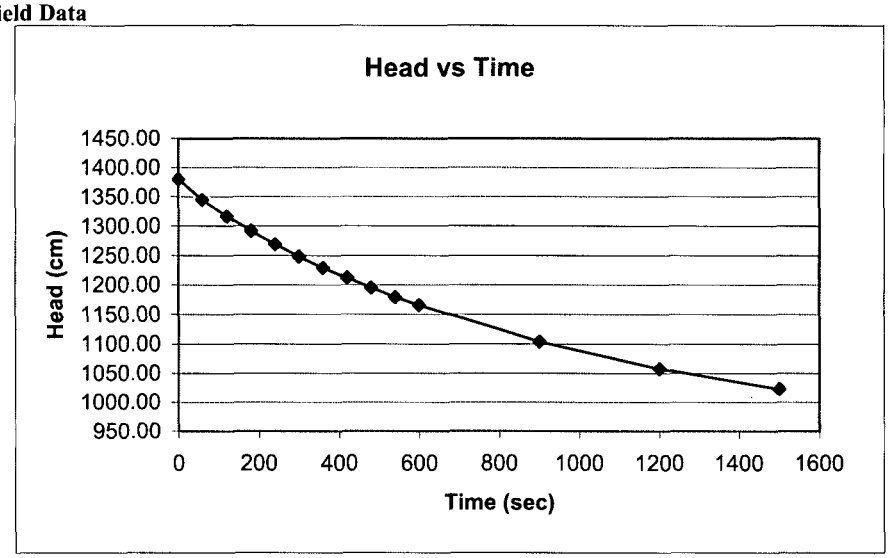
K_h	is the Horizontal Coefficient of Permeability (cm/sec)
H_1	is the Piezometric Head for time; $t = t_1$ (cm)
H_2	is the Piezometric Head for time; $t = t_2$ (cm)
D	is the Diameter of the Standpipe (cm)
d	is the diameter of the Open Length (cm),
m	is the Transformation Ratio, Where
	$m = \sqrt{K_h / K_v}$ — K_h is the Horizontal Permeability; K_v is the Vertical Permeability
L	is the Open Length of Hole (cm)

Spreadsheet assumes 3" ID Pipe; NQ Hole, OD = 3"

MEAN PERMEABILITY (cm/sec)

2.65E-05

Graph of Field Data

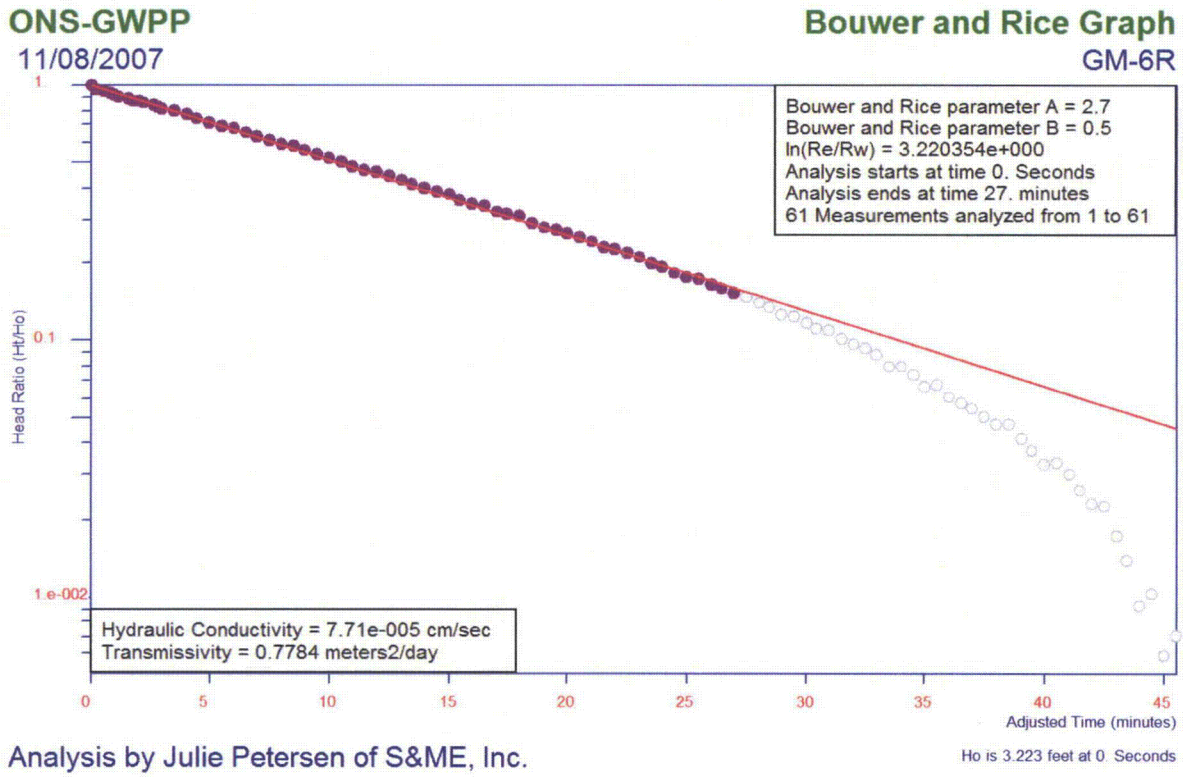


Calculation of Permeability By The Rising Head Method (Slug Test)

Site Name:	ONS-GWPP
Test Date:	11/8/2007
Well Label:	GM-6R
Aquifer Thickness:	38.34 feet
Screen Length:	5. feet
Casing Radius:	1. Inches
Effective Radius:	1.5 Inches
Static Water Level:	13.66 feet
Water Table to Screen Bottom:	33.34 feet
Anisotropy Ratio:	1

Time Adjustment: 0. Seconds
Test starts with trial 0
There are 98 time and drawdown measurements
Maximum head is 3.223 feet
Minimum head is 0. feet

Calculation by Bouwer and Rice Graphical Method



Analysis by Julie Petersen of S&ME, Inc.

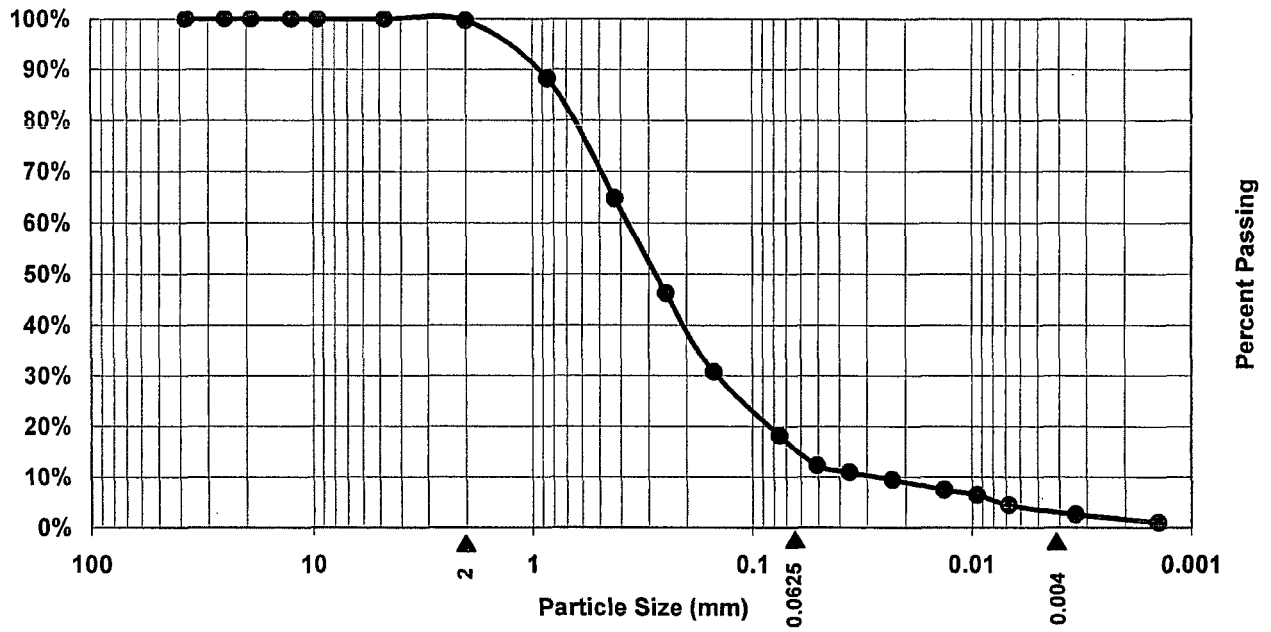
PERMEABILITY

7.71×10^{-5} cm/sec

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring No.:	Sample No.:	Depth:
GM-6R	SS-6	28.5 to 30 ft bls

Sample Description:
M2: White and Brown, Silty, Medium to Fine Sand (SM)



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 0.4%	% Sand 83.8%	% Silt 13.0%	% Clay 2.9%
Adjusted for Calculations	**0%**	**84%**	**13%**	**3%**

Notes:
Grain size distribution taken from grain size with hydrometer data located in Appendix II.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

S&ME Project:
Oconee Nuclear Station - GWPP

S&ME Project No.:
1264-07-234

S&ME

FETTER AND BEAR DIAGRAMS

S&ME PROJECT: Oconee Nuclear Station - GWPP
S&ME PROJECT NO.: 1264-07-234

Boring No. GM-6R

Boring Depth: 28.5 to 30 ft bls

% Sand: 84%

% Silt: 13%

% Clay: 3%

Estimated Specific Yield: 30%

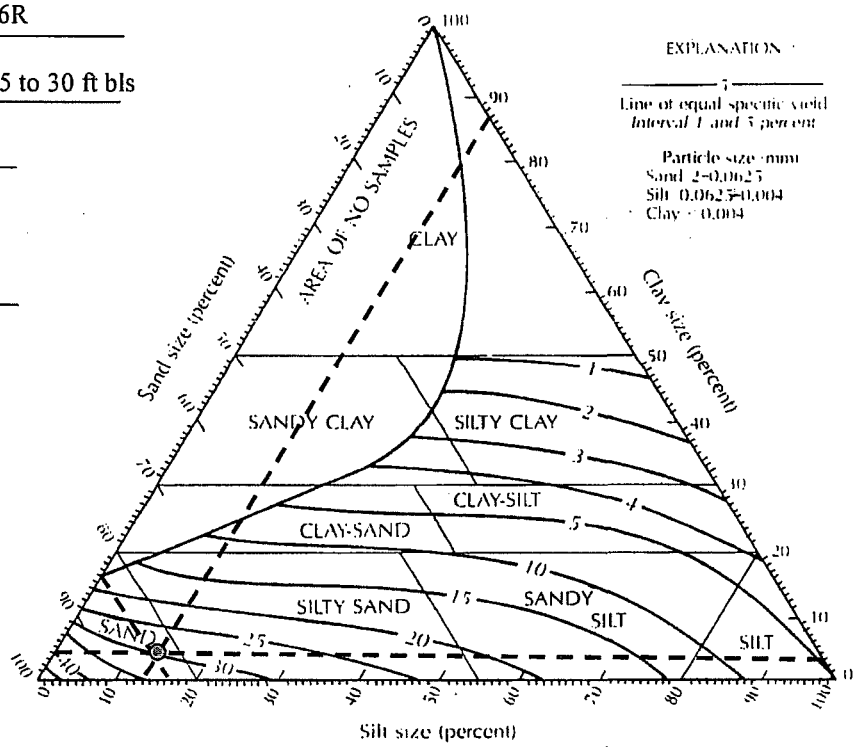
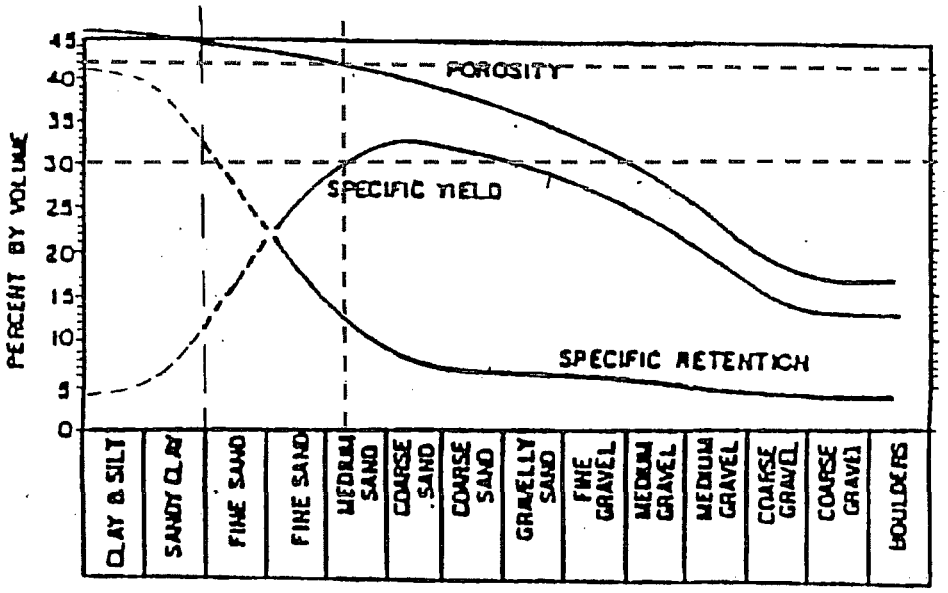


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



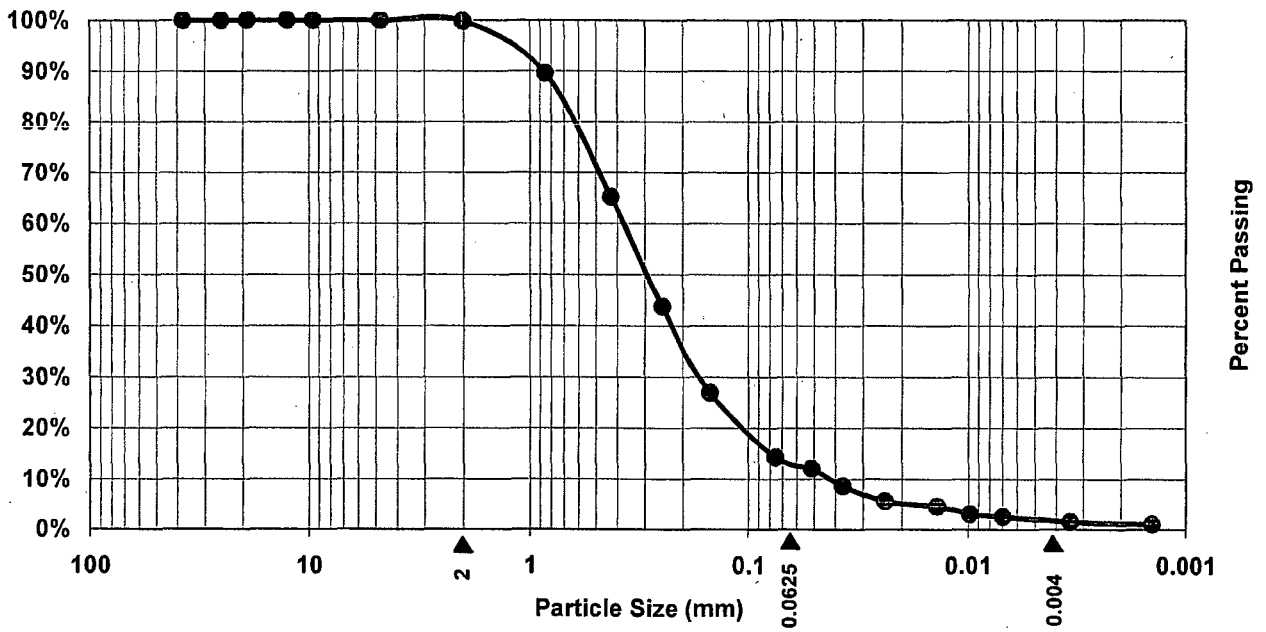
Estimated Porosity: 42%

Variation of Porosity, Specific Yield, and Specific Retention with Grain Size (after Bear, 1972)

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring No.:	Sample No.:	Depth:
GM-6R	SS-4	18.5 to 20 ft bls

Sample Description:
M1: White and Brown, Silty, Medium to Fine Sand (SM)



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 0.2%	% Sand 86.5%	% Silt 11.7%	% Clay 1.7%
Adjusted for Calculations	**0%**	**87%**	**12%**	**2%**

Notes:
Grain size distribution taken from grain size with hydrometer data located in Appendix II.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

S&ME Project:
Oconee Nuclear Station - GWPP

S&ME Project No.:
1264-07-234

S&ME

FETTER AND BEAR DIAGRAMS

S&ME PROJECT: Oconee Nuclear Station - GWPP
S&ME PROJECT NO.: 1264-07-234

Boring No. GM-6R

Boring Depth: 18.5 to 20 ft bls

% Sand: 87%

% Silt: 12%

% Clay: 2%

Estimated Specific Yield: 32%

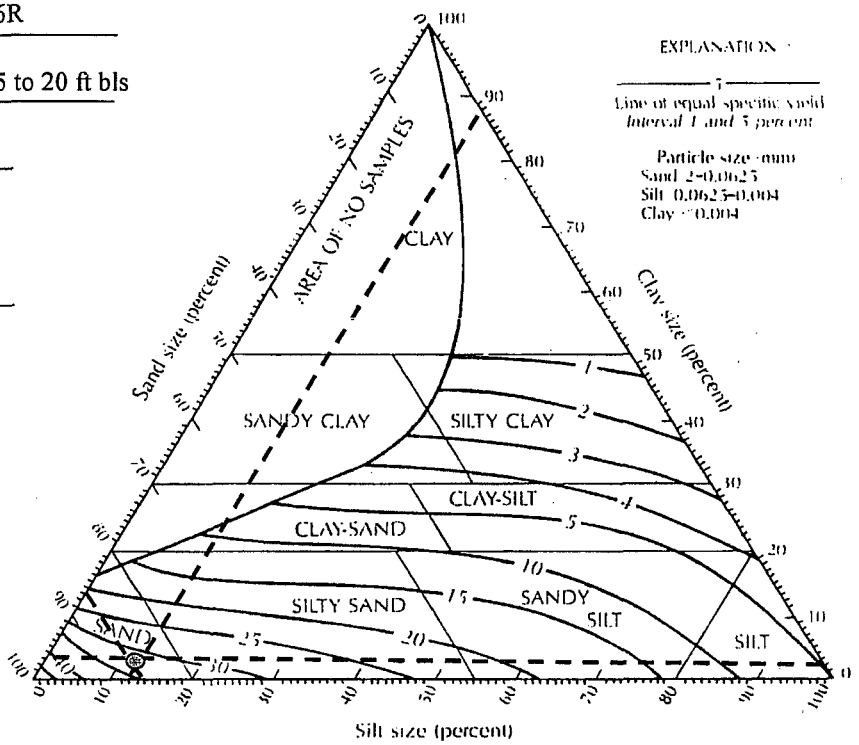
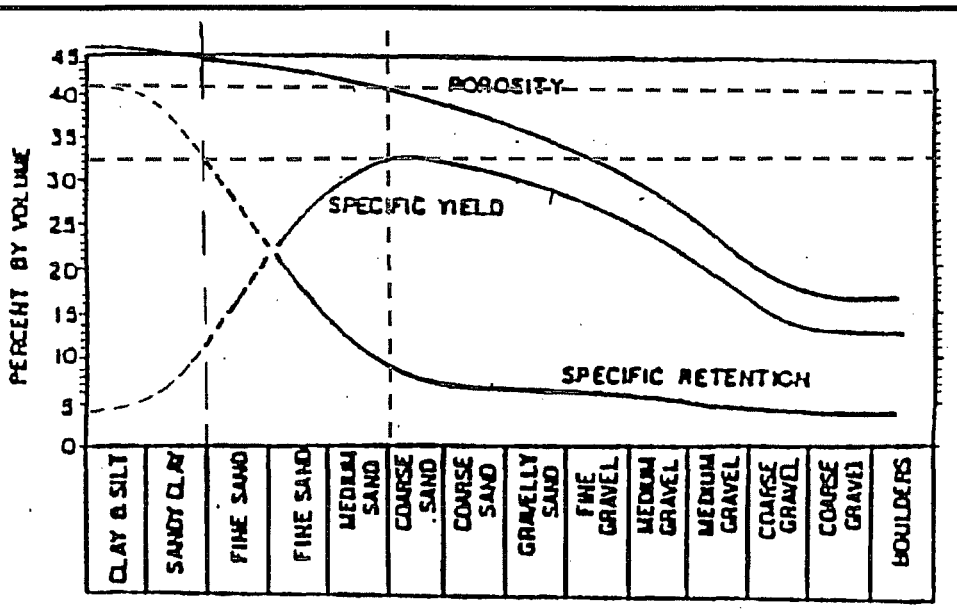


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



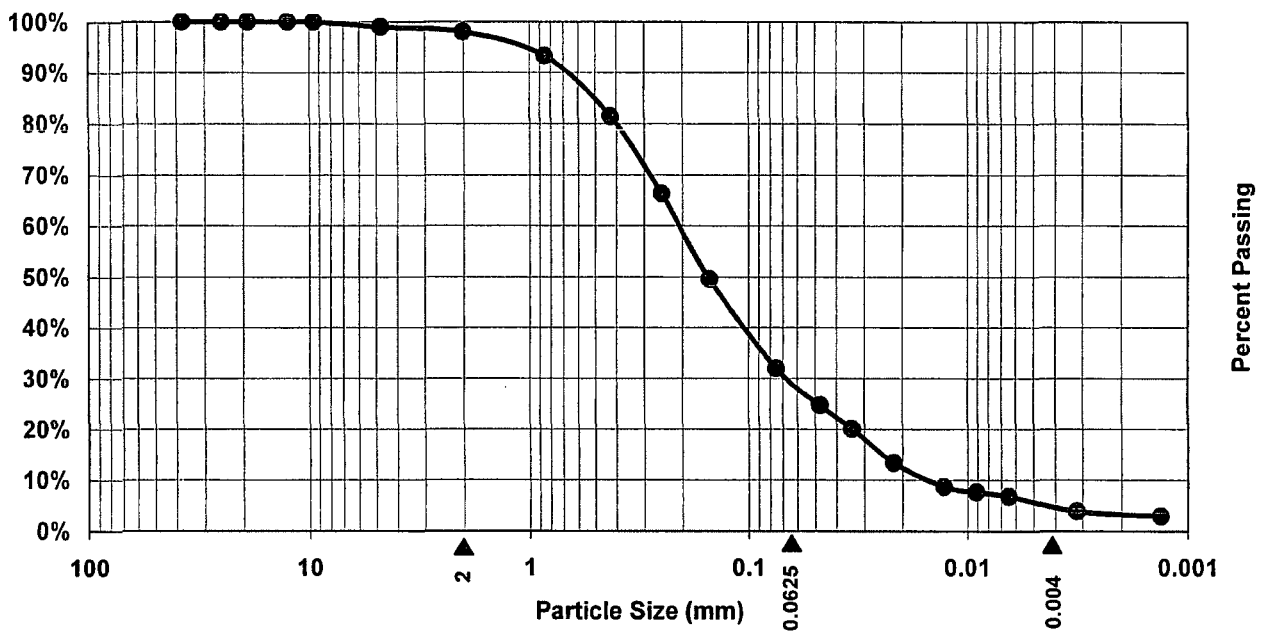
Estimated Porosity: 41%

Variation of Porosity, Specific Yield, and Specific Retention with Grain Size (after Bear, 1972)

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring No.:	Sample No.:	Depth:
GM-6R	SS-7	33.5 to 35 ft bls

Sample Description:
M2: White and Brown, Silty, Coarse to Fine Sand (SM)



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 2.0%	% Sand 68.7%	% Silt 24.8%	% Clay 4.5%
Adjusted for Calculations	**0%**	**70%**	**25%**	**5%**

Notes:
Grain size distribution taken from grain size with hydrometer data located in Appendix II.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

S&ME Project:
Oconee Nuclear Station - GWPP

S&ME Project No.:
1264-07-234

S&ME

FETTER AND BEAR DIAGRAMS

S&ME PROJECT: Oconee Nuclear Station - GWPP
S&ME PROJECT NO.: 1264-07-234

Boring No. GM-6R

Boring Depth: 33.5 to 35 ft bls

% Sand: 70%

% Silt: 25%

% Clay: 5%

Estimated Specific Yield: 25%

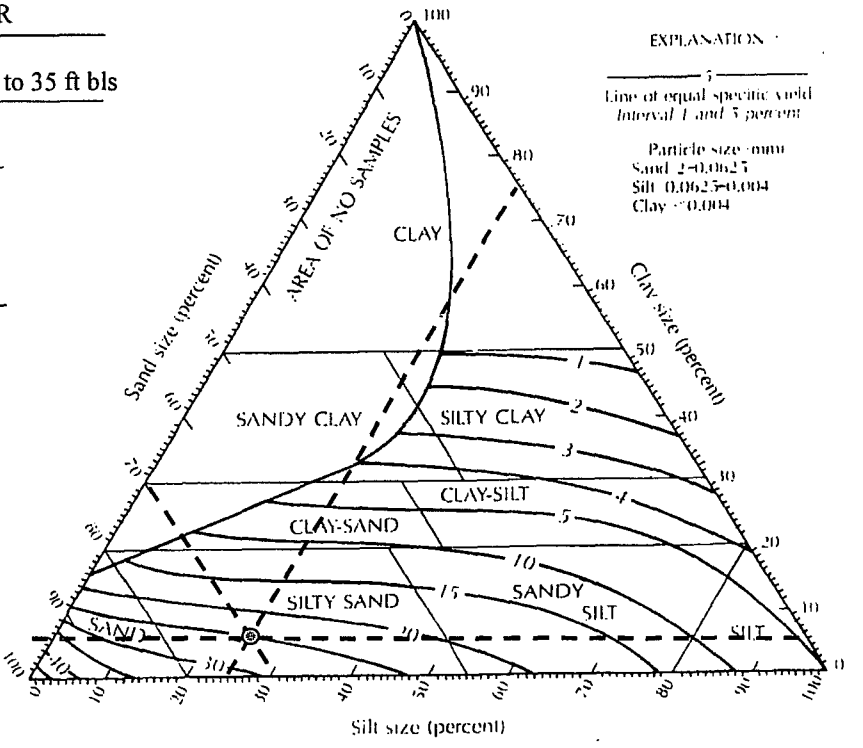
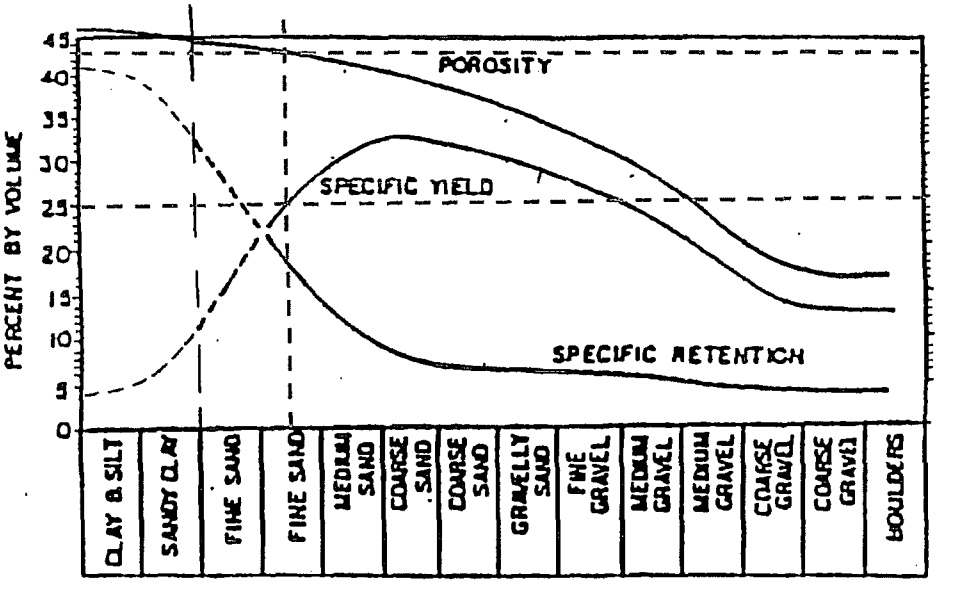


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



Estimated Porosity: 43%

Variation of Porosity, Specific Yield, and Specific Retention with Grain Size (after Bear, 1972)

S&ME, Inc.
9751 Southern Pine Boulevard
Charlotte, North Carolina 28273
Telephone: 704-523-4726
Fax: 704-525-3953

ENGINEERING • TESTING
ENVIRONMENTAL SERVICES

1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-7**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 1 of 1
Boring Depth (ft): **23.0**	Elevation (ft): **736.4**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **11/8/07**
Logged By: **Julie Petersen**	Water Level: **Stabilized Water Level at 8.50 ft bls**		Drilling Method: **Mud Rotary**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
735			PRE-DUG HOLE FOR UTILITY CLEARANCE: **FILL**		
	5				
730			SOIL/SAPROLITE (M1): Tan and White, Fine Sandy, **SILT** With Manganese Staining		
	10		SOIL/SAPROLITE (M1): White to Gray, Silty, Coarse to Fine **SAND**		
725			SOIL/SAPROLITE (M1): Tan and White, Silty, Fine **SAND** With Manganese Staining		
	15				
720					
	20		SOIL/SAPROLITE (M1): White, Silty, Coarse to Fine **SAND** With Quartz Rock Fragments		
715			SOIL/SAPROLITE (M1): Tan and White, Silty, Fine **SAND**		
			Lithologic Descriptions Obtained From GM-7R Boring Terminated at 23.00 ft bls		

BORING LOG WITH WELL RECOVERED_ONS LOG.GPJ LAGWGN01.GDT 7/23/08

COMPLETION REPORT OF WELL No. GM-7

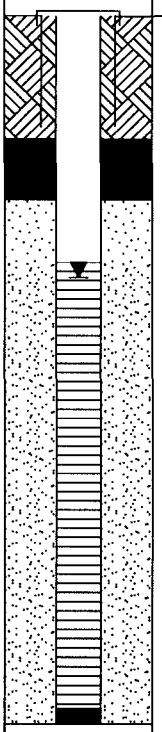
PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

WATER LEVEL: **Stabilized Water Level at 8.50 ft bls**

LATITUDE: **34°47'34.178"**
LONGITUDE: **82°53'45.135"**
TOP OF CASING ELEVATION: **736.21**
DATUM: **MSL**
LOGGED BY: **Julie Petersen**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **Mud Rotary**
DATE DRILLED: **11/8/07**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
				0.00	GS	736.44
PRE-DUG HOLE FOR UTILITY CLEARANCE: **FILL**		0		4.00		732.44
		5		6.00		730.44
SOIL/SAPROLITE (M1): Tan and White, Fine Sandy, **SILT** With Manganese Staining		10				
SOIL/SAPROLITE (M1): White to Gray, Silty, Coarse to Fine **SAND**						
SOIL/SAPROLITE (M1): Tan and White, Silty, Fine **SAND** With Manganese Staining		15				
SOIL/SAPROLITE (M1): White, Silty, Coarse to Fine **SAND** With Quartz Rock Fragments		20		22.50		713.94
SOIL/SAPROLITE (M1): Tan and White, Silty, Fine **SAND**				23.00		713.44



WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter:
Type:
Interval:

RISER CASING
Diameter: **2"**
Type: **Sch. 40 PVC**
Interval: **0 to 8 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 4 ft bls**

SEAL
Type: **Bentonite**
Interval: **4 to 6 ft bls**

FILTERPACK
Type: **#1 Silica Sand**
Interval: **6 to 23 ft bls**

SCREEN
Diameter: **2"**
Type: **0.010 Slotted PVC**
Interval: **8 to 23 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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COMPLETION REPORT OF WELL No. GM-7

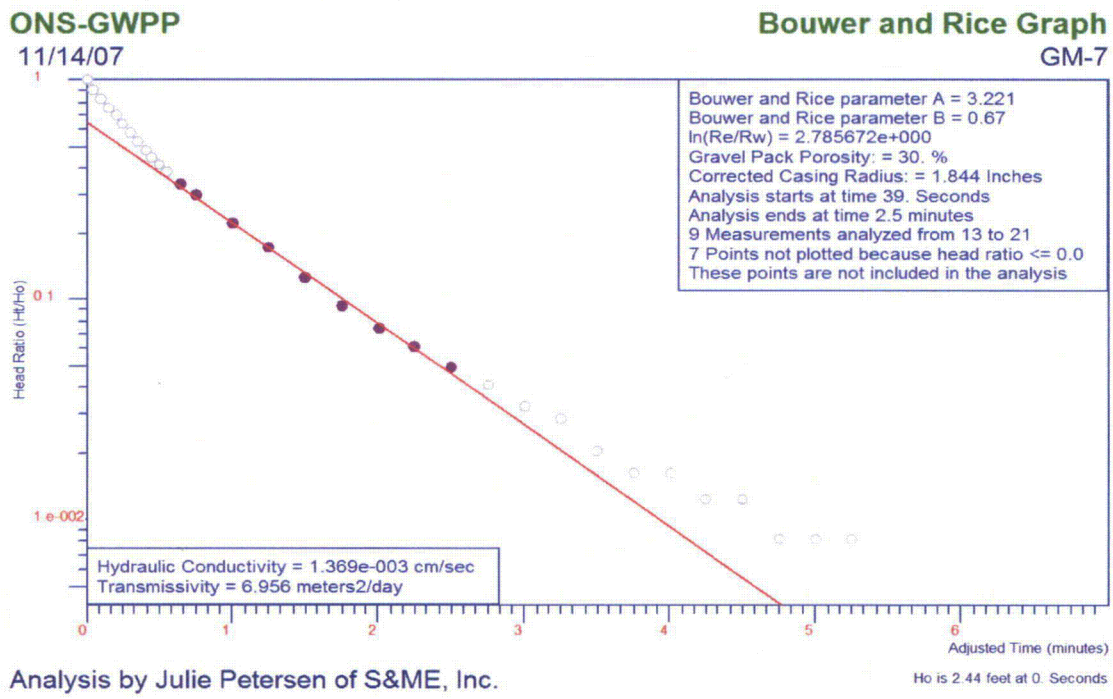
MONITORING WELL RECOVERED_ONS LOG.GPJ S&ME.GDT 7/23/08

Calculation of Permeability By The Rising Head Method (Slug Test)

Site Name:	ONS-GWPP
Test Date:	11/14/2007
Well Label:	GM-7
Aquifer Thickness:	19.3 feet
Screen Length:	15. feet
Casing Radius:	1. Inches
Effective Radius:	3. Inches
Gravel Pack Porosity:	30.00%
Corrected Casing Radius:	1.844 Inches
Static Water Level:	8.7 feet
Water Table to Screen Bottom:	14.3 feet
Anisotropy Ratio:	1

Time Adjustment: 0. Seconds
Test starts with trial 0
There are 39 time and drawdown measurements
Maximum head is 2.44 feet
Minimum head is 0. feet

Calculation by Bouwer and Rice Graphical Method



Analysis by Julie Petersen of S&ME, Inc.

PERMEABILITY

1.37×10^{-3} cm/sec

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9751 Southern Pine Boulevard
Charlotte, North Carolina 28273
Telephone: 704-523-4726
Fax: 704-525-3953

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1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-7R**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 1 of 3
Boring Depth (ft): **100.3**	Elevation (ft): **736.5**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **11/5/07**
Logged By: **Julie Petersen**	Water Level: **Stabilized Water Level at 7.80 ft bls**		Drilling Method: **Mud Rotary**

Elev. (Feet)	Depth (Feet)	Lithology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
735			PRE-DUG HOLE FOR UTILITY CLEARANCE: **FILL**		
	5				
730			SOIL/SAPROLITE (M1): Tan and White, Fine Sandy, **SILT** With Manganese Staining		14
			SOIL/SAPROLITE (M1): White to Gray, Silty, Coarse to Fine **SAND**		
	10				
725			SOIL/SAPROLITE (M1): Tan and White, Silty, Fine **SAND** With Manganese Staining		7
	15				7
720					
	20		SOIL/SAPROLITE (M1): White, Silty, Coarse to Fine **SAND** With Quartz Rock Fragments		41
715			SOIL/SAPROLITE (M1): Tan and White, Silty, Fine **SAND**		
	25		SOIL/SAPROLITE (M1): Red, Fine Sandy, **SILT** With Manganese Staining		12
710			SOIL/SAPROLITE (M1): Brown and White, Micaceous, Silty, Medium to Fine **SAND**		
	30				19
705					21

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2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-7R**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 2 of 3
Boring Depth (ft): **100.3**	Elevation (ft): **736.5**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **11/5/07**
Logged By: **Julie Petersen**	Water Level: **Stabilized Water Level at 7.80 ft bls**		Drilling Method: **Mud Rotary**

Elev. (Feet)	Depth (Feet)	Lithology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
700					
			SOIL/SAPROLITE (M1): White and Gray, Silty, Coarse to Fine **SAND** With Quartz Rock Fragments		
	40				38
695					
			SOIL/SAPROLITE (M1): White and Brown, Micaceous, Silty, Medium to Fine **SAND**		
	45				41
690					
			WEATHERED ROCK (M2): When Sampled Becomes White and Brown, Micaceous, Silty, Medium to Fine **SAND** With Quartz Rock Fragments		50/4 >>
	50				
685					
			WEATHERED ROCK (M2): When Sampled Becomes Green and White, Silty, Medium to Fine **SAND**		50/4 >>
	55				
680			**Roller Cone Refusal at 56.70 ft bls**		
			PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **GRANITIC GNEISS** With Intermittent **BIOTITE HORNBLENDE GNEISS** Intensely Weathered and Fractured, Horizontal, High Angle, and Low Angle Joints With Slight to No Stainng; Core Loss		
	60				
675					
	65				
670					

BORING LOG WITH WELL RECOVERED_ONS LOG.GPJ LAGWGN01.GDT 7/23/08

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1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-7R**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 3 of 3
Boring Depth (ft): **100.3**	Elevation (ft): **736.5**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **11/5/07**
Logged By: **Julie Petersen**	Water Level: **Stabilized Water Level at 7.80 ft bls**		Drilling Method: **Mud Rotary**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
665					
	75				
660					
	80				
655					
	85				
650					
	90				
645					
	95				
640					
	100				
			Boring Terminated at 100.30 ft bls		

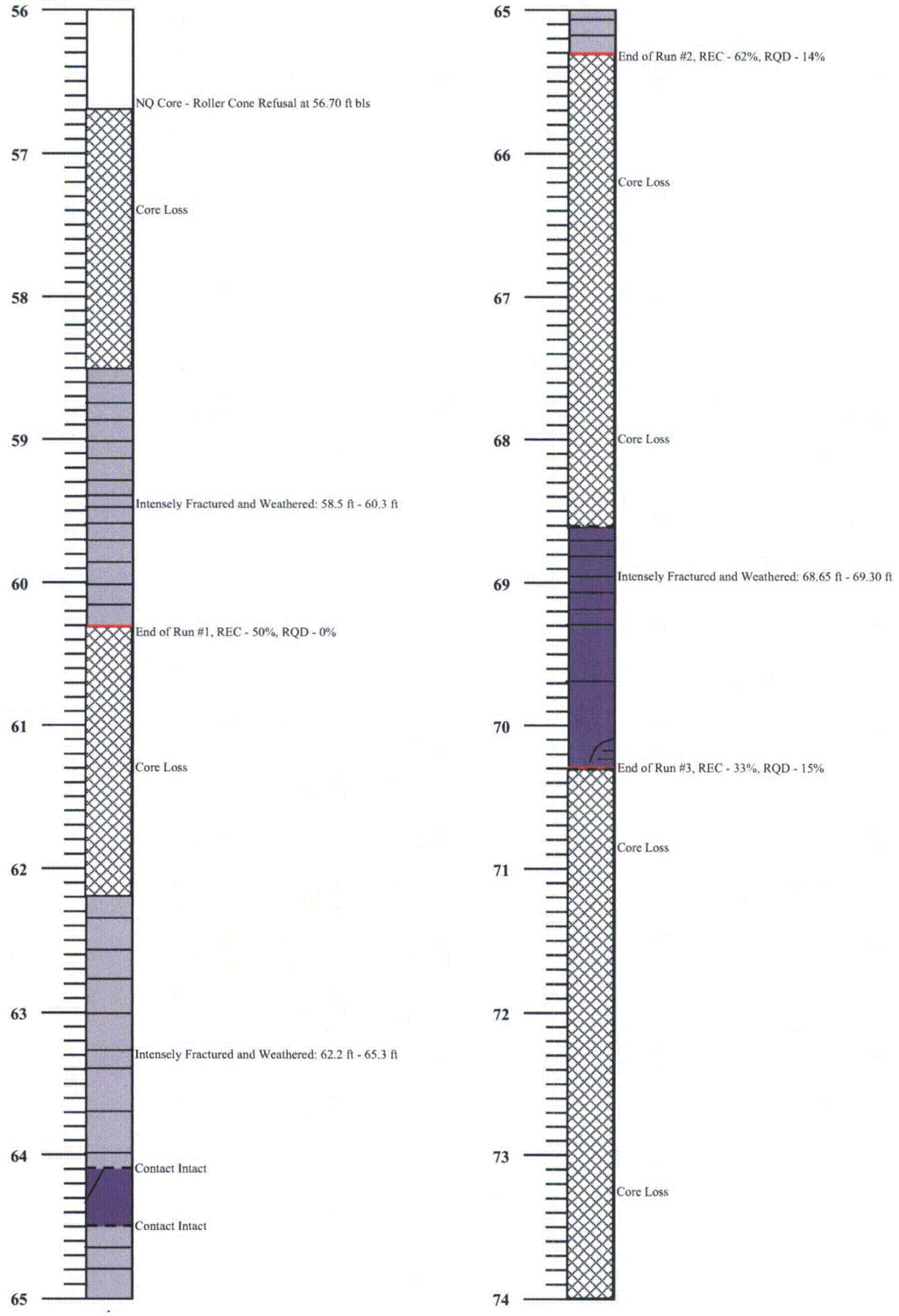
BORING LOG WITH WELL RECOVERED_ONS LOG.GPJ LAGWGN01.GDT 7/23/08

FIELD ROCK CORE LOG

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-7R



EXPLANATION

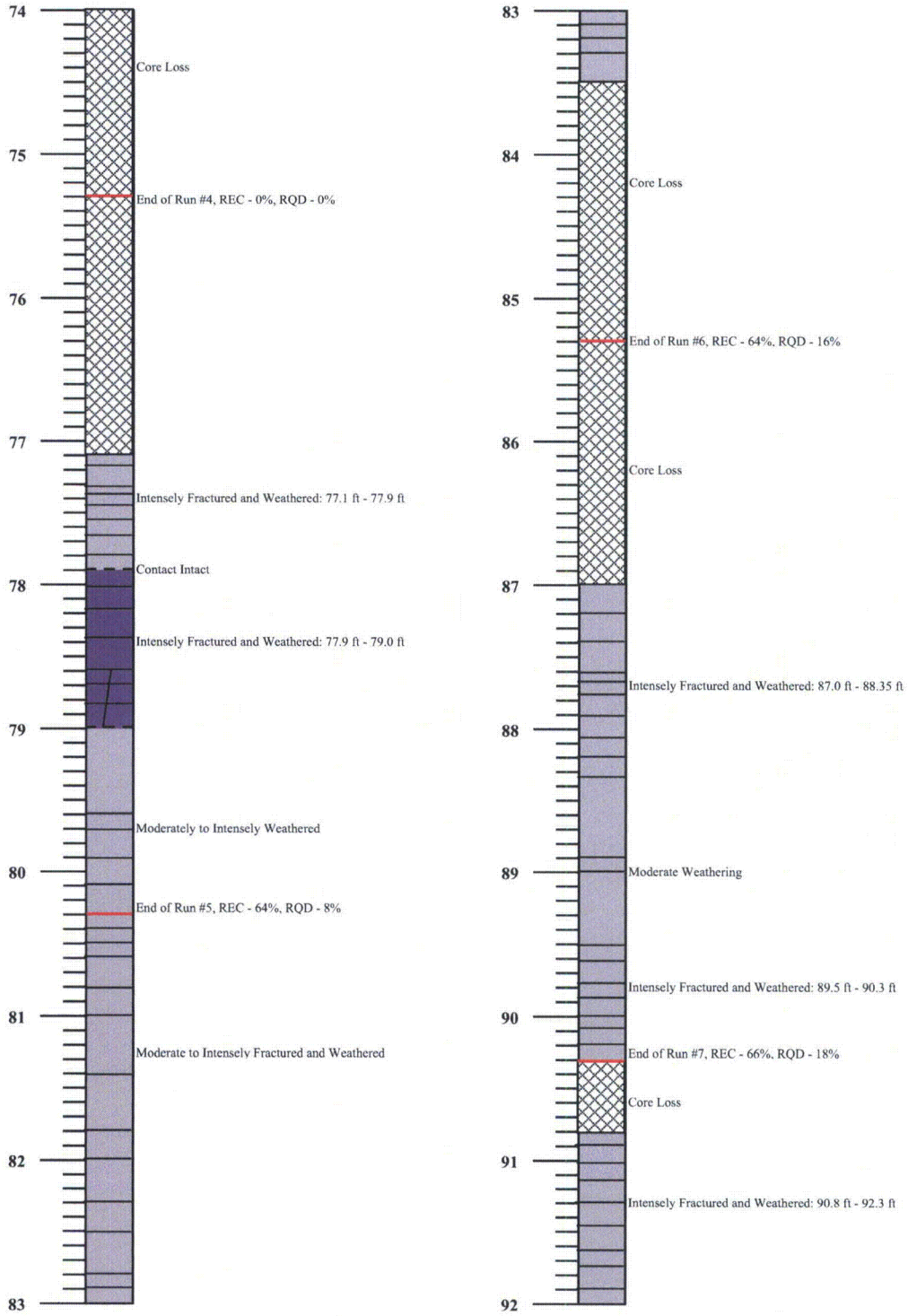
- Concrete
- Granitic Gneiss
- Biotite Hornblende Gneiss
- Core Loss
- Fracture
- End of Run
- Contact
- Healed Joint

FIELD ROCK CORE LOG

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-7R



EXPLANATION

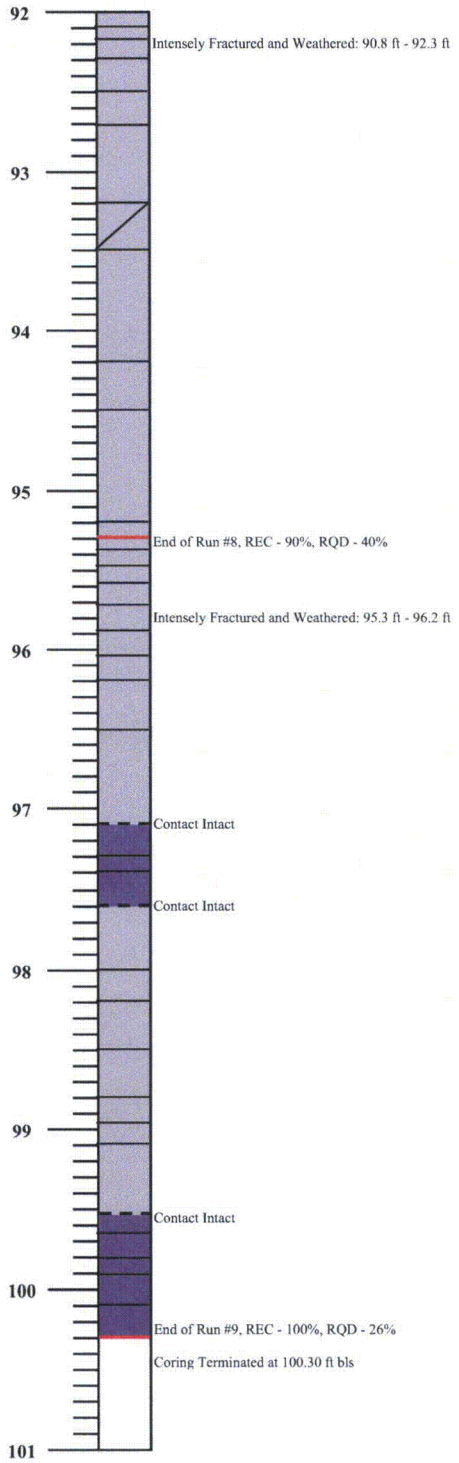
- Concrete
- Granitic Gneiss
- Biotite Hornblende Gneiss
- Core Loss
- Fracture
- End of Run
- Contact
- Healed Joint

FIELD ROCK CORE LOG

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-7R



EXPLANATION

- Concrete
- Granitic Gneiss
- Biotite Hornblende Gneiss
- Core Loss
- Fracture
- End of Run
- Contact
- Healed Joint

COMPLETION REPORT OF WELL No. GM-7R

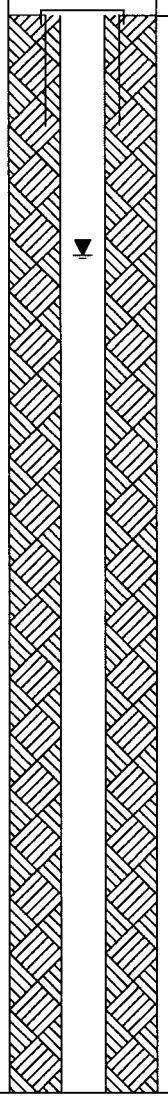
PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **Mud Rotary**
DATE DRILLED: **11/5/07**

WATER LEVEL: **Stabilized Water Level at 7.80 ft bls**

LATITUDE: **34°47'34.226"**
LONGITUDE: **82°53'45.157"**
TOP OF CASING ELEVATION: **736.16**
DATUM: **MSL**
LOGGED BY: **Julie Petersen**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
				0.00	GS	736.47
PRE-DUG HOLE FOR UTILITY CLEARANCE: **FILL**		0				
		5				
SOIL/SAPROLITE (M1): Tan and White, Fine Sandy, **SILT** With Manganese Staining						
		10				
SOIL/SAPROLITE (M1): White to Gray, Silty, Coarse to Fine **SAND**						
SOIL/SAPROLITE (M1): Tan and White, Silty, Fine **SAND** With Manganese Staining		15				
SOIL/SAPROLITE (M1): White, Silty, Coarse to Fine **SAND** With Quartz Rock Fragments		20				
SOIL/SAPROLITE (M1): Tan and White, Silty, Fine **SAND**						
		25				
SOIL/SAPROLITE (M1): Red, Fine Sandy, **SILT** With Manganese Staining						
SOIL/SAPROLITE (M1): Brown and White, Micaceous, Silty, Medium to Fine **SAND**		30				



WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter:
Type:
Interval:

RISER CASING
Diameter: **2"**
Type: **Sch. 40 PVC**
Interval: **0 to 60 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 56 ft bls**

SEAL
Type: **Bentonite**
Interval: **56 to 58 ft bls**

FILTERPACK
Type: **#2 Silica Sand**
Interval: **58 to 72 ft bls**

SCREEN
Diameter: **2"**
Type: **0.010 Slotted PVC**
Interval: **60 to 70 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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COMPLETION REPORT OF WELL No. GM-7R

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

GROUND SURFACE ELEVATION: **736.5**
LOGGED BY: **Julie Petersen**
CHECKED BY:

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)	WELL CONSTRUCTION DETAILS
							(See Page 1)
SOIL/SAPROLITE (M1): White and Gray, Silty, Coarse to Fine **SAND** With Quartz Rock Fragments		35, 40					
SOIL/SAPROLITE (M1): White and Brown, Micaceous, Silty, Medium to Fine **SAND**		45					
WEATHERED ROCK (M2): When Sampled Becomes White and Brown, Micaceous, Silty, Medium to Fine **SAND** With Quartz Rock Fragments		50					
WEATHERED ROCK (M2): When Sampled Becomes Green and White, Silty, Medium to Fine **SAND**		55		56.00		680.47	
PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **GRANITIC GNEISS** With Intermittent **BIOTITE HORNBLENDE GNEISS**; Intensely Weathered and Fractured, Horizontal, High Angle, and Low Angle Joints With Slight to No Stainng; Core Loss		60, 65		58.00		678.47	
		70		69.50 70.00		666.97 666.47	
		75		72.00		664.47	

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

MONITORING WELL RECOVERED ONS LOG.GPJ S&ME.GDT 7/23/08

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COMPLETION REPORT OF WELL No. GM-7R

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

GROUND SURFACE ELEVATION:
LOGGED BY: **736.5**
CHECKED BY: **Julie Petersen**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)	WELL CONSTRUCTION DETAILS
							(See Page 1)
PARTIALLY WEATHERED/FRACTURED ROCK (WF): Medium-Grained **GRANITIC GNEISS** With Intermittent **BIOTITE HORNBLENDE GNEISS**; Intensely Weathered and Fractured, Horizontal, High Angle, and Low Angle Joints With Slight to No Stainng; Core Loss *(continued)*		80 85 90 95 100		100.30		636.17	

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

MONITORING WELL RECOVERED_ONS LOG.GPJ S&ME.GDT 7/23/08

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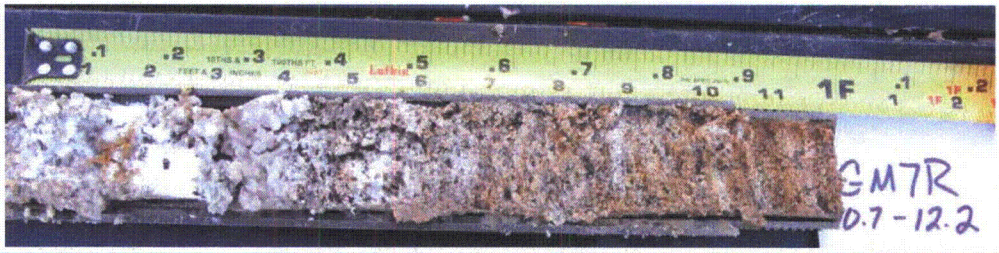
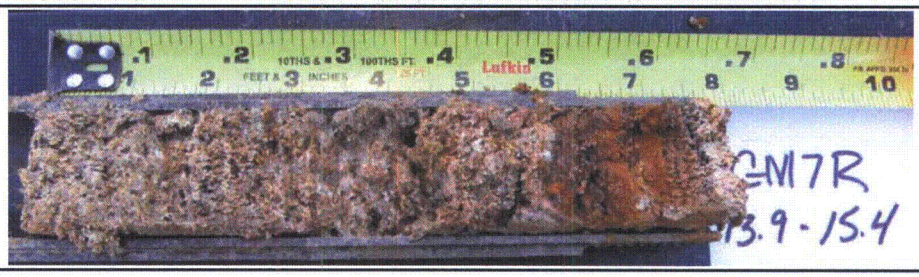
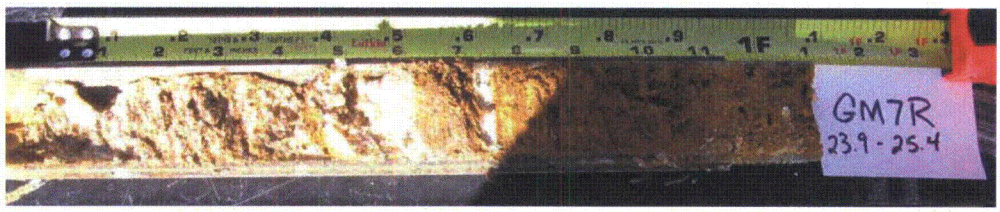
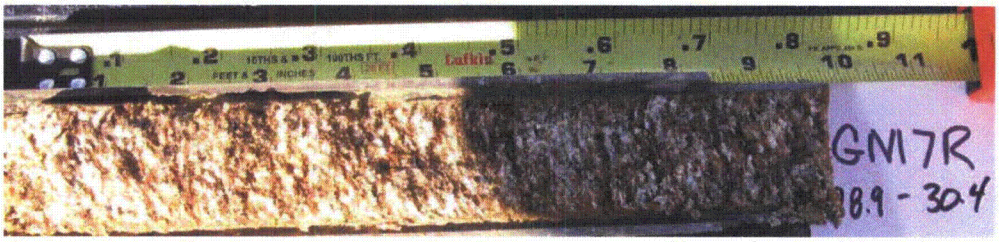
COMPLETION REPORT OF WELL No. GM-7R

SPLIT SPOON SAMPLE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Boring Number: GM-7R

Sample No:	1	
Depth (ft-bls):	7.1 - 8.6	
Blow Count:	2 * 5 * 9	
Sample No:	2	
Depth (ft-bls):	10.7 - 12.2	
Blow Count:	4 * 3 * 4	
Sample No:	3	
Depth (ft-bls):	13.9 - 15.4	
Blow Count:	3 * 3 * 4	
Sample No:	4	
Depth (ft-bls):	18.9 - 20.4	
Blow Count:	25 * 28 * 13	
Sample No:	5	
Depth (ft-bls):	23.9 - 25.4	
Blow Count:	4 * 5 * 7	
Sample No:	6	
Depth (ft-bls):	28.9 - 30.4	
Blow Count:	8 * 9 * 10	

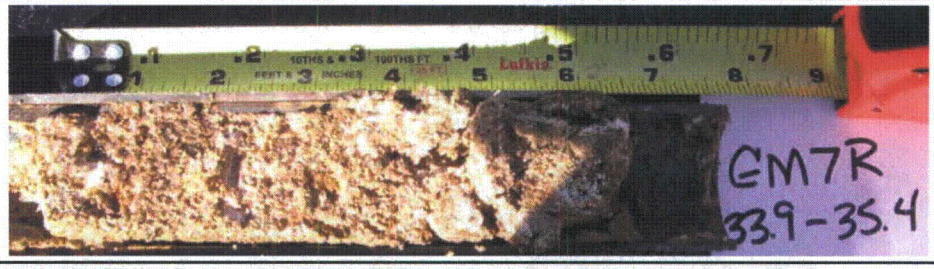
SPLIT SPOON SAMPLE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Boring Number: GM-7R

Sample No: 7
Depth (ft-bls): 33.9 - 35.4
Blow Count: 6 * 7 * 14



Sample No: 8
Depth (ft-bls): 38.9 - 40.4
Blow Count: 16 * 24 * 14

Sample No: 9
Depth (ft-bls): 43.9 - 45.4
Blow Count: 10 * 10 * 31

Sample No: 10
Depth (ft-bls): 48.9 - 50.4
Blow Count: 50/4

Sample No: 11
Depth (ft-bls): 53.9 - 55.4
Blow Count: 17 * 43 * 50/4

ROCK CORE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-7R

CLASSIFICATION:

56.70' to 100.30': Medium-Grained Granitic Gneiss With Intermittent Biotite Hornblende Gneiss

CALCULATION OF PERMEABILITY BY THE FALLING HEAD METHOD
(Open Hole in Uniform Material)

S&ME

Site Name:	ONS - GWPP	
Date:	11/6/2007	
Boring I.D.	GM-7R	
Test Interval:	56.7 to 60.3	(Weathered Rock)
Total Depth of Hole:	60.3 ft	1838.41 cm
Length of Open Hole:	3.6 ft	109.76 cm
Transformation Ratio m=	1	
Performed by:	Julie Petersen	

Time (sec)	Head (cm)	Permeability (cm/sec)
0	1728.23	
60	1719.70	1.83E-05
120	1712.26	1.61E-05
180	1705.52	1.46E-05
240	1699.63	1.28E-05
300	1693.72	1.29E-05
360	1688.66	1.11E-05
420	1684.24	9.71E-06
480	1680.15	9.00E-06
540	1675.37	1.06E-05
600	1671.10	9.45E-06
900	1651.46	8.75E-06
1200	1635.43	7.23E-06
1500	1620.91	6.60E-06
1800	1608.69	5.61E-06
2400	1586.95	5.04E-06
3000	1565.85	4.96E-06
3600	1546.01	4.72E-06

Calculations

$$K_h = \frac{d^2 \cdot \ln\left(\frac{2mL}{D}\right)}{8 \cdot L \cdot (t_2 - t_1)} \cdot \ln\frac{H_1}{H_2}$$

for $\frac{mL}{D} > 4$

Where:

K_h	is the Horizontal Coefficient of Permeability (cm/sec)
H_1	is the Piezometric Head for time; $t = t_1$ (cm)
H_2	is the Piezometric Head for time; $t = t_2$ (cm)
D	is the Diameter of the Standpipe (cm)
d	is the diameter of the Open Length (cm),
m	is the Transformation Ratio, Where

$$m = \sqrt{K_h / K_v}$$

K_h is the Horizontal Permeability
K_v is the Vertical Permeability

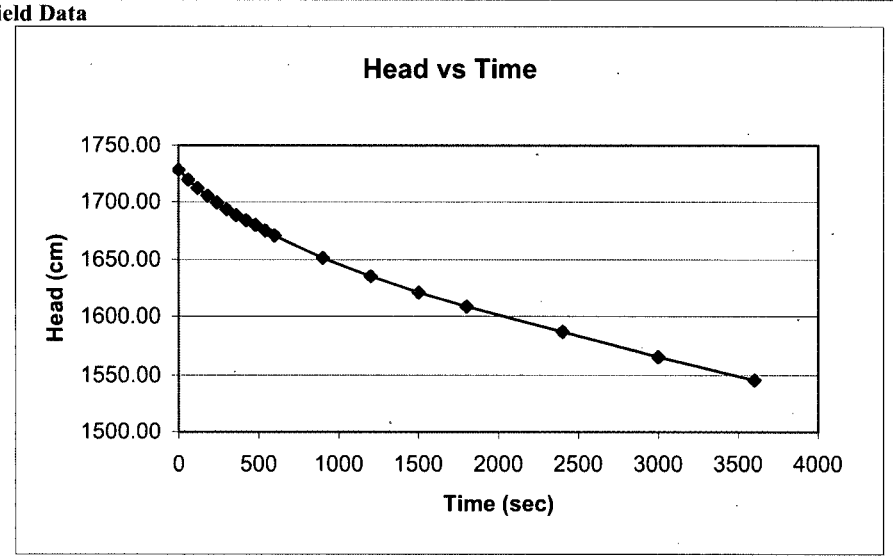
L	is the Open Length of Hole (cm)

Spreadsheet assumes 3" ID Pipe; NQ Hole, OD = 3"

MEAN PERMEABILITY (cm/sec)

9.85E-06

Graph of Field Data



CALCULATION OF PERMEABILITY BY THE FALLING HEAD METHOD
(Open Hole in Uniform Material)

S&ME

Site Name:	ONS - GWPP	
Date:	11/5/2007	
Boring I.D.	GM-7R	
Test Interval:	20.7 to 23.9	(Soil/Saprolite)
Total Depth of Hole:	23.9 ft	728.66 cm
Length of Open Hole:	3.2 ft	97.56 cm
Transformation Ratio m=	1	
Performed by:	Julie Petersen	

Time (sec)	Head (cm)	Permeability (cm/sec)
0	721.28	
60	666.95	3.15E-04
120	622.56	2.77E-04
180	586.83	2.38E-04
240	557.50	2.06E-04
300	533.17	1.79E-04
360	513.63	1.50E-04
420	497.29	1.30E-04
480	483.57	1.12E-04

Calculations

$$K_h = \frac{d^2 \cdot \ln\left(\frac{2mL}{D}\right)}{8 \cdot L \cdot (t_2 - t_1)} \cdot \ln\frac{H_1}{H_2}$$

for $\frac{mL}{D} > 4$

Where:

K_h	is the Horizontal Coefficient of Permeability (cm/sec)
H_1	is the Piezometric Head for time; $t = t_1$ (cm)
H_2	is the Piezometric Head for time; $t = t_2$ (cm)
D	is the Diameter of the Standpipe (cm)
d	is the diameter of the Open Length (cm),
m	is the Transformation Ratio, Where

$$m = \sqrt{K_h / K_v}$$

K_h is the Horizontal Permeability
K_v is the Vertical Permeability

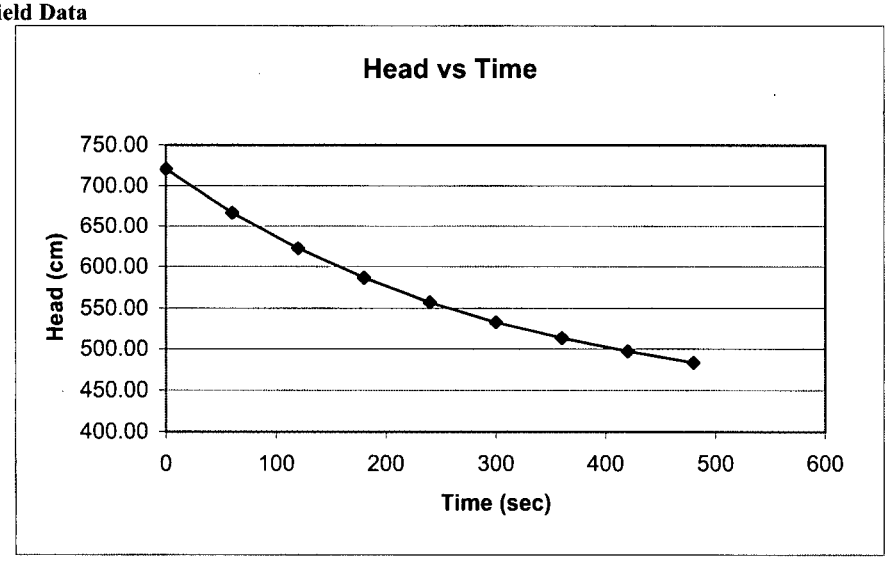
L	is the Open Length of Hole (cm)

Spreadsheet assumes 3" ID Pipe; NQ Hole, OD = 3"

MEAN PERMEABILITY (cm/sec)

2.01E-04

Graph of Field Data



CALCULATION OF PERMEABILITY BY THE FALLING HEAD METHOD
(Open Hole in Uniform Material)

S&ME

Site Name:	ONS - GWPP	
Date:	11/6/2007	
Boring I.D.	GM-7R	
Test Interval:	56.7 to 65.3 ft bls	(Weathered and Partially Weathered/Fractured Rock)
Total Depth of Hole:	65.3 ft	1990.85 cm
Length of Open Hole:	8.6 ft	262.2 cm
Transformation Ratio m=	1	
Performed by:	Julie Petersen	

Time (sec)	Head (cm)	Permeability (cm/sec)
0	1913.87	
60	1801.22	1.18E-04
120	1745.49	6.14E-05
180	1708.84	4.14E-05
240	1682.74	3.00E-05
300	1663.81	2.21E-05
360	1650.00	1.63E-05
420	1640.67	1.11E-05

Calculations

$$K_h = \frac{d^2 \cdot \ln\left(\frac{2mL}{D}\right)}{8 \cdot L \cdot (t_2 - t_1)} \cdot \ln\frac{H_1}{H_2}$$

for $\frac{mL}{D} > 4$

Where:

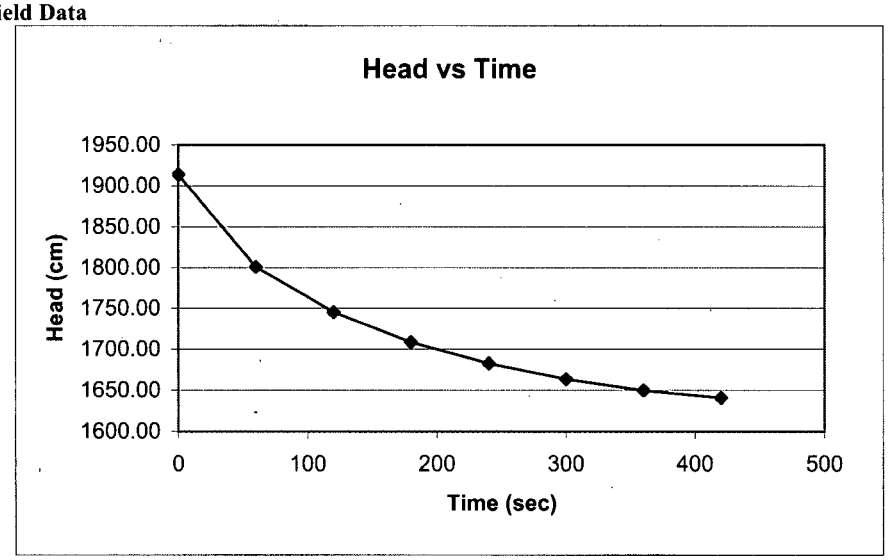
- K_h is the Horizontal Coefficient of Permeability (cm/sec)
- H_1 is the Piezometric Head for time; $t = t_1$ (cm)
- H_2 is the Piezometric Head for time; $t = t_2$ (cm)
- D is the Diameter of the Standpipe (cm)
- d is the diameter of the Open Length (cm),
- m is the Transformation Ratio, Where $m = \sqrt{K_h / K_v}$ — K_h is the Horizontal Permeability, K_v is the Vertical Permeability
- L is the Open Length of Hole (cm)

Spreadsheet assumes 3" ID Pipe; NQ Hole, OD = 3"

MEAN PERMEABILITY (cm/sec)

4.30E-05

Graph of Field Data

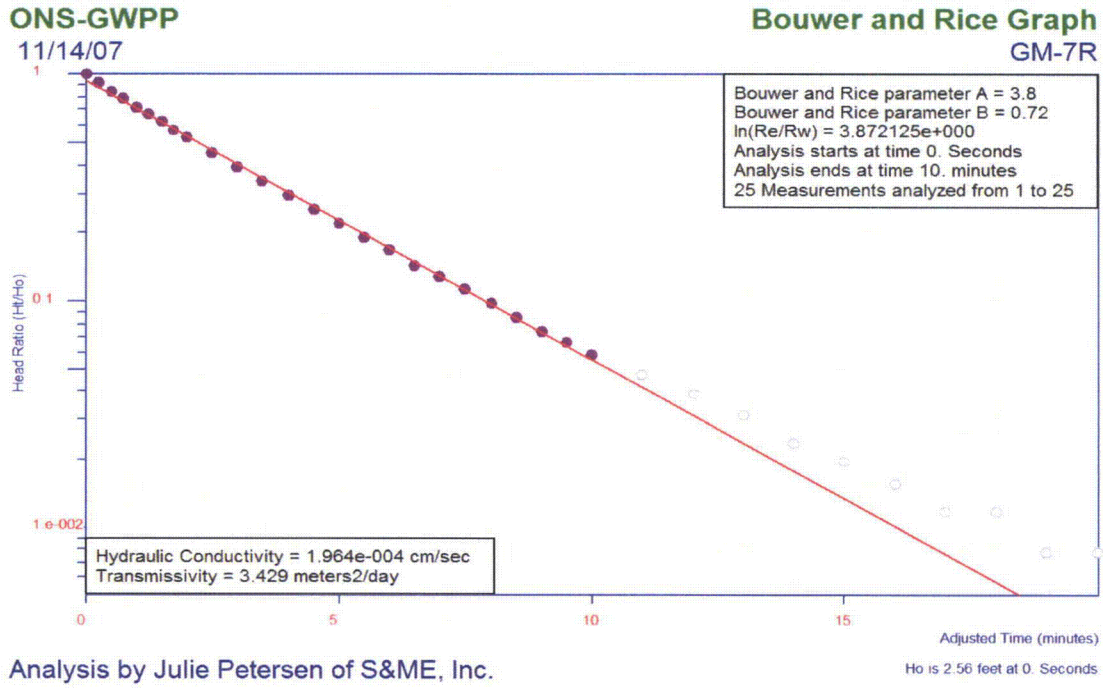


Calculation of Permeability By The Rising Head Method (Slug Test)

Site Name:	ONS-GWPP
Test Date:	11/14/2007
Well Label:	GM-7R
Aquifer Thickness:	66.3 feet
Screen Length:	10. feet
Casing Radius:	1. Inches
Effective Radius:	1.5 Inches
Static Water Level:	8.7 feet
Water Table to Screen Bottom:	61.3 feet
Anisotropy Ratio:	1
Time Adjustment:	0. Seconds

Test starts with trial 0
There are 35 time and drawdown measurements
Maximum head is 2.56 feet
Minimum head is 0. feet

Calculation by Bouwer and Rice Graphical Method



Analysis by Julie Petersen of S&ME, Inc.

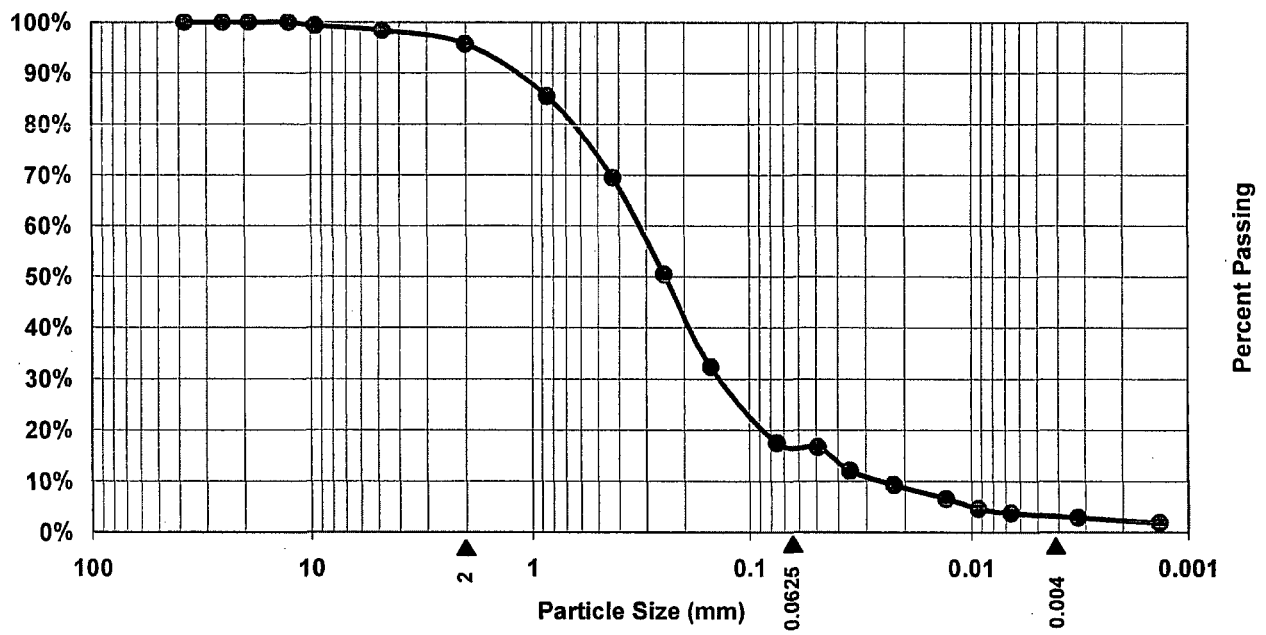
PERMEABILITY

1.96×10^{-4} cm/sec

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring No.:	Sample No.:	Depth:
GM-7R	SS-10	48.9 to 50.4 ft bls

Sample Description:
M2: White and Brown, Micaceous, Silty, Coarse to Fine Sand (SM)



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 4.3%	% Sand 78.6%	% Silt 14.1%	% Clay 3.0%
Adjusted for Calculations	**0%**	**82%**	**15%**	**3%**

Notes:
Grain size distribution taken from grain size with hydrometer data located in Appendix II.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

S&ME Project:
Oconee Nuclear Station - GWPP

S&ME Project No.:
1264-07-234

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FETTER AND BEAR DIAGRAMS

S&ME PROJECT: Oconee Nuclear Station - GWPP
S&ME PROJECT NO.: 1264-07-234

Boring No. GM-7R

Boring Depth: 48.9 to 50.4 ft bls

% Sand: 82%

% Silt: 15%

% Clay: 3%

Estimated Specific Yield: 30%

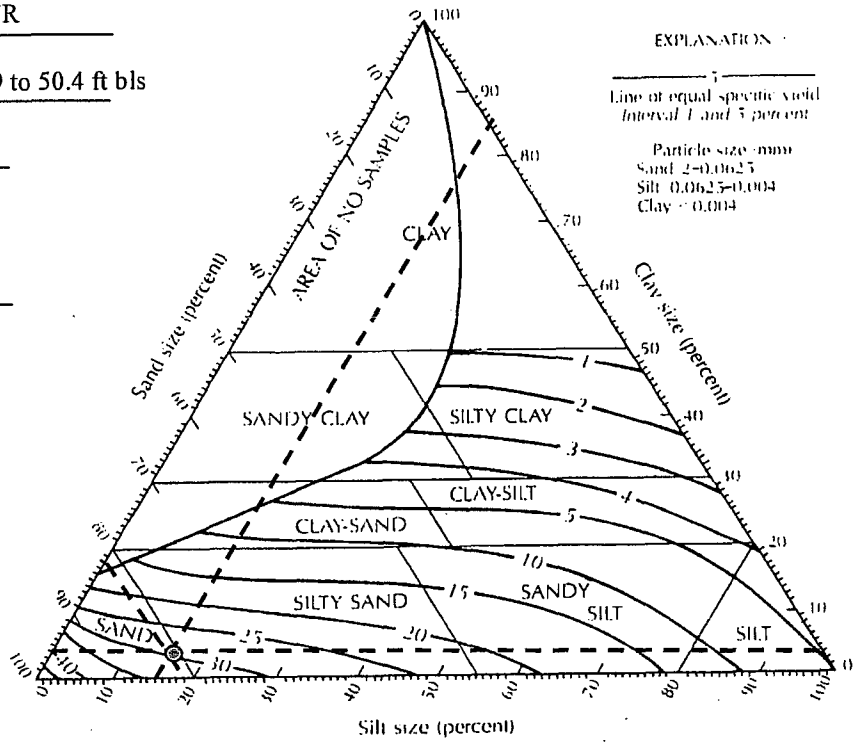
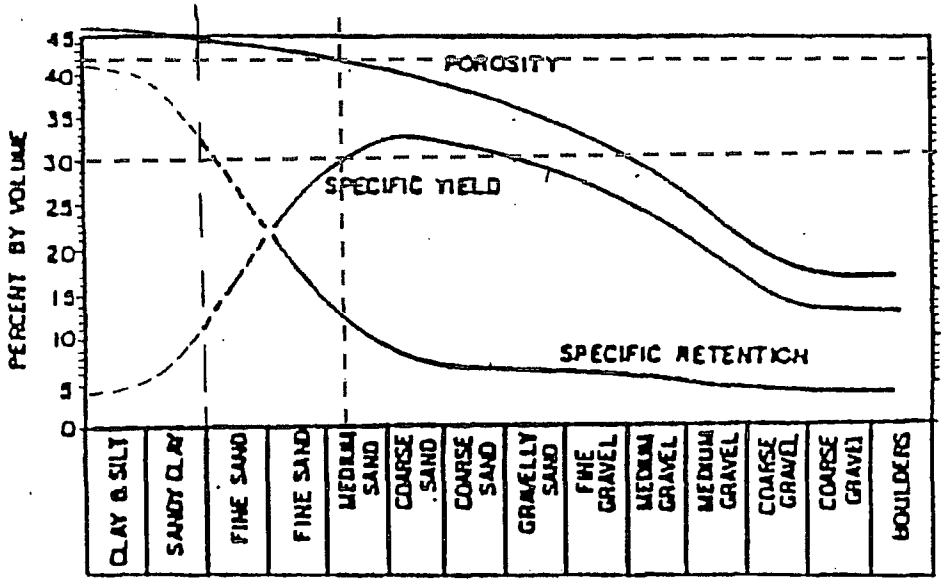


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



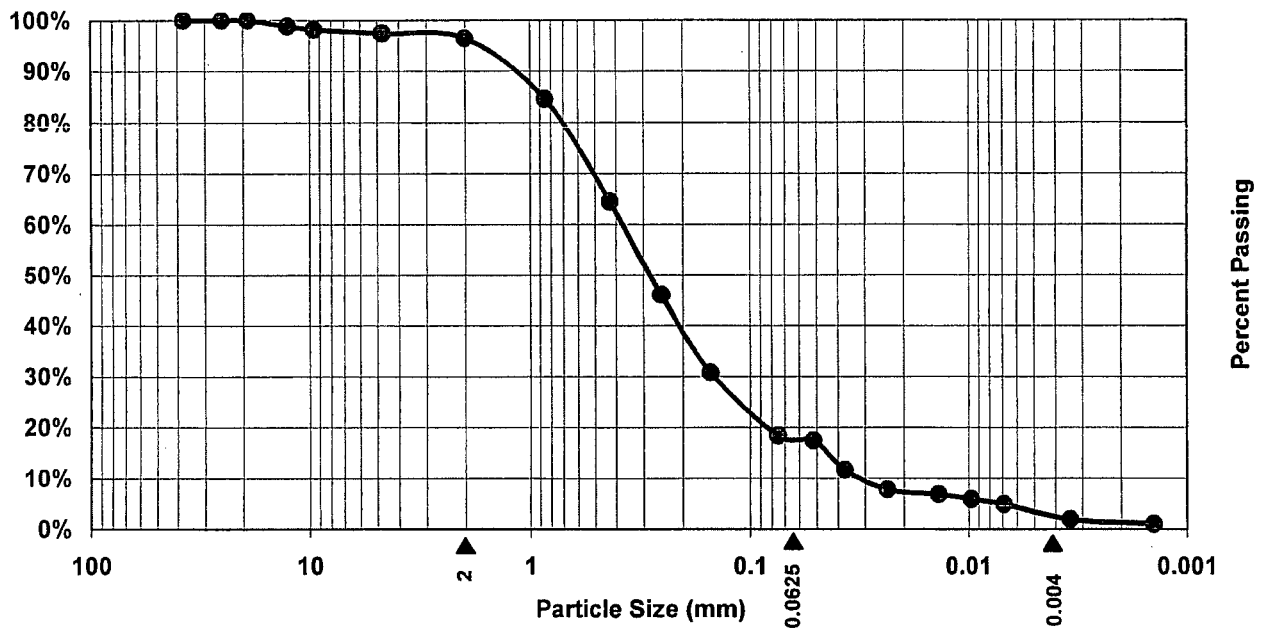
Estimated Porosity: 42%

Variation of Porosity, Specific Yield, and Specific Retention with Grain Size (after Bear, 1972)

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring No.:	Sample No.:	Depth:
GM-7R	SS-6	28.9 to 30.4 ft bls

Sample Description:
M1: Brown and White, Silty, Coarse to Fine Sand (SM)



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 3.6%	% Sand 78.4%	% Silt 15.6%	% Clay 2.4%
Adjusted for Calculations	**0%**	**81%**	**16%**	**2%**

Notes:
Grain size distribution taken from grain size with hydrometer data located in Appendix II.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

S&ME Project:
Oconee Nuclear Station - GWPP

S&ME Project No.:
1264-07-234

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FETTER AND BEAR DIAGRAMS

S&ME PROJECT: Oconee Nuclear Station - GWPP
S&ME PROJECT NO.: 1264-07-234

Boring No. GM-7R

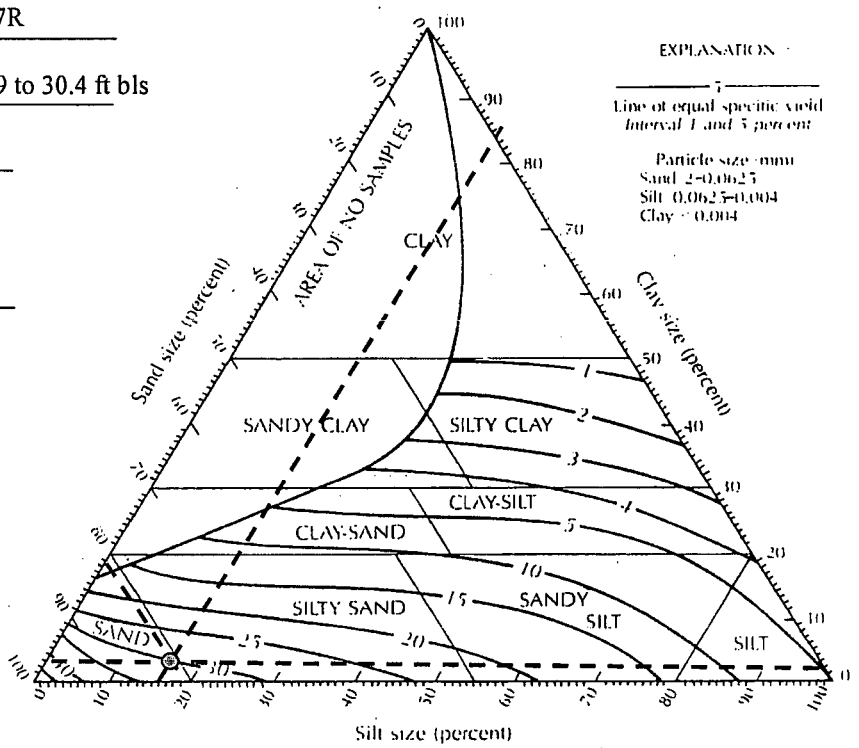
Boring Depth: 28.9 to 30.4 ft bls

% Sand: 81%

% Silt: 16%

% Clay: 2%

Estimated Specific Yield: 30%



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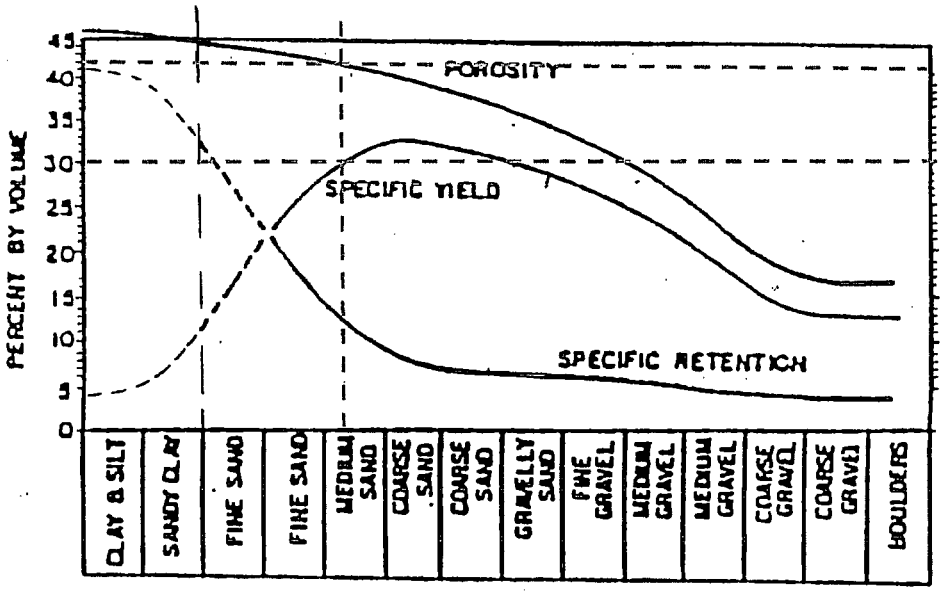


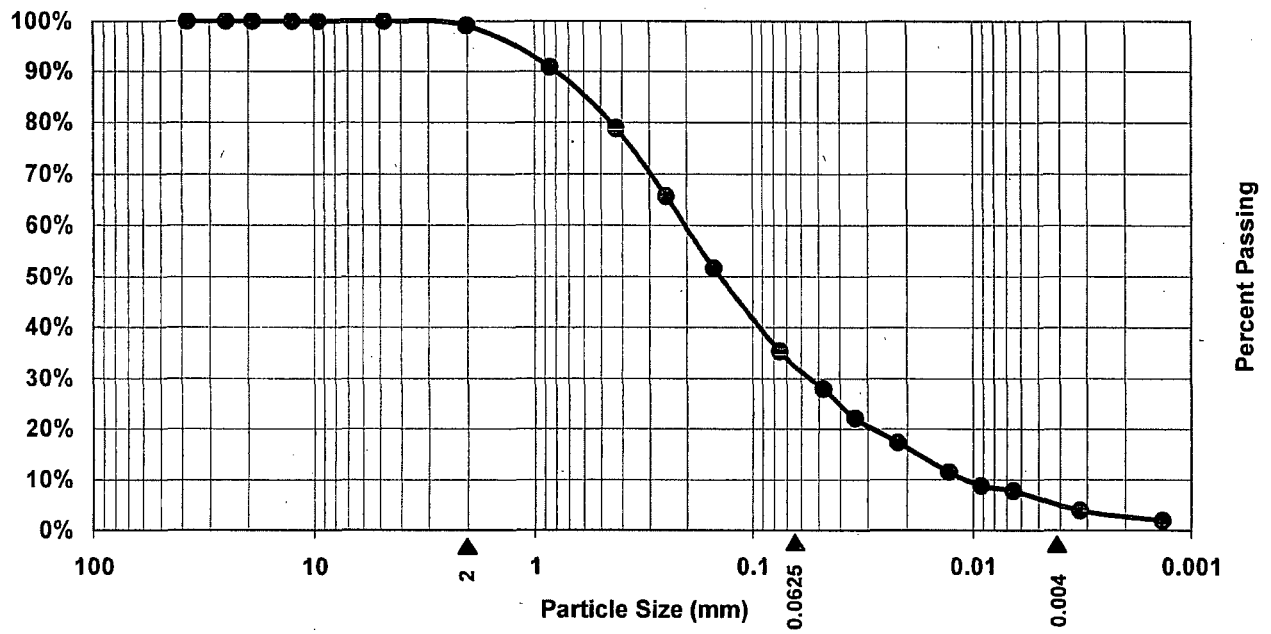
Estimated Porosity: 42%

Variation of Porosity, Specific Yield, and Specific Retention with Grain Size (after Bear, 1972)

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring No.:	Sample No.:	Depth:
GM-7R	SS-11	53.9 to 55.4 ft bls

Sample Description:
M2: Green and White, Silty, Medium to Fine Sand (SM)



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 0.9%	% Sand 66.5%	% Silt 27.9%	% Clay 4.7%
Adjusted for Calculations	**0%**	**67%**	**28%**	**5%**

Notes:
Grain size distribution taken from grain size with hydrometer data located in Appendix II.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

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S&ME Project No.:
1264-07-234

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FETTER AND BEAR DIAGRAMS

S&ME PROJECT: Oconee Nuclear Station - GWPP
S&ME PROJECT NO.: 1264-07-234

Boring No. GM-7R

Boring Depth: 53.9 to 55.4 ft bls

% Sand: 67%

% Silt: 28%

% Clay: 5%

Estimated Specific Yield: 24%

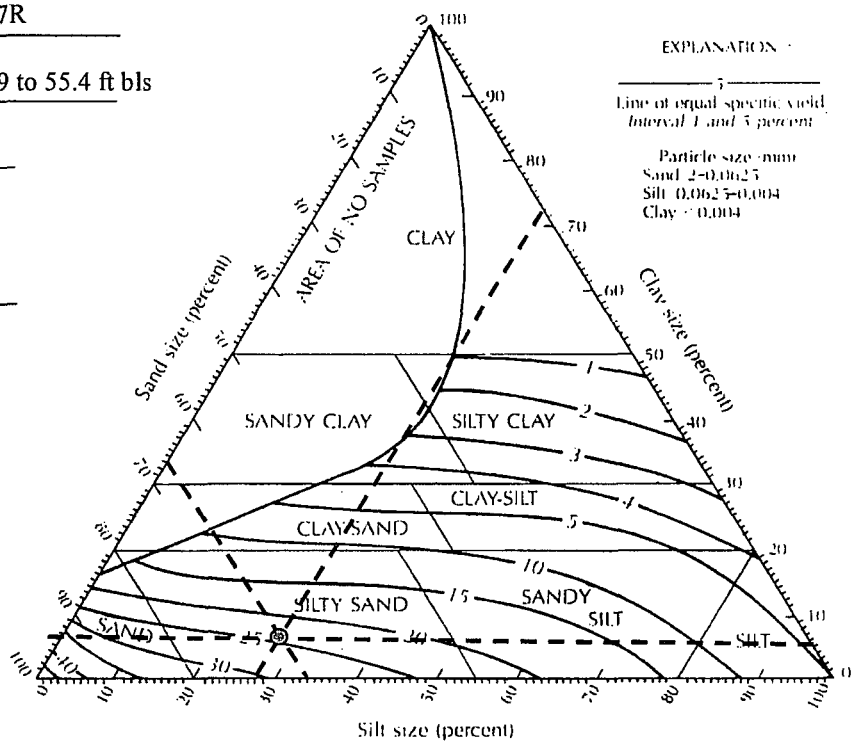
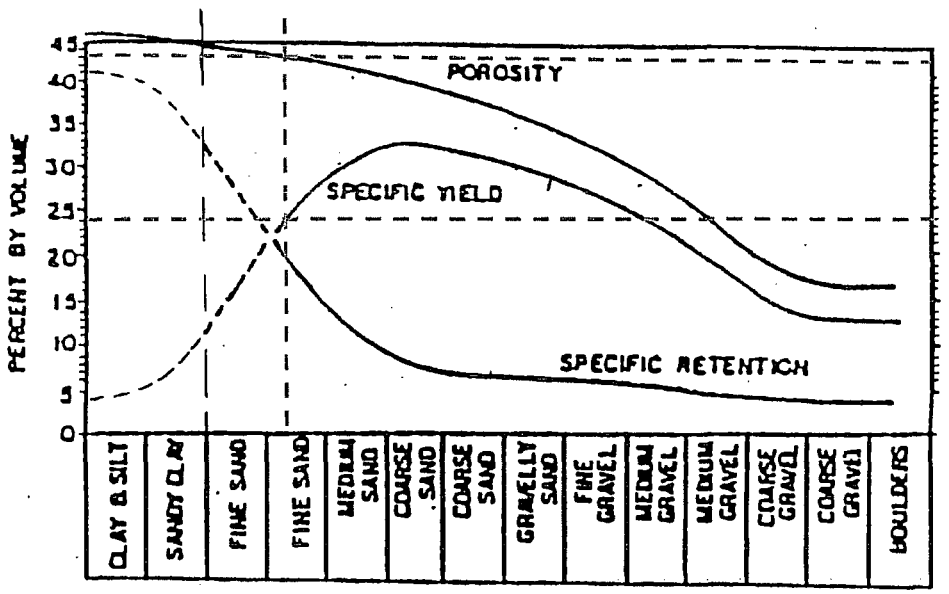


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



Estimated Porosity: 43%

Variation of Porosity, Specific Yield, and Specific Retention with Grain Size (after Bear, 1972)

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1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-8**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 1 of 2
Boring Depth (ft): **45.0**	Elevation (ft): **777.9**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **10/10/07**
Logged By: **Scott Dacus**	Water Level: **Stabilized Water Level at 35.15 ft bls**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
775	5		**PRE-DUG HOLE FOR UTILITY CLEARANCE**		
770	10		FILL (F): Brown, Micaceous, Silty, Clayey, **SAND**		
765	15				
760	20		FILL (F): Reddish-Brown, Silty, **CLAY**		
755	25				
750	30		SOIL/SAPROLITE (M1): Brown, Micaceous, Silty, **SAND**		
745					

BORING LOG WITH WELL RECOVERED ONS LOG.GPJ LAGWGN01.GDT 7/23/08

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Project: **Oconee Nuclear Station**			**Boring No. GM-8**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 2 of 2
Boring Depth (ft): **45.0**	Elevation (ft): **777.9**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **10/10/07**
Logged By: **Scott Dacus**	Water Level: **Stabilized Water Level at 35.15 ft bls**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
740					
	40		SOIL/SAPROLITE (M1): White and Brown, Micaceous, Silty, Medium to Fine **SAND** With Mafic-Rich Rock Fragments From 39.70 ft to 39.80 ft bls		
735					
	45		**Lithologic Descriptions Obtained From GM-8R** **Boring Terminated at 45.00 ft bls**		

COMPLETION REPORT OF WELL No. GM-8

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

WATER LEVEL: **Stabilized Water Level at 35.15 ft bls**

LATITUDE: **34°47'38.984"**
LONGITUDE: **82°53'48.224"**
TOP OF CASING ELEVATION: **777.73**
DATUM: **MSL**
LOGGED BY: **Scott Dacus**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **4¼" H.S.A.**
DATE DRILLED: **10/10/07**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
				0.00	GS	777.94
PRE-DUG HOLE FOR UTILITY CLEARANCE		0				
		5				
FILL (F): Brown, Micaceous, Silty, Clayey, **SAND**						
		10				
		15				
		20				
FILL (F): Reddish-Brown, Silty, **CLAY**						
		25		26.00		751.94
				28.00		749.94
SOIL/SAPROLITE (M1): Brown, Micaceous, Silty, **SAND**		30				

WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter:
Type:
Interval:

RISER CASING
Diameter: **2"**
Type: **Sch. 40 PVC**
Interval: **0 to 28.06 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 26 ft bls**

SEAL
Type: **Bentonite**
Interval: **26 to 28 ft bls**

FILTERPACK
Type: **#1 Silica Sand**
Interval: **28 to 45 ft bls**

SCREEN
Diameter: **2"**
Type: **0.010 Slotted PVC**
Interval: **28.06 to 43.06 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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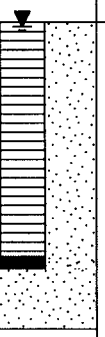
COMPLETION REPORT OF WELL No. GM-8

MONITORING WELL RECOVERED ONS.LOG.GPJ S&ME.GDT 7/23/08

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

GROUND SURFACE ELEVATION: **777.9**
LOGGED BY: **Scott Dacus**
CHECKED BY:

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)	WELL CONSTRUCTION DETAILS
							(See Page 1)
SOIL/SAPROLITE (M1): Brown, Micaceous, Silty, **SAND** *(continued)*		35					
SOIL/SAPROLITE (M1): White and Brown, Micaceous, Silty, Medium to Fine **SAND** With Mafic-Rich Rock Fragments From 39.70 ft to 39.80 ft bls		40		42.66 43.06 45.00		735.28 734.88 732.94	
		45					



LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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COMPLETION REPORT OF WELL No. GM-8

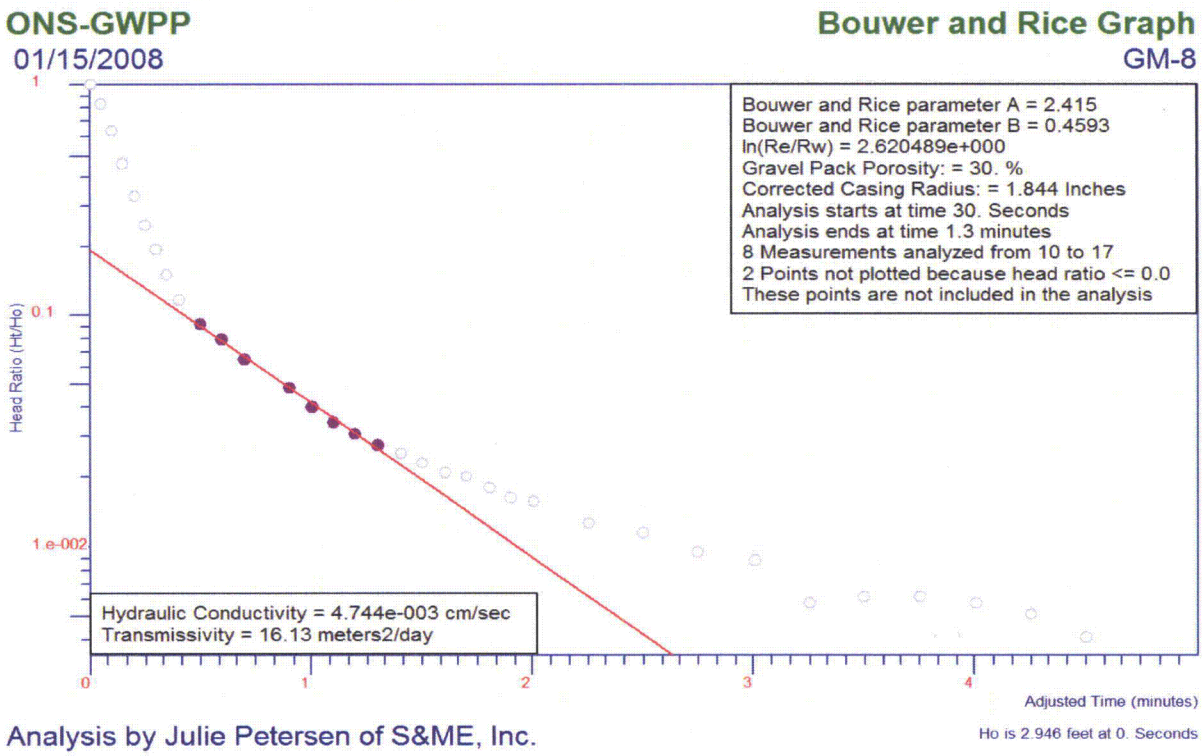
MONITORING WELL RECOVERED ONS LOG.GPJ S&ME.GDT 7/23/08

Calculation of Permeability By The Rising Head Method (Slug Test)

Site Name:	ONS-GWPP
Test Date:	1/15/2008
Well Label:	GM-8
Aquifer Thickness:	12.91 feet
Screen Length:	15. feet
Casing Radius:	1. Inches
Effective Radius:	3. Inches
Gravel Pack Porosity:	30.00%
Corrected Casing Radius:	1.844 Inches
Static Water Level:	35.15 feet
Water Table to Screen Bottom:	7.91 feet
Anisotropy Ratio:	1

Time Adjustment: 0. Seconds
Test starts with trial 0
There are 36 time and drawdown measurements
Maximum head is 2.946 feet
Minimum head is 0. feet

Calculation by Bouwer and Rice Graphical Method



Analysis by Julie Petersen of S&ME, Inc.

PERMEABILITY

4.74×10^{-3} cm/sec

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1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-8R**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 1 of 3
Boring Depth (ft): **82.1**	Elevation (ft): **778.2**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **10/2/07**
Logged By: **Scott Dacus**	Water Level: **Stabilized Water Level at 34.96 ft bls**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
775	5		PRE-DUG HOLE FOR UTILITY CLEARANCE: **FILL**		
770	10		FILL (F): Brown, Micaceous, Silty, Clayey, **SAND**		9, 16
765	15				11
760	20				14
755	25		FILL (F): Reddish-Brown, Silty, **CLAY**		19
750	30		SOIL/SAPROLITE (M1): Brown, Micaceous, Silty, **SAND**		12
745					15

BORING LOG WITH WELL RECOVERED ONS LOG.GPJ LAGWGN01.GDT 7/23/08

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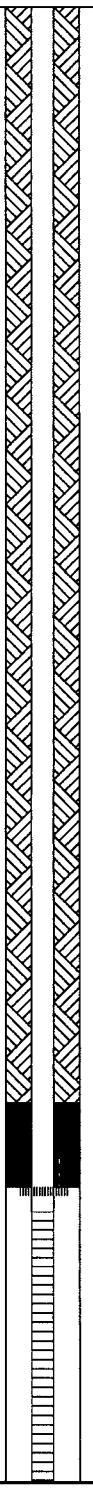
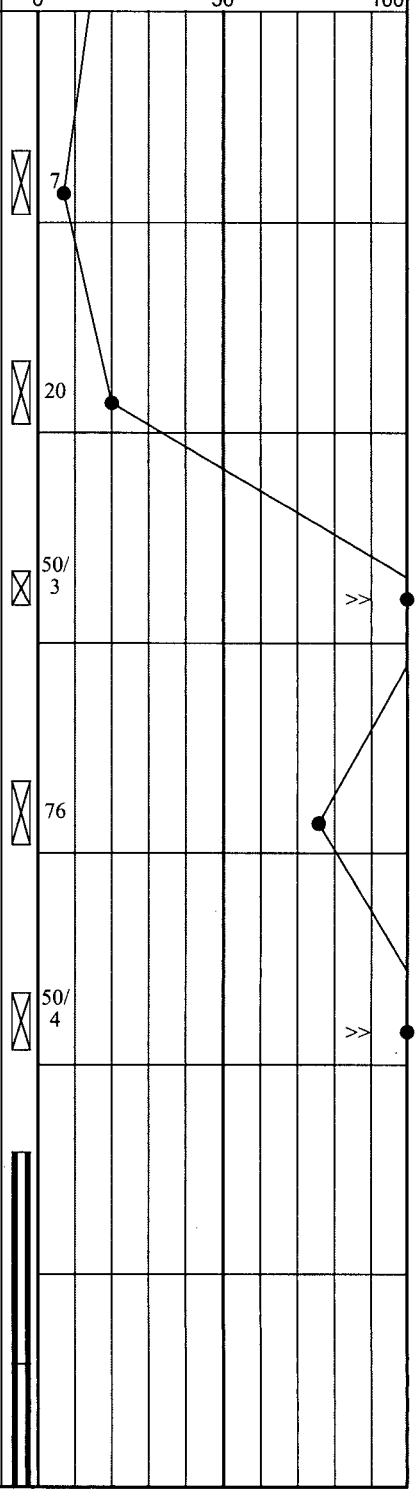
Project: **Oconee Nuclear Station**			**Boring No. GM-8R**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 2 of 3
Boring Depth (ft): **82.1**	Elevation (ft): **778.2**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **10/2/07**
Logged By: **Scott Dacus**	Water Level: **Stabilized Water Level at 34.96 ft bls**		Drilling Method: **4¼" H.S.A.**

Elev. (Feet)	Depth (Feet)	Material Description
740		
	40	SOIL/SAPROLITE (M1): White and Brown, Micaceous, Silty, Medium to Fine **SAND** With Mafic-Rich Rock Fragments From 39.70 ft to 39.80 ft bls
735	45	
730		WEATHERED ROCK (M2): When Sampled Becomes Black and White, Micaceous, Silty, Medium to Fine **SAND**
	50	SOIL/SAPROLITE (M1): White and Brown, MIcaceous, Silty, Medium to Fine **SAND**
725	55	
720		WEATHERED ROCK (M2): When Sampled Becomes White and Brown, Micaceous, Silty, Medium to Fine **SAND**
	60	**Roller Cone Refusal at 62.10 ft bls**
715		SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS**; Moderately Fractured, Horizontal and Low Angle Joints With Slight to No Staining
	65	SOUND ROCK (D): Coarse-Grained, Porphyritic, **BIOTITE HORNBLENDE GNEISS** Moderately Fractured, Low Angle Joints With No Staining
710		SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** With Intermittent Medium-Grained **BIOTITE HORNBLENDE GNEISS** Moderately

Well Construction



Penetration Resistance (Blows/Foot)



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9751 Southern Pine Boulevard
Charlotte, North Carolina 28273
Telephone: 704-523-4726
Fax: 704-525-3953

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1. BORING AND SAMPLING IS IN ACCORDANCE WITH ASTM D-1586.
2. PENETRATION (N-VALUE) IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

Project: **Oconee Nuclear Station**			**Boring No. GM-8R**
Location: **Seneca, SC**		Number: **1264-07-234**	Sheet No. 3 of 3
Boring Depth (ft): **82.1**	Elevation (ft): **778.2**	Driller: **Jay Little, SC Cert No. B1575**	Date Drilled: **10/2/07**
Logged By: **Scott Dacus**	Water Level: **Stabilized Water Level at 34.96 ft bls**		Drilling Method: **4¼" H.S.A.**

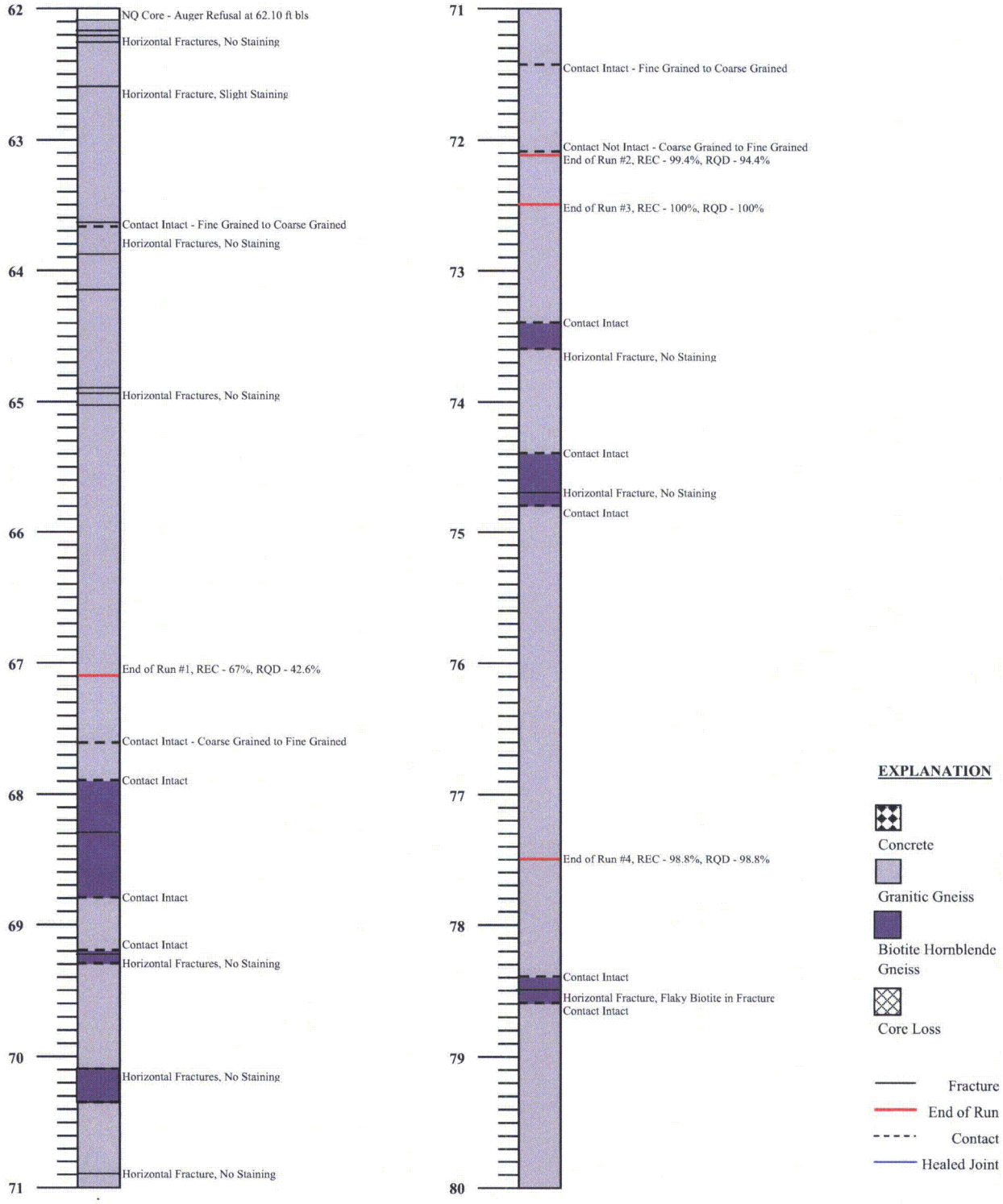
Elev. (Feet)	Depth (Feet)	Lith-ology	Material Description	Well Construction	Penetration Resistance (Blows/Foot) 0 50 100
			Fractured, Horizontal and Low Angle Joints With No Staining		
			SOUND ROCK (D): Coarse-Grained, Porphyritic, **BIOTITE HORNBLENDE GNEISS** Unfractured		
705			SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** With Intermittent Medium-Grained **BIOTITE HORNBLENDE GNEISS** Moderately Fractured, Horizontal and Low Angle Joints With No Staining		
	75				
700					
	80				
			Boring Terminated at 82.07 ft bls		

FIELD ROCK CORE LOG

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-8R

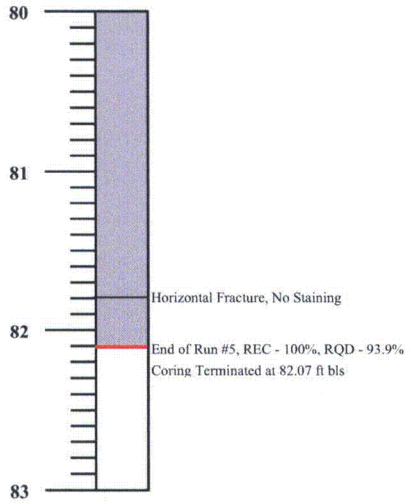


FIELD ROCK CORE LOG

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-8R



EXPLANATION

Concrete

Granitic Gneiss

Biotite Hornblende Gneiss

Core Loss

Fracture

End of Run

Contact

Healed Joint

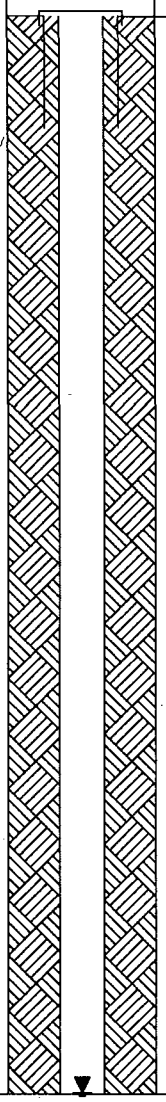
COMPLETION REPORT OF WELL No. GM-8R

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

DRILLING CONTRACTOR: **S&ME, Inc.**
DRILLING METHOD: **4¼" H.S.A.**
DATE DRILLED: **10/2/07**

WATER LEVEL: **Stabilized Water Level at 34.96 ft bls**
LATITUDE: **34°47'38.055"**
LONGITUDE: **82°53'48.055"**
TOP OF CASING ELEVATION: **777.99**
DATUM: **MSL**
LOGGED BY: **Scott Dacus**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)
				0.00	GS	778.18
PRE-DUG HOLE FOR UTILITY CLEARANCE: **FILL**		0				
FILL (F): Brown, Micaceous, Silty, Clayey, **SAND**		5, 10, 15				
FILL (F): Reddish-Brown, Silty, **CLAY**		20, 25				
SOIL/SAPROLITE (M1): Brown, Micaceous, Silty, **SAND**		30				



WELL CONSTRUCTION DETAILS

PROTECTIVE CASING
Diameter:
Type:
Interval:

RISER CASING
Diameter: **2"**
Type: **Sch. 40 PVC**
Interval: **0 to 63.61 ft bls**

GROUT
Type: **Neat Cement**
Interval: **0 to 61 ft bls**

SEAL
Type: **K-packer**
Interval: **63.03 to 63.23 ft bls**

FILTERPACK
Type:
Interval:

SCREEN
Diameter: **2"**
Type: **0.010 Slotted PVC**
Interval: **63.61 to 73.61 ft bls**

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

MONITORING WELL RECOVERED_ONS LOG.GPJ S&ME.GDT 7/23/08

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COMPLETION REPORT OF WELL No. GM-8R

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

GROUND SURFACE ELEVATION: **778.2**
LOGGED BY: **Scott Dacus**
CHECKED BY:

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)	WELL CONSTRUCTION DETAILS
							(See Page 1)
SOIL/SAPROLITE (M1): Brown, Micaceous, Silty, **SAND** *(continued)*		35					
SOIL/SAPROLITE (M1): White and Brown, Micaceous, Silty, Medium to Fine **SAND** With Mafic-Rich Rock Fragments From 39.70 ft to 39.80 ft bls		40, 45					
WEATHERED ROCK (M2): When Sampled Becomes Black and White, Micaceous, Silty, Medium to Fine **SAND**		50					
SOIL/SAPROLITE (M1): White and Brown, MIcaceous, Silty, Medium to Fine **SAND**		55					
WEATHERED ROCK (M2): When Sampled Becomes White and Brown, Micaceous, Silty, Medium to Fine **SAND**		60		61.00		717.18	
SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** Moderately Fractured, Horizontal and Low Angle Joints With Slight to No Staining		65		63.03 63.23 63.61		715.15 714.95 714.57	
SOUND ROCK (D): Coarse-Grained, Porphyritic, **BIOTITE HORNBLENDE GNEISS**; Moderately Fractured, Low Angle Joints With No Staining		70		73.11 73.61		705.07 704.57	
SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** With Intermittent Medium-Grained **BIOTITE HORNBLENDE**		75		75.61		702.57	

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

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COMPLETION REPORT OF WELL No. GM-8R

MONITORING WELL RECOVERED_ONS LOG.GPJ S&ME.GDT 7/23/08

PROJECT: **Oconee Nuclear Station**
PROJECT NO: **1264-07-234**
PROJECT LOCATION: **Seneca, SC**

GROUND SURFACE ELEVATION:
LOGGED BY: **778.2**
CHECKED BY: **Scott Dacus**

STRATA DESCRIPTION	SYMBOL	DEPTH (ft.)	WELL DETAILS	DEPTH (ft.)	LEGEND	ELEVATION (ft.)	WELL CONSTRUCTION DETAILS
							(See Page 1)
GNEISS; Moderately Fractured, Horizontal and Low Angle Joints With No Staining		80		82.07		696.11	
SOUND ROCK (D): Coarse-Grained, Porphyritic, **BIOTITE HORNBLENDE GNEISS**; Unfractured							
SOUND ROCK (D): Medium-Grained **GRANITIC GNEISS** With Intermittent Medium-Grained **BIOTITE HORNBLENDE GNEISS**; Moderately Fractured, Horizontal and Low Angle Joints With No Staining *(continued)*							

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL
- STATIC WATER LEVEL

TOC	TOP OF CASING
GS	GROUND SURFACE
BS	BENTONITE SEAL
FP	FILTER PACK
TSC	TOP OF SCREEN
BSC	BOTTOM OF SCREEN
TD	TOTAL DEPTH
CG	CEMENT GROUT

MONITORING WELL RECOVERED_ONS LOG.GPJ S&ME.GDT 7/23/08

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COMPLETION REPORT OF WELL No. GM-8R

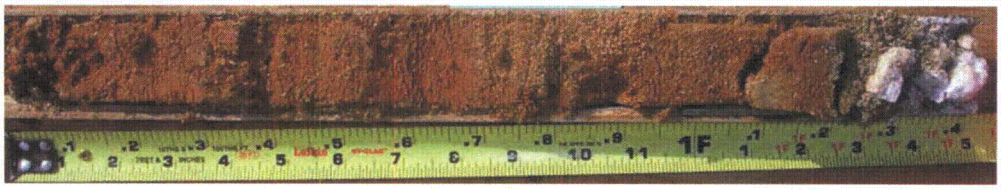
SPLIT SPOON SAMPLE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Boring Number: GM-8R

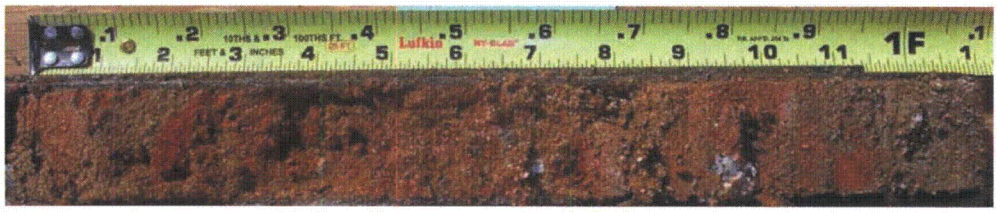
Sample No: 1
Depth (ft-bls): 6 - 7.5
Blow Count: 2 * 3 * 6



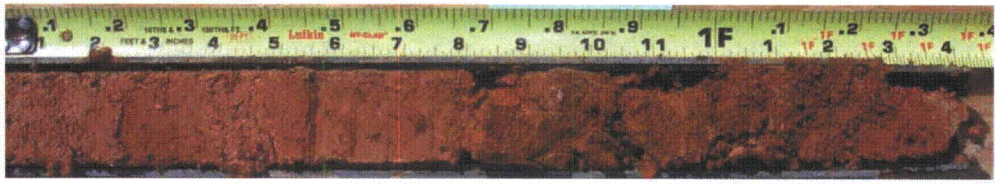
Sample No: 2
Depth (ft-bls): 8.3 - 9.8
Blow Count: 5 * 8 * 8

Sample No: 3
Depth (ft-bls): 13.3 - 14.8
Blow Count: 4 * 5 * 6

Sample No: 4
Depth (ft-bls): 18.3 - 19.8
Blow Count: 3 * 6 * 8



Sample No: 5
Depth (ft-bls): 23.3 - 24.8
Blow Count: 4 * 8 * 11



Sample No: 6
Depth (ft-bls): 28.3 - 29.8
Blow Count: 4 * 4 * 8

SPLIT SPOON SAMPLE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

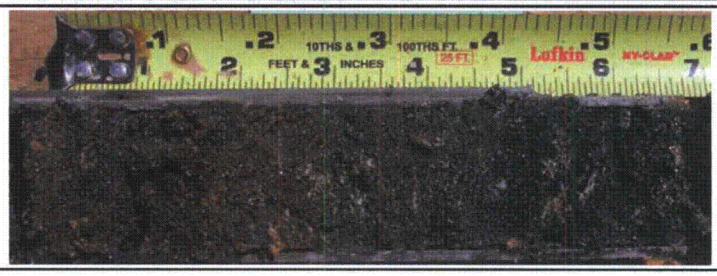
Boring Number: GM-8R

Sample No: 7
Depth (ft-bls): 33.3 - 34.8
Blow Count: 2 * 2 * 13

Sample No: 8
Depth (ft-bls): 38.3 - 39.8
Blow Count: 2 * 3 * 4

Sample No: 9
Depth (ft-bls): 43.3 - 44.8
Blow Count: 7 * 9 * 11

Sample No: 10
Depth (ft-bls): 48.3 - 49.8
Blow Count: 21 * 50/3



Sample No: 11
Depth (ft-bls): 53.3 - 54.8
Blow Count: 12 * 32 * 44

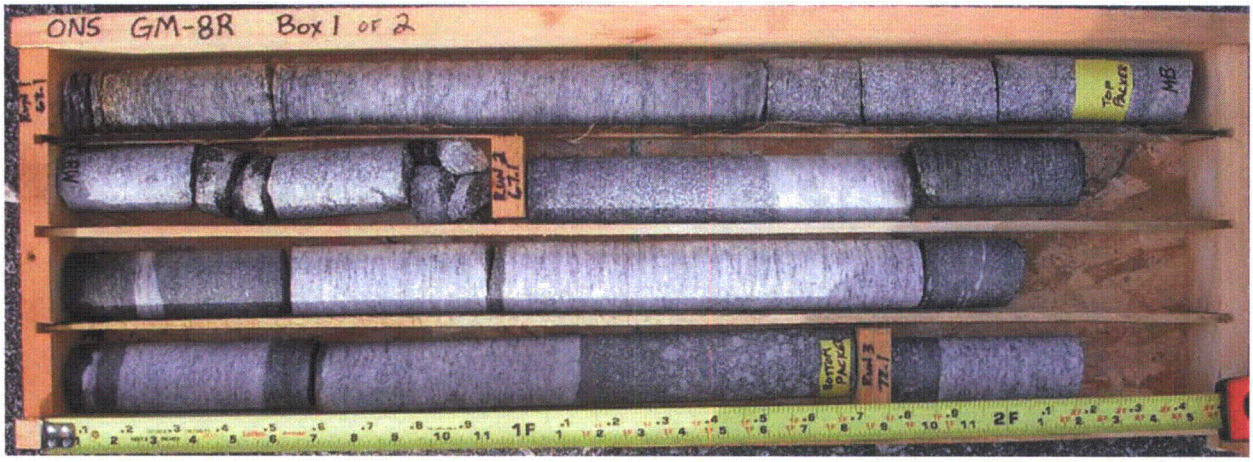
Sample No: 12
Depth (ft-bls): 58.3 - 59.8
Blow Count: 16 * 17 * 50/4

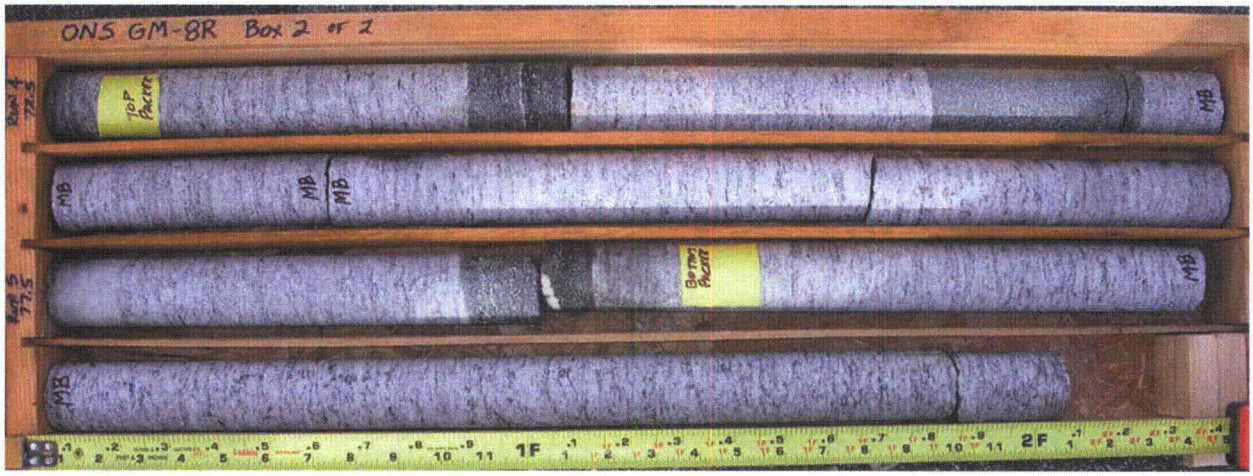
ROCK CORE PICTURES

Oconee Nuclear Station - Groundwater Protection Project

S&ME Project No: 1264-07-234

Core Location: GM-8R





CLASSIFICATION:

62.10' to 63.65': Medium-Grained Granitic Gneiss

63.65' to 67.60': Coarse-Grained Biotite Hornblende Gneiss

67.60' to 71.45': Medium-Grained Granitic Gneiss With Intermittent Biotite Hornblende Gneiss

71.45' to 72.20': Coarse-Grained Biotite Hornblende Gneiss

72.20' to 82.07': Medium-Grained Granitic Gneiss With Intermittent Biotite Hornblende Gneiss

CALCULATION OF PERMEABILITY BY THE FALLING HEAD METHOD
(Open Hole in Uniform Material)

S&ME

Site Name:	ONS - GWPP	
Date:	10/3/2007	
Boring I.D.	GM-8R	
Test Interval:	62.1' to 67.1'	(Sound Rock)
Total Depth of Hole:	67.1 ft	2045.73 cm
Length of Open Hole:	5 ft	152.44 cm
Transformation Ratio m=	1	
Performed by:	Scott Dacus	

Time (sec)	Head (cm)	Permeability (cm/sec)
0	899.63	
60	867.23	1.07E-04
120	839.79	9.41E-05
180	815.03	8.76E-05
240	792.13	8.34E-05
300	770.82	7.98E-05
360	751.07	7.60E-05
420	732.77	7.22E-05
480	715.70	6.90E-05
540	699.76	6.60E-05
600	684.88	6.29E-05
900	623.02	5.54E-05
1200	576.77	4.52E-05
1500	541.77	3.67E-05
1800	515.06	2.96E-05

Calculations

$$K_h = \frac{d^2 \cdot \ln\left(\frac{2mL}{D}\right)}{8 \cdot L \cdot (t_2 - t_1)} \cdot \ln\frac{H_1}{H_2}$$

for $\frac{mL}{D} > 4$

Where:

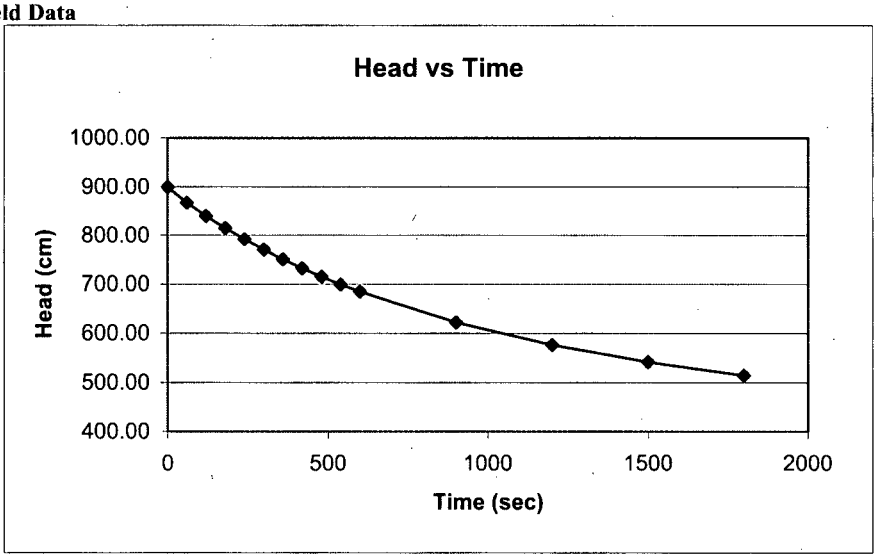
K_h	is the Horizontal Coefficient of Permeability (cm/sec)
H_1	is the Piezometric Head for time; $t = t_1$ (cm)
H_2	is the Piezometric Head for time; $t = t_2$ (cm)
D	is the Diameter of the Standpipe (cm)
d	is the diameter of the Open Length (cm),
m	is the Transformation Ratio, Where
	$m = \sqrt{K_h / K_v}$ — K_h is the Horizontal Permeability; K_v is the Vertical Permeability
L	is the Open Length of Hole (cm)

Spreadsheet assumes 3" ID Pipe; NQ Hole, OD = 3"

MEAN PERMEABILITY (cm/sec)

6.90E-05

Graph of Field Data



CALCULATION OF PERMEABILITY BY THE FALLING HEAD METHOD
(Open Hole in Uniform Material)

S&ME

Site Name:	ONS - GWPP	
Date:	10/9/2007	
Boring I.D.	GM-8R	
Test Interval:	41' to 45'	(Soil/Saprolite)
Total Depth of Hole:	45 ft	1371.95 cm
Length of Open Hole:	4 ft	121.95 cm
Transformation Ratio m=	1	
Performed by:	Scott Dacus	

Time (sec)	Head (cm)	Permeability (cm/sec)
0	601.68	
60	551.92	2.97E-04
120	513.78	2.46E-04
180	483.69	2.08E-04
240	459.45	1.77E-04
300	438.26	1.62E-04
360	419.48	1.51E-04
420	401.77	1.48E-04
480	384.24	1.53E-04
540	366.86	1.59E-04
600	350.09	1.61E-04
900	277.32	1.60E-04
1200	226.68	1.39E-04
1500	193.99	1.07E-04

Calculations

$$K_h = \frac{d^2 \cdot \ln\left(\frac{2mL}{D}\right)}{8 \cdot L \cdot (t_2 - t_1)} \cdot \ln\frac{H_1}{H_2}$$

for $\frac{mL}{D} > 4$

Where:

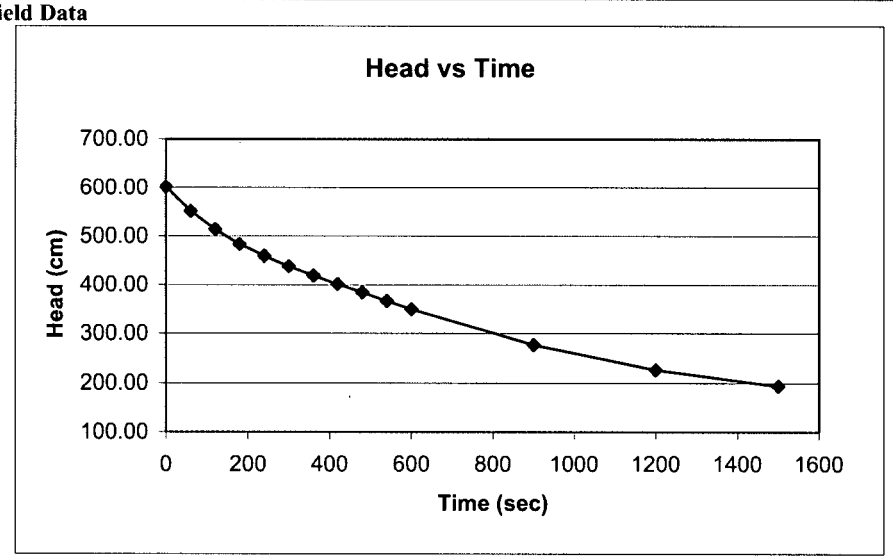
K_h	is the Horizontal Coefficient of Permeability (cm/sec)
H_1	is the Piezometric Head for time; $t = t_1$ (cm)
H_2	is the Piezometric Head for time; $t = t_2$ (cm)
D	is the Diameter of the Standpipe (cm)
d	is the diameter of the Open Length (cm),
m	is the Transformation Ratio, Where
	$m = \sqrt{K_h / K_v}$ — K_h is the Horizontal Permeability; K_v is the Vertical Permeability
L	is the Open Length of Hole (cm)

Spreadsheet assumes 3" ID Pipe; NQ Hole, OD = 3"

MEAN PERMEABILITY (cm/sec)

1.74E-04

Graph of Field Data



CALCULATION OF PERMEABILITY BY THE FALLING HEAD METHOD
(Open Hole in Uniform Material)

S&ME

Site Name:	ONS - GWPP	
Date:	10/3/2007	
Boring I.D.	GM-8R	
Test Interval:	62.1' to 72.1'	(Sound Rock)
Total Depth of Hole:	72.1 ft	2198.17 cm
Length of Open Hole:	10 ft	304.88 cm
Transformation Ratio m=	1	
Performed by:	Scott Dacus	

Time (sec)	Head (cm)	Permeability (cm/sec)
0	965.79	
60	900.55	1.22E-04
120	845.95	1.09E-04
180	800.06	9.70E-05
240	761.01	8.70E-05
300	727.38	7.86E-05
360	698.32	7.09E-05
420	673.08	6.40E-05
480	651.01	5.80E-05
540	631.77	5.22E-05
600	614.97	4.69E-05

Calculations

$$K_h = \frac{d^2 \cdot \ln\left(\frac{2mL}{D}\right)}{8 \cdot L \cdot (t_2 - t_1)} \cdot \ln\frac{H_1}{H_2}$$

for $\frac{mL}{D} \rangle 4$

Where:

K_h	is the Horizontal Coefficient of Permeability (cm/sec)
H_1	is the Piezometric Head for time; $t = t_1$ (cm)
H_2	is the Piezometric Head for time; $t = t_2$ (cm)
D	is the Diameter of the Standpipe (cm)
d	is the diameter of the Open Length (cm),
m	is the Transformation Ratio, Where

$$m = \sqrt{K_h / K_v}$$

K_h is the Horizontal Permeability
K_v is the Vertical Permeability

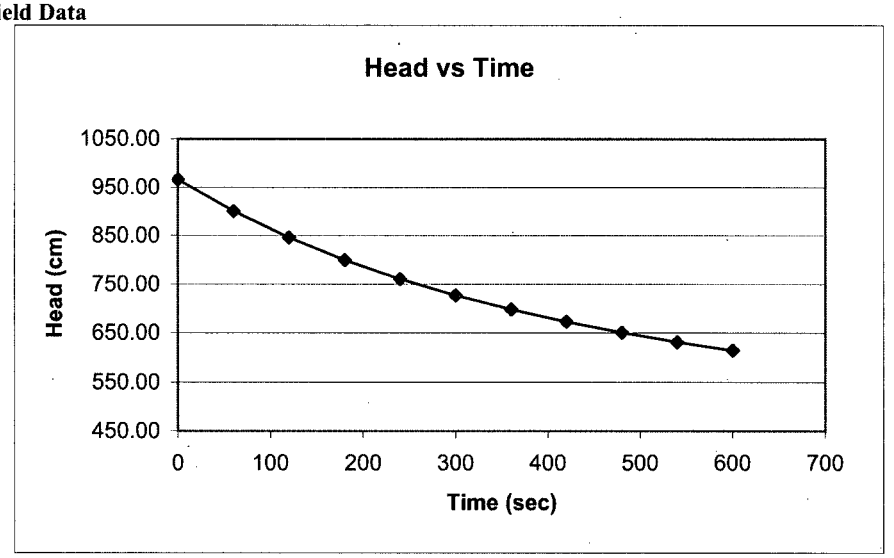
L	is the Open Length of Hole (cm)

Spreadsheet assumes 3" ID Pipe; NQ Hole, OD = 3"

MEAN PERMEABILITY (cm/sec)

7.85E-05

Graph of Field Data



BOREHOLE PERMEABILITY TEST USING PACKERS CALCULATIONS

S&ME

PROJECT NAME AND NO.: ONS - GWPP
LOCATION: Seneca, SC
TEST DATE: 10/4/2007
TESTED BY: Adam Jennings/Scott Dacus
GROUND ELEV (ft MSL): 778.2

BOREHOLE NO.: GM-8R
TEST INTERVAL: 64.4 to 70.4 bgs
TEST INTERVAL: 713.8 to 707.8 EL

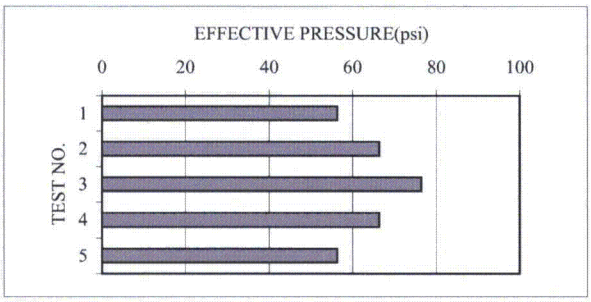
TEST METHOD: Double Packer Method using Multiple Pressure Tests
METHOD REFERENCE: Ground Water Manual, US Bureau of Reclamation, 1995, Chapter 10

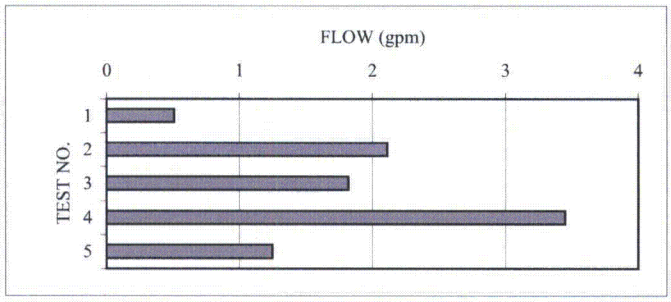
RESULTS OF PERMEABILITY CALCULATIONS
MULTIPLE STEP TEST

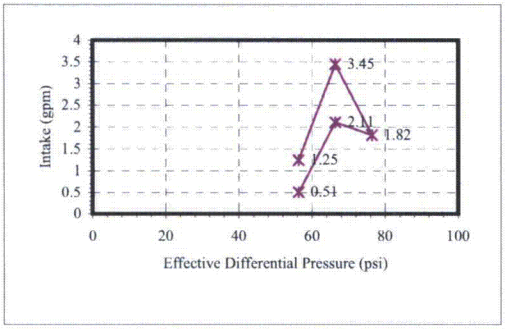
Step	Flow (Q) (gpm)	Pressure (psi) Gauge	Pressure (psi) Effective	Lugeons	Permeability (ft/sec)	Permeability (cm/sec)
1	0.51	40	56	3	9.70E-07	3.0E-05
2	2.11	50	66	10	3.4E-06	1.0E-04
3	1.82	60	76	7	2.6E-06	7.8E-05
4	3.45	50	66	16	5.6E-06	1.7E-04
5	1.25	40	56	7	2.4E-06	7.2E-05
			AVERAGE	8	3.0E-06	9.1E-05
			SELECTED VALUES			

Rock Description of Tested Interval:
Moderately Fractured Biotite Hornblende Gneiss to Granitic Gneiss

TEST INTERPRETATION







PERMEABILITY CALCULATIONS FOR EACH STEP OF TEST

S&ME

CALCULATED PERMEABILITY FOR STEP 1

Gauge Pressure, **h2**:	40	psi	92.4	feet of water
Flow Rate, **Q**:	0.51	gpm	0.001	ft^3/sec
Head loss per TEN foot section of pipe:	0.0	psi		(per tables)
Head Loss, ***L*** :	0.0	psi	0.0	feet of water
Distance from pressure gauge to bottom of test section, $\mathbf{h_1}$:	37.7	feet		
Value of $\mathbf{h_1}$:	37.7	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	130.1	feet	56.3	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	94.6	feet		
X = (H/Tu)*100	137.5	%		
Tu/A	15.7			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	48		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	72		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	9.70E-07	ft/sec	2.96E-05	cm/sec

Is this step valid?

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 4.7 square feet

Is Q/a * (estimated porosity) > 10?? True, Test Valid

CALCULATED PERMEABILITY FOR STEP 2

Gauge Pressure, **h2**:	50	psi	115.5	feet of water
Flow Rate, **Q**:	2.11	gpm	0.005	ft^3/sec
Head loss per TEN foot section of pipe:	0.0	psi		(per tables)
Head Loss, ***L*** :	0.0	psi	0.0	feet of water
Distance from pressure gauge to bottom of test section, $\mathbf{h_1}$:	37.7	feet		
Value of h_1:	37.7	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	153.2	feet	66.3	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	117.7	feet		
X = (H/Tu)*100	130.1	%		
Tu/A	19.6			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	48		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	72		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	3.41E-06	ft/sec	1.04E-04	cm/sec

Is this step valid?

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 4.7 square feet

Is Q/a * (estimated porosity) > 10?? True, Test Valid

CALCULATED PERMEABILITY FOR STEP 3

Gauge Pressure, **h2**:	60	psi	138.6	feet of water
Flow Rate, **Q**:	1.82	gpm	0.004	ft^3/sec
Head loss per TEN foot section of pipe:	0.0	psi		(per tables)
Head Loss, ***L*** :	0.0	psi	0.0	feet of water
Distance from pressure gauge to bottom of test section, $\mathbf{h_1}$:	37.7	feet		
Value of h_1:	37.7	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	176.3	feet	76.3	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	140.8	feet		
X = (H/Tu)*100	125.2	%		
Tu/A	23.4			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	48		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	72		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	2.56E-06	ft/sec	7.79E-05	cm/sec
Is this step valid?				

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 4.7 square feet

Is Q/a * (estimated porosity) > 10?? True, Test Valid

CALCULATED PERMEABILITY FOR STEP 4

Gauge Pressure, **h2**:	50	psi	115.5	feet of water
Flow Rate, **Q**:	3.45	gpm	0.008	ft^3/sec
Head loss per TEN foot section of pipe:	0.0	psi		(per tables)
Head Loss, ***L*** :	0.0	psi	0.0	feet of water
Distance from pressure gauge to bottom of test section, $\mathbf{h_1}$:	37.7	feet		
Value of h_1:	37.7	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	153.2	feet	66.3	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	117.7	feet		
X = (H/Tu)*100	130.1	%		
Tu/A	19.6			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	48		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	72		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	5.58E-06	ft/sec	1.70E-04	cm/sec
Is this step valid?				

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 4.7 square feet

Is Q/a * (estimated porosity) > 10?? True, Test Valid

CALCULATED PERMEABILITY FOR STEP 5				
Gauge Pressure, **h2**:	40	psi	92.4	feet of water
Flow Rate, **Q**:	1.25	gpm	0.003	ft^3/sec
Head loss per TEN foot section of pipe:	0.0	psi		(per tables)
Head Loss, ***L*** :	0.0	psi	0.0	feet of water
Distance from pressure gauge to bottom of test section, h_1:	37.7	feet		
Value of h_1:	37.7	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	130.1	feet	56.3	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	94.6	feet		
X = (H/Tu)*100	137.5	%		
Tu/A	15.7			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	48		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	72		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	2.38E-06	ft/sec	7.25E-05	cm/sec

Is this step valid?

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 4.7 square feet

Is Q/a * (estimated porosity) > 10?? True, Test Valid

BOREHOLE PERMEABILITY TEST USING PACKERS CALCULATIONS

S&ME

PROJECT NAME AND NO.: ONS - GWPP
LOCATION: Seneca, SC
TEST DATE: 10/4/2007
TESTED BY: Adam Jennings/Scott Dacus
GROUND ELEV (ft MSL): 778.2

BOREHOLE NO.: GM-8R
TEST INTERVAL: 72.8 to 78.9 bgs
TEST INTERVAL: 705.4 to 699.3 EL

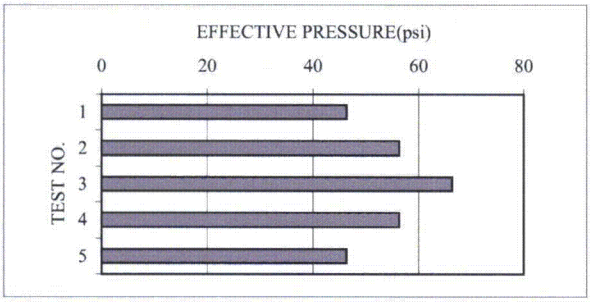
TEST METHOD: Double Packer Method using Multiple Pressure Tests
METHOD REFERENCE: Ground Water Manual, US Bureau of Reclamation, 1995, Chapter 10

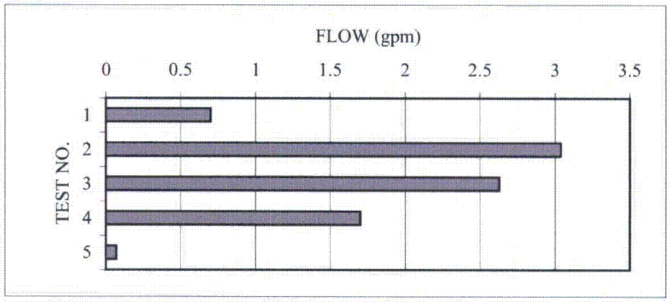
RESULTS OF PERMEABILITY CALCULATIONS
MULTIPLE STEP TEST

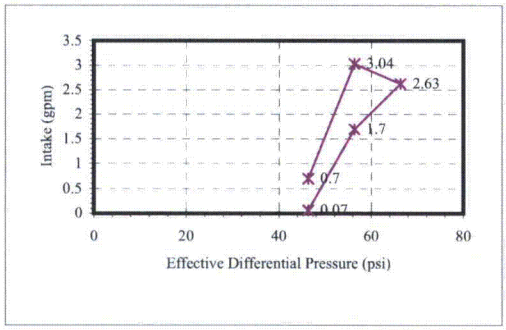
Step	Flow (Q) (gpm)	Pressure (psi) Gauge	Pressure (psi) Effective	Lugeons	Permeability (ft/sec)	Permeability (cm/sec)
1	0.7	30	46	5	1.62E-06	4.9E-05
2	3.04	40	56	16	5.8E-06	1.8E-04
3	2.63	50	66	12	4.2E-06	1.3E-04
4	1.7	40	56	9	3.2E-06	9.9E-05
5	0.07	30	46	0	1.6E-07	4.9E-06
			AVERAGE	8	3.0E-06	9.2E-05
			SELECTED VALUES			

Rock Description of Tested Interval:
Moderately Fractured Granitic Gneiss With Intermittent Biotite Hornblende Gneiss

TEST INTERPRETATION







PERMEABILITY CALCULATIONS FOR EACH STEP OF TEST

S&ME

CALCULATED PERMEABILITY FOR STEP 1

Gauge Pressure, **h2**:	30	psi	69.3	feet of water
Flow Rate, **Q**:	0.7	gpm	0.002	ft^3/sec
Head loss per TEN foot section of pipe:	0.0	psi		(per tables)
Head Loss, ***L*** :	0.0	psi	0.0	feet of water
Distance from pressure gauge to bottom of test section, $\mathbf{h_1}$:	37.7	feet		
Value of $\mathbf{h_1}$:	37.7	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	107.0	feet	46.3	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	63.1	feet		
X = (H/Tu)*100	169.5	%		
Tu/A	10.5			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	48		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	72		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	1.62E-06	ft/sec	4.94E-05	cm/sec

Is this step valid?

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 4.7 square feet

Is Q/a * (estimated porosity) > 10?? True, Test Valid

CALCULATED PERMEABILITY FOR STEP 2

Gauge Pressure, **h2**:	40	psi	92.4	feet of water
Flow Rate, **Q**:	3.04	gpm	0.007	ft^3/sec
Head loss per TEN foot section of pipe:	0.0	psi		(per tables)
Head Loss, ***L*** :	0.0	psi	0.0	feet of water
Distance from pressure gauge to bottom of test section, $\mathbf{h_1}$:	37.7	feet		
Value of h_1:	37.7	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	130.1	feet	56.3	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	86.2	feet		
X = (H/Tu)*100	150.9	%		
Tu/A	14.3			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	48		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	72		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	5.78E-06	ft/sec	1.76E-04	cm/sec

Is this step valid?

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 4.7 square feet

Is Q/a * (estimated porosity) > 10?? True, Test Valid

CALCULATED PERMEABILITY FOR STEP 3

Gauge Pressure, **h2**:	50	psi	115.5	feet of water
Flow Rate, **Q**:	2.63	gpm	0.006	ft^3/sec
Head loss per TEN foot section of pipe:	0.0	psi		(per tables)
Head Loss, ***L*** :	0.0	psi	0.0	feet of water
Distance from pressure gauge to bottom of test section, h_1:	37.7	feet		
Value of h_1:	37.7	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	153.2	feet	66.3	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	109.3	feet		
X = (H/Tu)*100	140.1	%		
Tu/A	18.2			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	48		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	72		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	4.25E-06	ft/sec	1.30E-04	cm/sec
Is this step valid?				

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 4.7 square feet

Is Q/a * (estimated porosity) > 10?? True, Test Valid

CALCULATED PERMEABILITY FOR STEP 4

Gauge Pressure, **h2**:	40	psi	92.4	feet of water
Flow Rate, **Q**:	1.70	gpm	0.004	ft^3/sec
Head loss per TEN foot section of pipe:	0.0	psi		(per tables)
Head Loss, ***L*** :	0.0	psi	0.0	feet of water
Distance from pressure gauge to bottom of test section, h_1:	37.7	feet		
Value of h_1:	37.7	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	130.1	feet	56.3	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	86.2	feet		
X = (H/Tu)*100	150.9	%		
Tu/A	14.3			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	48		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	72		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	3.23E-06	ft/sec	9.86E-05	cm/sec
Is this step valid?				

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 4.7 square feet

Is Q/a * (estimated porosity) > 10?? True, Test Valid

CALCULATED PERMEABILITY FOR STEP 5

Gauge Pressure, **h2**:	30	psi	69.3	feet of water
Flow Rate, **Q**:	0.07	gpm	0.000	ft^3/sec
Head loss per TEN foot section of pipe:	0.0	psi		(per tables)
Head Loss, ***L*** :	0.0	psi	0.0	feet of water
Distance from pressure gauge to bottom of test section, $\mathbf{h_1}$:	37.7	feet		
Value of h_1:	37.7	feet		
Effective Head, ***H*** where ***H = h1+h2-L*** :	107.0	feet	46.3	psi
Determine Saturation Zone:		-		
Select Zone 1, 2, or 3	3		Zones 1 and 2 are unsaturated, 3 is saturated	
Tu = U-D+H	63.1	feet		
X = (H/Tu)*100	169.5	%		
Tu/A	10.5			
Determine Conductivity Coefficient				
H/r	-		Value for Zone 1 analysis	
A/H	-		Value for Zone 1 analysis	
A/r	48		Value for Zone 2 and 3 analysis	
Select Cu from Fig 10-7 for Zone 1 tests:			Cu for Zone 1	
Cs for Zone 2 and 3 tests:	72		Cs for Zones 2 and 3	
Calculate K if Zone 1 and using single or double packer	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 2 and using double packer (Method 2)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using single packer (Method 1)	-	ft/sec	-	cm/sec
Calculate K if Zone 3 and using double packer (Method 2)	1.62E-07	ft/sec	4.94E-06	cm/sec

Is this step valid?

If (Q/a)*(estimated porosity) > 10 the calculations may not be valid due to turbulent flow

Calculate a, the total open area of the test section: 4.7 square feet

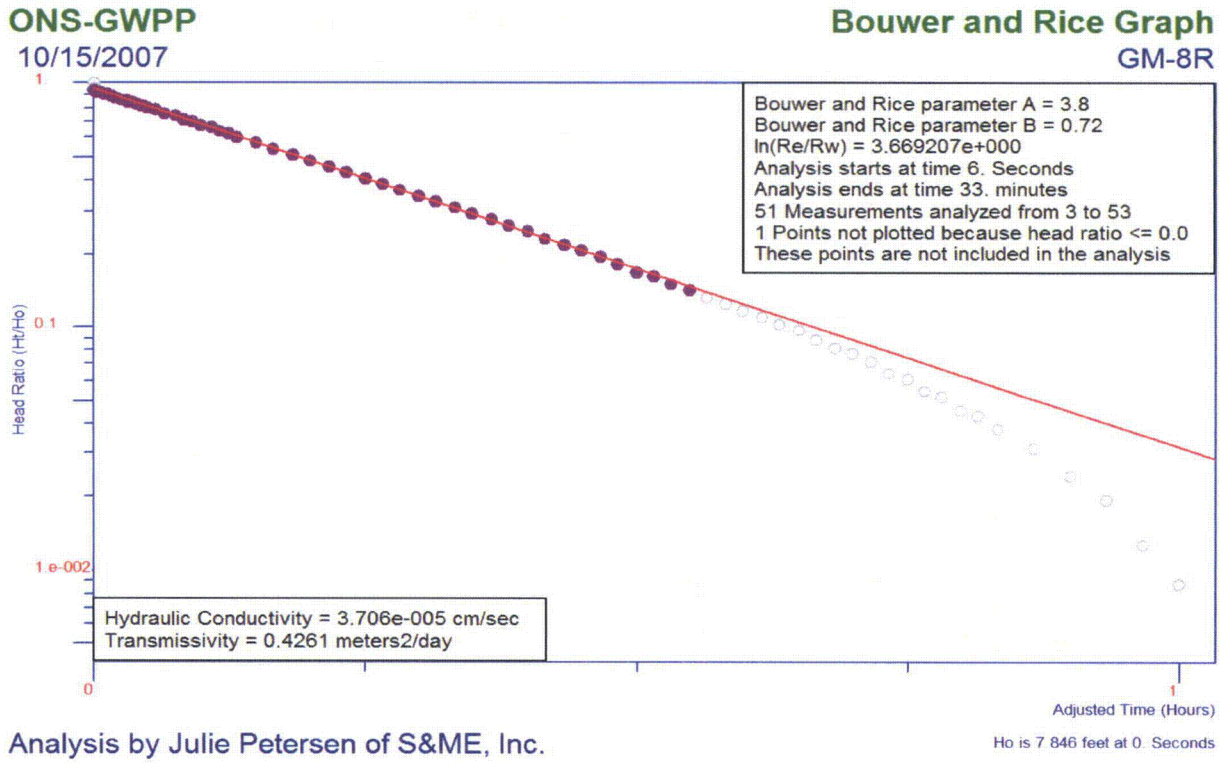
Is Q/a * (estimated porosity) > 10?? True, Test Valid

Calculation of Permeability By The Rising Head Method (Slug Test)

Site Name:	ONS-GWPP
Test Date:	10/15/2007
Well Label:	GM-8R
Aquifer Thickness:	43.65 feet
Screen Length:	10. feet
Casing Radius:	1. Inches
Effective Radius:	1.5 Inches
Static Water Level:	34.96 feet
Water Table to Screen Bottom:	38.65 feet
Anisotropy Ratio:	1

Time Adjustment: 0. Seconds
Test starts with trial 0
There are 76 time and drawdown measurements
Maximum head is 7.846 feet
Minimum head is 0. feet

Calculation by Bouwer and Rice Graphical Method



Analysis by Julie Petersen of S&ME, Inc.

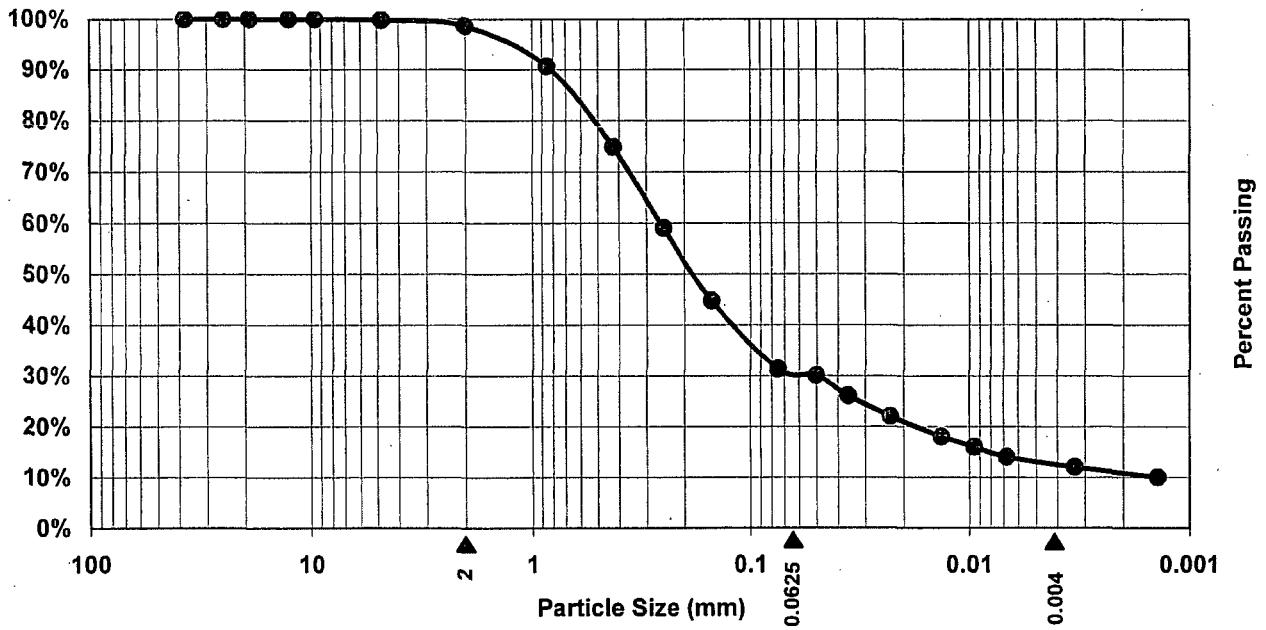
PERMEABILITY

3.71×10^{-5} cm/sec

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring No.:	Sample No.:	Depth:
GM-8R	SS-3	13.3 to 14.8 ft bls

Sample Description:
F: Brown, Clayey, Silty, Coarse to Fine Sand (SM)



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 1.4%	% Sand 67.8%	% Silt 18.4%	% Clay 12.4%
Adjusted for Calculations	**0%**	**69%**	**19%**	**13%**

Notes:
Grain size distribution taken from grain size with hydrometer data located in Appendix II.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

S&ME Project:
Oconee Nuclear Station - GWPP

S&ME Project No.:
1264-07-234

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FETTER AND BEAR DIAGRAMS

S&ME PROJECT: Oconee Nuclear Station - GWPP
S&ME PROJECT NO.: 1264-07-234

Boring No. GM-8R

Boring Depth: 13.3 to 14.8 ft bls

% Sand: 69%

% Silt: 19%

% Clay: 13%

Estimated Specific Yield: 16%

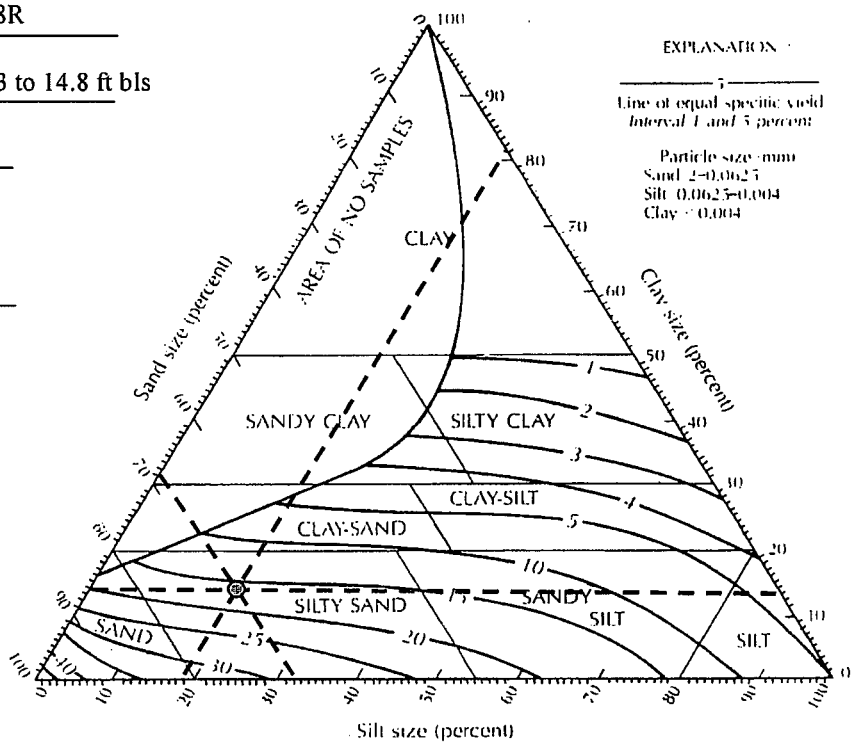
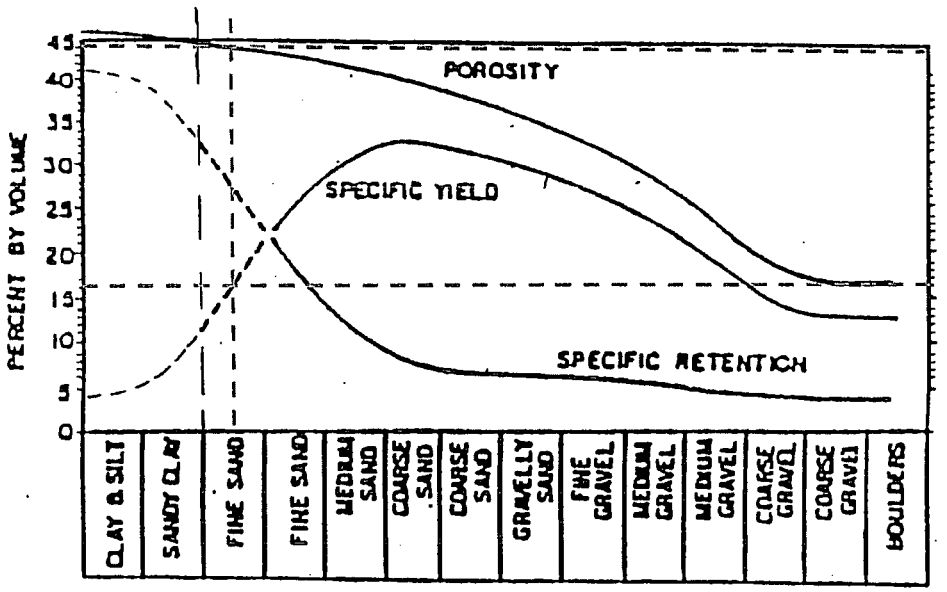


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



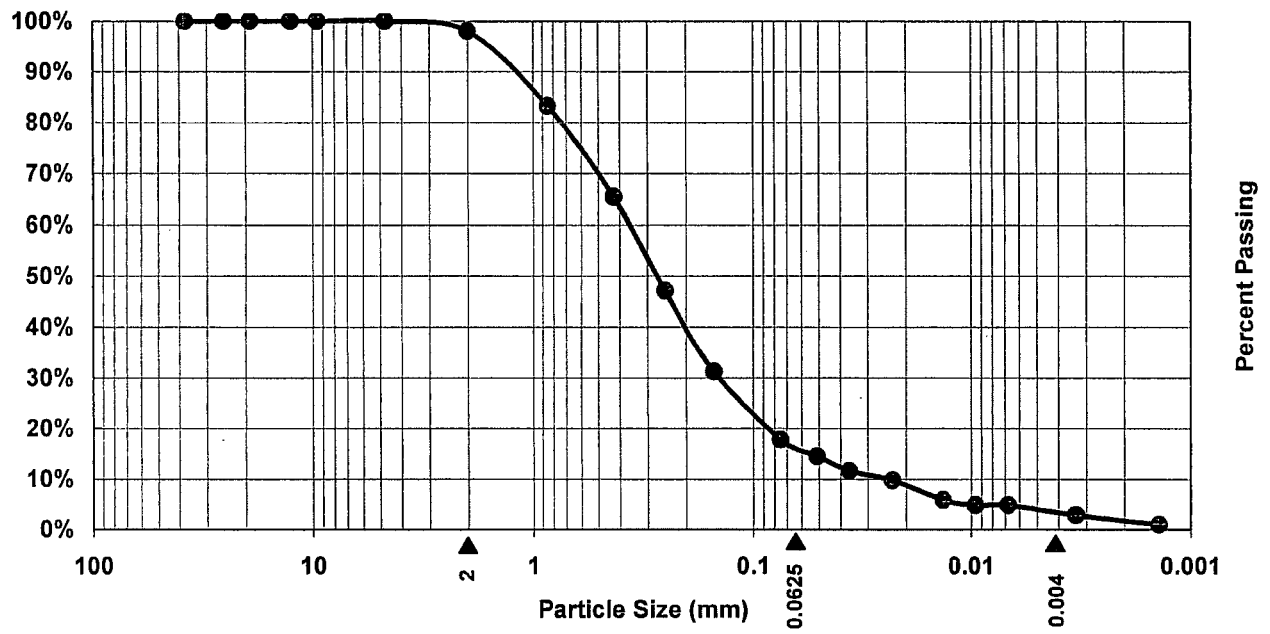
Estimated Porosity: 44%

Variation of Porosity, Specific Yield, and Specific Retention with Grain Size (after Bear, 1972)

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring No.:	Sample No.:	Depth:
GM-8R	SS-12	58.3 to 59.8 ft bls

Sample Description:
M2: White and Brown, Silty, Coarse to Fine Sand (SM)



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 2.0%	% Sand 81.6%	% Silt 13.2%	% Clay 3.3%
Adjusted for Calculations	**0%**	**83%**	**13%**	**3%**

Notes:
Grain size distribution taken from grain size with hydrometer data located in Appendix II.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

S&ME Project:
Oconee Nuclear Station - GWPP

S&ME Project No.:
1264-07-234

S&ME

FETTER AND BEAR DIAGRAMS

S&ME PROJECT: Oconee Nuclear Station - GWPP
S&ME PROJECT NO.: 1264-07-234

Boring No. GM-8R

Boring Depth: 58.3 to 59.8 ft bls

% Sand: 83%

% Silt: 13%

% Clay: 3%

Estimated Specific Yield: 30%

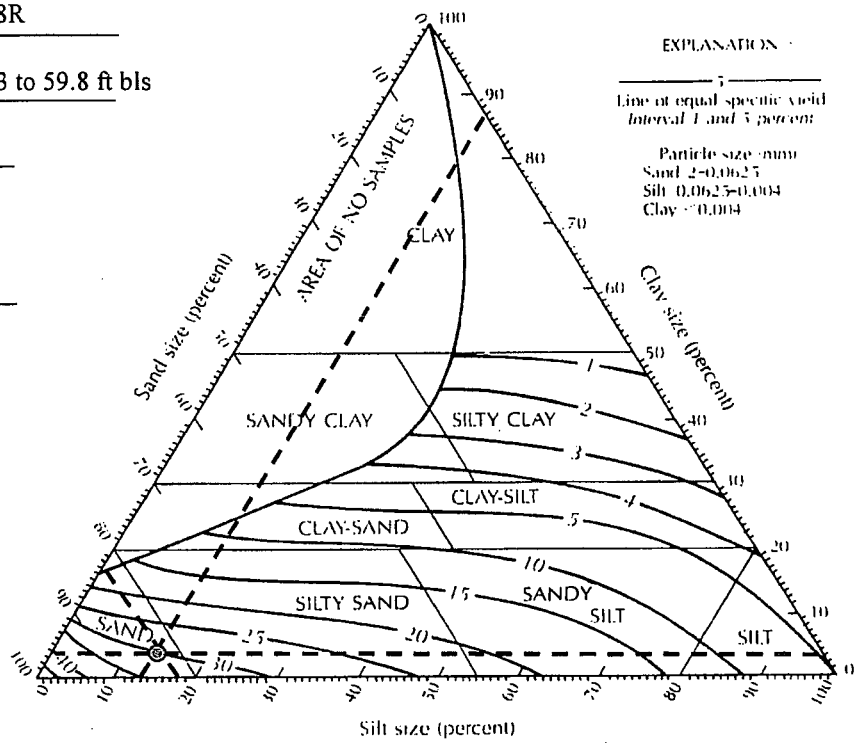
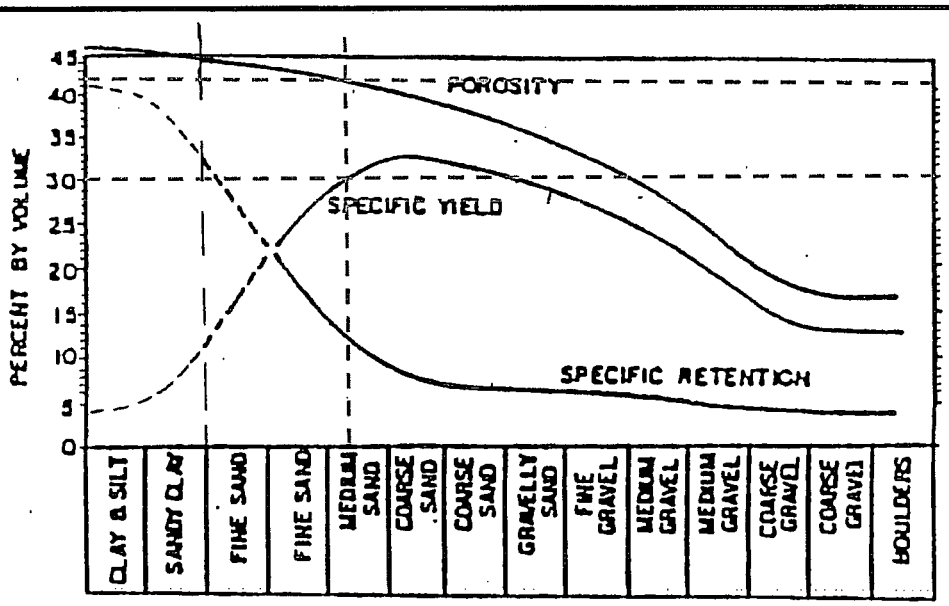


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



Estimated Porosity: 42%

Variation of Porosity, Specific Yield, and Specific Retention with Grain Size (after Bear, 1972)