

DATA REPORT Rev. 1
GEOTECHNICAL EXPLORATION AND TESTING

| Rev. 1

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA NUCLEAR POWER STATION
MINERAL, LOUISA COUNTY, VIRGINIA

| Rev. 1

September 28, 2007

| Rev. 1

VOLUME 2

APPENDICES C and D

Prepared For:

Virginia Electric and Power Company
Richmond, Virginia

| Rev. 1

Prepared By:

MACTEC Engineering and Consulting, Inc.
Raleigh, North Carolina

MACTEC Project No. 6468-06-1472

APPENDIX C.1

**OBSERVATION WELL LOGS, DEVELOPMENT
RECORDS AND SAMPLING RECORDS**

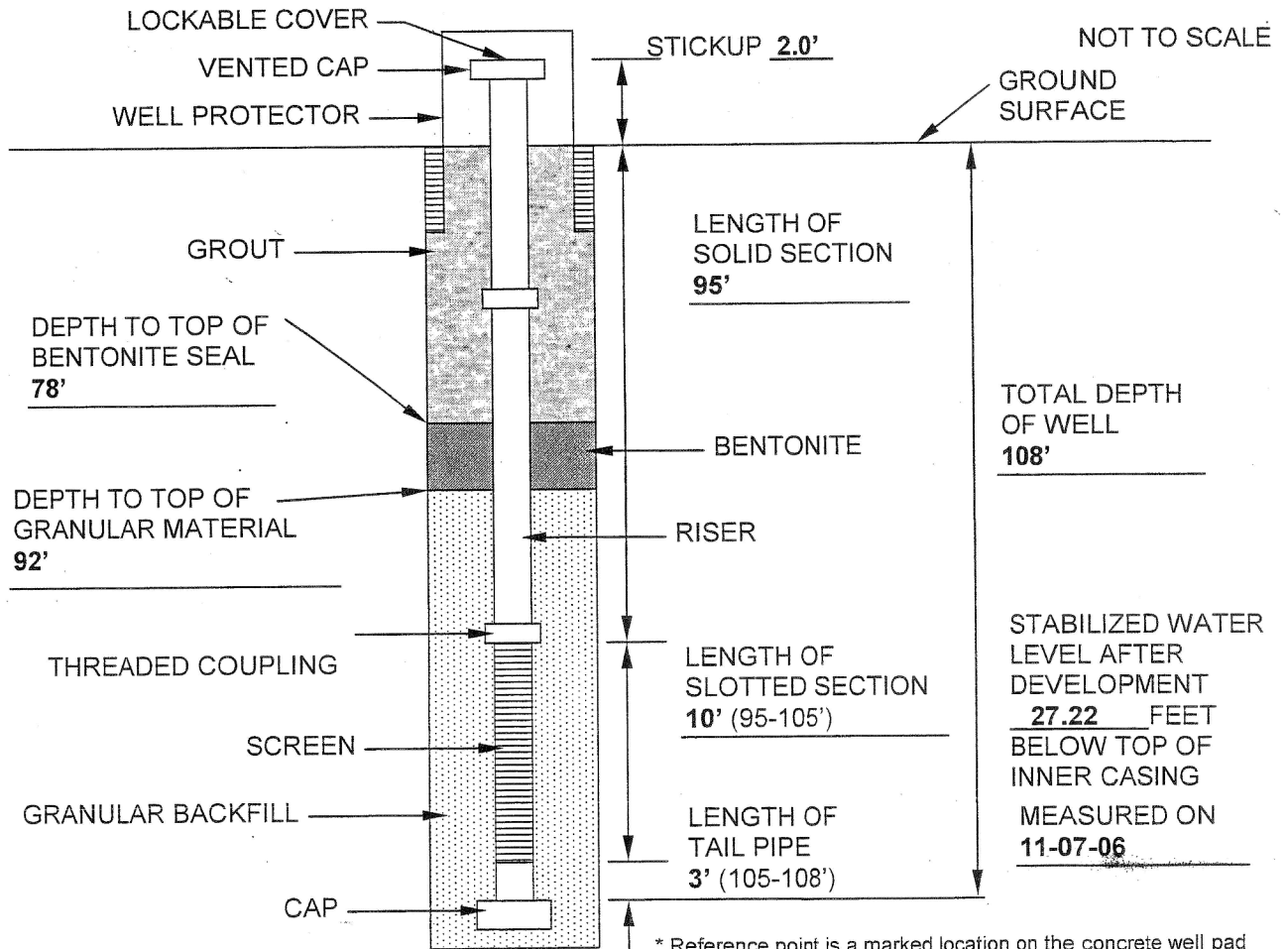
NORTH ANNA COL

**DATA REPORT REV. 0
JANUARY 23, 2007**

MACTEC PROJECT NO. 6468-06-1472

OBSERVATION WELL INSTALLATION RECORD

JOB NAME <u>NORTH ANNA COL</u>	JOB NUMBER <u>6468-06-1472</u>
WELL NUMBER <u>OW-901</u>	INSTALLATION DATE <u>10-31-06</u>
LOCATION (NAD83) <u>N = 3,909,772.32 E = 11,685,917.49</u>	
GROUND SURFACE ELEVATION* (NAVD88) <u>309.62</u>	REFERENCE POINT ELEVATION** (NAVD88) <u>311.32</u>
GRANULAR BACKFILL MATERIAL <u>Southern Silica #1 Sand</u>	SLOT SIZE <u>.010</u>
SCREEN MATERIAL <u>PVC Sched. 40-Standard</u>	SCREEN DIAMETER <u>2 in.</u>
RISER MATERIAL <u>PVC Sched. 40-Standard</u>	RISER DIAMETER <u>2 in.</u>
DRILLING TECHNIQUE <u>Air rotary</u>	DRILLING CONTRACTOR <u>Bedford</u>
BOREHOLE DIAMETER <u>6"</u>	MACTEC FIELD REPRESENTATIVE <u>Kim Charles-Smith</u>
LOCK BRAND <u>Master</u>	SIZE/MODEL <u>N/A</u>
KEY CODE/COMBINATION <u>#3206</u>	



* Reference point is a marked location on the concrete well pad
 ** Reference point is the top of PVC casing

NORTH ANNA POWER STATION
 MINERAL, VIRGINIA
 COL PROJECT
 Dominion Purchase Order 7015798

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 Raleigh, North Carolina 27604

OBSERVATION WELL
 INSTALLATION RECORD

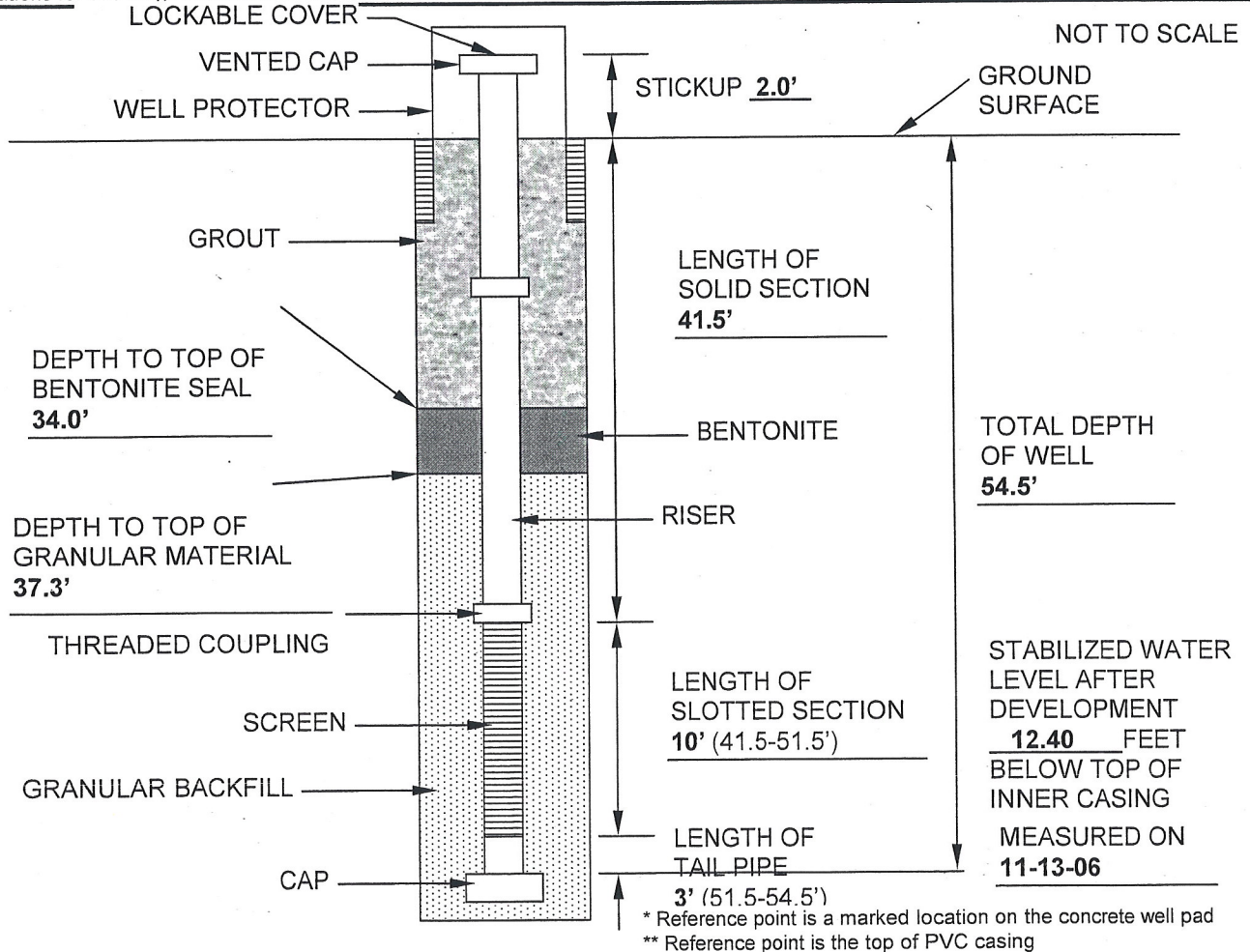
gag 1-19-07

OBSERVATION WELL INSTALLATION RECORD

JOB NAME <u>NORTH ANNA COL</u>	JOB NUMBER <u>6468-06-1472</u>
WELL NUMBER <u>OW-945</u>	INSTALLATION DATE <u>11-07-06</u>
LOCATION (NAD83) <u>N = 3,910,136.49 E = 11,683,793.31</u>	
GROUND SURFACE ELEVATION* (NAVD88) <u>281.56</u>	REFERENCE POINT ELEVATION** (NAVD88) <u>283.08</u>
GRANULAR BACKFILL MATERIAL <u>Southern Silica #1 & #3 Sand*</u>	SLOT SIZE <u>.010</u>
SCREEN MATERIAL <u>PVC Sched. 40-Standard</u>	SCREEN DIAMETER <u>2 in.</u>
RISER MATERIAL <u>PVC Sched. 40-Standard</u>	RISER DIAMETER <u>2 in.</u>
DRILLING TECHNIQUE <u>Hollow-stem auger 4.25" I.D.</u>	DRILLING CONTRACTOR <u>MACTEC</u>
BOREHOLE DIAMETER <u>Approximately 8"</u>	MACTEC FIELD REPRESENTATIVE <u>Kim Charles-Smith</u>
LOCK BRAND <u>Master</u>	SIZE/MODEL <u>N/A</u>

KEY CODE/COMBINATION #3206

* MACTEC initiated well construction using #3 sand, but did not have enough to complete the well. Because both #1 and #3 sands met technical specifications for use as granular backfill material for the observation wells, MACTEC completed the well using #1 sand.



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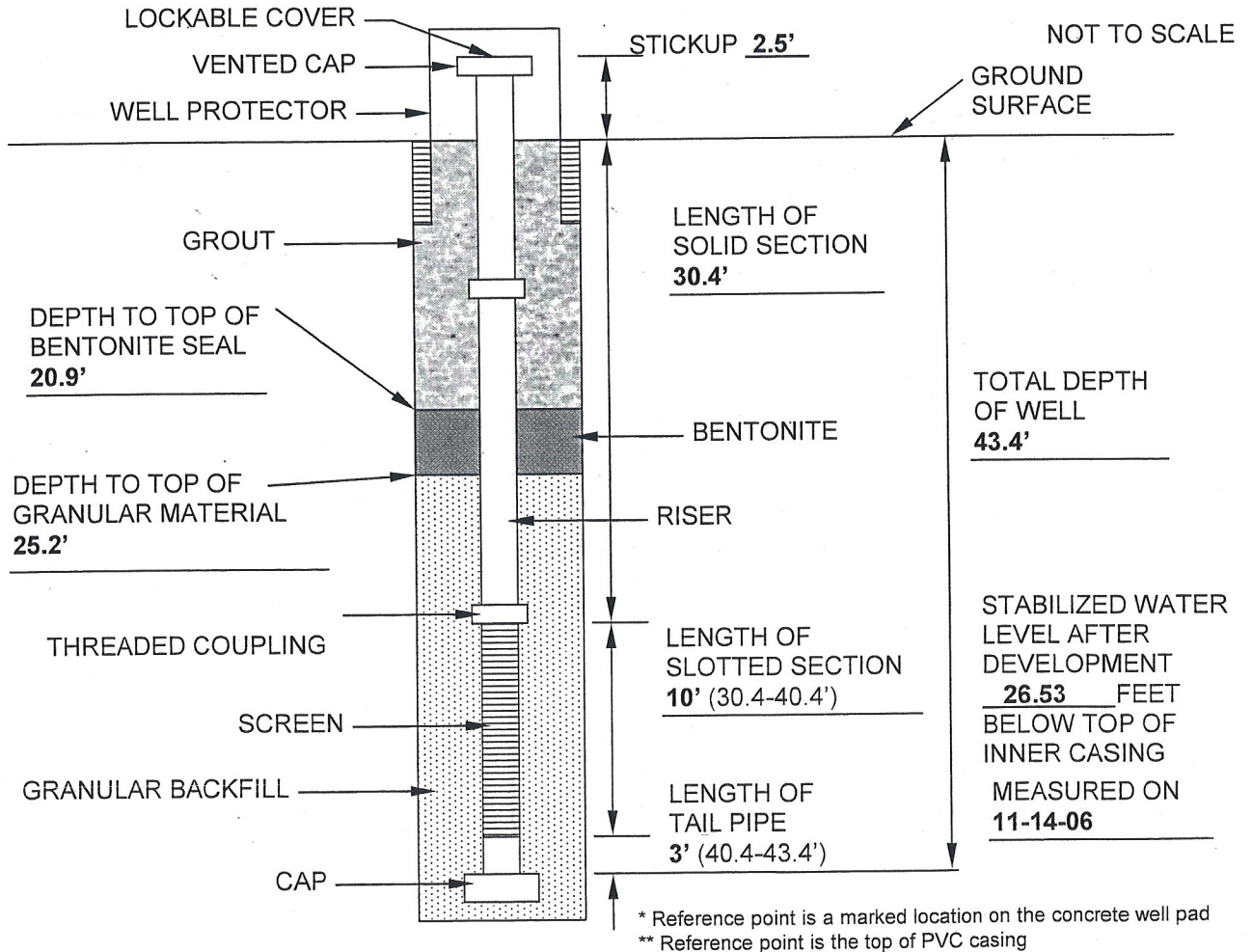
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OBSERVATION WELL
 INSTALLATION RECORD

JSJ 11-07-07

OBSERVATION WELL INSTALLATION RECORD

JOB NAME <u>NORTH ANNA COL</u>	JOB NUMBER <u>6468-06-1472</u>
WELL NUMBER <u>OW-946</u>	INSTALLATION DATE <u>11-13-06</u>
LOCATION (NAD83) <u>N = 3,908,787.97 E = 11,683,822.73</u>	
GROUND SURFACE ELEVATION* (NAVD88) <u>334.04</u>	REFERENCE POINT ELEVATION** (NAVD88) <u>335.58</u>
GRANULAR BACKFILL MATERIAL <u>Southern Silica #3 Sand</u>	SLOT SIZE <u>.010</u>
SCREEN MATERIAL <u>PVC Sched. 40-Standard</u>	SCREEN DIAMETER <u>2 in.</u>
RISER MATERIAL <u>PVC Sched. 40-Standard</u>	RISER DIAMETER <u>2 in.</u>
DRILLING TECHNIQUE <u>Hollow-stem auger 4.25" I.D.</u>	DRILLING CONTRACTOR <u>MACTEC</u>
BOREHOLE DIAMETER <u>Approximately 8"</u>	MACTEC FIELD REPRESENTATIVE <u>Joe Wallen</u>
LOCK BRAND <u>Master</u>	SIZE/MODEL <u>N/A</u>
KEY CODE/COMBINATION <u>#3206</u>	



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OBSERVATION WELL
 INSTALLATION RECORD

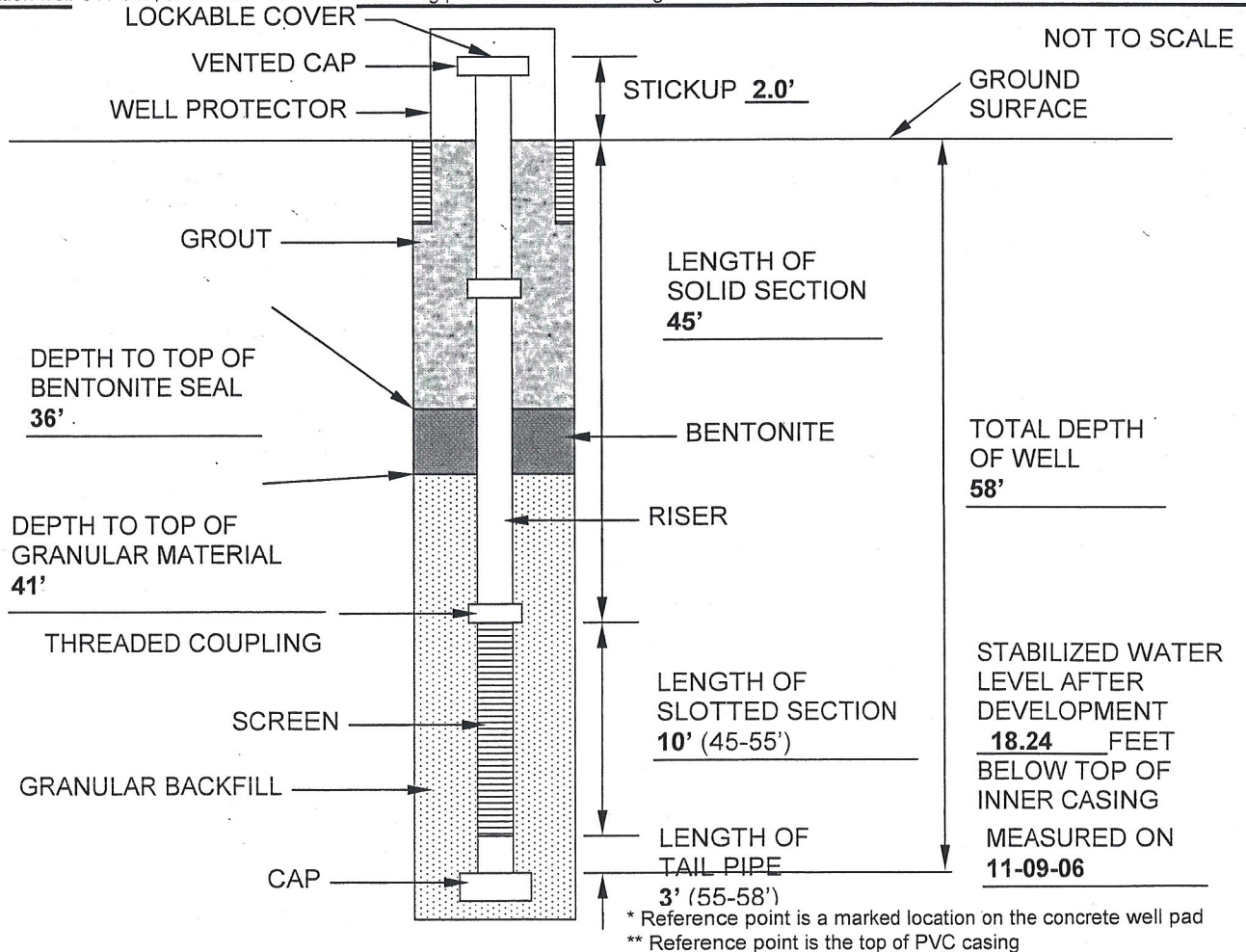
Joe Wallen 1-18-07

OBSERVATION WELL INSTALLATION RECORD

JOB NAME <u>NORTH ANNA COL</u>	JOB NUMBER <u>6468-06-1472</u>
WELL NUMBER <u>OW-947</u>	INSTALLATION DATE <u>11-06-06</u>
LOCATION (NAD83) <u>N = 3,909,579.58 E = 11,686,371.84</u>	
GROUND SURFACE ELEVATION* (NAVD88) <u>313.30</u>	REFERENCE POINT ELEVATION** (NAVD88) <u>315.08</u>
GRANULAR BACKFILL MATERIAL <u>Southern Silica #1 & #3 Sand*</u>	SLOT SIZE <u>.010</u>
SCREEN MATERIAL <u>PVC Schd. 40-Standard</u>	SCREEN DIAMETER <u>2 in.</u>
RISER MATERIAL <u>PVC Schd. 40-Standard</u>	RISER DIAMETER <u>2 in.</u>
DRILLING TECHNIQUE <u>Hollow-stem auger 4.25" I.D.</u>	DRILLING CONTRACTOR <u>MACTEC</u>
BOREHOLE DIAMETER <u>Approximately 8"</u>	MACTEC FIELD REPRESENTATIVE <u>Kim Charles-Smith</u>
LOCK BRAND <u>Master</u>	SIZE/MODEL <u>N/A</u>

KEY CODE/COMBINATION #3206

* Both #1 and #3 sand met the technical specifications for use as granular backfill material. MACTEC used #3 sand to backfill the sump portion of observation well OW-947, and #1 sand for the remaining portion of the well boring.



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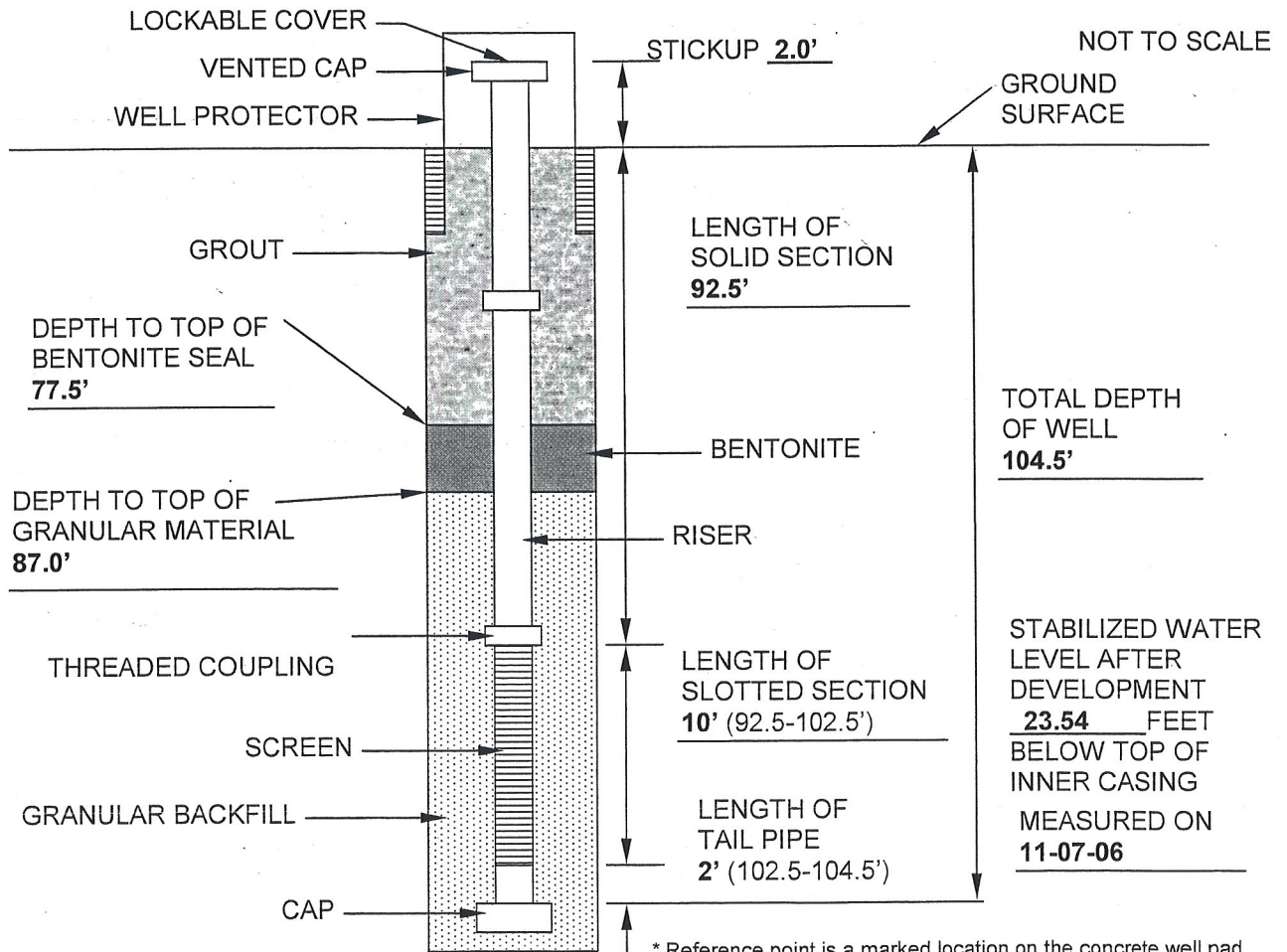
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OBSERVATION WELL
 INSTALLATION RECORD

Kim Charles-Smith 11-08-07

OBSERVATION WELL INSTALLATION RECORD

JOB NAME <u>NORTH ANNA COL</u>	JOB NUMBER <u>6468-06-1472</u>
WELL NUMBER <u>OW-949</u>	INSTALLATION DATE <u>10-30-06</u>
LOCATION (NAD83) <u>N = 3,909,025.20 E = 11,685,153.35</u>	
GROUND SURFACE ELEVATION* (NAVD88) <u>335.67</u>	REFERENCE POINT ELEVATION** (NAVD88) <u>336.91</u>
GRANULAR BACKFILL MATERIAL <u>Southern Silica #1 Sand</u>	SLOT SIZE <u>.010</u>
SCREEN MATERIAL <u>PVC Schd. 40-Standard</u>	SCREEN DIAMETER <u>2 in.</u>
RISER MATERIAL <u>PVC Schd. 40-Standard</u>	RISER DIAMETER <u>2 in.</u>
DRILLING TECHNIQUE <u>Air rotary</u>	DRILLING CONTRACTOR <u>Bedford</u>
BOREHOLE DIAMETER <u>6"</u>	MACTEC FIELD REPRESENTATIVE <u>Mike Lear</u>
LOCK BRAND <u>Master</u>	SIZE/MODEL <u>N/A</u>
KEY CODE/COMBINATION <u>#3206</u>	



* Reference point is a marked location on the concrete well pad
 ** Reference point is the top of PVC casing

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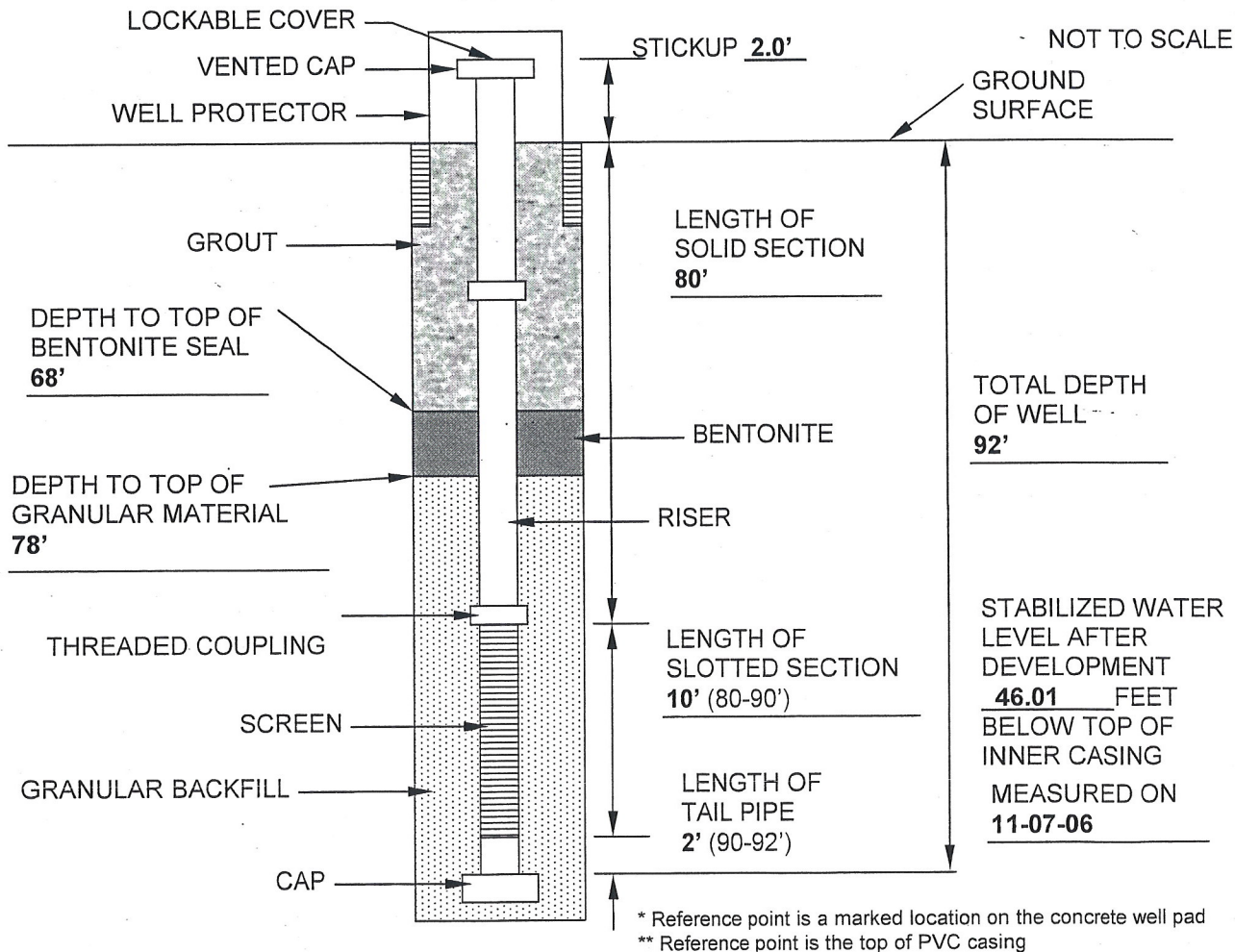
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OBSERVATION WELL
 INSTALLATION RECORD

JAJ 1-12-07

OBSERVATION WELL INSTALLATION RECORD

JOB NAME <u>NORTH ANNA COL</u>	JOB NUMBER <u>6468-06-1472</u>
WELL NUMBER <u>OW-950</u>	INSTALLATION DATE <u>10-31-06</u>
LOCATION (NAD83) <u>N = 3,910,842.18 E = 11,686,285.15</u>	
GROUND SURFACE ELEVATION* (NAVD88) <u>282.98</u>	REFERENCE POINT ELEVATION** (NAVD88) <u>284.49</u>
GRANULAR BACKFILL MATERIAL <u>Southern Silica #1 Sand</u>	SLOT SIZE <u>.010</u>
SCREEN MATERIAL <u>PVC Schd. 40-Standard</u>	SCREEN DIAMETER <u>2 in.</u>
RISER MATERIAL <u>PVC Schd. 40-Standard</u>	RISER DIAMETER <u>2 in.</u>
DRILLING TECHNIQUE <u>Air rotary</u>	DRILLING CONTRACTOR <u>Bedford</u>
BOREHOLE DIAMETER <u>6"</u>	MACTEC FIELD REPRESENTATIVE <u>Kim Charles-Smith</u>
LOCK BRAND <u>Master</u>	SIZE/MODEL <u>N/A</u>
KEY CODE/COMBINATION <u>#3206</u>	



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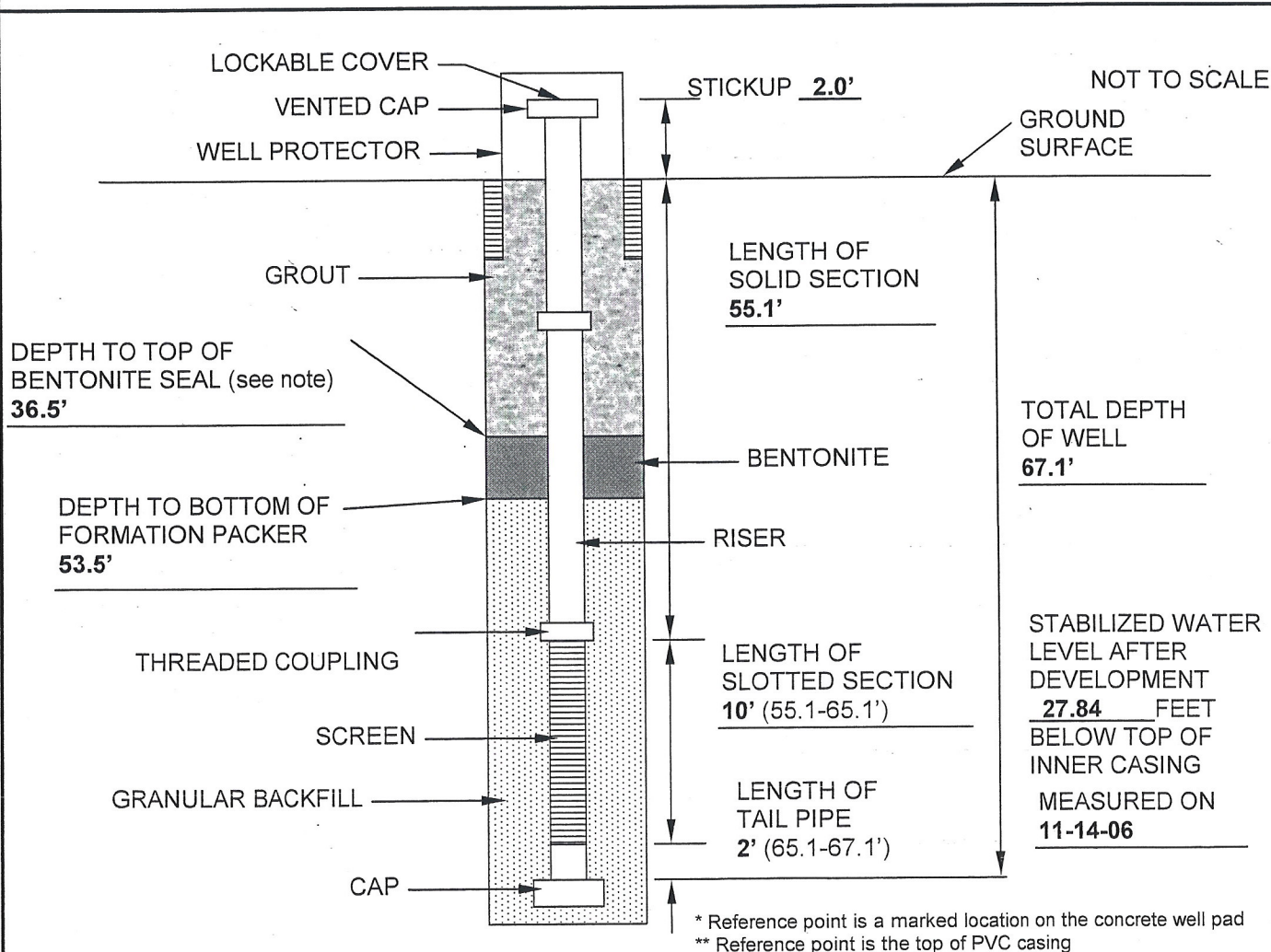
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OBSERVATION WELL
INSTALLATION RECORD

Joe 1-18-07

OBSERVATION WELL INSTALLATION RECORD

JOB NAME <u>NORTH ANNA COL</u>	JOB NUMBER <u>6468-06-1472</u>
WELL NUMBER <u>OW-951</u>	INSTALLATION DATE <u>11-10-06</u>
LOCATION (NAD83) <u>N = 3,910,521.44 E = 11,686,786.01</u>	
GROUND SURFACE ELEVATION* (NAVD88) <u>249.69</u>	REFERENCE POINT ELEVATION** (NAVD88) <u>250.68</u>
GRANULAR BACKFILL MATERIAL <u>Southern Silica #3 Sand</u>	SLOT SIZE <u>.010</u>
SCREEN MATERIAL <u>PVC Sched. 40-Standard</u>	SCREEN DIAMETER <u>2 in.</u>
RISER MATERIAL <u>PVC Sched. 40-Standard</u>	RISER DIAMETER <u>2 in.</u>
DRILLING TECHNIQUE <u>Hollow-stem auger 4.25" I.D.</u>	DRILLING CONTRACTOR <u>MACTEC</u>
BOREHOLE DIAMETER <u>Approximately 8"</u>	MACTEC FIELD REPRESENTATIVE <u>Kim Charles-Smith</u>
LOCK BRAND <u>Master</u>	SIZE/MODEL <u>N/A</u>
KEY CODE/COMBINATION <u>#3206</u>	



NOTE: DSI granular bentonite used above packer

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OBSERVATION WELL
INSTALLATION RECORD

jas 1-18-07



Observation Well Development Worksheet

MACTEC JOB NUMBER 6468-06-1472

OBSERVATION WELL NUMBER ow-901

SITE NAME North Anna Power Station

DATE (MO/DAY/YR) 11-02-06 TIME (MILITARY) 1100

FIELD PERSONNEL Kim Charles-Smith

WEATHER CONDITIONS Partly cloudy to sunny

TOTAL WELL DEPTH (TWD) 108' FT. (DEPTH BELOW MEASURING POINT)

HEIGHT OF MEASURING POINT ABOVE LAND SURFACE 2' FT.

DESCRIPTION OF MEASURING POINT TOC

DEPTH TO GROUNDWATER (DGW) 27.37' FT. (DEPTH BELOW MEASURING POINT)

METHOD OF WELL EVACUATION DISPOSABLE BAILER OTHER: Grundfos pump

TOTAL VOLUME OF WATER REMOVED Approx. 41.0 GAL. CASING DIAMETER 2 IN.

CASING MATERIAL PVC S.S. TEFLON OTHER NA

SCREENED INTERVAL (FROM ID PLATE) 95'-105' (DEPTHS BELOW LAND SURFACE - FT.)

STEEL GUARD PIPE AROUND CASING YES NO COMMENTS

LOCKING CAP YES NO

PROTECTIVE POST/ABUTMENT YES NO

NONPOTABLE LABEL YES NO

ID PLATE YES NO

WELL INTEGRITY SATISFACTORY YES NO

WELL YIELD LOW MODERATE HIGH COMMENTS See note

GROUNDWATER PARAMETERS

VOLUME (GAL.)	1 st volume	2 nd volume	3 rd volume <i>See note</i>			
pH (S.U.)	6.99	6.62	6.38			
SP. COND. (µMHOS/CM)	143.4	132.4	121.5			
WATER TEMP. (°C)	13.7	15.0	12.5			
TURBIDITY* (NTU)	4.22	42.2	32.9			

* VISUAL DETERMINATION ONLY (1) CLEAR (2) SLIGHT (3) MODERATE (4) HIGH

note: 3rd well volume pumped on 11-03-06 0819 hrs.
- Turbidity increased after 1st well volume was removed. Kef 0115-07

Kef
11-03-06

Observation Well Development Worksheet

MACTEC JOB NUMBER **6468-06-1472**

OBSERVATION WELL NUMBER OW-945

SITE NAME North Anna Power Station

DATE (MO/DAY/YR) 11-09-06

TIME (MILITARY) 1102

FIELD PERSONNEL Kim Charles-Smith

WEATHER CONDITIONS Sunny ~ 70°F

TOTAL WELL DEPTH (TWD) 54.5' FT. (DEPTH BELOW MEASURING POINT)

HEIGHT OF MEASURING POINT ABOVE LAND SURFACE 2' FT.

DESCRIPTION OF MEASURING POINT TOC

DEPTH TO GROUNDWATER (DGW) 12.43' FT. (DEPTH BELOW MEASURING POINT)

METHOD OF WELL EVACUATION DISPOSABLE BAILER OTHER: Grundfos Pump

TOTAL VOLUME OF WATER REMOVED Approx. 85 GAL. CASING DIAMETER 2 IN.

CASING MATERIAL PVC S.S. TEFLON OTHER

SCREENED INTERVAL (FROM ID PLATE) 41.5' - 51.5' (DEPTHS BELOW LAND SURFACE - FT.)

STEEL GUARD PIPE AROUND CASING YES NO COMMENTS

LOCKING CAP YES NO

PROTECTIVE POST/ABUTMENT YES NO

NONPOTABLE LABEL YES NO

ID PLATE YES NO

WELL INTEGRITY SATISFACTORY YES NO

WELL YIELD LOW MODERATE HIGH COMMENTS Pumped @ Approx. 2.5 gpm

GROUNDWATER PARAMETERS

VOLUME (GAL.)	14 gal	21 gal	35 gal	50 gal	70 gal	85 gal.
pH (S.U.)	6.60	6.78	6.61	6.34	6.00	6.00
SP. COND. (µMHOS/CM)	47.5	32.1	27.6	22.1	20.8	19.3
WATER TEMP. (°C)	20.1	18.3	17.7	17.1	17.0	17.1
TURBIDITY* (NTU)	>1000	>1000	402	71.5	50.3	31.0

* VISUAL DETERMINATION ONLY (1) CLEAR (2) SLIGHT (3) MODERATE (4) HIGH

NOTE: pH/COND meter calibrated w/7.0 buffer #4803 Exp 01-25-07 7.0=7.0
4.0 buffer #4804 Exp 01-25-07 4.0=3.99
Turbidity 100 = 101 20 = 19.9
500 = 799 20.1 = 0.09 See page 6 of Field Book for lot + exp date



Observation Well Development Worksheet

MACTEC JOB NUMBER 6468-06-1472

OBSERVATION WELL NUMBER OW946

SITE NAME North Anna Power Station

DATE (MO/DAY/YR) 11-14-06

TIME (MILITARY) 1421

FIELD PERSONNEL Kim Charles-Smith + Mike Lear

WEATHER CONDITIONS Sunny Approx 68°F

TOTAL WELL DEPTH (TWD) 43.4 FT. (DEPTH BELOW MEASURING POINT)

HEIGHT OF MEASURING POINT ABOVE LAND SURFACE 2.5 FT.

DESCRIPTION OF MEASURING POINT TOC

DEPTH TO GROUNDWATER (DGW) 26.39 FT. (DEPTH BELOW MEASURING POINT)

METHOD OF WELL EVACUATION DISPOSABLE BAILER OTHER: GroundFos Pump

TOTAL VOLUME OF WATER REMOVED 30 GAL. CASING DIAMETER 2 IN.

CASING MATERIAL PVC S.S. TEFLON OTHER

SCREENED INTERVAL (FROM ID PLATE) 30.4-40.4 (DEPTHS BELOW LAND SURFACE - FT.)

STEEL GUARD PIPE AROUND CASING YES NO COMMENTS pumped @ approx.

LOCKING CAP YES NO 2 gpm

PROTECTIVE POST/ABUTMENT YES NO

NONPOTABLE LABEL YES NO 2.84 gal = 1 Val.

ID PLATE YES NO

WELL INTEGRITY SATISFACTORY YES NO

WELL YIELD LOW MODERATE HIGH COMMENTS

GROUNDWATER PARAMETERS

KF 11-14-06

VOLUME (GAL.)	<u>6 gal.</u>	<u>18 gal.</u>	<u>21 gal.</u>	<u>24 gal.</u>	<u>27 gal.</u>	<u>30 gal.</u>
pH (S.U.)	<u>7.27</u>	<u>5.68</u>	<u>5.96</u>	<u>5.91</u>		<u>5.25</u>
SP. COND. (µMHOS/CM)	<u>143.2</u>	<u>51.0</u>	<u>51.9</u>	<u>44.8</u>		<u>45.4</u>
WATER TEMP. (°C)	<u>17.6</u>	<u>16.5</u>	<u>16.1</u>	<u>15.9</u>	<u>16.2</u> <u>11-14-06</u>	<u>16.1</u>
TURBIDITY* (NTU)	<u>536</u>	<u>680</u>	<u>165</u>	<u>20.6</u>		<u>7.90</u>

* VISUAL DETERMINATION ONLY (1) CLEAR (2) SLIGHT (3) MODERATE (4) HIGH

lfe. See
gl 6 of
id Book
r SM, etc.

pH/cond meter calibrated 7.0 buffer Lot # 4803 Exp 01-25-07
7.0 = 7.01; 4.0 buffer lot # 484 Exp. 01-25-07 4.0 = 4.02
Turbidity meter calibrated w/ 100 = 999; 100 = 100; 20 = 20.1, 50.1, 20.21



Observation Well Development Worksheet

MACTEC JOB NUMBER 6468-06-1472

OBSERVATION WELL NUMBER OW-947

SITE NAME North Anna Power Station

DATE (MO/DAY/YR) 11-08-06

TIME (MILITARY) 1147

FIELD PERSONNEL Kim Charles-Smith

WEATHER CONDITIONS Cloudy - Light Rain

TOTAL WELL DEPTH (TWD) 58.0 FT. (DEPTH BELOW MEASURING POINT)

HEIGHT OF MEASURING POINT ABOVE LAND SURFACE 2.0 FT.

DESCRIPTION OF MEASURING POINT TOC

DEPTH TO GROUNDWATER (DGW) 18.02 FT. (DEPTH BELOW MEASURING POINT)

METHOD OF WELL EVACUATION DISPOSABLE BAILER OTHER: Bailed + pumped w/grades

TOTAL VOLUME OF WATER REMOVED 87 GAL. CASING DIAMETER 2 IN.

CASING MATERIAL PVC S.S. TEFLON OTHER _____

SCREENED INTERVAL (FROM ID PLATE) 45'-55' (DEPTHS BELOW LAND SURFACE - FT.)

STEEL GUARD PIPE AROUND CASING YES NO COMMENTS _____

LOCKING CAP YES NO _____

PROTECTIVE POST/ABUTMENT YES NO _____

NONPOTABLE LABEL YES NO _____

ID PLATE YES NO _____

WELL INTEGRITY SATISFACTORY YES NO _____

WELL YIELD LOW MODERATE HIGH COMMENTS _____

GROUNDWATER PARAMETERS

VOLUME (GAL.)	14 gal.	21 gal.	35 gal.	50 gal.	80 gal.	87 gal.
pH (S.U.)	6.15	7.11	6.53	6.47	6.44	6.32
SP. COND. (µMHOS/CM)	81.0	75.1	6.47 71.7	67.9	56.2	56.9
WATER TEMP. (°C)	15.6	15.5	16.2	16.1	15.5	15.5
TURBIDITY* (NTU)	71000	71000	71000	71000	234	142

* VISUAL DETERMINATION ONLY (1) CLEAR (2) SLIGHT (3) MODERATE (4) HIGH

NOTE: Bailed + pumped well per Work Instruction Attachment NC. 19
pH, COND meter calibrated with 7.0 buffer lot #4803 Exp 01-25-07
7.0 rank 6.99 4.0 buffer 4 lot # 4804 Exp. 01-25-07 4.0=4.02



Observation Well Development Worksheet

MACTEC JOB NUMBER 6468-06-1472

OBSERVATION WELL NUMBER OW-949

SITE NAME North Anna Power Station

DATE (MO/DAY/YR) 11-02-06

TIME (MILITARY) 1325

FIELD PERSONNEL Kim Charles-Smith

WEATHER CONDITIONS partly cloudy - sunny

TOTAL WELL DEPTH (TWD) 105' FT. (DEPTH BELOW MEASURING POINT)

HEIGHT OF MEASURING POINT ABOVE LAND SURFACE 2' FT.

DESCRIPTION OF MEASURING POINT TOC

DEPTH TO GROUNDWATER (DGW) 23.80' FT. (DEPTH BELOW MEASURING POINT)

METHOD OF WELL EVACUATION DISPOSABLE BAILER OTHER: Grundfos pump

TOTAL VOLUME OF WATER REMOVED Approx. 150 GAL. CASING DIAMETER 2 IN.

CASING MATERIAL PVC S.S. TEFLON OTHER _____

SCREENED INTERVAL (FROM ID PLATE) 105'-95' (DEPTHS BELOW LAND SURFACE - FT.)

STEEL GUARD PIPE AROUND CASING YES NO COMMENTS _____

LOCKING CAP YES NO _____

PROTECTIVE POST/ABUTMENT YES NO _____

NONPOTABLE LABEL YES NO _____

ID PLATE YES NO _____

WELL INTEGRITY SATISFACTORY YES NO _____

WELL YIELD LOW MODERATE HIGH COMMENTS pumped @ ~2.5 gpm with no drawdown

GROUNDWATER PARAMETERS

VOLUME (GAL.)	5 th volume	6 th volume	7 th volume	8 th volume	9 th volume	10 th volume
pH (S.U.)	6.71	6.60	6.58	6.53	6.54	6.66
SP. COND. (µMHOS/CM)	92.8	92.4	91.8	92.9	90.4	96.6
WATER TEMP. (°C)	15.8	15.8	15.9	16.2	15.8	16.8
TURBIDITY* (NTU)	<u>11-02-06</u> 240	187	129	75.2	79.3	52.9

* VISUAL DETERMINATION ONLY (1) CLEAR (2) SLIGHT (3) MODERATE (4) HIGH

NOTE: Removed 3 well volumes via sagger pumping then removed 7 more volumes.

Kim
11-2-06



Observation Well Development Worksheet

MACTEC JOB NUMBER 6468-06-1472

OBSERVATION WELL NUMBER OW-950

SITE NAME North Anna Power Station

DATE (MO/DAY/YR) 11-02-06

TIME (MILITARY) 0935

FIELD PERSONNEL Kim Charles-Smith

WEATHER CONDITIONS Partly cloudy to Sunny

TOTAL WELL DEPTH (TWD) 92' FT. (DEPTH BELOW MEASURING POINT)

HEIGHT OF MEASURING POINT ABOVE LAND SURFACE 2' FT.

DESCRIPTION OF MEASURING POINT TOC

DEPTH TO GROUNDWATER (DGW) 46.07 FT. (DEPTH BELOW MEASURING POINT)

METHOD OF WELL EVACUATION DISPOSABLE BAILER OTHER: Grundfos pump

TOTAL VOLUME OF WATER REMOVED Approx. 23.0 GAL. CASING DIAMETER 2 IN.

CASING MATERIAL PVC S.S. TEFLON OTHER _____

SCREENED INTERVAL (FROM ID PLATE) 80'-90' (DEPTHS BELOW LAND SURFACE - FT.)

STEEL GUARD PIPE AROUND CASING YES NO COMMENTS _____

LOCKING CAP YES NO _____

PROTECTIVE POST/ABUTMENT YES NO _____

NONPOTABLE LABEL YES NO _____

ID PLATE YES NO _____

WELL INTEGRITY SATISFACTORY YES NO _____

WELL YIELD LOW MODERATE HIGH COMMENTS See note

GROUNDWATER PARAMETERS

VOLUME (GAL.)	1 st Volume	2 nd Volume	3 rd Volume			
	<u>~ 8.0 gal</u>	<u>~ 8 gal.</u>	<u>See note</u>			
pH (S.U.)	<u>6.58</u>	<u>7.10</u>	<u>7.27</u>			
SP. COND. (µMHOS/CM)	<u>427.2</u>	<u>310.6</u>	<u>202.4</u>			
WATER TEMP. (°C)	<u>13.1</u>	<u>15.4</u>	<u>9.1</u>			
TURBIDITY* (NTU)	<u>946</u>	<u>>1000</u>	<u>540</u>			

* VISUAL DETERMINATION ONLY (1) CLEAR (2) SLIGHT (3) MODERATE (4) HIGH

note: 3rd well volume purged on 11-03-06 0900 hrs.



Observation Well Development Worksheet

MACTEC JOB NUMBER 6468-06-1472

OBSERVATION WELL NUMBER OW-951

SITE NAME North Anna Power Station

DATE (MO/DAY/YR) ~~11-17-06~~ ¹¹⁻¹³⁻⁰⁶ _{Ky 11-13-06} TIME (MILITARY) 0805

FIELD PERSONNEL Kim Charles-Smith

WEATHER CONDITIONS cloudy - mid 50's

TOTAL WELL DEPTH (TWD) 67.1' FT. (DEPTH BELOW MEASURING POINT)

HEIGHT OF MEASURING POINT ABOVE LAND SURFACE 2 FT.

DESCRIPTION OF MEASURING POINT TOC

DEPTH TO GROUNDWATER (DGW) 27.84' FT. (DEPTH BELOW MEASURING POINT)

METHOD OF WELL EVACUATION DISPOSABLE BAILER OTHER: Grundfos Pump

TOTAL VOLUME OF WATER REMOVED 3 well val. GAL. CASING DIAMETER 2 IN.

CASING MATERIAL PVC S.S. TEFLON OTHER _____

SCREENED INTERVAL (FROM ID PLATE) _____ (DEPTHS BELOW LAND SURFACE - FT.)

STEEL GUARD PIPE AROUND CASING YES NO COMMENTS No for Ky 11-13-06

LOCKING CAP YES NO

PROTECTIVE POST/ABUTMENT YES NO

NONPOTABLE LABEL YES NO

ID PLATE YES NO

WELL INTEGRITY SATISFACTORY YES NO

WELL YIELD LOW MODERATE HIGH COMMENTS _____

11-13-06 GROUNDWATER PARAMETERS

	<u>11-13-06</u>	<u>11-14-06</u>	<u>11-15-06</u>			
VOLUME (GAL.)	<u>1 well val. 6 gal.</u>	<u>6 gal.</u>	<u>7 gal.</u>			
pH (S.U.)	<u>7.70</u>	<u>7.67</u>	<u>6.27</u>		<u>Ky 11-17-06</u>	
SP. COND. (µMHOS/CM)	<u>357.6</u>	<u>3223</u>	<u>1878</u>			
WATER TEMP. (°C)	<u>16.3 15.6</u>	<u>16.3</u>	<u>16.5</u>			
TURBIDITY*	<u>>1000</u>	<u>172</u>	<u>306</u>			

* VISUAL DETERMINATION ONLY (1) CLEAR (2) SLIGHT (3) MODERATE (4) HIGH

NOTE: well pumped dry after each attempt and was slow to recover. 4 Ky 01-15-07



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3301 ATLANTIC AVENUE
RALEIGH, NORTH CAROLINA 27604

OBSERVATION WELL SAMPLING WORKSHEET
IN ACCORDANCE WITH ASTM D 6089-97 (REAPPROVED 2003)

MACTEC JOB NUMBER 6468-06-1472

OBSERVATION WELL NUMBER OW-901

SITE NAME North Anna Coh

DATE (MO/DAY/YR) 11-16-06

TIME (MILITARY) 1330

FIELD PERSONNEL Kim Charles-Smith / Joe Wallan

WEATHER CONDITIONS light rain

PHYSICAL CONDITION OF THE WELL
very good / new

WELL HEAD OBSERVATIONS AND MEASUREMENTS

TOTAL WELL DEPTH (TWD) 108' FT. (DEPTH BELOW MEASURING POINT)

SCREENED INTERVAL (FT) 103'-95' SAND PACK INTERVAL (FT) 108'-92' (16')

HEIGHT OF MEASURING POINT ABOVE LAND SURFACE FT.

DESCRIPTION OF MEASURING POINT TOC (DEPTHS BELOW LAND SURFACE - FT.)

DEPTH TO FREE PRODUCT (DFP) NA FT. (DEPTH BELOW MEASURING POINT)

DEPTH TO GROUNDWATER (DGW) 26.63' FT. (DEPTH BELOW MEASURING POINT)

MEASURING DEVICE Slope Indicator DEVICE ID NUMBER SN: 15287

METHOD OF WELL EVACUATION Grundfos pump

DECONTAMINATION PROCEDURE Alconox Wash / Tap Rinse

TOTAL VOLUME OF WATER REMOVED Approx 17.0 GAL. CASING DIAMETER IN. 2

FIELD ANALYSIS

FIELD PARAMETER INSTRUMENT USED YSI 600XL INSTRUMENT ID NO. SN: 010629

CALIBRATION RECORD FOR INSTRUMENT In Field Book DATE 11-15-06 TIME 1330

		PURGING				STABILIZED	SAMPLING	
TIME (MILITARY)	<u>see note</u> <u>Sample 1455</u>	<u>11-16-06</u>						
PURGE RATE (gpm)	<u>Approx .5 gpm</u>							
VOLUME (GAL.)	<u>17.0</u>							
pH (S.U.)	<u>6.26</u>							
SP. COND. (mS/cm)	<u>.150</u>							
WATER TEMP. (°C)	<u>15.2</u>							
D.O. (mg/l)	<u>2.50</u>							
O.R.P. (mv)	<u>-18.0</u>							
Turbidity (NTUs)	<u>101</u>							
Appearance (visual)	<u>clear</u>							

NOTE: well purged by Allowed to recover obtained samples, no Field parameters during purging per ASTM ~~655~~ 652-99 (Section 7.6.3.2) PAGE 1 OF 2

OBSERVATION WELL SAMPLING WORKSHEET IN ACCORDANCE WITH ASTM D 6089-97 (REAPPROVED 2003)

MACTEC JOB NUMBER 6468-06-1472

OBSERVATION WELL NUMBER OW-901

SITE NAME North ANNA Col

DATE (MO/DAY/YR) 11-16-06

TIME (MILITARY) 1330

FIELD PERSONNEL Kim Charles-Smith / Joe Waller

SAMPLE COLLECTION

PUMPING RATE (gpm) Approx .5 gpm due to inability to get water to wellhead @ lower rate.

DESCRIPTION OF SAMPLING EQUIPMENT Grundfos pump w/HDPE tubing

DESCRIPTION OF SAMPLE APPEARANCE Clear

SAMPLE COLLECTED FOR (IN CHRONOLOGICAL ORDER)

DATE

TIME (MILITARY)

160.1 ; 300.0 ; 310.1

11-16-06

1455

350.1 ; 353.1

11-16-06

1455

RY
11-16-06

NOTE: 100ml sample given to Hach Physics (Dominic RAS) Analysis.

DESCRIPTION OF PURGE WATER MANAGEMENT purge water dumped near well on the ground - handled the same as well development water.

WELL VOLUME CALCULATION

WELL CASING VOLUME =

HEIGHT OF WATER COLUMN (FT) * 0.0218 FT² (AREA OF 2" CASING)

81.37 * 0.0218 = 1.77 FT³

SAND PACK VOLUME =

SOIL WELL

ROCK WELL

SAND PACK INTERVAL (FT) * 0.0767 ft² (AREA FOR 4 1/4" HOLE)

SAND PACK INTERVAL (FT) * 0.1744 ft² (AREA FOR 6" HOLE)

 * 0.0767 = FT³

16 * 0.0767 = 1.23 FT³ ¹¹⁻¹⁷⁻⁰⁶
13 * 0.1744 = 0.99 FT³ ^{TJW 11/15/06}
 * 0.1744 = 2.27 FT³ ^{TJW 11/15/06}

WELL VOLUME =

WELL CASING VOLUME + (SAND PACK VOLUME * 0.30) * 7.48 GAL/FT³

ASSUMED 30% POROSITY IN SAND PACK

1.77 + 1.23 * 7.48 = 22.44 GAL ^{TJW 11/15/06}

THREE WELL VOLUMES =

0.99 * 0.68 = 0.67 ^{TJW 11/15/06}
20.64 ^{TJW 11/15/06} 18.3

WELL VOLUME * 3

18.3 * 3 * 7.48 = 55 GAL ^{TJW 11/15/06}



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3301 ATLANTIC AVENUE
RALEIGH, NORTH CAROLINA 27604

OBSERVATION WELL SAMPLING WORKSHEET
IN ACCORDANCE WITH ASTM D 6089-97 (REAPPROVED 2003)

MACTEC JOB NUMBER 6468-06-1472

OBSERVATION WELL NUMBER 00-945

SITE NAME North Anna Col

DATE (MO/DAY/YR) 11/17/06

TIME (MILITARY) 10:05

FIELD PERSONNEL Kim Charles-Smith, Joe Wallen, Steve Nizely

WEATHER CONDITIONS Sunny Approx 65°F

PHYSICAL CONDITION OF THE WELL
Very good / New

WELL HEAD OBSERVATIONS AND MEASUREMENTS

TOTAL WELL DEPTH (TWD) 54.5' from ground surface FT. (DEPTH BELOW MEASURING POINT)

SCREENED INTERVAL (FT) 51.5' - 41.5' SAND PACK INTERVAL (FT) 54.5' - 37.3'

HEIGHT OF MEASURING POINT ABOVE LAND SURFACE 2 FT.

DESCRIPTION OF MEASURING POINT TOC (DEPTHS BELOW LAND SURFACE - FT.)

DEPTH TO FREE PRODUCT (DFP) N/A FT. (DEPTH BELOW MEASURING POINT)

DEPTH TO GROUNDWATER (DGW) 11.99 FT. (DEPTH BELOW MEASURING POINT)

MEASURING DEVICE slope Indicator DEVICE ID NUMBER SN: 15287

METHOD OF WELL EVACUATION Grundfos Pump

DECONTAMINATION PROCEDURE Aiconox Wash / Tap Rinse

TOTAL VOLUME OF WATER REMOVED 67.2 GAL. CASING DIAMETER IN. 2

FIELD ANALYSIS

FIELD PARAMETER INSTRUMENT USED YSI 600XL INSTRUMENT ID NO. SN: 0110629

CALIBRATION RECORD FOR INSTRUMENT In Field Book DATE 11-17-06 TIME 0715 hrs.

TIME (MILITARY)	PURGING						STABILIZED	SAMPLING
	10:45	11:16	11:33	11:47	12:02	12:17		
PURGE RATE (gpm)	0.5	0.5	0.5	0.5	0.5	0.5		
VOLUME (GAL.)	17	33.6	42.5	50.4	58.8	67.2		
pH (S.U.)	5.83	5.75	5.74	5.72	5.72	5.71		
SP. COND. (mS/cm)	0.017	0.017	0.017	0.017	0.017	0.017		<u>Ref.</u>
WATER TEMP. (°C)	14.03	14.08	13.99	13.99	14.00	14.01		<u>11-17-06</u>
D.O. (mg/l)	7.64	7.38	7.20	7.14	7.19	7.15		
O.R.P. (mv)	125.9	187.6	199.1	204.7	210.1	216.1		
Turbidity (NTUs)	6.40	1.68	1.29	0.95	0.79	0.70		
Appearance (visual)	clear	clear	clear	clear	clear	clear		

OBSERVATION WELL SAMPLING WORKSHEET

IN ACCORDANCE WITH ASTM D 6089-97 (REAPPROVED 2003)

ACTEC JOB NUMBER 648-06-1472

OBSERVATION WELL NUMBER OW-945

SITE NAME North Anna Coh

DATE (MO/DAY/YR) 11/17/06

TIME (MILITARY) 1005

FIELD PERSONNEL Kim Chole-Smith, Joe Weller, Steve Nicely

SAMPLE COLLECTION 12:20

PUMPING RATE (gpm) 0.4 gpm

DESCRIPTION OF SAMPLING EQUIPMENT Grundfos pump / HDPE Tubing

DESCRIPTION OF SAMPLE APPEARANCE Clear

SAMPLE COLLECTED FOR (IN CHRONOLOGICAL ORDER)

DATE

TIME (MILITARY)

160.1, 300.0, 310.1

11-17-06

1220

350.1, 353.1

11-17-06

1220

~~11-17-06~~

NOTE: 100 ml sample given to (RAJ) Pannik for Health physics.

DESCRIPTION OF PURGE WATER MANAGEMENT purge water dumped near well on the ground
- handled the same as well development purge water

WELL VOLUME CALCULATION

WELL CASING VOLUME =

HEIGHT OF WATER COLUMN (FT) * 0.0218 FT² (AREA OF 2" CASING)

42.51 * 0.0218 = 0.927 FT³

SAND PACK VOLUME =

SOIL WELL

ROCK WELL

SAND PACK INTERVAL (FT) * 0.0767 ft² (AREA FOR 4 1/4" HOLE)

SAND PACK INTERVAL (FT) * 0.1744 ft² (AREA FOR 6" HOLE)

17.2 * 0.0767 = 1.32 FT³
0.767
11/17/06

 * 0.0767 = FT³

WELL VOLUME =

WELL CASING VOLUME + (SAND PACK VOLUME * 0.30) * 7.48 GAL/FT³

ASSUMED 30% POROSITY IN SAND PACK

0.927 + 1.32 * 7.48 = 12.7 GAL
0.767
11/17/06

THREE WELL VOLUMES =

WELL VOLUME * 3

16.8 3 50.4
12.7 * 7.48 = 38.0 GAL
0.767 0.767 0.767
11/17/06 11/17/06 11/17/06



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3301 ATLANTIC AVENUE
RALEIGH, NORTH CAROLINA 27604

OBSERVATION WELL SAMPLING WORKSHEET
IN ACCORDANCE WITH ASTM D 6089-97 (REAPPROVED 2003)

MACTEC JOB NUMBER 6468-06-1472

OBSERVATION WELL NUMBER OW-946

SITE NAME North Anna COL

DATE (MO/DAY/YR) 11/28/06

TIME (MILITARY) 17:15

FIELD PERSONNEL Joe Wallen, Mike Lear

WEATHER CONDITIONS Partly cloudy, 50s

PHYSICAL CONDITION OF THE WELL
New

WELL HEAD OBSERVATIONS AND MEASUREMENTS

TOTAL WELL DEPTH (TWD) 45.9' below top casing FT. (DEPTH BELOW MEASURING POINT)

SCREENED INTERVAL (FT) 32.9' - 42.9' below top casing SAND PACK INTERVAL (FT) 28.7' - 45.9' below top casing

HEIGHT OF MEASURING POINT ABOVE LAND SURFACE 2.5' FT.

DESCRIPTION OF MEASURING POINT Top of casing (2.5' above ground sur.) (DEPTHS BELOW LAND SURFACE - FT.)

DEPTH TO FREE PRODUCT (DFP) N/A FT. (DEPTH BELOW MEASURING POINT)

DEPTH TO GROUNDWATER (DGW) 25.47 FT. (DEPTH BELOW MEASURING POINT)

MEASURING DEVICE Solinst water Level Meter MODEL 101 DEVICE ID NUMBER 29658

METHOD OF WELL EVACUATION Grundfos pump

DECONTAMINATION PROCEDURE Alconox / water

TOTAL VOLUME OF WATER REMOVED GAL. CASING DIAMETER IN. 2"

FIELD ANALYSIS

FIELD PARAMETER INSTRUMENT USED YSI 600 XL INSTRUMENT ID NO. 01J0527

CALIBRATION RECORD FOR INSTRUMENT DATE 11/28/06 TIME 08:30

TIME (MILITARY)	PURGING					STABILIZED	SAMPLING
	17:52	17:59	18:04	18:09	18:14		
PURGE RATE (gpm)	0.5	0.5	0.5	0.5	0.5		
VOLUME (GAL.)	13.8	16.3	18.8	21.3	23.8		
pH (S.U.)	5.80	5.79	5.79	5.78	5.79		
SP. COND. (mS/cm)	0.059	0.059	0.058	0.057	0.057		
WATER TEMP. (°C)	14.32	14.31	14.33	14.33	14.34		
D.O. (mg/l)	7.20	7.26	7.28	7.30	7.35		
O.R.P. (mv)	203.7	205.7	206.5	208.8	208.9		
Turbidity (NTUs)	4.87	3.48	1.60	1.65	0.95		
Appearance (visual)	Clear	Clear	Clear	Clear	Clear		



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RALEIGH, NORTH CAROLINA 27604

OBSERVATION WELL SAMPLING WORKSHEET
IN ACCORDANCE WITH ASTM D 6089-97 (REAPPROVED 2003)

CTEC JOB NUMBER 6468-06-1472

OBSERVATION WELL NUMBER OW-947

SITE NAME North Anna Col

DATE (MO/DAY/YR) 11-17-06

TIME (MILITARY) 1330

FIELD PERSONNEL Kim Charles-Smith / Steve nicely / Joe wallen

SAMPLE COLLECTION

PUMPING RATE (gpm) 0.28 - 0.4 gpm

DESCRIPTION OF SAMPLING EQUIPMENT Grundfos pump / LDPE Tubing

DESCRIPTION OF SAMPLE APPEARANCE Clear

SAMPLE COLLECTED FOR (IN CHRONOLOGICAL ORDER)	DATE	TIME (MILITARY)
<u>160.1; 300.0; 310.1</u>	<u>11-17-06</u>	<u>1508</u>
<u>350.1; 353.1</u>	<u>11-17-06</u>	<u>1508</u>

KCS 11-17-06

DESCRIPTION OF PURGE WATER MANAGEMENT purge water dumped near well on the ground handled same manner as well development ^{purge} water.

WELL VOLUME CALCULATION

WELL CASING VOLUME =
HEIGHT OF WATER COLUMN (FT) * 0.0218 FT² (AREA OF 2" CASING)
40.15 * 0.0218 = 0.875 FT³

SAND PACK VOLUME =
SOIL WELL
SAND PACK INTERVAL (FT) * 0.0767 ft² (AREA FOR 4 1/4" HOLE)
17 * 0.0767 = 1.30 FT³

ROCK WELL
SAND PACK INTERVAL (FT) * 0.1744 ft² (AREA FOR 6" HOLE)
 * 0.0767 = FT³

WELL VOLUME =
WELL CASING VOLUME + (SAND PACK VOLUME * 0.30) * 7.48 GAL/FT³ ASSUMED 30% POROSITY IN SAND PACK
0.875 + 1.30 * 7.48 = 16.3 GAL

THREE WELL VOLUMES =
.L VOLUME * 3 16.3 * 7.48 = 48.9 GAL



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3301 ATLANTIC AVENUE
RALEIGH, NORTH CAROLINA 27604

OBSERVATION WELL SAMPLING WORKSHEET
IN ACCORDANCE WITH ASTM D 6089-97 (REAPPROVED 2003)

MACTEC JOB NUMBER 6468-06-1472 OBSERVATION WELL NUMBER OW-949

SITE NAME North Anna COL

DATE (MO/DAY/YR) 11/28/06 TIME (MILITARY) 15:30

FIELD PERSONNEL Joe Wallen, Mike Lear

WEATHER CONDITIONS partly cloudy, 40s

PHYSICAL CONDITION OF THE WELL
New

WELL HEAD OBSERVATIONS AND MEASUREMENTS

TOTAL WELL DEPTH (TWD) 106.4' FT. (DEPTH BELOW MEASURING POINT)

SCREENED INTERVAL (FT) 94.5' - 104.5' below top casing SAND PACK INTERVAL (FT) 89.0' - 106.5' below top casing

HEIGHT OF MEASURING POINT ABOVE LAND SURFACE Top casing 2.0 FT.

DESCRIPTION OF MEASURING POINT Top casing (DEPTHS BELOW LAND SURFACE - FT.)

DEPTH TO FREE PRODUCT (DFP) N/A FT. (DEPTH BELOW MEASURING POINT)

DEPTH TO GROUNDWATER (DGW) 23.22 FT. (DEPTH BELOW MEASURING POINT)

MEASURING DEVICE Solinst Water Level Meter MODEL 101 DEVICE ID NUMBER 29658

METHOD OF WELL EVACUATION Grundfos Pump

DECONTAMINATION PROCEDURE Alconox / water

TOTAL VOLUME OF WATER REMOVED 34.5 GAL. CASING DIAMETER IN. 2"

FIELD ANALYSIS

FIELD PARAMETER INSTRUMENT USED	<u>YSI 600XL</u>		INSTRUMENT ID NO. <u>01J0527</u>						
CALIBRATION RECORD FOR INSTRUMENT	DATE <u>11/28/06</u>		TIME <u>08:30</u>						
	PURGING							TWD 11/28/06 STABILIZED	SAMPLING
TIME (MILITARY)	<u>14:51</u>	<u>14:56</u>	<u>15:01</u>	<u>15:06</u>	<u>15:11</u>	<u>15:16</u>	<u>15:21</u>	<u>15:26</u>	
PURGE RATE (gpm)	<u>0.4</u>	<u>0.4</u>	<u>0.4</u>	<u>0.4</u>	<u>0.4</u>	<u>0.4</u>	<u>0.4</u>	<u>0.4</u>	
VOLUME (GAL.)	<u>20.5</u>	<u>22.5</u>	<u>24.5</u>	<u>26.5</u>	<u>29.5</u>	<u>30.5</u>	<u>32.5</u>	<u>34.5</u>	
pH (S.U.)	<u>6.19</u>	<u>6.19</u>	<u>6.16</u>	<u>6.16</u>	<u>6.17</u>	<u>6.16</u>	<u>6.17</u>	<u>6.18</u>	
SP. COND. (mS/cm)	<u>0.113</u>	<u>0.113</u>	<u>0.113</u>	<u>0.112</u>	<u>0.112</u>	<u>0.111</u>	<u>0.111</u>	<u>0.111</u>	
WATER TEMP. (°C)	<u>16.17</u>	<u>16.15</u>	<u>16.16</u>	<u>16.20</u>	<u>16.16</u>	<u>16.16</u>	<u>16.13</u>	<u>16.15</u>	
D.O. (mg/l)	<u>3.26</u>	<u>3.24</u>	<u>3.26</u>	<u>3.25</u>	<u>3.24</u>	<u>3.28</u>	<u>3.24</u>	<u>3.26</u>	
O.R.P. (mv)	<u>170.8</u>	<u>174.9</u>	<u>178.6</u>	<u>183.4</u>	<u>187.0</u>	<u>188.6</u>	<u>190.2</u>	<u>191.4</u>	
Turbidity (NTUs)	<u>25.1</u>	<u>27.4</u>	<u>19.3</u>	<u>15.4</u>	<u>18.0</u>	<u>15.5</u>	<u>15.4</u>	<u>14.1</u>	
Appearance (visual)	<u>clear</u>	<u>clear</u>	<u>clear</u>	<u>clear</u>	<u>clear</u>	<u>clear</u>	<u>clear</u>	<u>clear</u>	



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3301 ATLANTIC AVENUE
RALEIGH, NORTH CAROLINA 27604

OBSERVATION WELL SAMPLING WORKSHEET
IN ACCORDANCE WITH ASTM D 6089-97 (REAPPROVED 2003)

MACTEC JOB NUMBER 6468-06-1478

OBSERVATION WELL NUMBER OW-949

SITE NAME North Anna Col

DATE (MO/DAY/YR) 11/28/06 TIME (MILITARY) 15:30

FIELD PERSONNEL Joe Wallen, Mike Lear

SAMPLE COLLECTION

PUMPING RATE (gpm) 0.4

DESCRIPTION OF SAMPLING EQUIPMENT Grundfos pump

DESCRIPTION OF SAMPLE APPEARANCE Clear

SAMPLE COLLECTED FOR (IN CHRONOLOGICAL ORDER)	DATE	TIME (MILITARY)

DESCRIPTION OF PURGE WATER MANAGEMENT

on site disposal

WELL VOLUME CALCULATION

WELL CASING VOLUME =

HEIGHT OF WATER COLUMN (FT) * 0.0218 FT² (AREA OF 2" CASING)

83.28 * 0.0218 = 1.82 FT³

SAND PACK VOLUME =

SOIL WELL

ROCK WELL

SAND PACK INTERVAL (FT) * 0.0767 ft² (AREA FOR 4 1/4" HOLE)

SAND PACK INTERVAL (FT) * 0.1744 ft² (AREA FOR 6" HOLE)

_____ * 0.0767 = _____ FT³

17.5 * $\frac{0.0767}{0.1744}$ = 3.05 FT³
TJW 11/28/06

WELL VOLUME =

WELL CASING VOLUME + (SAND PACK VOLUME * 0.30) * 7.48 GAL/FT³

ASSUMED 30% POROSITY IN SAND PACK

1.82 + 0.916 * 7.48 = 12.5 GAL
TJW 11/28/06
20.5

THREE WELL VOLUMES =

.L VOLUME * 3 _____ * 7.48 = _____ GAL

OBSERVATION WELL SAMPLING WORKSHEET

IN ACCORDANCE WITH ASTM D 6089-97 (REAPPROVED 2003)

MACTEC JOB NUMBER 6468-d6-1472 OBSERVATION WELL NUMBER OW-950

SITE NAME North Anna Col

DATE (MO/DAY/YR) ^{REV 11-16-06} 11-16-06 TIME (MILITARY) 1011

FIELD PERSONNEL Kim Charles-Smith / Mike Hear

WEATHER CONDITIONS Cloudy light rain

PHYSICAL CONDITION OF THE WELL very good/new

WELL HEAD OBSERVATIONS AND MEASUREMENTS

TOTAL WELL DEPTH (TWD) 92' FT. (DEPTH BELOW MEASURING POINT)

SCREENED INTERVAL (FT) 80'-90' SAND PACK INTERVAL (FT) 92'-78' (14 ft.)

HEIGHT OF MEASURING POINT ABOVE LAND SURFACE 2.0 FT.

DESCRIPTION OF MEASURING POINT TOC (DEPTHS BELOW LAND SURFACE - FT.)

DEPTH TO FREE PRODUCT (DFP) NA FT. (DEPTH BELOW MEASURING POINT)

DEPTH TO GROUNDWATER (DGW) 45.37' FT. (DEPTH BELOW MEASURING POINT)

MEASURING DEVICE Slope Indicator DEVICE ID NUMBER Sn: 15287

METHOD OF WELL EVACUATION Grundfos pump

DECONTAMINATION PROCEDURE Alconox wash / TAP Rinse

TOTAL VOLUME OF WATER REMOVED Approx 11.5 GAL. CASING DIAMETER IN. 2

FIELD ANALYSIS

FIELD PARAMETER INSTRUMENT USED YSI 600 XL INSTRUMENT ID NO. SN: 0140629

CALIBRATION RECORD FOR INSTRUMENT In Fieldbook DATE 11-15-06 TIME 1600

PARAMETER	VALUE	PURGING		STABILIZED	SAMPLING
		START	END		
TIME (MILITARY)	<u>Sample 1210</u>				
PURGE RATE (gpm)	<u>Approx 1.5 gpm</u>				
VOLUME (GAL.)	<u>11.5</u>				
pH (S.U.)	<u>6.46</u>				
SP. COND. (mS/cm)	<u>262</u>				
WATER TEMP. (°C)	<u>16.37</u>				
D.O. (mg/l)	<u>2.43</u>				
O.R.P. (mv)	<u>146.4</u>				
Turbidity (NTUs)	<u>67.5</u>				
Appearance (visual)	<u>clear</u>				

See NOTE

REV 11-16-06

NOTE: well purged Dry. Allow to recover obtained results, no field parameters during purging per ASTM 6452-99 (Section 7.6.3.2)



engineering and constructing a better tomorrow

3301 ATLANTIC AVENUE
RALEIGH, NORTH CAROLINA 27604

OBSERVATION WELL SAMPLING WORKSHEET
IN ACCORDANCE WITH ASTM D 6089-97 (REAPPROVED 2003)

MACTEC JOB NUMBER 6468-06-1472 OBSERVATION WELL NUMBER OW-950

SITE NAME North Anna Col

DATE (MO/DAY/YR) 11-16-06 TIME (MILITARY) 1011

FIELD PERSONNEL Kim Charles-Smith

SAMPLE COLLECTION

PUMPING RATE (gpm) Approx .5 gpm *Could not pump @ lower rate - had to increase rate to get water down to well head.*

DESCRIPTION OF SAMPLING EQUIPMENT Grundfos pump w/ HDPE Tubing

DESCRIPTION OF SAMPLE APPEARANCE Clear

SAMPLE COLLECTED FOR (IN CHRONOLOGICAL ORDER)	DATE	TIME (MILITARY)
<u>160.1', 300.0', 310.1</u>	<u>11-16-06</u>	<u>1210</u>
<u>350.1', 353.1</u>	<u>11-16-06</u>	<u>1210</u>
_____ _____ _____ _____ _____		

NOTE: 100 ml sample given to Dominion (R&S) for Health Physics Analysis

DESCRIPTION OF PURGE WATER MANAGEMENT purge water dumped near well on the ground - handled the same as well development purge water

WELL VOLUME CALCULATION

WELL CASING VOLUME =

HEIGHT OF WATER COLUMN (FT) * 0.0218 FT² (AREA OF 2" CASING)
32.63 * 0.0218 = 0.711 FT³

SAND PACK VOLUME =

SOIL WELL SAND PACK INTERVAL (FT) * 0.0767 ft² (AREA FOR 4 1/4" HOLE)
 * 0.0767 = FT³

ROCK WELL SAND PACK INTERVAL (FT) * 0.1744 ft² (AREA FOR 6" HOLE)
14' * 0.0767 = 1.07 FT³

WELL VOLUME =

WELL CASING VOLUME + (SAND PACK VOLUME * 0.30) * 7.48 GAL/FT³ ASSUMED 30% POROSITY IN SAND PACK
0.711 + 1.07 * 7.48 = 13.31 GAL

THREE WELL VOLUMES = 39.93 Gal.
WELL VOLUME * 3 = 13.31 * 3 = 39.93 GAL
11-16-06



engineering and constructing a better tomorrow

3301 ATLANTIC AVENUE
RALEIGH, NORTH CAROLINA 27604

OBSERVATION WELL SAMPLING WORKSHEET
IN ACCORDANCE WITH ASTM D 6089-97 (REAPPROVED 2003)

MACTEC JOB NUMBER CA68-06-1472

OBSERVATION WELL NUMBER OW-951

SITE NAME North Anna Col

DATE (MO/DAY/YR) 11-17-06

TIME (MILITARY) 0902

FIELD PERSONNEL Kim Charles Smith / Steve Nicely / Joe Wallen

WEATHER CONDITIONS Sunny

PHYSICAL CONDITION OF THE WELL
very GOOD/new

WELL HEAD OBSERVATIONS AND MEASUREMENTS

TOTAL WELL DEPTH (TWD) 67.1 FT. (DEPTH BELOW MEASURING POINT)

SCREENED INTERVAL (FT) 65.1 - 55.1 SAND PACK INTERVAL (FT) NA

HEIGHT OF MEASURING POINT ABOVE LAND SURFACE 1.5 FT.

DESCRIPTION OF MEASURING POINT TOC (DEPTHS BELOW LAND SURFACE - FT.)

DEPTH TO FREE PRODUCT (DFP) NA FT. (DEPTH BELOW MEASURING POINT)

DEPTH TO GROUNDWATER (DGW) 31.68' FT. (DEPTH BELOW MEASURING POINT)

MEASURING DEVICE Slope Indicator DEVICE ID NUMBER SN: 15287

METHOD OF WELL EVACUATION Grundfos pump

CONTAMINATION PROCEDURE Alconox Wash / Tap Rinse

TOTAL VOLUME OF WATER REMOVED 6.5 GAL. CASING DIAMETER IN. 2

FIELD ANALYSIS

FIELD PARAMETER INSTRUMENT USED NA INSTRUMENT ID NO. NA

CALIBRATION RECORD FOR INSTRUMENT NA DATE NA TIME NA

	PURGING				STABILIZED	SAMPLING
TIME (MILITARY)	_____ <i>help</i> <i>11-17-06</i>					
PURGE RATE (gpm)						
VOLUME (GAL.)						
pH (S.U.)						
SP. COND. (mS/cm)						
WATER TEMP. (°C)						
D.O. (mg/l)						
O.R.P. (mv)						
Turbidity (NTUs)						
Appearance (visual)						

