WATER QUALITY MONITORING PLAN

CENTRAL CAROLINA TIRE MONOFILL PHASE 3A AND 3B

PERMIT NO. 43-04

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Prepared for:

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1.0 Purpose and Background

The North Carolina Solid Waste Rules, 15A NCAC 13B .0504(g)(iv), specifies that the owner/operator must provide, as part of the groundwater and surface water monitoring program, a water quality sampling and analysis plan (SAP). The SAP is to be designed to provide accurate results of groundwater and surface water quality at upgradient/upstream and downgradient/downstream sampling locations. This SAP addresses the following subjects.

- Groundwater and surface water sample collection
- Sample preservation and shipment
- Analytical procedures
- Chain-of-custody
- Quality assurance/quality control (QA/QC)

The methods and procedures described in the following sections are intended to provide representative samples and test data. Field procedures are presented in their general order of implementation. Equipment requirements are presented in each section, and quality assurance and record keeping requirements are presented in the last sections. Strict adherence to these procedures is required.

1.1 Groundwater and Surface Water Sampling Locations

Groundwater and surface water samples will be collected from each monitoring point and analyzed for a list of detection monitoring target parameters in accordance with NC Division of Waste Management (NC DWM) regulations. Groundwater monitoring wells and surface water sampling locations for the facility are shown in Figure 1.

The detection monitoring wells are designed to monitor the shallow aquifer at the site and are constructed of 2-inch inside diameter Schedule 40 PVC, with isolated well screen intervals, in accordance with North Carolina well construction standards 15A NCAC 2C. Well construction data for the groundwater well network is presented in Table 1.

1.2 Static Water Level Measurements

Static water levels will be measured in each monitoring well prior to purging and sampling of groundwater. Static water level data will be used to monitor changes in site hydrogeologic conditions. The following measurements will be recorded in a dedicated field book prior to purging and sample collection.

- Static water level (measured to nearest 0.01 foot)
- Total depth of well
- Height of water column in well

- Changes in conditions of well, protective casing, surface pad and surroundings

An electronic water level instrument will be used to accurately measure water levels to within 0.01 foot. Each well will have a permanent, easily identified reference point on the top of the PVC well casing from which all water level measurements will be made. The reference point will be marked and the elevation of the top of the PVC casing will surveyed by a North Carolina Registered Land Surveyor. The static water level and total depth measurements will be used to calculate the volume of water in the well.

The parts of the static water level instrument that will contact groundwater within the well (e.g., graduated tape and electronic indicator) will be constructed of inert materials such as stainless steel and Teflon™. The instrument will be thoroughly decontaminated between well measurements by washing with non-phosphate soap and triple rinsing with deionized water to prevent cross-contamination from one well to another.

1.3 Detection of Immiscible Liquids

The detection of immiscible non-aqueous phase liquids (NAPLs) is not anticipated at this facility based on the waste stream handled. However, the water-level measuring instrument used at the facility (described above) will be equipped with an electronic interface probe that is capable of distinguishing NAPLs from water. Monitoring for both light NAPLS (less dense than water) and dense NAPLs (more dense than water) will be conducted at the site by measuring at the water-table and at the bottom of each well. In the event that NAPLs are detected, the instrument will initially be cleaned with denatured laboratory grade isopropyl alcohol, followed by washing with non-phosphate soap and triple rinsing with deionized water to prevent cross-contamination from one well to another.

1.4 Monitoring Well Purging

Following measurement of the static water levels in all of the wells, individual wells will be purged of all stagnant water. The stagnant water, which is not representative of true aquifer conditions, must be removed to ensure that fresh formation water can be sampled. Each monitoring well will be purged using a new PVC disposable bottom-loading bailer or using pre-cleaned Teflon-lined disposable polyethylene tubing connected to a peristaltic pump under low flow conditions.

Prior to sampling, the monitoring wells will be purged of a minimum of three static well volumes of water, or until dry. During purging, measurements will be made in the field of the pH, temperature, specific conductance and turbidity of the groundwater collected from the monitoring wells, in accordance with NC DWM requirements. Data collected will be recorded in a dedicated field book.

1.5 Groundwater Sample Collection

Groundwater samples will be collected from each monitoring point and analyzed for a list of detection monitoring target parameters in accordance with NC Division of Waste Management (NC DWM) regulations.

After the wells are purged, groundwater samples will be collected for laboratory analysis. New latex or nitrile disposable gloves will be donned prior to sampling at each well. Groundwater samples will be collected using the new disposable PVC bottom-loading bailers that were used to purge the wells or using the pre-cleaned Teflon-lined disposable polyethylene tubing connected to a peristaltic pump under low flow conditions. In general, sampling will be conducted as soon as practical after purging is complete. In the event that a monitoring well runs dry during purging, it is acceptable to allow the well to recharge up to 24 hours prior to sampling. Similarly, wells with excess turbidity may be allowed to sit up to 24 hours prior to sampling to allow collection of a representative groundwater sample. Water levels in the wells will be allowed to recover for a period not exceeding 24 hours after purging to produce an adequate sample volume. Wells that fail to produce an adequate sample volume within 24 hours of purging will not be sampled.

Temperature, ph, specific conductance and turbidity will be measured immediately prior to sampling as a measure of purging efficiency and the results recorded in a dedicated field book. The temperature, pH, specific conductance and turbidity meters will be calibrated prior to each sampling event according to the manufacturer's specifications and consistent with Test Methods for Evaluating Solid Waste – Physical/Chemical Methods (SW-846).

Groundwater samples will be collected and contained in the order of volatilization sensitivity of specific parameters as follows.

- Temperature, ph, specific conductance and turbidity measurements
- Volatile Organic Compounds
- Total Metals

All detection monitoring samples will be collected unfiltered as required by the NC DWM.

All reusable sampling equipment, including meter probes, will be thoroughly decontaminated between wells by washing with non-phosphate soap and water, followed by triple rinsing with deionized water. Samples will be collected directly from the disposable bailers into laboratory-prepared containers that have been specifically prepared for the preservation and storage of compatible parameters. All groundwater sample containers will be immediately placed on ice in a cooler following sample collection in accordance with required sampling protocol.

Blanks and duplicate samples will be collected and analyzed for the same parameters as groundwater samples to ensure cross-contamination has not occurred. On set of trip blanks, described later in this document, will be prepared at the laboratory and will remain

in the sample cooler during sample collection and shipment to the laboratory for analysis to ensure that the sample containers or handling processes have not affected the quality of the samples. A duplicate groundwater sample may be collected from a single well as a check of laboratory accuracy and reproducibility.

1.6 Surface Water Sample Collection

Surface water samples will be collected from each monitoring point and analyzed for a list of detection monitoring target parameters in accordance with NC Division of Waste Management (NC DWM) regulations.

Surface water samples will be obtained from areas of minimal turbulence and aeration. The following procedure will be implemented for sampling surface water at each location.

- Don new latex or nitrile disposable gloves
- Hold sample bottle with one hand, and with the other, remove the cap
- Push the sample container slowly into the water column and tilt up towards the surrent to fill. A depth of about 6 inches is satisfactory. Avoid breaching the surface or agitating the water while filling the container.
- If there is little current movement, the container should be moved slowly in a leral direction, side to side, keeping the opening pointed upstream.

Blanks and duplicates, preservatives, handling and transport procedures for the surface water samples will be identical to those noted form the groundwater samples.

1.7 Equipment Decontamination

All non-dedicated sampling equipment that will come into contact with groundwater or surface water will be decontaminated before each use. The equipment decontamination procedure is presented below.

- Clean item with tap water and non-phosphate detergent (Alconox™, Liquinox™ or equivalent), using a brush if necessary to remove particulate matter and surface films
- Rinse thoroughly with tap water.
- Triple rinse with deionized water and allow to air dry.
- Wrap with aluminum foil, if necessary, to prevent contamination of equipment during storage or transport.

1.8 Field QA/QC Program

Field Quality Assurance/Quality Control (QA/QC) for the subject facility requires the routine collection and analysis of trip blanks to verify that the sampling collection and handling process has not affected the quality of the samples. The trip blanks will be prepared at the

laboratory and transported to the site in the sample cooler with the field sample containers, handled like a sample collected in the field, and returned to the laboratory for analysis. The trip blanks will be analyzed for volatile organic compounds (VOCs) only. Any VOCs found in the trip blanks will be attributed to: 1) contaminated sample container in which the blank was prepared; 2) contaminated source water; or 3) contamination during handling.

Any concentrations of contaminants found in the trip blanks will be reported but will not be used to correct the water-quality data for the groundwater or surface water samples. In the event that elevated constituent concentrations are found in the trip blanks, the laboratory results for that constituent in the field samples will be flagged for future evaluation and possible resampling.

1.9 Sample Preservation and Shipment

Sample preservation and shipment procedures will be carefully monitored to ensure sample integrity. Ice and/or chemical ice packs will be used to preserve samples in a cooler at the required 4°C temperature. Dry ice is not to be used. Samples will be delivered to the laboratory via overnight courier to ensure sample holding times are not exceeded. Shipment and receipt of the samples will be coordinated with the laboratory.

Once collected, samples will be placed on ice and cooled to a temperature of 4°C. Samples are to be packed in high-impact polystyrene-insulated coolers so as to inhibit breakage of sample containers. Chain-of-custody control of all samples will be maintained as follows.

- Labels will be placed on individual sample containers in the field, indicating the site name, sample location, time and date of sampling, required analyses, sampler's initials and sample preservative.
- Sample containers will be individually secured or placed in a secure area in iced coolers and will remain in the continuous possession of the field samplers until custody has been transferred as provided by the chain-of-custody form.
- Upon delivery to the laboratory, samples will be given laboratory sample numbers and recorded into a logbook indicating client, well number, and date and time of delivery. The laboratory manager or his designee will sign the chain-of-custody forms and formally receive the samples. Proper refrigeration of the samples will be maintained at the laboratory prior to preparation of the samples for analysis.

1.10 Field Logbook

The field samplers will maintain an up-to-date logbook and sampling forms documenting important information pertaining to field sampling activities. The field logbook and sampling forms will document the following.

- Site name and location
- Date and time of sampling

- Climatic conditions at the time of sampling
- Personnel conducting the sampling
- Sampling locations
- Presence of NAPLs
- Static water levels in wells
- Total depth of wells
- Purged water volumes and qualitative well yield
- Time well purged
- Observations of water samples (appearance, odor, etc.)
- Time of sample collection
- Temperature, pH, specific conductance and turbidity

1.11 Laboratory Analysis

The groundwater and surface water parameters to be analyzed will be those specified in the landfill permit and applicable North Carolina Solid Waste Management Rules. These will include field indicators of groundwater quality (temperature, pH, specific conductivity and turbidity), as well as volatile organic and total metal constituents listed in Appendix I of 40 CFR 258. All laboratory analyses will be performed by a laboratory certified by the NC DWM for the analyzed parameters.

QA/QC procedures are to be utilized at all times. The owner/operator of the landfill is responsible for selecting a laboratory and ensuring that they are utilizing proper QA/QC procedures. The laboratory must have a QA/QC program based on specific routine procedures outlined in a written laboratory QA/QC manual. The QA/QC procedures listed in the manual provide the laboratory with the necessary assurances and documentation for accuracy and precision of analytical determinations. Internal QC checks shall be undertaken regularly by the laboratory to assess the precision and accuracy of analytical procedures.

The internal QC checks include the use of calibration standards, standard references, duplicate samples and spiked or fortified samples. Calibration standards shall be verified against a standard reference obtained from an outside source. Calibration curves shall be developed using at least one blank and three standards. Samples shall be diluted if necessary to ensure that analytical measurements fall on the linear portion of the calibration curve. Duplicate samples shall be processed at an average frequency of 10 percent to assess the precision of testing methods, and standard references shall be processed monthly to assess accuracy of analytical procedures. Spike or fortified samples shall be

carried through all stages of sample preparation and measurement to validate the accuracy of the analysis.

During the course of analyses, QC data and sample data shall be reviewed by the laboratory manager to identify questionable data and determine if the necessary QA/QC requirements are being followed. If a portion of the laboratory work is subcontracted, it is the responsibility of the contracted laboratory to verify that all subcontracted work is completed by certified laboratories.

1.12 Statistical Evaluation

Copies of all laboratory results and water quality reports will be kept in the Operation Record. Reports summarizing all water quality data and statistical evaluations will be submitted to the NC DWM for each sampling event, and as appropriate, following the baseline monitoring period of new monitoring locations. Methods to evaluate the data are taken from the North Carolina Solid Waste Rules, 40 CFR 258.53(g) and the USEPA RCRA Ground Water Monitoring Technical Guidance. The North Carolina Solid Waste Rules require that the owner or operator of the landfill specify a statistical method outlined in the rules to evaluate water quality monitoring data. The goal of the statistical analysis is to determine whether statistically significant evidence of contamination exists and to identify the point of contamination. Upon recent of the data from each monitoring event, the statistical database of analyses will be updated. The North Carolina Solid Waste Rules provide several acceptable methods for statistical analysis of water-quality data.

- Parametric analysis of variance (ANOVA)
- Rank-based (non-parametric) ANOVA with multiple comparisons
- Tolerance prediction interval
- Control chart
- Test of proportions
- An alternative statistical method that meets the performance standards of 40 CFR 258.53(h)

Statistical evaluation of water-quality monitoring data will be performed for the duration of the monitoring program, including the post-closure care period. The choice of an appropriate statistical test depends on the type of monitoring, the nature of the data, and the proportion of values in the data set that are below detection limits. The statistical analysis will be performed separately for each detected constituent in each well. The statistical methods used will be based on the USEPA Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities, Interim Final Guidance Document (1989). All analyses will be performed in accordance with North Carolina Regulations 15A NCAC 13B.1632.

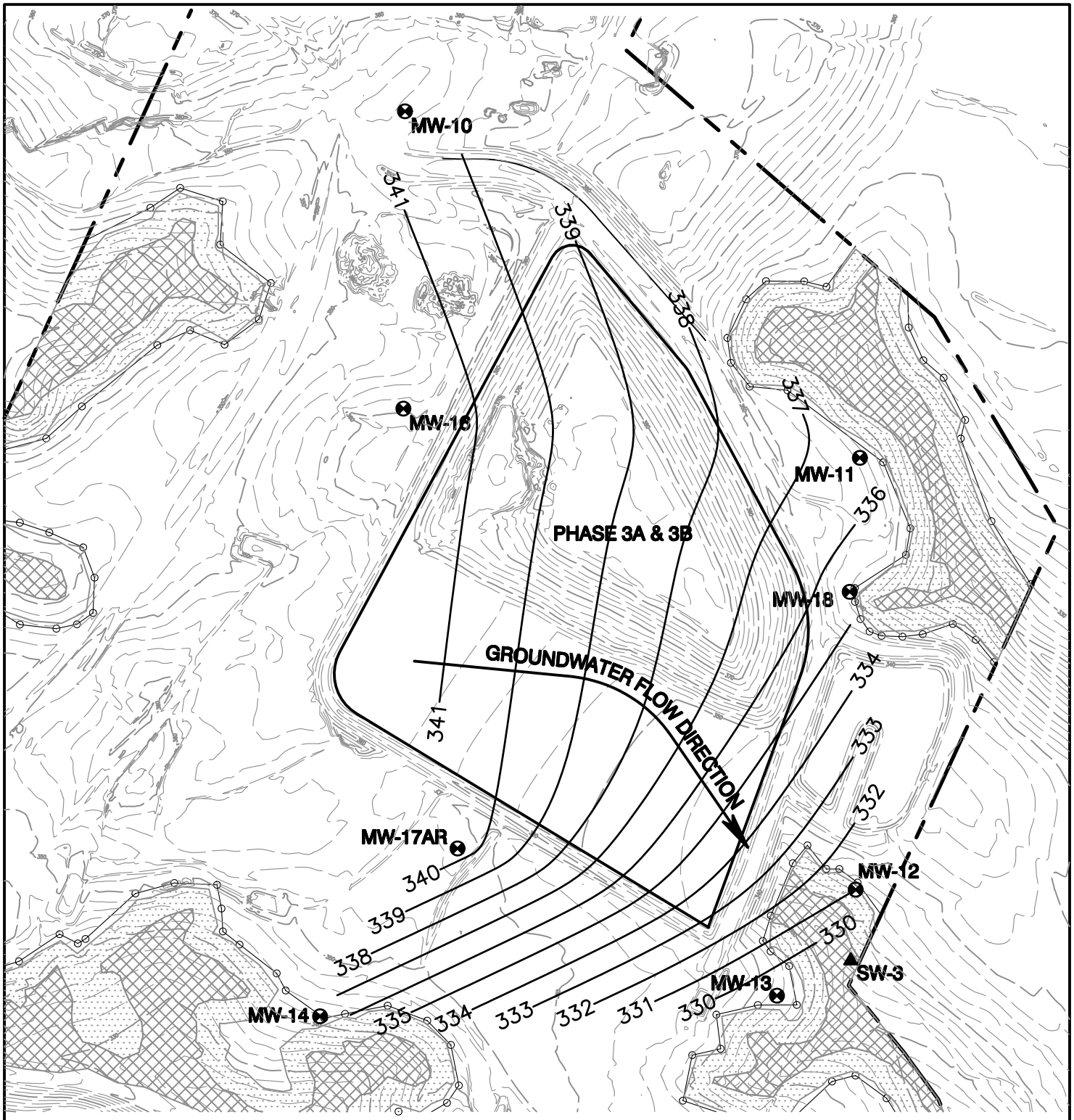
1.13 Record Keeping and Reporting

Should a statistically significant increase in groundwater concentrations of monitored parameters as defined in the North Carolina Solid Waste Rules be detected during monitoring, the owner/operator of the landfill shall notify the NC DWM within 14 days and will place a notice in the operating record as to which constituents showed an increase.

Should monitoring wells become irreversibly damaged or require rehabilitation, the NC DWM shall be notified. If monitoring wells and/or piezometers are damaged irreversibly they shall be abandoned under the direction of the NC DWM. The abandonment will consist of plugging the well with a chemically inert sealant which is impermeable, such as neat cement and/or bentonite clay. Where possible, it is preferred to over-drill and remove the well casing, screen and filter pack prior to grouting.

1.14 Implementation Schedule

This Water Quality SAP shall become effective upon approval by the NC DWM and will be implemented contingent on approval for construction of the landfill expansion. If and when new monitoring locations are required, baseline sampling shall commence as soon as possible after the expansion phase is granted approval and prior to waste being disposed in the new phase. Four independent rounds of sampling and laboratory analyses of groundwater and surface water shall be performed within six months of approval of the landfill expansion. Sampling will then be performed semi-annually throughout the active life of operational life of the facility and during the post-closure monitoring period, unless an alternate sampling schedule is accepted by the NC DWM.



LEGEND

- GROUNDWATER MONITORING WELL
- SURFACE WATER MONITORING LOCATION
- GROUNDWATER CONTOUR
- WETLANDS
- 50' UPLAND BUFFER

GRAPHIC SCALE 1"=300'

0 300

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CENTRAL CAROLINA TIRE MONOFILL PHASE 3A - 3B

FIG 1

Table 1 - Water Monitoring Locations
Central Carolina Tire Monofill

Groundwater Monitoring Locations Phase 3A - 3B Monofill						
Monitoring Well	Northing	Easting	Top of Casing Elevation [ft MSL]	Depth to Bottom of Well [ft BTOC]	Screen Interval [ft BTOC]	Up or Down Gradient
MW-10	549,731.36	1,954,619.21	356.28	27		Up
MW-11	548,984.87	1,955,599.35	347.8	24		Down
MW-12	548,054.79	1,955,590.24	336.58	22		Down
MW-13	547,826.40	1,955,420.62	339.47	21		Down
MW-14	547,781.99	1,954,436.12	344.12	13		Side
MW-16	549,090.90	1,954,615.69	362.53	29		Down
MW-17R	548,143.47	1,954,732.40	347.14	24		Down
MW-18	548,696.28	1,955,577.48	344.71	15		Down

Surface Water Monitoring Locations Phase 3A - 3B	
I.D.	Location
SW-3	280 feet beyond the Phase 3A – 3B landfill at the southeastern property boundary

Notes:
1. MSL = MEAN SEA LEVEL
2. BTOC = Below Top of Casing
3. TBD = To be Determined

Table 2
Laboratory Analytical Results for Surface Water and Groundwater Samples

	Parameter:	**EPA Method**	**GWP Std (ug/L)**	**NCAC 2L STD (ug/L)**
1	Alkalinity	SM2320B	NE	NE
2	pH	Field	NE	6.5 - 8.5
3	Specific Conductance	Field	NE	NE
4	Termperature	Field	NE	NE
5	Total Dissolved Solids	SM2540C	NE	500000
	Organic Constituents:	**EPA Method**	**GWP Std (ug/L)**	**NCAC 2L STD (ug/L)**
6	Acetone	8260	NE	6000
7	Acrylonitrile	8260	NE	NE
8	Benzene	8260	NE	1
9	Bromochloromethane	8260	0.6	NE
10	Bromodichloromethane	8260	NE	0.6
11	Bromoform; Tribromomethane	8260	NE	4
12	Carbon disulfide	8260	NE	700
13	Carbon tetrachloride	8260	NE	0.3
14	Chlorobenzene	8260	NE	50
15	Chloroethane; Ethyl chloride	8260	NE	3000
16	Chloroform; Trichloromethane	8260	NE	70
17	Dibromochloromethane; Chlorodibromomethane	8260	0.41	0.4
18	1,2-Dibromo-3-chloropropane; DBCP	8260	NE	0.04
19	1,2-Dibromoethane; Ethylene dibromide; EDB	8260	NE	0.02
20	o-Dichlorobenzene; 1,2-Dichlorobenzene	8260	NE	20
21	p-Dichlorobenzene; 1,4-Dichlorobenzene	8260	NE	6
22	trans-1, 4-Dichloro-2-butene	8260	NE	NE
23	1,1-Dichlorethane; Ethylidene chloride	8260	NE	6
24	1,2-Dichlorethane; Ethylene dichloride	8260	NE	0.4
25	1,1-Dichloroethylene; 1,1-Dichloroethene; Vinylidene chloride	8260	NE	7
26	cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene	8260	60	70
27	trans-1, 2-Dichloroethylene; trans-1,2-Dichloroethene	8260	NE	1000
28	1,2-Dichloropropane; Propylene dichloride	8260	NE	0.6
29	1,3-Dichloropropene (cis and trans isomers)	8260	NE	0.4
30	Ethylbenzene	8260	NE	600
31	2-Hexanone; Methyl butyl ketone	8260	NE	40
32	Methyl bromide; Bromomethane	8260	NE	10
33	Methyl chloride; Chloromethane	8260	NE	3
34	Methylene bromide; Dibromomethane	8260	5.5	NE
35	Methylene chloride; Dichloromethane	8260	NE	5
36	Methyl ethyl ketone; MEK; 2-Butanone	8260	NE	4000
37	Methyl iodide; Idomethane	8260	NE	NE
38	4-Methyl-2-pentanone; Methyl isobutyl ketone	8260	560	NE
39	Styrene	8260	NE	70
40	1,1,1,2-Tetrachloroethane	8260	1	NE
41	1,1,2,2-Tetrachloroethane	8260	0.18	0.2
42	Tetrachloroethylene; Tetrachloroethene; Perchloroethylene	8260	NE	0.7
43	Tetrahydrofuran	8260	NE	NE
44	Toluene	8260	NE	600
45	1,1,1-Trichloroethane; Methylchloroform	8260	NE	200
46	1,1,2-Trichloroethane	8260	0.6	NE
47	Trichloroethylene; Trichloroethene	8260	NE	3
48	Trichlorofluoromethane; CFC-11	8260	NE	2000
49	1,2,3-Trichloropropane	8260	NE	0.005
50	Vinyl acetate	8260	88	NE
51	Vinyl chloride	8260	NE	0.03
52	Xylenes	8260	NE	500

Table 2 (Continued)
Laboratory Analytical Results for Surface Water and Groundwater Samples

	Inorganic Constituents:	**EPA Method**	**GWP Std (ug/L)**	**NCAC 2L STD (ug/L)**
53	Antimony	7041	NE	1*
54	Arsenic	7060/7061	NE	10
55	Barium	7080/6010	NE	700
56	Beryllium	7091	NE	4*
57	Cadmium	7131	NE	2
58	Chloride	SM4500 CLB	NE	250000
59	Chromium	7191	NE	10
60	Cobalt	7201	NE	1*
61	Copper	7210/6010	NE	1000
62	Iron	7300	NE	300
63	Lead	7421	NE	15
64	Manganese	200.7	NE	50
65	Mercury	245.1	NE	1
66	Nickel	7520/6010	NE	100
67	Selenium	7740/7741	NE	20
68	Silver	7761	NE	20
69	Sulfate	SM4500	NE	250000
70	Thallium	7841	NE	0.2*
71	Vanadium	7911	NE	0.3*
72	Zinc	7950/6010	NE	1000

Note:
Standards marked with an asterisk (*) are Interim Maximum Allowable Concentrations (IMAC) (15A NCAC 02L .0202).