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MCGUIRE NUCLEAR STATION
LANDFILL #2, PERMIT NUMBER 60-04
GROUND-WATER MONITORING PROGRAM
SAMPLING AND ANALYSIS PLAN

Prepared By:
Duke Power Company
Environmental Division
Environmental Chemistry

September 14, 1996
Revised, November 24, 1997

Ronald A. Santini 11.25.97

Ronald A. Santini, PH-GW(American Institute of Hydrology)

1.0 PROGRAM DESCRIPTION

1.1 SCOPE OF WORK

This Ground-Water Monitoring Program is designed to address the Duke Power Company (DPC) permit requirement for ground-water monitoring around Landfill #2, permit number 60-04, at McGuire Nuclear Station. It has been prepared according to the guidelines set forth by the North Carolina Water Quality Guidance Document for Solid Waste Facilities (SW-1001-87), by the EPA , Region IV, in "Environmental Investigations, Standard Operating Procedures and Quality Assurance Manual", and documents the methods of field sampling, record-keeping protocols, data quality objectives, and data validation procedures that will be used in this program.

1.3 WELL LOCATION AND INSTALLATION

Eight wells have been installed to determine ground-water quality in the vicinity of the landfill . Monitoring wells designated with an "A" are deep wells. Monitoring wells MW5 and MW5A are located upgradient of the landfill area and six wells, MW1, MW1A, MW2, MW2A, MW3, MW3A, MW4, and MW4A are located downgradient of the landfill. In addition surface water is monitoried at locations SW1 and SW2. The locations of these wells and surface water locations are shown on Figures 1 and 1A. Well elevations and North Carolina State Plane Coordinates are shown in Table 1.

Each of the shallow wells is screened to intercept the water table. These wells are constructed of two-inch diameter PVC well screen and casing. Each shallow well intercepts the aquifer with a 15 foot section of PVC well screen with a slot size of 0.010 inch. The deep monitoring wells are screened at the top of bedrock. The wells are Type II monitoring wells installed by a North Carolina registered driller in accordance with applicable NCDENR regulations. Figure 2 shows a typical construction diagram for the wells. The wells are equipped with dedicated pump systems (Figure 3).

Table 1. Monitoring Well Information

Well ID	Coordinates		Ground Elevation	Top of Casing	Total Depth	Bottom Elevation
	NORTH	EAST	ft-msl	ft-msl	ft	ft-amsl
MW-5	611642.3	1420461	766.42	768.30	63.90	704.40
MW-5A	611644.3	1420446	766.45	768.40	96.00	672.40
MW-6	612271.4	1420458	726.79	728.50	37.20	691.30
MW-6A	612278.3	1420445	727.54	729.00	47.90	681.10
MW-7	612063.4	1419782	723.72	725.90	71.50	654.40
MW-7A	612051.3	1419778	722.74	724.70	84.40	640.30
MW-8	612263.7	1420098	757.30	759.60	37.30	722.30
MW-8A	612254.6	1420109	757.61	759.70	59.40	700.30
MW-9	611923.7	1419593	710.27	711.90	30.80	681.10
MW-9A	611908.9	1419590	710.30	712.10	47.80	664.30

WELL ID	Screen Length ft	Bottom of Screen ft-amsl	Top of Screen ft-amsl	Screen Slot Size inches	Screen Material	Well Type
MW-5	15	704.40	719.40	0.010	PVC	Type II
MW-5A	10	672.40	682.40	0.010	PVC	Type II
MW-6	15	691.30	706.30	0.010	PVC	Type II
MW-6A	10	681.30	691.30	0.010	PVC	Type II
MW-7	15	654.40	669.40	0.010	PVC	Type II
MW-7A	10	640.30	650.30	0.010	PVC	Type II
MW-8	15	722.30	737.30	0.010	PVC	Type II
MW-8A	10	700.30	710.30	0.010	PVC	Type II
MW-9	15	681.10	696.10	0.010	PVC	Type II
MW-9A	10	664.30	674.30	0.010	PVC	Type II

1.3 PARAMETERS AND FREQUENCY

Proposed parameters, units of measure, methods are presented in Table 2. The parameters represent pertinent groundwater quality standards. The wells are sampled semi-annually in June and December. Sampling results will be submitted to the State within 90 days of sampling.

Table 2. Sample Containers, Volumes, Preservatives and Holding Times.

PARAMETER	CONTAINERS	PRESERVATIVES	HOLDING TIMES
Insitu Parameters			
Field pH	Insitu	None: analyze immediately	NA
Specific Conductance	Insitu	None: analyze immediately	NA
Temperature	Insitu	None: analyze immediately	NA
Laboratory Analyses			
Nitrate	500 ml HDPE	Cool 4°C	48 hrs
Chloride	500 ml HDPE	None Required	28 days
Arsenic	500 ml HDPE	pH<2 HNO_3	6 months
Barium	500 ml HDPE	pH<2 HNO_3	6 months
Cadmium	500 ml HDPE	pH<2 HNO_3	6 months
Chromium	500 ml HDPE	pH<2 HNO_3	6 months
Copper	500 ml HDPE	pH<2 HNO_3	6 months
Iron	500 ml HDPE	pH<2 HNO_3	6 months
Lead	500 ml HDPE	pH<2 HNO_3	6 months
Manganese	500 ml HDPE	pH<2 HNO_3	6 months
Mercury	500 ml HDPE	pH<2 HNO_3	6 months
Selenium	500 ml HDPE	pH<2 HNO_3	6 months
Silver	500 ml HDPE	pH<2 HNO_3	6 months
Zinc	500 ml HDPE	pH<2 HNO_3	6 months
Sulfate	500 ml HDPE	Cool 4°C	28 days
Fluoride	500 ml HDPE	pH<2 HNO_3	6 months
TDS	500 ml HDPE	Cool 4°C	7 days
Chemical Oxygen Demand	500 ml HDPE	pH<2H_2SO_4;Cool 4°C	28 days
Biochemical Oxygen Demand	2 liters HDPE	Cool 4°C	48 hours
Asbestos	2 liters HDPE	Cool 4°C	48 hours
Volatile Organic Compounds	40 ml Glass	HCL;Cool 4°C	14 days
Semi-volatile Organic	2 liters Am Glass	Cool 4°C	7 days
Gross Alpha & Beta	4l cubitainer	10 ml 50%HNO_3	NA
Tritium	50 ml polybottle	None	NA

1.4 DATA QUALITY OBJECTIVES

The overall quality assurance (QA) objective is to ensure that data of known and acceptable quality are provided. All measurements will be made so as to yield results that are representative of the groundwater. All data will be calculated and reported in units consistent with those of other agencies and organizations to allow comparability of data bases.

The QA objectives for precision, accuracy, and completeness have been established by the laboratory(s) in accordance with EPA or other accepted agencies for each measurement variable (where possible). The objectives are outlined in the Duke Power Company Laboratory Services Procedures Manual, and are available upon request.

Detection limits for the water analyses presented in Table 3 are generally specified by the analytical methods. As stated above, appropriate methods have been selected to meet applicable standards for groundwater quality or the requirements of applicable permits. Instances may occur, however, in which the condition of the sample will not allow detection of the desired limits for various parameters either because of matrix interferences or high analyte concentrations requiring sample dilution. The laboratory(s) will provide sufficient information with each data package to allow reviewers of the data to be aware of encountered sample problems.

2.0 SAMPLING PROCEDURES

2.1 SAMPLING EQUIPMENT

Development, purging and sampling equipment are chosen to ensure the materials making up the equipment are compatible with the sample parameters and also comply with state and federal regulatory requirements for sampling. Positive-gas-displacement fluorocarbon resin bladder pumps are installed in each monitoring wells as dedicated purging and sampling systems.

2.1.1 Equipment Cleaning Procedures

All equipment used to monitor groundwater elevations and quality at the landfill use dedicated equipment. However, in the event non-dedicated equipment is used, reusable water level meters, development pumps, purging, and sampling equipment are cleaned between wells in accordance with standard EPA approved cleaning procedures for field equipment described in "Standard Operating Procedures and Quality Assurance Manual", Engineering Support Branch, EPA Region IV, February 1, 1991.

2.2 GROUND-WATER SAMPLING

2.2.1 Developing the Well

After installation of new wells, and prior to initial sampling, the monitoring wells are 'developed'. Development removes silt that has settled into the bottom of the well following installation, and removes fine silt and clay particles from the well screen and sandpack surrounding the screen, to avoid future clogging of the well or poor well performance. Development involves removing an estimated ten or more well volumes from the well using a positive-gas-displacement fluorocarbon resin bladder pump with an up-and-down agitation to loosen particles from the well screen. After development of a well, a true well depth is recorded.

2.2.2 Ground-Water Level and Total Depth Measurements

Water-level measurements are required to confirm the ground-water flow direction and to calculate the volume of standing water in the well. All monitoring wells have been surveyed by a registered surveyor to determine the elevation of the top of each well casing. All depth and water-level measurements are referenced to the top of the well casing and recorded to the nearest one-hundredth of a foot.

In non-dedicated systems, water-level measurements are made with the use of an electronic measuring device which consists of a spool of dual conductor wire, a probe attached to the end, and an indicator. When the probe comes in contact with water, the circuit is closed and a meter light and/or buzzer attached to the spool signal the contact. The probe is lowered further until it rests on the bottom of the well to determine the depth of the well. The depth and water level are used to determine that the well has not filled with silt and to calculate the volume of standing well water. The volume of well water (in liters) is calculated using the following equation:

$$V = h \times \pi r^2 \times (28.32\ l/ft^3)$$

where V = volume of standing water (liters)
h = height of standing water (feet)= casing depth - water level
r = radius of well casing (feet)

In dedicated systems, an accurate well depth is determined, as indicated above, after development of the well and prior to installation of the dedicated water level probe and pump. This well depth is referenced until replacement of the dedicated water level probe and/or pump is necessary. The dedicated water level probe consists of a pressure transducer and electronic meter. The height of water above the probe is measured and subtracted from the depth to which

the probe was placed in the well to yield the depth of the water (example: the dedicated probe is positioned 15 ft down from the top of the casing, the meter reads 6 feet of water above the probe, the water level is thus 9 feet below the top of the casing). The calculation of standing water is the same for non-dedicated systems. The total depth, water-level measurements, and calculated well volume are recorded on the Groundwater Monitoring Data Sheet (Figure 4).

2.2.3 Purging the Well

Prior to each sampling event, the well is purged to remove the standing water which may not be representative of formation water. Purging is accomplished by pumping. Dedicated bladder pump intakes are set about 1 foot above the bottom of the well.

Three to five times the calculated standing water volume (V) is removed from the well during purging. The water removed is measured in a graduated container. Under normal rates of recovery, monitoring wells should be sampled within eight hours of purging in accordance with EPA guidelines. In low-yield wells (wells that are incapable of yielding three to five standing water volumes), water is purged so that it is removed from the bottom of the screened interval. Low-yield wells are evacuated to dryness once; as soon as the well recovers sufficiently, the first sample is tested for pH and specific conductance (Section 2.2.4). Samples are then collected in the order of the parameters' volatilization sensitivity (Section 2.2.5).

2.2.4 Field Measurements

During purging of the well, grab samples are collected after each of the three or more well volumes are removed to obtain measurements of pH, specific conductivity. Stable readings during a purging event in a well are considered those which 1) do not indicate an increasing or decreasing trend, and 2) are within 10% of each other for specific conductance, and within 0.2 pH units over three consecutive readings.

The field instrumentation is calibrated with reference standards prior to and after each sampling day as described in the Environmental Chemistry Procedure 3210 or manufacturers specifications (available upon request). The pH meter is calibrated with two different pH standards which usually bracket the expected ground-water pH (pH standards 7.0 and 4.0). The conductivity meter is calibrated with a standard nearest the expected ground-water conductivity. Calibration results are recorded on the Field Sampling Calibration Form (Figure 5). The sample readings are recorded on the Groundwater Monitoring Data Sheet (Figure 4).

2.2.5 Sample Collection

After sufficient purging and stable field measurements, the wells are sampled for the parameters of interest. If non-dedicated or non-disposable equipment is used (i.e. cleaned in the field between wells), background wells are sampled before downgradient wells. Sampling personnel wear clean, disposable, non-powdered latex gloves at each well. Samples are collected in the order of the volatilization sensitivity of the parameters:

- Volatile Organic Compounds, pH
- Total metals
- Sulfate and chloride
- Nitrate
- Semi-volatile Compounds
- Asbestos, TDS

If ground-water samples for which metals analysis will be conducted have a turbidity of higher than 50 NTU, the sample is collected unpreserved. The unpreserved sample is stored at 4°C until delivered to the laboratory. The laboratory will filter and digest the sample within 72 hours of sample collection. Samples are not to be filtered in the field.

2.2.6 Sample Containers, Volume, Preservative, and Holding Time

All sample containers supplied for the collection of ground-water samples by the laboratory are new, precleaned and/or prebaked as approved by EPA procedures appropriate for the parameters of interest. Table 2 summarizes the sample containers, sample volume, preservation procedures and holding times required for each type of sample and parameter. Sample containers are kept closed until used. All sample containers are provided by DPC or vendor laboratories.

3.0 SAMPLE TRACKING

The chain of custody program allows for the tracing of possession and handling of individual samples from the time of field collection through laboratory analysis and report preparation.

3.1 SAMPLE LABELING

Sample containers are labeled at the time of sampling with the following information: sampling date and time, sample identification number, and initials of sample collector.

3.2 FIELD LOG BOOK

A Field Log Book is maintained during the course of the field work to document the following:

- Identification of well
- Well depth
- Static water level depth and measurement technique
- Presence of immiscible layers and detection method
- Well yield - high or low
- Purge volume or pumping rate
- Sample identification numbers
- Well evacuation procedure/equipment
- Sample withdrawal procedure/equipment
- Date and time of collection
- Types of sample containers used
- Identification of replicates or blind samples
- Preservative(s) used
- Parameters requested for analysis
- Field analysis data and methods
- Sample distribution and transporter
- Field observations on sampling event
- Name of collector(s)
- Climatic conditions including estimate of air temperature

This information is contained on the Groundwater Monitoring Data Sheets , the Field Sampling Calibration Form, or the Chain-of-Custody Record and Analysis Request Form (See Section 3.3) which are filled out for each sampling event. These loose-leaf sheets are arranged in sequential order and filed by project and date. All recorded entries are made in indelible ink. Errors are corrected by drawing a line through the error, initialing and dating the correction, and starting a new entry on the next line (if necessary).

3.3 CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST FORM (CCRARF)

The CCRARF (Figure 6) accompanies the sample(s), traces sample possession from time of collection to delivery to the laboratory(s), and clearly identifies which sample containers have been designated for each requested parameter. The record includes the following types of information:

- Sample identification number
- Signature of collector
- Date and time of collection
- Sample type (e.g., groundwater, immiscible layer)
- Identification of well
- Number of containers
- Parameters requested for analysis
- Preservative used

- Signature of persons involved in the chain of possession
- Inclusive dates of possession

3.4 SAMPLE CUSTODY, SHIPMENT AND LABORATORY RECEIPT

For the purpose of these procedures, a sample is considered in custody if it is:

- In actual possession of the responsible person;
- In view, after being in physical possession;
- Locked so that no one can tamper with it, after having been in physical custody; or in a secured area, restricted to authorized personnel. All samples are maintained in the custody of the sampling crew during the sampling event. At the end of each sampling day and prior to the transfer of the samples off-site, chain-of-custody entries are completed on the CCRARF for all samples. Upon transfer of custody, the chain-of-custody form is signed by a sampling crew member, including the date and time. Samples are delivered to outside laboratories by DPC personnel or courier.

All chain-of-custody forms received by the laboratory(s) are signed and dated by the respective Supervising Scientist(s) or their designee (at the DPC lab), or the laboratory sample custodian (at vendor labs) immediately following receipt by the laboratory.

The analysts at the laboratory(s) maintain a sample-tracking record that will follow each sample through all stages of laboratory processing. The sample tracking records show the date of sample extraction or preparation, and analysis. These records are used to determine compliance with holding time limits during lab audits and data validation.

Custody procedures followed by DPC laboratory personnel are described in detail in the DPC Laboratory Services Procedures Manual.

4.0 ANALYTICAL PROCEDURES

The main analytical laboratory used in this program is the DPC Laboratory Services Laboratory: N.C. Drinking Water (NC37804) and Wastewater (#248) Certifications. The organizational structure and staff qualifications of the laboratory are discussed in its generic Quality Assurance Program (QAP). The QAP and Laboratory Services Procedures Manual are available for review upon request to:

Laboratory Manager, Laboratory Services Section
Duke Power Company, Environmental Division
13339 Hagers Ferry Road
Huntersville, North Carolina 28078
704-875-5304

Vendor laboratories that meet EPA and NC certification requirements may be used for analyses which cannot be performed in-house.

The analytical procedures used for this Ground-Water Monitoring Program are briefly described in Table 3. Conductivity, pH, and/or turbidity are measured in the field according to DPC Laboratory Services Procedures Manual or instrument manufacturers' instructions.

Table 3. Sample Parameters, Analytical Methods and Detection Limits

PARAMETER	UNITS	ANALYTICAL METHOD	DETECTION LIMITS
Insitu Parameters			
Field pH	pH Units	Hydrolab	NA
Specific Conductance	umhos/cm	Hydrolab	NA
Temperature	°C	Hydrolab	NA
Water Levels	ft	Water Level Meter	0.010 ft
Laboratory Analyses			
Nitrate	mg/l	EPA 353.2	0.05
Chloride	mg/l	EPA 325.2	1.0
Arsenic	mg/l	SM3030C/EPA 206.2	0.0010
Barium	mg/l	SM3030C/EPA 200.7	0.0050
Cadmium	mg/l	SM3030C/EPA 213.2	0.00010
Chromium	mg/l	SM3030C/EPA 218.2	0.0010
Copper	mg/l	SM3030C/EPA 220.2	0.0050
Iron	mg/l	SM3030C/EPA 200.7	0.010
Lead	mg/l	SM3030C/EPA 239.2	0.0020
Manganese	mg/l	SM3030C/EPA 200.7	0.0050
Mercury	mg/l	SM3030C/EPA 245.1	0.00010
Selenium	mg/l	SM3030C/EPA 270.2	0.0010
Silver	mg/l	SM3030C/EPA 272.2	0.00020
Zinc	mg/l	SM3030C/EPA 200.7	0.0050
Sulfate	mg/l	EPA 375.4	1.0
Fluoride	mg/l	EPA 340.2	0.10
TDS	mg/l	EPA 160.1	1.0
BOD	mg/l	EPA 405.1	1.0
COD	mg/l	EPA 410.0	10
Volatile Organics	ug/l	EPA 8260	2
Semi-volatile Organics	ug/l	EPA 8270	10
Asbestos	Mill str/l	EPA 100.1 (EPA600/4-83-043)	0.2
Gross Alpha	pCi/l	EPA 900	3
Gross Beta	pCi/l	EPA 900	4
Tritium	pCi/l	NA	2000

5.0 INTERNAL QUALITY CONTROL CHECKS

Internal laboratory control checks used by the laboratories are described in their generic QAP and procedures manual. The laboratories demonstrate the ability to produce acceptable results using the methods specified.

Internal quality control checks for sampling procedures and laboratory analyses will be conducted with each sampling event. These checks will consist of the preparation and submittal of field blanks, trip (travel) blanks, and/or field replicates for analysis of all parameters at frequencies described in the laboratory(s) procedures manuals. Equipment rinsate blanks for laboratory-cleaned equipment will be collected quarterly.

The above field QC blanks and replicates included as internal QC checks are described as follows:

- **Field Blanks**: A field blank consists of sample containers filled in the field with organic-free, deionized or distilled water prepared and preserved in the same manner as the samples. The field blank is transported to the laboratory with the samples and analyzed along with the field samples for the constituents of interest to check for contamination imparted to the samples by the sample container, preservative, or other exogenous sources.

- **Trip Blanks**: A trip (travel) blank is a sample container filled with organic-free water in the laboratory that travels unopened with the sample bottles. It is returned to the laboratory with the field samples, and analyzed along with the field samples for parameters of interest.

- **Field Replicates**: A field replicate is a duplicate sample prepared at the sampling locations from equal portions of all sample aliquots combined to make the sample. Both the field replicate and the sample are collected at the same time, in the same container type, preserved in the same way, and analyzed by the same laboratory as a measure of sampling and analytical precision.

6.0 VALIDATION OF FIELD DATA PACKAGE

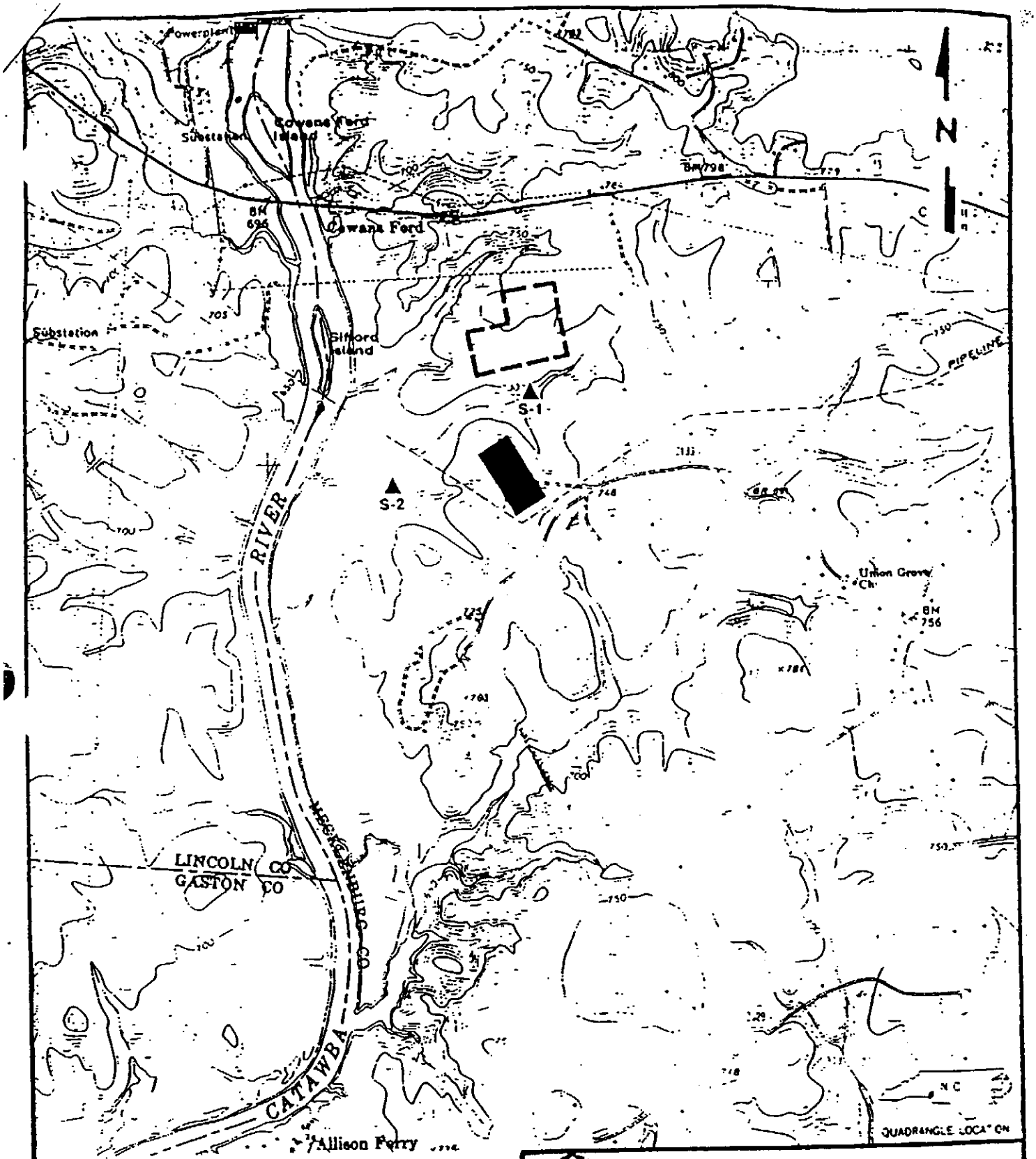
The field data package will be reviewed by the Project Scientist for completeness and accuracy using the Field Data Validation Checklist (Figure 7). The field data package includes all of the field records and measurements developed by the sampling team personnel. The field data package validation procedure consist of:

- A review of field data contained on the Groundwater Monitoring Data Sheets for completeness.
- A verification that equipment blanks, field blanks, and trip blanks were properly prepared, identified, and analyzed.
- A check of the Field Sampling Calibration Form for equipment calibration and instrument condition.
- A review of the Chain-Of-Custody Record and Analysis Request Form for proper completion, signatures of field personnel and the laboratory sample custodian, and dates, and for verification that the correct analyses were specified.

7.0 REPORT SUBMITTAL

A summary table of the field and laboratory data and a cover letter describing trends will be submitted to the North Carolina Department of Environment and Natural Resources within 90 days of sampling. The State will be notified in the event that vendor lab analyses have not been completed within this time frame. All Groundwater Monitoring Data Sheets, Field Calibration Forms, Chain-of-Custody Record and Analysis Request Forms, Laboratory(s) QA data, and Data Validation Checklists are kept in fire-proof file cabinets or microfiched, and are available upon request.

FIGURES



EXPLANATION

0 2000
APPROX. SCALE, FT.

PROPOSED LANDFILL

SWITCHYARD

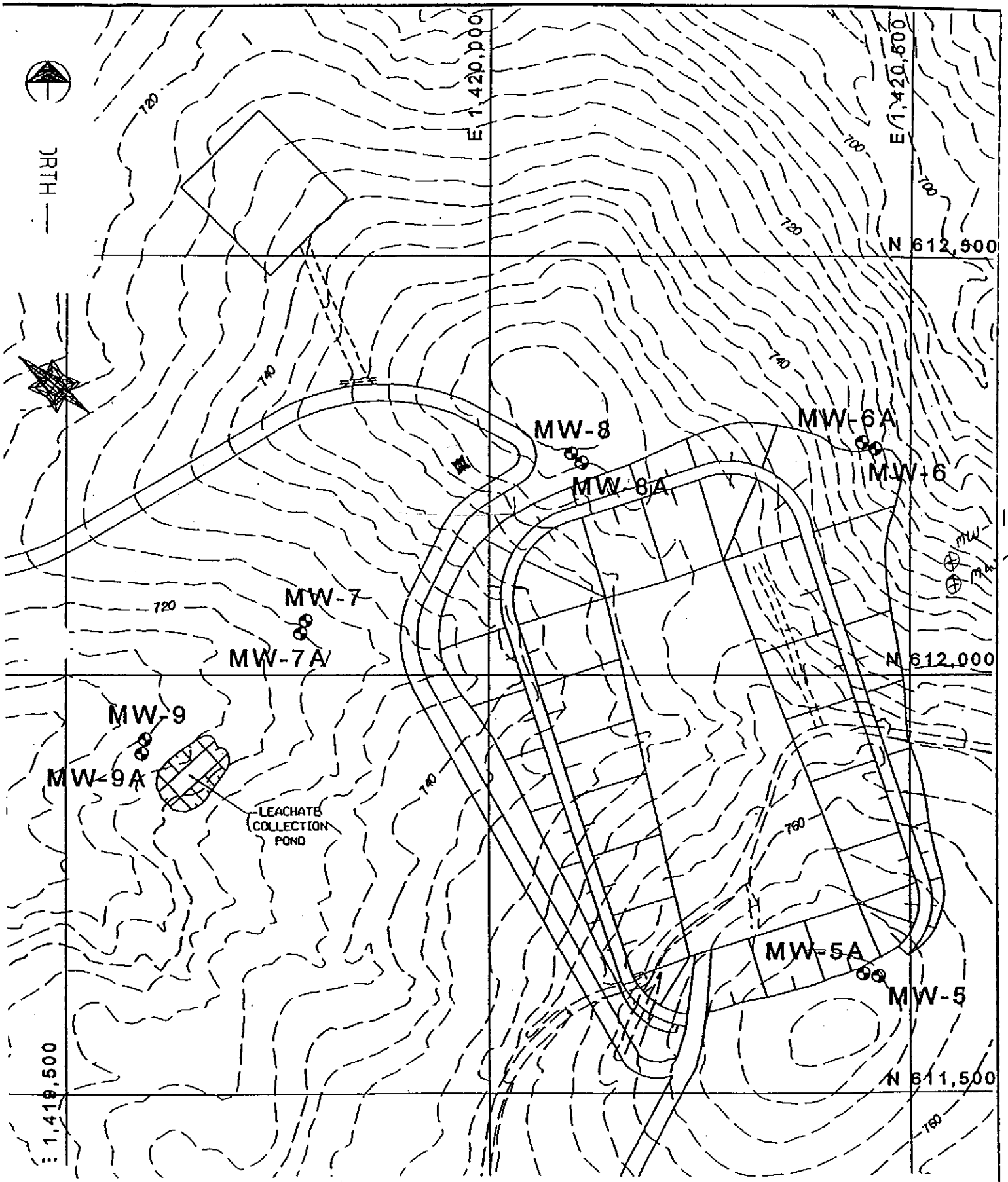
SURFACE-WATER SAMPLING POINT

REF.: U.S.G.S. 7.5 MIN. TOPOGRAPHIC MAP, LAKE NORMAN SOUTH, NORTH CAROLINA QUADRANGLE, DATED 1970.

LAW ENVIRONMENTAL, INC.
CHARLOTTE, NORTH CAROLINA

SITE LOCATION & SURFACE-WATER SAMPLING PLAN
DUKE POWER COMPANY
McGUIRE LANDFILL SITE
MECKLENBURG COUNTY, NORTH CAROLINA

JOB NO. 56-1565 | FIGURE 1



100 50 0 100 200

SCALE IN FEET

LEGEND

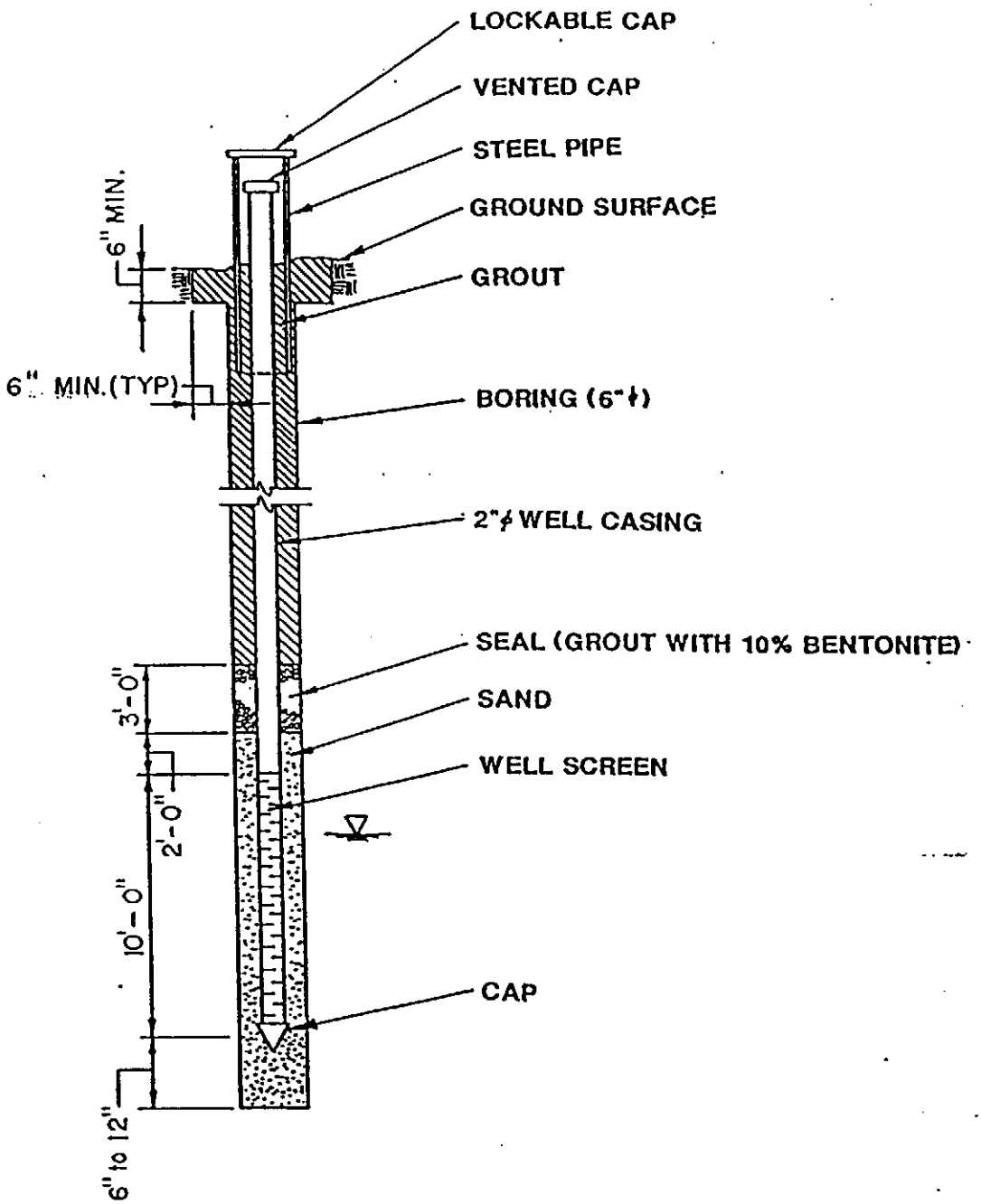
EXISTING SITE TOPOGRAPHY

MONITORING WELL

DUKE POWER COMPANY
McGUIRE NUCLEAR STATION

LANDFILL #2
MONITORING WELL
LOCATIONS

FIG 1A



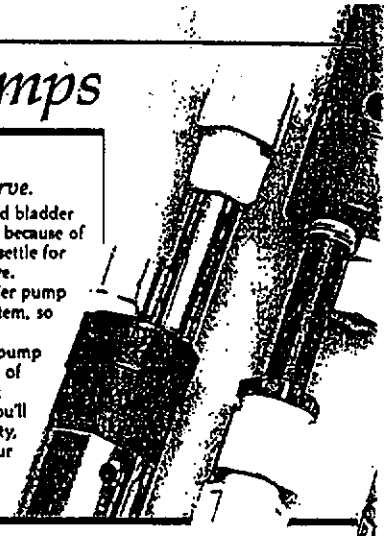
NOTES: 1.ALL DIMENSIONS ARE APPROXIMATE.
2.ALL CASING MATERIAL SHALL BE Sch 40 PVC.
3.WELL SCREEN MATERIAL SHALL BE Sch 40 PVC.

DUKE POWER CO.
GROUNDWATER MONITORING WELL DETAIL

FIGURE 2

WELL WIZARD

Sampling Pumps



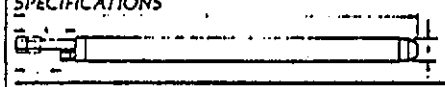
Choose the system that gives you the superior performance you deserve.

The whole reason you're selecting a dedicated bladder pump system for groundwater monitoring is because of its accuracy and long-term reliability. Don't settle for second best—get the high quality you deserve.

QED built the business of dedicated bladder pump systems. Our pumps are the heart of the system, so we spare no effort to make them the best.

Many of the details that make a superior pump are subtle modifications resulting from years of experience. They may not be obvious at first glance, but check the specs of our pumps. You'll find flow rates, pumping lifts, material quality, durability, and selection that clearly show our commitment to supplying you with the best pumps possible.

SPECIFICATIONS



Model No.	Rod Material	Bladder Material	Hose Fittings †	Maximum Lift (ft.)*	A	B	C	D	Pump Weight (lbs.)
P-1100	PVC	PVC	Polypropylene	300	40.85	4.65	3.70	1.66	3
P-1100	Teflon	Teflon	Teflon	250	40.33	4.13	2.96	1.66	4
P-1101	PVC	Teflon	Polypropylene	300	40.85	4.65	3.70	1.66	3
P-1101H	PVC	Teflon	316 S.S.	600	40.75	4.50	3.70	1.66	3
SP-1101P	316 S.S.	Teflon	316 S.S.	1000	40.50	4.12	3.12	1.66	10
P-1200	Teflon 316 S.S.	Teflon	316 S.S.	300	41.14	3.93	3.06	1.50	3
P-1201	PVC 316 S.S.	Teflon	Polypropylene	300	41.23	4.02	3.06	1.50	4
P-1201H	PVC 316 S.S.	Teflon	316 S.S.	600	41.37	4.16	3.20	1.50	4
P-1300	Teflon 316 S.S.	Teflon	316 S.S.	200	15.07	3.07	2.07	1.00	3

† All Air Supply Tube Fittings 0.25 OD
[illegible]

* [illegible] Clamp Tool No. [illegible] [illegible] attachment or tubing [illegible] pump

** [illegible] NOTE: Intake Screens are not [illegible] QED

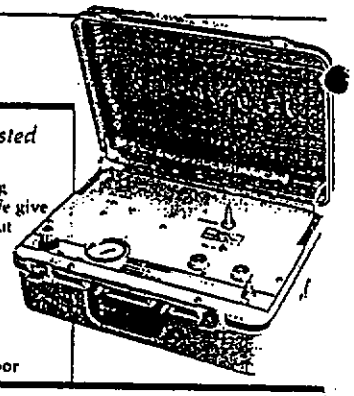
Field Replaceable Bladders

For Pumps	W Hand Tool	W O Hand Tool
P-1100	14055	14065
P-1101	14057	14067
P-1200	35315	35320
P-1201	35315	35320

Note: Kit kits contain 2 bladder sleeves and tool [illegible] replacement only. 35315 includes pin punch.

WELL WIZARD

Controllers



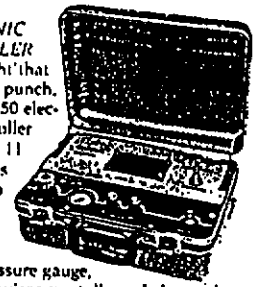
State-of-the-art, 100% performance-tested units cycle pumps automatically.

QED has more experience designing and building pneumatic controller devices than anyone else. We give you a better choice of controllers, with or without drivers—all field-proven performers. Versatile QED controllers are fully adjustable, can operate high-rate purge pumps and still be throttled down to 0 psi for TECD-recommended low flow rates for sample vial filling. One-person portability, fast set-up, and unattended cycling greatly reduce labor requirements.

STANDARD & HIGH-PRESSURE CONTROLLER

All 3013 series models are compatible with a wide range of external gas sources and use sophisticated pneumatic design that requires no batteries or electrical supply. Optional Pump Manifold (Model 3000) lets one controller operate three sampling pumps within a 20-foot radius simultaneously. High pressure models allow pump lifts to 1000 feet.

ELECTRONIC CONTROLLER



A lightweight that packs a real punch, the Model 350 electronic controller weighs only 11 pounds, runs pumps up to 250 ft. deep. Complete with flow throttle, pressure gauge, and other environmentally-sealed, weather-resistant components, enclosed in a tough, protective carrying case.

SPECIFICATIONS

Model No.	Logic	Maximum Supply Pressure	Maximum Pump Depth	Wt.
3013	Pneumatic	125	250	22
3013-H	Pneumatic	300	600	21
3013-UH	Pneumatic	500	1000	32
350	Electronic	125	250	12

3013 Series size: 18 L × 14 1/2 W × 9 1/2 H
350 size: 13 × 12 × 6 1/2

Extra performance built right in

Pneumatic power
3013 series controllers have all-pneumatic design for maximum reliability. No battery to drain, no long waits for recharging or replacement batteries—if you've got pressure, you've got power. Third-generation pneumatic logic controls provide inherent shock and moisture resistance for real field ruggedness.

Electronic efficiency
Model 350 has uniquely efficient circuits that work for 700 hours on one set of cheap, readily available AA batteries. Warning light shows a full day's power left, so you won't get left out in the field.

Stay in the driver's seat
Field-proven compressor carts not easily on high-flotation pneumatic tires, for true one-person portability even in heavy mud or snow. Constructed to take long hours, rough terrain—and the payloads are QED's reliable, high-power engine/compressor combinations that can operate pumps to 300 feet.

No hidden charges
QED systems come complete—no extra costs for hoses, batteries, chargers or other necessary equipment. For example, all units have two 20 foot, heavy-duty industrial air supply hoses with quick-connect fittings—standard, not additional.

FIGURE 3

DUKE POWER COMPANY
GROUNDWATER MONITORING DATA SHEET

LOCATION:			
PROJECT TITLE:			
SAMPLING DATE:		FIELD CREW	

MONITORING WELL NUMBER: [ ]

WATER LEVEL METER #: [ ]

TIME SAMPLE COLLECTED: [ ]

WELL VOLUME CALCULATION

WELL DIAMETER (INCHES)	WELL DEPTH (FEET)	-	WATER LEVEL (FEET)	=	WATER COLUMN (FEET)	X	3.14 x r^2	=	VOLUME (FT^3)
2"		-		=		X	0.0218	=	
4"		-		=		X	0.0873	=	

LITERS PER WELL VOLUME REMOVED:

WELL VOLUME	LITERS TO REMOVE: (FT^3 x 28.32 l/FT^3)	
	2" WELL	4" WELL
1		
5		
10		
20		

OBSERVATIONS:

ODORS DETECTED:		FREE PRODUCT MEASUREMENT:	
TYPE:		METHOD:	
STRONG:		THICKNESS:	
MINOR:		OTHER:	
NONE:			

WATER LEVEL (FEET)	METHOD (P=PUMP) (B=BAIL)	VOLUME (LITERS)	EVACUATED VOLUME (LITERS)		pH (SU)	TEMP (deg C)	SPECIFIC CONDUCT. (umho/cm)		COMPLETE EVACUATION (Y/N)
N/A									

COMMENTS: WATER LEVEL AND WELL DEPTH REFERENCED TO TOP OF PVC WELL CASING.

Form 18570 (R7-87)

FIELD SAMPLING CALIBRATION FORM

Study: _____

Da' _____ Water Collector: _____

Crew. _____ Surface Unit Reader: _____

Weather & Lake Conditions: _____

Equipment: Sonde#: _____ Other Instruments: _____

Cable#: _____ _____

Battery#: _____ _____

Surface Unit#: _____ _____

Procedure Number: PESCS/ 3210 Water Quality Analyzer: DS 3

Calibration Time		Time:			Time:			Time:		
Variable	Calib. Std.	Initial (Hydrolab)	→	Adj. To (Std.)	Initial (Hydrolab)	→	Adj. To (Std.)	Initial (Hydrolab)	→	Adj. To (Std.)
Temp. °C										
Therm.#:	_____	.	-/->	.	.	-/->	.	.	-/->	.
Therm.#:	_____	.	-/->	.	.	-/->	.	.	-/->	.
DO mg/l	W			.			.			.
	W			.			.			.
	W			.			.			.
	AW	.	→	.	.	→	.	.	→	.
pH	B	.	→	7.00	.	→	7.00	.	→	7.00
	B	.	→	4.01	.	→	4.01	.	→	4.01
	B	.	→	9.18	.	→	9.18	.	→	9.18
SP COND µmho/cm	SS	.	→	.	.	→	.	.	→	.
	SS	.	→	.	.	→	.	.	→	.
	SS	.	→	.	.	→	.	.	→	.

Y: B – Buffer
W – Winkler
AW – Average Winkler
SS – Standard Solution

NA – Not Applicable
IM – Instrument Malfunction
→ – Adjusted to
-/-> – Not Adjusted to

DUKE POWE[illegible] [illegible]PANY
Laboratory S[illegible]
MNS Bldg. # [illegible] (MG03A1)
13339 Hagers Ferry Road
Huntersville, NC 28078

CHAIN OF CUST[illegible]Y RECORD
AN
ANALYSIS REQUEST FORM *

Form [illegible]6 (R10-93)

LS CLIENT CONTACT/PHONE[1]: _____
CLIENT[2]: _____
Project Name[3]: _____
Results to/Phone[4]: _____
Address and/or PROFS[5]: _____
Matrix (type of samples)/QC Level[6]: _____
SAM No.[7]: _____

ANALYSES REQUESTED by bottle type—MUST NOTE PRESERVATIVE[12] (may note special DL or Method)[13]

FRAC[8]	CHEMPLOT Number[9]	Sample Description or ID[10]	Collected using sampling instructions[11]														
			Date	Time	Name												

Sample Preserved ☐ Yes ☐ No [14]
Name:

Total # of samples[15]:

Delivered by[16]:	Delivered by:	Delivered by:
Date/Time:	Date/Time:	Date/Time:
Received by:	Received by:	Received by:

Turnaround Requested[19]:
- ☐ Routine (3 weeks)
- ☐ Rush (2 weeks)
- ☐ Emergency Rush
- ☐ Date Results Requested _____

Comments[17]: _____

* See instructions on back of form.

[illegible] White [illegible] LS Files Pink Client Copy

Duke Power Company
Groundwater Monitoring Program
Field Data Validation Checklist

Data Validation Item	Yes	No
1. Has the Ground Water Monitoring Data Sheets been reviewed for completeness ?		
2. Were all equipment blanks, field blanks and trip blanks properly prepared, identified and analyzed?		
3. Was the Field Sampling Calibration Form completed?; Was the equipment within procedure calibration limits?		
4. Was the Chain-of- Custody Record completed, with the analyses requested, the number of containers, preservatives added, dates, times and signatures of field personnel and lab personnel ?		

Comments:_____

_____ _____
Project Scientist Signature

Figure 7.