GROUNDWATER ASSESSMENT REPORT

PROTECTED AREA

BRUNSWICK NUCLEAR PLANT

SOUTHPORT, NORTH CAROLINA

PREPARED FOR:

Progress Energy

PROGRESS ENERGY CAROLINAS

PREPARED BY:

SSi

SILAR SERVICES, INC.
983 BUTLER PIKE
BLUE BELL, PA 19422

October 2009

V-3

Table of Contents

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1 INTRODUCTION

1.1 Purpose of Report

Silar Services Incorporated (SSi) has prepared this Groundwater Assessment Report (GAR) to document the results of groundwater assessment activities performed within the Protected Area (PA) of the Brunswick Nuclear Plant (BNP), located in Southport, Brunswick County, North Carolina. The PA includes all accessible areas within the secured access area of the power generating facility, and the assessment of the PA included areas adjacent to the perimeter of the PA. The purpose of the groundwater assessment in the PA was to evaluate the geology and hydrogeology in the PA and to identify the presence and extent of radiological materials in groundwater within the PA of the BNP.

The groundwater assessment was initiated in the PA to characterize groundwater quality at areas where tritium and/or other radiological sources are known to exist as part of Progress Energy's commitment to comply with the Industry Groundwater Protection Initiative (NEI, 2007) and to address recommendations provided by American Nuclear Insurers after the completion of a routine inspection of the BNP. The scope of the groundwater assessment in the PA was also developed to assist in determining the source of persistent elevated concentrations of tritium detected in monitoring well ESS-2C.

The activities included in the groundwater assessment were established consistent with industry standard practice and guidance documents associated with the protection of groundwater resources from radiological materials, including the following:

- Guideline for Implementing a Groundwater Protection Program at Nuclear Power Plants [Electric Power Research Institute, November, 2007]; and,
- Industry Ground Water Protection Initiative – Final Guidance Document [Nuclear Energy Institute (NEI), August 2007].

The groundwater assessment activities were initiated at the Site in July 2008, and this report provides a comprehensive presentation of the activities completed to date and the findings of the assessment.

1.2 Project Background

This section includes information on the location, description and history of the Site.

1.2.1 Site Location

The Brunswick Nuclear Plant Site is located approximately 2.5 miles north-northeast of the City of Southport, Brunswick County, North Carolina, and is situated on approximately 1,200 acres of land. The Site location is depicted on **Figure 1**.

The PA includes all accessible areas within the secured access area of the power generating facility and areas adjacent to the perimeter of the PA. The Site layout, including the various areas is depicted on **Figure 2**.

Areas not included as part of this assessment include the Storm Drain Stabilization Pond (SDSP), and the Site-Wide Area of the BNP. The groundwater assessments of the SDSP and the Site-Wide Area have been completed and the results are summarized in separate reports provided to Progress Energy.

1.2.2 Project Background

The NEI Ground Water Protection Initiative identifies actions to improve utilities' management and response to instances where the inadvertent release of radioactive substances may result in low but detectible levels of plant-related materials in subsurface soils and water. The inadvertent releases addressed by this initiative fall outside the current requirements of the Nuclear Regulatory Commission (NRC) and are well below the NRC's limits that ensure protection of public health and safety. This GAR meets objectives 1.1 and 1.3 of the NEI guidance by characterizing the

groundwater hydrogeology and performing initial groundwater sampling and analysis in the vicinity of the PA to be considered in the development of a long-term groundwater monitoring program at the BNP.

1.3 Scope and Objectives

The overall objectives of the groundwater assessment in the Protected Area were to provide sampling points to evaluate groundwater quality, to assess potential sources of contamination in the PA, and to characterize the geology and hydrogeology of the PA. The scope of the assessment included the collection of groundwater data as close as reasonably possible to the identified systems, structures, or components (SSCs) in the PA that contain or could contain licensed material and for which there is a credible mechanism for the licensed material to reach ground water. The information collected within the PA will be utilized in conjunction with other data collected in the owner controlled area (OCA) to establish a comprehensive site-wide groundwater monitoring program to ensure timely detection of inadvertent radiological releases to groundwater.

In addition to the primary objectives of the groundwater assessment, an evaluation of potential radiological materials in subsurface soils was completed via the collection and analysis of soil samples obtained from the borings included in the groundwater assessment program. The soils component of the assessment was added to the scope of the groundwater assessment to provide additional information in support of long-term considerations associated with subsurface materials in the PA.

1.4 Report Organization

The organization and content of the remainder of this report are described below.

Section 2.0 - Investigation Activities and Findings

Section 2 provides a summary of the activities completed during planning and implementation of the assessment. The methods, locations, and results of the sampling and analysis program are summarized in detail for soil and groundwater.

Section 3.0 - Physical Characteristics of the Study Area

A description of the study area including surface features, geology and soils, surface water hydrology, and groundwater hydrology is provided in Section 3.

Section 4.0 - Summary and Conclusions

A summary of the environmental conditions relevant to satisfying the objectives of the investigation are provided in Section 4.

Section 5.0 - References

Section 5 presents a list of references utilized during the preparation of this report.

2 ASSESSMENT ACTIVITIES AND FINDINGS

The planning and implementation of the PA groundwater assessment was completed in several phases. The sequence of these activities is generally summarized below. Following this general summary, a detailed description of the field activities, methods, and findings of the soil and groundwater assessment is provided.

The planning of the groundwater assessment activities involved a number of meetings that included appropriate plant personnel and groundwater professionals to identify SSCs within the PA and to select assessment locations in the vicinity of the SSCs that would provide the necessary information to meet the intent of the NEI initiatives. Additionally, the selected investigation locations were carefully examined by plant engineering personnel in order to target each sampling area as reasonably close to a respective SSC as possible while maintaining the integrity of the plant infrastructure. Twenty-four (24) groundwater screening locations were selected within and around the PA for inclusion in the assessment at locations shown on **Figure 3**. Drilling and monitoring well installation activities were performed by Geologic Exploration, Inc. of Statesville, North Carolina and overseen by SSi.

The protected area groundwater assessment field activities were completed in two phases. The first phase was completed from May 30, 2008 to August 28, 2008, and included the following activities:

- Groundwater profiling at five (5) temporary groundwater screening locations (TP-PA1 through TP-PA5) at areas around the perimeter of the PA, as summarized in Section 2.2;

- Collection of soil samples at sixteen (16) locations within the protected area (TP-PA6 through TP-PA24) as summarized in Section 2.1;

- Groundwater profiling at nineteen (19) temporary groundwater screening locations (TP-PA6 through TP-PA24) within the PA, as summarized in Section 2.2; and,

- Collection of groundwater screening samples from various depth intervals at each location, as summarized in Section 2.2.

The installation of the screening locations in the PA (TP-PA6 through TP-PA24) was completed by using air-assisted soil boring techniques to avoid potential damage to subsurface utilities and plant infrastructure (Section 2.1.1). After each location was safely cleared for deeper investigation, Geo-probe® drilling techniques were utilized to advance each boring to pre-determined depth intervals for the collection and analysis of groundwater screening samples. Geo-probe® drilling techniques were utilized exclusively at locations TP-PA1 through TP-PA5 since there were no potential subsurface conflicts with critical plant infrastructure.

Phase 2 of the assessment was completed from August 29, 2008 to September 19, 2008, and included the evaluation of the screening data, the installation and development of groundwater monitoring wells, and the completion of the first complete round of groundwater monitoring activities. The groundwater screening results provided the basis for selecting the location(s) and depth(s) at which to install the permanent groundwater monitoring well network in the protected area. These activities are described in detail in Section 2.2. The locations of the groundwater monitoring wells installed in the protected area are depicted on **Figure 4**.

The activities and findings are summarized in the following subsections. The analytical results are presented and, where concentrations of radiological materials were observed, the results are also presented on figures. Throughout this section, groundwater data are compared and discussed with respect to the USEPA drinking water standard of 20,000 pCi/L (picocuries per liter).

2.1 Soil Investigation

The soils investigation included the collection soil samples from borings advanced within the PA (TP-PA6 through TP-PA24) to evaluate whether radiolonuclides may be present in the shallow subsurface soils within the PA as a result of historical inadvertent releases. The methods and findings of these activities are summarized in the following subsections.

2.1.1 Methods

During the initial phase of the assessment, the initial 14-feet of each soil borings was advanced into the subsurface using an air knife to eliminate the potential risk of damaging critical infrastructure. The air knife activities were performed by McKim & Creed of Raleigh, North Carolina and overseen by SSi. The air knife method uses a combination of a focused stream of pressurized air in conjunction with applied vacuum to advance a 12-inch diameter boring into the subsurface. At depths greater than 14 feet below ground surface (BGS), soil sampling was completed using direct-push drilling techniques in general accordance with ASTM D 6282 at the screening locations. Soil samples were generally collected at 5-foot intervals using a 5-foot macro-core sampling tube and new acetate liners to provide detailed information in support of the development of geologic and hydrogeologic cross sections for areas within the protected area.

Borehole logs were maintained by a Professional Geologist for all borings advanced during the drilling program. The boring logs were recorded to document the results of the soil sampling activities and support an interpretation of the subsurface stratigraphy and geologic framework at the Site. Interpretation of borehole logs and soil cores provide tools that aid in understanding the geologic and hydrogeologic framework of the Site. The borehole logs (**Appendix A**) describe soil units/lithologies encountered, depths

of various strata, moisture content, and other pertinent data. Section 3.2 (Geology) and Section 3.3 (Groundwater Hydrology) describe additional details regarding the physical site settings.

A total of thirty-four (34) soil samples were collected for analysis and were analyzed in the on-site radiochemistry laboratory by Progress Energy chemists. All soil samples were analyzed for gamma-spec radionuclides. The soil samples were collected while advancing the initial 10-feet of each boring in the unsaturated zone with the air knife.

2.1.2 Findings

The general purpose of the soil investigation program was to identify the presence/absence of radionuclides in shallow subsurface soils and to characterize the subsurface stratigraphy in the vicinity of the SDSP. The results of the analyses of the soil samples collected during the assessment are discussed below in Section 2.1.2.1. The findings of the soil boring investigation with respect to the geology and hydrology are discussed in Section 3.2 (Geology) and Section 3.3 (Groundwater Hydrology). Borehole logs for each of the soil borings are included as **Appendix A**.

2.1.2.1 Radiological Results – Soil Samples

A total of thirty-four (34) soil samples were collected for purposes of determining the presence/absence of radiological materials in shallow subsurface soils in the PA. The samples were analyzed for gamma-emitting isotopes. The results are presented in **Table 2**. **Figure 5** presents the locations and results of soil samples that exhibited a detection of radionuclides above the background level of radiological activity.

As depicted on **Figure 5**, four of the locations in the PA exhibited a detection of the gamma-emitting isotope Cesium-137. Three of the four locations (TP-PA8, TP-PA9, and TP-PA10) are within the transformer yard, and one location (TP-PA16) is near the Radwaste Building.

It is important to note that the soil investigation activities were generally not performed with the intent of providing a detailed profile of the nature and extent of radiological materials in the soils underlying the PA. The results of the soil assessment are intended to provide general information in support of future plant operation and maintenance considerations, and to provide preliminary information in support of decommissioning planning.

2.2 Groundwater Investigation Activities

The overall objectives of the groundwater assessment were to provide sampling points to evaluate groundwater quality in order to assess the potential for sources of contamination in various areas of the PA and, to characterize the geology and hydrogeology of the various areas.

To accomplish these objectives, several investigation activities were completed including: groundwater screening, monitoring well installation, groundwater elevation measurements and groundwater sampling. The assessment methods and results are discussed in the following subsections.

2.2.1 Groundwater Profiling

Groundwater profiling included the collection of groundwater screening samples from multiple depth intervals at each of the groundwater screening locations depicted on **Figure 3**. The profiling activities were conducted in the PA from May 30 through September 19, 2008. The screening locations within the PA

were generally positioned as close as possible to plant SSCs and areas where there had been a known or suspected inadvertent release of licensed radionuclides (i.e. the Radwaste Line, storm drain piping, and condensate storage tanks).

The methods used and the results obtained at each screening location are summarized in the following subsections.

2.2.1.1 Groundwater Screening Point Installation and Sampling Methods

Groundwater profiling was conducted at each of the 24 groundwater screening locations by Geoprobe® methods to various depths ranging from 20 feet to 65 feet below ground surface (bgs) during the assessment. Soil and groundwater samples were collected at various depth intervals to characterize the subsurface geology and hydrostratigraphy in the protected area. The general procedures employed to complete the groundwater profiling included the following sequence of activities:

- Geoprobe® drilling equipment fitted with a stainless steel groundwater profiler (sample collection tool) was advanced into the subsurface (initial depths were generally 20 or 25 feet bgs).
- The drill stem was then retracted approximately four feet to expose the stainless steel well screen to groundwater (e.g. 16'-20' bgs).
- A disposable polyethylene sample tube with a stainless steel check valve was inserted through the drill rods to the approximate depth of the screened interval.

- Groundwater was then purged from the well using a low-flow, peristaltic or inertial pumping method to extract groundwater from the subsurface. Approximately 3-5 gallons of groundwater were purged from the well until the discharge from the tubing was visually non-turbid.

- A representative groundwater sample was then collected by the field geologist from the associated depth interval. The groundwater samples were collected in new, unused sample containers provided by Progress Energy.

- After the groundwater sample was collected from a respective interval, the drill stem, including the drill rods and groundwater profiler, was removed from the boring, decontaminated, and prepared for use in subsequent deeper groundwater screening intervals.

- A discrete soil sampling device (5-foot macro-core soil sampler) was then advanced to the depth that corresponds to the base of the previous groundwater screening sample (e.g. 20' bgs), and a soil sample was retrieved from the next five-foot depth increment (e.g. 20'-25' bgs) for soil/geological characterization by the field geologist. The soil sampling equipment was subsequently decontaminated and prepared for use.

- The groundwater sampling procedure was then repeated for the next 5-foot increment of the screening location.

- The above procedure was repeated to the terminal depth of each boring.

In general, one groundwater sample and one soil sample were collected in each 10-foot interval of each screening location. This procedure continued to the terminal depth of each screening location. The terminal depth of each boring was reached when the Geoprobe® could not penetrate deeper into the subsurface (refusal) or if plant infrastructure limited deeper penetration (i.e. cooling water intake conveyance, approximate 34 feet bgs at TP-PA18). The terminal depth of the screening locations ranged from 34 feet bgs (TP-PA18) to 65 feet bgs (TP-PA24). The groundwater samples were collected by SSi and delivered to the radiochemistry laboratory at BNP for tritium analysis.

The soil samples were visually inspected by a field geologist to provide a record of the materials encountered and to support geologic and hydrogeologic interpretation. The boring logs for each location are provided in **Appendix A**.

2.2.1.2 Analytical Results - Groundwater Screening Samples

A total of 97 groundwater samples were collected from the 24 groundwater screening locations and analyzed for tritium by radiochemists in the on-site radiochemistry lab at BNP. The results of the analyses are presented on **Table 3** and are depicted on **Figure 6**.

Tritium was detected in 20 of 97 groundwater screening samples, representing 8 of the 24 screening locations at a detection limit of approximately 2,000 pCi/L. All of the samples exhibiting a detectable concentration of tritium were collected from screening locations within the protected area. The concentration of tritium ranged from 3,004 pCi/L at TP-PA8-3 (36-40' bgs) to 57,760 pCi/L at TP-PA10-4 (51-55' bgs). At several locations (TP-PA-10, TP-PA13,

and TP-PA18), the highest concentrations of tritium were observed at the terminal (deepest) depth of the screening location.

2.2.2 Groundwater Monitoring Well Installation

The primary objective of the monitoring well installation was to establish a network of monitoring wells in the PA to evaluate groundwater quality and hydrology. To accomplish this objective, monitoring wells were installed at each of the groundwater screening point locations. Where appropriate, the screened interval for each monitoring well was selected to intersect the depth intervals where radiological activity was detected to be highest in the groundwater screening samples. Where no radiological activity was observed in the screening samples, the screened interval was selected to intersect the top of the shallow aquifer at approximately 15'-30' bgs.

Hollow-stem auger drilling methods were employed to complete the installation of the groundwater monitoring well network, with the exception of MWPA-107B/107C, which was installed using mud-rotary drilling methods. The drilling activities are described in the following sections.

During the investigation, a total of nineteen (19) shallow groundwater monitoring wells and four (4) intermediate monitoring wells were installed in the various areas described in **Table 1**. All monitoring wells (except MWPA-107B/107C) were installed using 3 ¼-inch I.D. hollow-stem auger drilling techniques. MWPA-107B/107C were installed with mud rotary drilling techniques initially in September 2008 and replaced in April 2009 due to well damage. **Figure 4** shows all of the monitoring well locations on an aerial photograph of the Site. Monitoring wells were constructed using 1-inch I.D. Schedule 40 PVC well casing and 0.010-slotted 1-inch diameter Schedule 40 PVC well screen.

The general monitoring well installation procedures are summarized below.

1. The depth for each of the wells was selected by the project team based on presence and depth of the maximum concentrations of tritium observed in the analytical results of groundwater screening samples at each location. Where no tritium was observed in screening samples, the depth of the well was selected to intersect the top of the shallow aquifer.
2. The shallow wells were generally installed using 3¼-inch inner diameter (I.D.) hollow stem augers with the bottom of the well screen placed at least 10 feet into the saturated interval of the sand aquifer.
3. The four intermediate wells were installed as cluster wells within the same borehole as the corresponding shallow well. A bentonite seal was used to isolate the shallow groundwater interval from the intermediate groundwater interval to minimize the possibility for cross-contamination between these intervals.
4. Formation water and drill cuttings generated during the construction of monitoring wells were transported to the SDSP.
5. At least ten feet of 1-inch-ID, Schedule 40 PVC, machine cut, well screen with 0.010-inch-slot size was set at the bottom of each shallow and intermediate well. A sufficient length of Schedule 40 PVC riser pipe was coupled to the screen to allow the PVC riser pipe to extend to just below ground surface. Well screens were fitted with a nominal 1-inch solid (unslotted) bottom sediment trap.
6. The annular space around the well screens was back-filled with clean uniform sand (filter pack sieve #2). The filter pack was placed from the bottom of the well to approximately 2 to 3 feet above the top of the well screen. A seal consisting of a minimum of a 2-foot-thick bentonite seal was placed above the sand and allowed to hydrate. At the three locations where cluster wells were installed in the same borehole, a bentonite seal was also installed between the two screened intervals to minimize potential cross-contamination between these groundwater zones. The remaining annular space was filled with bentonite-cement grout.
7. All wells were completed as flush-mount wells, with lockable expansion plugs.
8. A concrete pad was installed around the well box and mounded to direct surface runoff away from the casing.
9. Monitoring well construction reports (**Appendix A**) were prepared for each monitoring well.

A summary of the monitoring well construction details is provided in **Table 4** and depicted in the Well Construction Records are included in **Appendix B**.

2.2.3 Groundwater Monitoring

2.2.3.1 Groundwater Elevation Measurements

Groundwater elevation measurements were collected from the monitoring wells and used to provide data to map the potentiometric surface of the shallow and intermediate aquifers and interpret the horizontal and vertical gradients in the shallow and intermediate aquifers. Two rounds of depth-to-water measurements were recorded from the twenty-two (22) monitoring wells in October 2008. Measurements were collected using a Keck ET Model 122 Water Level Indicator Probe capable of measuring depth to water within 0.01-foot accuracy. These measurements are presented in **Table 5**. The results of the groundwater elevation measurements are presented as potentiometric surface maps that are presented and discussed in Section 3.3 of this report.

2.2.3.2 Groundwater Sampling

Two rounds of groundwater samples were collected from the monitoring wells. The groundwater samples were analyzed for tritium in Progress Energy's onsite radiological analytical laboratory.

Prior to sampling, each well was purged in accordance with Progress Energy's low flow groundwater sampling procedure (OE-RC-3250, Rev. 29) to assure collection of a representative groundwater sample. Groundwater sampling was completed using a peristaltic pump, dedicated pump (flex) tubing, and dedicated down-hole polyethylene tubing at each well to eliminate the potential for cross-contamination.

Water quality measurements were collected during the purging activities. The procedure for well purging and sampling is generally as follows:

- First, the security cap was removed, and the depth to water in the well was determined by sounding the well with a water level meter (Keck ET). The depth to water was recorded on a groundwater sample form.

- The dedicated down-hole tubing was lowered into the monitoring well and cut to the desired length, attached to the pre-cut flex tubing on the peristaltic pump, and a new section of poly tubing was inserted on the effluent side of the pump and the sample line was connected from the pump to the in-line water quality instrument (YSI MP556 with flow through cell), the effluent line from the flow-through cell was inserted into a purge water container to capture purge water, the peristaltic pump was started, and purging of groundwater at the well was commenced.

- An optimum low-flow pumping rate was established at each well to minimize drawdown. The groundwater quality parameters and depth to water were monitored and recorded at prescribed time intervals to determine when the water quality parameters had stabilized to within 10%.

- Following the stabilization of the groundwater quality parameters, groundwater samples were collected from the wells and delivered to the radiological analytical laboratory.

Purge water was collected in dedicated purge water containers and transported to the SDSP.

2.2.3.3 Groundwater Analytical Results Summary – Shallow Monitoring Wells

The initial round of groundwater samples were collected from the shallow monitoring wells between October 3, 2008 and 13, 2008. A second round of groundwater samples were collected from all shallow monitoring wells between March 19, 2009 and March 25, 2009. A third groundwater sample was collected from MWPA-107C on June 2, 2009 subsequent to installation of the replacement wells in April 2009. Groundwater samples from the wells were analyzed for tritium at the on-site radiological analytical laboratory. **Figure 7** depicts the spatial location of the groundwater analytical results. **Table 6** presents tabulated analytical results from the groundwater sampling event. The results of the laboratory analyses of groundwater samples are summarized below.

- Tritium was detected in groundwater samples from fourteen (14) of the nineteen (19) shallow monitoring wells in the PA. The detection limit for the analyses was approximately 250 pCi/L. The results are summarized below.

- Concentrations of tritium in groundwater samples from the nineteen (19) shallow wells ranged from less than the detection limit (4 samples) to 40,630 pCi/L at MWPA-111C during the first round.

- The analytical results from the groundwater samples collected from the monitoring wells were generally comparable to the results obtained from the screening samples. However, the analytical results of the monitoring well groundwater samples are typically lower than corresponding screening samples.

This is likely due to the fact that the screened interval of the monitoring wells (10-15 vertical feet) represents a depth interval that is approximately 2-4 times larger than the depth interval intersected by the groundwater profiler (4 vertical feet). Therefore, the concentration data obtained from the samples collected from the monitoring wells provides a better representation of the average concentration of tritium present in the aquifer since it intersects a wider depth interval of the aquifer.

- The highest concentration of tritium detected in the shallow wells was detected east of the Radwaste building at MWPA-111C. The second highest concentration of tritium was detected at MWPA-115C adjacent to the condensate storage tank.

- The shallow wells that exhibited elevated concentrations of tritium are generally clustered in four discrete areas of the PA, including the following:

    - An area near the location where a historical release of radionuclide from the radwaste effluent line was known to have occurred MWPA-104C;

    - An area near the condensate storage tank (MWPA-115C);

    - An area adjacent and to and east of the Radwaste Building (MWPA-111C); and,

    - An area adjacent to the storm drain collection system piping (MWPA-101C).

The specific source of the elevated tritium concentrations in the shallow aquifer is difficult to determine directly from the groundwater analytical results alone. Analysis of the hydrogeology and groundwater conditions within the PA is presented and discussed in Section 3, and further discussion regarding the possible sources of tritium in shallow groundwater is presented in Section 4. A summary of the conclusions and recommended response actions that may be selected to evaluate potential source areas and address the groundwater conditions is presented in Section 4 of the report.

2.2.3.4 Groundwater Analytical Results Summary – Intermediate Monitoring Wells

The initial round of groundwater samples were collected from the intermediate monitoring wells on October 4 and 13, 2008, with the exception of MWPA-107B, which was sampled on January 30, 2009. A second round of groundwater samples were collected from all intermediate monitoring wells (except MWPA-107B due to siltation) between March 19, 2009 and March 24, 2009. A groundwater sample was collected from MWPA-107B on June 2, 2009 subsequent to installation of the replacement wells in April 2009. Groundwater samples from the wells were analyzed for tritium at the on-site radiological analytical laboratory. **Figure 7** depicts the spatial location of the groundwater analytical results. **Table 6** presents tabulated analytical results from the groundwater sampling events. The results of the laboratory analyses of groundwater samples are summarized below.

Tritium was detected in groundwater samples from three (3) of four (4) intermediate monitoring wells in the PA. The concentration of tritium in the intermediate well groundwater samples ranged from less

than the detection limit (MWPA-118B) to 37,210 pCi/L (MWPA-107B). Elevated concentrations of tritium were also detected at MWPA-104B (29,090 pCi/L and 27,210 pCi/L) and MWPA-111B (2,908 pCi/L and 2,862 pCi/L). Intermediate wells MWPA-104B and MWPA-107B are located is in the vicinity of a historical release of radionuclides from the radwaste effluent line that occurred near monitoring well ESS-2C.

It should be noted that an obstruction in the well casing was observed at MWPA-107B which required the well to be flushed with clean water to remove the obstruction. Because the flushing occurred approximately 1 week prior to the well being sampled, the analytical result obtained from MWPA-107B (3,809 pCi/L) during the initial round of groundwater sampling is biased low as a result of dilution. The tritium concentration (37,210 pCi/L) detected at MWPA-107B during the June 2009 sampling is considered more representative of the tritium concentration in the intermediate aquifer in this area.

2.3 Surveying and Mapping

A site survey was conducted. Surveying activities were performed and certified by a North Carolina Registered Land Surveyor (McKim & Creed). The surveyor reviewed existing site maps and other maps that encompassed the project area prior to mobilization. The surveyor ascertained the locations and conditions of all horizontal and vertical controls available for the project utilizing benchmark descriptions, maps, and listings provided by Progress Energy, as well as other documents. The survey was georeferenced using the previously established local monuments of known northing and easting as defined by the North Carolina Geological Survey.

A survey map was produced that includes scale, benchmarks, North arrow, dimensions and locations of property boundaries, the locations of monitoring wells and sample

locations. The survey map provided the information required to produce a site basemap, which all of the site maps presented in this report have been based on.

3 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

This section presents the physical characteristics of the Site including surface features, geology, and groundwater hydrology.

3.1 Surface Features

The BNP is located within approximately 2.5 miles north-northeast of the City of Southport, North Carolina. Access to the BNP is from River Road (State Route 87). The owner controlled area encompasses approximately 1,200 acres. The Protected Area of the Site, which is the focus of this assessment, includes approximately 25 acres.

Significant surface features in the PA are referenced in bold in the following Section, and are shown on **Figure 2**. In the descriptions of these site features, the direction of north, south, east, and west are described relative to the generating facility (plant north, etc.). The "plant north" direction is generally oriented in the N45°W direction.

Transformer Yard: The transformer yard is located west of the turbine building. This area is generally surrounded by a security fence. Surface cover generally consists of pervious gravel surfaces, although a small portion of the transformer yard is covered by an asphalt pavement near the two electric transformers. The subsurface Radwaste line is located to the west/southwest of the turbine building. The north and south storm drain conveyance lines are located to the north and south of the reactor and turbine building, and convey stormwater to the west and into the storm drain collection basin, which is northwest of the turbine building near the edge of the transformer yard.

Turbine Building, Reactor Buildings, and Power Generation Buildings: The electric power generating equipment and associated equipment/support buildings generally encompass the majority of the PA. The primary surface structures include the Turbine Building, 2 Reactor Buildings (Unit 1 and Unit 2 Reactors), and Radwaste Buildings, which are generally located in the middle of the PA. It should be noted that the reactor buildings extend approximately thirty nine (39) feet bgs, and the turbine and

Radwaste Building extend approximately twenty (20) feet bgs (D'Appolonia Consulting Engineers, Inc., 1968), and may present a significant vertical barrier impeding the horizontal flow of groundwater in the subsurface around these facilities (discussed in greater detail in Section 3.3). Administrative buildings and a number of support structures are located around the perimeter of the electric generating facility to the south, east, and north, as shown on **Figure 2**. Farther to the east, the cooling water intake pumping facilities and intake structure are located adjacent to the Intake Canal. The large subsurface cooling water conveyance tunnels extend from the canal bulkhead to the Reactor Buildings, and are located approximately 36 feet bgs. The cooling water discharge tunnels extend to the west from the Reactor Buildings and Turbine Building, and then turn to the south and exit the PA where the cooling water is discharged to the Discharge Canal.

Intake Canal: The cooling water Intake Canal is located adjacent to the PA to the east (not considered part of the PA). The Intake Canal is approximately 18 feet deep and is designed to provide a constant source of water from the Cape Fear River to the BNP to cool the nuclear reactors. The design of the Intake Canal permits flow into the plant area, and cannot be reversed by tides or other hydraulic conditions. As such, the water elevation in the canal is relatively consistent (although it fluctuates with the tidal cycles) and presents a shallow hydraulic boundary to the east of the PA.

Surface water runoff in the PA is generally transferred into a storm water drainage and collection system and transported to the SDSP located approximately 1,000 feet east of the PA. In general, all surface water drainage from within the PA is conveyed to the storm drain collection system; however, in the gravel areas within the transformer yard, surface water from precipitation may percolate directly into the shallow aquifer (upper sand) and migrate as groundwater into the PA.

The Site location is shown in **Figure 1**, and the Site Layout is depicted on **Figure 2**.

3.2 Geology

3.2.1 Regional Geology and Hydrogeology

According to the 1985 Geologic Map of North Carolina, prepared by the North Carolina Geological Survey Section of the North Carolina Department of Environment and Natural Resources (NCDENR), the Site is located in the North Carolina Coastal Plain Physiographic Province. The geology of this area is characterized by an easterly thickening wedge of unconsolidated sediments underlain by limestone aquifers. According to the United States Geologic Survey (USGS) *Water Resources Investigations Report 03-4051* (USGS, 2003), the Site is located in the Coastal Lowlands subregion of the coastal plain, which consists of sediments deposited in estuarine and near-shore environments; however, close to the north is the interpreted boundary with the middle-coastal plain subregion, which is characterized by variable sediment conditions laterally and vertically, and includes coarse sands associated with shoreline deposits to silts and clays associated with estuararies and lagoons deposited during the Pleistocene Age.

Based on the *Water Resources Investigations Report,* the geologic formations in the area, from most recent to oldest include the following:

- the Quaternary Age surficial sand deposits;
- the undifferentiated Pleistocene and Pliocene Age deposits of the quaternary and later tertiary system;
- the Tertiary Age Castle Hayne Formation;
- the Tertiary Age Beaufort Formation (Peedee Confining Unit); and,
- the Cretaceous Age Peedee Formation.

According to the North Carolina Geologic Survey, the Site area is underlain by the Waccamaw Formation, which is generalized as a fossiliferous bluish-gray to tan loosely consolidated sand with silt and clay. The Waccamaw Formation

straddles the Pleistocene-Pliocene boundary, and generally correlates with the data provided by US Geologic Survey.

These units are described in the USGS report as follows:

Quaternary Age Deposits: Light yellow to grey fine to medium sands with traces of clay, coarse-grained sand, pebbles, and minerals. These deposits are part of the *surficial aquifer*, which is a shallow groundwater aquifer in the uppermost strata in Brunswick County. The surficial aquifer system is used as a source of agricultural and domestic water supply in Brunswick County (USGS, 2003)

Pleistocene and Pliocene Deposits: An undifferentiated, variable unit that does not have sufficient structure to divide into discrete formations, this unit is characterized by shelly quartz sands with well preserved shell material or shell hash, and shelly carbonates consisting of shell hash and sandy marls or sandy moldic limestone.

> "In areas where the Castle Hayne...confining unit is missing, the surficial aquifer is in direct contact with the Castle Hayne Aquifer..." (Pg. 14, USGS, 2003).

Clays and silts in these deposits are generally thin, discontinuous, and lack lateral continuity. However, the USGS points out that, at Sunny Point Military Terminal (SPMT), a clay unit separates the surficial aquifer into a surficial aquifer and a deeper tertiary sand aquifer, which is directly underlain by the Castle Hayne aquifer at SPMT. As mentioned above, the surficial aquifer system includes groundwater present in the Pleistocene and Pliocene Deposits, and is used as a source of agricultural and domestic water supply in Brunswick County (USGS, 2003)

Castle Hayne Formation: The Castle Hayne Formation consists primarily of limestone and sand deposited in a marine environment (Winner and Coble,

1996). The elevation of the top of the Castle Hayne in the vicinity of the Site is documented to be approximately 45 feet below mean sea level (-45 feet MSL), as documented on the hydrogeologic cross section provided as Plate G of the USGS Water Resources Report (USGS, 2003). The Castle Hayne aquifer is one of the principal sources of potable water supply for the City of Southport (USGS, 2003).

The Castle Hayne is recharged primarily from the overlying surficial aquifers and where it is exposed or unconfined. The Castle Hayne is also prone to the development of sinkholes, and, where their occurrence is prevalent, the aquifer can be recharged through the development and collapse of sinkholes. A minor amount of recharge (~1-inch) is provided through seepage from the shallow surficial aquifer into the deeper intermediate aquifer directly through infiltration from precipitation, and from the underlying Peedee aquifer.

Peedee Confining Unit: The Peedee confining unit is generally the clay or silt beds that occur near the top of the Peedee Formation. Where it is present, the Peedee confining unit is part of the Beaufort Formation in southeastern Brunswick County (Lautier, 1998). The elevation of the top of the Peedee confining unit is documented to be approximately -65 feet MSL, as documented on Plate G of the USGS Water Resources Report (USGS, 2003).

Peedee Formation: The composition of the Peedee Formation in southeastern Brunswick County is described as the Rocky Point Member of the Upper Peedee Formation consisting of gray, sandy, moldic limestone that grades downward to a calcareous sandstone. The upper part of the Peedee aquifer is an important source of water for domestic and commercial use, and is used in combination with the Castle Hayne aquifer as the source of municipal water supply by Brunswick County (USGS, 2003).

3.2.2 Site-Specific Geology

A site-specific interpretation of the geology in the PA has been developed by using boring logs from the assessment activities, boring logs from nearby assessment activities, historical plant construction information, and sources of publicly available geologic and environmental information. The following section presents a summary of the geologic units that are present within and in the vicinity of the PA. Additionally, geologic and hydrogeologic cross sections have been developed that depict plant infrastructure, site features, subsurface stratigraphic units, groundwater monitoring data, and groundwater analytical results, and are presented on **Figure 8** and **Figure 9**.

The site-specific geology in the vicinity of the plant area has been significantly modified as a result of the construction of the plant. As observed in pre-construction drawings related to the construction of the plant foundation (D'Appolonia Consulting Engineers, Inc., 1968), a benched excavation extending to a terminal depth of approximately forty five (45) feet bgs (-25 feet MSL) was required to construct the plant foundation and associated power generation facilities, and areas within the excavation footprint were backfilled with sand fill materials and compacted to various specifications. These drawings are included as **Appendix C** of this report. The information obtained from the referenced documents was carefully considered during the interpretation of the site-specific geology and the development of the geologic cross sections.

In general, the site-specific geology observed in the PA is as follows:

Plant Backfill: Very hard, sandy fill material is generally present in the area surrounding the reactor and turbine building, and extends laterally in all directions as a result of the significant excavation and foundation construction completed as part of the plant construction activities. The sandy fill is a very dense, well compacted material, and generally exhibits no sedimentary structure.

In some areas, the fill unit was not penetrable via Geoprobe® soil sampling techniques because of the high density obtained from compaction of the fill during plant construction. As a result, soil samples from these materials were typically not able to be obtained. The thickness of the backfill materials is greatest at locations near the reactor and turbine buildings (up to 45 to 50 feet thick). The thickness of the backfill decreases radially in general proportion to the lateral distance from the reactor and turbine building areas.

Groundwater is observed in the plant backfill at approximately 15 feet bgs. Because the excavation of the plant foundations penetrates through a low-permeability unit that provides a vertical hydraulic barrier between a shallow and intermediate depth aquifer (described below), the groundwater in the plant backfill is associated with both shallow and intermediate depth aquifers. Outside of the plant backfill, the shallow aquifer is typically observed in the upper sand from approximately 8 to 30 feet bgs, and the intermediate aquifer is generally present in the lower sand unit from approximately 35 to 65 feet bgs. As a result, both of these aquifers are hydraulically connected to the plant backfill. It should be noted that the lower sand aquifer is also hydraulically connected to the Tertiary Age Castle Hayne aquifer, which is one of the sources of potable water supply in the region. Groundwater hydrology in the plant area is further discussed in Section 3.3.

Upper Sand: The upper sand is generally present at locations where it was not removed during the excavation and construction of the foundations. The upper sand is generally observed as a loose tan to light grey fine sand, with varying amounts of silt. Towards the middle to bottom of the upper sand, silty and clayey sub-units are often observed, although the depths of the silt and clay lenses are generally not consistent between borings. In several borings, the clay and silt lenses are not observed. The upper sand was typically observed to be saturated at a depth of approximately 8 to 10 feet bgs and has a thickness from 10 to 20 feet. Towards the base of the upper sand, shelly layers were often

encountered in thin lenses of silt, and the contact with the underlying low-permeability unit was typically characterized by interlayered sandy silts, silty sands, and clayey silts. The upper sand generally occurs from the surface to 1 to 10 feet MSL. This unit correlates with the *Surficial Deposits* described by USGS (USGS, 2003).

A shallow aquifer is observed in the upper sand at approximately 15 feet bgs. This aquifer represents the shallow hydrostratigraphic unit in the *Surficial Aquifer* described by USGS (USGS, 2003).

Low-Permeability Unit: Below the upper sand, a low permeability unit was encountered. The low permeability unit consists of cohesive dark grey silt and clay. As described above, the contact with the overlying upper sand is typically gradational until the competent dark grey silt and clay unit is encountered. At previously investigated areas of the plant it is approximately four (4) to fifteen (15) feet thick, and exhibits shelly layers and occasional thin laminates of very fine grained sand within the low to medium moist silt and clay. Shelly layers were observed in a number of the borings around 20 to 25 feet bgs.

The low permeability unit hydraulically separates the shallow aquifer and the intermediate aquifer that is observed in other areas of the plant.

Lower Sand Unit: Below the low permeability unit, a layer of fine to medium grey dense sand is observed. The lower sand generally consists of quartz sands and silty limey sands (sandy carbonates) with occasional shells, shell hash, clayey sands, clayey silt, and sandy silt layers. The lower portion of this sand unit generally grades to a limey sand/sandy carbonate. The thickness of the lower sand is generally 35 to 40 feet thick. This unit correlates with the *Undifferentiated Pleistocene and Pliocene Deposits* described by USGS (USGS, 2003)

The lower sand exhibits saturated conditions generally throughout the vertical thickness of the unit. A groundwater aquifer is observed in the lower sand and is referred to in this report as the intermediate aquifer. This aquifer correlates with the *Tertiary Sand Aquifer* described by USGS (USGS, 2003).

Castle Hayne Formation: None of the borings completed during the assessment of the PA were advanced deep enough to encounter the Castle Hayne Formation; however, because the unit is present approximately 15 to 20 feet below the constructed foundations of the nuclear reactors, it is important to consider the Castle Hayne Formation in the assessment of the PA given its importance with respect to local and regional groundwater supplies. The Castle Hayne Formation is a very hard, consolidated sandy limestone, and is an important source water supply in the vicinity of Southport (USGS, 2003).

3.3 Groundwater Hydrology

Groundwater hydrology within the PA is relatively complex as a result of the significant depth of the subsurface excavation activities associated with plant construction. The groundwater system within the plant area is therefore best characterized by presenting a discussion of the aquifers that are present outside of the plant backfill, and concluding with a discussion of the groundwater hydrology within the plant backfill materials.

3.3.1 Shallow Aquifer

In the areas upgradient of the plant backfill, a shallow groundwater aquifer is generally encountered at a depth of approximately eight feet bgs and extends to approximately -8 to -14 feet msl. The thickness of the aquifer is approximately 16 to 25 feet, and exhibits unconfined, water table conditions. The upgradient

shallow aquifer is generally recharged directly through infiltration from precipitation.

Based on previous groundwater investigations completed at the upgradient area (SSi, 2008), the groundwater originating from the upgradient area flows towards and into the PA from the north, west, and south. Groundwater monitoring activities completed during the assessment of the PA support these interpretations, and indicate that groundwater flows radially from the upgradient areas into the PA and into the plant backfill, as depicted as shallow potentiometric surface maps presented on **Figure 10** and **Figure 11**.

The shallow aquifer outside of the plant backfill area is generally underlain by the low-permeability unit (described in Section 3.2.2), which was encountered in several of boreholes advanced in the PA (but outside of the plant backfill area) during the groundwater assessment. Based on the previous work conducted at the Site, the low permeability unit separates the shallow aquifer from an intermediate aquifer that is below the low-permeability unit. Where the low permeability unit is present, the vertical migration of contaminants from the shallow aquifer into the intermediate aquifer is generally impeded or significantly retarded; however, there is a small degree of hydraulic and chemical exchange between the shallow and intermediate aquifers that occurs vertically through the clay, as observed in previous investigation activities.

The interpretations regarding groundwater flow direction at the Site is based on water level measurements collected from the shallow wells. These data are presented in **Table 5** and provided the basis for the interpretation of the horizontal flow of groundwater in the shallow aquifer.

3.3.2 Intermediate Aquifer

Based on previous groundwater investigations completed in the vicinity of the PA (SSi, 2008), an intermediate-depth aquifer is located beneath the low

permeability unit in the lower sand unit (at areas outside of the plant backfill). The intermediate aquifer in the lower sand is generally encountered at a depth of approximately -10 to -20 feet msl, and extends to top of the Castle Hayne Formation, approximately -50 feet msl. As such, the intermediate aquifer in the lower sand is hydraulically connected to the underlying Castle Hayne Formation aquifer, which is a source of potable water in Southport. As a result, these two aquifers behave as a single aquifer (USGS, 2003), which is an important consideration with respect to groundwater conditions within the plant backfill.

Each of the four groundwater monitoring wells installed in the intermediate aquifer during the assessment of the PA were installed in the lower sand unit below the plant backfill. Based on groundwater elevation measurements collected from the four intermediate monitoring wells, groundwater in the intermediate aquifer flows to the southeast toward the Intake Canal, as depicted on potentiometric surface maps presented as **Figure 12** and **Figure 13**.

Based on the depth of the bottom of the Intake Canal relative to the top of the intermediate aquifer, groundwater in the intermediate aquifer appears to discharge into the intake canal; however, it cannot be determined from the available information whether that Intake Canal intercepts all of the groundwater in the intermediate aquifer in the vicinity of the PA.

Based on the previous investigations in other areas of the BNP, the combined thickness of the intermediate aquifer is approximately 40 to 55 feet, and extends to a depth of approximately -50 to -65 feet msl in the vicinity of the PA. At areas outside of the footprint of the plant backfill, the intermediate aquifer exhibits semi-confined to confined conditions, is recharged primarily by inflow from the Castle Hayne Formation aquifer, and receives a relatively small volume of recharge from vertical percolation through the overlying low-permeability unit.

The intermediate aquifer (Castle Hayne member) is generally underlain by the low-permeability Peedee confining unit. The Peedee confining unit is considered a vertical hydraulic boundary between the intermediate aquifer and the deep (Peedee) aquifer that is below the low-permeability unit (SSi, 2008).

3.3.3 Groundwater in the Plant Backfill

Groundwater flow into and out of the plant backfill is conceptualized on the Geologic Cross Sections provided on **Figure 8** and **Figure 9**. Saturated conditions are present in the plant backfill from a depth of approximately 15 feet bgs to below the base of backfill (approximately 45 to 50 feet bgs). As described in Section 3.2.2, the excavation that was completed to construct the foundations for the reactor and turbine buildings penetrates through a low-permeability unit that provided a vertical hydraulic barrier between the shallow and intermediate depth aquifer (described above). As a result, the groundwater in the plant backfill receives groundwater inflow from the shallow and intermediate depth aquifers, as evidenced by the potentiometric surface maps presented as **Figure 10 and Figure 11** (shallow groundwater) and **Figure 12 and Figure 13** (intermediate aquifer).

Groundwater is observed to flow radially into the plant backfill from the shallow aquifer surrounding the plant. Groundwater elevations are notably lower within the plant backfill than the surrounding shallow aquifer, primarily the result of an increase in the vertical thickness of porous media in which the groundwater may flow. As a result, horizontal groundwater flows into the plant backfill from the shallow aquifer at areas immediately adjacent to the plant backfill area as a result of the lower hydraulic head in the plant backfill.

Similarly, groundwater in the intermediate aquifer flows horizontally to the south and southeast based on the potentiometric surface depicted on **Figure 12** and **Figure 13,** which is consistent with the observed flow direction in the intermediate aquifer at other areas of the BNP. Because the plant backfill

intersects the upper portion of the intermediate aquifer, some of the groundwater from the intermediate aquifer appears to flow into the plant backfill, where it becomes intermixed with groundwater that enters the plant backfill from the shallow aquifer. Additionally, because the vertical hydraulic gradient between the shallow wells installed in the plant backfill and the intermediate wells installed in the PA is in the downward direction, the shallow groundwater in the backfill migrates vertically into the deeper plant backfill and into the intermediate aquifer. The groundwater in the intermediate aquifer flows to the south-southeast from the PA.

The intermediate aquifer extends to an estimated depth of -50 to -65 feet msl (the estimated top of the Peedee confining unit), which separates the shallow and intermediate aquifer from the deeper Peedee aquifer.

4 SUMMARY AND CONCLUSIONS

Silar Services Incorporated (SSi) has prepared this Groundwater Assessment Report (GAR) to document the results of groundwater assessment activities performed at the Protected Area (PA) of the Brunswick Nuclear Plant (BNP), located in Southport, Brunswick County, North Carolina. The purpose of the groundwater assessment was to evaluate hydrogeology and determine the presence of potential radiological impacts to groundwater in various areas of the BNP PA.

The assessment was initiated to be consistent with industry standard practice and current guidance documents associated with the protection of groundwater resources from radiological materials.

The overall objectives of the groundwater assessment were to provide sampling points to evaluate groundwater quality in order to assess the potential for sources of contamination in various areas of the PA and, characterize the geology and hydrogeology in the PA.

Groundwater profiling was completed at twenty-four (24) temporary groundwater screening points located within and around the PA. A total of ninety-seven (97) groundwater screening samples were collected from the screening points and analyzed for tritium. Additionally, soil samples were collected from seventeen (17) of the nineteen screening locations inside the PA and analyzed for gamma-emitting isotopes.

Following the evaluation of the groundwater screening data, nineteen (19) shallow groundwater monitoring wells and four (4) intermediate groundwater monitoring wells were installed in the PA to provide groundwater monitoring locations that may be selected for inclusion, as necessary, in a site-wide groundwater monitoring program. Two rounds of groundwater samples were collected and analyzed to assess the presence and concentrations of tritium in groundwater. The investigation locations were surveyed by a Professional Land Surveyor licensed in the State of North Carolina to

facilitate the evaluation of the chemical and physical data collected during the project. The results are summarized in the following subsections.

4.1 Summary of Soil Conditions

A total of thirty-four (34) soil samples were collected from seventeen (17) locations for purposes of determining the presence/absence of residual radiological materials in shallow subsurface soils in the PA. The samples were analyzed for gamma-emitting isotopes.

As depicted on **Figure 5**, four of the locations in the PA exhibited a detection of the gamma-emitting isotope Cesium-137. Three of the four locations (TP-PA8, TP-PA9, and TP-PA10) are within the transformer yard, and one location (TP-PA16) is near the Radwaste Building. Future groundwater samples will be collected from these areas and analyzed for gamma-emitting isotopes to determine if there are related impacts to groundwater quality in these areas. Should plant operation and maintenance activities in these areas require subsurface work, worker protection measures should be considered by the appropriate qualified plant personnel ensure that exposures to radiological materials is minimized.

The results of the soil assessment are intended to provide general information in support of plant operation and maintenance considerations, and to provide preliminary information in support of decommissioning considerations. Additional assessment of the nature and extent of radionuclides in the subsurface may be warranted in the future to support plant operations and maintenance and/or decommissioning activities, as required by the NEI Industry Groundwater Protection Initiative 07-07 (NEI, August 2007):

NEI Objective 1.4: "Establish a remediation protocol to prevent migration of licensed material off-site and to minimize decommissioning impacts."

4.2 Summary of Groundwater Conditions

Twenty-four (24) temporary groundwater screening locations, nineteen (19) shallow monitoring wells, and four (4) intermediate monitoring wells were completed as part of the PA assessment.

Groundwater elevation measurements were obtained from each of the monitoring wells to evaluate the direction of groundwater flow in the study area. The results of the elevation measurements were plotted to develop the potentiometric surface maps presented on **Figures 10 through Figure 13**. Based on the measurements recorded, groundwater in the shallow aquifer around the PA flows radially into the plant backfill. Groundwater in the intermediate aquifer flows to the south-southeast in the vicinity of the PA. Because the plant backfill intersects the upper portion of the intermediate aquifer, some of the groundwater from the intermediate aquifer appears to flow into the plant backfill, where it becomes intermixed with groundwater that enters the plant backfill from the shallow aquifer. The general vertical hydraulic gradient between the shallow wells installed in the plant backfill and the intermediate wells installed in the PA is in the downward direction indicating that the shallow groundwater in the backfill migrates vertically into the deeper plant backfill and into the intermediate aquifer.

The groundwater in the intermediate aquifer flows to the south-southeast from the PA. Some of the groundwater in the intermediate aquifer may discharge into the Intake Canal, although the groundwater in the Castle Hayne aquifer, which is hydraulically connected to the intermediate aquifer, is not likely to discharge into the Intake Canal. The hydrogeologic cross sections presented on **Figure 8** and **Figure 9** depicts the interconnectedness of the shallow aquifer, the intermediate aquifer, and the groundwater in the plant backfill.

The groundwater samples collected during the groundwater screening program resulted in the development of a detailed vertical profile of groundwater quality, which is depicted on Cross Sections A-A' and B-B' on **Figure 8** and **Figure 9**, respectively. Ninety-seven (97) groundwater screening samples were obtained from depth intervals

throughout the saturated thickness of the plant backfill and adjacent shallow and intermediate aquifers. The results indicate that, in general, groundwater in the shallow aquifer in the vicinity of the plant has been affected by the release of tritium from several potential sources. As evidenced by the distribution of tritium in the groundwater screening samples, the majority of tritium is observed within the plant backfill materials. Additionally, an increasing trend of tritium activity is observed in groundwater screening samples collected from the intermediate aquifer below the plant backfill at TP-PA10 and TP-PA13, where the highest concentrations of tritium were observed below the plant backfill in the intermediate aquifer. The concentrations of tritium at TP-PA10-4 and TP-PA13-5 were 57,760 pCi/L and 49,830 pCi/L, respectively, which exceed the USEPA drinking water standard of 20,000 pCi/L. This may be the result of the downward vertical hydraulic gradient and tritium present in the shallow aquifer may have migrated downward into the intermediate aquifer. The source of tritium may be in the vicinity of monitoring well ESS-2C, where a historical release of tritium has resulted in a localized area of impacts.

Based on the results of the groundwater screening nineteen (19) shallow and four (4) intermediate permanent monitoring wells were installed in the PA. Representative groundwater samples were obtained from each of the permanent monitoring wells using low-flow groundwater sampling techniques. All groundwater samples were analyzed for tritium in Progress Energy's onsite radiological laboratory. Tritium was detected in fourteen (14) of the nineteen (19) shallow monitoring wells. Only three (3) of the nineteen (19) shallow groundwater samples exhibited concentrations of tritium that exceed the USEPA drinking water standard, and include: MWPA-104C located near the radwaste effluent line; MWPA-111C (located near the Radwaste Building); and, MWPA-115C (located adjacent to the Condensate Storage Tank). Tritium was also detected at three (3) of four (4) intermediate monitoring wells in the PA. The USEPA drinking water standard was exceeded at MW-PA104B and MWPA-107B. Both these wells are located in the general vicinity of the historic radwaste effluent line leak.

4.3 Conclusions

Radiological constituents in the form of tritium were observed in groundwater samples collected from groundwater monitoring wells in the PA included in this assessment. In general, the results from the initial groundwater sampling event conducted in October 2008 and the second round collected in March 2009 are similar. It is recommended that additional groundwater monitoring be completed on a monthly basis for one year. All groundwater samples should be analyzed for tritium; groundwater from monitoring wells MWPA-102C, MWPA103C, MWPA-104C, MWPA104B, and MWPA110C should be analyzed for gamma-specific nuclides by January 2010; groundwater from all other monitoring wells should be analyzed for gamma-specific nuclides at least once during the first year of monitoring. These results will be evaluated to establish a basis for which PA wells should be included in a long-term, site-wide groundwater monitoring program.

Additionally, further investigation in the vicinity of monitoring well ESS-2C (**Figure 7**) is warranted to delineate the vertical and horizontal extent of tritium in the shallow and intermediate aquifers in this area. Although it may be unlikely that the tritium activity observed in groundwater collected from monitoring well ESS-2C and in the vicinity of the PA are high enough to pose a risk to off-site potable groundwater supplies, concentration of tritium detected in the intermediate aquifer at MWPA-104B and MWPA-107B exceed the USEPA drinking water standard, and exhibit an increasing trend that has not been fully evaluated. Since the intermediate aquifer is hydraulically connected with a water supply aquifer for private wells in the City of Southport and surrounding area (the Castle Hayne Formation), delineating the extent of tritium in this area should be completed to provide conclusive evidence that demonstrates groundwater quality is not at risk as a result of plant operations.

5 REFERENCES

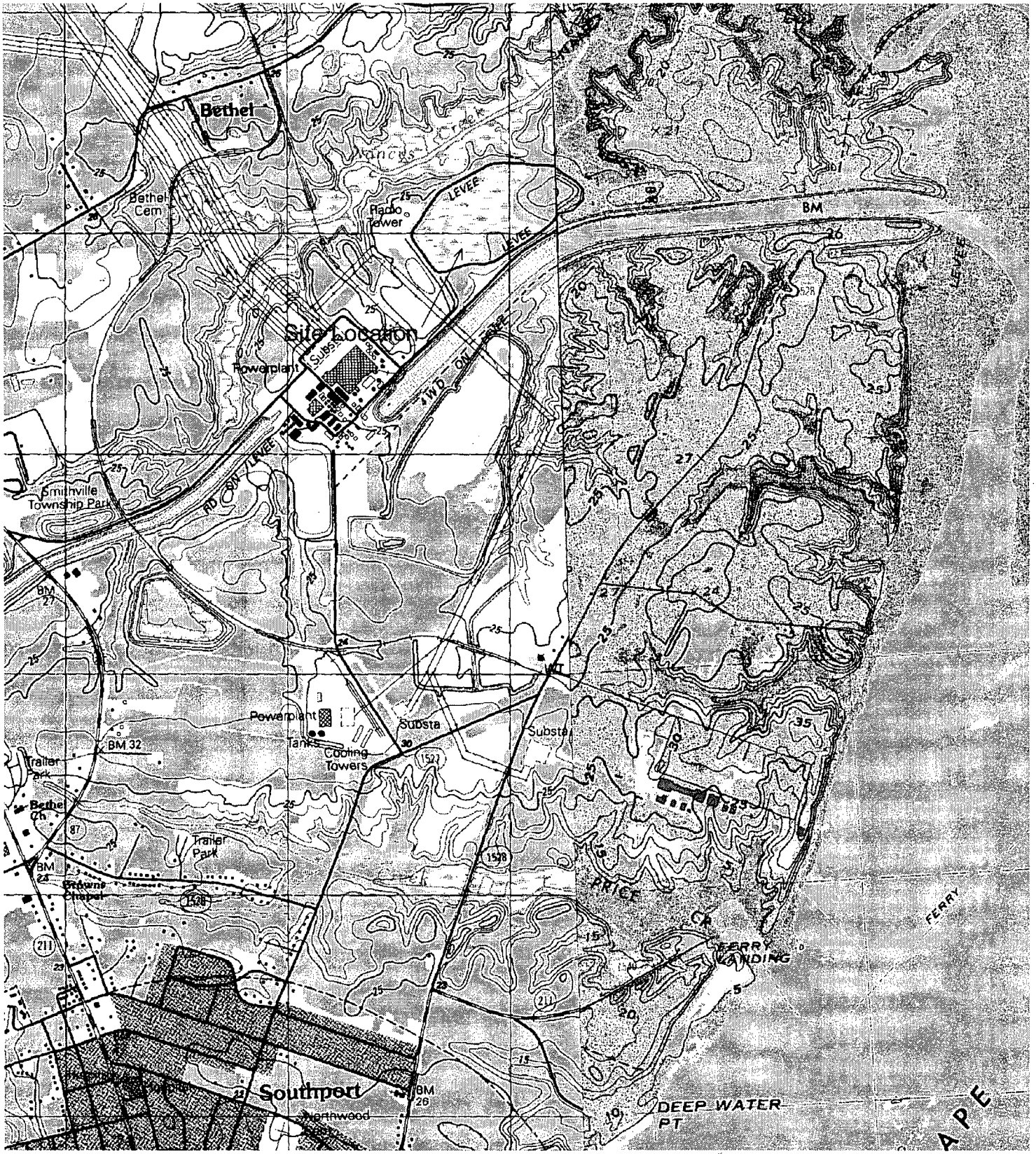
1. Brown, P.M. and others, 1985 Geologic Map of North Carolina, North Carolina Department of Natural Resources and Community Development.
2. Carolina Power & Light Company, Brunswick Plant, An Evaluation of Ground-water Conditions in the Vicinity of the Intake and Discharge Canals at the Brunswick Steam Electric Plant, November 10, 1982.
3. D'Appolonia Consulting Engineers, Inc., Brunswick Steam Electric Plant, Site Investigation, Proposed Foundation Scheme, Drawing No: 68-118-E12, July, 1968.
4. D'Appolonia Consulting Engineers, Inc., Site Assessment Report, Unit 2 Radwaste Effluent Line, Brunswick Nuclear Plant, June, 1995.
5. EPRI, Groundwater Monitoring Guidance for Nuclear Plants, Palo Alto, CA, 2005. 1011730
6. EPRI, Guideline for Implementing a Groundwater Protection Program at Nuclear Power Plants, Palo Alto, CA, 2007.TR-.
7. Nuclear Power Institute, Industry Ground water Protection Initiative – Final Guidance Document, NEI 07-07 [Final], August, 2007.
8. North Carolina Department of Environment, Arid Natural Resources, Division of Waste Management, Superfund Section, Inactive Hazardous Sites Branch. Inactive Hazardous Sites Program, Guidelines for Assessment and Cleanup, August 2001.
9. North Carolina Geologic Survey, Division of Land Resources, Subsurface Stratigraphic Framework for Cenozoic Strata in Brunswick and new Hanover Counties, North Carolina, Information Circular 27, 1991.
10. Progress Energy, Groundwater Monitoring Program, OE&RC-3250, Rev. 29.
11. SSI, Inc., Groundwater Investigation Report, Brunswick Nuclear Plant, Storm Drain Stabilization Pond, March 2008.
12. The EDR Radius Map with GeoCheck Brunswick Nuclear Generating Station, PO Box 10429, Southport, NC. 28461. Inquiry Number: 1942118.1s, May 31, 2007. Environmental Data Resources, Inc., Milford, Connecticut.
13. United States Department of the Interior Geological Survey. Southport and Kure Beach 7.5-Minute Quadrangle Maps, North Carolina.

14. United States Department of the Interior, Geological Survey, Hydrogeology and Ground-Water Quality of Brunswick County, North Carolina, Water Resources Investigation Report 03-4051, 2003.

15. U.S. EPA 2001. Region 4. Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, May 1996, Includes 1997 and 2001 Revisions. Athens: USEPA Region 4, 1997.

16. U.S. EPA 2004, Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP), MARLAP, July, 2004.

FIGURES



Quadrangle Location

0 2000 4000 Feet

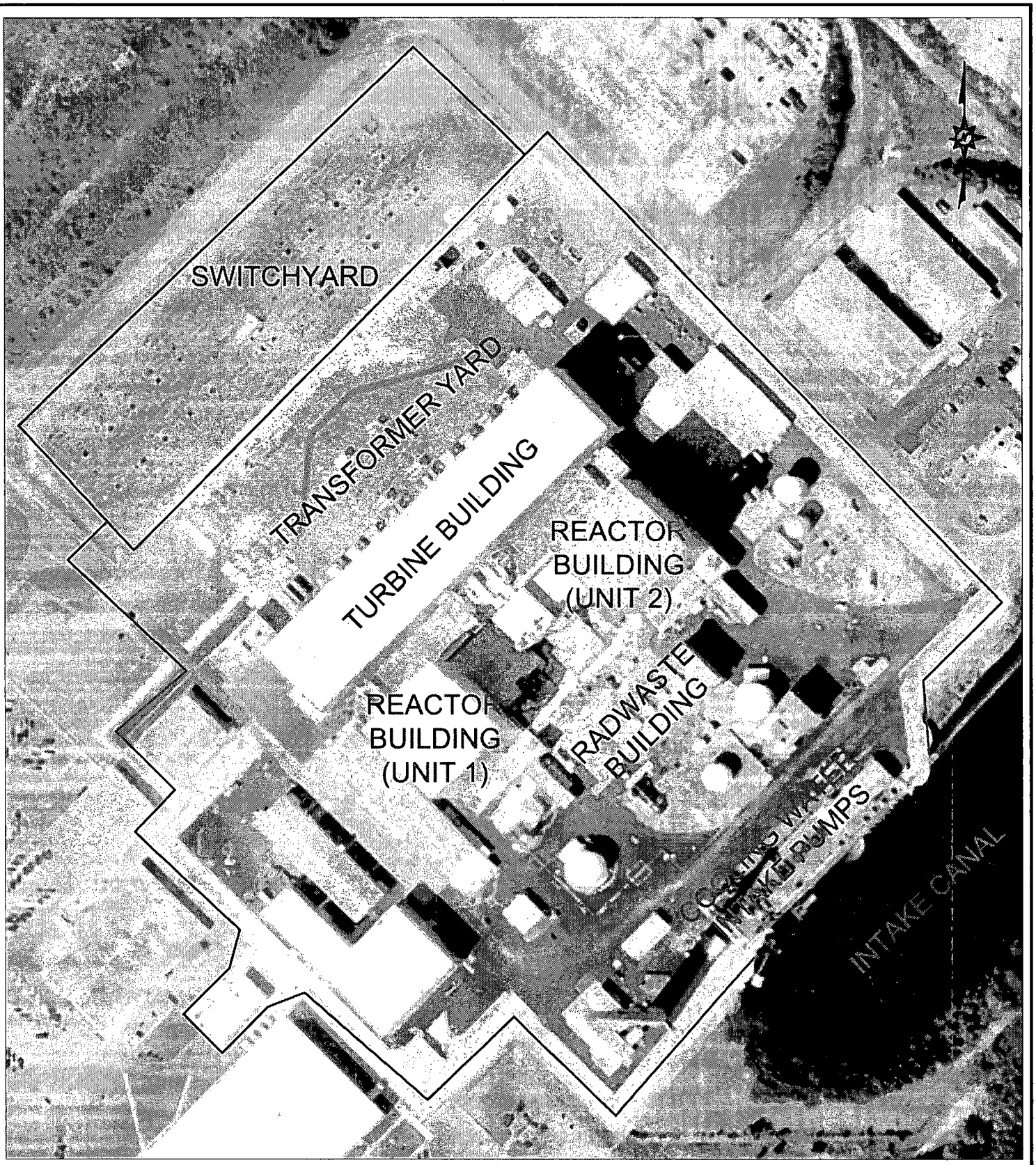
N

Source: U.S.G.S. Topographic Map (7.5 minute)
Southport & Kure Beach, NC quadrangles

Progress Energy
Brunswick Nuclear Plant
Southport, NC

Figure 1
Site Location Map

Silar Services Inc.



GENERAL BOUNDARY OF THE PROTECTED AREA

SCALE 1" = 200'

0 100 200 400 600

Progress Energy
Brunswick Nuclear Plant
Southport, NC

Groundwater Assessment Report

Figure 2

Site Layout - Protected Area

SSi Silar Services Inc.

SCALE 1" = 300'

0 150 300 600 1200

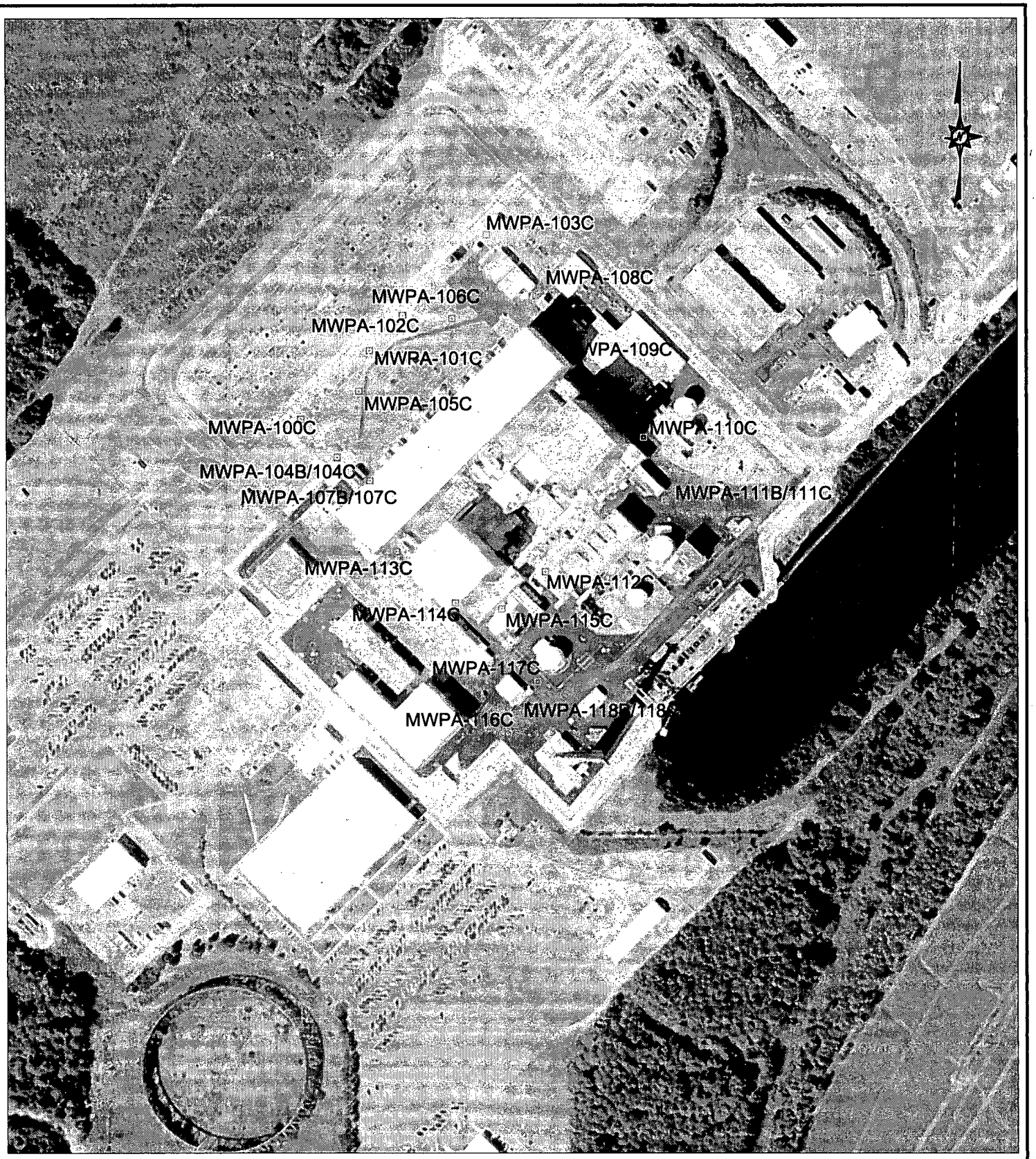
Progress Energy
Brunswick Nuclear Plant
Southport, NC

Groundwater Assessment Report

Figure 3

Protected Area Groundwater Screening Locations

Silar Services Inc.



LEGEND:

MWPA-113C ☐ *Monitoring Well*
C – Designates shallow well
B – Designates intermediate well

SCALE 1" = 300'

0 150 300 600 1200

Progress Energy
Brunswick Nuclear Plant
Southport, NC

Groundwater Assessment Report

Figure 4

Protected Area Groundwater Monitoring Well Locations

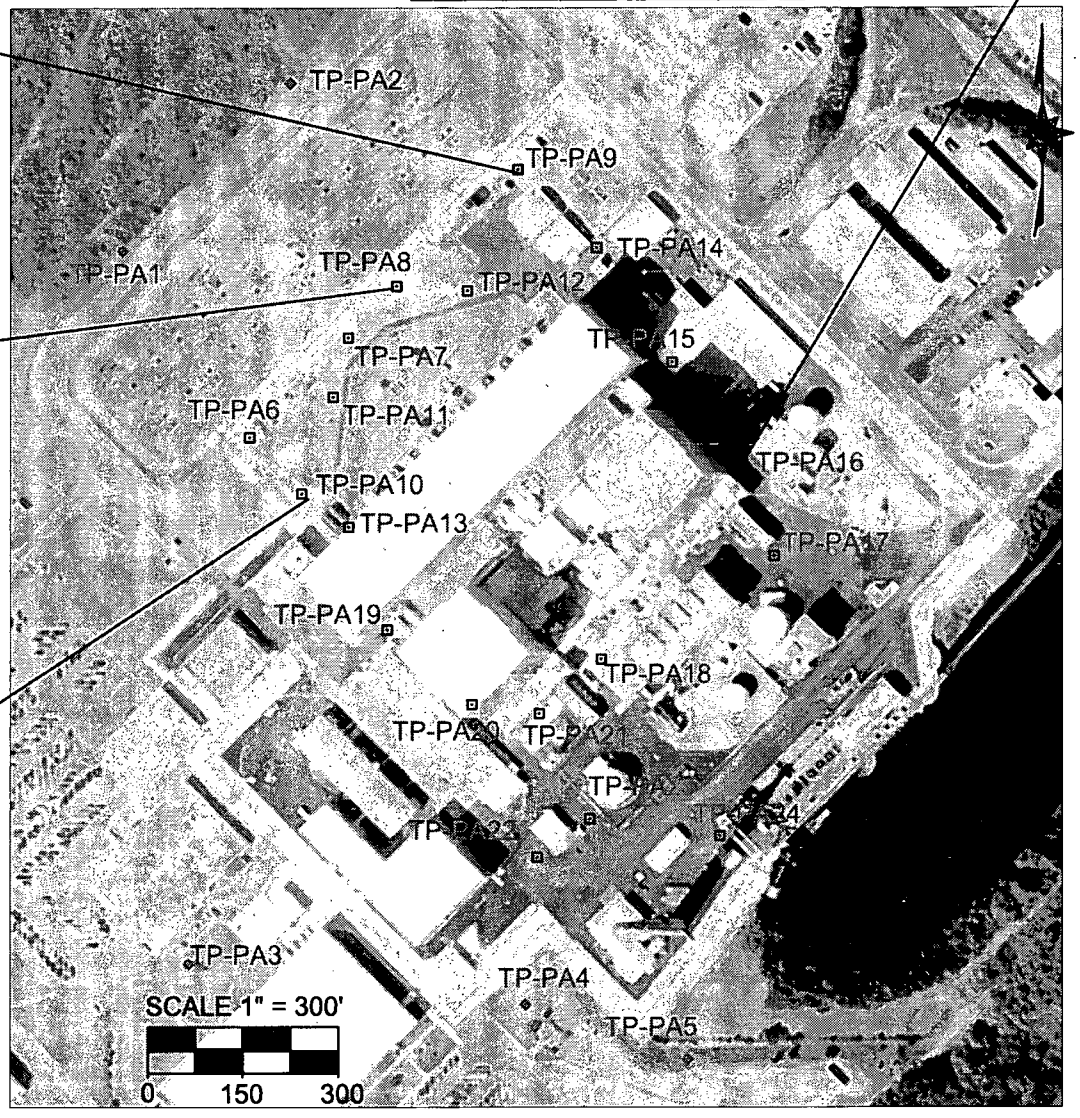
Silar Services Inc.

Sample I.D.	Sample Depth	Nuclide	Activity
TP-PA16-2	10	Cs-137	4.390E-02

Sample I.D.	Sample Depth	Nuclide	Activity
TP-PA9-1	6	Cs-137	2.007E-01
TP-PA9-2	9	Cs-137	2.712E-01

Sample I.D.	Sample Depth	Nuclide	Activity
TP-PA8-1	5	Cs-137	9.090E-02
TP-PA8-2	10	Cs-137	2.459E-02

Sample I.D.	Sample Depth	Nuclide	Activity
TP-PA10-1	5-6	Cs-137	2.608E-02



Legend:

TP-PA9-1 Temporary Point (soil boring)

All soil samples collected from 7/29/2008 to 8/1/2008
Results reported in pCi/ml (picocuries per milliliter)
Cs-137 - Cesium 137

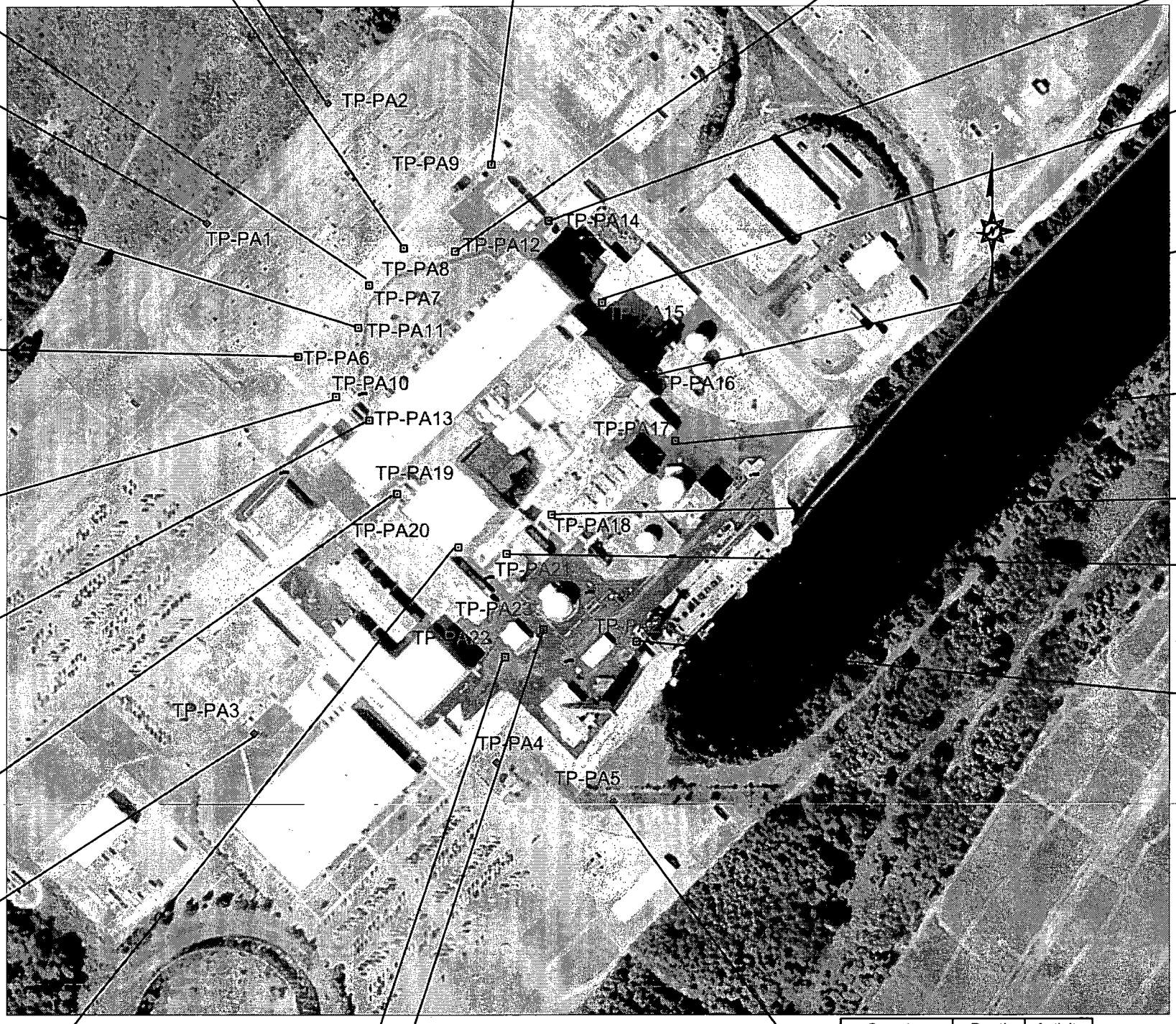
Progress Energy
Brunswick Nuclear Plant
Southport, NC

Groundwater Assessment Report

Figure 5

Analytical Results - Soil Samples

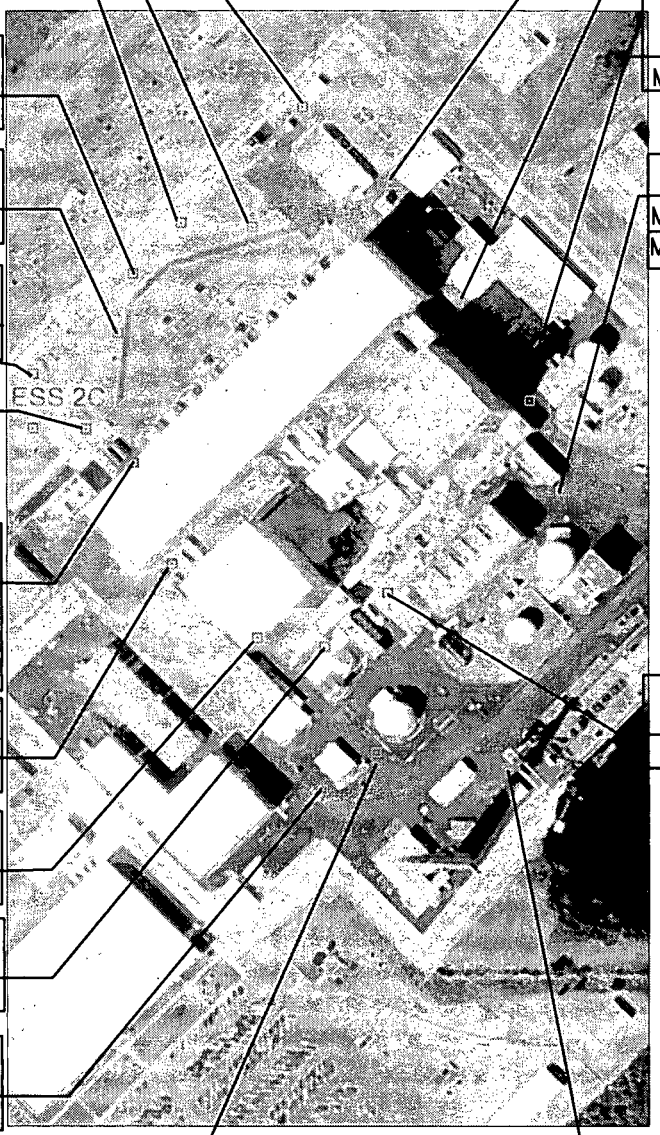
Silar Services Inc.



Sample Number	Depth feet	Activity pCi/L
TP-PA5-1	46-50	ND
TP-PA5-2	54-58	ND

TP-PA3 TEMPORAR

ND LESS THAN
CONCENTR



Well ID	10/3/08	3/24/09
MWPA-106C	445	386

Well ID	10/3/08	3/24/09
MWPA-102C	8,050	9,288

Well ID	10/4/08	3/24/09
MWPA-101C	19,120	3,411

Well ID	10/4/08	3/24/09
MWPA-105C	2,893	4,821

Well ID	10/4/08	3/24/09
MWPA-100C	ND	ND

Well ID	10/4/08	3/24/09
MWPA-104B	29,090	27,210
MWPA-104C	17,110	23,000

Well ID	10/13/08	6/2/09
MWPA-107C	1,733	1,309
	1/30/09	6/2/09
MWPA-107B	3,809	37,210

Well ID	10/3/08	3/23/09
MWPA-113C	ND	ND

Well ID	10/4/08	3/24/09
MWPA-114C	ND	523

Well ID	10/3/08	3/23/09
MWPA-115C	33,440	31,290

Well ID	10/4/08	3/23/09
MWPA-116C	ND	ND

Well ID	10/3/08	3/23/09
MWPA-117C	2,656	1,585

Well ID	10/3/08	3/24/09
MWPA-103C	ND	ND

Well ID	10/3/08	3/24/09
MWPA-108C	400	404

Well ID	10/3/08	3/25/09
MWPA-109C	ND	287

Well ID	10/3/08	3/19/09
MWPA-110C	ND	300

Well ID	10/13/08	3/19/09
MWPA-111B	2,908	2,862
MWPA-111C	40,630	30,790

Well ID	10/4/08	3/25/09
MWPA-112C	13,590	10,960

Well ID	10/4/08	3/23/09
MWPA-118B	ND	ND
MWPA-118C	ND	ND

Results are reported in pCi/L

ND = Less than the Lower Limit of Detection (LLD)

SCALE 1" = 300'

0 150 300 600 1200

Progress Energy

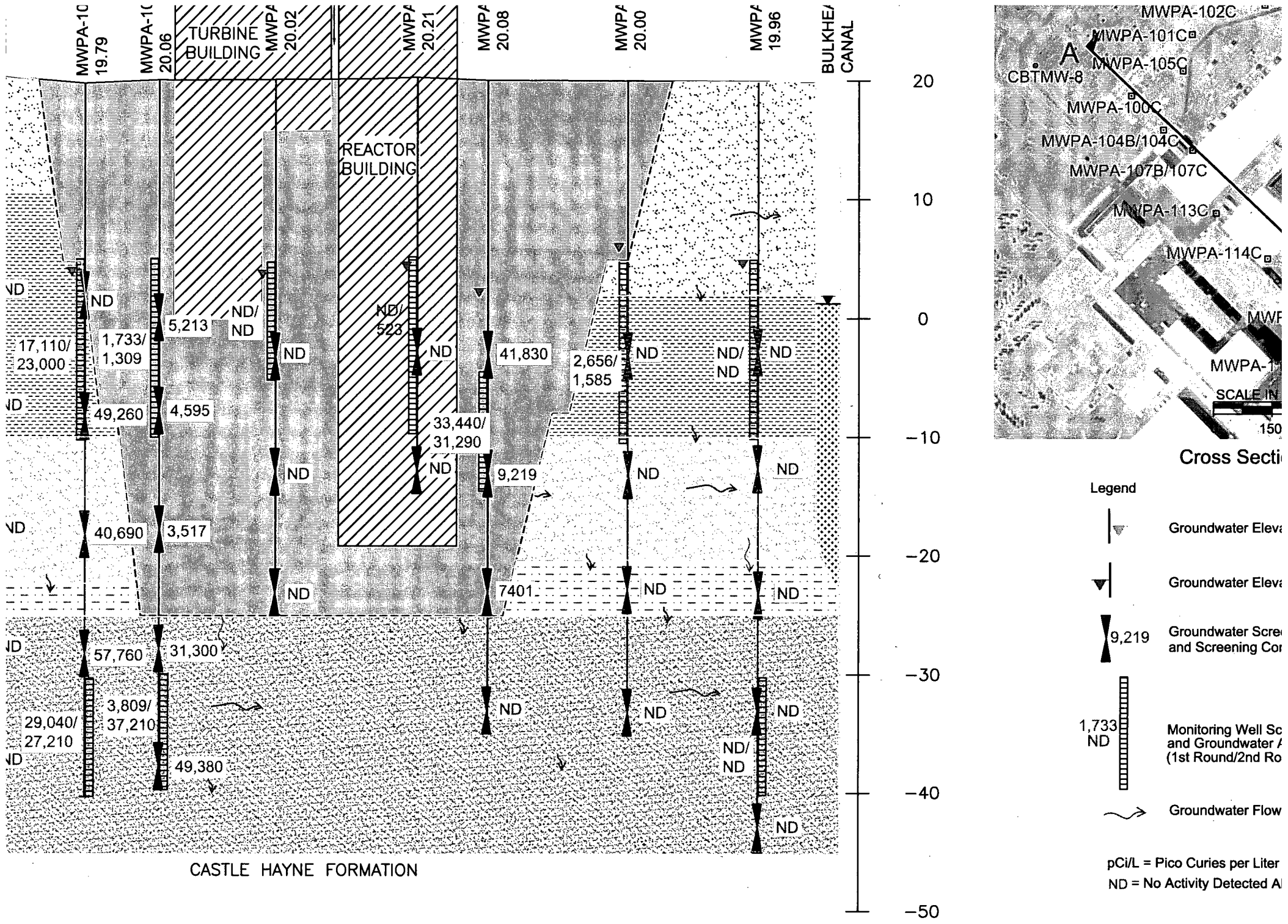
Brunswick Nuclear Plant
Southport, NC

Groundwater Assessment Report

Figure 7

Analytical Results - Groundwater Samples

Silar Services Inc.



Cross Secti

Legend

Groundwater Eleva

Groundwater Eleva

9,219 Groundwater Scre and Screening Cor

1,733 ND Monitoring Well Sc and Groundwater A (1st Round/2nd Ro

Groundwater Flow

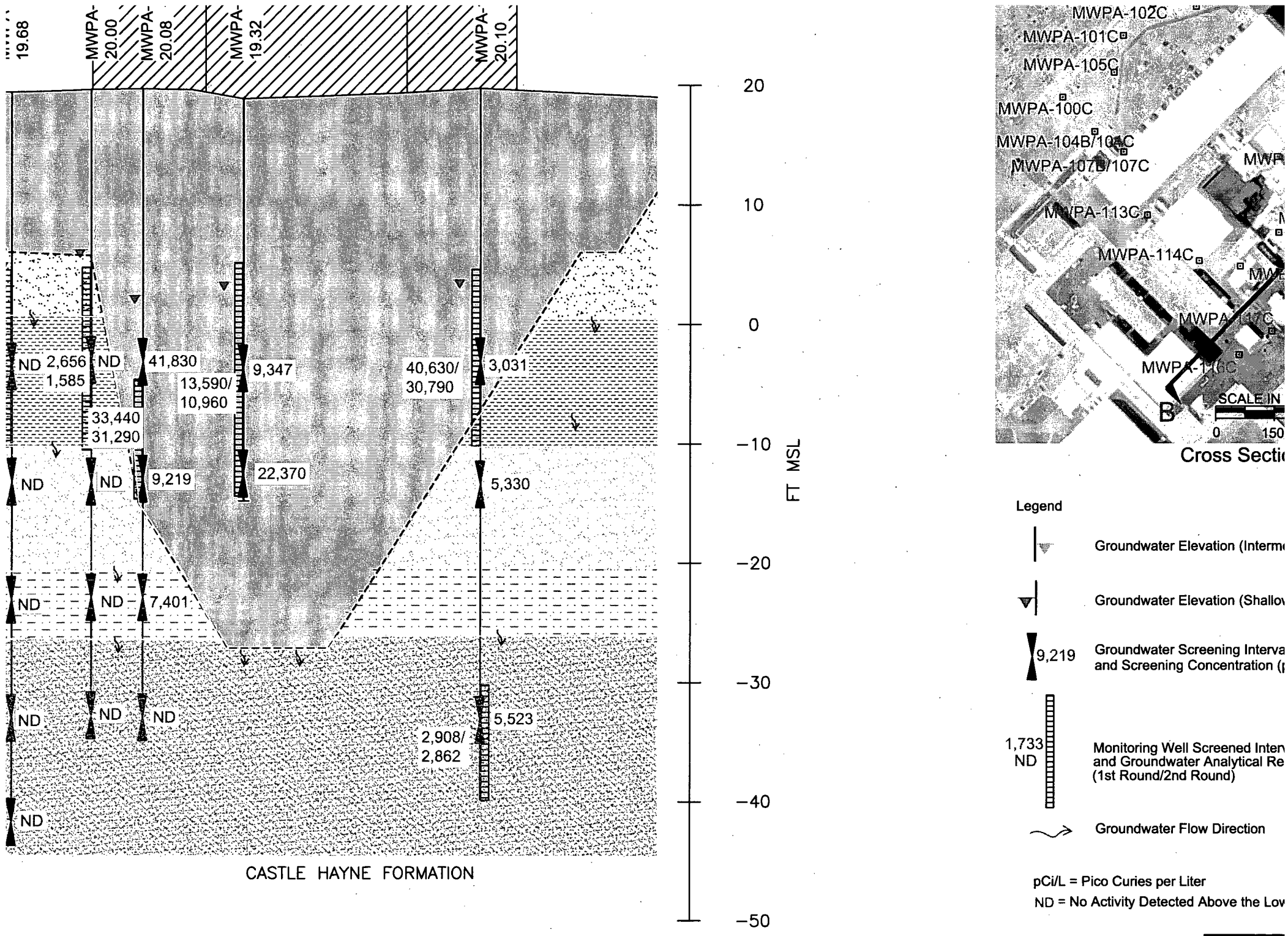
pCi/L = Pico Curies per Liter

ND = No Activity Detected Al

Clayey Silt
(Low Permeability Unit)

Clayey Silt, Silty Clay
(Part of Lower Sand Unit)

Horizontal Scale: 1" = 150'
Vertical Scale: 1" = 10'


19.68
MWPA-
20.00
MWPA-
20.08
MWPA-
19.32
MWPA-
20.10
ND 2,656
1,585
ND
41,830
13,590/
10,960
9,347
40,630/
30,790
3,031
33,440
31,290
ND
ND
9,219
22,370
5,330
ND
ND
7,401
ND
ND
ND
2,908/
2,862
5,523
ND
CASTLE HAYNE FORMATION
20
10
0
−10
−20
−30
−40
−50
FT MSL
MWPA-102C
MWPA-101C
MWPA-105C
MWPA-100C
MWPA-104B/104C
MWPA-107B/107C
MWPA-113C
MWPA-114C
B
SCALE IN
0
150
Cross Sectio
Legend
Groundwater Elevation (Interme
Groundwater Elevation (Shallo
9,219
Groundwater Screening Interva
and Screening Concentration (
1,733
ND
Monitoring Well Screened Inter
and Groundwater Analytical Re
(1st Round/2nd Round)
Groundwater Flow Direction
pCi/L = Pico Curies per Liter
ND = No Activity Detected Above the Lov
ckfill
Clayey Silt
(Low Permeability Unit)
Clayey Silt, Silty Clay
(Part of Lower Sand Unit)
Horizontal Scale: 1" = 150'
Vertical Scale: 1" = 10'

LEGEND:

- ▣ *MONITORING WELL*
- ← *GROUNDWATER FLOW DIRECTION*
- — *GROUNDWATER CONTOUR LINE (DASHED WHERE INFERRED)*
- 2.59 *ELEVATION MEAN SEA LEVEL*

Progress Energy
Brunswick Nuclear Plant
Southport, NC

Groundwater Assessment Report

Figure 10

Potentiometric Surface Map-Shallow Wells
October 3, 2008

Silar Services Inc.

LEGEND:

- ▫ *MONITORING WELL*
- ← *GROUNDWATER FLOW DIRECTION*
- — *GROUNDWATER CONTOUR LINE (DASHED WHERE INFERRED)*
- 2.59 *ELEVATION MEAN SEA LEVEL*

Progress Energy
Brunswick Nuclear Plant
Southport, NC

Groundwater Assessment Report

Figure 11
Potentiometric Surface Map-Shallow Wells
October 9, 2008

SSi Silar Services Inc.

LEGEND:

- ▫ *MONITORING WELL*
- ← *GROUNDWATER FLOW DIRECTION*
- — *GROUNDWATER CONTOUR LINE (DASHED WHERE INFERRED)*
- 2.59 *ELEVATION MEAN SEA LEVEL*

Progress Energy
Brunswick Nuclear Plant
Southport, NC

Groundwater Assessment Report

Figure 12

Potentiometric Surface Map-Deep Wells
October 3, 2008

Silar Services Inc.

LEGEND:

- *MONITORING WELL*
- *GROUNDWATER FLOW DIRECTION*
- *GROUNDWATER CONTOUR LINE (DASHED WHERE INFERRED)*
- 2.59 *ELEVATION MEAN SEA LEVEL*

Progress Energy
Brunswick Nuclear Plant
Southport, NC

Groundwater Assessment Report

Figure 13
Potentiometric Surface Map-Deep Wells
October 10, 2008

Silar Services Inc.

TABLES

TABLE 1
GROUNDWATER ASSESSMENT REPORT – PROTECTED AREA
BRUNSWICK NUCLEAR PLANT, SOUTHPORT, NORTH CAROLINA
GROUNDWATER ASSESSMENT LOCATIONS / RATIONALE

AREA	MONITORING WELL NUMBERS	LOCATION/RATIONALE
Perimeter of Protected Area	PA-TP1 though PA-TP5	Characterize subsurface geology and groundwater quality around the perimeter of the Protected Area.
West of Turbine Building / Reactors	TP-PA6 through TP-PA13	Characterize subsurface geology and establish a groundwater quality profile west of the turbine buildings, and near the subsurface radwaste line, storm sewer mains, and storm sewer collection basin. Install groundwater monitoring wells as necessary to facilitate future groundwater monitoring programs. Identify the presence/absence of gamma nuclides in shallow subsurface soils.
North of Turbine Building / Reactors	TP-PA14 through TP-PA16	Characterize subsurface geology and establish a groundwater quality profile on the northern portion of the Protected Area near the north storm drain line. Install groundwater monitoring wells as necessary to facilitate future groundwater monitoring programs. Identify the presence/absence of gamma nuclides in shallow subsurface soils.
East of Turbine Building / Reactors	TP-PA17, TP-PA18, TP-PA21, and TP-PA24	Characterize subsurface geology and establish a groundwater quality profile downgradient of the Reactor Buildings on the eastern portion of the Protected Area near the Radwaste Building, and the Condensate Storage Tank (TP-PA21). Install groundwater monitoring wells as necessary to facilitate future groundwater monitoring programs. Identify the presence/absence of gamma nuclides in shallow subsurface soils.

TABLE 1
GROUNDWATER ASSESSMENT REPORT – PROTECTED AREA
BRUNSWICK NUCLEAR PLANT, SOUTHPORT, NORTH CAROLINA
GROUNDWATER ASSESSMENT LOCATIONS / RATIONALE

AREA	MONITORING WELL NUMBERS	LOCATION/RATIONALE
South of Turbine Building / Reactors	TP-PA19, TP-PA20, TP-PA22 and TP-PA23	Characterize subsurface geology and establish a groundwater quality profile adjacent to the Reactor Building (TP-PA20) and turbine building (TP-PA19), and to the southeast of these areas near the south storm drain sewer main. Install groundwater monitoring wells as necessary to facilitate future groundwater monitoring programs. Identify the presence/absence of gamma nuclides in shallow subsurface soils.

Table 2
Progress Energy - Brunswick Nuclear Plant
Groundwater Assessment Report - Protected Area
Analytical Results - Soils

Well I.D.	Sample Date	Sample Depth (feet BGS)	Nuclide	Activity, pCi/ml
TP-PA6-1	7/29/2008	4.5-5.5	NORM	NA
TP-PA6-2	7/29/2008	9.5-10	NORM	NA
TP-PA7-1	7/29/2008	5-6	NORM	NA
TP-PA7-2	7/29/2008	10	NORM	NA
TP-PA8-1	7/30/2008	5	**Cs-137**	**9.090E-02**
TP-PA8-2	7/30/2008	10	**Cs-137**	**2.459E-02**
TP-PA9-1	7/31/2008	6	**Cs-137**	**2.007E-01**
TP-PA9-2	7/31/2008	9	**Cs-137**	**2.712E-01**
TP-PA10-1	7/29/2008	5-6	**Cs-137**	**2.608E-02**
TP-PA-10-2	7/29/2008	10	NORM	NA
TP-PA11-1	7/30/2008	5	NORM	NA
TP-PA11-2	7/30/2008	10	NORM	NA
TP-PA12-1	7/31/2008	6	NORM	NA
TP-PA12-2	7/31/2008	10	NORM	NA
TP-PA13-1	7/30/2008	6	NORM	NA
TP-PA13-2	7/30/2008	10	NORM	NA
TP-PA15-1	8/1/2008	5	NORM	NA
TP-PA15-2	8/1/2008	10	NORM	NA
TP-PA16-1	8/1/2008	5	NORM	NA
TP-PA16-2	8/1/2008	10	**Cs-137**	**4.390E-02**
TP-PA17-1	8/4/2008	5	NORM	NA
TP-PA17-2	8/4/2008	10	NORM	NA
TP-PA18-1	8/4/2008	5	NORM	NA
TP-PA18-2	8/5/2008	10	NORM	NA
TP-PA19-1	8/6/2008	5	NORM	NA
TP-PA19-2	8/6/2008	10	NORM	NA
TP-PA20-1	8/5/2008	5	NORM	NA
TP-PA20-2	8/5/2008	10	NORM	NA
TP-PA22-1	8/6/2008	5	NORM	NA
TP-PA22-2	8/6/2008	10	NORM	NA
TP-PA23-1	8/5/2008	5	NORM	NA
TP-PA23-2	8/5/2008	10	NORM	NA
TP-PA24-1	8/7/2008	5	NORM	NA
TP-PA24-2	8/7/2008	10	NORM	NA

Notes:
All samples analyzed by Progress Energy for Gamma Spec Nuclides
pCi/mL = picocuries per milliliter
NS = Not sampled
NORM - Naturally Occurring Radioactive Material (no radiological activity was detected above normal background radiological acti
Cs - Cesium
BGS - below ground surface

SSi

Table 3
Progress Energy - Brunswick Nuclear Plant
Groundwater Assessment Report - Protected Area
Analytical Results - Groundwater Screening Samples

Screening Location (well ID)	Sample Name	Sample Date	Groundwater Depth Interval (feet BGS)	Activity, pCi/L
TP-PA1 (No Well)	TP-PA1-1	05/30/08	16-20	NA
	TP-PA1-2	05/30/08	26-30	NA
	TP-PA1-3	05/30/08	36-40	NA
	TP-PA1-4	05/30/08	46-50	NA
TP-PA2 (No Well)	TP-PA2-1	07/07/08	16-20	NA
	TP-PA2-2	07/07/08	26-30	NA
	TP-PA2-3	07/08/08	36-40	NA
	TP-PA2-4	07/08/08	46-50	NA
	TP-PA2-5	07/08/08	61-65	NA
TP-PA3 (No Well)	TP-PA3-1	07/10/09	16-20	NA
	TP-PA3-2	07/10/09	26-30	NA
	TP-PA3-3	07/10/09	36-40	NA
	TP-PA3-4	07/10/09	46-50	NA
	TP-PA3-5	07/11/08	56-60	NA
TP-PA4 (No Well)	TP-PA4-1	07/09/09	16-20	NA
	TP-PA4-2	07/09/09	26-30	NA
	TP-PA4-3	07/09/09	36-40	NA
	TP-PA4-4	07/10/09	50-54	NA
TP-PA5 (No Well)	TP-PA5-1	07/09/09	46-50	NA
	TP-PA5-2	07/09/08	54-58	NA
TP-PA6 MWPA-100C	TP-PA6-1	07/29/08	16-20	NA
	TP-PA6-2	07/30/08	26-30	NA
	TP-PA6-3	07/30/08	36-40	NA
	TP-PA6-4	07/30/08	46-50	NA
	TP-PA6-5	07/30/08	56-60	NA
TP-PA7 MWPA-101C	TP-PA7-1	07/31/08	16-20	**3,150**
	TP-PA7-2	07/31/08	26-30	NA
	TP-PA7-3	08/01/08	36-40	NA
	TP-PA7-4	08/01/08	46-50	NA
	TP-PA7-5	08/01/08	56-60	NA
TP-PA8 MWPA-102C	TP-PA8-1	08/05/08	16-20	NA
	TP-PA8-2	08/05/08	26-30	NA
	TP-PA8-3	08/05/08	36-40	**3,004**
	TP-PA8-4	08/06/08	46-50	**3,331**
	TP-PA8-5	08/06/08	56-60	NA

Table 3
Progress Energy - Brunswick Nuclear Plant
Groundwater Assessment Report - Protected Area
Analytical Results - Groundwater Screening Samples

Screening Location (well ID)	Sample Name	Sample Date	Groundwater Depth Interval (feet BGS)	Activity, pCi/L
TP-PA9 MWPA-103C	TP-PA9-1	08/07/08	16-20	NA
	TP-PA9-2	08/07/08	26-30	NA
	TP-PA9-3	08/08/08	36-40	NA
	TP-PA9-4	08/08/08	46-50	NA
	TP-PA9-5	08/09/08	56-60	NA
TP-PA10 MWPA-104B/C	TP-PA10-1	07/31/08	16-20	NA
	TP-PA10-2	07/31/08	26-30	**49,260**
	TP-PA10-3	07/31/08	36-40	**40,690**
	TP-PA10-4	07/31/08	46-50	**57,760**
TP-PA11 MWPA-105	TP-PA11-1	08/01/08	16-20	NA
	TP-PA11-2	08/01/08	26-30	**4,984**
	TP-PA11-3	08/04/08	36-40	NA
	TP-PA11-4	08/04/08	46-50	NA
	TP-PA11-5	08/04/08	56-60	NA
TP-PA12 MWPA-106C	TP-PA12-1	08/06/08	16-20	NA
	TP-PA12-2	08/06/08	26-30	NA
	TP-PA12-3	08/06/08	36-40	NA
	TP-PA12-4	08/07/08	46-50	NA
TP-PA13 MWPA-107B/C	TP-PA13-1	08/05/08	18-22	**5,213**
	TP-PA13-2	08/05/08	26-30	**4,595**
	TP-PA13-3	08/05/08	36-40	**3,517**
	TP-PA13-4	08/05/08	46-50	**31,300**
	TP-PA13-5	08/05/08	56-60	**49,380**
TP-PA14 MWPA-108C	TP-PA14-1	08/11/08	21-25	NA
	TP-PA14-2	08/11/08	36-40	NA
	TP-PA14-3	08/11/08	46-50	NA
	TP-PA14-4	08/11/08	56-60	NA
TP-PA15 MWPA-109C	TP-PA15-1	08/11/08	21-25	NA
	TP-PA15-2	08/12/08	31-35	NA
	TP-PA15-3	08/12/08	41-48	NA
TP-PA16 MWPA-110C	TP-PA16-1	08/12/08	21-25	NA
	TP-PA16-2	08/14/08	31-35	NA
	TP-PA16-3	08/14/08	41-45	NA
	TP-PA16-4	08/14/08	51-55	NA

Table 3
Progress Energy - Brunswick Nuclear Plant
Groundwater Assessment Report - Protected Area
Analytical Results - Groundwater Screening Samples

Screening Location (well ID)	Sample Name	Sample Date	Groundwater Depth Interval (feet BGS)	Activity, pCi/L
TP-PA17	TP-PA17-1	08/14/08	21-25	**3,031**
MWPA-111B/C	TP-PA17-2	08/15/08	31-35	**5,330**
	TP-PA17-5	08/18/08	51-55	**5,523**
TP-PA18	TP-PA18-1	08/18/08	21-25	**9,347**
MWPA-112C	TP-PA18-2	08/18/08	30-34	**22,370**
TP-PA19	TP-PA19-1	08/19/08	21-25	NA
MWPA-113C	TP-PA19-2	08/19/08	31-35	NA
	TP-PA19-3	08/20/08	41-45	NA
TP-PA20	TP-PA20-1	08/20/08	21-25	NA
MWPA-114C	TP-PA20-2	08/20/08	31-35	NA
	TP-PA21-1	08/28/08	21-25	**41,830**
TP-PA21	TP-PA21-2	08/28/08	31-35	**9,219**
MWPA-115C	TP-PA21-3	08/28/08	41-45	**7,401**
	TP-PA21-4	08/28/08	51-55	NA
	TP-PA22-1	08/22/08	21-25	NA
TP-PA22	TP-PA22-2	08/22/08	31-35	NA
MWPA-116C	TP-PA22-3	08/22/08	41-45	NA
	TP-PA22-4	08/25/08	51-55	NA
	TP-PA22-5	08/25/08	61-65	NA
	TP-PA23-1	08/20/08	21-25	NA
TP-PA23	TP-PA23-2	08/21/08	31-35	NA
MWPA-117B/C	TP-PA23-3	08/22/08	41-45	NA
	TP-PA23-4	08/22/08	51-55	NA
	TP-PA24-1	08/25/08	21-25	NA
TP-PA24	TP-PA24-2	08/25/08	31-35	NA
MWPA-118C	TP-PA24-3	08/26/08	41-45	NA
	TP-PA24-4	08/26/08	51-55	NA
	TP-PA24-5	08/26/08	61-65	NA

Notes:
All samples analyzed by Progress Energy for tritium only
pCi/L = picocuries per liter
NA = No Radiological Activity
BGS = below ground surface (feet)

Table 4
Groundwater Assessment - Protected Area
Brunswick Nuclear Plant, Southport, North Carolina
Monitoring Well Construction Summary

Well I.D.	Previous Well I.D.[2]	Well Depth (TOC)	Surface Casing Depth (bgs)	TOC (MSL)	Ground Surface Elevation (MSL)	Annular Fill Material			
						Screen Interval (feet bgs)	Sand Interval (feet bgs)	Seal Interval (feet bgs)	Concrete Interval (feet bgs)
Shallow Wells									
MWPA-100C	MWPA-6C	29.59	NA	19.75	20.47	30-15	30-13	13-4	4-0
MWPA-101C	MWPA-7C	29.26	NA	20.34	20.84	30-15	30-13	13-5	5-0
MWPA-102C	MWPA-8C	29.5	NA	20.7	20.92	30-15	30-13	13-5	5-0
MWPA-103C	MWPA-9C	29.9	NA	19.25	20.02	30-15	30-13	13-5	5-0
MWPA-104C	MWPA-10C	29.19	NA	19.36	19.79	30-15	34-13	13-4	4-0
MWPA-105C	MWPA11C	29.92	NA	19.08	19.57	30-15	30-13	13-5	5-0
MWPA-106C	MWPA-12C	29.45	NA	18.89	19.4	30-15	30-127	12.7-5	5-0
MWPA-107C*	MWPA-13C	28.94	NA	19.78	20.06	30-15	34-13	13-4	4-0
MWPA-108C	MWPA-14C	29.45	NA	19.91	20.19	30-15	30-13.2	13.2-5	5-0
MWPA-109C	MWPA-15C	29.13	NA	20.19	20.41	29.5-14.5	30-12.5	12.5-5	5-0
MWPA-110C	MWPA-16C	29.31	NA	19.74	19.94	30-15	30-13	13-5	5-0
MWPA-111C	MWPA-17C	29.71	NA	19.87	20.1	30-15	30-13	13-4	4-0
MWPA-112C	MWPA-18C	33.65	NA	19.06	19.32	34-14	34-12	12-3.5	3.5-0
MWPA-113C	MWPA-19C	24.51	NA	19.52	20.02	25.25-15.25	25.25-8.1 (5-3)	8.1-5	3-0
MWPA-114C	MWPA-20C	29.68	NA	19.59	20.21	30-15	30-13	13-5	5-0
MWPA-115C	MWPA-21C	33.92	NA	19.78	20.08	34.5-24.5	34.5-20	20-5	5-0
MWPA-116C	MWPA-22C	29.64	NA	19.39	19.68	30-15	30-13	13-5	5-0
MWPA-117C	MWPA-23C	29.66	NA	19.22	20	30.5-15.5	30.5-13	13-5	5-0
MWPA-118C	MWPA-24C	29.72	NA	19.53	19.96	30-15	32-13	13-5	5-0
Intermediate Wells									
MWPA-104B[1]	MWPA-10B[1]	58.99	NA	19.53	19.79	60-50	60-46 (34-13)	46-34 (13-4)	4-0
MWPA-107B[1*]	MWPA-13B[1]	~60	NA	19.78	20.06	60-50	65-45 (35-13)	45-35 (13-4)	4-0
MWPA-111B[1]	MWPA-17B[1]	59.34	NA	19.61	20.10	60-50	60-48 (40-30)	48-40 (13-4)	4-0
MWPA-118B[1]	MWPA-24B[1]	59.57	NA	19.51	19.96	60-50	60-48 (32-13)	48-32 (13-5)	5-0

Notes:
bgs - Below Ground Surface
TOC - Top of Well Casing
MSL - Mean Sea Level
[1] - Intermediate well installed in same boring as the corresponding shallow monitoring well.
Survey data provided by McKimm & Creed, accurate to 0.01 feet MSL
[2] - Well identification numbers were changed following the completion of the assessment to be consistent with the monitoring well identification system for all of the monitoring wells in the owner controlled area.
* indicates measurements are estimated pending final land survey

SSi

Table 5
Groundwater Assessment Report -Protected Area
Brunswick Nuclear Plant, Southport, NC
Water Elevation Measurements

Monitoring Well Identification	Previous Well I.D.[2]	Depth of Well[1] (feet)	Top of Casing (TOC) Elevation (feet above MSL)	10/3/2008		10/9/2008	
				Depth to Water (feet from TOC)	Elevation (feet above MSL)	Depth to Water (feet from TOC)	Elevation (feet above MSL)
Shallow Wells							
MWPA-100C	MWPA-6C	29.59	19.75	13.97	5.78	13.66	6.09
MWPA-101C	MWPA-7C	29.26	20.34	10.26	10.08	10.32	10.02
MWPA-102C	MWPA-8C	29.5	20.7	10.96	9.74	10.93	9.77
MWPA-103C	MWPA-9C	29.9	19.25	8.92	10.33	6.13	13.12
MWPA-104C	MWPA-10C	29.19	19.36	16.31	3.05	16.04	3.32
MWPA-105C	MWPA-11C	29.92	19.08	14.11	4.97	13.85	5.23
MWPA-106C	MWPA-12C	29.45	18.89	11.25	7.64	11.08	7.81
MWPA-107C	MWPA-13C	28.94	19.78	NM	NM	16.86	2.92
MWPA-108C	MWPA-14C	29.45	19.91	13.05	6.86	13.04	6.87
MWPA-109C	MWPA-15C	29.13	20.19	16.72	3.47	16.71	3.48
MWPA-110C	MWPA-16C	29.31	19.74	16.83	2.91	16.81	2.93
MWPA-111C	MWPA-17C	29.71	19.87	16.34	3.53	16.42	3.45
MWPA-112C	MWPA-18C	33.65	19.06	15.88	3.18	15.93	3.13
MWPA-113C	MWPA-19C	24.51	19.52	14.49	5.03	16.23	3.29
MWPA-114C	MWPA-20C	29.68	19.59	15.61	3.98	15.55	4.04
MWPA-115C	MWPA-21C	33.92	19.78	16.42	3.36	17.7	2.08
MWPA-116C	MWPA-22C	29.64	19.39	14.62	4.77	14.77	4.62
MWPA-117C	MWPA-23C	29.66	19.22	13.46	5.76	13.44	5.78
MWPA-118C	MWPA-24C	29.72	19.53	15.24	4.29	15.28	4.25
Intermediate Wells							
MWPA-104B[1]	MWPA-10B[1]	58.99	19.53	17.06	2.47	16.74	2.79
MWPA-107B[1]	MWPA-13B[1]	~60	19.78	10.00	9.78	13.86	5.92
MWPA-111B[1]	MWPA-17B[1]	59.34	19.61	17.67	1.94	17.43	2.18
MWPA-118B[1]	MWPA-24B[1]	59.57	19.51	17.94	1.57	17.37	2.14
Intake Canal							
Canal Data (U2SCW125)		-	-	-	1.78	-	-

Notes:

[1] - Depth of Well for tritium and radiological wells from ground surface; Depth of Well for Other Site Wells from TOC.

[2] - Well identification numbers were changed following the completion of the assessment to be consistent with the monitoring well identification system for all of the monitoring wells in the owner controlled area.

Table 6
Groundwater Assessment - Protected Area
Brunswick Nuclear Plant, Southport, North Carolina
Analytical Results for Tritium - Groundwater Samples

Well ID.	Previous Well I.D.[1]	Sample Date	Tritium Concentration (pCi/L)	Sample Date	Tritium Concentration (pCi/L)
Shallow Wells					
MWPA-100C	MWPA-6C	10/4/2008	< 398	3/24/2009	< 253
MWPA-101C	MWPA-7C	10/4/2008	19,120	3/24/2009	3,411
MWPA-102C	MWPA-8C	10/3/2008	8,050	3/24/2009	9,288
MWPA-103C	MWPA-9C	10/3/2008	< 246	3/24/2009	< 241
MWPA-104C	MWPA-10C	10/4/2008	17,110	3/24/2009	**23,000**
MWPA-105C	MWPA11C	10/4/2008	2,893	3/24/2009	4,821
MWPA-106C	MWPA-12C	10/3/2008	445	3/24/2009	368
MWPA-107C	MWPA-13C	10/13/2008	1,733	3/23/09 6/2/2009	4,615 1,309
MWPA-108C	MWPA-14C	10/3/2008	400	3/25/2009	404
MWPA-109C	MWPA-15C	10/3/2008	< 251	3/25/2009	287
MWPA-110C	MWPA-16C	10/3/2008	< 252	3/19/2009	300
MWPA-111C	MWPA-17C	10/13/2008	**40,630**	3/19/2009	**30,790**
MWPA-112C	MWPA-18C	10/4/2008	13,590	3/25/2009	10,960
MWPA-113C	MWPA-19C	10/3/2008	< 266	3/25/2009	< 243
MWPA-114C	MWPA-20C	10/4/2008	< 250	3/23/2009	523
MWPA-115C	MWPA-21C	10/3/2008	**33,440**	3/23/2009	**31,290**
MWPA-116C	MWPA-22C	10/4/2008	< 253	3/23/2009	< 275
MWPA-117C	MWPA-23C	10/3/2008	2,656	3/23/2009	1,585
MWPA-118C	MWPA-24C	10/4/2008	< 252	3/23/2009	< 241
Intermediate Wells					
MWPA-104B	MWPA-10B	10/4/2008	**29,040**	3/24/09	**27,210**
MWPA-107B	MWPA-13B	1/30/2009	3,809	6/2/09	**37,210**
MWPA-111B	MWPA-17B	10/13/2008	2,908	3/19/2009	2,862
MWPA-118B	MWPA-24B	10/4/2008	< 251	3/23/09	< 240

Notes:
C-Series wells are installed in the upper 35 feet of sandy plant backfill.
B-Series wells are installed from 50-60 feet below ground surface
in the sandy plant backfill.
pCi/L - Picocuries of radiological activity per Liter
Bold indicates concentration exceeds the federal and state drinking water standard.
[1] - Well identification numbers were changed following the completion of the assessment to be consistent with the monitoring well identification system for all of the monitoring wells in the owner controlled area.

Appendix A

Boring Logs / Well Completion Reports

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	6/2/08	Logged By:
Boring Dia:	2 Inches	Boring Number:	PA-TP1	RMears / TSilar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
			5		
			10		
			15		
	TP-PA1-1 ND				(16-20') Groundwater sample PA-TP1-1 Collected
			20		
			25		
	TP-PA1-2 ND				(26-30') Groundwater sample PA-TP1-2 Collected
			30		
			35		
	TP-PA1-3 ND				(36-40') Groundwater sample PA-TP1-3 Collected

Completion Notes:

-Grab groundwater samples collected at specified intervals using inertial pump sampling techniques.
-No soil samples collected.
-Borehole sealed to ground surface with bentonite.

Site:

BNP- Protected Area

Southport , NC

Project No.:

Silar Services Inc.

BORING LOG / WELL CONSTRUCTION REPORT

Drill Rig:	Geoprobe	Date Drilled:	6/2/08	Logged By:
Boring Dia:	2 Inches	Boring Number:	PA-TP1	RMears / TSilar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
	TP-PA1-4 ND		45 50 55 60 65 70 75		(46-50') Groundwater sample PA-TP1-4 Collected

Completion Notes:

-Grab groundwater samples collected at specified intervals using inertial pump sampling techniques.
-No soil samples collected.
-Borehole sealed to ground surface with bentonite.

Site:

BNP- Protected Area

Southport , NC

Project No.:

Silar Services Inc.

BORING LOG / WELL CONSTRUCTION REPORT

Drill Rig:	Geoprobe	Date Drilled:	7/8/08	Logged By:
Boring Dia:	2 Inches	Boring Number:	PA-TP2	RMears / TSilar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
			5		
			10		
			15		
	TP-PA2-20 ND				(16-20') Groundwater sample PA-TP2-1 collected
			20		
			25		
	TP-PA2-30 ND				(26-30') Groundwater sample PA-TP2-2 collected
			30		
			35		
	TP-PA2-40 ND				(36-40') Groundwater sample PA-TP2-3 collected

Completion Notes:

-Grab groundwater samples collected at specified intervals using inertial pump sampling techniques.
-No soil samples collected.
-Borehole sealed to ground surface with bentonite.

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	7/8/08	Logged By:
Boring Dia:	2 Inches	Boring Number:	PA-TP2	RMears / TSilar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
			45		
	TP-PA2-50 ND				(46-50') Groundwater sample PA-TP2-4 collected
			50		
			55		
			60		
	TP-PA2-65 ND				(61-65') Groundwater sample PA-TP2-5 collected
			65		
			70		
			75		

Completion Notes:

-Grab groundwater samples collected at specified intervals using inertial pump sampling techniques.
-No soil samples collected.
-Borehole sealed to ground surface with bentonite.

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	7/11/08	Logged By:
Boring Dia:	2 Inches	Boring Number:	PA-TP-3	RMears / TSilar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
			5		
			10		
			15		
	TP-PA3-20 ND		20		(16-20') Groundwater sample PA-TP3-20 collected
			25		
	TP-PA3-30 ND		30		(26-30') Groundwater sample PA-TP3-30 collected
			35		
	TP-PA3-40 ND				(36-40') Groundwater sample PA-TP3-40 collected

Completion Notes:

-Grab groundwater samples collected at specified intervals using inertial pump sampling techniques.
-No soil samples collected.
-Borehole sealed to ground surface with bentonite.

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	7/11/08	Logged By:
Boring Dia:	2 Inches	Boring Number:	PA-TP-3	RMears / TSilar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
			45		
	TP-PA3-50 ND				(46-50') Groundwater sample PA-TP3-50 collected
			50		
			55		
			60		(60-64') Groundwater sample PA-TP3-60 collected
	TP-PA3-60 ND				
			65		
			70		
			75		

Completion Notes:

-Grab groundwater samples collected at specified intervals using inertial pump sampling techniques.
-No soil samples collected.
-Borehole sealed to ground surface with bentonite.

Site:

BNP- Protected Area

Southport , NC

Project No.:

Silar Services Inc.

BORING LOG / WELL CONSTRUCTION REPORT

Drill Rig:	Geoprobe	Date Drilled:	7/10/08	Logged By:
Boring Dia:	2 Inches	Boring Number:	PA-TP4	CSilar / TSilar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
			5		
			10		
			15		
	TP-PA4-20 ND				(16-20') Groundwater sample PA-TP4-20 collected
			20		
			25		
	TP-PA4-30 ND				(26-30') Groundwater sample PA-TP4-30 collected
			30		
			35		
	TP-PA4-40 ND				(36-40') Groundwater sample PA-TP4-40 collected

Completion Notes:

-Grab groundwater samples collected at specified intervals using inertial pump sampling techniques.
-No soil samples collected.
-Borehole sealed to ground surface with bentonite.

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	7/10/08	Logged By:
Boring Dia:	2 Inches	Boring Number:	PA-TP4	CSilar / TSilar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
	TP-PA4-54 ND		45, 50, 55, 60, 65, 70, 75		(60-64') Groundwater sample PA-TP4-54 collected

Completion Notes:

-Grab groundwater samples collected at specified intervals using inertial pump sampling techniques.
-No soil samples collected.
-Borehole sealed to ground surface with bentonite.

Site:

BNP- Protected Area

Southport , NC

Project No.:

Silar Services Inc.

BORING LOG / WELL CONSTRUCTION REPORT

Drill Rig:	Geoprobe	Date Drilled:	7/9/08	Logged By:
Boring Dia:	2 Inches	Boring Number:	PA-TP5	CSilar / TSilar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
			5		
			10		
			15		
			20		
			25		
			30		
			35		

Completion Notes:

-Grab groundwater samples collected at specified intervals using inertial pump sampling techniques.
-No soil samples collected.
-Borehole sealed to ground surface with bentonite.

Site:

BNP- Protected Area

Southport , NC

Project No.:

Silar Services Inc.

BORING LOG / WELL CONSTRUCTION REPORT

Drill Rig:	Geoprobe	Date Drilled:	7/9/08	Logged By:
Boring Dia:	2 Inches	Boring Number:	PA-TP5	CSilar / TSilar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
			45		
	TP-PA5-50 ND				(46-50') Groundwater Sample PA-TP5-50 collected
			50		
					(54-58') Groundwater sample PA-TP5-58 collected
	TP-PA5-58 ND		55		
			60		
			65		
			70		
			75		

Completion Notes:

-Grab groundwater samples collected at specified intervals using inertial pump sampling techniques.
-No soil samples collected.
-Borehole sealed to ground surface with bentonite.

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/12/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-6C / 100C	RMears / TSilar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					Soil Sample TP-PA6-1 collected (4.5-5.0')
	Soil Sample		5		Soil sample TP-PA6-2 collected (9.5-10')
	Soil Sample		10		
			15		(16-20') Groundwater sample TP-PA6-1 collected
	TP-PA6-1 ND @ 3066 pCi/L		20		Gray silt w/ some clay, thin zone of very fine grain sand, saturated at ~ 23' bgs, increasing shell fragments with depth, 5% shells from 24-25' bgs (bivalves). Contact between fill and native soils appears to be at 20.5'.
			25		
	TP-PA6-2 ND@ 3926 pCi/L		30		Gray silt with tr fine grain sand and shell fragments (<5%), saturated.
			35		(36-40') Groundwater sample PA-TP6-3 collected
	TP-PA6-3 ND @ 3640 pCi/L				

Completion Notes:

-Vaccum excavation to approximayely 14' bgs on 7-29-08
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Borehole sealed fron the terminal depth of the boring to the bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole
-Ground Elevation 20.47; Casing Elevation 19.75
-

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/12/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-6C / 100C	RMears / TSilar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					Gray medium-coarse grained sand with tr shells, saturated.
	TP-PA6-4 ND @ 2997 pCi/L		45		(46-50') Groundwater sample TP-PA6-4 collected
			50		Tan fine to medium grained sand, well sorted, saturated.
	TP-PA6-5 ND @ 2938 pCi/L		55		(56-60') Groundwater sample TP-PA6-5 collected
			60		Boring terminated at 60 ft bgs
			65		
			70		
			75		

Completion Notes:

-Vaccum excavation to approximayely 14' bgs on 7-29-08
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Borehole sealed fron the terminal depth of the boring to the bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole
-Ground Elevation 20.47; Casing Elevation 19.75
-

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/12/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-7C / 101C	TSilar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					Soil Sample TP-PA7-1 collected (5-6')
	Soil sample		5		Soil Sample TP-PA7-2 collected (9-10')
	Soil sample		10		
			15		(16-20') Groundwater sample TP-PA7-1 collected
	TP-PA7-1 ND @ 3150 pCi/L		20		Gray silt with tr very fine grain sand, tr shell fragments.
			25		(26-30') Groundwater sample TP-PA7-2 collected
	TP-PA7-2 ND@ 2860 pCi/L		30		Gray silt with tr very fine grain sand, less than 1% shell fragments, increase shell content from 33'-35' bgs, appears to be backfill, no observed depositional structure.
			35		(36-40') Groundwater sample TP-PA7-3 collected
	TP-PA7-3 ND @ 2857 pCi/L				

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Borehole grouted from the termninal depth of the boring to the bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole
-Ground Elevation 20.84; Casing Elevation 20.34

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/12/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-7C / 101C	TSilar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					0% recovery, material in tip of sampler is gray fine grained sand with shell fragments.
	TP-PA7-4 ND @ 2807 pCi/L		45		(46-50') Groundwater sample TP-PA7-4 collected
			50		Light gray medium grained sand, tr coarse grain sand to 54.5, gray fine grained sand from 54.5 to 55.0.
	TP-PA7-5 ND @ 2823 pCi/L		55		(56-60') Groundwater sample TP-PA7-5 collected
			60		
			65		
			70		
			75		

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Borehole grouted from the termninal depth of the boring to the bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole
-Ground Elevation 20.84; Casing Elevation 20.34

Site:

BNP- Protected Area

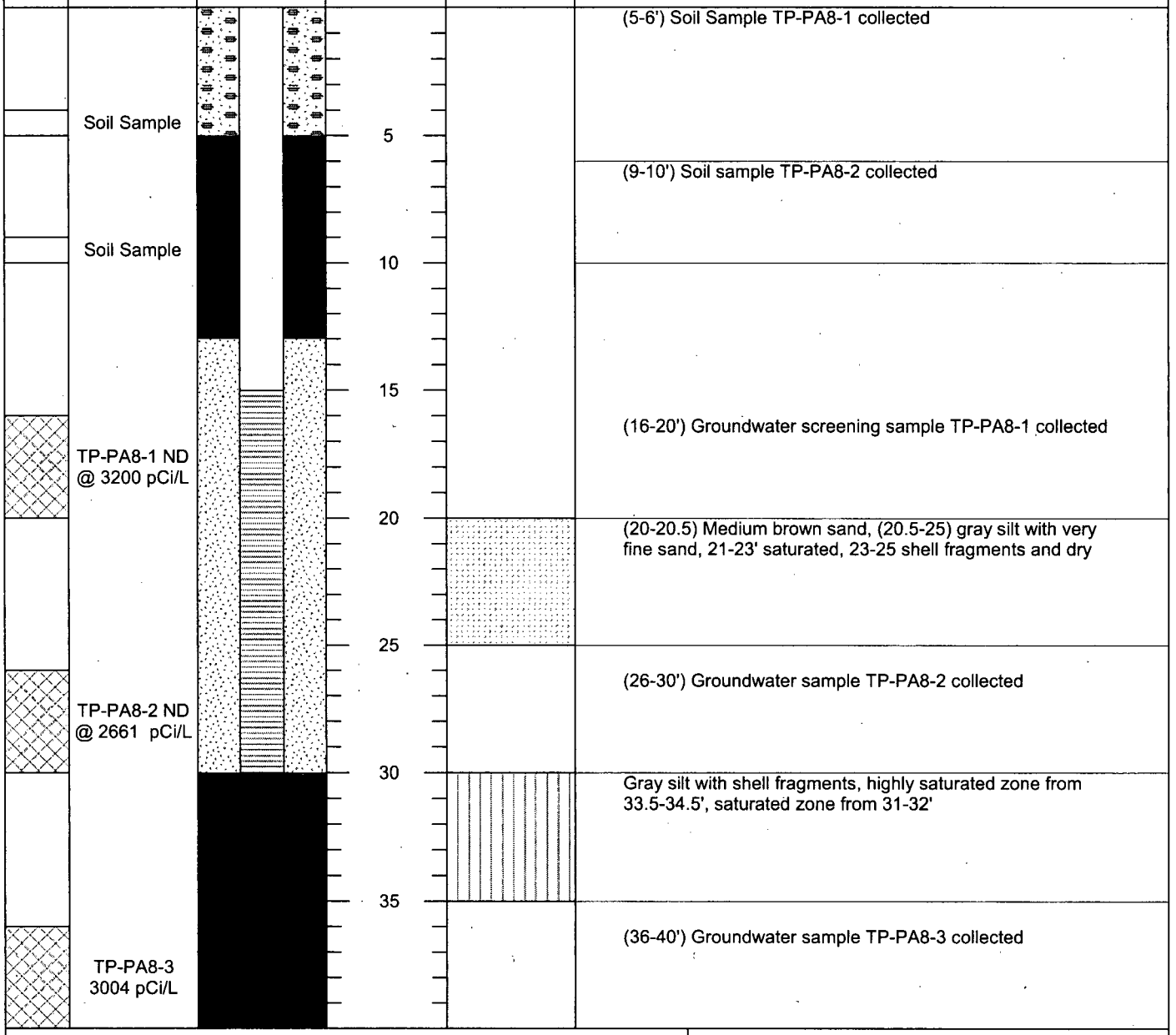
Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/15/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-8C / 102C	JMagee



Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Groundwater samples collected using inertial pump sampling method
-Borehole sealed from the terminal depth of the boring to the base of monitoring well
-1" PVC monitoring well installed in borehole and finished with flush mount manhole
-Gr

Site:

BNP- Protected Area

Southport , NC

Project No.:

Silar Services Inc.

BORING LOG / WELL CONSTRUCTION REPORT

Drill Rig:	Geoprobe	Date Drilled:	9/15/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-8C / 102C	JMagee

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
			45		40-45 gray silt with shells, saturated at 42', high shell content 42'42.5, very fine sand 42.5-43.5, medium grained sand 43.5-45
	TP-PA8-4 3331 pCi/L		50		(46-50') Groundwater screening sample TP-PA8-4 collected
			55		No recovery, sampler refusal encountered at 50" bgs.
	TP-PA8-5 ND @ 2914 pCi/L		60		(56-60') Groundwater screening sample TP-PA8-5 collected
			65		
			70		
			75		

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Groundwater samples collected using inertial pump sampling method
-Borehole sealed from the terminal depth of the boring to the base of monitoring well
-1" PVC monitoring well installed in borehole and finished with flush mount manhole
-Gr

Site:

BNP- Protected Area

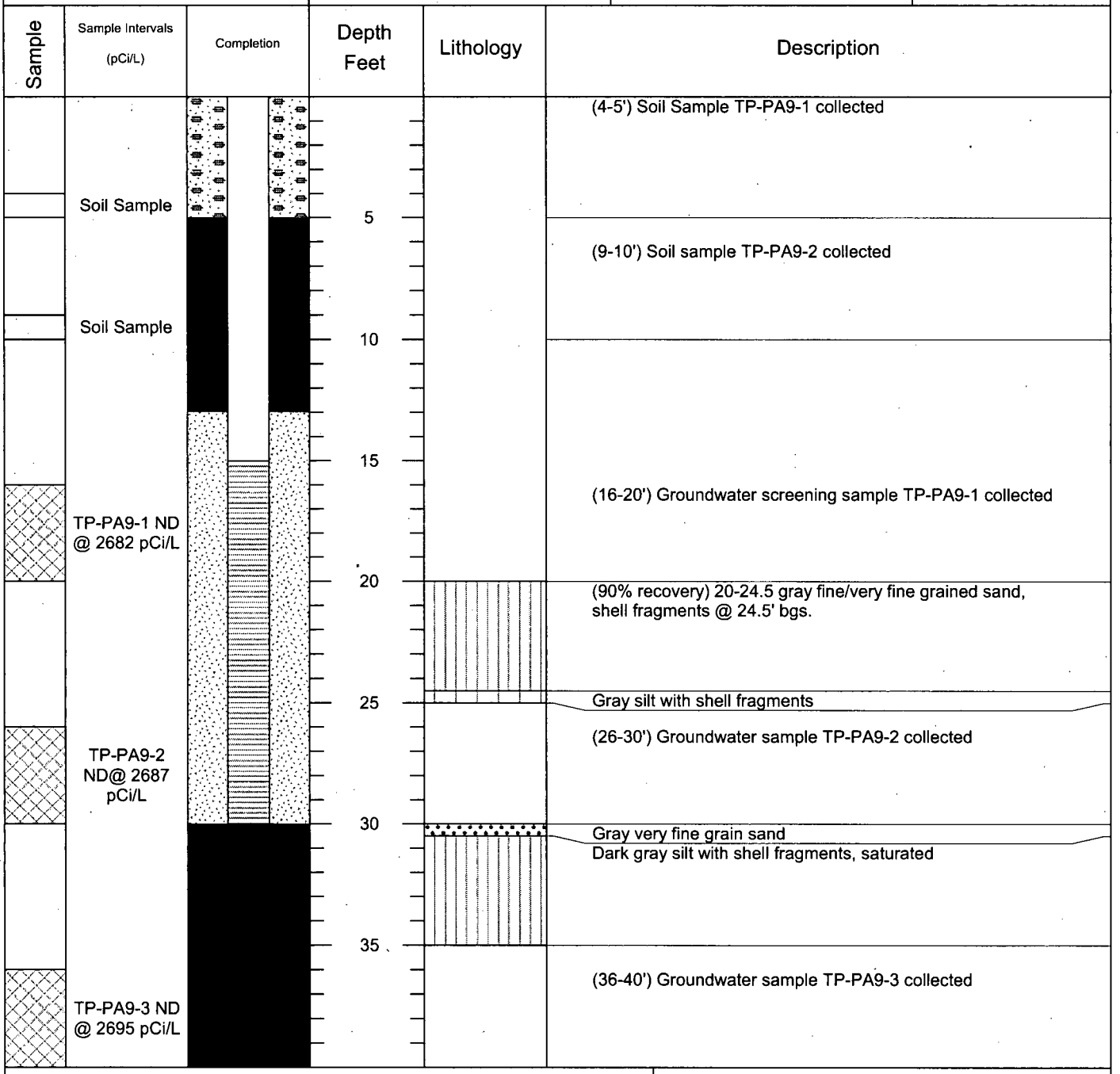
Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/16/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-9C / 103C	John Magee



Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Groundwater sampled collected using inertial pump sampling method
-Borehole sealed from terminal depth of boring to the bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole
-Gro

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/16/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-9C / 103C	John Magee

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
			45		Gray very fine grain sand, saturated, grading to medium grain sand 41-42.5' bgs, 42.5-45 light gray medium grain sand.
	TP-PA9-4 ND @ 2764 pCi/L		50		(46-50') Groundwater sample TP-PA9-4 collected
					Light gray medium grain sand.
					Light brown coarse grain sand
					Light brown medium grain sand
			55		Light brown coarse grain sand
	TP-PA9-5 ND @ 2894 pCi/L				(56-60') Groundwater sample TP-PA9-5 collected
			60		
			65		
			70		
			75		

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Groundwater sampled collected using inertial pump sampling method
-Borehole sealed from terminal depth of boring to the bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole
-Gro

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/8/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-10B/C / 104B/C	Tim Silar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					(5-6') Soil sampleTP-PA10-1 collected
	Soil Sample		5		
	Soil Sample		10		(9-10') Soil sample TP-PA10-2 collected
			15		(16-20') Grouondwater sample TP-PA10-1 collected
	TP-PA10-1 ND @ 2913 pCi/L		20		Dark gray silt with little very fine grain sand, tr shell fragments, no structure, within backfill area, moist-dry
			25		(26-30') Groundwater sample TP-PA10-2 collected
	TP-PA10-2 49,260 pCi/L		30		Dark gray silt with some very fine grain sand and tr shell fragements, more shells than 20-25, saturated, no structure
			35		(36-40') Groundwater sample TP-PA10-3 collected
	TP-PA10-3 40,690 pCi/L				

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Soil samples collected on 7/29/08
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Groundwater screening samples collected using inertial pump sampling method
-Two 1" PVC monitoring wells installed in borehole (MW-PA10C / 104C and MW-PA10B / 104B) and finished with flush mount manhole

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/8/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-10B/C / 104B/C	Tim Silar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					Gray-dark gray fine grain sand, dense
	TP-PA10-4 57,760 pCi/L		45		(46-50') Groundwater sample TP-PA10-4 collected
			50		No recovery, sampler refusal encountered at ~50' bgs.
			55		
			60		
			65		
			70		
			75		

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Soil samples collected on 7/29/08
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Groundwater screening samples collected using inertial pump sampling method
-Two 1" PVC monitoring wells installed in borehole (MW-PA10C / 104C and MW-PA10B / 104B) and finished with flush mount manhole

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/12/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-11C / 105C	Tim Silar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					(5-6') Soil Sample TP-PA11-1 collected
	Soil Sample		5		
					(9-10') Soil sample TP-PA11-2 collected
	Soil Sample		10		
			15		
	TP-PA11-1 ND @ 3043 pCi/L				(16-20') Groundwater screening sample TP-PA11-1 collected
			20		Brown fine gr sand, dense
			25		(26-30') Groundwater samnple TP-PA11-2 collected
	TP-PA11-2 4984 pCi/L		30		Brown fine grained sand with trace crushed stone (backfill), some gray sand @ 33-33.5
			35		
	TP-PA11-3 ND @ 3035 pCi/L				(36-40') Groundwater sample TP-PA11-3 collected

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Groundwater screening samples collected using inertial pump sampling technique
-Borehole sealed to bottom of monitoring well
-1" PVC monitoring well installed in borehole and finished with flush mount manhole
-Ground Elevation 19.57; Cas

Site:

BNP- Protected Area

Southport , NC

Project No.:

Silar Services Inc.

BORING LOG / WELL CONSTRUCTION REPORT

Drill Rig:	Geoprobe	Date Drilled:	9/12/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-11C / 105C	Tim Silar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					brown fine grained sand, little medium grained sand, tr stone (backfill)
			45		Gray fine grain sand, appears to be native soils
	TP-PA11-4 ND @ 3214 pCi/L				(46-40') Groundwater sample TP-PA11-4 collected
			50		No recovery, sampler refusal
			55		
	TP-PA11-5 ND @ 3060 pCi/L				(56-60') Groundwater sample TP-PA11-5 collected
			60		
			65		
			70		
			75		

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Groundwater screening samples collected using inertial pump sampling technique
-Borehole sealed to bottom of monitoring well
-1" PVC monitoring well installed in borehole and finished with flush mount manhole
-Ground Elevation 19.57; Cas

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/15/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-12C / 106C	JMagee / TSilar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					Soil Sample TP-PA12-1 collected (5-6')
	Soil Sample		5		Soil Sample TP-PA12-2 collected (9-10')
	Soil Sample		10		
			15		(16-20') Groundwater sample TP-PA12-1 collected
	TP-PA12-1 ND @ 2890pCi/L		20		Gray silt, loose
					Gray clayey silt, trace shells, moist
			25		(26-30') Groundwater sample TP-PA12-2 collected
	TP-PA12-2 ND @ 2934 pCi/L		30		Gray fine grained sand, saturated
					Gray fine grained sand with some shells, saturated
					Gray silty fine grained sand, saturated
			35		Gray fine grained sand trace shells, moist
	TP-PA12-3 ND @ 2914 pCi/L				(36-40') Groundwater sample TP-PA12-3 collected

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Groundwater samples collected using inertial pump sampling method and dedicated PTFE sample tubing
-Borehole sealed from terminal depth of boring up to the bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/15/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-12C / 106C	JMagee / TSilar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					Gray medium grained sand grading to light gray fine grained sand saturated
	TP-PA12-4 ND @ 3109 pCi/L		45		(46-50') Groundwater sample TP-PA12-4 collected
			50		Soil sampler refusal encountered at 50 feet
	TP-PA12-5 ND @ 2685 pCi/L		55		(56-60') Groundwater sample TP-PA12-5 collected
			60		
			65		
			70		
			75		

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Groundwater samples collected using inertial pump sampling method and dedicated PTFE sample tubing
-Borehole sealed from terminal depth of boring up to the bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/11/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-13B/C / 107B/C	Bryan Sladky

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
			5		(5-6') Soil Sample TP-PA13-1 collected
			10		(9-10') Soil sample TP-PA13-2 collected
			15		Brown Fine-medium grained sand, poorly sorted. Groundwater sample TP-PA13-1 collected (18-22')
			20		
			25		(26-30') Groundwater sample TP-PA13-2 collected
			30		Soil sampler refusal
			35		(36-40') Groundwater sample TP-PA13-3 collected

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Groundwater screening samples collected using inertial pump sampling technique
-Two 1" PVC monitoring wells installed in borehole (MWPA-13C and MW-13B) and finished with flush mount manhole
-Wells were redrilled and installed on 4/24/2009
-Ground elevation 20.06; Casing elevation 19.78 (MWPA-107B) and 19.81 (MWPA-107C)

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/11/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-13B/C / 107B/C	Bryan Sladky

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					No soil sample collected due to previous refusal
			45		(46-50') Groundwater sample TP-PA13-4 collected
			50		No soil sample collected due to previous refusal
			55		(56-60') Groundwater sample TP-PA13-5 collected
			60		
			65		
			70		
			75		

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Groundwater screening samples collected using inertial pump sampling technique
-Two 1" PVC monitoring wells installed in borehole (MWPA-13C and MW-13B) and finished with flush mount manhole
-Wells were redrilled and installed on 4/24/2009
-Ground elevation 20.06; Casing elevation 19.78 (MWPA-107B) and 19.81 (MWPA-107C)

Site:

BNP- Protected Area

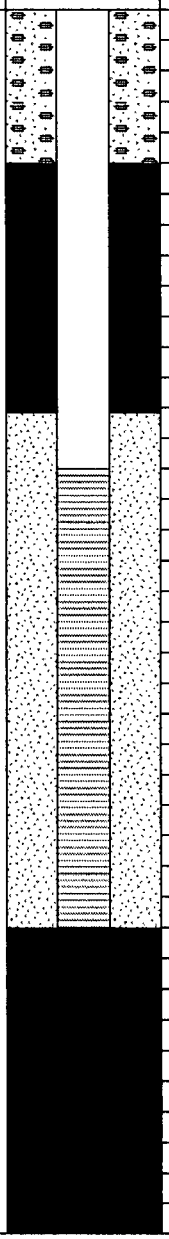
Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/16/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-14C / 108C	Bryan Sladky

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
	Soil Sample		5		
	Soil Sample		10		
			15		No water (attempted to collect groundwater sample)
			20		(21-25') Groundwater sample TP-PA14-1 collected
	TP-PA14-1 ND @ 2958 pCi/L		25		
			30		Gray silt abundant shells @ 32-33,
					Gray clayey silt
			35		(36-40') Groundwater sample TP-PA14-2 collected
	TP-PA14-2 ND @ 2967 pCi/L				

Completion Notes:

Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Groundwater samples collected using inertial pump sampling method and dedicated PTFE tubing
-Borehole sealed from the terminal depth of the boring to the bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/16/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-14C / 108C	Bryan Sladky

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					No recovery
	TP-PA14-3 ND @ 2928 pCi/L		45		(46-50') Groundwater sample TP-PA14-3 collected
			50		
			55		Gray medium grain sand, well sorted.
	TP-PA14-4 ND @ 2967 pCi/L		60		(57-60') Groundwater sample TP--PA14-4 collected
			65		
			70		
			75		

Completion Notes:

Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Groundwater samples collected using inertial pump sampling method and dedicated PTFE tubing
-Borehole sealed from the terminal depth of the boring to the bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole

Site:

BNP- Protected Area

Southport , NC

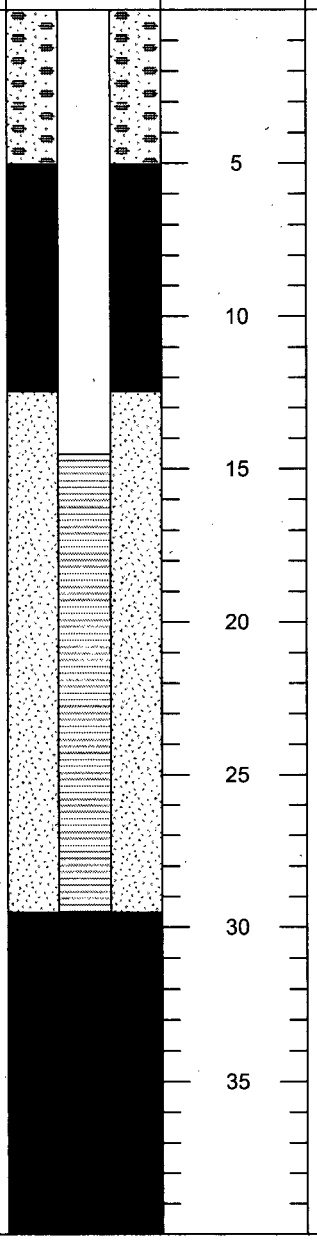
Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/16/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-15C / 109C	JMagee / TSilar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					Soil Sample TP-PA15-1 collected (5-6')
	Soil Sample		5		Soil Sample TP-PA15-2 collected (9-10')
	Soil Sample		10		
			15		(16-20') Groundwater sample TP-PA15-1 collected
	TP-PA15-1 ND @ 3005 pCi/L		20		
			25		No recovery, very hard drilling at this location
	TP-PA15-2 ND @ 2880 pCi/L		30		(31-35') Groundwater sample TP-PA15-2 collected
			35		No recovery, refusal @ about 32', very hard



Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (48' bgs)
-Groundwater screening samples collected using inertial pump sampling method and new PTFE tubing at each interval
-Borehole sealed from terminal depth of boring to bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole

Site:

BNP- Protected Area

Southport , NC

Project No.:

Silar Services Inc.

BORING LOG / WELL CONSTRUCTION REPORT

Drill Rig:	Geoprobe	Date Drilled:	9/16/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-15C / 109C	JMagee / TSilar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
	TP-PA15-3 ND @ 3242 pCi/L		45		(41-45') Groundwater sample TP-PA15-3 collected
			50		Attempt to collect groundwater samples at 51-55' bgs and 56-60' bgs, no recovery of groundwater
			55		
			60		
			65		
			70		
			75		

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (48' bgs)
-Groundwater screening samples collected using inertial pump sampling method and new PTFE tubing at each interval
-Borehole sealed from terminal depth of boring to bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/17/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-16C / 110C	J Magee

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					Soil Sample TP-PA16-1 collected (5-6')
	Soil Sample		5		Soil Sample TP-PA16-2 collected (9-10')
	Soil Sample		10		
			15		
			20		
	TP-PA16-1 ND @ 2810 pCi/L				(21-25') Groundwater sample TP-PA16-1 collected
			25		Soil sampler refusal, could not advance soil sampler
			30		
	TP-PA16-2 ND @ 3214 pCi/L				(31-35') Groundwater sample TP-PA16-2 collected
			35		Sampler refusal

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (55' bgs)
-Groundwater samples colected using inertial pump sampling method
-Borehole sealed fornm the terminal depth of the boring to the bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/17/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-16C / 110C	J Magee

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
	TP-PA16-3 ND @ 2979 pCi/L		45		(41-45') Groundwater sample TP-PA16-3 collected
	TP-PA16-4 ND @ 2817		50 55 60 65 70 75		(51-55') Groundwater sample TP-PA16-4 collected

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (55' bgs)
-Groundwater samples colected using inertial pump sampling method
-Borehole sealed fornm the terminal depth of the boring to the bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/5/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-17B/C / 111B/C	T Silar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					Soil Sample TP-PA17-1 collected (5-6')
	Soil Sample		5		Soil Sample TP-PA17-2 collected (9-10')
	Soil Sample		10		
			15		
			20		(21-25') Groundwater sample TP-PA17-1 collected
	TP-PA17-1 3031 pCi/L		25		No recovery, could not advance soil sampler
			30		(31-35') Groundwater sample TP-PA17-2 collected
	TP-PA17-2 5330 pCi/L		35		Sampler refusal

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Groundwater screening samples collected using inertial pump sampling method
-Two 1" PVC monitoring well installed in borehole (MWPA-17C / 111C and MW-17B / 111B) and finished with flush mount manhole
-Ground Elevation 20.1; Casing Elevation 19.61 (MWPA-17B / 111B) and 19.87 (MWPA17C / 111C)

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/5/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-17B/C / 111B/C	T Silar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					Groundwater sampling attempted, no groundwater could be recovered
	TP-PA17-5 5330		45, 50, 55, 60, 65, 70, 75		(51-55') Groundwater sample TP-PA17-5 collected

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (60' bgs)
-Groundwater screening samples collected using inertial pump sampling method
-Two 1" PVC monitoring well installed in borehole (MWPA-17C / 111C and MW-17B / 111B) and finished with flush mount manhole
-Ground Elevation 20.1; Casing Elevation 19.61 (MWPA-17B / 111B) and 19.87 (MWPA17C / 111C)

Site:

BNP- Protected Area

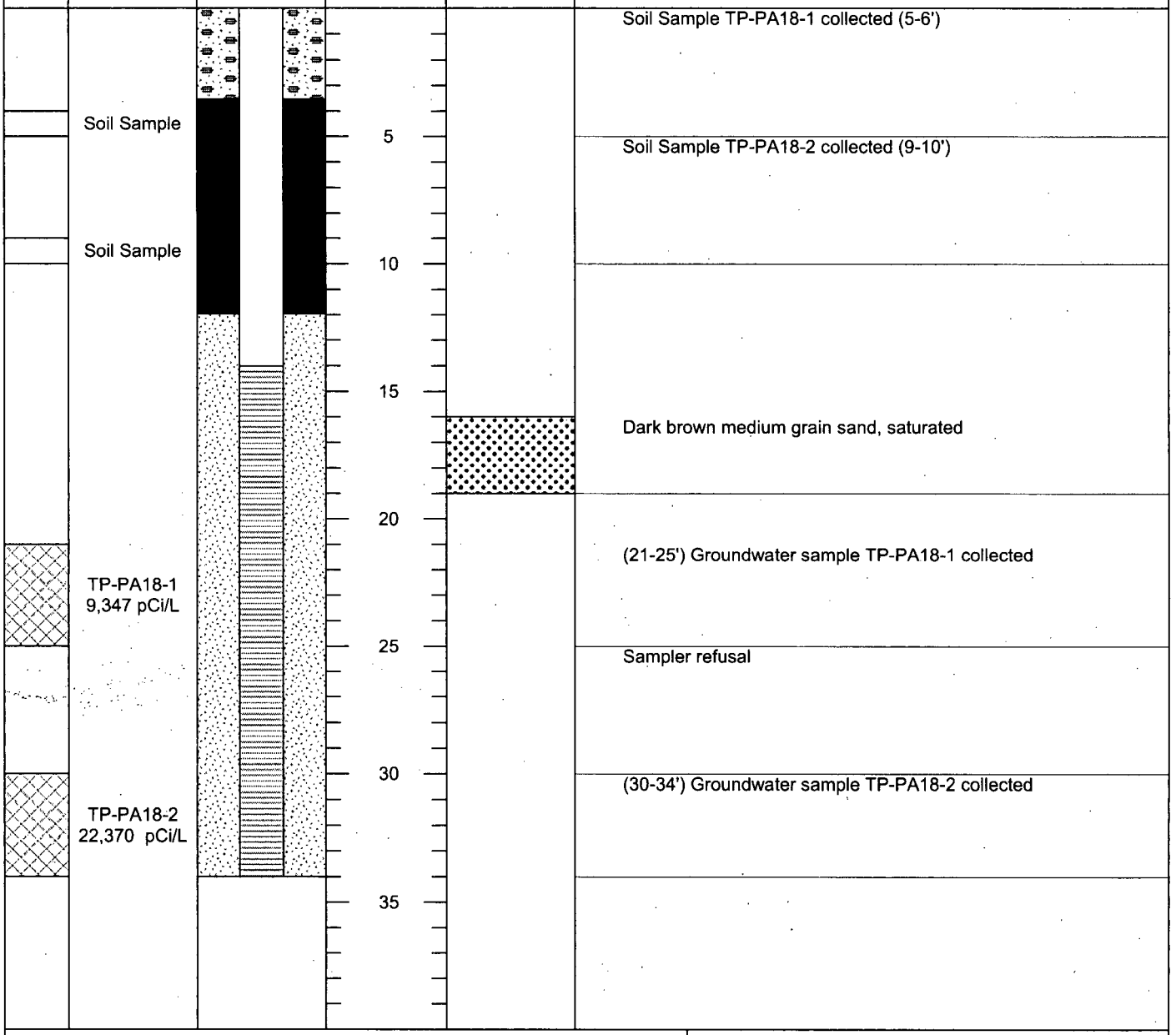
Southport , NC

Project No.:

Silar Services Inc.

BORING LOG / WELL CONSTRUCTION REPORT

Drill Rig:	Geoprobe	Date Drilled:	9/17/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-18C / 112C	J Magee



Completion Notes:

Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (34' bgs)
-1" PVC monitoring well installed in borehole and finished with flush mount manhole
-Ground Elevation 19.32; Casing Elevation 19.06

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/18/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-19C / 113C	Bryan Sladky

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					Soil Sample TP-PA19-1 collected (5-6')
	Soil Sample		5		Soil Sample TP-PA19-2 collected (9-10')
	Soil Sample		10		
			15		Light brown coarse to medium grain sand
					Brown medium grain sand,saturated
			20		Brown medium grain sand
	TP-PA19-1 ND @ 2790 pCi/L				(21-25') Groundwater sample TP-PA19-1 collected
			25		No recovery, sampler refusal
			30		(31-35') Groundwater sample TP-PA19-2 collected
	TP-PA19-2 ND @ 2882 pCi/L		35		Sampler refusal

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (45' bgs)
-Groundwater screening samples collected via inertial pump sampling method and dedicated PTFE tubing
-Borehole sealed form the terminal depth of the boring to the bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/18/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-19C / 113C	Bryan Sladky

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
	TP-PA19-3 ND @ 3246 pCi/L		45		(41-45') Groundwater sample TP-PA19-3 collected
			50		
			55		
			60		
			65		
			70		
			75		

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (45' bgs)
-Groundwater screening samples collected via inertial pump sampling method and dedicated PTFE tubing
-Borehole sealed form the terminal depth of the boring to the bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole

Site:

BNP- Protected Area

Southport , NC

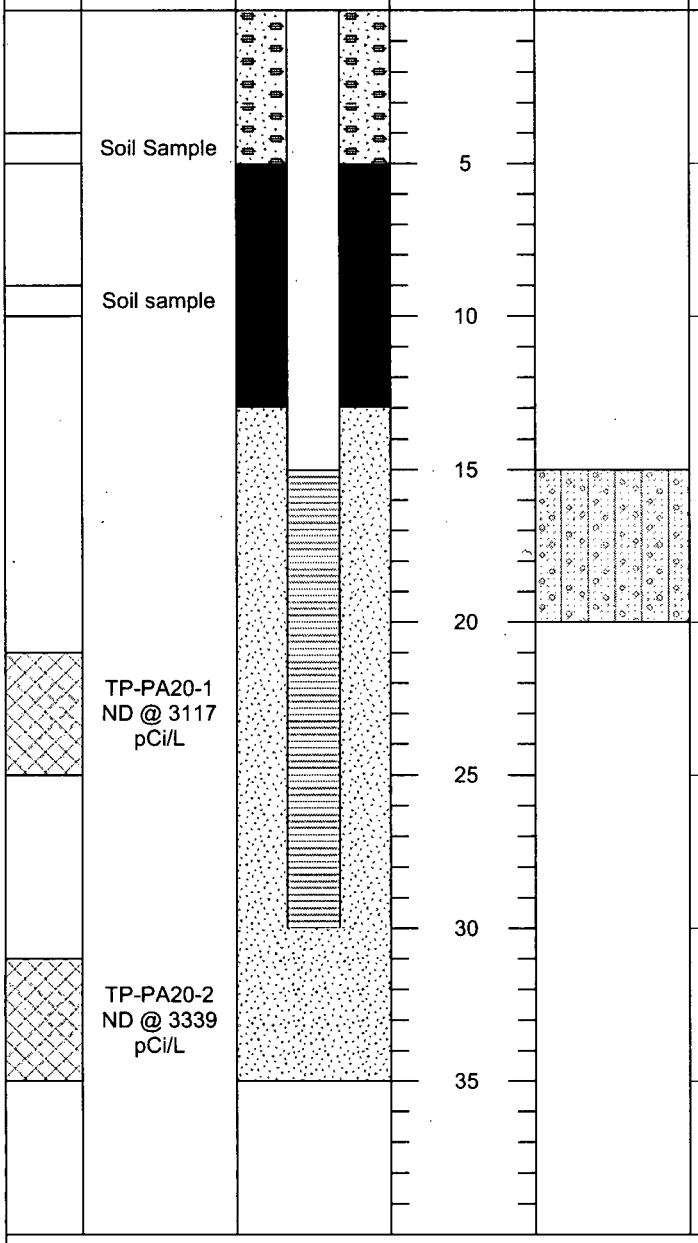
Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/03/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-20C / 114C	Bryan Sladky

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					Soil Sample TP-PA20-1 collected (4-5')
	Soil Sample		5		Soil Sample TP-PA20-2 collected (9-10')
	Soil sample		10		
			15		Light brown fine-medium grain sand, trace silt, med. moist to wet
	TP-PA20-1 ND @ 3117 pCi/L		20		(21-25') Groundwater sample TP-PA20-1 collected
			25		No recovery- soil hardness welded threads together on piston sampler.
	TP-PA20-2 ND @ 3339 pCi/L		30		(31-35') Groundwater sample TP-PA20-2 collected
			35		



Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (35' bgs)
-Groundwater screeing samples collected using inertial pump sampling technique
-1" PVC monitoring well installed in borehole and finished with flush mount manhole
-Ground Elevation 20.21; Casing Elevation 19.59

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	8/29/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-21C / 115C	T Silar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					Soil Sample TP-PA21-1 collected (4-5')
	Soil Sample		5		Soil Sample TP-PA21-2 collected (9-10')
	Soil Sample		10		
			15		Brown Fine to medium grained sand, moist
	TP-PA21-1 41,830 pCi/L		20		(21-25') Groundwater sample TP-PA21-1 collected
			25		
			30		(31-35') Groundwater sample TP-PA21-2 collected
	TP-PA21-2 9,219 pCi/L		35		

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe rig for groundwater screening from terminus of vaccum extraction borehole to boring total depth (55' bgs)
Groundwater screening samples collected using inertial pump sampling method and new PTFE tubing at each interval
-Borehole sealed from the terminal depth of the boring to the bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	8/29/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-21C / 115C	T Silar

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					(41-45') Groundwater sample TP-PA21-3 collected
	TP-PA21-3 7,401 pCi/L		45		
			50		(51-55') Groundwater sample TP-PA21-4 collected
	TP-PA21-4 ND @ 3006 pCi/L		55		
					Refusal
			60		
			65		
			70		
			75		

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe rig for groundwater screening from terminus of vaccum extraction borehole to boring total depth (55' bgs)
Groundwater screening samples collected using inertial pump sampling method and new PTFE tubing at each interval
-Borehole sealed from the terminal depth of the boring to the bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/02/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-22C / 116C	Bryan Sladky

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					Soil Sample TP-PA22-1 collected (4-5')
			5		Soil Sample TP-PA22-2 collected (9-10')
			10		
			15		
			20		(21-25') Groundwater sample TP-PA-22-1 collected
			25		
			30		(31-35') Groundwater sample TP-PA-22-2 collected
			35		

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Soil samples not collected due to extreme hardness of formation
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (65' bgs)
-Groundwater samples collected using inertial pump sampling method
-Borehole sealed from base of borehole to the bottom of monitoring well screen
-1" PVC monitoring well

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/02/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-22C / 116C	Bryan Sladky

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					(41-45') Groundwater sample TP-PA-22-3 collected
			45		
			50		
					(51-55') Groundwater sample TP-PA-22-4 collected
			55		
			60		
			65		
			70		
			75		

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Soil samples not collected due to extreme hardness of formation
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (65' bgs)
-Groundwater samples collected using inertial pump sampling method
-Borehole sealed from base of borehole to the bottom of monitoring well screen
-1" PVC monitoring well

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/02/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-23C / 117C	Bryan Sladky

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
					Soil Sample TP-PA23-1 collected (4-5')
	Soil Sample		5		
					Soil Sample TP-PA23-2 collected (9-10')
	Soil Sample		10		
			15		
			20		(21-25') Groundwater sample TP-PA23-1 collected
	TP-PA-23-1 ND @ 3002 pCi/L		25		
			30		(31-35') Groundwater sample TP-PA23-2 collected
	TP-PA-23-2 ND @ 3656 pCi/L		35		

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (55' bgs)
-Groundwater screening samples collected using inertial pump sampling method and new PTFE tubing
-Borehole sealed from the terminal depth of boring to the bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/02/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-23C / 117C	Bryan Sladky

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
	TP-PA23-3 ND @ 2793 pCi/L		45		(41-45') Groundwater sample TP-PA23-3 collected
	TP-PA23-4 ND @ 3029 pCi/L		50 55 60 65 70 75		(51-55') Groundwater sample TP-PA23-4 collected

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (55' bgs)
-Groundwater screening samples collected using inertial pump sampling method and new PTFE tubing
-Borehole sealed from the terminal depth of boring to the bottom of monitoring well screen
-1" PVC monitoring well installed in borehole and finished with flush mount manhole

Site:

BNP- Protected Area

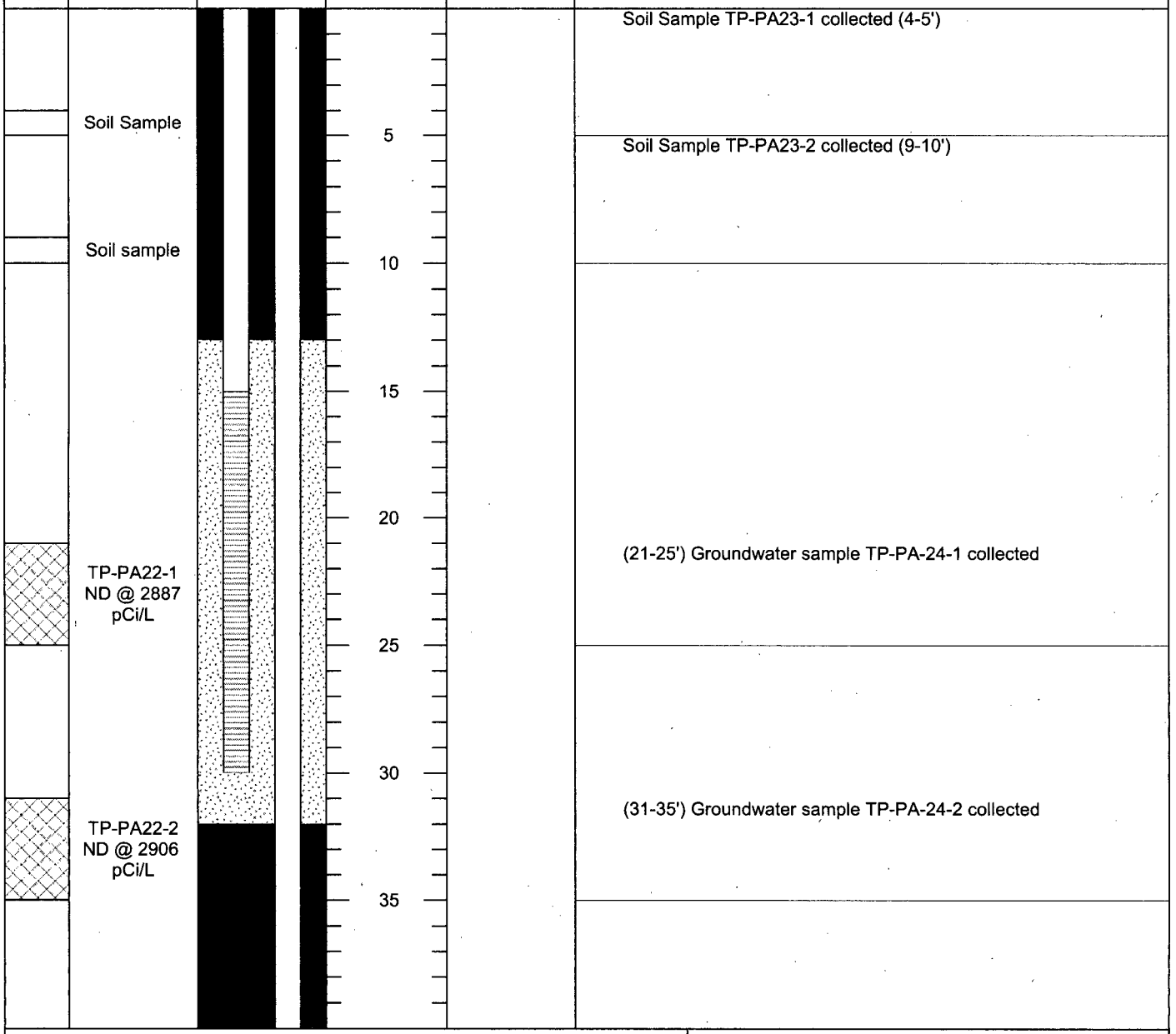
Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/03/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-24B/C / 118B/C	Bryan Sladky



Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (65' bgs)
-Groundwater sanmples collected using inertial pump sampling method and new PTFE tubing at each interval
-Two 1" PVC monitoring wells installed in borehole (MWPA-24C / 118C and MWPA-24B / 118B) and finished with flush mount manhole
-Ground Elevation 19.96; Casing Elevations: 19.51 (MWPA24B / 118B) and 19.51 (MWPA-24C / 118C).

Site:

BNP- Protected Area

Southport , NC

Project No.:

BORING LOG / WELL CONSTRUCTION REPORT

Silar Services Inc.

Drill Rig:	Geoprobe	Date Drilled:	9/03/08	Logged By:
Boring Dia:	6.5 Inches	Boring Number:	MWPA-24B/C / 118B/C	Bryan Sladky

Sample	Sample Intervals (pCi/L)	Completion	Depth Feet	Lithology	Description
	TP-PA22-3 ND @ 2793 pCi/L		45		(41-45') Groundwater sample TP-PA-24-3 collected
	TP-PA22-4 ND @ 3029 pCi/L		50 55		(51-55') Groundwater sample TP-PA-24-4 collected
	TP-PA22-5 ND @ 2907 pCi/L		60 65		(61-65') Groundwater sample TP-PA-24-5 collected
			70 75		

Completion Notes:

-Vaccum excavation to approximayely 14' bgs
-Direct push drilling techniques using Geoprobe for groundwater screening from terminus of vaccum extraction borehole to boring total depth (65' bgs)
-Groundwater sanmples collected using inertial pump sampling method and new PTFE tubing at each interval
-Two 1" PVC monitoring wells installed in borehole (MWPA-24C / 118C and MWPA-24B / 118B) and finished with flush mount manhole
-Ground Elevation 19.96; Casing Elevations: 19.51 (MWPA24B / 118B) and 19.51 (MWPA-24C / 118C).

Site:

BNP- Protected Area

Southport , NC

Project No.:

Appendix B

DENR Well Construction Records

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 3098

1. WELL CONTRACTOR:

JOHNNY BURR
Well Contractor (Individual) Name

GEOLOGIC EXPLORATION, INC.
Well Contractor Company Name

STREET ADDRESS 176 COMMERCE BLVD

STATESVILLE | NC | 28625
City or Town | State | Zip Code

(704)- 872-7686
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MWPA-6

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use)

DATE DRILLED 09/11/08

TIME COMPLETED AM ☐ PM ☐

3. WELL LOCATION:

CITY: SOUTHPORT COUNTY BRUNSWICK

PO BOX 10429 28419
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE
LONGITUDE
May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY PROGRESS ENERGY

STREET ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

CONTACT PERSON PROGRESS ENERGY

MAILING ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

( )-
Area code - Phone number

5. WELL DETAILS:

a. **TOTAL DEPTH:** 30.0

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☒

c. **WATER LEVEL** Below Top of Casing: FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):

From	To	From	To
From	To	From	To
From	To	From	To

6. CASING:

	Depth			Diameter	Thickness/ Weight	Material
From 0.0	To 15.0	Ft.	1 INCH	SCH 40	PVC
From	To	Ft.			
From	To	Ft.			

7. GROUT:

	Depth			Material	Method
From 0.0	To 4.0	Ft.	Portland bentonite	SLURRY
From	To	Ft.		
From	To	Ft.		

8. SCREEN:

	Depth			Diameter		Slot Size		Material
From 15.0	To 30.0	Ft.	1.0	in.	.010	in.	PVC
From	To	Ft.		in.		in.	
From	To	Ft.		in.		in.	

9. SAND/GRAVEL PACK:

Depth			Size	Material
From 13.0	To 35.0	Ft.	20-40	Fine Silica Sand
From	To	Ft.		
From	To	Ft.		

10. DRILLING LOG

From	To	Formation Description
0.0	8.0	GRAVEL
8.0	20.0	BROWN SAND
20.0	30.0	GRAY SAND SILT

11. REMARKS:

Bentonite seal from 4.0 to 13.0 Feet.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR — DATE 10/01/08

JOHNNY BURR
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 3098

1. WELL CONTRACTOR:

JOHNNY BURR
Well Contractor (Individual) Name

GEOLOGIC EXPLORATION, INC.
Well Contractor Company Name

STREET ADDRESS 176 COMMERCE BLVD

STATESVILLE | NC | 28625
City or Town | State | Zip Code

(704)- 872-7686
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MWPA-7

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use)

DATE DRILLED 09/15/08 - 09/18/08

TIME COMPLETED AM ☐ PM ☐

3. WELL LOCATION:

CITY: SOUTHPORT COUNTY BRUNSWICK

PO BOX 10429 28419
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel. Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE ___ ___
LONGITUDE ___ ___

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY PROGRESS ENERGY

STREET ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

CONTACT PERSON PROGRESS ENERGY

MAILING ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

( )-
Area code - Phone number

5. WELL DETAILS:

a. **TOTAL DEPTH:** 30.0

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☒

c. **WATER LEVEL** Below Top of Casing: 20.0 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm)** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):

From ___ To ___ From ___ To ___
From ___ To ___ From ___ To ___
From ___ To ___ From ___ To ___

6. CASING:

	Depth			Diameter	Thickness/ Weight	Material
From	0.0	To 15.0	Ft.	1 INCH	SCH 40	PVC
From		To	Ft.			
From		To	Ft.			

7. GROUT:

	Depth			Material	Method
From	0.0	To 4.0	Ft.	Portland bentonite	SLURRY
From		To	Ft.		
From		To	Ft.		

8. SCREEN:

	Depth			Diameter		Slot Size		Material
From	15.0	To 30.0	Ft.	1.0	in.	.010	in.	PVC
From		To	Ft.		in.		in.	
From		To	Ft.		in.		in.	

9. SAND/GRAVEL PACK:

	Depth			Size	Material
From	13.0	To 30.0	Ft.	20-40	Fine Silica Sand
From		To	Ft.		
From		To	Ft.		

10. DRILLING LOG

From	To	Formation Description
0.0	10.0	GRAVEL
10.0	18.0	BROWN SAND
18.0	30.0	GRAY SANDY CLAY

11. REMARKS:

Bentonite seal from 4 0 to 13.0 Feet.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR — DATE 10/01/08

JOHNNY BURR
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 3098

1. WELL CONTRACTOR:

JOHNNY BURR
Well Contractor (Individual) Name

GEOLOGIC EXPLORATION, INC.
Well Contractor Company Name

STREET ADDRESS 176 COMMERCE BLVD

STATESVILLE | NC | 28625
City or Town | State | Zip Code

(704)- 872-7686
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MWPA-8

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use)

DATE DRILLED 09/15/08 - 09/18/08

TIME COMPLETED AM ☐ PM ☐

3. WELL LOCATION:

CITY: SOUTHPORT COUNTY BRUNSWICK

PO BOX 10429 28419
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE
LONGITUDE
May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY PROGRESS ENERGY

STREET ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

CONTACT PERSON PROGRESS ENERGY

MAILING ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

( )-
Area code - Phone number

5. WELL DETAILS:

a. **TOTAL DEPTH:** 30.0

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☒

c. **WATER LEVEL** Below Top of Casing: 20.0 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):
From To From To
From To From To
From To From To

6. CASING:

	Depth		Diameter	Thickness/ Weight	Material
From 0.0	To 15.0	Ft.	1 INCH	SCH 40	PVC
From	To	Ft.			
From	To	Ft.			

7. GROUT:

	Depth		Material	Method
From 0.0	To 4.0	Ft.	Portland bentonite	SLURRY
From	To	Ft.		
From	To	Ft.		

8. SCREEN:

	Depth		Diameter	Slot Size	Material
From 15.0	To 30.0	Ft.	1.0 in.	.010 in.	PVC
From	To	Ft.	in.	in.	
From	To	Ft.	in.	in.	

9. SAND/GRAVEL PACK:

Depth			Size	Material
From 13.0	To 30.0	Ft.	20-40	Fine Silica Sand
From	To	Ft.		
From	To	Ft.		

10. DRILLING LOG

From	To	Formation Description
0.0	10.0	GRAVEL
10.0	18.0	BROWN SAND
18.0	30.0	GRAY SANDY CLAY

11. REMARKS:

Bentonite seal from 4.0 to 13.0 Feet.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR — DATE 10/01/08

JOHNNY BURR
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 3098

1. WELL CONTRACTOR:

JOHNNY BURR
Well Contractor (Individual) Name

GEOLOGIC EXPLORATION, INC.
Well Contractor Company Name

STREET ADDRESS 176 COMMERCE BLVD

STATESVILLE | NC | 28625
City or Town | State | Zip Code

(704)- 872-7686
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MWPA-9

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use)

DATE DRILLED 09/15/08 - 09/18/08

TIME COMPLETED AM ☐ PM ☐

3. WELL LOCATION:

CITY: SOUTHPORT COUNTY BRUNSWICK

PO BOX 10429 28419
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE
LONGITUDE

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY PROGRESS ENERGY

STREET ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

CONTACT PERSON PROGRESS ENERGY

MAILING ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

( )-
Area code - Phone number

5. WELL DETAILS:

a. **TOTAL DEPTH:** 30.0

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☒

c. **WATER LEVEL** Below Top of Casing: 20.0 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):

From ____ To ____ From ____ To ____
From ____ To ____ From ____ To ____
From ____ To ____ From ____ To ____

6. CASING:

	Depth			Diameter	Thickness/ Weight	Material
From	0.0	To 15.0	Ft.	1 INCH	SCH 40	PVC
From		To	Ft.			
From		To	Ft.			

7. GROUT:

	Depth			Material	Method
From	0.0	To 4.0	Ft.	Portland bentonite	SLURRY
From		To	Ft.		
From		To	Ft.		

8. SCREEN:

	Depth			Diameter		Slot Size		Material
From	15.0	To 30.0	Ft.	1.0	in.	.010	in.	PVC
From		To	Ft.		in.		in.	
From		To	Ft.		in.		in.	

9. SAND/GRAVEL PACK:

	Depth			Size	Material
From	13.0	To 30.0	Ft.	20-40	Fine Silica Sand
From		To	Ft.		
From		To	Ft.		

10. DRILLING LOG

From	To	Formation Description
0.0	10.0	GRAVEL
10.0	18.0	BROWN SAND
18.0	30.0	GRAY SANDY CLAY

11. REMARKS:

Bentonite seal from 4.0 to 13.0 Feet.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR — DATE 10/01/08

JOHNNY BURR
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 3098

1. WELL CONTRACTOR:

JOHNNY BURR
Well Contractor (Individual) Name

GEOLOGIC EXPLORATION, INC.
Well Contractor Company Name

STREET ADDRESS 176 COMMERCE BLVD

STATESVILLE | NC | 28625
City or Town | State | Zip Code

(704) 872-7686
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MWPA-10D, 10S

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use)

DATE DRILLED 09/09/08 - 09/11/08

TIME COMPLETED AM ☐ PM ☐

3. WELL LOCATION:

CITY: SOUTHPORT COUNTY BRUNSWICK

PO BOX 10429 28419
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE ___ ___ ___
LONGITUDE ___ ___ ___
May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY PROGRESS ENERGY

STREET ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

CONTACT PERSON PROGRESS ENERGY

MAILING ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

( ) -
Area code - Phone number

5. WELL DETAILS:

a. **TOTAL DEPTH:** 60.0, 30.0

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☒

c. **WATER LEVEL** Below Top of Casing: ___ FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):

From	To	From	To

6. CASING:

	Depth			Diameter	Thickness/ Weight	Material
From 0.0	To 50.0	Ft.	1 INCH	SCH 40	PVC
From 0.0	To 15.0	Ft.	1 INCH	SCH 40	PVC
From	To	Ft.			

7. GROUT:

	Depth			Material	Method
From 0.0	To 4.0	Ft.	Portland bentonite	SLURRY
From	To	Ft.		
From	To	Ft.		

8. SCREEN:

	Depth			Diameter		Slot Size		Material
From 50.0	To 60.0	Ft.	1.0	in.	.010	in.	PVC
From 15.0	To 30.0	Ft.	1.0	in.	.010	in.	PVC
From	To	Ft.		in.		in.	

9. SAND/GRAVEL PACK:

Depth			Size	Material
From 48.0	To 60.0	Ft.	20-40	Fine Silica Sand
From 13.0	To 35.0	Ft.	20-40	Fine Silica Sand
From	To	Ft.		

10. DRILLING LOG

From	To	Formation Description
0.0	8.0	GRAVEL
8.0	40.0	BROWN SAND
40.0	60.0	GRAY SAND SILT

11. REMARKS:

Bentonite Holeblock from 35.0 to 48.0 Feet and 4.0 to 13.0 Feet.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR — DATE 10/01/08

JOHNNY BURR
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 3098

1. WELL CONTRACTOR:

JOHNNY BURR
Well Contractor (Individual) Name

GEOLOGIC EXPLORATION, INC.
Well Contractor Company Name

STREET ADDRESS 176 COMMERCE BLVD

STATESVILLE | NC | 28625
City or Town | State | Zip Code

(704) 872-7686
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MWPA-11

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use)

DATE DRILLED 09/11/08

TIME COMPLETED AM ☐ PM ☐

3. WELL LOCATION:

CITY: SOUTHPORT COUNTY BRUNSWICK

PO BOX 10429 28419
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE
LONGITUDE
May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY PROGRESS ENERGY

STREET ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

CONTACT PERSON PROGRESS ENERGY

MAILING ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

( ) -
Area code - Phone number

5. WELL DETAILS:

a. **TOTAL DEPTH:** 30.0

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☒

c. **WATER LEVEL** Below Top of Casing: ____ FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):

From ____ To ____ From ____ To ____
From ____ To ____ From ____ To ____
From ____ To ____ From ____ To ____

6. CASING:

	Depth			Diameter	Thickness/ Weight	Material
From 0.0	To 15.0	Ft.		1 INCH	SCH 40	PVC
From	To	Ft.				
From	To	Ft.				

7. GROUT:

	Depth			Material	Method
From 0.0	To 4.0	Ft.		Portland bentonite	SLURRY
From	To	Ft.			
From	To	Ft.			

8. SCREEN:

	Depth			Diameter		Slot Size		Material
From 15.0	To 30.0	Ft.		1.0	in.	.010	in.	PVC
From	To	Ft.			in.		in.	
From	To	Ft.			in.		in.	

9. SAND/GRAVEL PACK:

	Depth			Size	Material
From 13.0	To 35.0	Ft.		20-40	Fine Silica Sand
From	To	Ft.			
From	To	Ft.			

10. DRILLING LOG

From	To	Formation Description
0.0	8.0	GRAVEL
8.0	20.0	BROWN SAND
20.0	30.0	GRAY SAND SILT

11. REMARKS:

Bentonite seal from 4.0 to 13.0 Feet.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR — DATE 10/01/08

JOHNNY BURR
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 3098

1. WELL CONTRACTOR:

JOHNNY BURR
Well Contractor (Individual) Name

GEOLOGIC EXPLORATION, INC.
Well Contractor Company Name

STREET ADDRESS 176 COMMERCE BLVD

STATESVILLE | NC | 28625
City or Town | State | Zip Code

(704)- 872-7686
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MWPA-12

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐

Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐

Irrigation ☐ Other ☐ (list use)

DATE DRILLED 09/15/08 - 09/18/08

TIME COMPLETED AM ☐ PM ☐

3. WELL LOCATION:

CITY: SOUTHPORT COUNTY BRUNSWICK

PO BOX 10429 28419
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:

☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE ___ ___

LONGITUDE ___ ___ ___

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map

(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY PROGRESS ENERGY

STREET ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

CONTACT PERSON PROGRESS ENERGY

MAILING ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

( )-
Area code - Phone number

5. WELL DETAILS:

a. **TOTAL DEPTH:** 30.0

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☒

c. **WATER LEVEL** Below Top of Casing: 20.0 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):

From ___ To ___ From ___ To ___
From ___ To ___ From ___ To ___
From ___ To ___ From ___ To ___

6. CASING:

	Depth		Diameter	Thickness/ Weight	Material
From 0.0	To 15.0	Ft.	1 INCH	SCH 40	PVC
From ___	To ___	Ft.			
From ___	To ___	Ft.			

7. GROUT:

	Depth		Material	Method
From 0.0	To 4.0	Ft.	Portland bentonite	SLURRY
From ___	To ___	Ft.		
From ___	To ___	Ft.		

8. SCREEN:

	Depth		Diameter		Slot Size		Material
From 15.0	To 30.0	Ft.	1.0	in.	.010	in.	PVC
From ___	To ___	Ft.	___	in.	___	in.	
From ___	To ___	Ft.	___	in.	___	in.	

9. SAND/GRAVEL PACK:

	Depth		Size	Material
From 13.0	To 30.0	Ft.	20-40	Fine Silica Sand
From ___	To ___	Ft.		
From ___	To ___	Ft.		

10. DRILLING LOG

From	To	Formation Description
0.0	10.0	GRAVEL
10.0	18.0	BROWN SAND
18.0	30.0	GRAY SANDY CLAY

11. REMARKS:

Bentonite seal from 4.0 to 13.0 Feet.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR — DATE 10/01/08

JOHNNY BURR
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2402

1. WELL CONTRACTOR:

MIKE MCCONAHEY
Well Contractor (Individual) Name

GEOLOGIC EXPLORATION, INC.
Well Contractor Company Name

STREET ADDRESS 176 COMMERCE BLVD

STATESVILLE | NC | 28625
City or Town | State | Zip Code

(704)- 872-7686
Area code - Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MW-PA-13A, MW-PA-13B

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use)

DATE DRILLED 04/23/09 - 04/24/09

TIME COMPLETED AM ☐ PM ☐

3. WELL LOCATION:

CITY: SOUTHPORT COUNTY BRUNSWICK

PO BOX 10429 28419
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE ___ ___
LONGITUDE ___ ___ ___
May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY PROGRESS ENERGY

STREET ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

CONTACT PERSON PROGRESS ENERGY

MAILING ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

( )-
Area code - Phone number

5. WELL DETAILS:

a. **TOTAL DEPTH:** 60.0 FEET/30.0 FEET

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☒

c. **WATER LEVEL** Below Top of Casing: 12.0 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 0.0 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):

From ___ To ___ From ___ To ___
From ___ To ___ From ___ To ___
From ___ To ___ From ___ To ___

6. CASING:

	Depth		Diameter	Thickness/ Weight	Material
From 0.0	To 50.0	Ft.	1 INCH	SCH 40	PVC
From 0.0	To 15.0	Ft.	1 INCH	SCH 40	PVC
From	To	Ft.			

7. GROUT:

	Depth		Material	Method
From 1.0	To 2.0	Ft.	Portland bentonite	SLURRY
From	To	Ft.		
From	To	Ft.		

8. SCREEN:

	Depth		Diameter	Slot Size	Material
From 50.0	To 60.0	Ft.	1.0 in.	.010 in.	PVC
From 15.0	To 30.0	Ft.	1.0 in.	.010 in.	PVC
From	To	Ft.	in.	in.	

9. SAND/GRAVEL PACK:

Depth			Size	Material
From 47.0	To 60.0	Ft.	20-40	FINE SILICA SAND
From 13.0	To 30.0	Ft.	20-40	FINE SILICA SAND
From	To	Ft.		

10. DRILLING LOG

From	To	Formation Description
0.0	1.0	MANHOLE/CONCRETE
1.0	13.0	HOLE BLOCK
13.0	31.0	SAND - 2
31.0	47.0	BENTONITE
47.0	62.0	SAND - 2

11. REMARKS:

BENTONITE SEAL FROM 31.0 TO 47.0 FEET & 2.0 TO 13.0 FEET

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

06/22/09
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE

MIKE MCCONAHEY
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 3098

1. WELL CONTRACTOR:

JOHNNY BURR
Well Contractor (Individual) Name

GEOLOGIC EXPLORATION, INC.
Well Contractor Company Name

STREET ADDRESS 176 COMMERCE BLVD

STATESVILLE | NC | 28625
City or Town | State | Zip Code

(704)- 872-7686
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MWPA-14

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐

Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐

Irrigation ☐ Other ☐ (list use)

DATE DRILLED 09/16/08 - 09/19/08

TIME COMPLETED AM ☐ PM ☐

3. WELL LOCATION:

CITY: SOUTHPORT COUNTY BRUNSWICK

PO BOX 10429 28419
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:

☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE
LONGITUDE

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map

(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY PROGRESS ENERGY

STREET ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

CONTACT PERSON PROGRESS ENERGY

MAILING ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

( )-
Area code - Phone number

5. WELL DETAILS:

a. **TOTAL DEPTH:** 30.0

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☒

c. **WATER LEVEL** Below Top of Casing: 20.0 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):

From To From To
From To From To
From To From To

6. CASING:

	Depth		Diameter	Thickness/ Weight	Material
From 0.0	To 15.0	Ft.	1 INCH	SCH 40	PVC
From	To	Ft.			
From	To	Ft.			

7. GROUT:

	Depth		Material	Method
From 0.0	To 4.0	Ft.	Portland bentonite	SLURRY
From	To	Ft.		
From	To	Ft.		

8. SCREEN:

	Depth		Diameter		Slot Size		Material
From 15.0	To 30.0	Ft.	1.0	in.	.010	in.	PVC
From	To	Ft.		in.		in.	
From	To	Ft.		in.		in.	

9. SAND/GRAVEL PACK:

	Depth		Size	Material
From 13.0	To 30.0	Ft.	20-40	Fine Silica Sand
From	To	Ft.		
From	To	Ft.		

10. DRILLING LOG

From	To	Formation Description
0.0	4.0	ASPHALT
4.0	10.0	GRAVEL
10.0	18.0	BROWN SAND
18.0	30.0	GRAY SANDY CLAY

11. REMARKS:

Bentonite seal from 4.0 to 13.0 Feet.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR — DATE 10/01/08

JOHNNY BURR
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 3098

1. WELL CONTRACTOR:

JOHNNY BURR
Well Contractor (Individual) Name

GEOLOGIC EXPLORATION, INC.
Well Contractor Company Name

STREET ADDRESS 176 COMMERCE BLVD

STATESVILLE | NC | 28625
City or Town | State | Zip Code

(704)- 872-7686
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MWPA-15

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use)

DATE DRILLED 09/16/08 - 09/19/08

TIME COMPLETED AM ☐ PM ☐

3. WELL LOCATION:

CITY: SOUTHPORT COUNTY BRUNSWICK

PO BOX 10429 28419
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE ___ ___
LONGITUDE ___ ___

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY PROGRESS ENERGY

STREET ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

CONTACT PERSON PROGRESS ENERGY

MAILING ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

( )-
Area code - Phone number

5. WELL DETAILS:

a. **TOTAL DEPTH:** 30.0

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☒

c. **WATER LEVEL** Below Top of Casing: 20.0 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):
From ___ To ___ From ___ To ___
From ___ To ___ From ___ To ___
From ___ To ___ From ___ To ___

6. CASING:

	Depth		Diameter	Thickness/ Weight	Material
From 0.0	To 15.0	Ft.	1 INCH	SCH 40	PVC
From	To	Ft.			
From	To	Ft.			

7. GROUT:

	Depth		Material	Method
From 0.0	To 4.0	Ft.	Portland bentonite	SLURRY
From	To	Ft.		
From	To	Ft.		

8. SCREEN:

	Depth		Diameter		Slot Size		Material
From 15.0	To 30.0	Ft.	1.0	in.	.010	in.	PVC
From	To	Ft.		in.		in.	
From	To	Ft.		in.		in.	

9. SAND/GRAVEL PACK:

Depth			Size	Material
From 13.0	To 30.0	Ft.	20-40	Fine Silica Sand
From	To	Ft.		
From	To	Ft.		

10. DRILLING LOG

From	To	Formation Description
0.0	4.0	ASPHALT
4.0	10.0	GRAVEL
10.0	18.0	BROWN SAND
18.0	30.0	GRAY SANDY CLAY

11. REMARKS:

Bentonite seal from 4.0 to 13.0 Feet.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR — DATE 10/01/08

JOHNNY BURR
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 3398

1. WELL CONTRACTOR:

JOHNNY BURR
Well Contractor (Individual) Name

GEOLOGIC EXPLORATION, INC.
Well Contractor Company Name

STREET ADDRESS 176 COMMERCE BLVD

STATESVILLE | NC | 28625
City or Town | State | Zip Code

(704)- 872-7686
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MWPA-16

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use)

DATE DRILLED 09/16/08 - 09/19/08

TIME COMPLETED AM ☐ PM ☐

3. WELL LOCATION:

CITY: SOUTHPORT COUNTY BRUNSWICK

PO BOX 10429 28419
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE ___ ___
LONGITUDE ___ ___ ___

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY PROGRESS ENERGY

STREET ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

CONTACT PERSON PROGRESS ENERGY

MAILING ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

(_____)-_____
Area code - Phone number

5. WELL DETAILS:

a. **TOTAL DEPTH:** 30.0

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☒

c. **WATER LEVEL** Below Top of Casing: 20.0 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):

From ___ To ___ From ___ To ___
From ___ To ___ From ___ To ___
From ___ To ___ From ___ To ___

6. CASING:

	Depth		Diameter	Thickness/ Weight	Material
From 0.0	To 15.0	Ft.	1 INCH	SCH 40	PVC
From ___	To ___	Ft.			
From ___	To ___	Ft.			

7. GROUT:

	Depth		Material	Method
From 0.0	To 4.0	Ft.	Portland bentonite	SLURRY
From ___	To ___	Ft.		
From ___	To ___	Ft.		

8. SCREEN:

	Depth		Diameter		Slot Size		Material
From 15.0	To 30.0	Ft.	1.0	in.	.010	in.	PVC
From ___	To ___	Ft.	___	in.	___	in.	
From ___	To ___	Ft.	___	in.	___	in.	

9. SAND/GRAVEL PACK:

	Depth		Size	Material
From 13.0	To 30.0	Ft.	20-40	Fine Silica Sand
From ___	To ___	Ft.		
From ___	To ___	Ft.		

10. DRILLING LOG

From	To	Formation Description
0.0	4.0	ASPHALT
4.0	10.0	GRAVEL
10.0	18.0	BROWN SAND
18.0	30.0	GRAY SANDY CLAY

11. REMARKS:

Bentonite seal from 4.0 to 13.0 Feet.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR — DATE 10/01/08

JOHNNY BURR
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 3098

1. WELL CONTRACTOR:

JOHNNY BURR
Well Contractor (Individual) Name

GEOLOGIC EXPLORATION, INC.
Well Contractor Company Name

STREET ADDRESS 176 COMMERCE BLVD

STATESVILLE | NC | 28625
City or Town | State | Zip Code

(704)- 872-7686
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MWPA-17, D-175

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐ Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐ Irrigation ☐ Other ☐ (list use)

DATE DRILLED 09/02/08

TIME COMPLETED AM ☐ PM ☐

3. WELL LOCATION:

CITY: SOUTHPORT COUNTY BRUNSWICK

PO BOX 10429 28419
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:

☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE ___ ___

LONGITUDE ___ ___ ___

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map

(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY PROGRESS ENERGY

STREET ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

CONTACT PERSON PROGRESS ENERGY

MAILING ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

(_____)-_____
Area code - Phone number

5. WELL DETAILS:

a. **TOTAL DEPTH:** 60.0, 30.0

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☒

c. **WATER LEVEL** Below Top of Casing: 20.0 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):

From___ To___ From___ To___
From___ To___ From___ To___
From___ To___ From___ To___

6. CASING:

	Depth			Diameter	Thickness/ Weight	Material
From	0.0	To 50.0	Ft.	1 INCH	SCH 40	PVC
From	0.0	To 15.0	Ft.	1 INCH	SCH 40	PVC
From		To	Ft.			

7. GROUT:

	Depth			Material	Method
From	0.0	To 4.0	Ft.	Portland bentonite	SLURRY
From		To	Ft.		
From		To	Ft.		

8. SCREEN:

	Depth			Diameter		Slot Size		Material
From	50.0	To 60.0	Ft.	1.0	in.	.010	in.	PVC
From	15.0	To 30.0	Ft.	1.0	in.	.010	in.	PVC
From		To	Ft.		in.		in.	

9. SAND/GRAVEL PACK:

	Depth			Size	Material
From	48.0	To 60.0	Ft.	20-40	Fine Silica Sand
From	13.0	To 35.0	Ft.	20-40	Fine Silica Sand
From		To	Ft.		

10. DRILLING LOG

From	To	Formation Description
0.0	4.0	ASPHALT
4.0	10.0	GRAVEL
10.0	60.0	BROWN SAND

11. REMARKS:

Bentonite Holeblock from 35.0 to 48.0 Feet and 4.0 to 13.0 Feet.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

J. Burr — 09/30/08
SIGNATURE OF CERTIFIED WELL CONTRACTOR — DATE

JOHNNY BURR
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 3098

1. WELL CONTRACTOR:

JOHNNY BURR
Well Contractor (Individual) Name

GEOLOGIC EXPLORATION, INC.
Well Contractor Company Name

STREET ADDRESS 176 COMMERCE BLVD

STATESVILLE | NC | 28625
City or Town | State | Zip Code

(704)- 872-7686
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MWPA-18

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use)

DATE DRILLED 09/17/08 - 09/22/08

TIME COMPLETED AM ☐ PM ☐

3. WELL LOCATION:

CITY: SOUTHPORT COUNTY BRUNSWICK

PO BOX 10429 28419
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE
LONGITUDE

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY PROGRESS ENERGY

STREET ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

CONTACT PERSON PROGRESS ENERGY

MAILING ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

( )-
Area code - Phone number

5. WELL DETAILS:

a. **TOTAL DEPTH:** 30.0

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☒

c. **WATER LEVEL** Below Top of Casing: 20.0 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):

From To From To
From To From To
From To From To

6. CASING:

	Depth		Diameter	Thickness/ Weight	Material
From 0.0	To 15.0	Ft.	1 INCH	SCH 40	PVC
From	To	Ft.			
From	To	Ft.			

7. GROUT:

	Depth		Material	Method
From 0.0	To 4.0	Ft.	Portland bentonite	SLURRY
From	To	Ft.		
From	To	Ft.		

8. SCREEN:

	Depth		Diameter		Slot Size		Material
From 15.0	To 30.0	Ft.	1.0	in.	.010	in.	PVC
From	To	Ft.		in.		in.	
From	To	Ft.		in.		in.	

9. SAND/GRAVEL PACK:

	Depth		Size	Material
From 13.0	To 30.0	Ft.	20-40	Fine Silica Sand
From	To	Ft.		
From	To	Ft.		

10. DRILLING LOG

From	To	Formation Description
0.0	10.0	CONCRETE
10.0	18.0	GRAVEL
18.0	30.0	BROWN SAND

11. REMARKS:

Bentonite seal from 4.0 to 13.0 Feet.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR — DATE 10/01/08

JOHNNY BURR
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 3098

1. WELL CONTRACTOR:

JOHNNY BURR
Well Contractor (Individual) Name

GEOLOGIC EXPLORATION, INC.
Well Contractor Company Name

STREET ADDRESS 176 COMMERCE BLVD

STATESVILLE | NC | 28625
City or Town | State | Zip Code

(704)- 872-7686
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MWPA-19

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use)

DATE DRILLED 09/18/08 - 09/22/08

TIME COMPLETED AM ☐ PM ☐

3. WELL LOCATION:

CITY: SOUTHPORT COUNTY BRUNSWICK

PO BOX 10429 28419
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE
LONGITUDE

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY PROGRESS ENERGY

STREET ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

CONTACT PERSON PROGRESS ENERGY

MAILING ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

( )-
Area code - Phone number

5. WELL DETAILS:

a. **TOTAL DEPTH:** 30.0

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☒

c. **WATER LEVEL** Below Top of Casing: 20.0 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):
From To From To
From To From To
From To From To

6. CASING:

	Depth		Diameter	Thickness/ Weight	Material
From 0.0	To 15.0	Ft.	1 INCH	SCH 40	PVC
From	To	Ft.			
From	To	Ft.			

7. GROUT:

	Depth		Material	Method
From 0.0	To 4.0	Ft.	Portland bentonite	SLURRY
From	To	Ft.		
From	To	Ft.		

8. SCREEN:

	Depth		Diameter		Slot Size		Material
From 15.0	To 30.0	Ft.	1.0	in.	.010	in.	PVC
From	To	Ft.		in.		in.	
From	To	Ft.		in.		in.	

9. SAND/GRAVEL PACK:

	Depth		Size	Material
From 13.0	To 30.0	Ft.	20-40	Fine Silica Sand
From	To	Ft.		
From	To	Ft.		

10. DRILLING LOG

From	To	Formation Description
0.0	10.0	CONCRETE
10.0	18.0	GRAVEL
18.0	30.0	BROWN SAND

11. REMARKS:

Bentonite seal from 4.0 to 13.0 Feet.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR — DATE 10/01/08

JOHNNY BURR
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., **1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.**

Form GW-1b
Rev. 7/05

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 3098

1. WELL CONTRACTOR:

JOHNNY BURR
Well Contractor (Individual) Name

GEOLOGIC EXPLORATION, INC.
Well Contractor Company Name

STREET ADDRESS 176 COMMERCE BLVD

STATESVILLE | NC | 28625
City or Town | State | Zip Code

(704)- 872-7686
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MWPA-20, D-205

STATE WELL PERMIT#(if applicable) _____

DWQ or OTHER PERMIT #(if applicable) _____

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use) _____

DATE DRILLED 09/02/08

TIME COMPLETED _____ AM ☐ PM ☐

3. WELL LOCATION:

CITY: SOUTHPORT COUNTY BRUNSWICK

PO BOX 10429 28419
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other _____
(check appropriate box)

LATITUDE ___ _____
LONGITUDE ___ ___ _____
May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable) _____

NAME OF FACILITY PROGRESS ENERGY

STREET ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

CONTACT PERSON PROGRESS ENERGY

MAILING ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

(_____)-_____
Area code - Phone number

5. WELL DETAILS:

a. **TOTAL DEPTH:** 60.0, 30.0

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☒

c. **WATER LEVEL** Below Top of Casing: 20.0 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm)** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):
From _____ To _____ From _____ To _____
From _____ To _____ From _____ To _____
From _____ To _____ From _____ To _____

6. CASING:

	Depth		Diameter	Thickness/ Weight	Material
From 0.0	To 50.0	Ft.	1 INCH	SCH 40	PVC
From 0.0	To 15.0	Ft.	1 INCH	SCH 40	PVC
From	To	Ft.			

7. GROUT:

	Depth		Material	Method
From 0.0	To 4.0	Ft.	Portland bentonite	SLURRY
From	To	Ft.		
From	To	Ft.		

8. SCREEN:

	Depth		Diameter	Slot Size	Material
From 50.0	To 60.0	Ft.	1.0 in.	.010 in.	PVC
From 15.0	To 30.0	Ft.	1.0 in.	.010 in.	PVC
From	To	Ft.	in.	in.	

9. SAND/GRAVEL PACK:

Depth			Size	Material
From 48.0	To 60.0	Ft.	20-40	Fine Silica Sand
From 13.0	To 30.0	Ft.	20-40	Fine Silica Sand
From	To	Ft.		

10. DRILLING LOG

From	To	Formation Description
0.0	4.0	ASPHALT
4.0	8.0	GRAVEL
8.0	30.0	BROWN SAND

11. REMARKS:

Bentonite Holeblock from 35.0 to 48.0 Feet and 4.0 to 13.0 Feet.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

09/30/08
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE

JOHNNY BURR
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 3098

1. WELL CONTRACTOR:

JOHNNY BURR
Well Contractor (Individual) Name

GEOLOGIC EXPLORATION, INC.
Well Contractor Company Name

STREET ADDRESS 176 COMMERCE BLVD

STATESVILLE | NC | 28625
City or Town | State | Zip Code

(704)- 872-7686
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MW-PA-21

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use)

DATE DRILLED 08/29/08 - 09/02/08

TIME COMPLETED AM ☐ PM ☐

3. WELL LOCATION:

CITY: SOUTHPORT COUNTY BRUNSWICK

HWY 87 (RIVER ROAD)
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE
LONGITUDE
May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY PROGRESS ENERGY

STREET ADDRESS HWY 87 (RIVER ROAD)

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

CONTACT PERSON PROGRESS ENERGY

MAILING ADDRESS P.O. BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

( )-
Area code - Phone number

5. WELL DETAILS:

a. **TOTAL DEPTH:** 30.0

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☒

c. **WATER LEVEL** Below Top of Casing: 20.0 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 0.0 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):
From To From To
From To From To
From To From To

6. CASING:

	Depth		Diameter	Thickness/ Weight	Material
From 0.0	To 20.0	Ft.	2 INCH	SCH 40	PVC
From	To	Ft.			
From	To	Ft.			

7. GROUT:

	Depth		Material	Method
From 0.0	To 4.0	Ft.	Portland bentonite	SLURRY
From	To	Ft.		
From	To	Ft.		

8. SCREEN:

	Depth		Diameter		Slot Size		Material
From 20.0	To 30.0	Ft.	2.0	in.	.010	in.	PVC
From	To	Ft.		in.		in.	
From	To	Ft.		in.		in.	

9. SAND/GRAVEL PACK:

Depth			Size	Material
From 18.0	To 30.0	Ft.	20-40	Fine Silica Sand
From	To	Ft.		
From	To	Ft.		

10. DRILLING LOG

From	To	Formation Description
0.0	4.0	ASPHALT
4.0	10.0	GRAVEL
10.0	30.0	BROWN SAND

11. REMARKS:

Bentonite seal from 4.0 to 18.0 Feet.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

09/22/08
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE

JOHNNY BURR
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 3098

1. WELL CONTRACTOR:

JOHNNY BURR
Well Contractor (Individual) Name

GEOLOGIC EXPLORATION, INC.
Well Contractor Company Name

STREET ADDRESS 176 COMMERCE BLVD

STATESVILLE | NC | 28625
City or Town | State | Zip Code

(704)- 872-7686
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MWPA-22

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use)

DATE DRILLED 09/02/08

TIME COMPLETED AM ☐ PM ☐

3. WELL LOCATION:

CITY: SOUTHPORT COUNTY BRUNSWICK

PO BOX 10429 28419
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE ___ ___
LONGITUDE ___ ___ ___

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY PROGRESS ENERGY

STREET ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

CONTACT PERSON PROGRESS ENERGY

MAILING ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

( )-
Area code - Phone number

5. WELL DETAILS:

a. **TOTAL DEPTH:** 30.0

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☒

c. **WATER LEVEL** Below Top of Casing: 20.0 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm)** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):
From ___ To ___ From ___ To ___
From ___ To ___ From ___ To ___
From ___ To ___ From ___ To ___

6. CASING:

	Depth			Diameter	Thickness/ Weight	Material
From	0.0	To 15.0	Ft.	1 INCH	SCH 40	PVC
From		To	Ft.			
From		To	Ft.			

7. GROUT:

	Depth			Material	Method
From	0.0	To 4.0	Ft.	Portland bentonite	SLURRY
From		To	Ft.		
From		To	Ft.		

8. SCREEN:

	Depth			Diameter		Slot Size		Material
From	15.0	To 30.0	Ft.	1.0	in.	.010	in.	PVC
From		To	Ft.		in.		in.	
From		To	Ft.		in.		in.	

9. SAND/GRAVEL PACK:

	Depth			Size	Material
From	13.0	To 30.0	Ft.	20-40	Fine Silica Sand
From		To	Ft.		
From		To	Ft.		

10. DRILLING LOG

From	To	Formation Description
0.0	4.0	ASPHALT
4.0	10.0	GRAVEL
10.0	30.0	BROWN SAND

11. REMARKS:

Bentonite seal from 4.0 to 13.0 Feet.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

J O Burr — 09/30/08
SIGNATURE OF CERTIFIED WELL CONTRACTOR — DATE

JOHNNY BURR
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 3098

1. WELL CONTRACTOR:

JOHNNY BURR
Well Contractor (Individual) Name

GEOLOGIC EXPLORATION, INC.
Well Contractor Company Name

STREET ADDRESS 176 COMMERCE BLVD

STATESVILLE | NC | 28625
City or Town | State | Zip Code

(704)- 872-7686
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MWPA-23

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use)

DATE DRILLED 09/02/08

TIME COMPLETED AM ☐ PM ☐

3. WELL LOCATION:

CITY: SOUTHPORT COUNTY BRUNSWICK

PO BOX 10429 28419
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE ___ ___
LONGITUDE ___ ___

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY PROGRESS ENERGY

STREET ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

CONTACT PERSON PROGRESS ENERGY

MAILING ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

( )-
Area code - Phone number

5. WELL DETAILS:

a. **TOTAL DEPTH:** 30.0

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☒

c. **WATER LEVEL** Below Top of Casing: 20.0 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):

From ___ To ___ From ___ To ___
From ___ To ___ From ___ To ___
From ___ To ___ From ___ To ___

6. CASING:

	Depth			Diameter	Thickness/ Weight	Material
From	0.0	To 15.0	Ft.	1 INCH	SCH 40	PVC
From		To	Ft.			
From		To	Ft.			

7. GROUT:

	Depth			Material	Method
From	0.0	To 4.0	Ft.	Portland bentonite	SLURRY
From		To	Ft.		
From		To	Ft.		

8. SCREEN:

	Depth			Diameter		Slot Size		Material
From	15.0	To 30.0	Ft.	1.0	in.	.010	in.	PVC
From		To	Ft.		in.		in.	
From		To	Ft.		in.		in.	

9. SAND/GRAVEL PACK:

	Depth			Size	Material
From	13.0	To 30.0	Ft.	20-40	Fine Silica Sand
From		To	Ft.		
From		To	Ft.		

10. DRILLING LOG

From	To	Formation Description
0.0	4.0	ASPHALT
4.0	10.0	GRAVEL
10.0	60.0	BROWN SAND

11. REMARKS:

Bentonite seal from 4.0 to 13.0 Feet.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR — DATE 09/30/08

JOHNNY BURR
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 3098

1. WELL CONTRACTOR:

JOHNNY BURR
Well Contractor (Individual) Name

GEOLOGIC EXPLORATION, INC.
Well Contractor Company Name

STREET ADDRESS 176 COMMERCE BLVD

STATESVILLE | NC | 28625
City or Town | State | Zip Code

(704)- 872-7686
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MWPA-24, D-24S

STATE WELL PERMIT#(if applicable)

DWQ or OTHER PERMIT #(if applicable)

WELL USE (Check Applicable Box) Monitoring ☒ Municipal/Public ☐

Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐

Irrigation ☐ Other ☐ (list use)

DATE DRILLED 09/02/08

TIME COMPLETED AM ☐ PM ☐

3. WELL LOCATION:

CITY: SOUTHPORT COUNTY BRUNSWICK

PO BOX 10429 28419
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:

☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE ___ ___

LONGITUDE ___ ___

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map

(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY PROGRESS ENERGY

STREET ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

CONTACT PERSON PROGRESS ENERGY

MAILING ADDRESS PO BOX 10429

SOUTHPORT | NC | 28419
City or Town | State | Zip Code

( )-
Area code - Phone number

5. WELL DETAILS:

a. **TOTAL DEPTH:** 60.0, 30.0

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☒

c. **WATER LEVEL** Below Top of Casing: 20.0 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 2.5 FT. Above Land Surface*
**Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.*

e. **YIELD (gpm)** N/A **METHOD OF TEST** N/A

f. **DISINFECTION: Type** N/A **Amount** N/A

g. **WATER ZONES** (depth):

From ___ To ___ From ___ To ___

From ___ To ___ From ___ To ___

From ___ To ___ From ___ To ___

6. CASING:

	Depth		Diameter	Thickness/ Weight	Material
From 0.0	To 50.0	Ft.	1 INCH	SCH 40	PVC
From 0.0	To 15.0	Ft.	1 INCH	SCH 40	PVC
From	To	Ft.			

7. GROUT:

	Depth		Material	Method
From 0.0	To 4.0	Ft.	Portland bentonite	SLURRY
From	To	Ft.		
From	To	Ft.		

8. SCREEN:

	Depth		Diameter		Slot Size		Material
From 50.0	To 60.0	Ft.	1.0	in.	.010	in.	PVC
From 15.0	To 30.0	Ft.	1.0	in.	.010	in.	PVC
From	To	Ft.		in.		in.	

9. SAND/GRAVEL PACK:

	Depth		Size	Material
From 48.0	To 60.0	Ft.	20-40	Fine Silica Sand
From 13.0	To 30.0	Ft.	20-40	Fine Silica Sand
From	To	Ft.		

10. DRILLING LOG

From	To	Formation Description
0.0	4.0	ASPHALT
4.0	10.0	GRAVEL
10.0	60.0	BROWN SAND

11. REMARKS:

Bentonite Holeblock from 35.0 to 48.0 Feet and 4.0 to 13.0 Feet.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Johnny Burr — 09/30/08
SIGNATURE OF CERTIFIED WELL CONTRACTOR — DATE

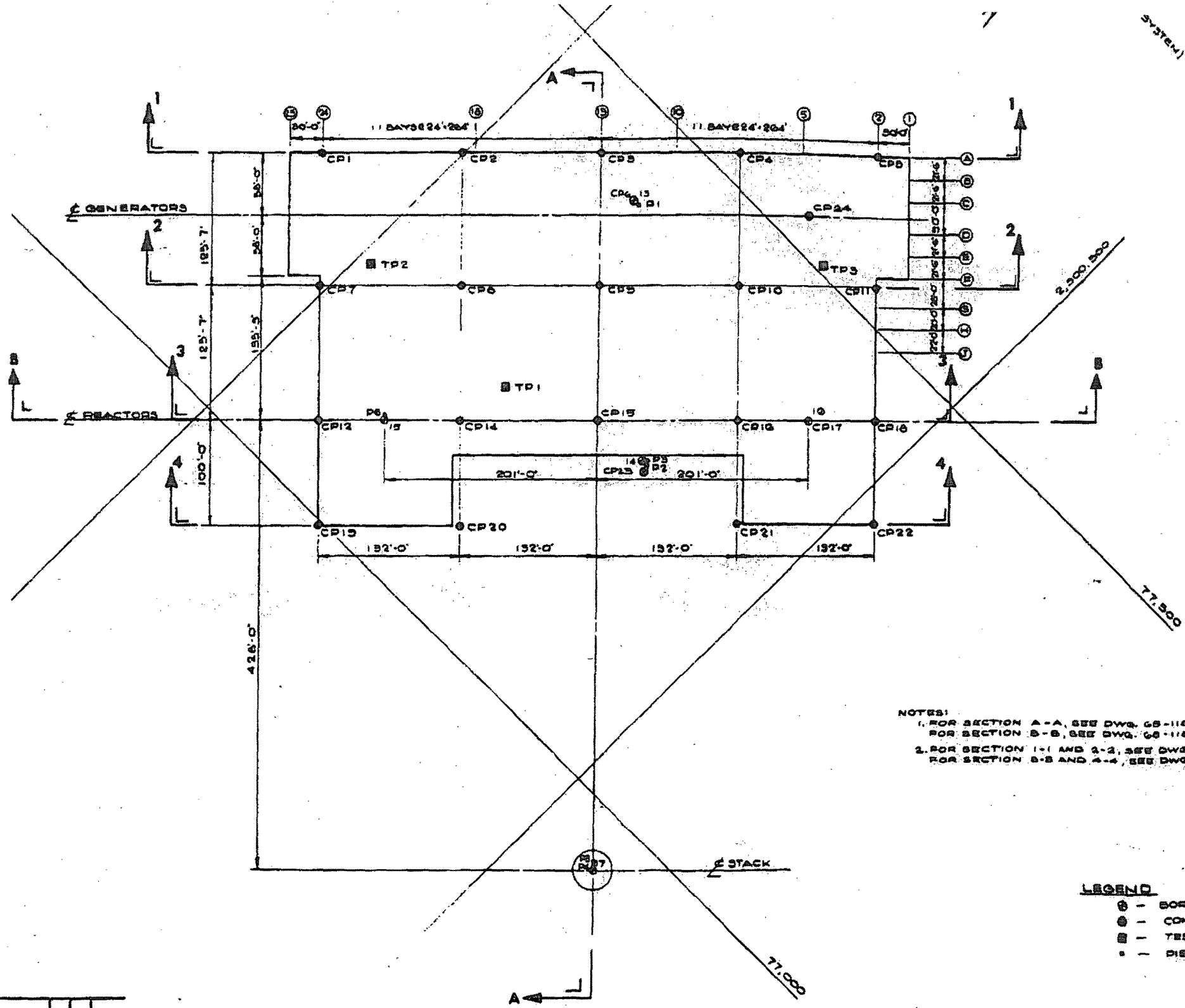
JOHNNY BURR
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

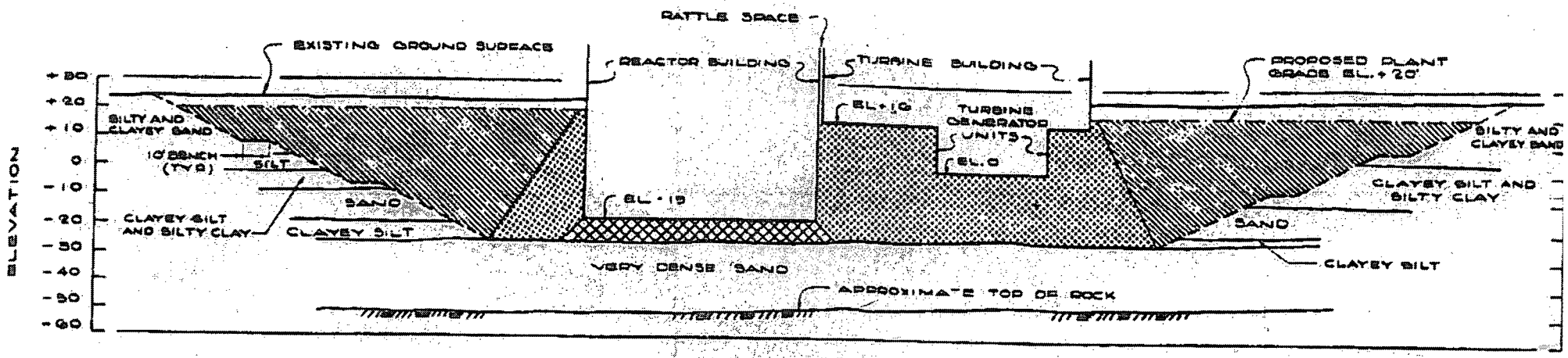
Appendix C

Plant Foundation Pre-Construction Drawings

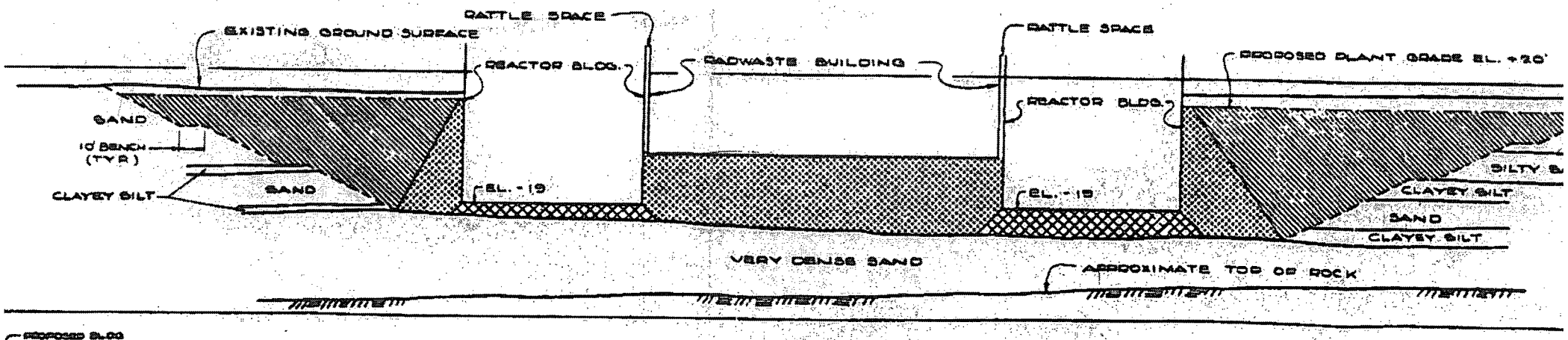


NOTES:
1. FOR SECTION A-A, SEE DWG. 68-116-52.;
FOR SECTION B-B, SEE DWG. 68-116-58.
2. FOR SECTION 1-1 AND 2-2, SEE DWG. 68-116-54.
FOR SECTION 3-3 AND 4-4, SEE DWG. 68-116-56.

LEGEND
- ⊕ — BORING
- ● — CONE PROBE
- ■ — TEST PIT
- • — PIEZOMETERS



SECTION 'A-A'



SECTION 'B-B'

PLAN
SCALE 1" = 200'

NOTE:
PROPOSED SLOPE LINES FOR EXCAVATION ARE TENTATIVE ONLY. FINAL DESIGN OF SLOPES TO BE CONSISTENT WITH DEWATERING SCHEME.

HORIZONTAL SCALE
40 0 40 80 FEET

VERTICAL SCALE
10 0 10 20 FEET

LEGEND

- EXCAVATE AND BACKFILL WITH SAND COMPACTED TO 65% RELATIVE DENSITY.
- EXCAVATE AND BACKFILL WITH SAND COMPACTED TO 75% RELATIVE DENSITY.
- EXCAVATE AND BACKFILL WITH SAND COMPACTED TO 90% RELATIVE DENSITY.