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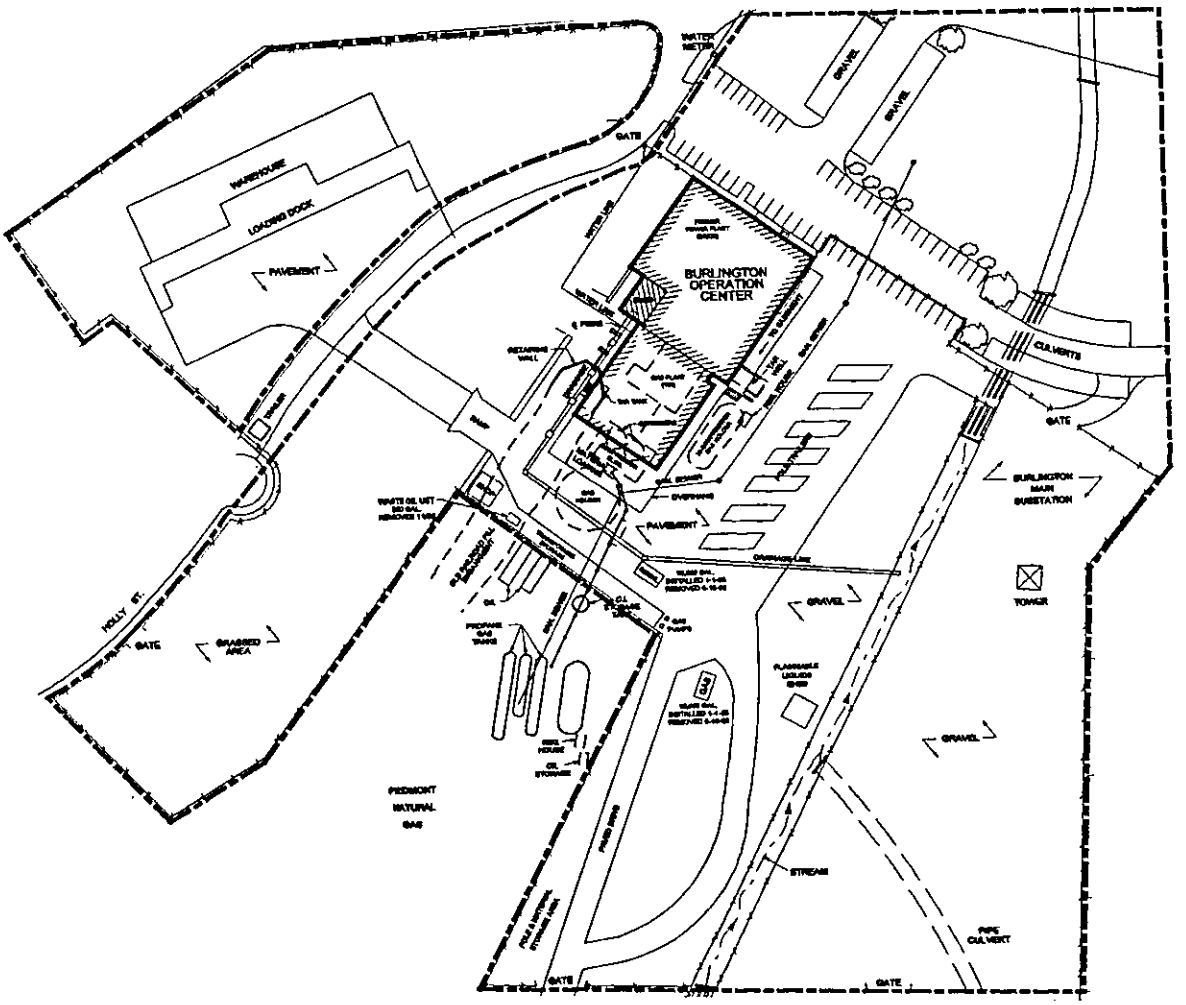
BURLINGTON
MANUFACTURED GAS PLANT SITE
REMEDIAL INVESTIGATION PLAN



Prepared by:

MGP SITE MANAGEMENT GROUP
DUKE POWER
GROUP ENVIRONMENT, HEALTH & SAFETY

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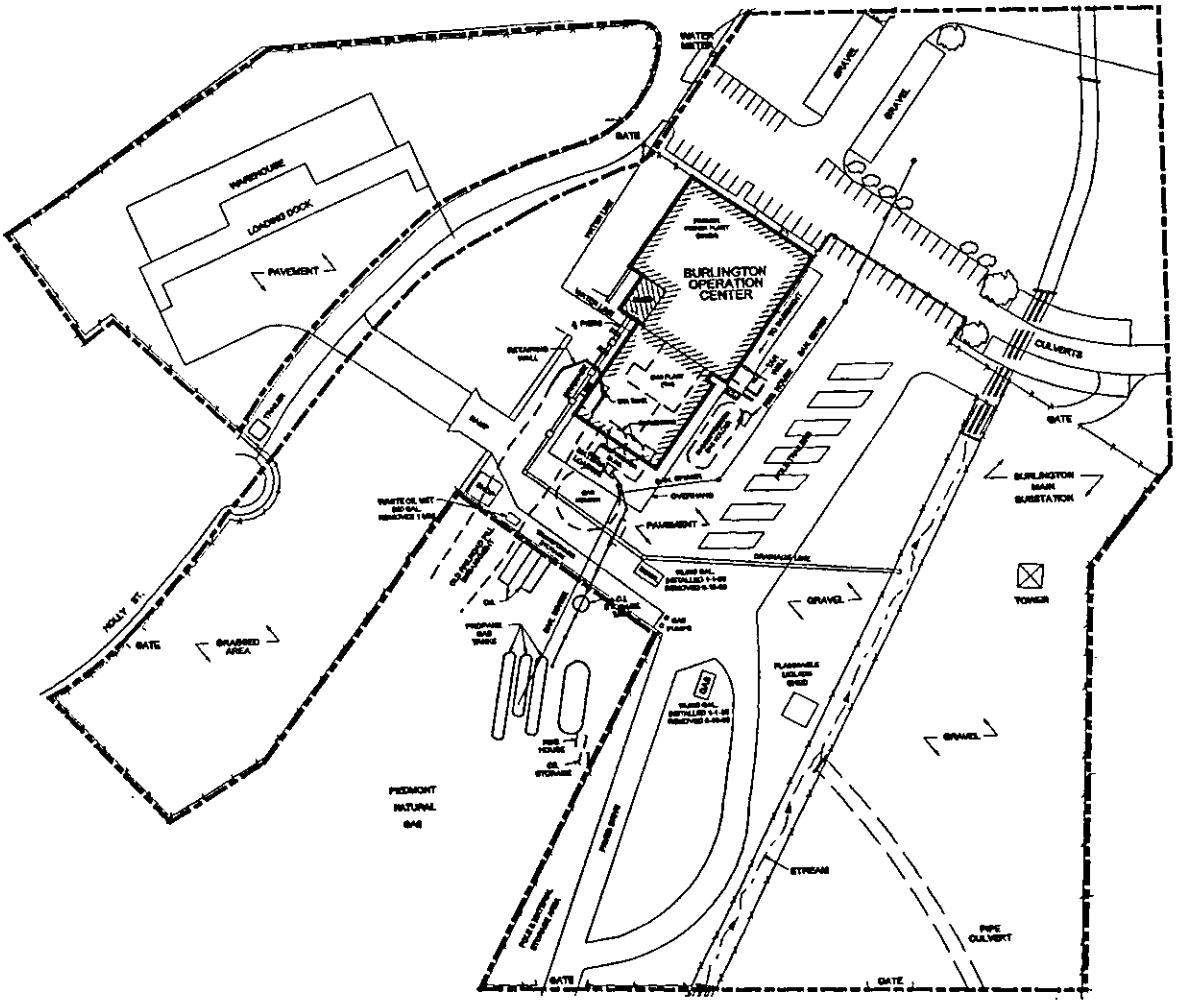

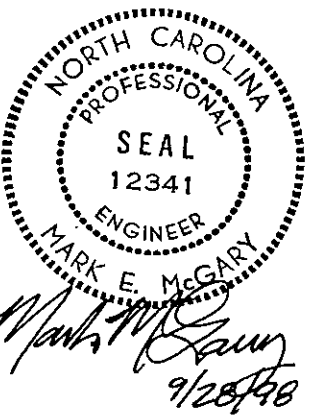

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BURLINGTON MANUFACTURED GAS PLANT SITE
REMEDIAL INVESTIGATION PLAN

Introduction

This Remedial Investigation Plan has been prepared by Duke Power Company's MGP Site Management Group for the purposes of addressing and documenting information required by the Investigation Administrative Order On Consent (IAOC) for the Burlington Manufactured Gas Plant (MGP) Site.

This Remedial Investigation Plan is organized and presented to provide the information required in conjunction with Section V.A. - Remedial Investigation Plan (Items 1 through 20) of the IAOC.

Limited investigations performed to-date at the Burlington MGP site have provided analytical data suggestive of the presence of MGP related contamination.
This Remedial Investigation Plan provides the framework necessary for determining the nature and extent of MGP related contamination at the site. Investigative efforts will focus on delineating the horizontal and vertical extent of contamination within potential exposure media, on providing media specific data to be used for the determination of human health risk-based clean-up targets, and on providing data necessary for the development of a remediation work plan.

SECTION V.A.
Remedial Investigation Plan

IAOC Section V.A. - Item 1 Site Description

The Burlington Manufactured Gas Plant site is located at 1205 North Church Street in Burlington, North Carolina at the approximate coordinates of North latitude 36°-5'-49" and West longitude 79°-25'-6". A Manufactured Gas Plant (MGP) facility operated at this site beginning in 1925 and into the 1950s producing gas using the water gas process. The MGP facilities were demolished at some point during the late 1950s to mid 1960s timeframe. The site originally served as an electric power plant and trolley facility. The site currently serves as an operations center for Duke Power utility line operations and maintenance, and also contains an electric substation. The current boundaries for the Duke Power property were established in 1962 and consist of approximately 10 acres.

Site features, indicating historical and current site facilities, are shown on Figure V.A.1-1 in Appendix V.A.1. Sanborn Fire Insurance maps dated 1924, 1929, 1948, 1952 and 1963 are also provided in Appendix V.A.1. The MGP franchise began operation in 1925. The gas plant facilities (gas plant building, gas holders, scrubbers, tar tanks, etc.) are initially indicated on the 1929 Sanborn map. The Sanborn maps also provide information on historical upgradient industrial facilities which could have potentially contributed to contamination at the site. Historical upgradient industries include textile processing facilities (weaving, mercerizing, dyeing, etc.); oil company storage facilities; lumber milling facilities; auto repair shops, motor freight facilities; a laundry; and a railway car barn.

The original power plant building was converted into a trolley facility and later into an operations center by Duke Power. Duke Power sold the gas franchise along with 3.06 acres of the property to Piedmont Natural Gas (PNG) Company in 1951. Duke repurchased 0.8 acres from PNG in 1962 to expand the operations center facility. At some point during the 1950s and/or 1960s timeframe, the MGP facilities were demolished and the cooling water pond was filled in to provide additional area for an operations center storage yard and electrical substation.

The Burlington MGP site lies in a commercial/residential area approximately one mile east of downtown Burlington. The site is bordered by city streets on the north, east and west sides, and by Piedmont Natural Gas Company property on the south side. Residential properties are located directly adjacent to the site along the east and west property boundaries. Public access to the site is restricted by perimeter security fencing. A stream flows from south to north through the eastern area of the site and through the area of the former cooling water pond. The stream originates approximately 4000 feet south of the site. The central area of the site is covered by the operations center building, other structures, and asphalt paving. This area comprises approximately one-third of the overall site property and can be considered impervious. The southeastern area of the site along and on both sides of the stream, and the western area of the site located in the vicinity of Holly Street, is gravel surfaced.

Although limited data exists as to the extent of contamination at the Burlington MGP site, the type of soil contamination encountered to-date is consistent with numerous similar MGP sites throughout the United States. Documentation on historical MGP operations and the typical types of contamination encountered at MGP sites can be found in such publications as "Management of Manufactured Gas Plant Sites - Volume 1; Wastes and Chemicals of Interest", Gas Research Institute, 1987. MGP process residuals and unwanted by-products are considered to be the primary source of contamination historically found at MGP sites. Typically, these unwanted by-products consisted of coal tars, oil tars, tar emulsions, lampblack, decanter sludges, coke, ash, spent oxide/lime, ammonia sludges, ammonia sulfate, and acid/caustic sludges.

For the most part, hydrocarbon residuals from coal tars, oil tars, tar/oil/water emulsions and wastewater treatment sludges are expected to be present at a water gas process facility such as the Burlington MGP site. For the same reason, neither phenols nor acid/caustic or ammonia sludges are expected to be present in high concentrations at the site. The host of organic chemicals present in hydrocarbon residuals (VOCs, PAHs,

etc.) form the primary constituents of interest at historical MGP sites. These hydrocarbon residuals are likely the source of the following hazardous organic substances at the Burlington MGP Site (reference *IAOC Section III, paragraph D):*

acenaphthene	dibenzo(ah)anthracene
anthracene	fluoranthene
benzo(a)anthracene	fluorene
benzo(k)fluoranthene	indeno(1,2,3,-cd)pyrene
benzo(ghi)perylene	naphthalene
benzo(a)pyrene	phenanthrene
chrysene	pyrene
benzene	toluene
ethyl benzene	xylenes

Inorganic residuals were primarily produced during purification processes conducted to remove trace organics and sulfur from the gas prior to sale. Spent lime and spent oxide, often referred to as purifier box wastes, are typically the primary source of cyanides and other trace metals found at MGP sites. These inorganic residuals are likely the source of the following hazardous inorganic substances at the Burlington MGP site (reference *IAOC Section III, paragraph D):*

arsenic	cyanide
barium	lead
cadmium	mercury
chromium	selenium
silver	

An undetermined quantity of free tar may be present within historical tar wells located at the site. If found during the site investigation, this material will be sampled and analyzed for hazardous characteristics. Typically, contaminated soils encountered at MGP sites do not exhibit hazardous characteristics as defined within RCRA guidelines.

In addition to the typical types of contamination associated with historical MGP processes and activities, the site has been impacted by petroleum contamination associated with former underground storage tanks.

During November of 1990, a 550 gallon used transformer oil UST was removed from the site along with approximately 7 cubic yards of petroleum contaminated soil. Analytical results indicated oil & grease concentrations in soils from the UST excavation.

During December of 1992, an overfill incident occurred during routine tanker unloading associated with a 15,000 gallon gasoline UST at the site. Approximately 18 gallons of gasoline was discharged into soils surrounding the UST fill pipe, prompting the excavation of 19 cubic yards of impacted soil. Subsequent groundwater sampling in the UST area indicated the presence of volatile organics.

On June 16, 1998 a 10,000 gallon diesel UST and the aforementioned 15,000 gallon gasoline UST were excavated and removed from the site. Soil sampling was

performed during the closure of the USTs in accordance with applicable North Carolina guidelines. Soil analytical results indicated the presence of various organics which likely originated from a combination of UST petroleum contamination and typical MGP related wastes. The source of soil contamination associated with the UST system was likely due to product overfills and leaking dispensers. Certain polycyclic aromatic hydrocarbon (PAH) contamination indicated in the UST closure analyses most likely originated from MGP residual wastes.

A preliminary environmental assessment was performed at the site in May 1989. This assessment included a soil vapor survey, limited soil sampling, and surface water sampling. The results of this assessment indicated the presence of both petroleum and MGP related contamination in soils at the site (Section V.A.16). No petroleum or MGP related constituents were detected in the surface water samples.

No permanent groundwater monitoring wells have been installed at the Burlington MGP site to-date.

AOC Section V.A. - Item 2 Environmentally Sensitive Areas

The Burlington MGP site is located in a commercialized urban setting approximately one mile east of downtown Burlington, North Carolina. Soils at the site have been highly disturbed as a result of past grading and re-grading activities. Little of the original, undisturbed soil structure is expected to be intact. There are no permanent standing bodies of water or wetlands on or adjacent to the site. Standing water, limited to a minimal number of 'low spots', either evaporates or infiltrates into the subsurface. Most site drainage is directed to on-site storm drains which discharge into a stream running from south to north through the property. Some site drainage is directly to the stream via overland runoff. The stream is approximately 4 feet in width and averages 6 inches in depth. The stream originates approximately 4000 feet south of the site. The stream flows through a highly urbanized area and eventually discharges into Service Creek located approximately 6500 feet northeast of the site. Service Creek eventually discharges into the Haw River located 1.6 miles to the northeast. Terrestrial vegetation at the site consists of weeds, grasses and shrubs that are typically found on industrial property in an urban setting. No unique biotic communities exist in the area.

A search to locate any potential environmentally sensitive areas was conducted on the site and within a one mile radius of the site. A review of North Carolina state highway maps, recreational maps, USGS topographic maps, and Alamance County maps indicated no sensitive sites. A survey of the North Carolina Corporate Geographic Database (North Carolina Center for Geographic Information and Analysis) also indicated no environmentally sensitive areas within a one mile radius of the site. Snoffers Lake, an impoundment located at the extreme edge of the one mile search radius, receives no drainage from the site. The Downtown Burlington Historical District is located at the extreme edge of the one mile search radius, however no part of the historic district is adjacent to the site. Searches and surveys to locate any environmentally sensitive areas included the following area classifications and results:

Marine Sanctuaries	N/A
National and State Parks	None
Designated/proposed Wilderness or Natural Areas	None
Coastal Zone Management Act	N/A
National Estuary Program/Near Coastal Waters	N/A
Clean Lakes Program	N/A
National Monuments	None
National/State Historical Sites	None adjacent
National/State Seashore, Lakeshore, River Rec. Areas	N/A
Critical Habitats	None
National/State Preserves or Forests	None
National/State Wildlife Refuges	None
Coastal Barriers	N/A
Protection of Natural Ecosystems	None
Critical Spawning Areas	N/A
Migratory Pathways for Fish and Shellfish	N/A
Breeding Areas for Aggregation of Animals	None
Scenic or Wild Rivers	N/A
State Wildlife Management Lands	None
Maintenance of Unique Biotic Communities	None
Wetlands - Aquatic Life Maintenance	None

AOC Section V.A. - Item 3 USGS Topographic Maps

A partial USGS topographic map of the Burlington MGP site area is provided on Figure V.A.3-1 in Appendix V.A.3.

AOC Section V.A. - Item 4 Owner's Deeds

Copies of property owner's deeds for the Burlington MGP site are provided in Appendix V.A.4.

AOC Section V.A. - Item 5 Chronology of Previous Owners

The following table provides a chronological history of ownership and operation of the Burlington MGP site beginning in 1915:

Owner	Date Acquired	Comments
Piedmont Railway & Electric Co.	4/30/1915	Power plant operation
North Carolina Public Service Co.	4/20/25	Gas operations began
Southern Public Utilities, Maine	7/1/32	later to be known as Duke Power Co.
Southern Public Utilities, New Jersey	4/4/1935	later to be known as Duke Power Co.
Duke Power Co.	5/1/1935	
Piedmont Natural Gas Co.	5/9/1951	Gas plant franchise and 3.16 acres sold to PNG
Duke Power Co.	11/27/62	Repurchased 0.8 acres which included gas plant facilities (less oil tanks and high pressure tanks) from PNG. Gas facilities demolished sometime between 1962 and 1967

AOC Section V.A. - Item 6 Survey Plat

A current property survey plat for the Burlington MGP site is provided on Figure V.A.6-1 in Appendix V.A.6. The survey was prepared by a registered land surveyor and indicates the location of property boundaries, buildings, structures, utilities, and adjacent property owners.

AOC Section V.A. - Item 7 Site Topographic Map

Site topography information is included on the site survey map provided in Appendix V.A.6.

AOC Section V.A. - Item 8 List of Hazardous Substances

The type of soil and groundwater contamination encountered at the Burlington MGP site is expected to be consistent with numerous similar MGP sites throughout the United States, and has been previously discussed in Section V.A.1.

Typically, soil contamination resulting from MGP process residuals and unwanted by-products at MGP sites do not exhibit hazardous characteristics as defined within RCRA

guidelines (reference: "Management of Manufactured Gas Plant Sites", Gas Research Institute, 1987). With the exception of any free tar which may be encountered, concentrations of organics (VOCs and PAHs) in soils at the site are not expected to exceed RCRA regulatory limits. As previously discussed, an undetermined quantity of free tar may be present within historical tar wells located at the site. Investigation efforts will target the tar well areas and, if tarry residues are discovered, the material will be sampled and analyzed for hazardous characteristics.

AOC Section V.A. - Item 9 Site Environmental Permit History

There were no environmental permits associated with the historical operation of the Burlington MGP Site. An underground storage tank permit was obtained on May 6, 1986 for the current operations center facility. This permit was modified on January 14, 1991 to reflect the removal of a waste oil tank from the facility. Copies of UST permits are provided in Appendix V.A.9.

AOC Section V.A. - Item 10 Potable Water Supply Inventory

The Burlington MGP Site is located in a commercial area of Burlington, North Carolina, approximately one mile east of downtown Burlington. Drinking water in the area surrounding the site is supplied by the City of Burlington municipal water supply system. A walking survey of properties in areas surrounding the site was conducted on September 3, 1998. The walking survey extended east of the site approximately 1500 feet to Beaumont Avenue, south of the site approximately 1500 feet to North Mebane Street, west of the site approximately 1500 feet to Saint John Street, and north of the site approximately 2500 feet to Vaughn Road as indicated on Figure V.A.10-1 in Appendix V.A.10. All properties within the survey area were serviced by the local municipal water supply system. No potable water supply wells were observed, as were no springs nor surface water intakes. The municipal water supply system is available to all properties within a one-half mile radius of the site. Considering the commercialized nature of development in the area and the ready availability of a municipal water supply, there is little likelihood of future installation of potable water supply wells.

AOC Section V.A. - Item 11 Site Characterization Procedures

Investigations performed to-date at the Burlington MGP site have provided analytical data concerning petroleum related impacts, but only limited data documenting the presence of MGP related contamination. This Remedial Investigation Plan provides the framework necessary for determining the nature and extent of MGP related contamination at the site. Investigative efforts will focus on delineating the horizontal and vertical extent of contamination within potential exposure media, and providing media specific data to be used for the determination of human health risk-based clean-up targets.

Specifically, investigative efforts will focus on:

1. Determining the characteristics of subsurface soils, including the horizontal and vertical extent of MGP related contamination in subsurface soils,
2. Determining the characteristics of the surficial aquifer, and the presence and horizontal extent of any light non-aqueous phase liquids (LNAPL) and/or MGP related dissolved contamination in the surficial groundwater table,
3. Determining the characteristics and depth of bedrock, and the presence and extent of any dense non-aqueous phase liquids (DNAPL),
4. Determining the presence and magnitude of any MGP related indoor air contaminants inside structures at the site,
5. Determining the presence and magnitude of any MGP related impacts to water and sediments in the on-site stream.

Subsurface Investigations

Site characterization procedures will include subsurface investigations using Geoprobe direct-push sampling techniques and conventional drill rig augering methods as described in Section V.A.12. The extent of subsurface soil contamination will primarily be characterized by a site-wide Geoprobe sampling program targeting expected areas of contamination. Supplemental sampling will be conducted using conventional drill rig augering and split-spoon sampling. Sampling will be conducted in and around the area of the former MGP facilities, and in areas in which MGP impacted soils may have been deposited during dismantling of the facility. Specifically, soil sampling will target the following areas of the site as indicated on Figure V.A.11-1 in Appendix V.A.11:

1. Approximately 1 acre in and around the former gas holder, valve shed, scrubbers, gas plant building, tar tank, hi-compression gas holder, and tar well located on Duke Power property. Sampling in the area of the gas plant building, scrubbers, and part of the tar well and gas holder will involve coring through the concrete floor of the Operations Center building, and will necessitate access to the loading dock and inside the building. Access to all areas of interest inside the building may not be feasible. Approximately 28 sampling locations are expected for this area.
2. Approximately 0.5 acres in and around the oil tanks, propane gas tanks, hi-compression gas holder, oil storage building and regulator house located on the adjoining Piedmont Natural Gas Company property. Duke Power will secure permission from PNG prior to accessing this property. Approximately 10 sampling locations are expected for this area.
3. Approximately 2 acres comprising that part of the site between the Operations Center building and the on-site stream, and containing the former UST areas. This area contained the original steam plant cooling pond which was subsequently backfilled to provide yard area for an expansion of the Operations Center and construction of a substation. For this area, initial samples will be taken at the nodal points of a 50' grid system. Approximately 34 sampling locations are expected for this area.

4. Approximately 1.5 acres comprising that part of the site between the eastern property boundary and the on-site stream. Part of this area also contained the original steam plant cooling pond. Investigation in this area will target only that portion filled in to construct the substation (i.e. below approximate elevation 590). Access to all areas of interest in and around the substation may not be feasible due to the presence of electrical equipment, energized lines, and subsurface grounding mats. Initial samples will be taken at the nodal points of a 50' grid system as much as is feasible. Approximately 19 sampling locations are expected for this area.
5. Approximately 1.5 acres of supplemental area located on both the Duke property and the PNG property. This area will be investigated on a field determined basis to ascertain the existence and extent of any MGP related contaminants which may have been placed during MGP operation or dismantling. Approximately 14 sampling locations are expected for this area.

Monitoring wells will be installed on-site and, if necessary, on adjacent properties for characterization of groundwater at the Burlington MGP site. Groundwater samples will be collected from temporary monitoring points installed by Geoprobe methods during the soil sampling program. Groundwater samples obtained from temporary monitoring points will be field screened, and the results used to establish locations for the installation of monitoring wells. Potential monitoring well locations are indicated on Figure V.A.11-2 in Appendix V.A.11.

A number of shallow monitoring wells will be needed in order to determine the hydrogeologic characteristics (flow direction and gradient) of the surficial aquifer. These shallow wells will contain well screens located at such depths as to bracket the surficial groundwater table. Aquifer testing (pump tests, slug tests, etc.) will be conducted in selected shallow wells to estimate hydraulic conductivities and horizontal seepage velocities for use in fate and transport studies as needed. Sampling and monitoring will be performed in shallow wells to delineate the horizontal extent of any LNAPL and/or dissolved groundwater contamination present. Analytical data will be used to map isoconcentration contours of groundwater contaminants of interest. A limited number of deeper monitoring wells will be installed to establish the presence and extent of any DNAPL present, and to delineate the vertical extent of any dissolved groundwater contamination.

Conventional drill rigs will be used for the installation of shallow monitoring wells located in areas of the site which will likely remain undisturbed during any future remedial excavation work, and for all wells targeted for pump or slug testing. These shallow wells will likely contain 10' to 20' slotted PVC well screens located to bracket the surficial groundwater table. Conventional drill rigs will also be used for the installation of deep wells and/or any wells drilled into bedrock where protective casings will be required; to obtain rock core samples for site-specific geologic evaluations; and to establish thicknesses and depths of saprolite layers, weathered rock and sound rock across the site. Deep wells will likely contain 5' slotted PVC well screens located at various depths dependent on the depth to bedrock at the site. Deep wells drilled into bedrock will be cased and sealed to prevent the vertical migration of contaminants into the bedrock aquifer

Monitoring wells to be located in areas of potential remedial excavation will be installed by Geoprobe methods using Geoprobe prepacked screen monitoring wells as outlined in the SOP in Appendix V.A.11. Geoprobe wells will contain 9' to 12' screen lengths assembled from 3' screen sections. Geoprobe wells will not be installed in locations where depth to groundwater exceeds 28 feet.

Indoor Air

Periodic odors have been noticed by personnel employed at the Burlington Operations Center. These odors are likely influenced by a myriad of potential sources related to everyday activities at the Operations Center (i.e., truck and forklift exhausts, creosote poles, paints, solvents, aerosol products, etc.). MGP related constituents might also be a source of odors at the site. To ascertain the presence and nature of air contaminants at the site, air sampling will be conducted both inside and immediately surrounding the Operations Center building as indicated on Figure V.A.11-3 in Appendix V.A.11. Indoor samples will be taken in the basement, in the stores area adjacent to the loading docks, and in the main office area of the building. Outdoor air samples will be taken at 2 locations on the loading dock and 1 location on the ramp leading into the basement. Samples will be taken over an 8 hour period to be representative of a normal work day at the facility, and will be taken for both VOCs and PAHs.

On-Site Stream

Surface water samples and sediment samples will be collected from 4 locations in the stream as indicated on Figure V.A.11-4 in Appendix V.A.11. As indicated, these samples will be collected from 2 upstream locations, 1 on-site location, and 1 downstream location. Upstream samples will be collected from the main branch and the secondary branch of the stream south of the site and just upstream of the culverts beneath Rainey Street. On-site samples will be collected just upstream of the culverts beneath the substation access road. Downstream samples will be collected north of the site near the outlet of the culverts beneath North Church Street. One sediment core sample will be collected by hand auger from the stream bottom near the middle of the site as indicated on the figure. This sample will be used to assess the historical nature of sediment deposits in the streambed.

AOC Section V.A. - Item 12 Sampling Methods and Justifications

All sample collection, handling, and chain of custody procedures will be performed in accordance with EPA protocols outlined in "Environmental Investigations, Standard Operating Procedures and Quality Assurance Manual, May, 1996, USEPA, Region IV".

Soil Sampling

Soil samples will be obtained from the site by a combination of Geoprobe direct-push sampling methods and by conventional drill rig auger and split-spoon sampling techniques.

Geoprobe sampling methods will be used on a site-wide basis for the collection of most soil samples from the site. At each sampling location, a continuous soil sample will be

collected using a 1.5 inch diameter disposable sample tube advanced inside a 2 inch diameter casing. Samples will be collected in continuous 4' intervals until the extent of contamination has been established or until refusal is encountered. Should caving within the sample hole occur, samples will be taken using a dual tube sampler.

As stated in Section V.A.11, conventional drill rigs will be used for the installation of groundwater monitoring wells and to obtain rock core samples for site-specific geologic evaluations. During drill rig operation, soil samples will be obtained by conventional augering and split-spoon sampling techniques. Specifically, soil samples were collected by driving a 1.375 inch I.D. split-spoon sampler through a 7.75 inch diameter hollow-stemmed auger into undisturbed soil. Split-spoon samplers will be advanced by repeated blows of a 140 pound slide hammer falling through a 30 inch drop as outlined in ASTM Procedure D1586. Split-spoon samples will typically be collected at 5' depth intervals until auger refusal is encountered. Complete boring logs including blow counts and soil descriptions will be maintained.

All soil samples will be characterized by physical appearance (color, structure, presence or absence of visible contamination), by odor, and by field screening methods (reference Section V.A.-Item 14). Color photographs will be taken of each sample interval. Soil samples identified for laboratory analyses will be placed in clean glass containers, labeled, and stored on ice for transport to the laboratory.

Initially, at least one soil sample from each sampling location will be submitted for laboratory analyses. Analyses results from these initial samples will be used to validate results from immunoassay field screen methods (reference Section V.A.14). Upon validation, the frequency of laboratory submittals is expected to decrease to approximately 10% of samples collected.

Exploratory trenching may be used to investigate areas where Geoprobe sampling methods or conventional drill rig sampling methods encounter excessive debris or unusual subsurface conditions.

Groundwater

Groundwater samples will be collected from temporary monitoring points installed by Geoprobe methods during soil sampling. These samples will be field screened, and the results used to establish locations for the installation of monitoring wells. Groundwater samples obtained from monitoring wells will be handled in accordance with standard EPA protocols which include the collection of field and trip blank samples. Groundwater parameters such as pH and conductivity will be routinely recorded during sampling.

Air

Air samples will be collected from both inside and immediately surrounding the Operations Center building for VOC and PAH analyses as previously described. VOC samples will be analyzed by an expanded volatile organics scan using thermal desorption GC/MS methods. VOC samples will be collected by multimedia tubes or tedlar bags. Dedicated pumps will be used to collect composite VOC samples over an 8 hour period at flow rates of 0.05 to 0.1 liter/min. PAH samples will be analyzed by a PAH scan using NIOSH method 5506 HPLC/UV. PAH samples will be collected by

PTFE filters or Orbo 43 tubes. Dedicated pumps will be used to collect composite PAH samples over an 8 hour period at flow rates of 2 liters/min.

Surface Water

Surface water samples will be collected from 4 locations in the on-site stream as previously described in Section V.A.11. Surface water samples will be collected by sampling personnel directly accessing the stream by wading. Samples will be collected directly into clean sampling containers with special care taken not to disturb underlying sediments.

Sediments

Sediment samples will be collected from 4 locations in the on-site stream as previously described in Section V.A.11. Sediment samples will be collected by sampling personnel directly accessing the stream by wading. Samples will be collected using a stainless steel scoop or spoon. Aliquots of sediment will be placed in glass pans and homogenized prior to transfer into clean sample containers. One core sample will be taken by hand auger at the location described in Section V.A.11. Following collection, the core sample will be capped and stored upright on ice for transport to the laboratory.

AOC Section V.A. - Item 13 QA/QC Procedures

All sampling and analyses procedures will be performed in accordance with US EPA approved methods and quality control procedures. Sample collection, handling, and chain-of-custody procedures will be performed in accordance with EPA protocols outlined in "Engineering Support Branch, Standard Operating Procedures and Quality Assurance Manual, US EPA Region IV, 1986. All laboratory analyses will be performed by state certified laboratories, and complete chain-of-custody records will be maintained on all samples analyzed. Field monitoring reports and blank results (field and trip) will be documented for all groundwater sampling performed at the site.

AOC Section V.A. - Item 14 Analytical Methods

Field Screening

Soil samples collected at the Burlington MGP site will be field screened by the use of both immunoassay tests and photo ionization detector (PID). Field screening results will be used in real-time during the subsurface investigation to, a) revise sampling strategies as necessary, b) revise planned sampling locations, c) identify site areas for increased/decreased sampling efforts, and d) identify samples for laboratory analyses. Field screening methods to be employed at the site include:

PAHs: Immunoassays will be performed using the Ohmicron PAH RaPID Assay test which will target the carcinogenic PAH compounds. This test method provides a means for analyzing trace amounts of carcinogenic PAH compounds through a quick and quantitative field process. The Ohmicron PAH RaPID Assay uses

a three point standard curve to quantify test samples, and includes a known control sample in each batch. This test has a normal working range of 1.2 to 50 ppm in soil. In the case of soils exhibiting higher concentrations, the working range will be expanded through dilution.

VOCs PID screening will be performed on all samples to identify those areas of the site which may also have been impacted by petroleum related contamination. (immunoassay screens may not provide an indication of petroleum related contamination in the absence of typical MGP residuals)

PCBs Immunoassays will be performed using the D Tech PCB Field Test Kit. This test is based on an enzyme linked immunosorbent assay and provides semi-quantitative results. The test is sensitive to 0.5 ppm PCBs in soil.

Laboratory Analyses

Laboratory confirmation analyses will be performed on selected soil, sediment, groundwater and surface water samples using EPA methods directed towards the detection of constituents of interest associated with typical MGP wastes. Organic constituents of interest include volatile organics (VOCs), phenols, and polycyclic aromatic hydrocarbons (PAHs). Inorganic constituents of interest include RCRA metals, cyanide, ammonia and sulfur. Air samples will be analyzed for volatile and semi-volatile organics. Selected soil, and groundwater samples, as well as all sediment samples, will be analyzed for PCBs.

Selected soil samples will also be analyzed for total organic carbon (TOC) content; carbon, hydrogen and nitrogen (C, H & N); moisture content; TOX; total microbial count and BTU content. Approximately 10% of all soil samples submitted for laboratory analyses, *and* all samples collected from within tar wells or tanks (if present), will be analyzed for RCRA hazardous characteristics (TCLP organics, TCLP RCRA metals, pH, flash point and oil & grease). Selected groundwater samples will be field analyzed for constituents indicative of natural attenuation processes (dissolved oxygen, ferrous iron, sulfate, alkalinity and oxidation-reduction potential). All groundwater samples will be field analyzed for pH and specific conductance.

All analysis methods will be performed in accordance with approved methods as summarized in the following tables:

SOILS & SEDIMENTS	
Parameter	**Method**
Volatile Organics	EPA 8020 or 8260
Polycyclic Aromatic Hydrocarbons	EPA 8270 (3550B / 8270C)
Phenols	EPA 420.1 (Modified)
RCRA Metals	EPA SW 3051 or 3050B / 6010B or 6020
Mercury	EPA 7471
Cyanide	EPA 335.4
TCLP Organics	SW846 / 1311 EPA 8260B / 8270C
TCLP RCRA Metals	SW846 / 1311 / EPA 6010B or 6020
PCBs	EPA 8080
BTU Content	ASTM 3180
Oil & Grease	SW846 / EPA 9071A
pH	SW846 / EPA 9045A
Total Organic Carbon	EPA 9060
Total Microbial Count	SM9211C / SM9215B
Sulfur	ASTM D-4239
% Moisture	EPA 3550B
Extractable Organic Halides	SW846 / EPA 9023
Hexavalent Chromium	SM3500-D
Fluoride	EPA 340.2 (water method)
Carbon, Hydrogen & Nitrogen	ASTM D-5373

GROUNDWATER AND SURFACE WATER	
Parameter	**Method**
Volatile Organics	EPA 601&602 w/ IPE, MTBE and EDB
Polycyclic Aromatic Hydrocarbons	EPA 625
Phenol	EPA 420.1
RCRA Metals	NC GW SM 3030c / 200.7 OR 200.8
Mercury	EPA 245.1
Cyanide	EPA 335.4
PCBs	EPA 608
Oil & Grease	EPA 413.2 OR 1664
Flash Point	ASTM D-93
Total Organic Halides	SW846 / EPA 9020B
Total Microbial Count	SM9215 / SM9211C
Total Organic Carbon	EPA 415.1
Ammonia	EPA 350.1
Sulfur	EPA 200.7
Fluoride	EPA 340.2
Nitrate (Field/Lab)	HACH 8507 / EPA 353.2
Total Phosphate (Field/Lab)	EPA 365.1

GROUNDWATER AND SURFACE WATER (cont)	
Parameter	**Method**
Alkalinity (Field)	HACH 8221
Ferrous Iron (Field)	HACH 8146
Sulfate (Field)	HACH 8051
Specific Conductance (Field)	HYDROLAB
Temperature (Field)	HYDROLAB
ORP (Field)	HYDROLAB
pH (Field)	EPA 150.1

AIR	
Parameter	**Method**
Volatile Organics	VOC Scan by thermal desorption GC/MS
Polycyclic Aromatic Hydrocarbons	PAH Scan by NIOSH 5506 HPLC / UV

Selected soil samples will be submitted to the soils laboratory for characterization of grain size, loose density and permeability as follows:

SOILS LABORATORY	
Parameter	**Method**
Grain Size Analyses	ASTM D-422
Permeability	ASTM D-5084
Loose Density	Standard Lab Method

AOC Section V.A. - Item 15 Decontamination Procedures

All sampling equipment will be decontaminated as necessary to prevent potential cross contamination of samples. Geoprobe sampling methods will utilize new clean disposable liners for each sampling interval. All sampling equipment (Geoprobe sample rods, drill rig augers and split spoons) will be washed with detergent and rinsed with methanol and water. Steam cleaning will be used to remove tarry residues from sampling equipment if necessary. All sample handling equipment (glass pans, spatulas, etc.) will be cleaned between samples in accordance with EPA protocols. Decontamination rinse water will be discharged onto pervious ground surface areas on-site.

AOC Section V.A. - Item 16 Summary of Investigations

Limited investigations have been performed at the Burlington MGP Site to-date. These investigations are described and summarized as follows:

Preliminary Site Environmental Assessment

This investigation was conducted at the site in advance of a proposed expansion to the operations center facility, and to assess the nature and extent of any MGP related contamination across the property. This assessment made use of an expansive grid-based soil vapor survey, limited soil sampling, and surface water sampling. The results of this assessment are included in Appendix V.A.16.

The soil vapor survey involved the use of vapor probes to collect soil gas samples from a depth of 3 feet at the nodal points of a 50' grid superimposed across the site. Vapor samples were analyzed in the field using a portable gas chromatograph (GC). The vapor survey results indicated the presence of subsurface volatile organics in the area between the Operations Center building and the on-site stream.

Based on the soil vapor survey results, and with consideration given to the former location of the MGP facilities, 11 soil samples were taken at various locations around the site. Samples were taken at a depth of approximately 4 feet by mechanical auger and split-spoon sampler. The samples were analyzed for total petroleum hydrocarbons, BTEX compounds, benzo(a)pyrene (BaP), pyrene and naphthalene. The analytical results indicated BaP and pyrene (typical MGP related contaminants) in 6 of the 11 samples taken. BaP and pyrene were indicated at maximum concentrations of 19.5 ppm and 64.6 ppm, respectively. Naphthalene was undetected, however, reporting limits for the compound ranged up to 20 ppm. BTEX compounds were indicated in 5 samples at very low concentrations (less than 1 ppb). TPH was indicated in 7 samples at concentrations ranging up to 420 ppm.

Surface water grab samples were collected from the on-site stream at 4 locations (2 upstream of the site, 1 centrally located within the site, and 1 downstream of the site). Water samples were analyzed for total metals, BTEX, and PAHs (BaP, pyrene, and naphthalene). Barium, cadmium, chromium, iron, manganese and zinc were detected at low concentrations in all samples taken. No data trends suggesting MGP related impacts to the stream were indicated. No BTEX or PAH compounds were detected in the surface water samples.

UST Investigations

Three separate UST investigations have been performed at the Burlington MGP site as follows:

Used Transformer Oil UST

This report was prepared and submitted to NCDENR in May 1991 to document the November 1990 removal of a 550 gallon used transformer oil UST formerly located between the shop building and the transformer storage area (Figure V.A.1-1). Approximately 7 cubic yards of petroleum contaminated soil was excavated during the UST removal and stockpiled on-site for subsequent disposal. Soil samples from both the excavation and from the excavated soil were submitted for oil & grease and PCB analyses. Analytical results indicated oil & grease concentrations in the excavation up to 400 ppm, and in the excavated soil up to 1400 ppm. No PCBs were detected in any of the soil samples.

Gasoline UST Overfill

This report was prepared and submitted to NCDENR in October 1993 to document the investigation of an 18 gallon (estimated) overfill associated with a 15,000 gallon gasoline UST at the site (Figure V.A.1-1). Approximately 19 cubic yards of contaminated soil was excavated and stockpiled for subsequent use on-site. Soil samples collected from the walls of the excavation indicated that all impacted soil had been excavated. Groundwater was encountered in the excavation at a depth of 8 feet. A groundwater sample taken from the excavation indicated a TPH concentration of 22.7 ppm. Subsequent groundwater samples were taken at 3 locations by Geoprobe methods (21 feet upgradient, 6 feet downgradient, and 46 feet downgradient from the source area), and were analyzed by EPA Method 624. Analytical results indicated acetone at 25 ppb in the immediately downgradient sample, and benzene at 81 ppb in the distant downgradient sample.

Gasoline and Diesel UST Closure

This report was prepared and submitted to NCDENR in July 1998 to document the removal of two underground petroleum storage tanks at the site. The USTs (the aforementioned 15,000 gallon gasoline and a 10,000 gallon diesel) were located in the central area of the site southeast from the operations center building (reference Figure V.A.1-1), and were removed on June 16, 1998. Approximately 78 cubic yards of soil was excavated and temporarily stockpiled on-site for subsequent backfilling of the excavation. Analytical results from soil samples taken at depths of 12 and 13 feet in the bottoms of the diesel and gasoline UST excavations, respectively, indicated the presence of heavy PAH compounds not associated with typical gasoline and/or diesel contamination. These heavy PAH compounds, typically indicative of MGP related contamination, included benzo(a)anthracene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-c,d)pyrene.and pyrene. Lighter weight PAH compounds detected included naphthalene, 2-methylnapthalene, acenaphthene, fluorene, fluoranthene, anthracene, phenanthrene and dibenzofuran. While these lighter weight compounds can be associated with diesel contamination, they are also included among the group of PAH compounds typically associated with MGP wastes (reference "Management of Manufactured Gas Plant Sites - Volume 1; Wastes and Chemicals of Interest", Gas Research Institute, 1987). A summary of analytical results from the UST closure report are provided in Appendix V.A.16.

AOC Section V.A. - Item 17 Schedule

A schedule of site investigation activities is provided in Appendix V.A.17.

AOC Section V.A. - Item 18 Principal Consultants

All investigative and assessment work performed at the Burlington MGP Site will be performed by, or will be under the administration of, Duke Power Company's MGP Site Management Group. All correspondence associated with the Burlington MGP Site should be directed to:

Mr. Ralph C. Roberts, P.E.
Duke Power Company
EC12 ZB
526 South Church Street
P.O. Box 1006
Charlotte, North Carolina 28201-1006

Phone: (704) 373-7888 Fax: (704) 382-6240

Laboratory analyses will be performed by, or will be under the administration of, the Duke Power Environmental Division Laboratory Services Section (North Carolina Certification Number 248).

AOC Section V.A. - Item 19 Health and Safety Plan

A Health & Safety Plan (HASP) conforming to OSHA guidelines has been developed and is included in Appendix V.A.19. The HASP addresses precautions needed with respect to the toxicity of on-site contaminants, odors, visual impacts, and site security. This HASP will be implemented in association with remedial investigation activities work to ensure the health and safety of investigation personnel, operations center personnel, nearby residences, businesses, pedestrians, and site visitors.

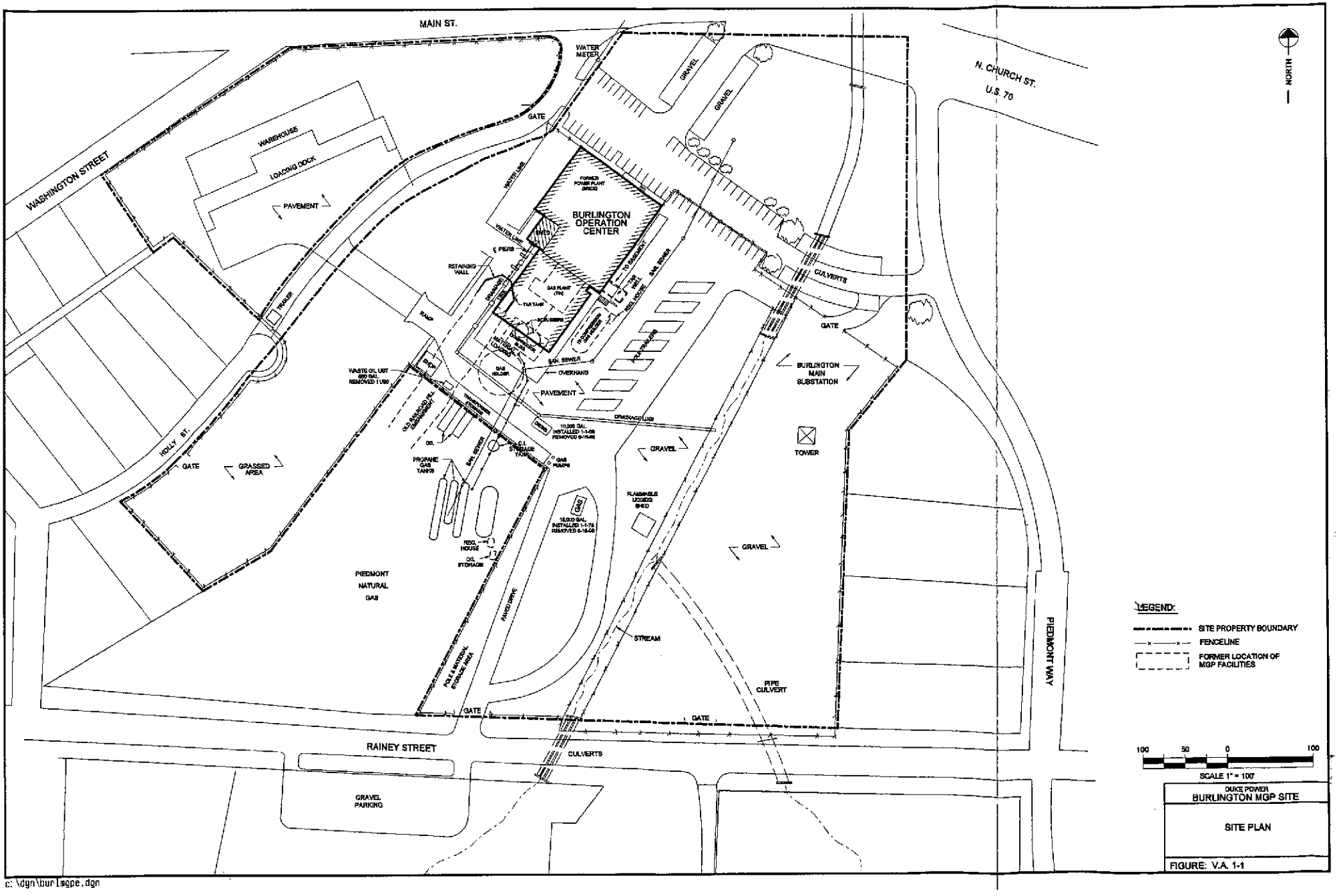
AOC Section V.A. - Item 20 Other Information

None.

Appendix V.A.1

APPENDIX V.A.1

Site Description



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22

SCALE 100 FT. TO AN INCH.

22

(1923)

247

248

249

APR. 1924
BURLINGTON
N.C.

HIGHLAND AV.

PIEDMONT WAY

PIEDMONT POWER & LIGHT CO.
SUB-STATION & ICE FACTORY

241

9

Pond

PIEDMONT WAY

252

264

259

PHILO PL.

QUEEN ANNE AV.

NOT NAMED

242

RAINEY HOSPITAL

265

260

NORTH

PARKER

BEAUMONT AV.

Pond

Pond

RELIANCE PAINT MFG. CO.

244

266

261

MILL

MIDWAY LUMBER CO.

PLANING MILL

CAROLINA OIL CO.

272

BURLINGTON COTTON MILLS
TO MANF. COTTON CLOTH
MILL & MILL VILLAGE FROM PLANS

MAIN MILL

7

267

QUEEN ST. (WALDO MONTGOMERY)

QUEEN ST. LUMBER STORAGE

TEXTILE CO.

HEATING.

CLENDENNING ROAD

S. RY. (GREENSBORO & GOLDSBORO BRANCH.)

273

274

NEW ARCADIA RD.

ROAD

Scale 100 Ft. to One Inch.

EDR Sanborn, Inc.

This Sanborn™ map is a certified copy produced by EDR Sanborn, Inc. from its archives. Information on this map is derived from Sanborn field surveys conducted in 1924

DMS

EDR Sanborn, Inc. Research Associate

22

22

N. MAIN EXT'D

418

SOUTHERN PUBLIC UTILITIES SUB-STATION & GAS PLANT

TRANSFORMERS

TOBACCO STEMMERY

241

PIEDMONT WAY

252

Pond

BOWMAN AV.

242

RAINEY HOSPITAL

HEAT: STEAM, LIGHTS: ELEC., CHEM. EXTERS

RAINEY (BEAUMONT AV.)

NOT OPENED

CITY LAUNDRY

POWER: STEAM, LIGHTS: ELEC.

LAUNDRY

435

Pond

244

248

OKLAHOMA AV. (HIGHLAND AV.)

HOT WATER

249

JAN. 1929 BURLINGTON N.C.

247

264

485

265

DELAWARE AV.

PHILO PL.

259

CLOVERDALE (QUEEN ANNE)

NORTH AV.

260

PARKER

BEAUMONT AV.

426

262

261

266

GRAHAM (MILL)

SOUTHERN HARDWOOD FLOORING CO.

RIGHT WATCHMAN, APPROVED CLOCK, HEAT: STEAM, LIGHTS: ELEC., POWER: STEAM & ELEC., FUEL: WASTE, WOOD, AUTO SPRINKLERS, HYDS & HOSE AS SHOWN, CHEM EXTERS, CITY WATER

KILNS

LUMBER STORE

PLANING MILL CONS. FER.

CARPENTER SHOP

CAROLINA SILK MILLS

RAISED 2

WEAVING SLASHER

BURLINGTON COTTON MILLS

MANF. SILK & COTTON CLOTH & BED SPREADS

RIGHT WATCHMAN, APPROVED CLOCK, HEAT: STEAM, POWER & LIGHTS: ELEC., FUEL: COAL, ASHES & PITS, OUTSIDE HYDS & HOSE & AUTO SPRKLS THROUGHOUT, SUPPLIED BY CITY MAINS & 50 000 GAL W.T., CHEM EXTERS

MAIN MILL

WEAVING

COTTON W. HO.

272

BURLINGTON PROCESSING CO.

HOLT, LOVE & SMITH, MFRS. BED SPREADS

RAISED 4

WEAVING

WARE HO.

SIDING

QUEEN ANNE (5TH ST.)

NOTE: BURLINGTON COTTON MILLS, CAROLINA SILK MILLS & HOLT, LOVE & SMITH UNDER SAME MANAGEMENT

267

HAW RIVER RD.

263

ROAD

CLENDENNING

273

S RY (GREENSBORO & GOLDSBORO BRANCH)

RACE (ROAD)

443 (274)

SINCLAIR OIL CO.

WARE HO.

SOUTHERN DYE WORKS

DYEING

PACKING

WINDING

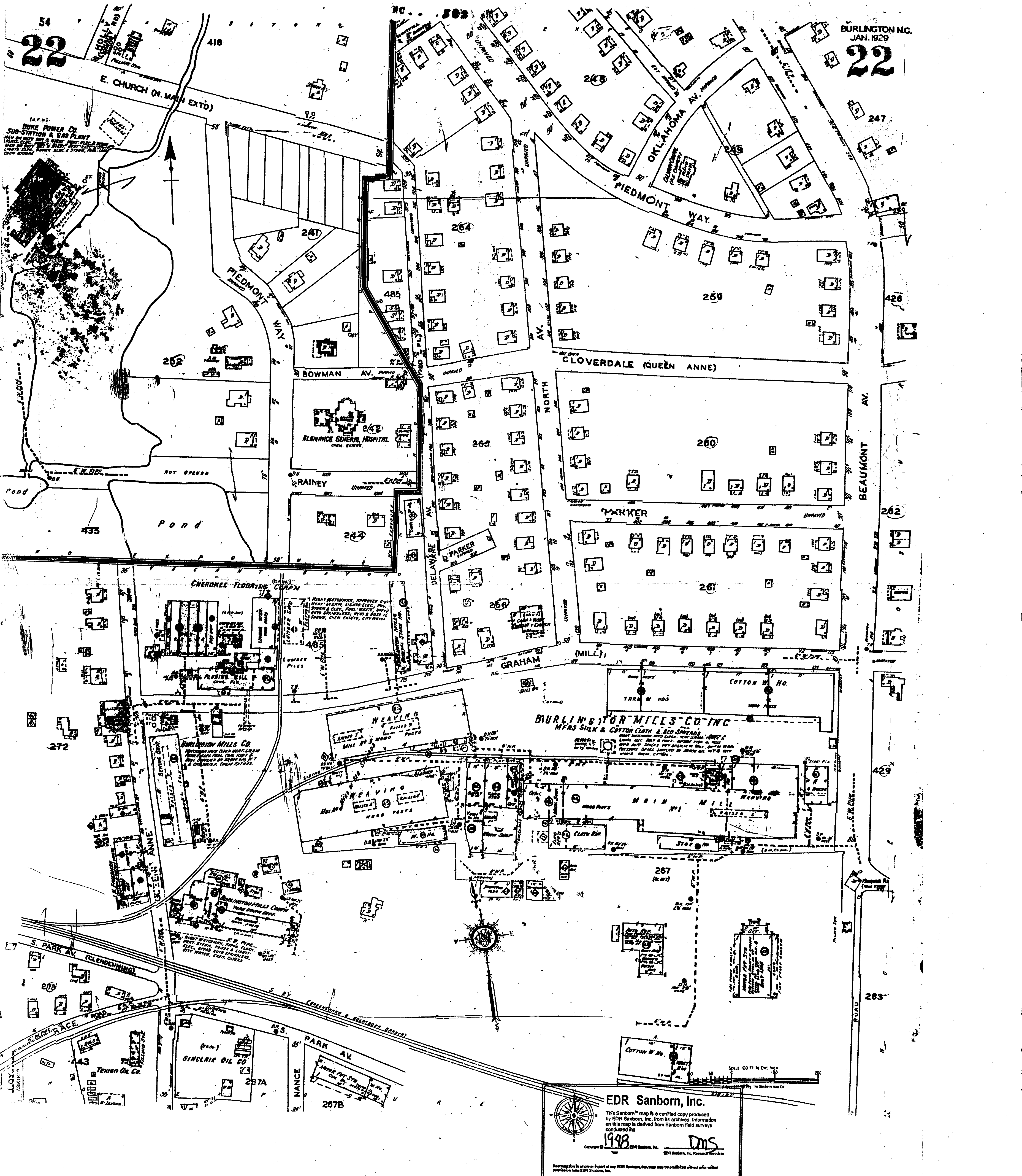
RIGHT WATCHMAN, APPROVED CLOCK, HEAT: STEAM, POWER & LIGHTS: ELEC., BOILERS, AUTO SPRINKLERS, CITY WATER, CHEM. EXTERS

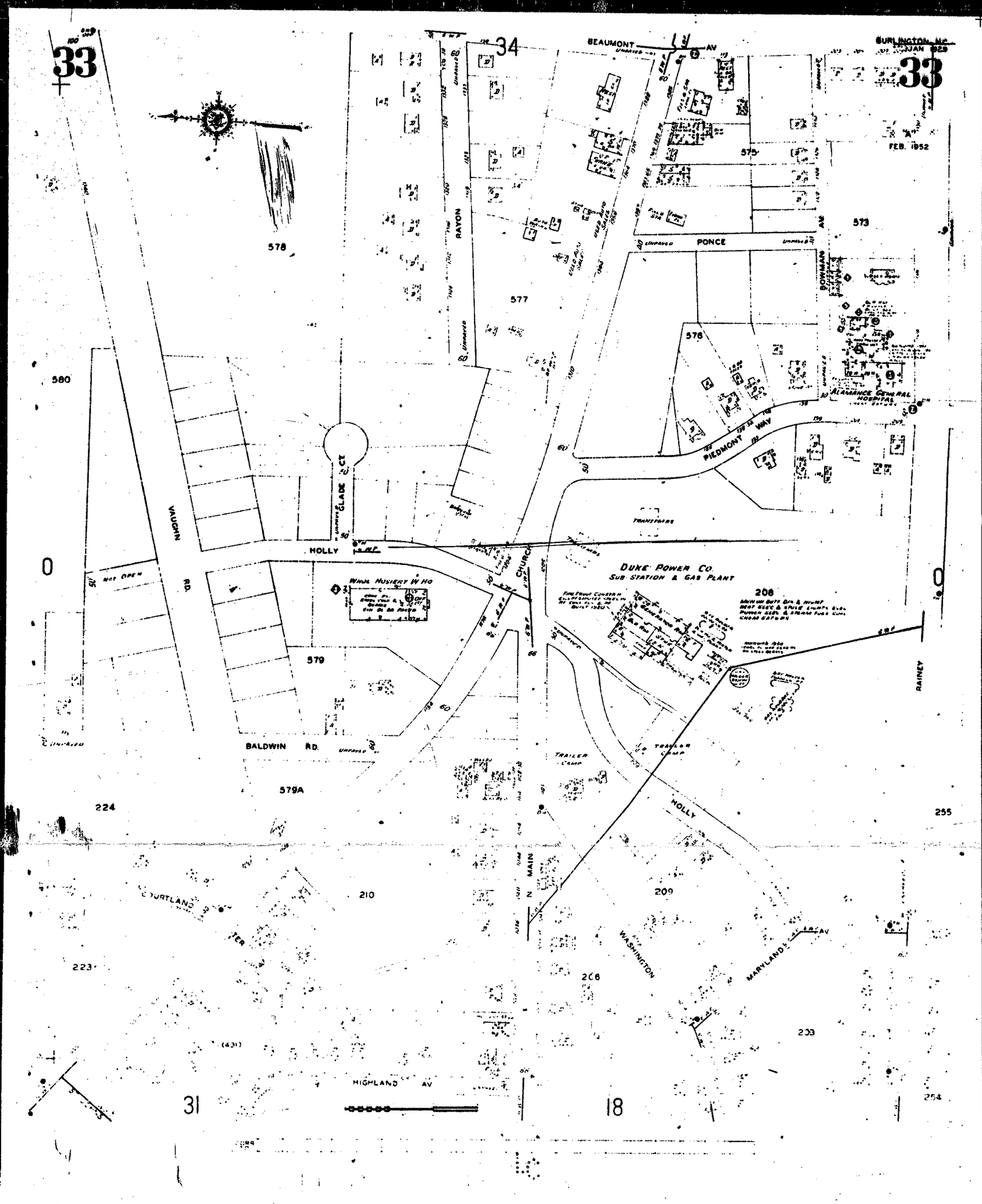
Scale 100 Ft to One Inch.

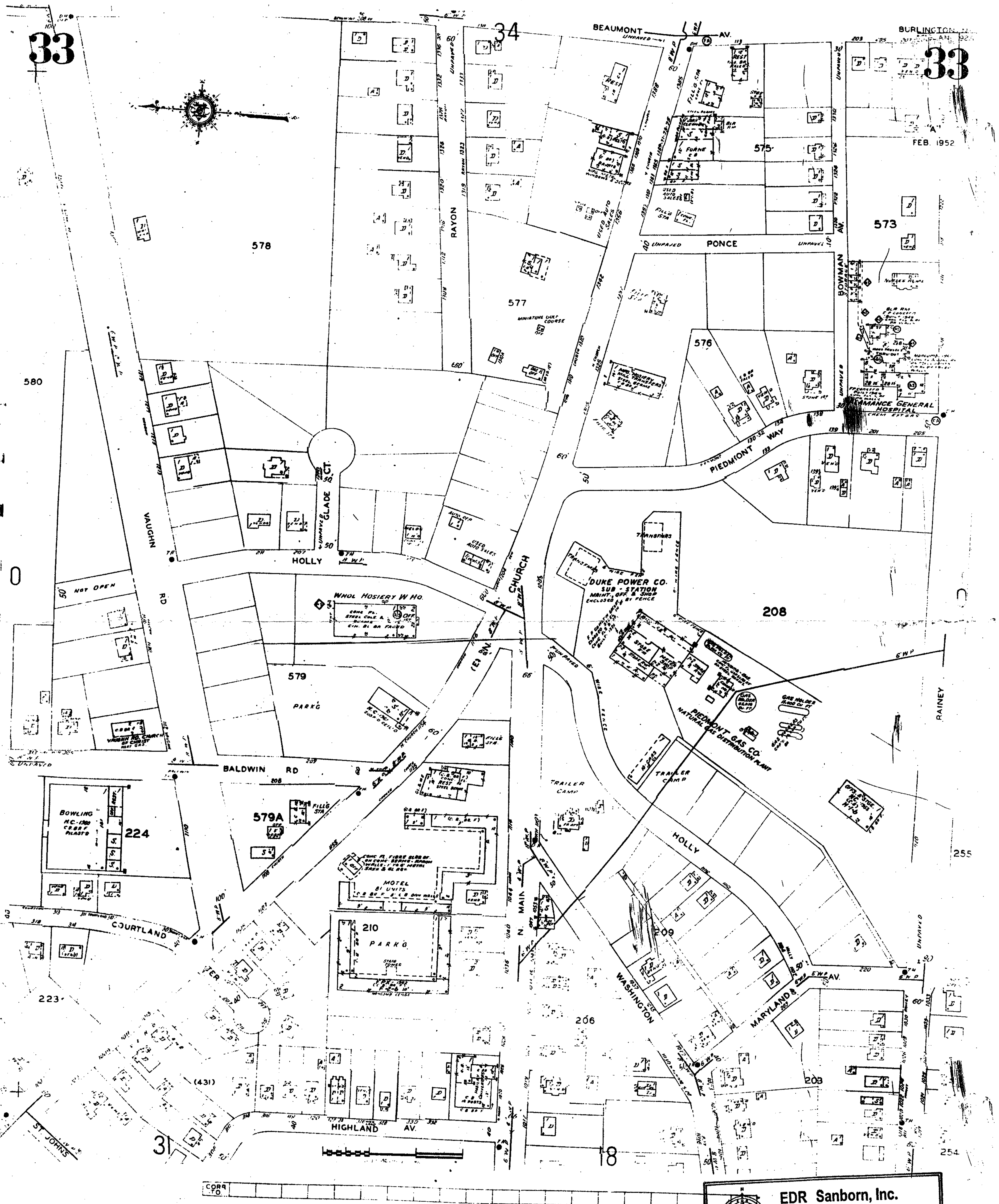
100 50 0 100 200 300

EDR Sanborn, Inc.

This Sanborn™ map is a certified copy produced by EDR Sanborn, Inc. from its archives. Information on this map is derived from Sanborn field surveys conducted in 1929


54
22
BURLINGTON N.C.
JAN. 1929
22
E. CHURCH (N. MAIN EXTD)
HOLLY (COUNTY RD)
FILLING STA
418
247
248
OKLAHOMA AV.
249
PIEDMONT WAY
DUKE POWER CO.
SUB-STATION & GAS PLANT
TRANSFORMERS
241
264
485
259
426
252
BOWMAN AV.
CLOVERDALE (QUEEN ANNE)
NORTH AV.
BEAUMONT AV.
242
ALAMANCE GENERAL HOSPITAL
CHEM. EXTGRS.
265
260
RAINEY
UNPAVED
NOT OPENED
Pond
Pond
435
PARKER
244
DELAWARE AV.
(PHILD PL)
262
S. PARKER
261
266
NO EXPOSURE VACANT BEYOND
CHEROKEE FLOORING CORP'N
PLANING MILL
LUMBER PILES
GRAHAM
(MILL)
COTTON W. HO.
YARN W. HOS
WEAVING
MILL No. 3
BURLINGTON MILLS CO. INC
MFRS SILK & COTTON CLOTH & BED SPREADS
MAIN MILL No. 1
WEAVING
CLOTH RM.
STGE
BURLINGTON MILLS CO.
SEWING DEPT.
272
429
267
BURLINGTON MILLS CORP'N
YARN DYEING DEPT.
QUEEN ANNE
S. PARK AV. (CLENDENNING)
273
RACE ROAD
S. RY (GREENSBORO & GOLDSBORO BRANCH)
243
TEXACO OIL CO.
SINCLAIR OIL CO.
267A
NANCE
S. PARK AV.
267B
MOTOR FRT. STA.
AUTO REP.
COTTON W. HO.
SALES
ROAD
263
SCALE 100 FT TO ONE INCH




33
34
BEAUMONT AV.
UNPAVED
BURLINGTON
33
"A"
FEB. 1952
578
577
MINIATURE GOLF COURSE
RAYON
UNPAVED
575
FILL'G STA
REST
USED AUTO SALES
PONCE
UNPAVED
BOWMAN AV.
573
NURSES HOME
576
ALAMANCE GENERAL HOSPITAL
PIEDMONT WAY
580
VAUGHN RD
GLADE CT.
HOLLY
NOT OPEN
WHOL HOSIERY W HO.
CHURCH
N. CHURCH (E)
DUKE POWER CO. SUB - STATION
MAINT., OFF. & SHOP ENCLOSED BY FENCE
TRANSFMRS
208
579
PARK'G
VAUGHN RD. CHURCH OF CHRIST
PIEDMONT GAS CO. NATURAL GAS DISTRIBUTION PLANT
GAS HOLDER
RAINEY
BALDWIN RD
BOWLING
224
579A
FILL'G STA
TRAILER CAMP
MOTEL 81 UNITS
HOLLY
255
210
PARK'G
N. MAIN
209
WASHINGTON
MARYLAND AV.
COURTLAND
223
206
(431)
203
HIGHLAND AV.
ST JOHNS
31
18
254
CORR TO

Appendix V.A.2

APPENDIX V.A.2

Environmentally Sensitive Areas

Section V. A. 2. Identification of environmentally sensitive areas on and adjacent to the Site.

The site is located in an urban setting. The soils on and adjacent to the site are highly disturbed and consist of a variety of fills; little, if any, original, undisturbed soil appears to be extant. There are no permanent standing bodies of water on or adjacent to the site. Drainage from the site is directed to storm drains so that standing water is limited to a few low spots and it either evaporates or infiltrates the surrounding soils. There is no wetland on or adjacent to the site. A small stream runs through the site from the south to the north. This stream is about four feet wide and averages six inches in depth. The stream originates about ¾ mile south of the site and flows through a highly urbanized area. The terrestrial vegetation consists of weeds, grasses, and shrubs that are typically found on industrial property in an urban setting. No unique biotic communities exist in the area.

In order to determine if any environmentally sensitive areas exist on or adjacent to the site a search within a one mile radius of the site was conducted (see Figure 1). Maps, such as state highway, recreational, USGS topographic, and Alamance County (in North Carolina County Maps), revealed no sensitive sites. A survey of the North Carolina Corporate Geographic Database (North Carolina Center for Geographic Information and Analysis) revealed no environmentally sensitive areas within a one mile radius of the site. Snoffers Lake, an impoundment situated at the edge of the one mile radius south of the site, receives no drainage from the site. The Downtown Burlington Historical District is located at the edge of the one mile radius but none of the historic district is adjacent to the site. Table 1 contains a summary of these searches.

Table 1. Results of searches for environmentally sensitive areas within a one mile radius of the site. **Note:** no sensitive areas were found on or adjacent to the site.

Marine Sanctuaries	N/A
National and State Parks	None
Designated/proposed wilderness and natural areas	None
Coastal Zone Mgt Act	N/A
National Estuary Program/Near Coastal Waters	N/A
Clean Lakes Program	N/A
National Monuments	None
National/State Historical Sites	None adjacent
National/State Seashore,Lakeshore,River Rec. Areas	N/A
Critical habitats	None
National/State Preserves and Forests	None
National/State Wildlife Refuges	None
Coastal Barriers	N/A
Protection of natural ecosystems	None
Critical spawning areas	N/A
Migratory pathways for fish and shellfish	N/A
Breeding areas for aggregation of animals	None
Scenic or Wild Rivers	N/A
State wildlife management lands	None
Maintenance of unique biotic communities	None
Wetlands - Aquatic life maintenance	None

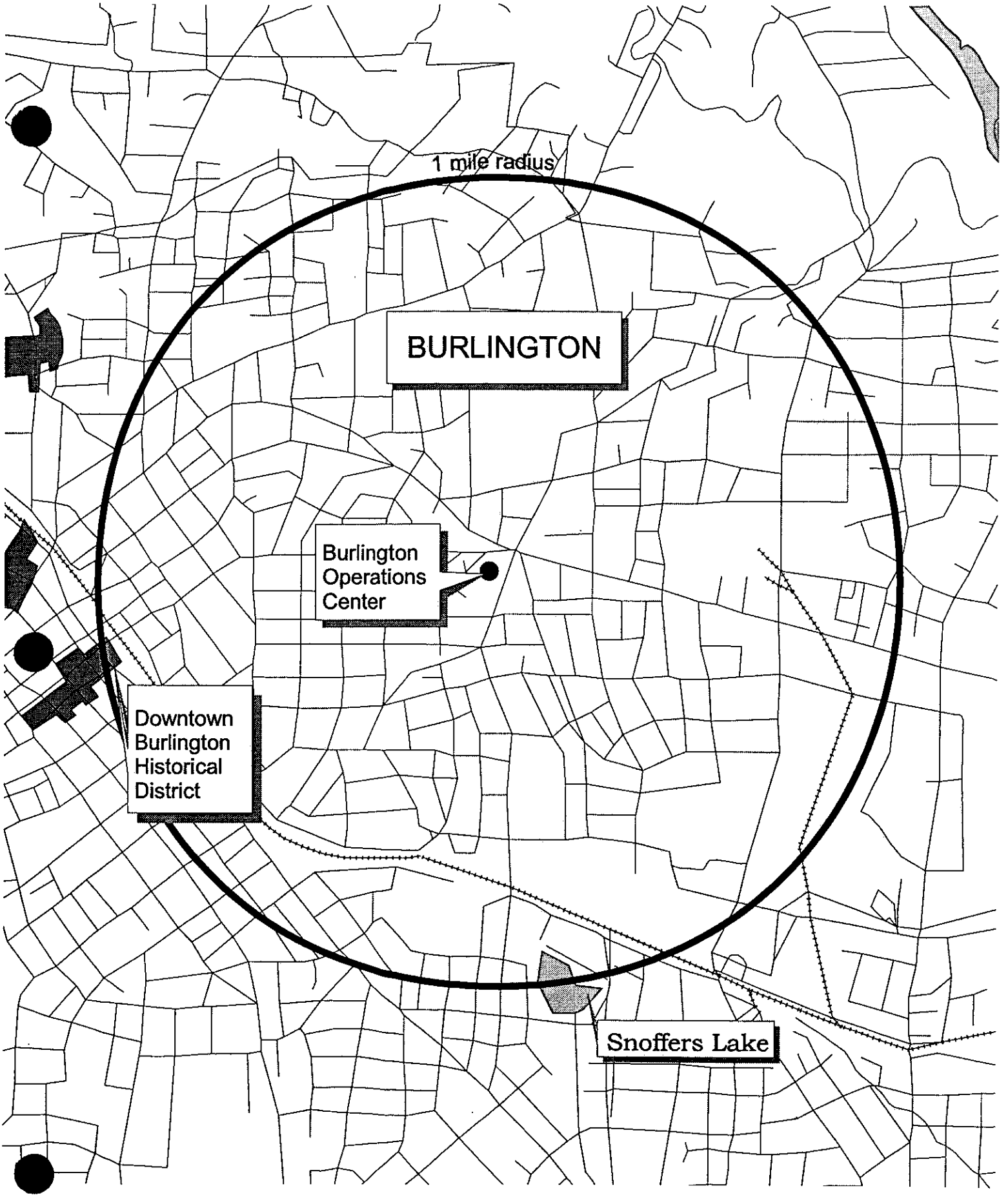
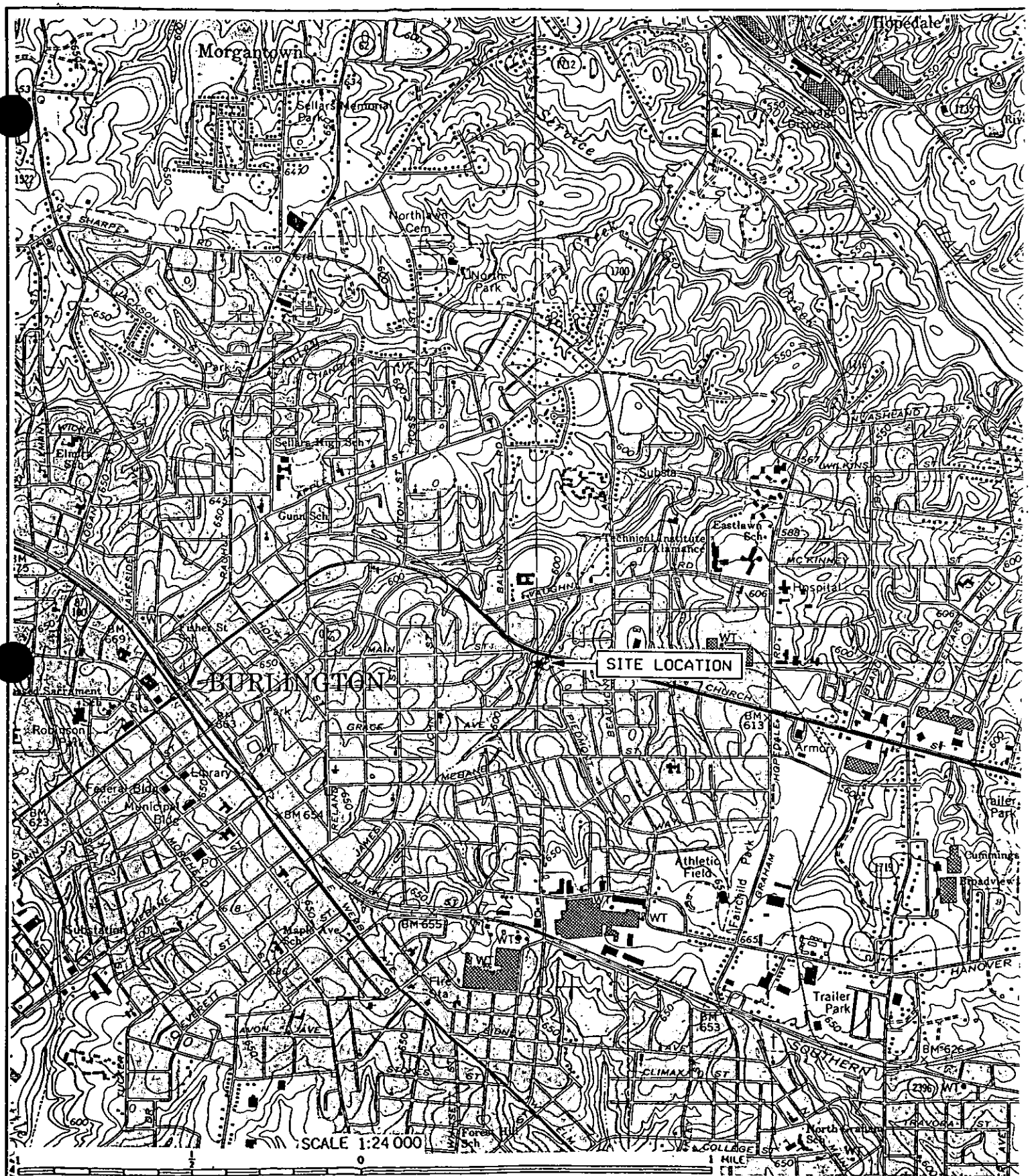


Figure 1. Site map showing one mile radius searched for environmentally senesitive areas.

Appendix V.A.3

APPENDIX V.A.3

USGS Topographic Maps



DUKE POWER

BURLINGTON MGP SITE

SITE LOCATION MAP
PARTIAL USGS TOPO
BURLINGTON, N.C.

FIGURE: V.A.3-1

Appendix V.A.4

APPENDIX V.A.4

Owner's Deeds

((Burlington

RESOLUTION OF THE COUNCIL OF THE CITY OF BURLINGTON CONSENTING TO THE SALE AND TRANSFER BY DUKE POWER COMPANY TO PIEDMONT NATURAL GAS COMPANY, INC., ITS SUCCESSORS AND ASSIGNS, OF THE PLANT, DISTRIBUTION SYSTEM AND FRANCHISE FOR THE MANUFACTURE, SALE AND DISTRIBUTION OF GAS IN THE CITY OF BURLINGTON, NOW OWNED BY DUKE POWER COMPANY.

WHEREAS, Duke Power Company is now the owner of the plant, distribution system and franchise for the manufacture, sale and distribution of gas in the City of Burlington, North Carolina, the ownership of said franchise being derived as follows:

Franchise dated April 20, 1925, for a term of 50 years, whereby the City of Burlington granted to North Carolina Public Service Company, its successors and assigns, the right, privilege and franchise to locate, construct, operate and maintain a plant or plants for furnishing and selling gas in the City of Burlington, and its vicinity, and to locate and maintain pipes and other necessary and proper appliances and fixtures, in, through, along, upon, over and under all of the streets, alleys, lanes and ways in public places within the city limits of the City of Burlington;

Conveyance from North Carolina Public Service Company to Southern Public Utilities Company of Maine, dated July 1, 1932, and recorded in Book 103, Page 372, of the Register of Deeds office of Alamance County;

Conveyance from Southern Public Utilities Company of Maine to Southern Public Utilities Company of New Jersey, dated April 4, 1935, and recorded in Book 109, Page 381, of the Register of Deeds office of Alamance County;

Conveyance from Southern Public Utilities Company of New Jersey to Duke Power Company, dated May 1, 1935, and recorded in Book 109, Page 564, of the Register of Deeds office of Alamance County; and

WHEREAS, Duke Power Company has entered into a contract for the sale of its gas plant and system in the City of Burlington to the Piedmont Natural Gas Company,

Inc., and as an incident to said sale proposes to assign and transfer to said Company its franchise to manufacture, sell and distribute gas in said City subject to the approval of said sale, transfer and assignment by the Council of the City of Burlington.

NOW, THEREFORE, BE IT RESOLVED By the Council of the City of Burlington that it does hereby approve and consent to the sale, transfer and assignment by Duke Power Company to Piedmont Natural Gas Company, Inc., its successors and assigns, of the plant, system and franchise now owned and held by Duke Power Company for the manufacture, sale and distribution of gas in the City of Burlington; provided, however, that said sale, transfer and assignment shall not impair or affect in any way the electric franchises now owned and held by Duke Power Company, and that Duke Power Company, its successors and assigns, shall retain and remain fully vested with all other franchises, rights and privileges which it owns and holds in the City of Burlington except the franchise for the manufacture, sale and distribution of gas.

****

I, R. P. Pope, Clerk of the City of Burlington, do hereby certify that the foregoing is a true copy of a Resolution duly adopted by the City Council of the City of Burlington at a regular meeting held on the 1st day of August, 1950.

Witness my hand and the official seal of the City of Burlington, North Carolina, this the 4th day of August, 1950.

(SEAL)

(s) R. P. Pope
Clerk

ymap 50, 207+208

198/328

said Piedmont Natural Gas Company, Inc., its successors and assigns, all of its rights, title, interest and estate as Trustee, as aforesaid, in and to the above described property, franchises, rights, privileges, immunities, rights of way and easements, subject, however, to the exceptions hereinabove set out.

The recitals herein contained are based only on representations made by Duke Power Company and Guaranty Trust Company of New York accepts no responsibility for the states therein contained.

IN WITNESS WHEREOF, the Guaranty Trust Company of New York, Trustee, has caused its corporate name to be hereunto subscribed by its Vice President, attested by its Secretary or an Assistant Secretary, and its corporate seal to be hereunto affixed, on the 7th day of May, A.D., 1951.

GUARANTY TRUST COMPANY OF NEW YORK, TRUSTEE,

Attest:
J. C. Buttery, Asst. Secretary

BY: Arthur E. Burke,
Vice-President

Guaranty Trust Company of New York
Incorporated 1864

STATE OF NEW YORK
COUNTY OF NEW YORK

I, Walter J. Grimes, a Notary Public for the above State and County, hereby certify that J. C. Buttery personally came before me this day and acknowledged that he is Assistant Secretary of Guaranty Trust Company of New York, a corporation, Trustee, and that by authority duly given and as the act of said corporation the foregoing and annexed instrument was signed in its name by Arthur E. Burke, its Vice President, sealed with its corporate seal and attested by himself as its Assistant Secretary.

WITNESS my hand and official seal this the 7th day of May, 1951.

Walter J. Grimes, Notary Public

Walter J. Grimes
Notary Public
New York

My Commission expires 3-30-52

NORTH CAROLINA
ALAMANCE COUNTY

The foregoing certificate of Walter J. Grimes, a N. P. of N. Y. is adjudged to be correct. Let this instrument with the certificate be registered.

This 11th day of May, 1951.

D. J. Walker, Jr., C.S.C.

Filed for Registration at 3:50 o'clock P. M., May 11, 1951 and registered in the office of the Register of Deeds for Alamance County in Book No. 198 Deeds, page 326-328.

This the 15th day of May, 1951.

REGISTER OF DEEDS

BSM.

STATE OF NORTH CAROLINA
COUNTY OF ALAMANCE

THIS DEED Made this 9th day of May, 1951, by and between Duke Power Company, a corporation duly organized and existing under and by virtue of the laws of the State of New Jersey, hereinafter sometimes referred to as the "Grantors", party of the first part, and PIEDMONT NATURAL GAS COMPANY, INC., a corporation duly organized and existing under and by virtue of the laws of the State of New York, hereinafter sometimes referred to as the "Grantee", party of the second part,

W I T N E S S E T H :

That the said party of the first part, in consideration of One Hundred ($100.00) Dollars and other valuable considerations to it paid by the party of the second part, the receipt of which is hereby acknowledged, has bargained and sold, and by these presents does grant, bargain, sell, assign, transfer and convey unto said party of the second part, its successors and assigns, the following described property, franchises, rights, privileges, immunities, rights of way and easements, to-wit:

1. All that certain piece, parcel or lot of land situate, lying and being on the northerly side of Rainey Street in the City of Burlington, Alamance County, State of North Carolina, described as follows, to-wit:

BEGINNING at a railroad iron on the northerly side of Rainey Street (formerly known as Murray Avenue), said railroad iron being at the westerly corner of the land described in deed from North State Realty Company and the Piedmont Development Company to Piedmont Railway & Electric Company be deed dated April 30, 1915, recorded in the public registry for Alamance County in Deed Book 56 at pages 1-8, and running thence from said point of beginning as so established N. 55 - 46 E., 300.36 ft. to an iron pin; thence N. 35 - 00 E., 410.98 ft. to an iron pin; thence N. 66 - 45 E., 86.90 ft. to the westerly corner of the power plant building of the Grantor, thence along the southwesterly wall of said building and along other property of the Grantor, S. 54 - 23 E., 121.80 ft. to an iron pin; thence S. 26 - 20 W., 534.80 ft. to an iron pin on the northerly side of Rainey St. thence along the northerly side of Rainey Street N. 88 - 38 W., 426.10 ft. to the point of BEGINNING, containing 3.16 acres, more or less, being shown on plat entitled "Duke Power Company - Portion of Burlington Gas Plant Property deeded to Piedmont Natural Gas Co;, Inc., - Burlington, N. C.", dated April 2, 1951, hereto attached and made a part hereof, and being the westerly portion of the property described in the deed from North State Realty Company and Piedmont Development Company to Piedmont Railway & Electric Company hereinabove referred to;

together with the gas plants, works, tanks and holders, and the buildings, structures and improvements, with the fixtures and appurtenances thereto, located on the lot hereinabove described, and together with all gas genarators, mixers, compressors, purifiers, scrubbers, pipes, mains, machinery, apparatus and equipment, which are installed in or upon said buildings or structures, or in or upon the lot hereinabove described, excepting, however, any such fixtures, machinery, appamtus and equipment which are reflected in the Grantor's gas plant property accounts Nos. 1327.3 (Shop Equipment) and 1327.7 (Misc. Equipment), and subject to the exceptions and reservations hereinafter set out.

11. All of the right, title and interest of the Grantor in and to the portion of Rainey Street adjacent to the lot hereinabove described and lying between the southerly boundary line of said lot and the center line of Rainey St.

111. The gas distribution system of the Grantor located in the City of Burlington and in the Town of Graham, and in the vicinity thereof, in Alamance County, North Carolina, including but not being limited to all pipe, mains, conduits, service boxes, service connections, meters, and all other appliances, apparatus, equipment and materials installed as a part of said distribution system (excepting, however, any such appliances, apparatus, equipment and materials which are reflected in the Grantor's gas plant property accounts Nos. 1327.3 (Shop Equipment) and 1327.7 (Misc. Equipment)} together with all rights, privileges, easements and rights of way of the Grantor for or connected in any way with the construction, repair, maintenance and/or operation of the gas distribution system hereby granted and conveyed, or any part thereof.

1V. The fixed gas properties of the gas generating, mixing and storage plants, and of the gas distribution system of the Grantor, in the City of Burlington and in the Town of Graham, and in the vicinity thereof, which are reflected in the Grantor's gas plant property accounts Nos. 1312.1, 1312.2, 1313, 1314, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1323, 1324, 1325 and 1327.6.

All Franchises, rights, privileges and immunities of the Grantor for or incident to the manufacture, sale and distribution of gas in the City of Burlington and in the Town of Graham, and in the vicinity thereof, including but not being limited to (1) the franchise for such purposes originally granted to North Carolina Public Service Company, Inc. by an ordinance of the Board of Aldermen of the City of Burlington adopted April 20, 1925, and (2) the franchise

for such purposes originally granted to North Carolina Public Service Company by an ordinance of the Board of Commissioners of the Town of Graham adopted February 6, 1931; expressly excluding, however, and reserving unto the Grantor, its successors and assigns, the franchises, rights, privileges and immunities of the Grantor for the electric utility business in the City of Burlington and in the Town of Graham, and in the vicinity thereof.

There is expressly excepted from this conveyance and the Grantor reserves unto itself, its successors and assigns (1) the existing electric transmission, distribution and service lines and facilities (including meters and transformers) of the Grantor located upon the lots hereinabove described; (2) a right of way and easement to maintain, repair and operate upon and over the lots hereinabove described lines and facilities for the purpose of transmitting power by electricity located substantially as shown by red lines on the attached plat, with the right at all times to enter upon the premises adjacent to said lines and facilities for the purpose of inspecting same and making necessary repairs and alterations thereon, and with the right to keep said lines and facilities clear of all trees, structures and obstructions other than structures now existing that may in any way endanger or interfere with the proper maintenance and operation of said lines and facilities; and (3) the right, in common with the Grantee, its successors and assigns, to use for purposes of ingress, egress and regress, the driveway extending from the northerly side of the lot described in paragraph I hereof and running across said lot to the Power Plant Building of the Grantor and being indicated as "Drive" on the attached plat.

There is also excepted from this conveyance the sewer line and facilities of the City of Burlington located upon the lot described in paragraph I hereof, substantially as shown by the line marked "Sewer Line" on the attached plat, and this conveyance is made subject to the easement of the City of Burlington for said sewer line and facilities.

TO HAVE AND TO HOLD the aforesaid property, franchises, rights, privileges, immunities, rights of way and easements, and all privileges and appurtenances thereto belonging, subject to the exceptions and reservations hereinabove set out, to the said Piedmont Natural Gas Company, Inc., its successors and assigns, to its and their only use and behoof forever.

AND THE GRANTOR, for itself and its successors, covenants with the Grantee, its successors and assigns, that it is seized of the property described in Paragraph I hereof in fee and has right to convey the same in fee simple; that it is the owner of the property described in paragraphs III and IV hereof and has right to sell and transfer same; that said property is free and clear from all encumbrances, and that it will warrant and defend the title to same, subject to the exceptions, reservations and sewer line easement hereinabove set out, against the lawful claims of all persons whomsoever. The Grantor, however, makes no representation or warranty whatsoever, express or implied, with respect to the property described in paragraph II hereof, or with respect to the franchises, rights privileges and easements described in paragraphs III and V hereof.

IN WITNESS WHEREOF, Duke Power Company has caused these presents to be signed in its name and on behalf by its _____ President and its corporate seal to be hereunto affixed and attested by its Assistant Secretary, this the day and year first above written.

Attest:
L. H. Adams, Assistant Secretary

DUKE POWER COMPANY,

By: E. C. Marshall, President

Duke Power Company
Incorporated 1917
New Jersey, U.S.A.

Documentary.
$111.10
xx

STATE OF NORTH CAROLINA
COUNTY OF MECKLENBURG

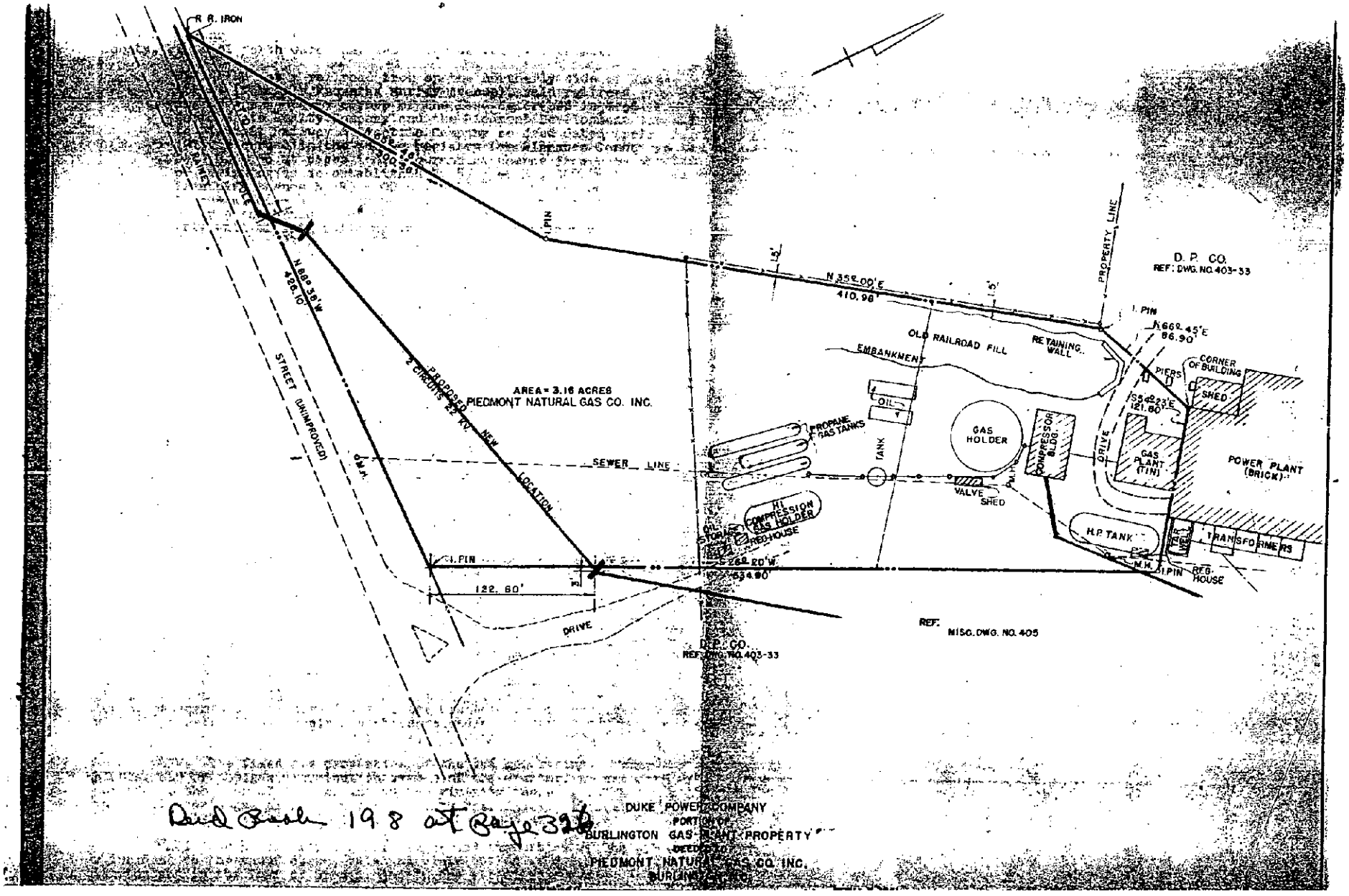
I, Jas. S. Sease, a Notary Public for the above State and County, hereby certify that L. H. Adams, personally came before me this day and acknowledged that he is assistant Secretary of Duke Power Company, a corporation, and that by authority duly given and as the act of said corporation the foregoing and annexed instrument was signed in its name by E. C. Marshall, its President, sealed with its corporate seal and attested by himself as its Assistant Secretary.

WITNESS my hand and official seal this the ninth day of May, 1951.

Jas. S. Sease
Notary Public
Mecklenburg Co.

My Commission expires 6-18-51

Jas. S. Sease, Notary Public



Deed Book 198 at Page 328

BOOK 306 PAGE 426

056

STATE OF NORTH CAROLINA

COUNTY OF ALAMANCE

THIS DEED made this the 27th day of November 1962, by PIEDMONT NATURAL GAS COMPANY, INC., a corporation duly organized and existing under and by virtue of the laws of the State of New York, hereinafter sometimes referred to as "Grantor", party of the first part, to DUKE POWER COMPANY, a corporation duly organized and existing under and by virtue of the laws of the State of New Jersey, hereinafter sometimes referred to as "Grantee", party of the second part.

WITNESSETH:

That the said party of the first part, in consideration of One Hundred Dollars ($100.00) and other valuable considerations to it paid by the party of the second part, the receipt of which is hereby acknowledged, has bargained and sold and by these presents does grant, bargain, sell and convey unto the party of the second part, its successors and assigns, subject to the exceptions and reservations hereinafter set out, the following described property, to wit:

All that certain piece, parcel or lot of land lying and being in the City of Burlington, Alamance County, North Carolina, described as follows, to wit:

BEGINNING at an iron pin, a corner of the land of the party of the second part and runs thence with the line of the land of the party of the second part S 26-20 W 205.00 ft. to an iron stake, thence N 53-15 W 198.43 ft. to an iron stake, thence N 35-00 E 124.00 ft. to the corner of the land of the party of the second part, thence with the line of the land of the party of the second part N 66-45 E 86.90 ft. to the westerly corner of the power plant building of the party of the second part, thence along the southwesterly wall of said building and along the property of the party of the second part

S 54-23 E 121.80 ft. to the point of BEGINNING, containing 0.80 acres, more or less, being shown within red line on print dated March 27, 1962, a copy of which is hereto attached and being a portion of the property conveyed by Duke Power Company to Piedmont Natural Gas Company, Inc., by deed dated May 9, 1951, duly recorded in the office of the Register of Deeds of Alamance County; subject however to the exceptions and reservations hereinafter set out. D-1286

There is expressly excepted from this conveyance and reserved to the party of the first part, its successors and assigns (1) all pipelines now installed upon said property, together with necessary easements for their maintenance and operation and (2) necessary easements across said property for the construction and maintenance of such pipelines as the party of the first part may desire to construct and maintain in the future.

There is also excepted from this conveyance the sewer line and facilities of the City of Burlington located upon the above described property and this conveyance is made subject to the easement of the City of Burlington for said sewer line and facilities. The location of the sewer line referred to is indicated on the print attached to deed from Duke Power Company to Piedmont Natural Gas Company, Inc., dated May 9, 1951 above referred to.

TO HAVE AND TO HOLD, the aforesaid property and all privileges and appurtenances thereto belonging, subject to the exceptions and reservations hereinabove set out, to the said Duke Power Company, its successors and assigns, to its and their only use and behoof forever.

And the Grantor, for itself and its successors, covenants with the Grantee, its successors and assigns, that it is seized of the above described property in fee and has right to convey the same in fee simple

0 0 0 2 6

that said pr[illegible] free and clear from all encumbrances and that it will warrant an[illegible]he title to same, subject to the exceptions, reservations and sewer li[illegible]ement hereinabove set out, against the lawful claims of all persons w[illegible]soever.

IN WITNESS WHEREOF, Piedmont Natural Gas Company, Inc. has caused these presents to be signed in its name and on its behalf by its _____ President and its corporate seal to be hereunto affixed and attested by its _____ Secretary, this the day and year first above written.

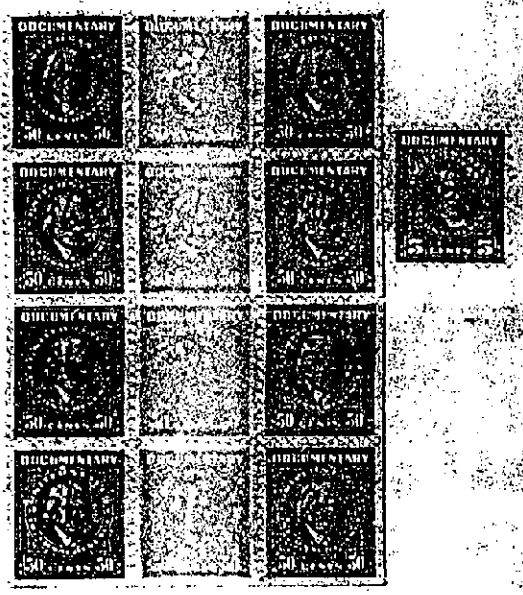
ATTEST:

PIEDMONT NATURAL GAS COMPANY, INC.

Secretary

By _____ President

APPROVED
Kenneth M. Brim
General Counsel
Piedmont Natural Gas Company, Inc.



BOOK 306 PAGE 429

056 00027

STATE OF North Carolina

COUNTY OF Mecklenburg

I, Lavada J. Freeman, a Notary Public for the above State and County, hereby certify that R. P. Armstrong personally came before me this day and acknowledged that he is Secretary of Piedmont Natural Gas Company, Inc., a corporation, and that by authority duly given and as the act of said corporation the foregoing and annexed instrument was signed in its name by R. P. Dameron its _____ President, sealed with its corporate seal and attested by himself as its _____ Secretary.

WITNESS my hand and official seal this the 27th day of November, 1962.

Lavada J. Freeman
Notary Public

My Commission Expires April 7, 1963

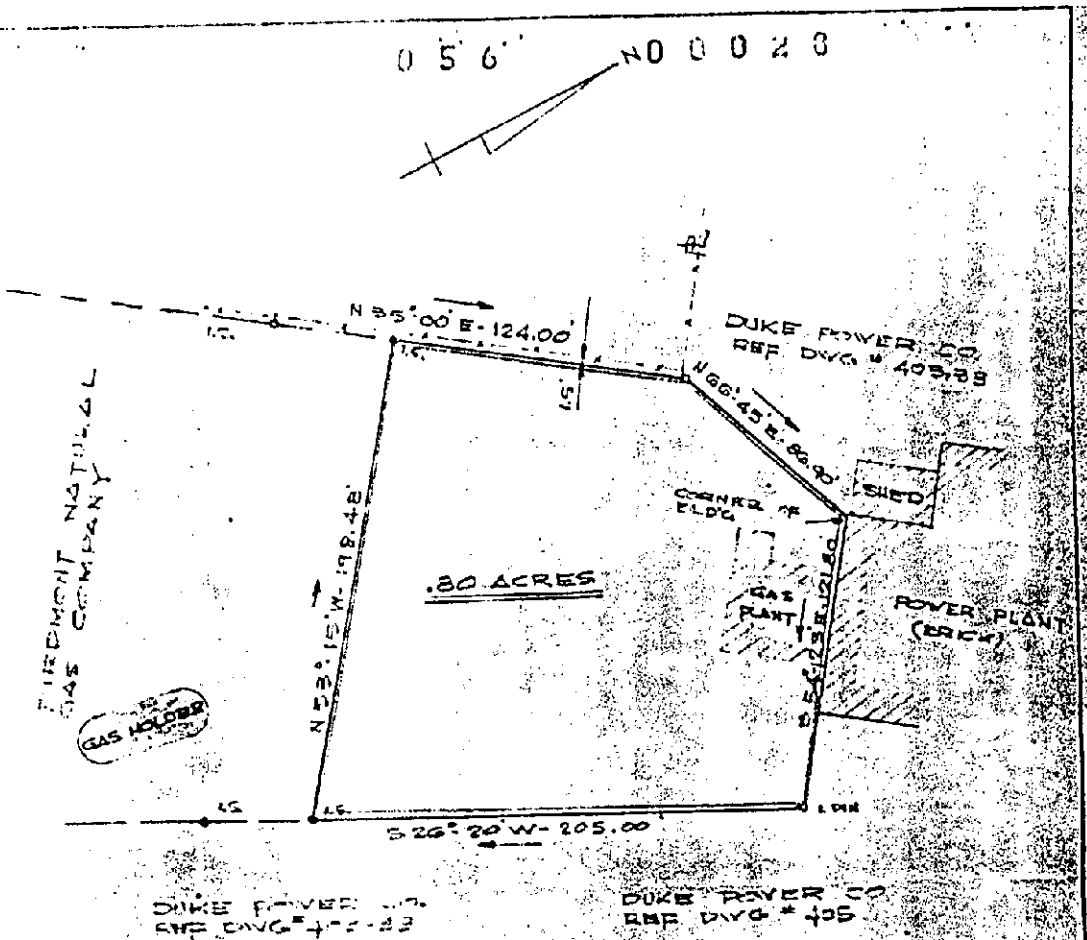
NORTH CAROLINA - Alamance County

The foregoing certificate of Lavada J. Freeman, Notary or Notaries Public of the governmental units designated, is or are adjudged to be correct. Let the instrument, with the certificates, be registered.

This 27th day of December, 1962.

Deputy Clerk of Superior Court

Filed for record at 4:50 o'clock P. M., 19
12/27/62 Book No. 205 Page 426
This the 28 day of Dec. 62
North Carolina, Alamance County D. B. Davis
Register of Deeds
Jo Craige Deputy



REF FILE # 150-134
APRIL 2, 1951

REVISED 7-16-62

State of North Carolina, County of ALAMANCE

I, L. A. ALLEY, Civil Engineer, being duly sworn say that the above plat is in every respect correct to the best of my knowledge and belief, and that same was prepared by me from actual surveys made during MARCH 1951

.....Civil Engineer

*Sworn to and subscribed before me this .....day of

1949 19....

.....Notary Public

My commission expires .....

PLAT SHOWING
PROPERTY OF
DUKE POWER COMPANY
Portion of
BURLINGTON GAS PLANT PROPERTY
BURLINGTON, NORTH CAROLINA

SCALE: 1" = 60' DATE: 3/27/62

L. A. ALLEY, CONSULTING ENGINEER
BURLINGTON, N. C. DRAWING NO. 54-62

D-1286

STATE OF NORTH CAROLINA

COUNTY OF ALAMANCE

DUKE POWER COMPANY

TO

PIEDMONT NATURAL GAS COMPANY, INC.

BILL OF SALE

STATE OF NORTH CAROLINA)
:
COUNTY OF ALAMANCE)

THIS BILL OF SALE Made this 3rd day of April, 1952, by DUKE POWER COMPANY, a corporation organized under the laws of the State of New Jersey, party of the first part, hereinafter called the "Seller", to PIEDMONT NATURAL GAS COMPANY, INC., a corporation organized under the laws of the State of New York, party of the second part, hereinafter called the "Buyer",

W I T N E S S E T H:

That for and in consideration of the sum of Two Hundred and Forty ($240.00) Dollars in hand paid to the Seller by the Buyer, receipt of which is hereby acknowledged, the Seller does hereby sell, assign and transfer to the Buyer, its successors and assigns, two (2) transformers, 5 KVA 2400-120/240 volts, now installed on the load side of the primary electric meter on the property of the Buyer located on the northerly side of Rainey Street in the City of Burlington, Alamance County, North Carolina, and described in deed from Duke Power Company to Piedmont Natural Gas Company, Inc., dated May 9, 1951.

And for the consideration above set out the Seller warrants to the Buyer, its successors and assigns, that it is the owner of the property set out above and has right to sell and transfer same and that same is free and clear of all liens and encumbrances.

IN WITNESS WHEREOF, the said Duke Power Company has caused this instrument to be executed by its duly authorized officials on the day and year first above written.

ATTEST:

Assistant Secretary

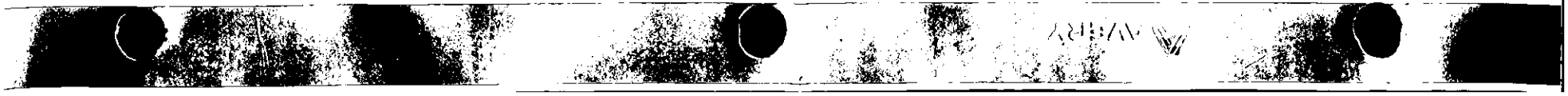
DUKE POWER COMPANY

By Thos. A. Hall
Vice President

Appendix V.A.5

APPENDIX V.A.5

Refer to Section V.A.5



APPENDIX V.A.6

Survey Plat

Appendix V.A.7

APPENDIX V.A.7

Refer to Section V.A.7

APPENDIX V.A.8

Refer to Section V.A.8

Appendix V.A.9

APPENDIX V.A.9

Site Environmental Permit History

Notification for Underground Storage Tanks

FORM APPROVED
OMB NO. 2050-0049
APPROVAL EXPIRES 6-30-88

FOR TANKS IN **NC**

RETURN COMPLETED FORM TO
Div. of Environmental Mgmt./GW Section
Dept. of Natural Resources & Comm. Development
P.O. Box 27687
Raleigh, NC 27611
(919) 733-5083

I.D. Number

STATE USE ONLY

Date Received

GENERAL INFORMATION

Notification is required by Federal law for all underground tanks that have been used to store regulated substances since January 1, 1974, that are in the ground as of May 8, 1986, or that are brought into use after May 8, 1986. The information requested is required by Section 9002 of the Resource Conservation and Recovery Act, (RCRA), as amended.

The primary purpose of this notification program is to locate and evaluate underground tanks that store or have stored petroleum or hazardous substances. It is expected that the information you provide will be based on reasonably available records, or, in the absence of such records, your knowledge, belief, or recollection.

Who Must Notify? Section 9002 of RCRA, as amended, requires that, unless exempted, owners of underground tanks that store regulated substances must notify designated State or local agencies of the existence of their tanks. Owner means—
(a) in the case of an underground storage tank in use on November 8, 1984, or brought into use after that date, any person who owns an underground storage tank used for the storage, use, or dispensing of regulated substances, and
(b) in the case of any underground storage tank in use before November 8, 1984, but no longer in use on that date, any person who owned such tank immediately before the discontinuation of its use.

What Tanks Are Included? Underground storage tank is defined as any one or combination of tanks that (1) is used to contain an accumulation of "regulated substances," and (2) whose volume (including connected underground piping) is 10% or more beneath the ground. Some examples are underground tanks storing: 1. gasoline, used oil, or diesel fuel, and 2. industrial solvents, pesticides, herbicides or fumigants.

What Tanks Are Excluded? Tanks removed from the ground are not subject to notification. Other tanks excluded from notification are:
1. farm or residential tanks of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes;
2. tanks used for storing heating oil for consumptive use on the premises where stored;
3. septic tanks;
4. pipeline facilities (including gathering lines) regulated under the Natural Gas Pipeline Safety Act of 1968, or the Hazardous Liquid Pipeline Safety Act of 1979, or which is an intrastate pipeline facility regulated under State laws;
5. surface impoundments, pits, ponds, or lagoons;
6. storm water or waste water collection systems;
7. flow-through process tanks;
8. liquid traps or associated gathering lines directly related to oil or gas production and gathering operations;
9. storage tanks situated in an underground area (such as a basement, cellar, mineworking, drift, shaft, or tunnel) if the storage tank is situated upon or above the surface of the floor.

What Substances Are Covered? The notification requirements apply to underground storage tanks that contain regulated substances. This includes any substance defined as hazardous in section 101 (14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), with the exception of those substances regulated as hazardous waste under Subtitle C of RCRA. It also includes petroleum, e.g., crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute).

Where To Notify? Completed notification forms should be sent to the address given at the top of this page.

When To Notify? 1. Owners of underground storage tanks in use or that have been taken out of operation after January 1, 1974, but still in the ground, must notify by May 8, 1986. 2. Owners who bring underground storage tanks into use after May 8, 1986, must notify within 30 days of bringing the tanks into use.

Penalties: Any owner who knowingly fails to notify or submits false information shall be subject to a civil penalty not to exceed $10,000 for each tank for which notification is not given or for which false information is submitted.

INSTRUCTIONS

Please type or print in ink all items except "signature" in Section V. **This form must by completed for each location containing underground storage tanks.** If more than 5 tanks are owned at this location, photocopy the reverse side, and staple continuation sheets to this form.

Indicate number of continuation sheets attached: 0

I. OWNERSHIP OF TANK(S)

Owner Name (Corporation, Individual, Public Agency, or Other Entity)
DUKE POWER COMPANY

Street Address
422 S CHURCH STREET

County
MECKLENBURG

City: CHARLOTTE | State: NC | ZIP Code: 28242

Area Code: (704) | Phone Number: 373-5989 (D E M SULLIVAN)

Type of Owner *(Mark all that apply ☒)*
- ☒ Current
- ☐ Former
- ☐ State or Local Gov't
- ☐ Federal Gov't (GSA facility I.D. no. _____)
- ☒ Private or Corporate
- ☐ Ownership uncertain

II. LOCATION OF TANK(S)

(If same as Section 1, mark box here ☐)

Facility Name or Company Site Identifier, as applicable
Burlington Branch Office

Street Address or State Road, as applicable
1205 N. Church Street

County
Alamance

City (nearest): Burlington | State: NC | ZIP Code: 27215

Indicate number of tanks at this location: 3

Mark box here if tank(s) are located on land within an Indian reservation or on other Indian trust lands ☐

III. CONTACT PERSON AT TANK LOCATION

Name (If same as Section I, mark box here ☒) | Job Title | Area Code | Phone Number

IV. TYPE OF NOTIFICATION

☐ Mark box here only if this is an amended or subsequent notification for this location.

V. CERTIFICATION (Read and sign after completing Section VI.)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Name and official title of owner or owner's authorized representative	Signature	Date Signed
D E M SULLIVAN ENGINEER ASSOCIATE	D E M Sullivan	5-6-86

CONTINUE ON REVERSE SIDE

Owner Name (from Section I) DUKE POWER COMPANY Location (from Section II) Burlington Branch Page No. 2 of 2 Pages

VI. DESCRIPTION OF UNDERGROUND STORAGE TANKS (Complete for each tank at this location.)

Tank Identification No. (e.g., ABC-123), or Arbitrarily Assigned Sequential Number (e.g., 1,2,3...)		Tank No. 1	Tank No. 2	Tank No. 3	Tank No.	Tank
1. Status of Tank (Mark all that apply ☒)	Currently in Use	X	X			
	Temporarily Out of Use					
	Permanently Out of Use			X		
	Brought into Use after 5/8/86					
2. Estimated Age (Years)		18	11	18		
3. Estimated Total Capacity (Gallons)		10,000	15,000	500		
4. Material of Construction (Mark one ☒)	Steel	X	X	X		
	Concrete					
	Fiberglass Reinforced Plastic					
	Unknown					
	Other, Please Specify					
5. Internal Protection (Mark all that apply ☒)	Cathodic Protection					
	Interior Lining (e.g., epoxy resins)					
	None					
	Unknown	X	X	X		
	Other, Please Specify					
6. External Protection (Mark all that apply ☒)	Cathodic Protection					
	Painted (e.g., asphaltic)	X	X	X		
	Fiberglass Reinforced Plastic Coated					
	None					
	Unknown					
	Other, Please Specify					
7. Piping (Mark all that apply ☒)	Bare Steel	X	X	X		
	Galvanized Steel					
	Fiberglass Reinforced Plastic					
	Cathodically Protected					
	Unknown					
	Other, Please Specify					
8. Substance Currently or Last Stored in Greatest Quantity by Volume (Mark all that apply ☒)	a. Empty					
	b. Petroleum					
	Diesel					
	Kerosene					
	Gasoline (including alcohol blends)	X	X			
	Used Oil					
	Other, Please Specify			Transformer Oil		
	c. Hazardous Substance					
	Please Indicate Name of Principal CERCLA Substance					
	OR Chemical Abstract Service (CAS) No.					
	Mark box ☒ if tank stores a mixture of substances					
	d. Unknown					
9. Additional Information (for tanks permanently taken out of service)	a. Estimated date last used (mo/yr)	/	/	- / 76	/	
	b. Estimated quantity of substance remaining (gal.)			0		
	c. Mark box ☒ if tank was filled with inert material (e.g., sand, concrete)					

REVISED 1-14-91

Notification for Underground Storage Tanks

FORM APPROVED
OMB NO. 2050-0049
APPROVAL EXPIRES 6-30-88

FOR TANKS IN NC

RETURN COMPLETED FORM TO: Div. of Environmental Mgmt./GW Section
Dept. of Natural Resources & Comm. Development
P.O. Box 27687
Raleigh, NC 27611
(919)733-3221

STATE USE ONLY
I.D. Number
Date Received

GENERAL INFORMATION

Notification is required by Federal law for all underground tanks that have been used to store regulated substances since January 1, 1974, that are in the ground as of May 8, 1986, or that are brought into use after May 8, 1986. The information requested is required by Section 9002 of the Resource Conservation and Recovery Act, (RCRA), as amended.

The primary purpose of this notification program is to locate and evaluate underground tanks that store or have stored petroleum or hazardous substances. It is expected that the information you provide will be based on reasonably available records, or, in the absence of such records, your knowledge, belief, or recollection.

Who Must Notify? Section 9002 of RCRA, as amended, requires that, unless exempted, owners of underground tanks that store regulated substances must notify designated State or local agencies of the existence of their tanks. Owner means—

(a) in the case of an underground storage tank in use on November 8, 1984, or brought into use after that date, any person who owns an underground storage tank used for the storage, use, or dispensing of regulated substances, and

(b) in the case of any underground storage tank in use before November 8, 1984, but no longer in use on that date, any person who owned such tank immediately before the discontinuation of its use.

What Tanks Are Included? Underground storage tank is defined as any one or combination of tanks that (1) is used to contain an accumulation of "regulated substances," and (2) whose volume (including connected underground piping) is 10% or more beneath the ground. Some examples are underground tanks storing: 1. gasoline, used oil, or diesel fuel, and 2. industrial solvents, pesticides, herbicides or fumigants.

What Tanks Are Excluded? Tanks removed from the ground are not subject to notification. Other tanks excluded from notification are:

1. farm or residential tanks of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes;
2. tanks used for storing heating oil for consumptive use on the premises where stored;
3. septic tanks;
4. pipeline facilities (including gathering lines) regulated under the Natural Gas Pipeline Safety Act of 1968, or the Hazardous Liquid Pipeline Safety Act of 1979, or which is an intrastate pipeline facility regulated under State laws;
5. surface impoundments, pits, ponds, or lagoons;
6. storm water or waste water collection systems;
7. flow-through process tanks;
8. liquid traps or associated gathering lines directly related to oil or gas production and gathering operations;
9. storage tanks situated in an underground area (such as a basement, cellar, mineworking, drift, shaft, or tunnel) if the storage tank is situated upon or above the surface of the floor.

What Substances Are Covered? The notification requirements apply to underground storage tanks that contain regulated substances. This includes any substance defined as hazardous in section 101 (14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), with the exception of those substances regulated as hazardous waste under Subtitle C of RCRA. It also includes petroleum, e.g., crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute).

Where To Notify? Completed notification forms should be sent to the address given at the top of this page.

When To Notify? 1. Owners of underground storage tanks in use or that have been taken out of operation after January 1, 1974, but still in the ground, must notify by May 8, 1986. 2. Owners who bring underground storage tanks into use after May 8, 1986, must notify within 30 days of bringing the tanks into use.

Penalties: Any owner who knowingly fails to notify or submits false information shall be subject to a civil penalty not to exceed $10,000 for each tank for which notification is not given or for which false information is submitted.

INSTRUCTIONS

Please type or print in ink all items except "signature" in Section V. **This form must by completed for each location containing underground storage tanks.** If more than 5 tanks are owned at this location, photocopy the reverse side, and staple continuation sheets to this form.

Indicate number of continuation sheets attached: ☐

I. OWNERSHIP OF TANK(S)

Owner Name (Corporation, Individual, Public Agency, or Other Entity)
Duke Power Company

Street Address
422 South Church Street - Attn: D.E.M. Sullivan

County
Mecklenburg

City: Charlotte | State: NC | ZIP Code: 28242

Area Code: 704 | Phone Number: 373-7894 (D.E.M. Sullivan)

Type of Owner *(Mark all that apply ☒)*

- ☒ Current
- ☐ Former
- ☐ State or Local Gov't
- ☐ Federal Gov't (GSA facility I.D. no. _____)
- ☒ Private or Corporate
- ☐ Ownership uncertain

II. LOCATION OF TANK(S)

(If same as Section 1, mark box here ☐)

Facility Name or Company Site Identifier, as applicable
Burlington Branch Office

Street Address or State Road, as applicable
1205 N. Church Street

County
Alamance

City (nearest): Burlington | State: NC | ZIP Code: 27215

Indicate number of tanks at this location: 2

Mark box here if tank(s) are located on land within an Indian reservation or on other Indian trust lands ☐

III. CONTACT PERSON AT TANK LOCATION

Name (If same as Section I, mark box here ☒) | Job Title | Area Code | Phone Number

IV. TYPE OF NOTIFICATION

☒ Mark box here only if this is an amended or subsequent notification for this location.

V. CERTIFICATION (Read and sign after completing Section VI.)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Name and official title of owner or owner's authorized representative	Signature	Date Signed
D.E.M. Sullivan, Design Engineer		

CONTINUE ON REVERSE SIDE

VI. DESCRIPTION OF UNDERGROUND STORAGE TANKS *(Complete for each tank at this location.)*

Tank Identification No. (e.g., ABC-123), or Arbitrarily Assigned Sequential Number (e.g., 1,2,3...)	Tank No. 1	Tank No. 2	Tank No.	Tank No.	Tank No.
1. Status of Tank *(Mark all that apply ☒)*					
Currently in Use	X	X			
Temporarily Out of Use					
Permanently Out of Use					
Brought into Use after 5/8/86					
2. Estimated Age (Years)	23	16			
3. Estimated Total Capacity (Gallons)	10,000	15,000			
4. Material of Construction *(Mark one ☒)*					
Steel	X	X			
Concrete					
Fiberglass Reinforced Plastic					
Unknown					
Other, Please Specify					
5. Internal Protection *(Mark all that apply ☒)*					
Cathodic Protection					
Interior Lining (e.g., epoxy resins)					
None					
Unknown	X	X			
Other, Please Specify					
6. External Protection *(Mark all that apply ☒)*					
Cathodic Protection					
Painted (e.g., asphaltic)	X	X			
Fiberglass Reinforced Plastic Coated					
None					
Unknown					
Other, Please Specify					
7. Piping *(Mark all that apply ☒)*					
Bare Steel	X	X			
Galvanized Steel					
Fiberglass Reinforced Plastic					
Cathodically Protected					
Unknown					
Other, Please Specify					
8. Substance Currently or Last Stored in Greatest Quantity by Volume *(Mark all that apply ☒)*					
a. Empty					
b. Petroleum					
Diesel					
Kerosene					
Gasoline (including alcohol blends)	X	X			
Used Oil					
Other, Please Specify					
c. Hazardous Substance					
Please Indicate Name of Principal CERCLA Substance					
OR Chemical Abstract Service (CAS) No.					
Mark box ☒ if tank stores a mixture of substances					
d. Unknown					
Additional Information (for tanks permanently taken out of service)					
a. Estimated date last used (mo/yr)	/	/	/	/	/
b. Estimated quantity of substance remaining (gal.)					
c. Mark box ☒ if tank was filled with inert material (e.g., sand, concrete)					

VII. CERTIFICATION OF COMPLIANCE (COMPLETE FOR ALL NEW TANKS AT THIS LOCATION)

10. Installation (mark all that apply):

- ☐ The installer has been certified by the tank and piping manufacturers.
- ☐ The installer has been certified or licensed by the implementing agency.
- ☐ The installation has been inspected and certified by a registered professional engineer.
- ☐ The installation has been inspected and approved by the implementing agency.
- ☐ All work listed on the manufacturer's installation checklists has been completed.
- ☐ Another method was used as allowed by the implementing agency. Please specify:

_____

11. Release Detection (mark all that apply):

- ☐ Manual tank gauging.
- ☒ Tank tightness testing with inventory controls.
- ☐ Automatic tank gauging.
- ☐ Vapor monitoring.
- ☐ Ground-water monitoring.
- ☐ Interstitial monitoring within a secondary barrier.
- ☐ Interstitial monitoring within secondary containment.
- ☐ Automatic line leak detectors.
- ☐ Line tightness testing.
- ☐ Another method allowed by the implementing agency. Please specify:

_____

12. Corrosion Protection (if applicable)

- ☐ As specified for coated steel tanks with cathodic protection.
- ☐ As specified for coated steel piping with cathodic protection.
- ☐ Another method allowed by the implementing agency. Please specify:

_____

13. I have financial responsibility in accordance with Subpart I. Please specify:

Method: FINANCIAL TEST OF SELF-INSURANCE (40 CFR PART 280.95 (d))

Insurer: N/A

Policy Number: N/A

14. OATH: I certify that the information concerning installation provided in Item 10 is true to the best of my belief and knowledge.

Installer: _____ _____

Name Date

_____

Position

_____

Company

Notification for Underground Storage Tanks

FORM APPROVED
OMB NO. 2050-0049
APPROVAL EXPIRES 6-30-88

FOR TANKS IN NC

RETURN COMPLETED FORM TO
Div. of Environmental Mgmt./GW Section
Dept. of Natural Resources & Comm. Development
P.O. Box 27687
Raleigh, NC 27611
(919) 733-5083

I.D. Number

STATE USE ONLY

Date Received

GENERAL INFORMATION

Notification is required by Federal law for all underground tanks that have been used to store regulated substances since January 1, 1974, that are in the ground as of May 8, 1986, or that are brought into use after May 8, 1986. The information requested is required by Section 9002 of the Resource Conservation and Recovery Act, (RCRA), as amended.

The primary purpose of this notification program is to locate and evaluate underground tanks that store or have stored petroleum or hazardous substances. It is expected that the information you provide will be based on reasonably available records, or, in the absence of such records, your knowledge, belief, or recollection.

Who Must Notify? Section 9002 of RCRA, as amended, requires that, unless exempted, owners of underground tanks that store regulated substances must notify designated State or local agencies of the existence of their tanks. Owner means—

(a) in the case of an underground storage tank in use on November 8, 1984, or brought into use after that date, any person who owns an underground storage tank used for the storage, use, or dispensing of regulated substances, and

(b) in the case of any underground storage tank in use before November 8, 1984, but no longer in use on that date, any person who owned such tank immediately before the discontinuation of its use.

What Tanks Are Included? Underground storage tank is defined as any one or combination of tanks that (1) is used to contain an accumulation of "regulated substances," and (2) whose volume (including connected underground piping) is 10% or more beneath the ground. Some examples are underground tanks storing: 1. gasoline, used oil, or diesel fuel, and 2. industrial solvents, pesticides, herbicides or fumigants.

What Tanks Are Excluded? Tanks removed from the ground are not subject to notification. Other tanks excluded from notification are:
1. farm or residential tanks of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes;
2. tanks used for storing heating oil for consumptive use on the premises where stored;
3. septic tanks;
4. pipeline facilities (including gathering lines) regulated under the Natural Gas Pipeline Safety Act of 1968, or the Hazardous Liquid Pipeline Safety Act of 1979, or which is an intrastate pipeline facility regulated under State laws;
5. surface impoundments, pits, ponds, or lagoons;
6. storm water or waste water collection systems;
7. flow-through process tanks;
8. liquid traps or associated gathering lines directly related to oil or gas production and gathering operations;
9. storage tanks situated in an underground area (such as a basement, cellar, mineworking, drift, shaft, or tunnel) if the storage tank is situated upon or above the surface of the floor.

What Substances Are Covered? The notification requirements apply to underground storage tanks that contain regulated substances. This includes any substance defined as hazardous in section 101 (14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), with the exception of those substances regulated as hazardous waste under Subtitle C of RCRA. It also includes petroleum, e.g., crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute).

Where To Notify? Completed notification forms should be sent to the address given at the top of this page.

When To Notify? 1. Owners of underground storage tanks in use or that have been taken out of operation after January 1, 1974, but still in the ground, must notify by May 8, 1986. 2. Owners who bring underground storage tanks into use after May 8, 1986, must notify within 30 days of bringing the tanks into use.

Penalties: Any owner who knowingly fails to notify or submits false information shall be subject to a civil penalty not to exceed $10,000 for each tank for which notification is not given or for which false information is submitted.

INSTRUCTIONS

Please type or print in ink all items except "signature" in Section V. **This form must by completed for each location containing underground storage tanks.** If more than 5 tanks are owned at this location, photocopy the reverse side, and staple continuation sheets to this form.

Indicate number of continuation sheets attached: 0

I. OWNERSHIP OF TANK(S)

Owner Name (Corporation, Individual, Public Agency, or Other Entity)
DUKE POWER COMPANY

Street Address
422 S CHURCH STREET

County
MECKLENBURG

City: CHARLOTTE | State: NC | ZIP Code: 28242

Area Code: (704) | Phone Number: 373-5989 (D E M SULLIVAN)

Type of Owner *(Mark all that apply ☒)*

- [X] Current
- [ ] Former
- [ ] State or Local Gov't
- [ ] Federal Gov't (GSA facility I.D. no. _____)
- [X] Private or Corporate
- [ ] Ownership uncertain

II. LOCATION OF TANK(S)

(If same as Section 1, mark box here [ ])

Facility Name or Company Site Identifier, as applicable
Burlington Branch Office

Street Address or State Road, as applicable
1205 N. Church Street

County
Alamance

City (nearest): Burlington | State: NC | ZIP Code: 27215

Indicate number of tanks at this location: 3

Mark box here if tank(s) are located on land within an Indian reservation or on other Indian trust lands [ ]

III. CONTACT PERSON AT TANK LOCATION

Name (If same as Section I, mark box here [X]) | Job Title | Area Code | Phone Number

IV. TYPE OF NOTIFICATION

[ ] Mark box here only if this is an amended or subsequent notification for this location.

V. CERTIFICATION (Read and sign after completing Section VI.)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

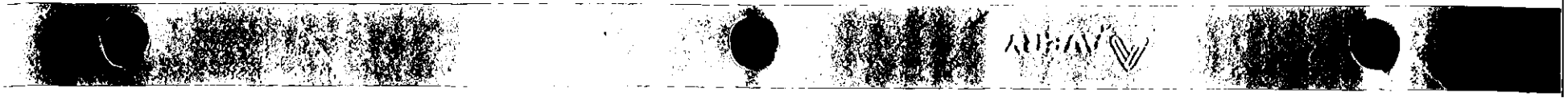
Name and official title of owner or owner's authorized representative	Signature	Date Signed
D E M SULLIVAN ENGINEER ASSOCIATE	D E M Sullivan	5-6-86

CONTINUE ON REVERSE SIDE.

Owner Name (from Section I) DUKE POWER COMPANY Location (from Section II) Burlington Branch Page No. 2 of 2 Pages

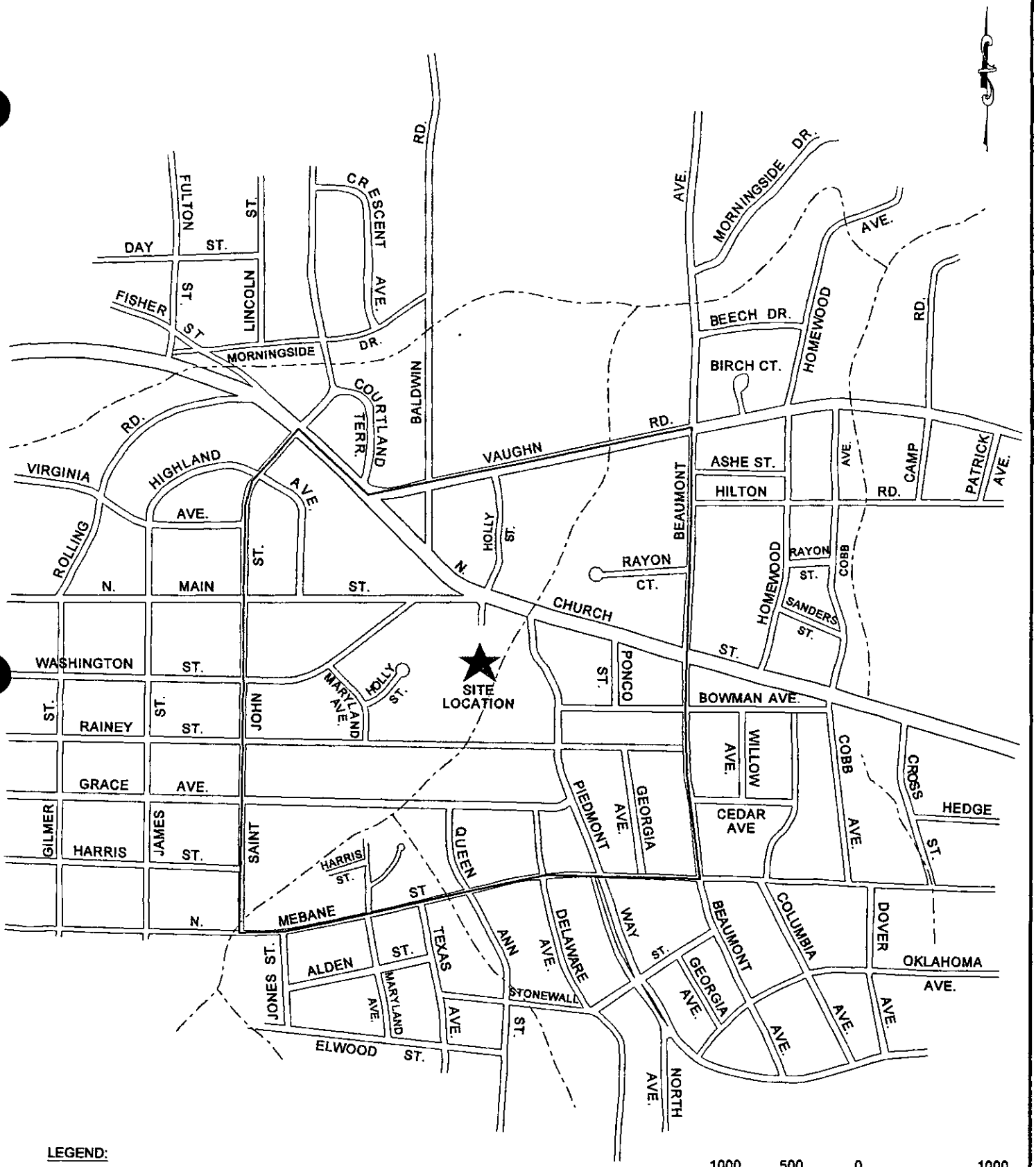
VI. DESCRIPTION OF UNDERGROUND STORAGE TANKS (Complete for each tank at this location.)

Tank Identification No. (e.g., ABC-123), or Arbitrarily Assigned Sequential Number (e.g., 1,2,3...)		Tank No. 1	Tank No. 2	Tank No. 3	Tank No.	Tank
1. Status of Tank (Mark all that apply ☒)	Currently in Use	X	X			
	Temporarily Out of Use					
	Permanently Out of Use			X		
	Brought into Use after 5/8/86					
2. Estimated Age (Years)		18	11	18		
3. Estimated Total Capacity (Gallons)		10,000	15,000	500		
4. Material of Construction (Mark one ☒)	Steel	X	X	X		
	Concrete					
	Fiberglass Reinforced Plastic					
	Unknown					
	Other, Please Specify					
5. Internal Protection (Mark all that apply ☒)	Cathodic Protection					
	Interior Lining (e.g., epoxy resins)					
	None					
	Unknown	X	X	X		
	Other, Please Specify					
6. External Protection (Mark all that apply ☒)	Cathodic Protection					
	Painted (e.g., asphaltic)	X	X	X		
	Fiberglass Reinforced Plastic Coated					
	None					
	Unknown					
	Other, Please Specify					
7. Piping (Mark all that apply ☒)	Bare Steel	X	X	X		
	Galvanized Steel					
	Fiberglass Reinforced Plastic					
	Cathodically Protected					
	Unknown					
	Other, Please Specify					
8. Substance Currently or Last Stored in Greatest Quantity by Volume (Mark all that apply ☒)	a. Empty					
	b. Petroleum					
	Diesel					
	Kerosene					
	Gasoline (including alcohol blends)	X	X			
	Used Oil					
	Other, Please Specify			Transformer Oil		
	c. Hazardous Substance					
Please Indicate Name of Principal CERCLA Substance						
OR Chemical Abstract Service (CAS) No.						
Mark box ☒ if tank stores a mixture of substances						
	d. Unknown					
9. Additional Information (for tanks permanently taken out of service)						
a. Estimated date last used (mo/yr)		/	/	- / 76	/	/
b. Estimated quantity of substance remaining (gal.)				0		
c. Mark box ☒ if tank was filled with inert material (e.g., sand, concrete)						



APPENDIX V.A.10

Potable Water Supply Inventory



DUKE POWER
BURLINGTON MGP SITE

POTABLE WATER
SUPPLY INVENTORY
MAP

FIGURE: V.A.10-1

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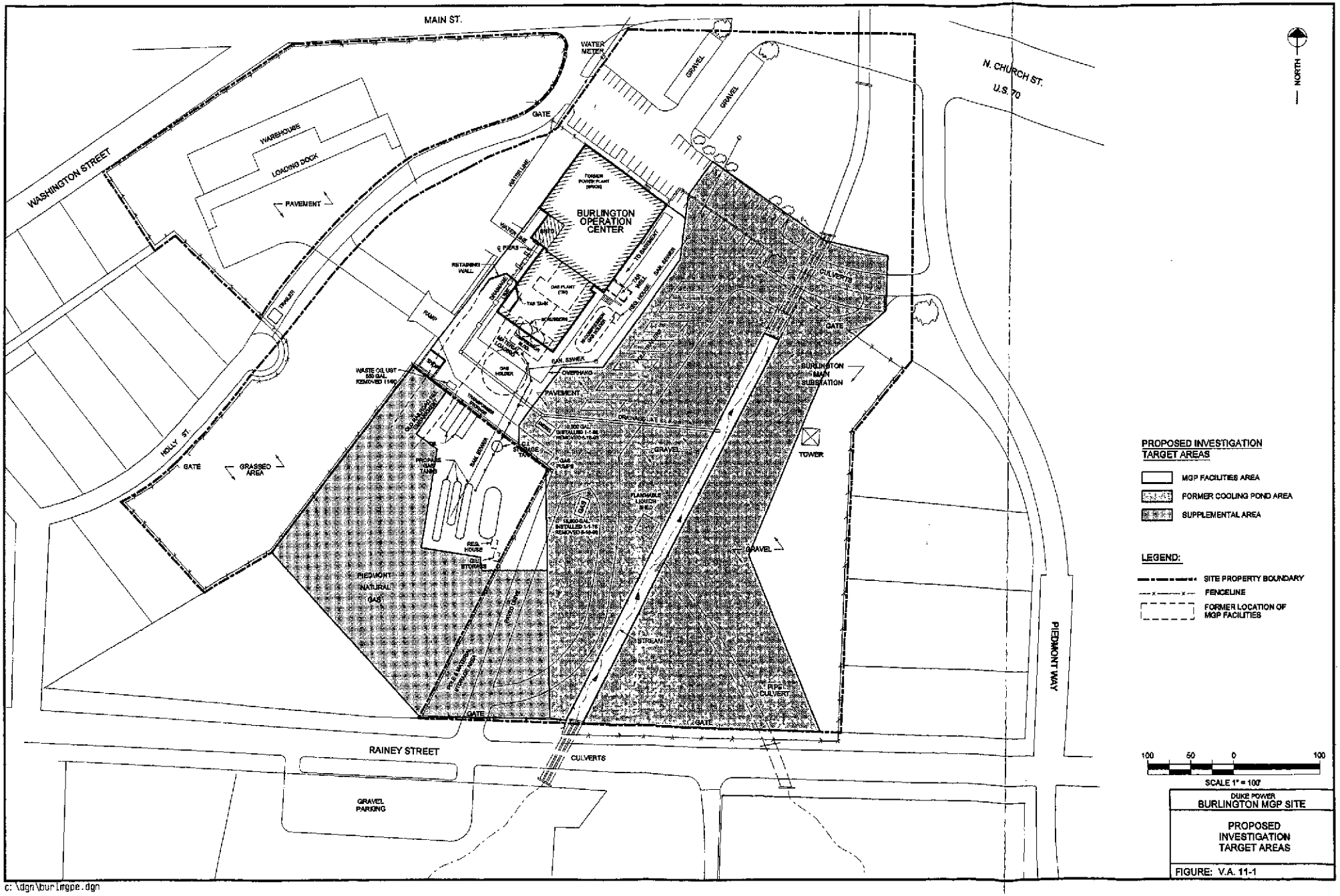
Appendix V.A.11

APPENDIX V.A.11

Site Characterization Procedures



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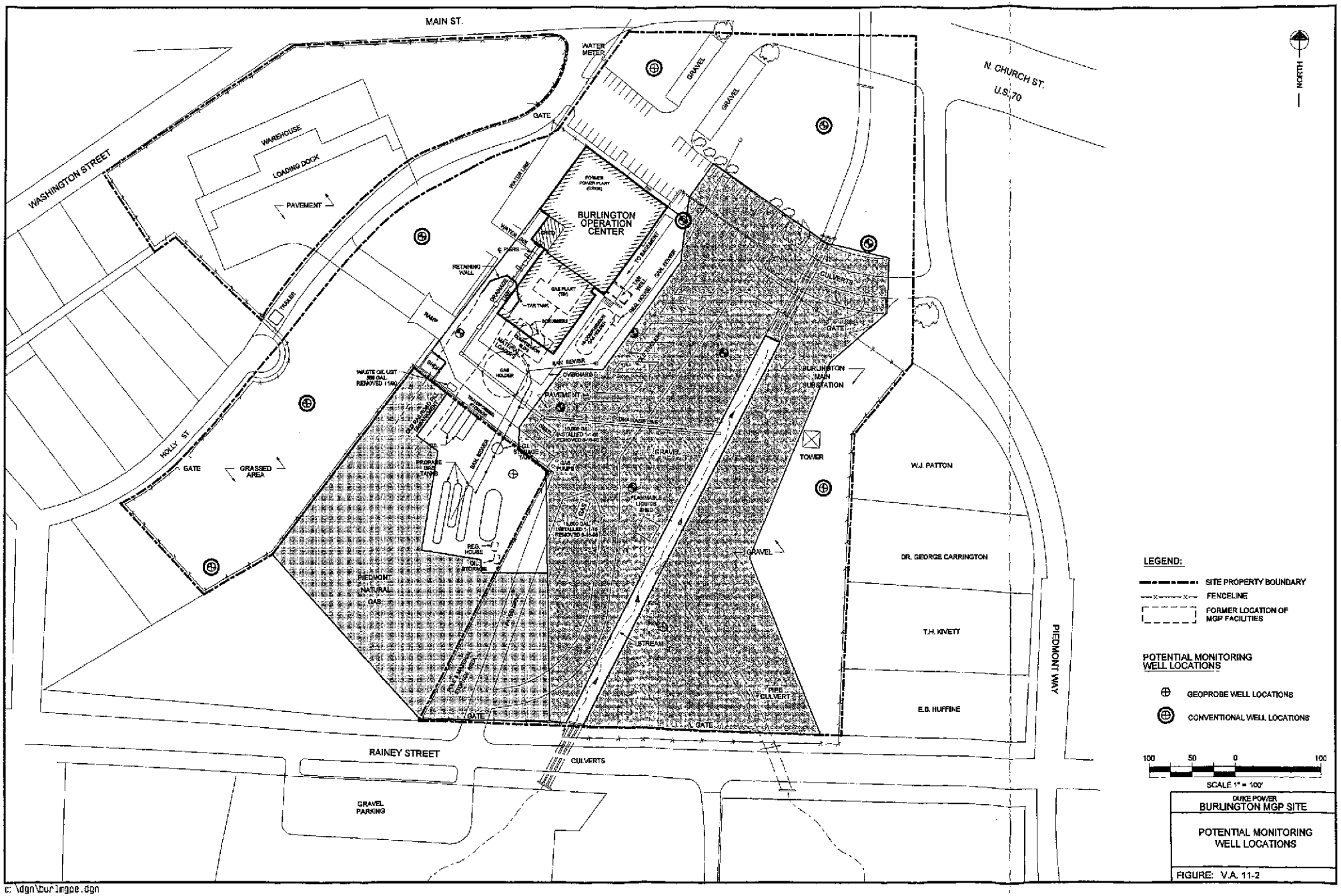

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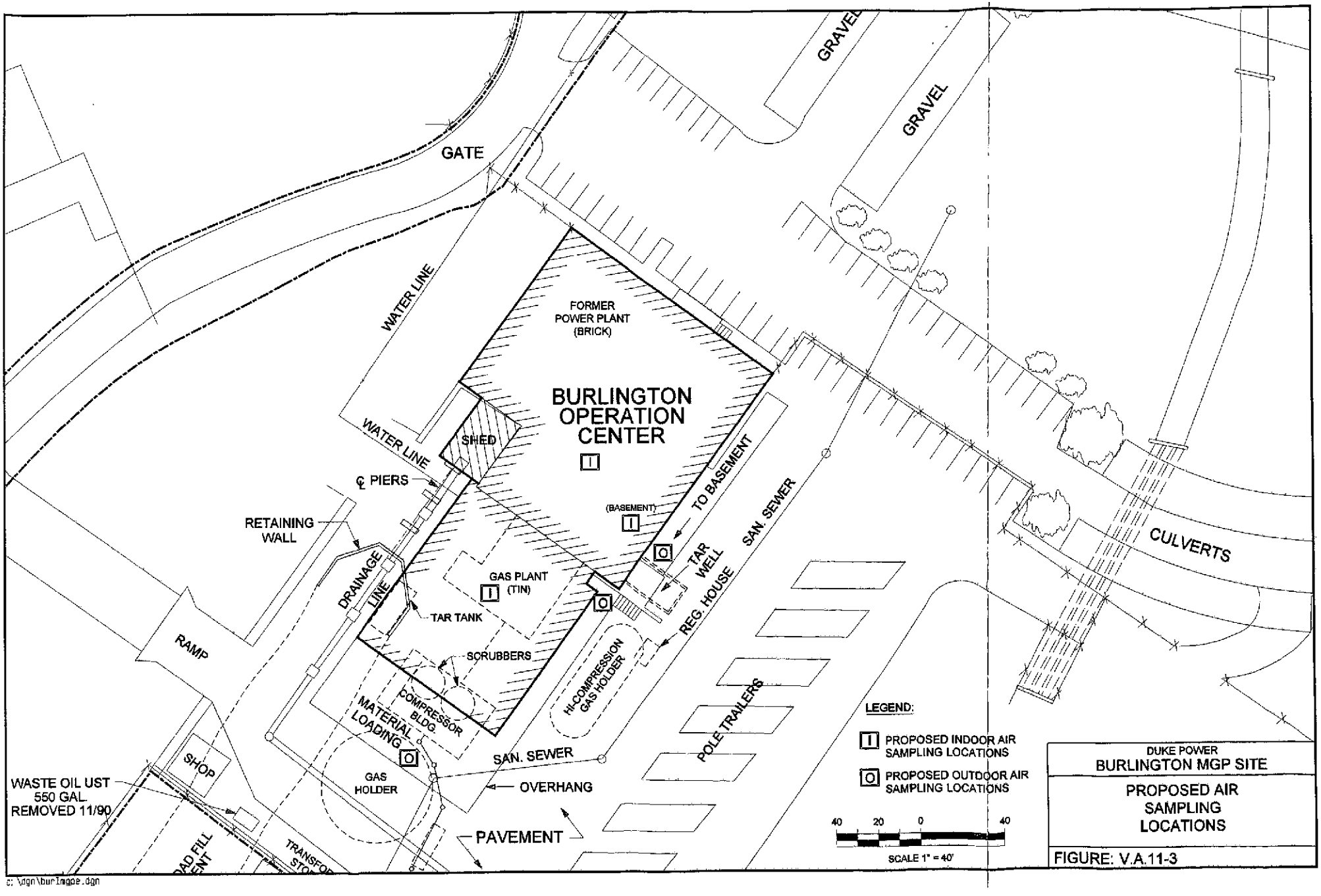
GATE
GRAVEL
GRAVEL
WATER LINE
FORMER
POWER PLANT
(BRICK)
BURLINGTON
OPERATION
CENTER
WATER LINE
SHED
℄ PIERS
RETAINING
WALL
(BASEMENT)
TO BASEMENT
SAN. SEWER
CULVERTS
TAR
WELL
DRAINAGE
LINE
GAS PLANT
(TIN)
TAR TANK
REG. HOUSE
RAMP
SCRUBBERS
HI-COMPRESSION
GAS HOLDER
COMPRESSOR
BLDG.
MATERIAL
LOADING
POLE TRAILERS
SHOP
SAN. SEWER
WASTE OIL UST
550 GAL.
REMOVED 11/90
GAS
HOLDER
OVERHANG
PAVEMENT
LEGEND:
PROPOSED INDOOR AIR
SAMPLING LOCATIONS
PROPOSED OUTDOOR AIR
SAMPLING LOCATIONS
40 20 0 40
SCALE 1" = 40'
DUKE POWER
BURLINGTON MGP SITE
PROPOSED AIR
SAMPLING
LOCATIONS
FIGURE: V.A.11-3
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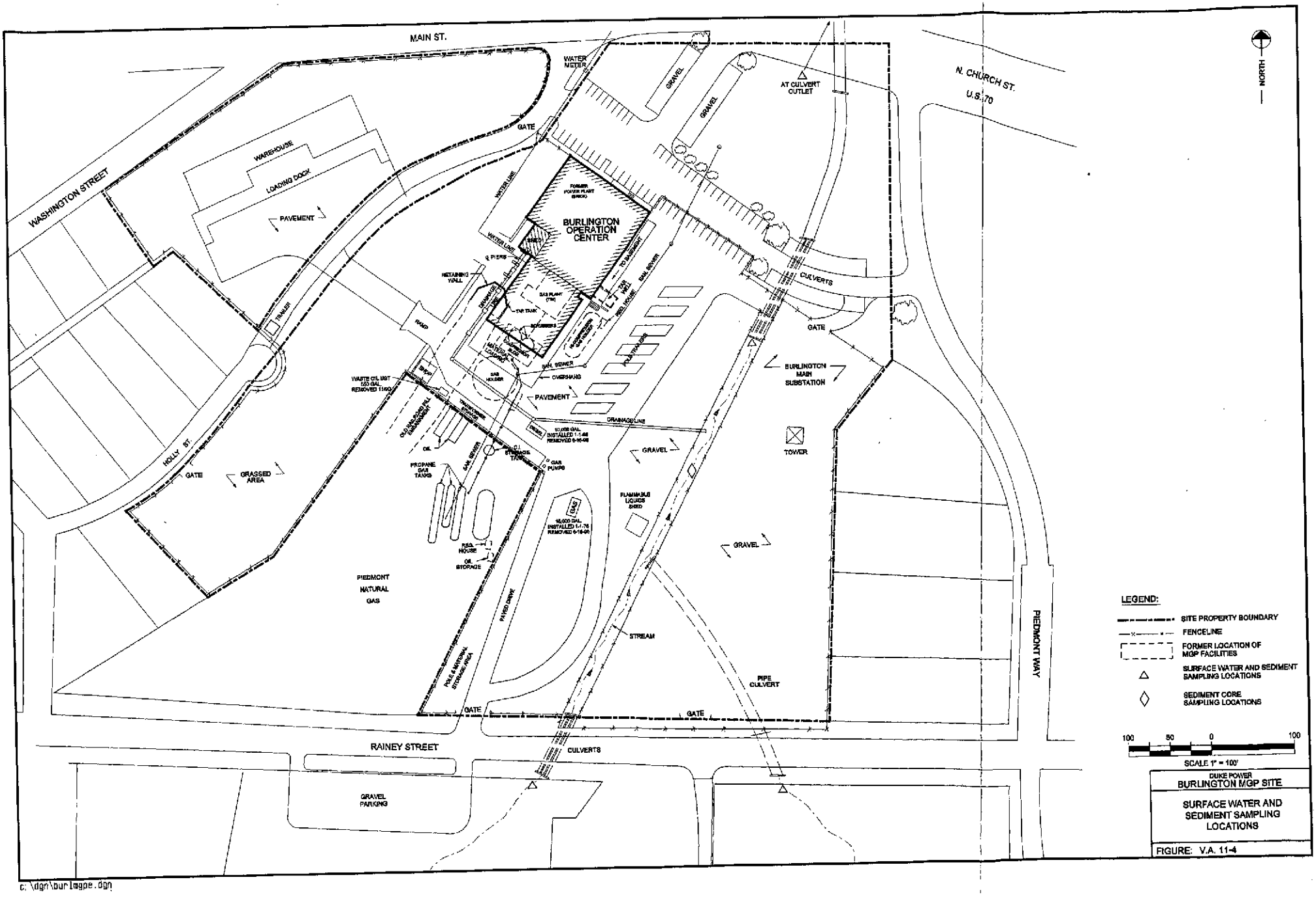

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Geoprobe Prepacked Screen Monitoring Wells

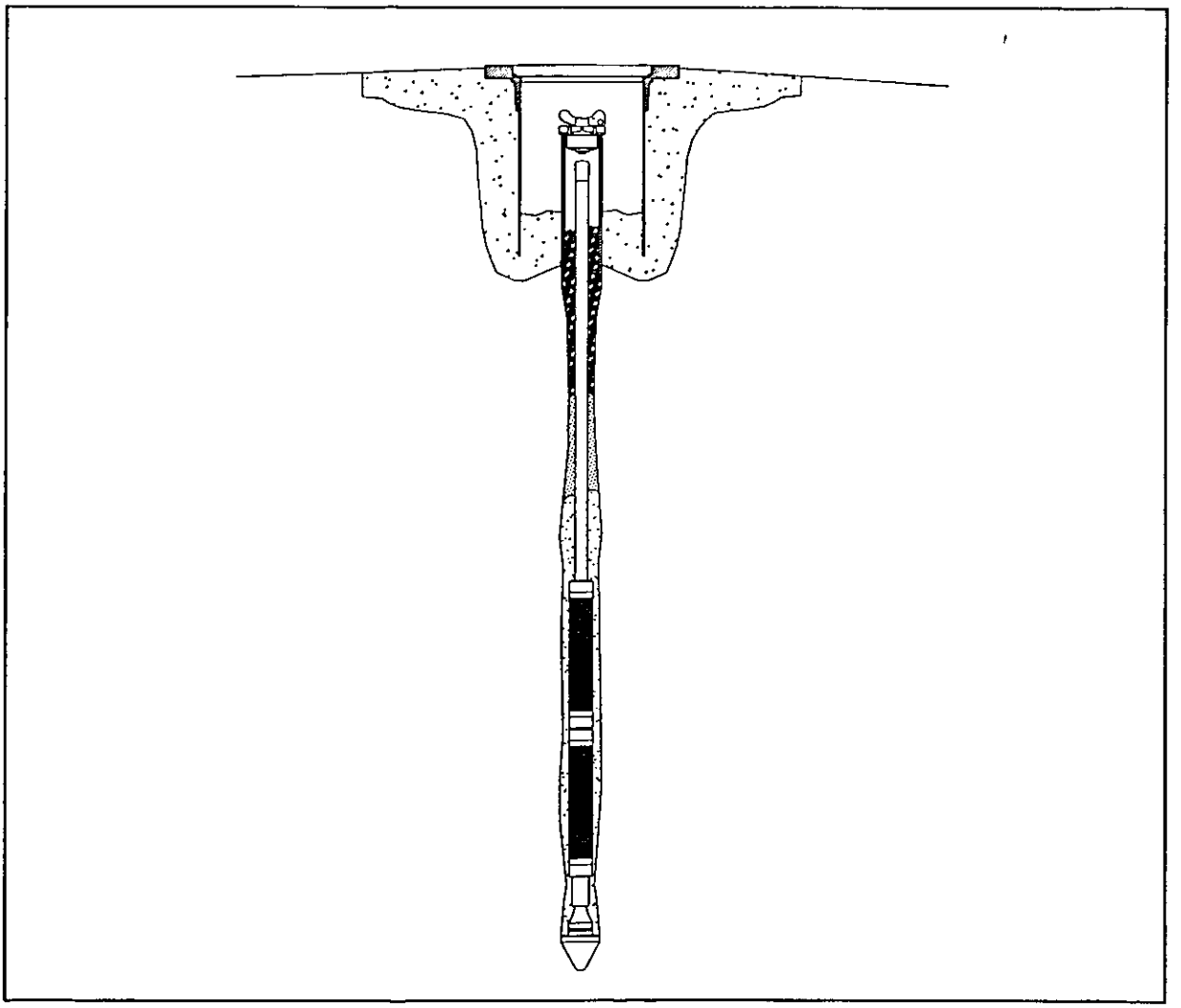
Standard Operating Procedure

GEOPROBE PREPACKED SCREEN MONITORING WELL

STANDARD OPERATING PROCEDURE

Technical Bulletin No. 96-2000

September, 1996



GEOPROBE PREPACKED SCREEN MONITORINGWELL

Geoprobe® Systems

Geoprobe® is a Registered Trademark of Kejr Engineering, Inc., Salina, Kansas

1.0 OBJECTIVE

The objective of this procedure is to install a permanent, small diameter groundwater monitoring well that can be used to collect water quality samples, conduct hydrologic and pressure measurements, or perform any other sampling event that does not require large amounts of water at any given time.

2.0 BACKGROUND

2.1 Definitions

Geoprobe® Soil Probing Machine: A vehicle-mounted, hydraulically-powered machine that utilizes static force and percussion to advance small diameter sampling tools into the subsurface for collecting soil core, soil gas, or groundwater samples.
**Geoprobe® is a registered trademark of Kejr Engineering, Inc., Salina, Kansas.*

Prepacked Screen: The Geoprobe prepacked screens are available in 3-foot sections which have an outside diameter of 1.5 inches (38 mm) and an inside diameter of 0.5 inches (12.7 mm). The inner component of the prepacked screens consists of 0.5-inch Schedule 80 PVC with 0.01-inch (0.25 mm) slots. The outer component of the screen is stainless steel wire mesh with a pore size of 0.011 inches (0.28 mm). The screens are prepacked with 20/40 grade silica sand.

2.2 Discussion

This procedure describes how 2.125-inch (54 mm) outside diameter (O.D.) probe rods are advanced to a predetermined depth using a Geoprobe percussion probing machine to allow for the installation of a permanent monitoring well. The permanent monitoring well is assembled and installed through the 1.5-inch (38 mm) inside diameter (I.D.) of the probe rods. The well is constructed with prepacked screens and 0.5-inch Schedule 80 PVC well riser.

Once the rods are set at depth, the prepacked screens are lowered through the 1.5-inch (38 mm) I.D. of the probe rods as additional PVC riser is added to the well assembly (Fig. 2.1-A). The prepacked screens are attached to an expendable anchor point by a locking connector threaded to the bottom of the prepacked screens. When the prepacked screens are locked into the anchor point the probe rods are retracted. As the rods are retracted above the screens, either natural formation collapse or a fine-grade sand installed by gravity through the rod annulus, is used to form a barrier above the prepacked screens (Fig. 2.1-B). This sand or natural formation barrier prevents bentonite grout from penetrating into the screened interval. Granular bentonite or bentonite slurry is then installed in the annulus to form a well seal (Fig. 2.1-B). A high-pressure grout pump (Geoprobe Model GS-1000) may be used to pump high-solids bentonite slurry or neat cement grout to fill the well annulus as the probe rods are retracted (Fig. 2.1-B). The grout mixture must be pumped from the bottom up to accomplish a tight seal and to meet regulatory requirements.

In certain formation conditions, the prepacked screens may bind inside the probe rods as the rods are retracted. This is most common in sandy formations sometimes called flowing or heaving sands. This binding can generally be overcome by lowering extension rods down the inside of the well riser and gently, but firmly, tapping the extension rods against the base of the well as the rods are slowly retracted. If the binding persists, clean tap water or distilled water may be poured down the annulus of the rods to increase

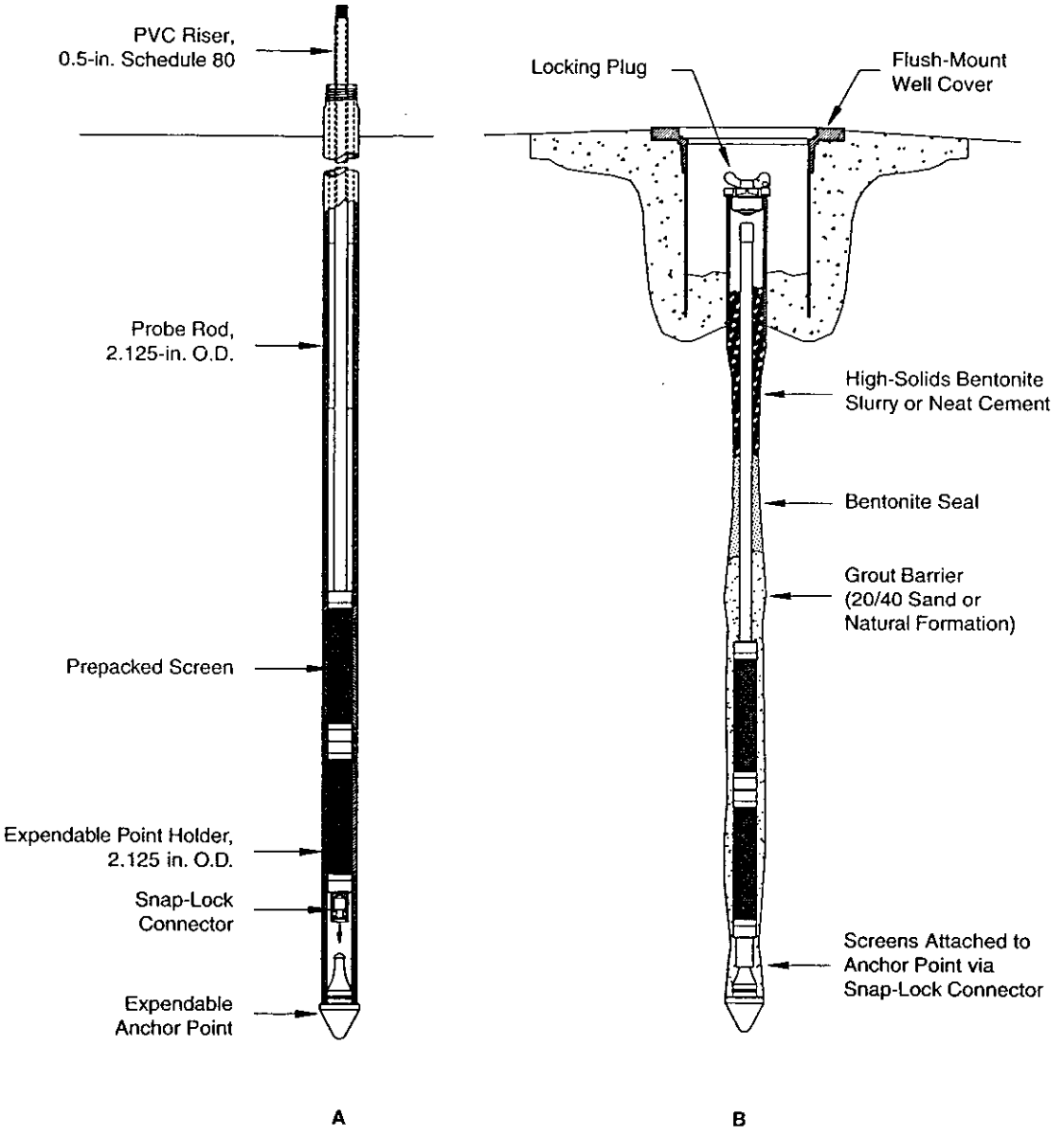


FIGURE 2.1
Insertion of Prepacked Screens (A) and Installed Geoprobe Monitoring Well (B)

the hydraulic head inside the well. This, combined with the use of the extension rods, will free up the prepacked screen and allow for proper emplacement.

Once the well is set, conventional flush-mount or aboveground well protection can be installed to prevent tampering or damage to the well head (Fig. 2.1-B). These wells can be sampled by several available methods (peristaltic pump, mini-bailer, Geoprobe's tubing check valve, etc.) to obtain high integrity water quality samples. These wells also provide accurate water level measurements and can be used as observation wells during aquifer pump tests.

When installed properly, these small diameter wells generally meet regulatory requirements for a permanent monitoring well. While a detailed installation procedure is given in this document, it is by no means totally inclusive. Always check local regulatory requirements and modify the procedure accordingly.

3.0 REQUIRED EQUIPMENT

The following equipment is required to install a permanent monitoring well with the Geoprobe prepacked screens and probing system. Figure 3.1 identifies the major monitoring well components.

MONITORING WELL PARTS	QUANTITY	PART NUMBER
Prepacked Screen	Variable	GW-2010
Snap-Lock Connector Assembly	-1-	GW-2030
Expendable Anchor Point, 2.125-inch	-1-	GW-2040
PVC Riser, 0.5-inch Schedule 80 (5-foot lengths)	Variable	GW-2050
PVC Top Cap, 0.5-inch Flush-Threaded	-1-	GW-2055

GEOPROBE TOOLS	QUANTITY	PART NUMBER
O-rings for 2.125-inch Probe Rod, (Pkg. of 25)	Variable	AT-2100R
Drive Cap, 2.125-inch	-1-	AT-2101
Expendable Point Holder, 2.125 x 36 inches (optional)	-1-	AT-2110
Expendable Point Holder, 2.125 x 48 inches	-1-	AT-2111
Probe Rod, 2.125 x 36 inches (optional)	Variable	AT-2136
Probe Rod, 2.125 x 48 inches	Variable	AT-2148
Rod Grip Puller Assembly	-1-	AT-2150K
Vinyl Cap, 0.812 inch I.D.	-1-	AT-441
Extension Rod, 36-inch (optional)	Variable	AT-67
Extension Rod, 48-inch	Variable	AT-671
Extension Rod Coupler	Variable	AT-68
Extension Rod Handle	-1-	AT-69
Extension Rod Quick Links (optional)	Variable	AT-694K
Grout Machine	-1-	GS-1010
Water Level Sounder	-1-	GW-1200
Screen Push Adapter	-1-	GW-1535
Stainless Steel Mini-Bailer Assembly (optional)	-1-	GW-41
Tubing Bottom Check Valve	-1-	GW-42
O-rings for 0.5-inch PVC Riser (Pkg. of 25)	Variable	GW-430R
Polyethylene Tubing, 3/8 inch O.D.	Variable	TB-25L

ADDITIONAL TOOLS AND EQUIPMENT	QUANTITY	PART NUMBER
Locking Pliers	-2-	FA-200
Pipe Wrench	-2-	
Volumetric Measuring Cup	-1-	
PVC Cutting Pliers	-1-	
Weighted Measuring Tape (optional)	-1-	
Small Funnel or Flexible Container (for pouring sand)	-1-	
Duct Tape Roll	-1-	
Bucket or Tub (for dry material, water, and mixing)	-3-	
PVC Pipe, 2-inch Schedule 40 (24-inch section)	-1-	
J Plug (locking plug), 2-inch	-1-	
Well Cover (aboveground or flush-mount)	-1-	
Sand, 20/40 grade	Variable	
Bentonite, granular (8 mesh)	Variable	AT-91
Bentonite, powdered (200 mesh)	Variable	AT-92
Portland Cement, Type I	Variable	
Concrete Mix (premixed cement and aggregate)	Variable	
Clean Water	Variable	

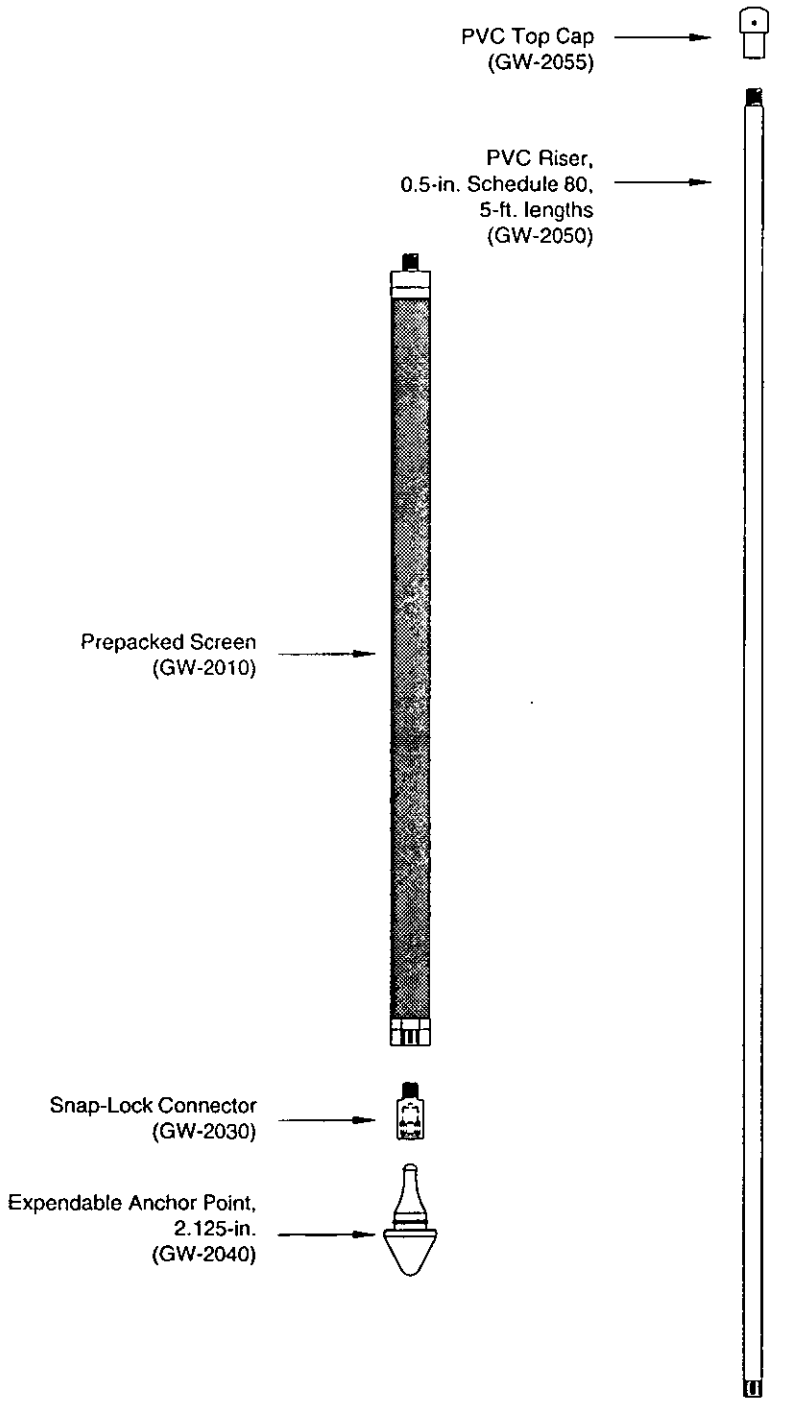


FIGURE 3.1
Prepacked Screen Monitoring Well Parts

4.0 WELL INSTALLATION

Monitoring well installation can be broken down into five main steps:

- Anchoring the well assembly at depth
- Providing a sand pack and grout barrier
- Installing a bentonite seal above the screen
- Grouting the well annulus
- Installing a surface cover

4.1 Anchoring Well Assembly

In this portion of the well installation procedure, an expendable anchor point is driven to depth on the end of a 2.125-inch (54 mm) O.D. probe rod string (Fig. 4.1). A prepacked screen assembly is inserted into the I.D. of the rod string with 5-foot (1.5 m) sections of 0.5-inch PVC riser pipe (Fig. 4.2). The screens and riser pipe are attached to the anchor point via a snap-lock connector.

1. If the monitoring well is to have a flush-mount finish, it is a good practice to prepare a hole large enough to accept a standard well protector before driving the probe rods.

2. Move the Geoprobe probing machine into position over the proposed monitoring well. Unfold the probe and place in the proper probing position as shown in the unit Owner's Manual. Access to the top of the probe rods will be required. It is therefore important to allow room for some derrick retraction when placing the unit in the probing position.

3. Referring to Figure 4.3, place an O-ring in the groove of a 2.125-inch Expendable Anchor Point (GW-2040). Insert the point into the unthreaded end of a 2.125-inch Expendable Point Holder (AT-2110 or AT-2111).

   NOTE: Unlike other Geoprobe applications, the 2.125-inch expendable point holders are actually modified probe rods. These expendable point holders are available in lengths of 36 inches (AT-2110) and 48 inches (AT-2111).

4. Attach a 2.125-inch Drive Cap (AT-2101) to the threaded end of the point holder (Fig. 4.3).

5. Place the expendable point holder under the probe hammer in the driving position (refer to unit Owner's Manual). Drive the point holder into the ground utilizing percussion if necessary. To provide a representative monitoring well, it is important that the rod string is driven as straight as possible. If the point holder is not straight, pull the assembly and start over with Step 2.

6. Remove the drive cap from the expendable point holder. Install an O-ring (AT-2100R) on the point holder in the groove located at the base of the male threads (Fig. 4.4).

7. Thread a probe rod (AT-2136 or AT-2148) onto the expendable point holder. Place the drive cap on the probe rod and advance the rod string.

8. Remove the drive cap and install an O-ring (AT-2100R) at the base of the male threads of the probe rod (Fig. 4.4). Add another probe rod and replace the drive cap. Once again, advance the rod string.

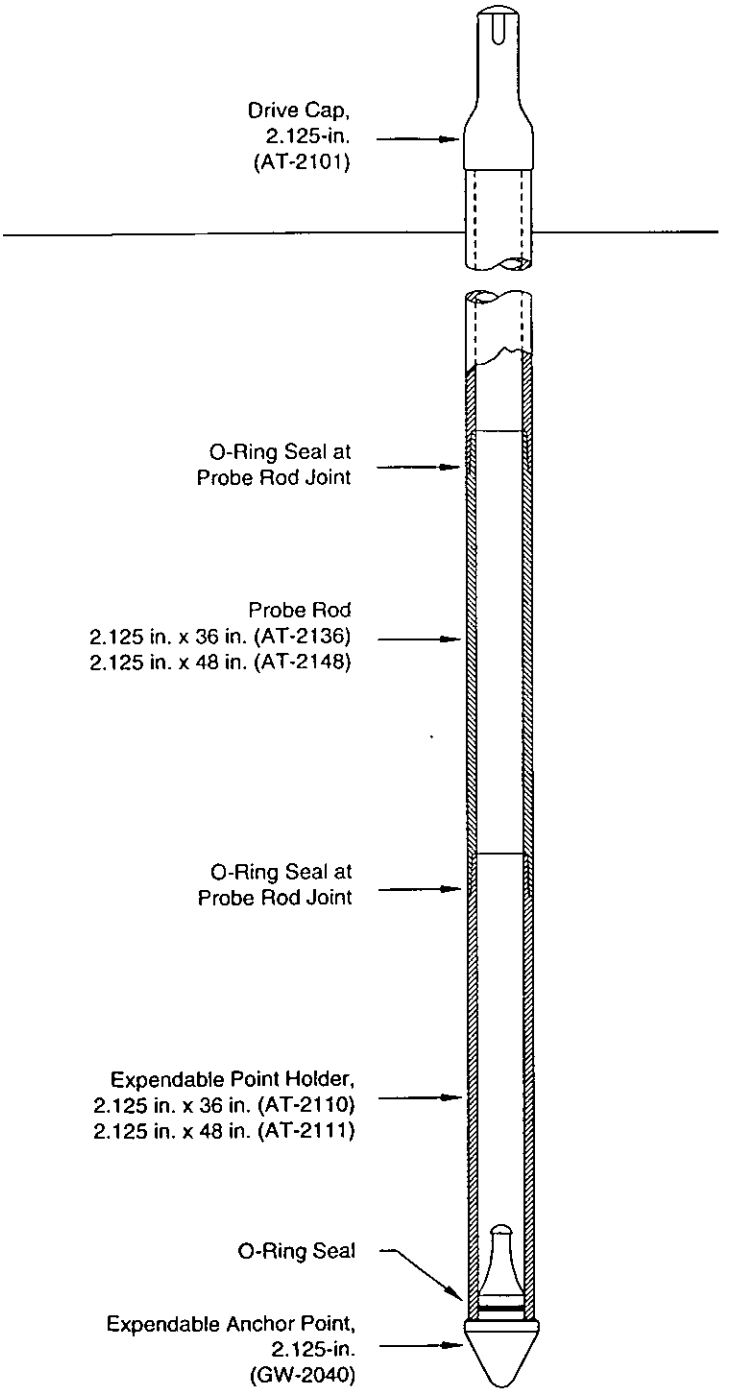


FIGURE 4.1
Expendable Anchor Point Driven To Depth

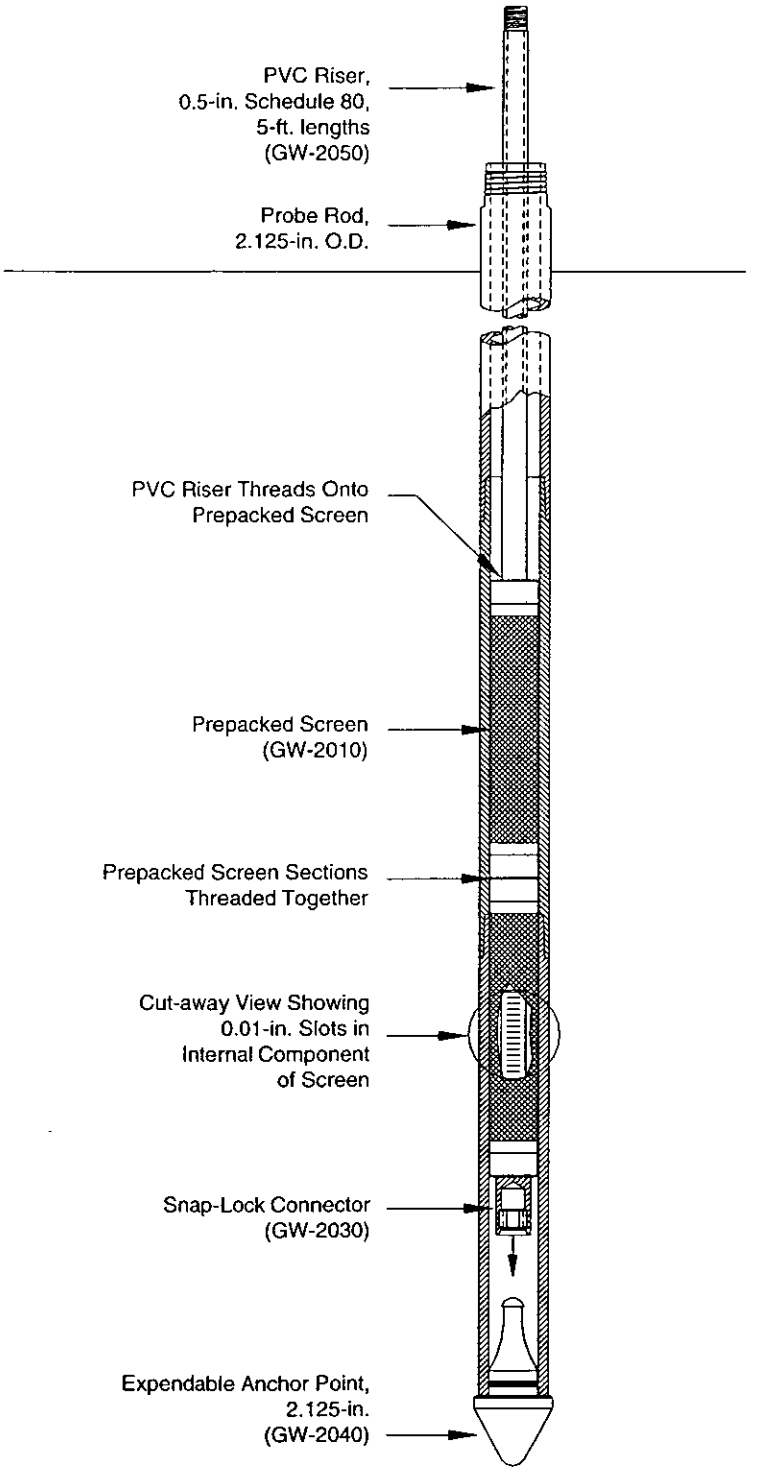


FIGURE 4.2
Prepacked Screens Inserted into Inside Diameter of Probe Rod String

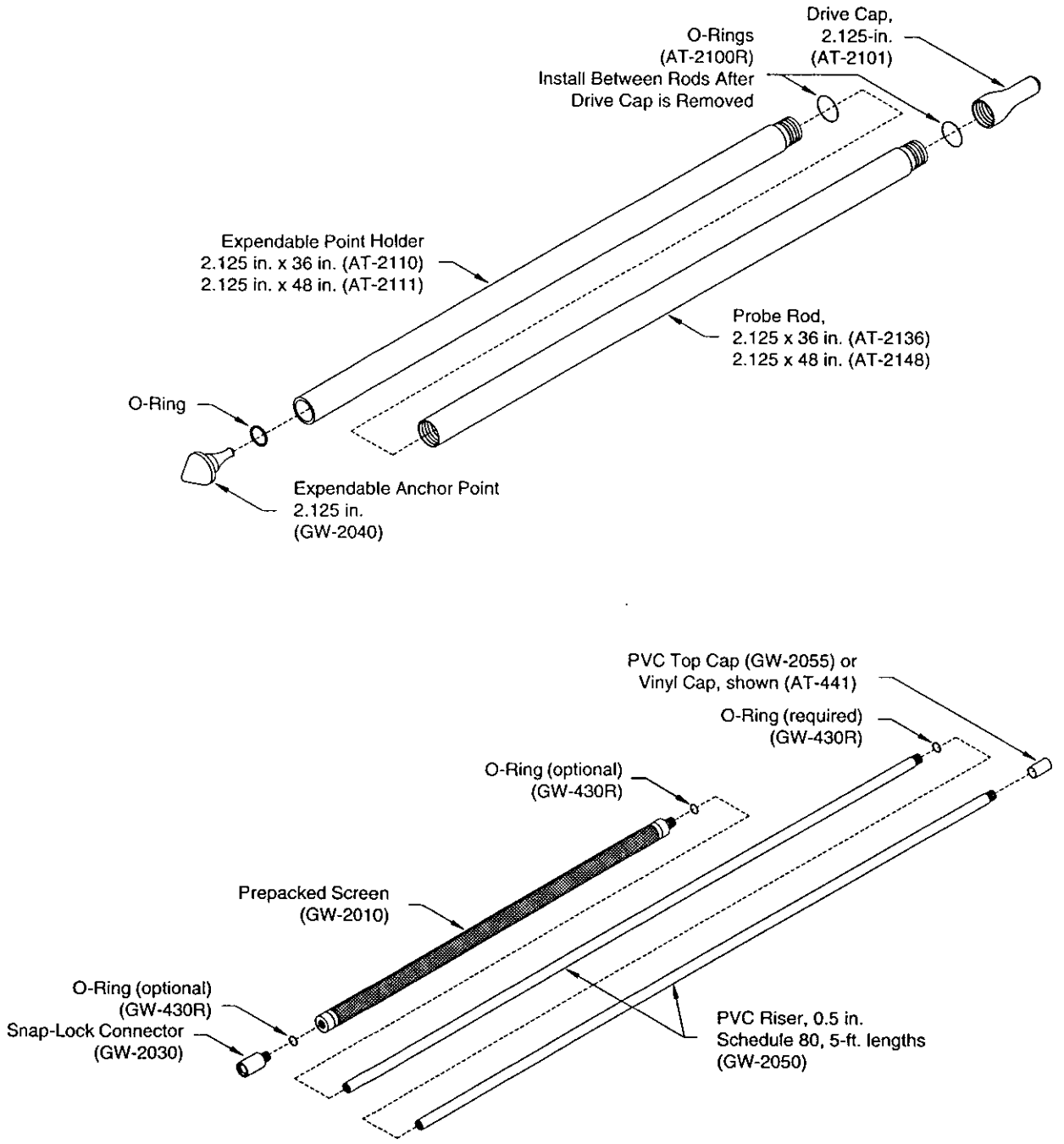


FIGURE 4.3
Prepacked Screen and Probe Rod Assembly

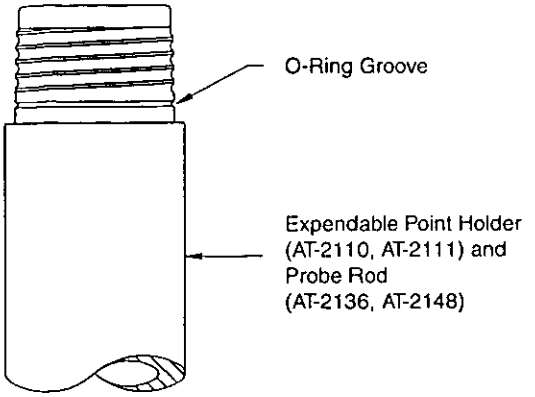


FIGURE 4.4
O-Ring Groove in 2.125-inch Expendable Point Holders and Probe Rods

9. Repeat Step 8 until the end of the rod string is 4 inches (102 mm) below the bottom of the desired screen interval. The additional depth allows for the connection between the expendable anchor point and screen assembly. The top probe rod must also extend at least 1 foot (25 mm) above the ground surface to allow room for the rod grip puller later in this procedure. Move the probe foot back to provide access to the top of the rod string.

10. With the probe rods and anchor point driven to the proper depth, the next step is to deploy the screen and riser pipe. Begin by threading together three-foot Prepacked Screen sections (GW-2010) to achieve the desired screen interval (Fig. 4.3). O-rings (GW-430R) can be installed between the screen sections if desired.

11. Thread a Snap-Lock Connector (GW-2030) into the female end of the assembled screens (Fig. 4.3). An O-ring (GW-430R) can be placed on the male threads of the connector if desired.

12. Insert the screen assembly into the top of the probe rod string with the connector facing toward the bottom of the rods, Figure 4.2.

13. With the assistance of a second person, attach 5-foot (1.5 m) sections of 0.5-inch Schedule 80 PVC Riser (GW-2050) to the top of the screen assembly. O-rings (GW-430R) are required at each riser joint to prevent groundwater from seeping into the screens from above the desired monitoring interval. Continue to add riser sections until the assembly reaches the bottom of the rods (Fig. 4.2). At least one foot (0.3 m) of riser should extend past the top probe rod. Place a PVC Top Cap (GW-2055) or Vinyl Cap (AT-441) on the top riser. If using the vinyl cap, secure the cap with two wraps of duct tape.

14. Raise the screen and riser assembly a few inches and then quickly lower it onto the expendable anchor point. This should force the snap-lock connector over the mushroomed tip of the anchor (Fig. 4.5). Gently pull up on the riser to ensure that the connector and anchor are firmly attached. Approximately 0.25 inches (6 mm) of play is normal.

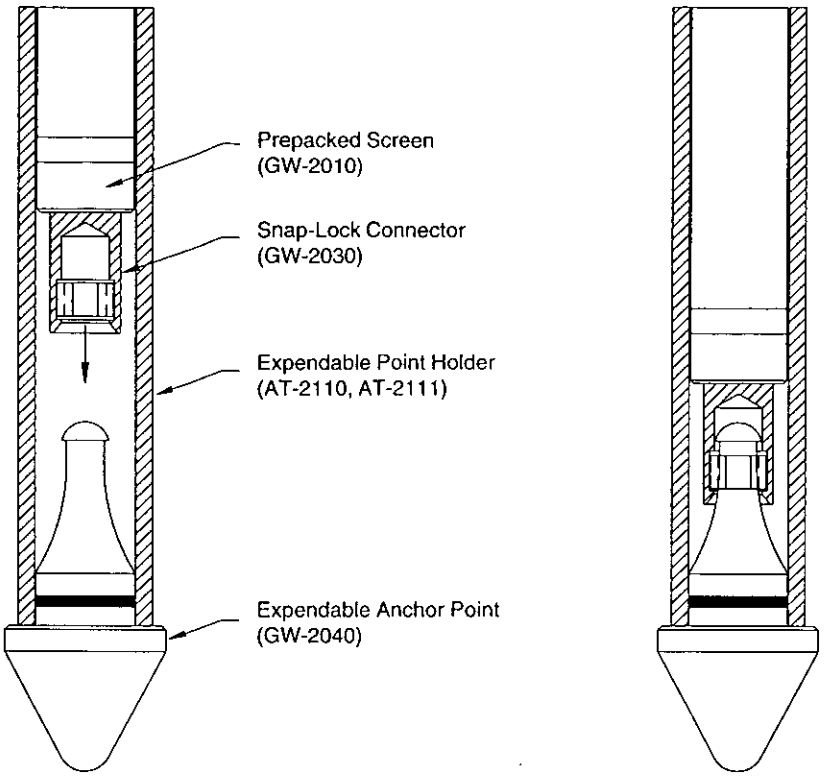


FIGURE 4.5
Connecting Screen Assembly To Expendable Anchor Point

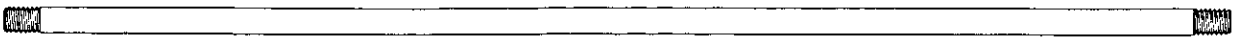
15. It is now time to pull up the probe rods from around the well screen and riser. Reposition the probe unit so that the Rod Grip Puller (AT-2150K) can be attached to the rod string.

16. Retract the rod string the length of the screens plus an additional 3 feet (1 m). While pulling the rods, observe whether the PVC risers stay in place or move up with the rods.

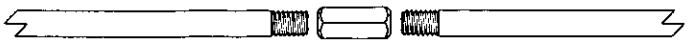
    a. If the risers stay in place, stable formation conditions are present. Continue retracting the rods to the depth specified above. Go to Section 4.2.

    b. If the risers move up with the probe rods, have a second person hold it in place while pulling up the rods. An additional section of PVC riser may be helpful. Once the probe rods have cleared the anchor point and part of the screen, the screen and riser assembly should stop raising with the rods. Continue retracting to the depth specified above. Go to Section 4.2.

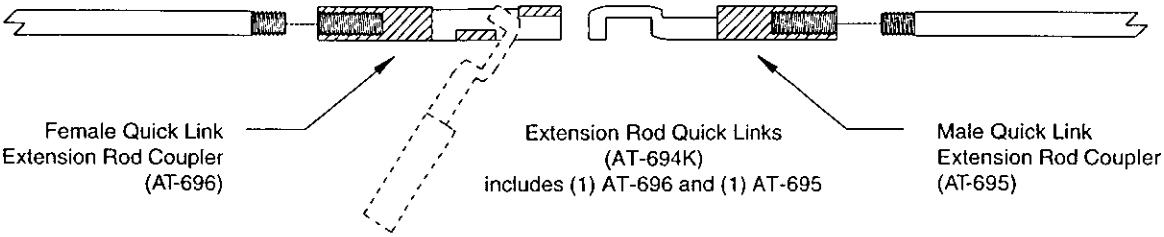
    c. If the risers continue to move up with the probe rods and can not be held in place by hand, the anchor point is most likely located in heaving sands. Extension rods are now required. (Refer to Figure 4.6 for an illustration of extension rod accessories.)



Extension Rod, 36 inch (AT-67) or 48 inch (AT-671)



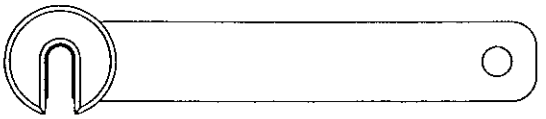
Extension Rod Coupler
(AT-68)



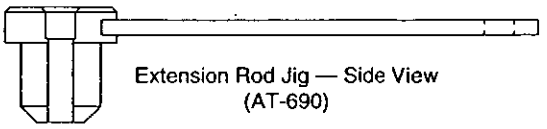
Female Quick Link
Extension Rod Coupler
(AT-696)

Extension Rod Quick Links
(AT-694K)
includes (1) AT-696 and (1) AT-695

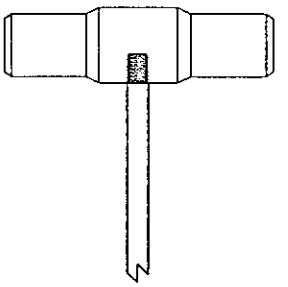
Male Quick Link
Extension Rod Coupler
(AT-695)



Extension Rod Jig — Top
View
(AT-690)



Extension Rod Jig — Side View
(AT-690)



Extension Rod Handle
(AT-69)

Screen Push Adapter
(GW-1535)

FIGURE 4.6
Geoprobe Extension Rods and Accessories

d. Place a Screen Push Adapter (GW-1535) on the end of an Extension Rod (AT-67 or AT-671). Insert the adapter and extension rod into the PVC riser and hold by hand or with an Extension Rod Jig (AT-690). Attach additional extension rods with Extension Rod Couplers (AT-68) or Extension Rod Quick Links (AT-694K) until the push adapter contacts the bottom of the screens (Fig. 4.7). Place an Extension Rod Handle (AT-69) on the top extension rod after leaving 3 to 4 feet (1 to 1.2 m) of extra height above the last probe rod.

e. Slowly retract the probe rods while another person pushes and taps on the screen bottom with the extension rods (Fig. 4.7). To ensure proper placement of the screen interval and prevent damage to the well, be careful not to get ahead while pulling the probe rods. The risers should stay in place once the probe rods are withdrawn past the screens. Retrieve the extension rods. Place the cap back on the top riser and secure the cap with duct tape if necessary.

4.2 Sand Pack and Grout Barrier

The natural formation will sometimes collapse around the well screens as the probe rod string is withdrawn. This provides an effective barrier between the screens and grout material used to seal the well annulus. If the formation does not collapse, a sand pack must be placed from the surface. This portion of the well installation procedure is important because an inadequate barrier will allow grout to reach the well screens. Nonrepresentative samples and retarded groundwater flow into the well result from grout contamination.

1. Using a Water Level Sounder (GW-1200) or flat tape measure, determine the depth from the top of the PVC riser to the bottom of the annulus between the riser and probe rods. Two scenarios are possible:

   a. Measured depth is 2 to 3 feet (0.6 to 0.9 m) less than riser length. This indicates that unstable conditions have resulted in formation collapse. A natural grout barrier was formed as material collapsed around the PVC riser when the probe rods were retracted. This commonly occurs in heaving sands. No further action is required. Proceed with Section 4.3 and perform Step 2 (for stable formations).

   b. Measured depth is equal to or greater than riser length. This indicates that stable conditions are present. The probe hole has remained open and void space exists between the riser (and possibly the screen) and formation material. Clean sand must be placed downhole to provide a suitable grout barrier. Continue with Step 2.

2. Begin slowly pouring 20/40 grade sand down the annulus between the PVC riser and probe rod string. Reduce spillage by using a funnel or flexible container as shown in Figure 4.8. Add approximately 1.25 liters for each 3-foot (1 m) screen section, plus 1.25 liters for a 2-foot (0.6 m) layer of sand above the screen section.

3. Measure the annulus depth after each 1.25 liters of sand. The sand may not fall all the way past the screens due to the tight annulus and possible water intrusion. This is acceptable, however, since the prepacked screens do not require the addition of sand. The important thing is that a sand barrier is provided above the screens.

4. Sand may also bridge within the annulus between the risers and probe rods and consequently fail to reach total depth (Fig. 4.8). This most likely occurs when the sand contacts the water table during deep well installations. Wet probe rods also contribute to sand bridging. If the annulus is open, skip to Section 4.3, Step 1. If bridging is evident, continue with Step 5.

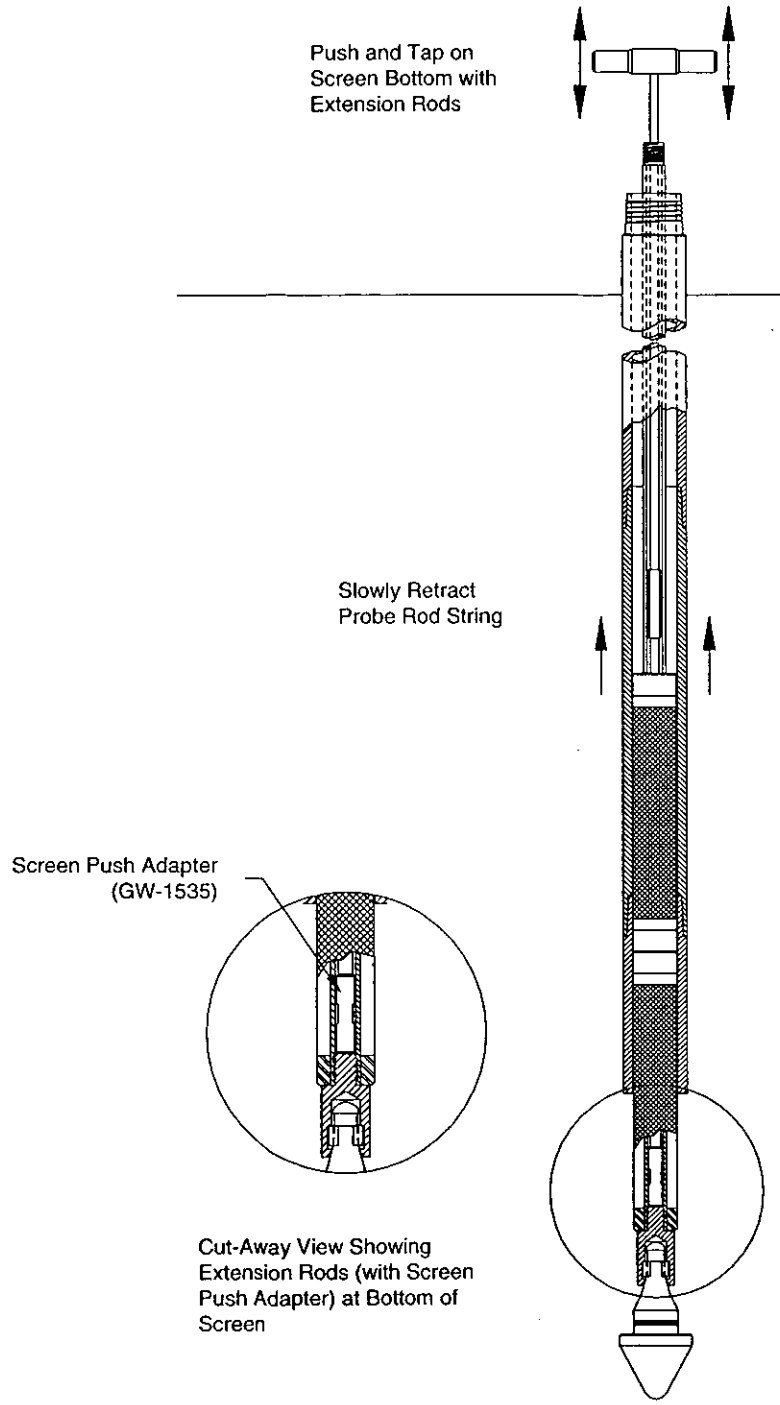


FIGURE 4.7
Use Extension Rods To Tap Out Wedged Screens

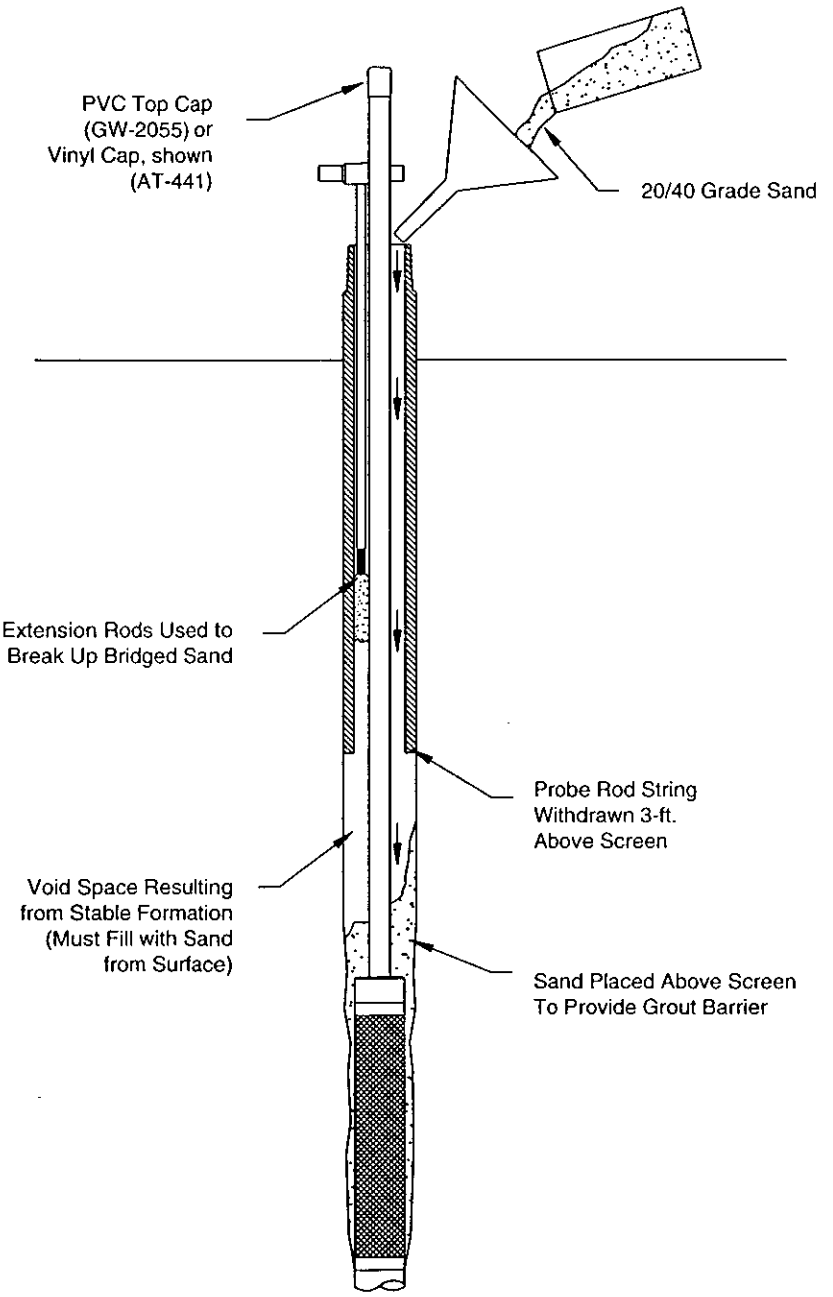


FIGURE 4.8
Installing Grout Barrier from Ground Surface with 20/40 Grade Sand

5. In case of a sand bridge above the screens (wet rods, high water table, etc.), insert clean extension rods into the well annulus to break up the sand (Fig. 4.8). Simultaneously retracting the probe rods usually helps. Check annulus depth again. If sand is no longer bridged, proceed to Section 4.3. If bridging is still evident, continue with Step 6.

6. If the sand bridge can not be broken up with extension rods, inject a small amount of clean water into the annulus. This is accomplished with a Geoprobe Model GS-1000 Grout Machine (GS-1010 includes grout machine and accessories) and 3/8-inch (9.5 mm) O.D. polyethylene tubing (TB-25L). Simply insert the poly tubing down the well annulus until the sand bridge is contacted. Attach the tubing to the grout machine and pump up to one gallon of clean water while moving the tubing up and down. The jetting action of the water will loosen and remove the sand bridge. Check annulus depth again. The distance should be 2 to 3 feet (0.6 to 0.9 m) less than the riser length. Proceed with Section 4.3.

4.3 Bentonite Seal Above Screen

Bentonite is an expanding clay which exhibits very low permeability. When properly placed, bentonite prevents contaminants from moving into the well screens from above the desired monitoring interval. The seal is formed either by pouring granular bentonite into the annulus from the ground surface, or by injecting a high-solids bentonite slurry directly above the grout barrier. The use of bentonite chips is limited to cases in which the top of the screen ends above the water table (no water is present in the probe rods). Whichever method is used, at least 2 feet (0.6 m) of bentonite must be placed above the sand pack.

1. **(Stable Formation)** Granular bentonite is recommended if the following conditions are met:
   1) Top of screen interval is above the water table
   2) Formation remained open when probe rods were retracted
   3) Bridging was not encountered while installing the sand pack and grout barrier in Section 4.2.

   a. Withdraw the probe rod string another 3 to 4 feet (0.9 to 1 m) and ensure that the PVC riser does not rise with rods. It is important that the bottom of the rod string is above the proposed seal interval. If positioned too low, dry bentonite will backup into the expendable point holder. Bridging then results if moisture is present inside the probe rods.

   b. Pour approximately 1.5 liters of granular bentonite between the probe rods and PVC riser as was done with the sand in Section 4.2

   c. Measure the riser depth to the bottom of the annulus. The distance should now equal the installed riser length minus the minimum 2 feet (0.6 m) of sand pack and 2 feet (0.6 m) of bentonite seal. As was stated with the sand pack, if the measured depth is significantly less than expected, the bentonite has more than likely bridged somewhere along the rod string. A procedure similar to that identified for bridged sand (Section 4.2, Steps 5 and 6) may be utilized to dislodge the granular bentonite.

   d. Once it has been determined that the bentonite seal is properly emplaced, add 1 liter of clean water to hydrate the dry bentonite according to regulations. This is not necessary if water was used to clear bridged bentonite.

2. **(Unstable Formation)** A grout machine is required to install the bentonite seal if the formation collapsed when the rods were retracted or the sand bridged when installing the grout barrier. The pump is able to supply a high-solids bentonite slurry under sufficient pressure to displace collapsing soil. Void

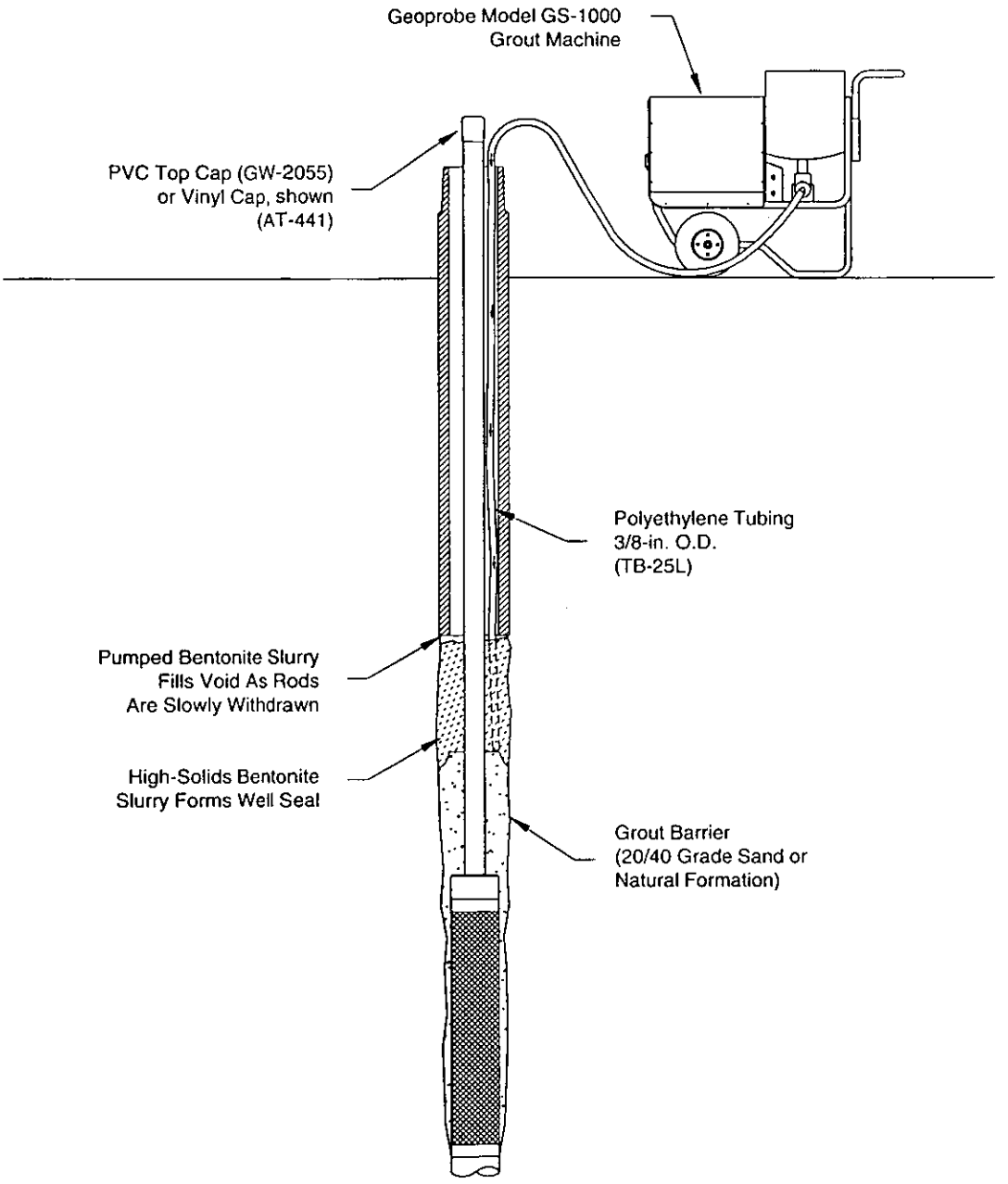


FIGURE 4.9
Providing Bentonite Seal With Geoprobe Model GS-1000 Grout Machine

spaces often develop when poured (gravity installed) granular bentonite is used under these conditions, resulting in an inadequate annular seal. Wet rods will often lead to bridging problems as well.

a. Mix 1 gallon (3.8 L) of high-solids bentonite (20 to 25 percent by dry weight) and place in the hopper of the grout machine.

b. Insert 3/8-inch poly tubing to the bottom of the annulus between the probe rods and well riser. Leaving at least 25 feet (8 m) extending from the top of the rod string, connect the tubing to the grout machine. This extra length will allow rod extraction later in the procedure.

c. Reposition the probe unit and attach the rod grip puller.

d. Activate the pump and fill the poly tubing with bentonite. Begin slowly pulling the rod string approximately 3 feet (1 m) while operating the pump (Fig. 4.9). This will place bentonite in the void left by the retracted rods before it is filled by the collapsing formation. Continue to watch that the PVC riser does not come up with the rod string.

   When removing the retracted probe rod, slide the rod over the poly tubing and place it on the ground next to the grout machine. This eliminates cutting and reattaching the tubing for each rod removed from the string. Take care not to "kink" the tubing during this process as it will create a weak spot in the tubing which may burst when pressure is applied.

e. Measure the annulus depth to ensure that at least 2 feet (0.6 m) of bentonite was delivered. Pump additional bentonite slurry if needed.

4.4 Grouting Well Annulus

The placement of grout material within the remaining well annulus provides additional protection from vertical contaminant migration. Most grout mixes are composed of neat cement, high-solids bentonite slurry, or a combination of cement and bentonite. Such mixes must be delivered with a high-pressure grout pump. When stable formations exist, the well may be sealed by pouring dry granular bentonite directly into the annulus from the ground surface. Consult the appropriate regulatory agency to determine approved grouting methods.

This section presents the procedure for grouting the well annulus with the Geoprobe Model GS-1000 Grout Machine. Refer to Figure 4.10 as needed.

1. Mix an appropriate amount of grout material and place it in the hopper on the grout machine.

   NOTE: It is recommended that an additional 25 to 50 percent of the calculated annulus volume is included in the total grout volume. This allows for material that is left in the grout hose and tubing or moves into the formation during pumping. An approximate range is 0.20 to 0.25 gallons (0.8 to 0.9 L) of grout for each foot of riser below ground surface.

2. Insert 3/8-inch poly tubing into the well annulus until the end of the tubing reaches the top of the bentonite seal. Leaving at least 25 feet (8 m) extending from the top of the rod string, cut the tubing from the roll. This extra length allows rod extraction with the tubing attached to the pump. If tubing was used to install the bentonite seal, it may be reused for the application of grout.

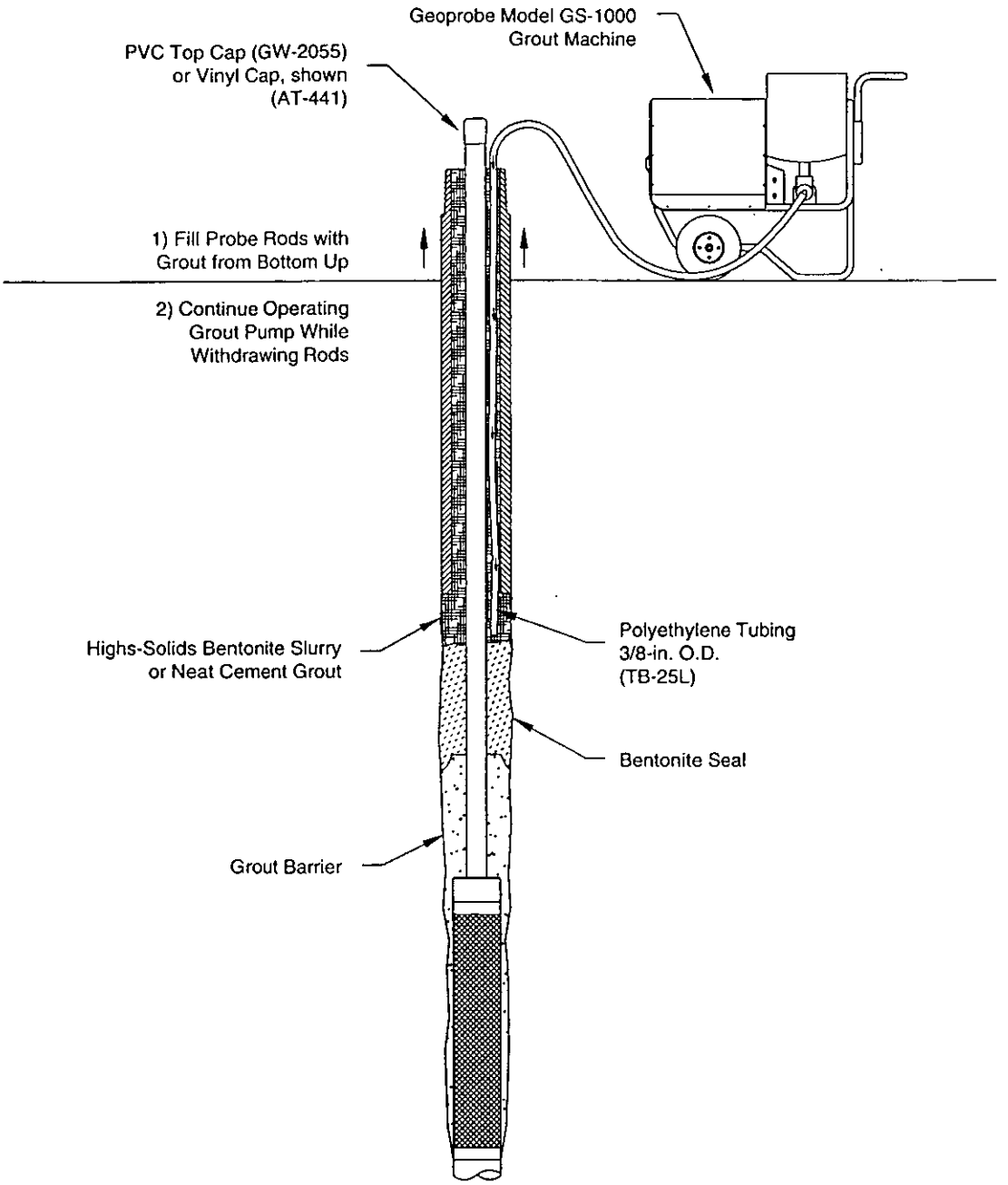


FIGURE 4.10
Grouting Well Annulus with Geoprobe Model GS-1000 Grout Machine

3. Attach the tubing to the grout machine and begin pumping. If the bentonite seal was below the water table (deep well installation), water will be displaced and flow from the probe rods as the annulus is filled with grout. Continue operating the pump until undiluted grout flows from the top probe rod.

4. Reposition the probe unit and prepare to pull rods.

5. Begin pulling the probe rods while continuing to pump grout. Match the pulling speed to grout flow so that the rods remain filled to the ground surface. This maintains hydraulic head within the probe rods and ensures that the void left by the withdrawn rods is completely filled with grout.

   NOTE: Slide the probe rods over the poly tubing and place neatly on the ground next to the grout machine. Be careful not to pinch or bind the poly tubing as this forms weak spots which may burst when pressure is applied.

   NOTE: Try to avoid filling the upper 12 inches (305 mm) of well annulus with grout when pulling the expendable point holder. This will make for a cleaner well cap installation.

6. When all probe rods have been retrieved and the well is adequately grouted, unstring the poly tubing and begin cleanup. It is important to promptly clean the probe rods, grout machine, and accessories. This is especially true of cement mixes as they quickly set up and are difficult to remove once dried.

4.5 Surface Cover

A surface cover protects the PVC well riser from damage and tampering. Although aboveground and flush-mount well covers may be used, most Geoprobe monitoring wells have been installed with flush-mount covers (Fig. 4.11). Consult the project planners and/or appropriate regulators to determine the approved well cover configuration for your specific application.

1. In order to fit under a flush-mount cover, the top of the well riser must be below the ground surface. Place the well cover over the riser and push it into the ground to mark the cover diameter. Remove the cover and dig out approximately 6 inches (152 mm) of soil from within the cover mark.

2. Remove the cap from the 0.5-inch PVC riser. The top of the riser should be approximately 2 inches (51 mm) above the bottom of the hole. If a joint is near this level, unthread the top riser and place a threaded PVC cap on the remaining riser. If a joint is not positioned near the specified level, cut off the riser with a pair of PVC cutters. Cut at a slight angle to make it easier to remove the cap. A vinyl cap is now required. Place the cap on the well riser. Do not apply duct tape at this time.

   NOTE: Do not cut off the riser with a hacksaw as cuttings will fall down into the screens.

3. Push the 24-inch (610 mm) section of 2-inch PVC pipe over the well riser. Position the top of the 2-inch pipe 1.5 to 2.0 inches (38 to 51 mm) above the top of the riser. This will provide adequate room to install the locking cap on the 2-inch pipe and still allow removal of the riser cap.

4. Insert the locking cap into the 2-inch PVC pipe. Tighten the wing-bolt until the cap fits snugly.

5. Position the well cover so that it is centered over the PVC pipe. Push the cover into the ground using the foot of the probe unit if needed. Provide at least 0.5 inches (13 mm) of space between the top of the locking cap and bottom of the well cover lid. Do not push the cover so deep as to place the top of the lid below the surrounding ground surface.

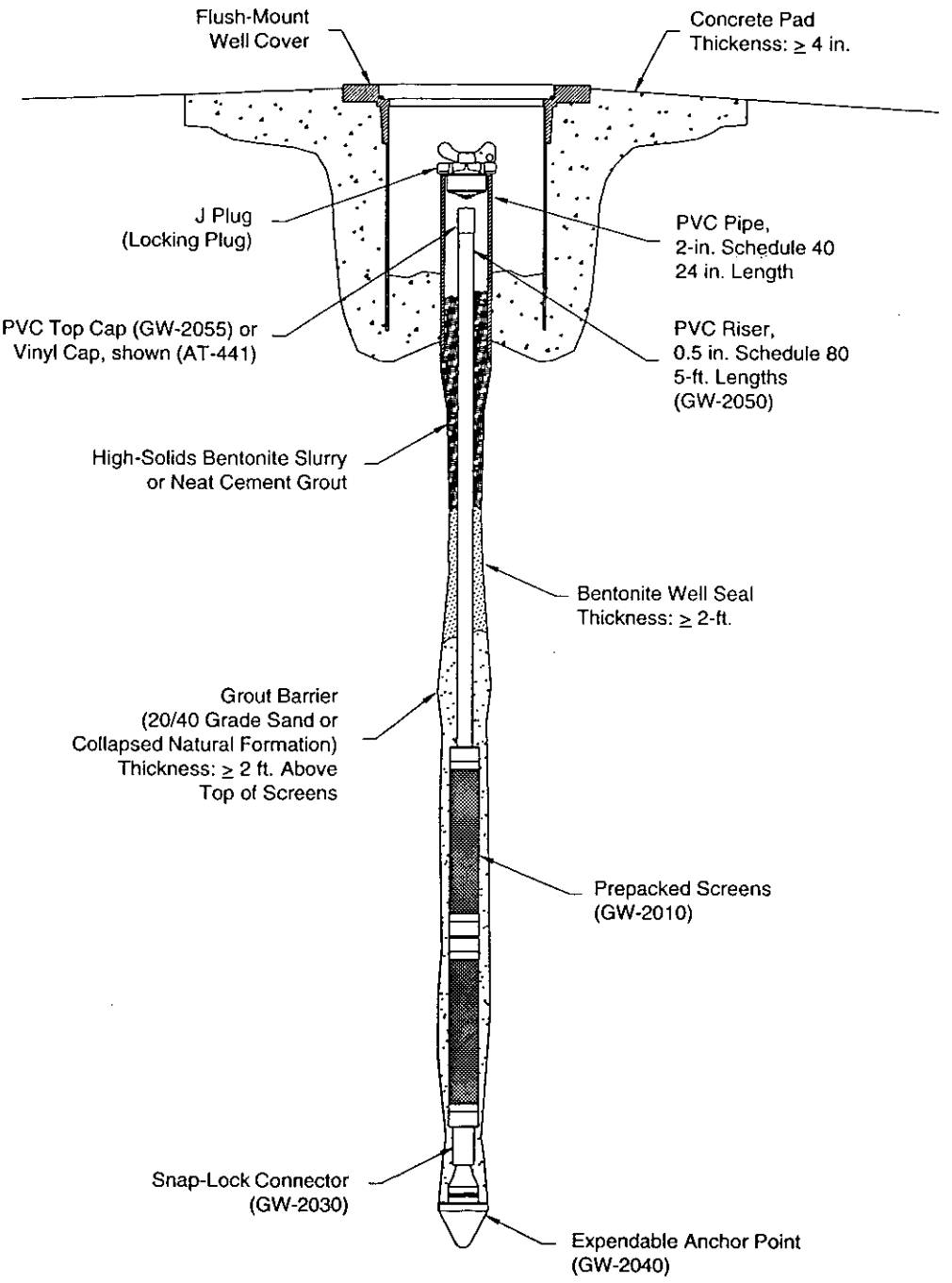


FIGURE 4.11
A Properly Installed Geoprobe Prepacked Screen Monitoring Well

6. Support the well cover by installing a concrete pad according to project requirements. Pads are commonly square-shaped with a thickness of 4 inches (102 mm) and sides measuring 24 inches (610 mm) or greater. Finish the pad so that the edges slope away from the center to prevent ponding of surface water on the well cover.

7. Fill the inside of the well cover with sand up to approximately 2 to 3 inches (51 to 76 mm) from the top of the PVC pipe with locking cap.

5.0 WELL DEVELOPMENT

"The development serves to remove the finer grained material from the well screen and filter pack that may otherwise interfere with water quality analyses, restore groundwater properties disturbed during the (probing) process, and to improve the hydraulic characteristics of the filter pack and hydraulic communication between the well and the hydrologic unit adjacent to the well screen," (ASTM D 5092).

The two most common methods of well development are bailing or pumping (purging) and mechanical surging.

Purging involves removing at least three well volumes of water with either a Tubing Bottom Check Valve (GW-42) or a Stainless Steel Mini-Bailer Assembly (GW-41). Include the entire 2.125-inch (54 mm) diameter of disturbed soil at the screen interval when calculating the well volume.

Mechanical Surging utilizes a surge block which is attached to extension rods and lowered inside the riser to the screen interval. The extension rods and surge block are moved up and down, forcing water into and out of the screen. A tubing bottom check valve is then used to remove the water and loosened sediments (Fig. 4.12).

NOTE: Mechanical surging may damage the well screen and/or reduce groundwater flow across the filter pack if performed incorrectly or under improper conditions. Refer to ASTM D 5521, "Standard Guide for Development of Groundwater Monitoring Wells in Granular Aquifers" for a detailed discussion of mechanical surging.

Development should continue until consecutive samples yield representative water. "Representative water is assumed to have been obtained when pH, temperature, and specific conductivity readings stabilize and the water is visually clear of suspended solids," (ASTM D 5092).

6.0 SAMPLE COLLECTION

Groundwater samples are easily obtained with a tubing bottom check valve (with 3/8-inch O.D. tubing as shown in Fig. 4.12) or a stainless steel mini-bailer assembly. While the check valve is the quicker and more economical sampling device, some operators still prefer the traditional mini-bailer.

NOTE: The up and down motion of the check valve can introduce significant error when collecting samples for volatiles analysis. To avoid volatiles loss, lower the check valve and tubing to the target monitoring zone without the check ball. Drop the check ball to the bottom of the tubing from the ground surface. This seals the check valve and captures the sample inside the tubing without stripping away volatiles. To collect the sample, simply retrieve the tubing from the well riser, remove the check valve, and place the groundwater in an approved container.

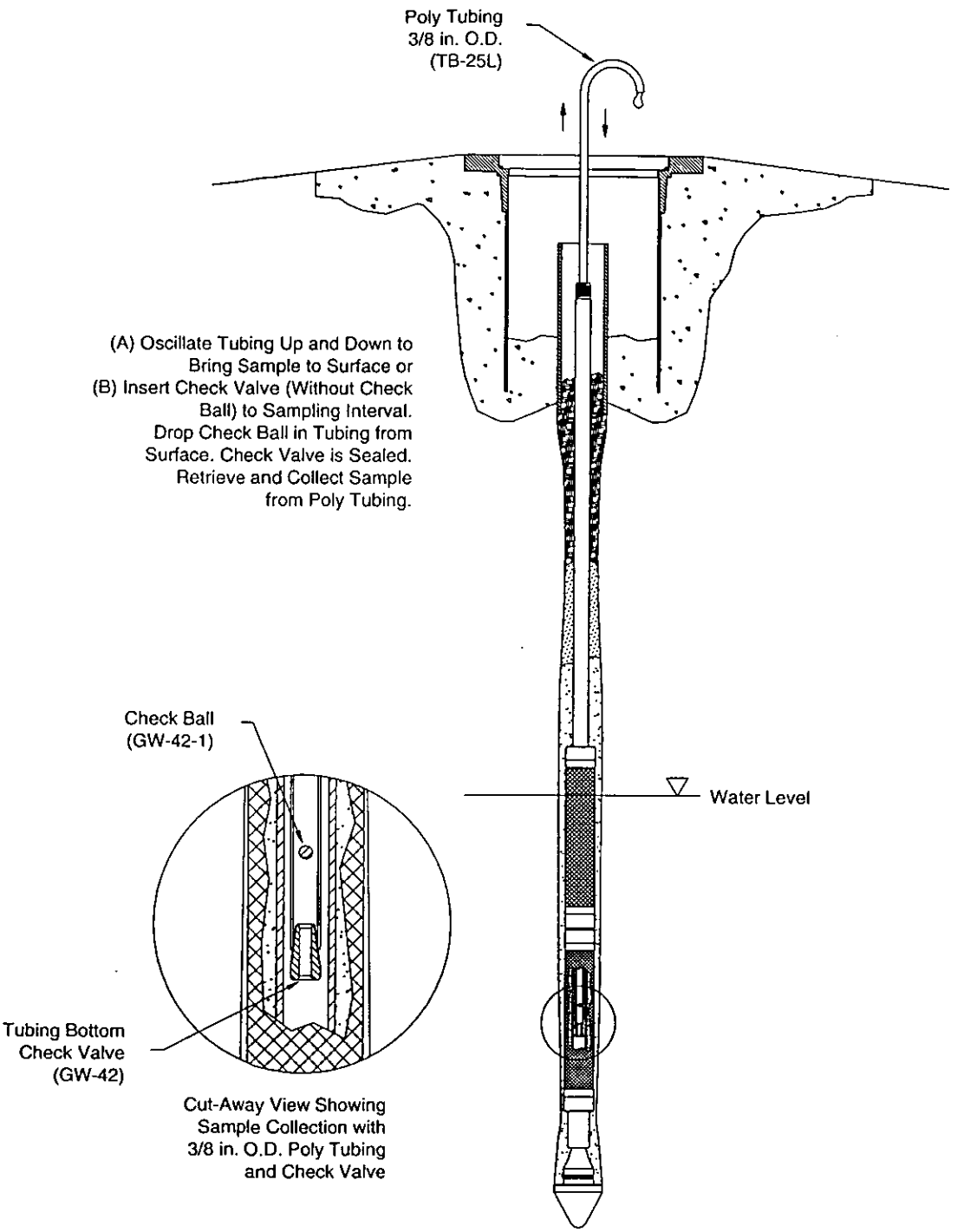


FIGURE 4.12
Sampling With Polyethylene Tubing and a Tubing Bottom Check Valve

7.0 REFERENCES

American Society for Testing and Materials (ASTM), 1992. ASTM D 5092 Standard Practice for Design and Installation of Ground Water Monitoring Wells in Aquifers: *1993 Annual Book of ASTM Standards, Vol. 0408.* Philadelphia, PA.

American Society for Testing and Materials (ASTM), 1995. ASTM D 5521 Standard Guide for Development of Ground Water Monitoring Wells in Granular Aquifers: *1996 Annual Book of ASTM Standards, Vol. 0409.* Philadelphia, PA.

Appendix V.A.12

APPENDIX V.A.12

Refer to Section V.A.12

Appendix V.A.13

APPENDIX V.A.13

Refer to Section V.A.13

APPENDIX V.A.14

Refer to Section V.A.14

Appendix V.A.15

APPENDIX V.A.15

Refer to Section V.A.15

APPENDIX V.A.16

Summary of Investigations

Burlington MGP Site

Preliminary Site Environmental Assessment

1989

Draft Report

BURLINGTON OPERATIONS CENTER

PRELIMINARY SITE ENVIRONMENTAL ASSESSMENT

PREPARED BY:

PRODUCTION ENVIRONMENTAL SERVICES

PRODUCTION SUPPORT DEPARTMENT

DUKE POWER COMPANY

August 18, 1989

INTRODUCTION

A preliminary site environmental assessment was conducted at the Burlington Operations Center, Burlington, NC, to determine the presence of contaminants resulting from the operation of a former manufactured gas plant (MGP). The assessment was conducted during the period of May 22 through May 25, 1989 by personnel from the Applied Science Center, Production Environmental Services. The assessment techniques included soil vapor survey, soil sampling, and surface water sampling.

METHODS AND MATERIALS

Sampling Locations:

Sample locations were identified by reviewing a plot plan of the operations center. Surface water sampling locations were identified on the plot plan at locations above, on-site, and below the operations center. Soil vapor measurement points were identified by constructing a 50 ft X 50 ft grid on the plot plan. This grid was then identified in the field by using a transit and survey tape. Soil samples were located at specific grid nodes based on the results of the soil vapor survey.

Field Methods: Field methods included soil vapor extraction, soil sample collection, and surface water sample collection.

Soil Vapor Extraction: Soil vapor probes were pushed in to the subsurface to a depth of 3.0 ft, at the designated grid locations (Figure 2). A vacuum pump system was connected to

the probes and soil pore air was extracted. The evacuated air was collected by filling an air-tight glass micro syringe. The sample was injected into a Photovac portable gas chromatograph for filed analysis of benzene, toluene, and xylenes.

Soil Samples: Soil samples were collected at selected locations based on the results of the soil vapor survey. soil samples were collected by using a mechanical auger, and augering to the desired depth. A split-spoon sampler was driven into the undisturbed soil. The sample from the split-spoon sampler was transferred to sample containers and stored on ice until deleivery to PES/vendor labs for analysis.

Surface Water Samples: Grab samples from two upstream, one on-site, and downstream locations were collected. Analysis for pH, specific conductivity, and temperature were conducted in-situ, while samples for total metals, and organic parameters were preserved in the field, stored on ice, and delivered to PES/vendor labs for analysis.

RESULTS AND DISCUSSION

Soil Vapor Survey: The results from the soil vapor survey indicate that the total petroleum hydrocarbon (TPH) vapor concentrations for benzene, toluene, and xylene, were highest near grid node H9 (15.2 ppm)(Figure 3). The highest

TPH vapor concentrations were centered in the area of the fuel pumps , and the the area northeast of the pumps. TPH concentrations above 1.0 ppm were identified near the

property boundary located in the northern section of the property.

Soil Samples: Soil samples were collected at the locations indicated on Figure 4. These locations were selected based on the results of the soil vapor survey and past experience of the assessment team. Soil samples were analyzed for volatile (benzene, toluene, xylene), PAH compounds (benzo(a)pyrene, pyrene, naphthalene), and RCRA metals.

Organics: The TPH isopleth drawing (Figure 5) confirms the results of the soil vapor survey by identifying grid node H9 as ahving the highest concentration of TPH (420 ppm). Soil TPH concentrations greater than 100 ppm cover a wide area of the site. The 100 ppm concentration is significant because this is the maximum TPH concentration permitted for disposal of contaminated soil at a landfill in North Carolina. Pyrene and benzo(a)pyrene concentration isopleths are indicated on Figures 6 and 7. The highest pyrene concentration was identified at node H9 (64.6 ppm). Benzo(a)pyrene concentrations generally mimicked those of pyrene, while naphthalene concentrations were generally below the detection limits (Table 1).

Inorganics: The analytical results of soil sample analyses indicated that total metal concentrations exceeded limits for all RCRA metals (As, Ag, Ba, Cd, Cr, Hg, Pb), except selenium (Se) (Table 2).

Surface Water Samples: Analytical results for all surface water locations indicated that SDWA primary parameter concentrations were below the SDWA limits, and VOC and PAH compounds were below the detection limits (Table 3).

CONCLUSIONS

The primary purpose of the preliminary site environmental assessment was to determine the presence, and identify the location of contamination. Based on the assessment findings, decisions on additional site characterization can be made. The data collected during this preliminary assessment indicates that additional studies should be conducted to:

1. Identify sources of contamination
2. Identify types of contamination
3. Identify aquifers
4. Determine groundwater flow direction and velocity
5. Determine the vertical and horizontal extent of contamination
6. Determine migration characteristics of both organic and inorganic contaminants in soil, groundwater, sediments, and surface water.
7. Develop a database for use in risk assessment decisions.

Specifically:

1. Additional soil samples should be collected throughout the site and at varoius depths to determine the horizontal and vertical range of contaminants.
2. Soils samples should be analyzed for the following parameters: VOC, expanded PAH compound list, RCRA metals, EP Tox leach (If results are above RCRA limits), SDWA parameters, total, alkaline, acidic forms of cyanide, sulfate, pH, CEC, TOC, major cations and anions.
3. Groundwater monitoring wells should be installed, using the data generated from this assessment, to determine groundwater dynamics: flow paths, velocity, hydraulic conductivity, depth to water table, thickness of aquifer, and the extent of groundwater contamination. Analytical tests should included the same parameters as soil samples, with the exception of the EP Tox leach, CEC, the alkaline and acidic forms of cyanide, RCRA metals.
4. Surface water and sediment samples should be collect above, on, and below the site, and analyzed for organics and inorganics. Sediments should include EP Tox leach if total metal concentrations are above RCRA limits.

Figure 1. General Site Plan
Burlington Operations Center
Burlington, NC

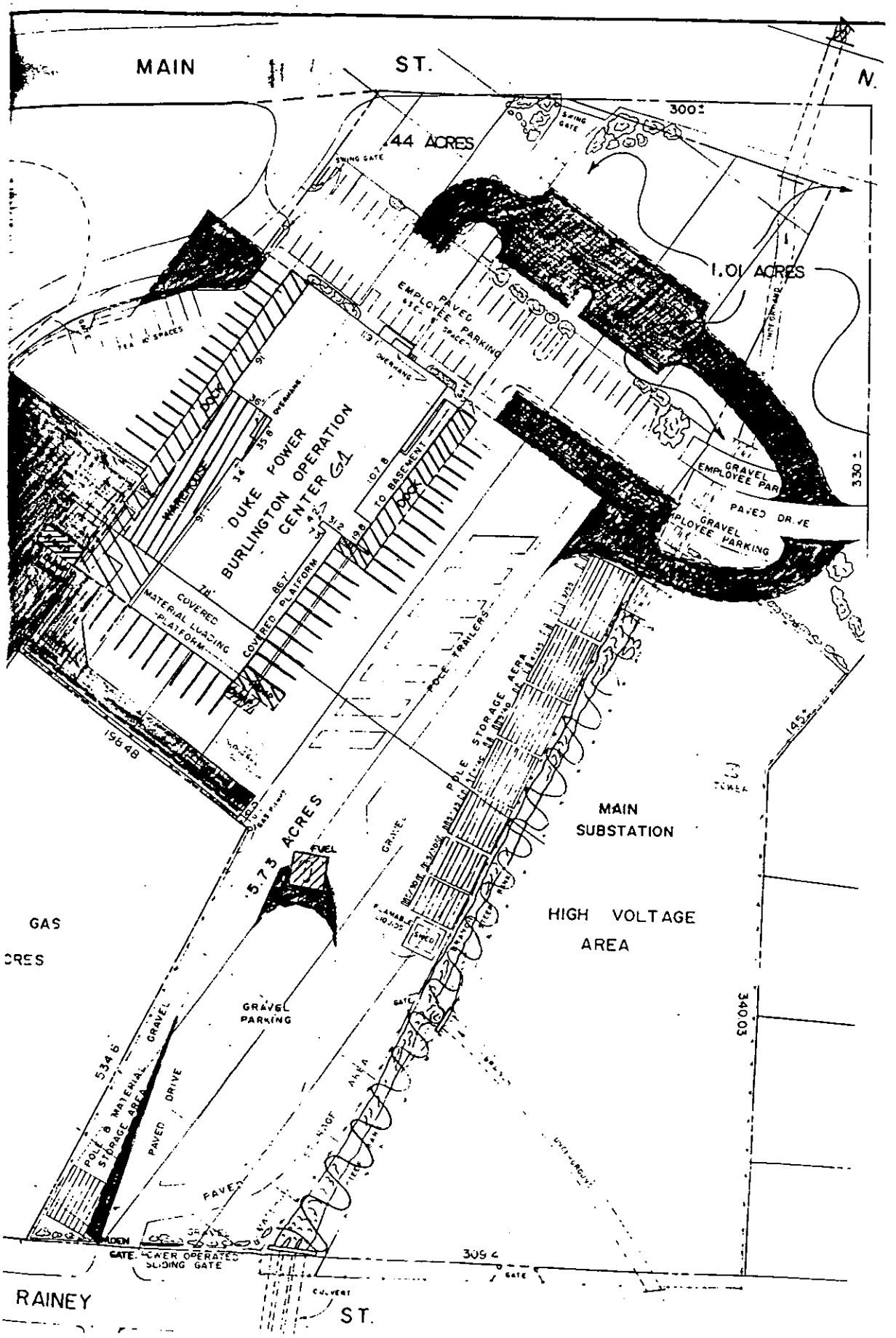


Figure 2. Soil Vapor Survey Grid Overlay
Burlington Operations Center

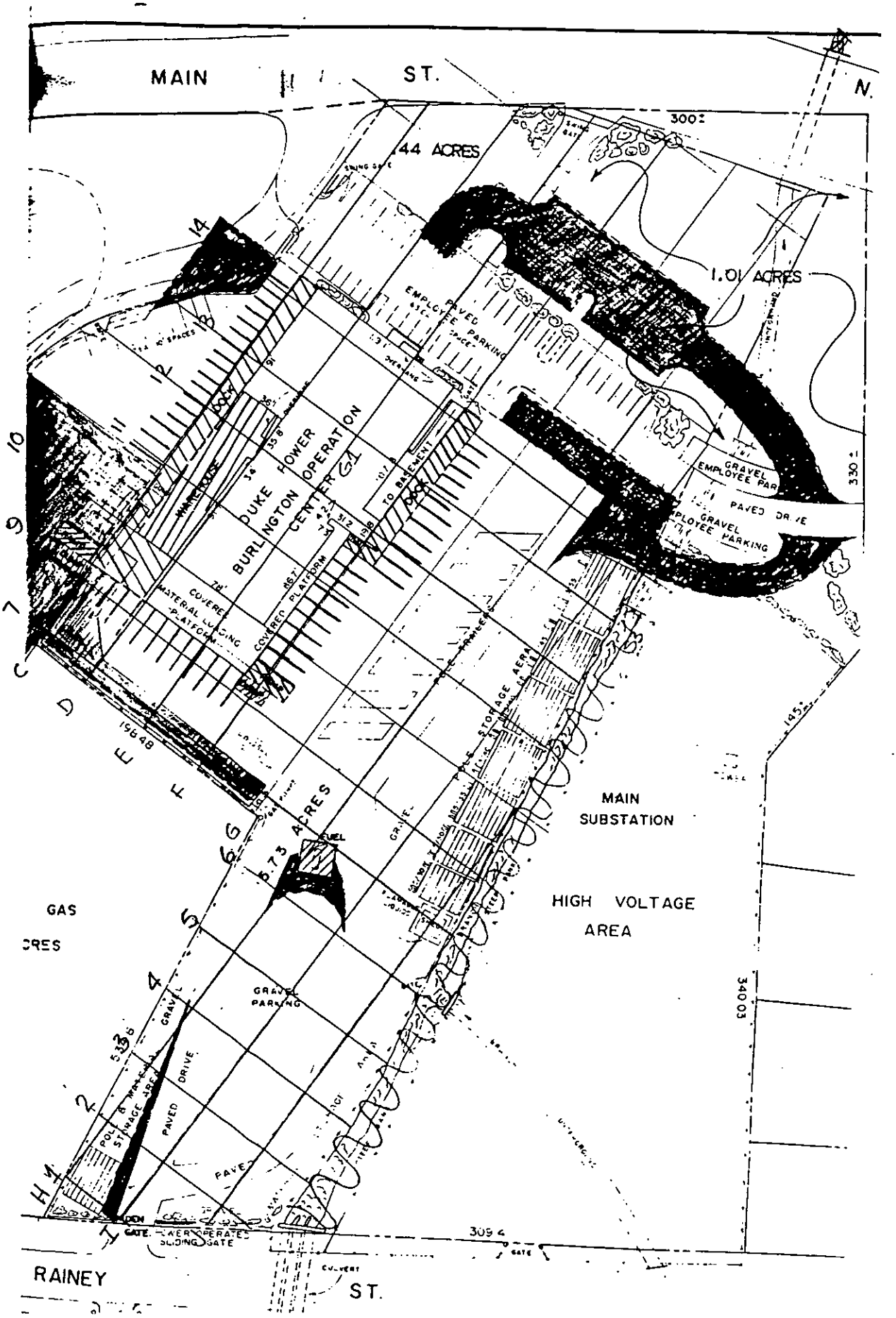


Figure 3. Soil Vapor Survey TPH Isopleth Map
Burlington Operations Center

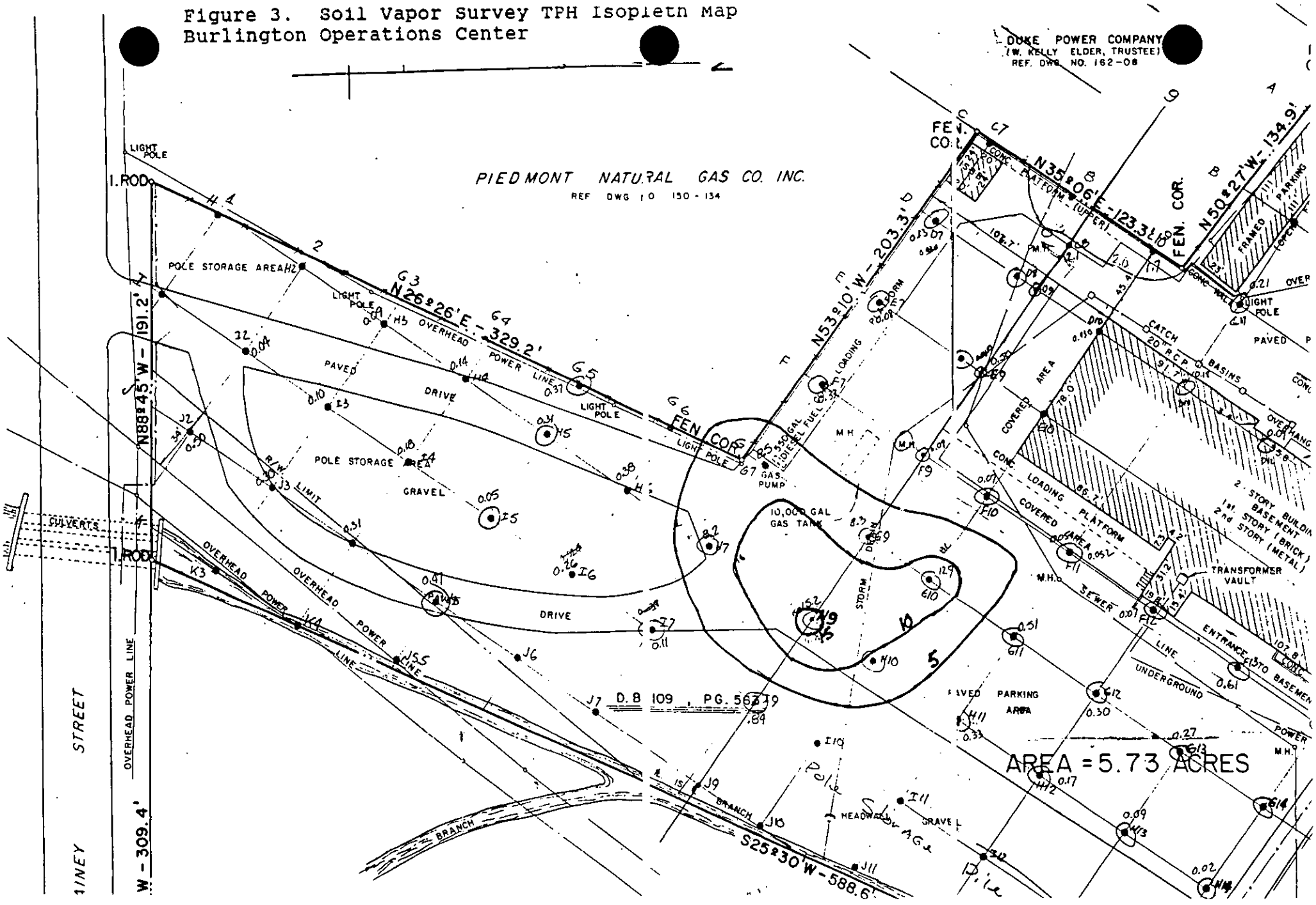


Figure 4. Soil Sampling Locations
Burlington Operations Center

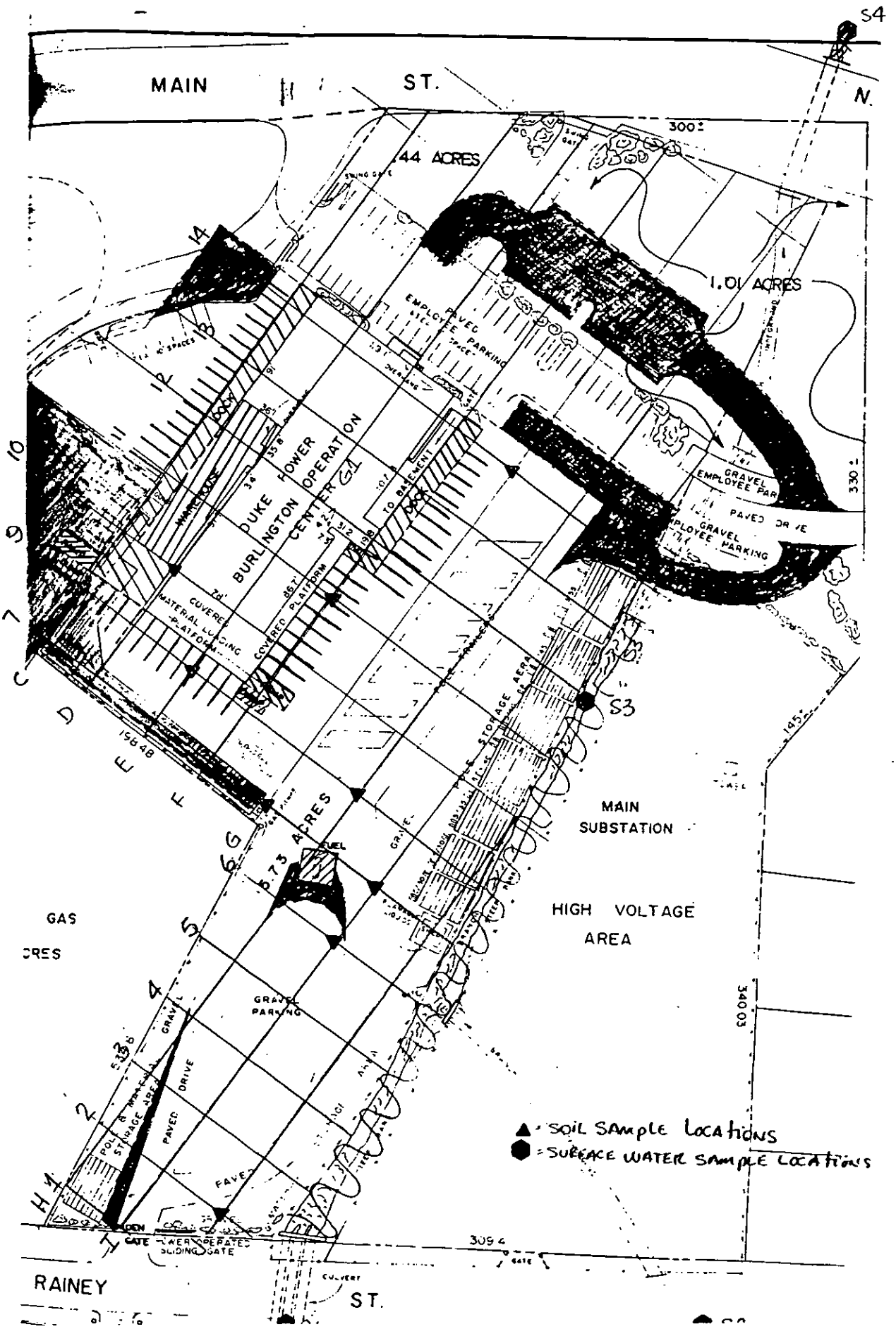


Figure 5. Soil Chemistry TPH Isopleth Map
Burlington Operations Center, NV

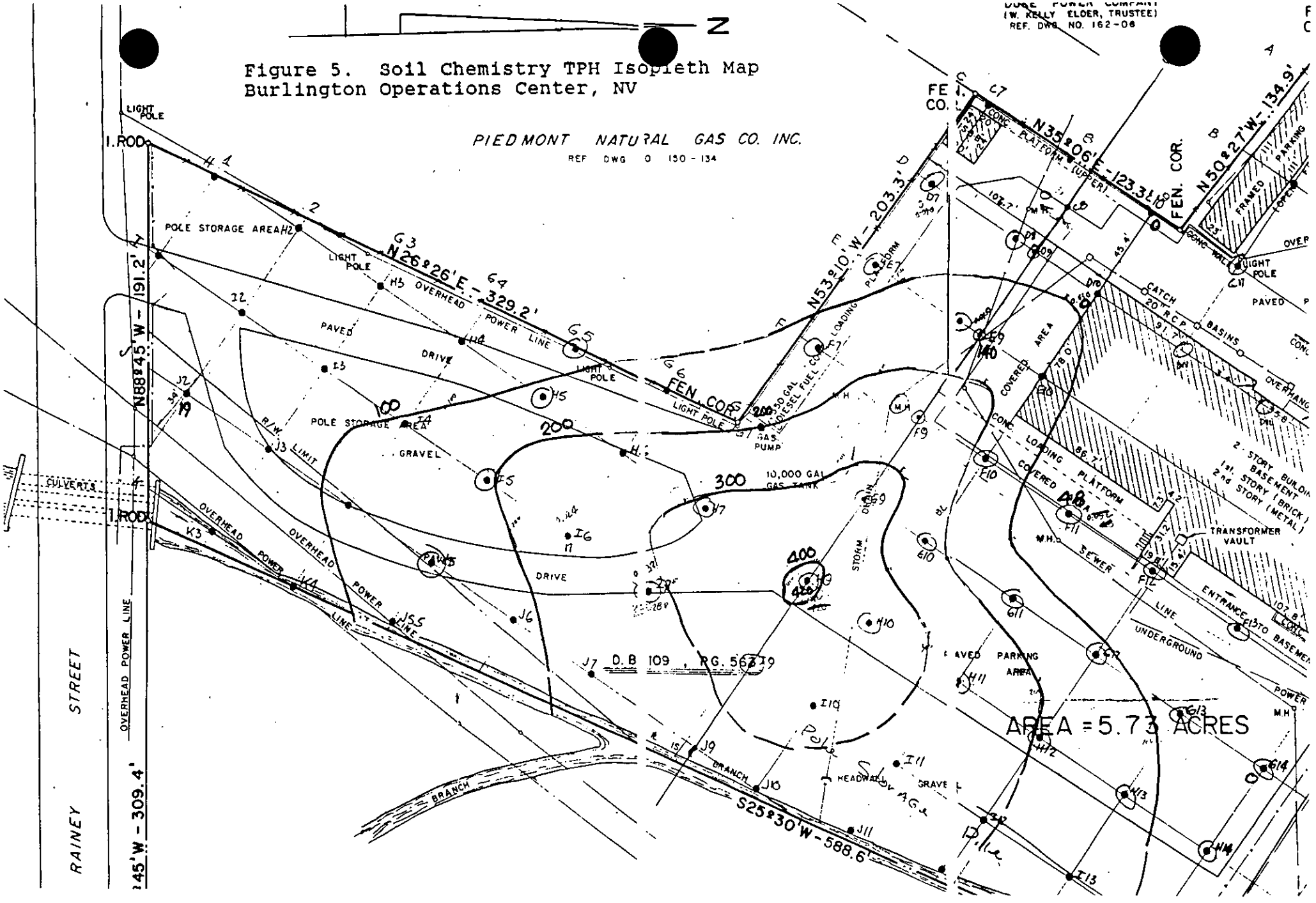


Figure 6. Pyrene Concentrations (ppm) in Soil
Burlington Operations Center

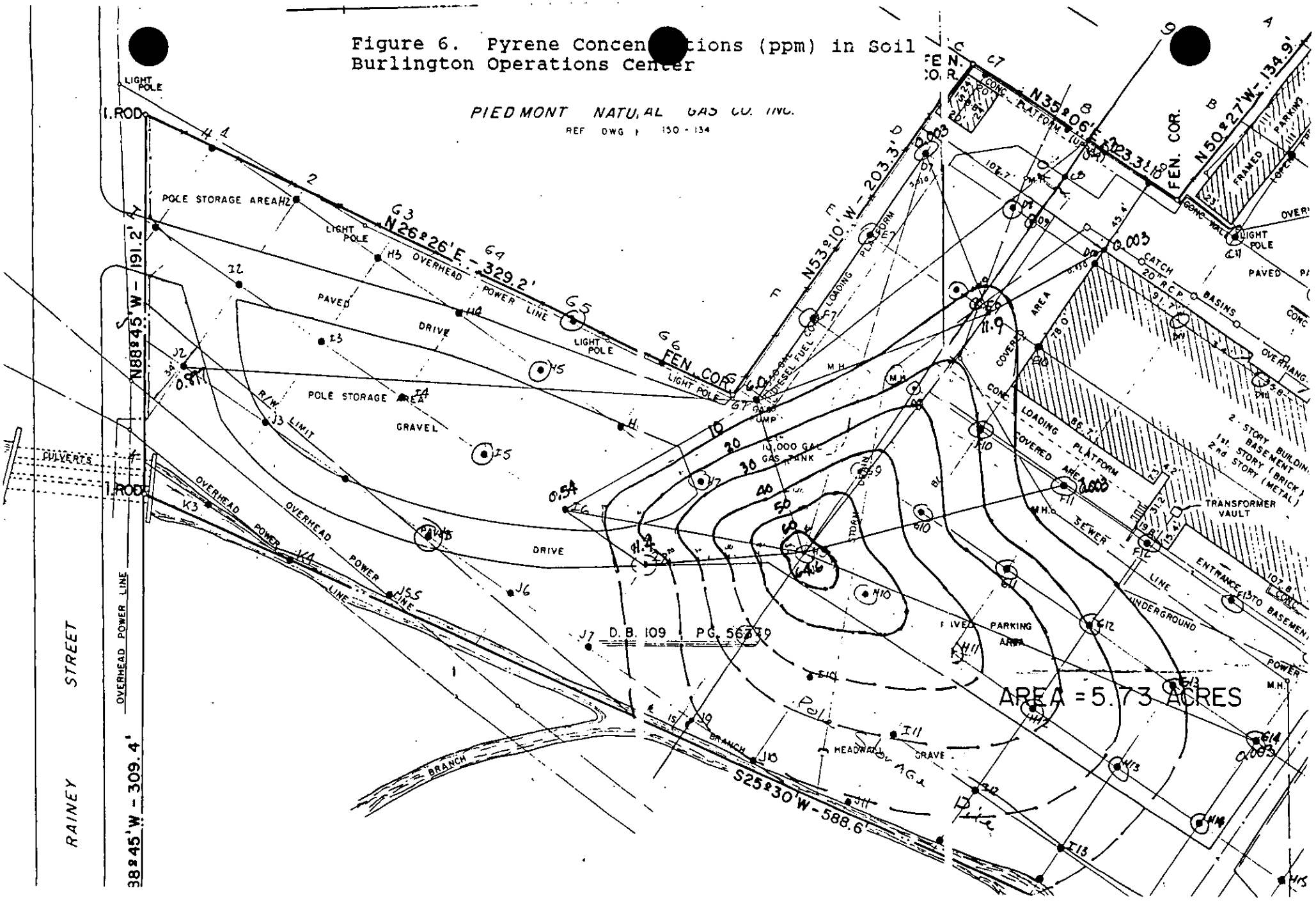


Figure 7. Benzo(a)Pyrene Concentrations in Soil
Burlington Operations Center

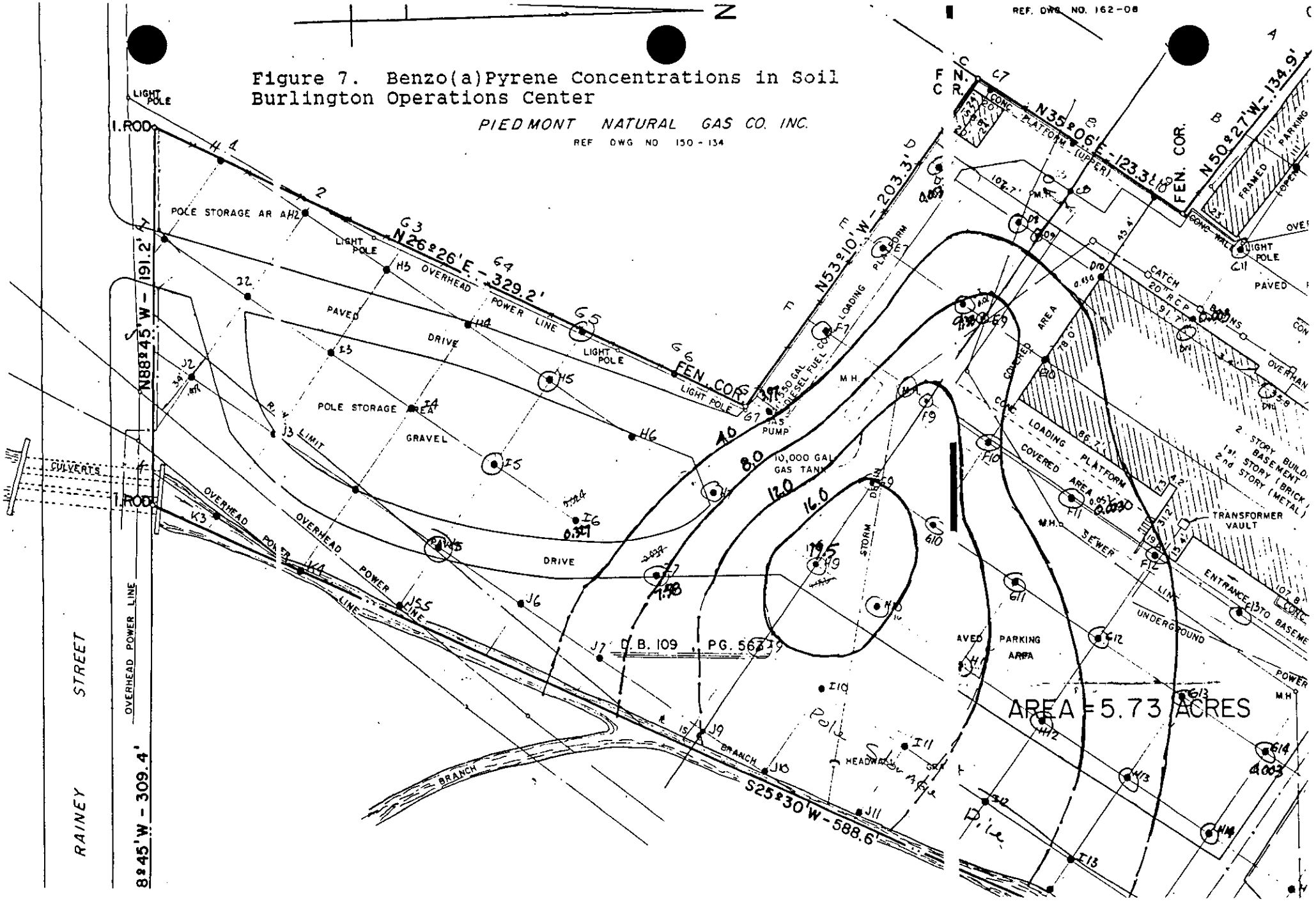


Table 1. Soil Chemistry-Organics
Preliminary Site Environmental Assessment
Burlington Operations Center
May 22-25, 1989

LOCATION	Depth	TPH (ug/kg)	Bz (ug/kg)	Tn (ug/kg)	EB (ug/kg)	Xy (ug/kg)	BaP (ug/kg)	Py (ug/kg)	Np (ug/kg)
J2	3'4"-4'4"	19000	ND	ND	ND	ND	408	897	< 2000
H9	3'4"-4'4"	420230	ND	0.58	ND	ND	19500	64600	< 20000
I6	3'4"-4'4"	17090	ND	ND	ND	ND	327	541	< 2000
I7	3'4"-4'4"	280000	ND	ND	ND	ND	7480	11400	< 20000
F11	3'4"-4'4"	4800	ND	0.49	ND	ND	< 3.0	< 30	< 2000
G7	3'4"-4'4"	200000	ND	ND	ND	ND	3970	6020	< 20000
G14	3'4"-4'4"	ND	ND	ND	ND	ND	< 3.0	< 30	< 2000
C9	3'4"-4'4"	ND	ND	ND	ND	ND	< 3.0	< 30	< 2000
E9	3'4"-4'4"	140000	ND	0.30	ND	ND	9330	11900	< 20000
D10	3'4"-4'4"	ND	ND	0.33	0.34	ND	< 3.0	< 30	< 2000
D7	3'4"-4'4"	ND	ND	0.56	ND	ND	< 3.0	< 30	< 2000

TPH = Total Petroleum Hydrocarbons
Bz = Benzene
Tn = Toluene
EB = Ethylbenzene
Xy = Xylene
BaP = Benzo(a)Pyrene
Py = Pyrene
Np = Naphthalene
< = Less Than
ND = Not Detected

Table 2. Soil Chemistry-Inorganics
Preliminary Site Environmental Assessment
Burlington Operations Center
May 22-25, 1989

SAMPLE DISC.	SAM NUMBER	TOTAL RESULT (mg/G)							(ug/G)	LEACH PROPORTIONED RESULTS (mg/L)						
		AG	BA	CD	CR	PB	AS	SE	HG	AG	BA	CD	CR	PB	AS	SE
I-2 (3'4"-4'4")	8905190-01	<0.001	0.030	0.001	0.008	0.012	0.002	<0.00004	<0.05	<0.04	1.5	0.05	0.43	0.62	0.10	<0.002
I-6 (3'4"-4'4")	8905190-02	<0.001	0.044	0.002	0.006	0.024	0.001	<0.00004	0.094	<0.04	2.2	0.08	0.31	1.2	0.03	<0.002
I-7 (3'4"-4'4")	8905190-03	<0.001	0.062	0.002	0.011	0.038	0.005	<0.00004	0.116	<0.04	3.1	0.11	0.54	1.9	0.24	<0.002
G-7 (3'4"-4'4")	8905190-04	<0.001	0.078	0.002	0.013	0.058	0.007	<0.00004	1.24	<0.04	3.9	0.12	0.64	2.9	0.35	<0.002
H-9 (3'4"-4'4")	8905190-05	<0.001	0.060	0.002	0.020	0.082	0.002	<0.00004	<0.05	<0.04	3.0	0.09	1.0	4.1	0.09	<0.002
F-11(3'4"-4'4")	8905190-06	0.001	0.166	0.006	0.011	0.052	0.006	0.0002	0.057	0.07	8.3	0.31	0.54	2.6	0.28	0.008
F-[redacted]"-7'8")	8905190-07	0.002	0.094	0.006	0.008	0.046	0.012	<0.00004	0.05	0.08	4.7	0.32	0.42	2.3	0.60	<0.002
G-14(3'4"-4'4")	8905190-08	<0.001	0.044	0.004	0.024	0.032	0.004	<0.00004	<0.05	<0.04	2.2	0.21	1.2	1.6	0.21	<0.002
D-10(3'4"-4'4")	8905191-01	0.001	0.220	0.004	0.007	0.030	0.001	<0.00004	<0.05	0.04	11	0.19	0.35	1.5	0.05	<0.002
D-10(6'8"-7'8")	8905191-02	0.001	0.168	0.003	0.005	0.020	0.005	<0.00004	<0.05	0.04	8.4	0.14	0.26	1.0	0.23	<0.002
E-9 (3'4"-4'4")	8905191-03	<0.001	0.088	0.002	0.012	0.019	<0.001	<0.00004	0.13	<0.04	4.4	0.12	0.61	0.94	0.02	<0.002
E-9 (6'8"-7'8")	8905191-04	0.001	0.076	0.004	0.020	0.038	0.003	<0.00004	0.073	0.06	3.8	0.22	1.0	1.9	0.16	<0.002
D-7 (3'4"-4'4")	8905191-05	0.001	0.154	0.004	0.018	0.030	0.003	<0.00004	<0.05	0.06	7.7	0.20	0.92	1.5	0.15	<0.002
D-7 (6'8"-7'8")	8905191-06	<0.001	0.026	0.002	0.011	0.014	0.001	0.00005	<0.05	<0.04	1.3	0.08	0.56	0.70	0.03	0.002
C-9 (3'4"-4'4")	8905191-07	<0.001	0.084	0.004	0.010	0.034	0.001	<0.00004	<0.05	<0.04	4.2	0.20	0.52	1.7	0.07	<0.002
C-9 (6'8"-7'8")	8905191-08	0.003	0.184	0.007	0.046	0.052	0.007	<0.00004	<0.05	0.13	9.2	0.35	2.3	2.6	0.34	<0.002

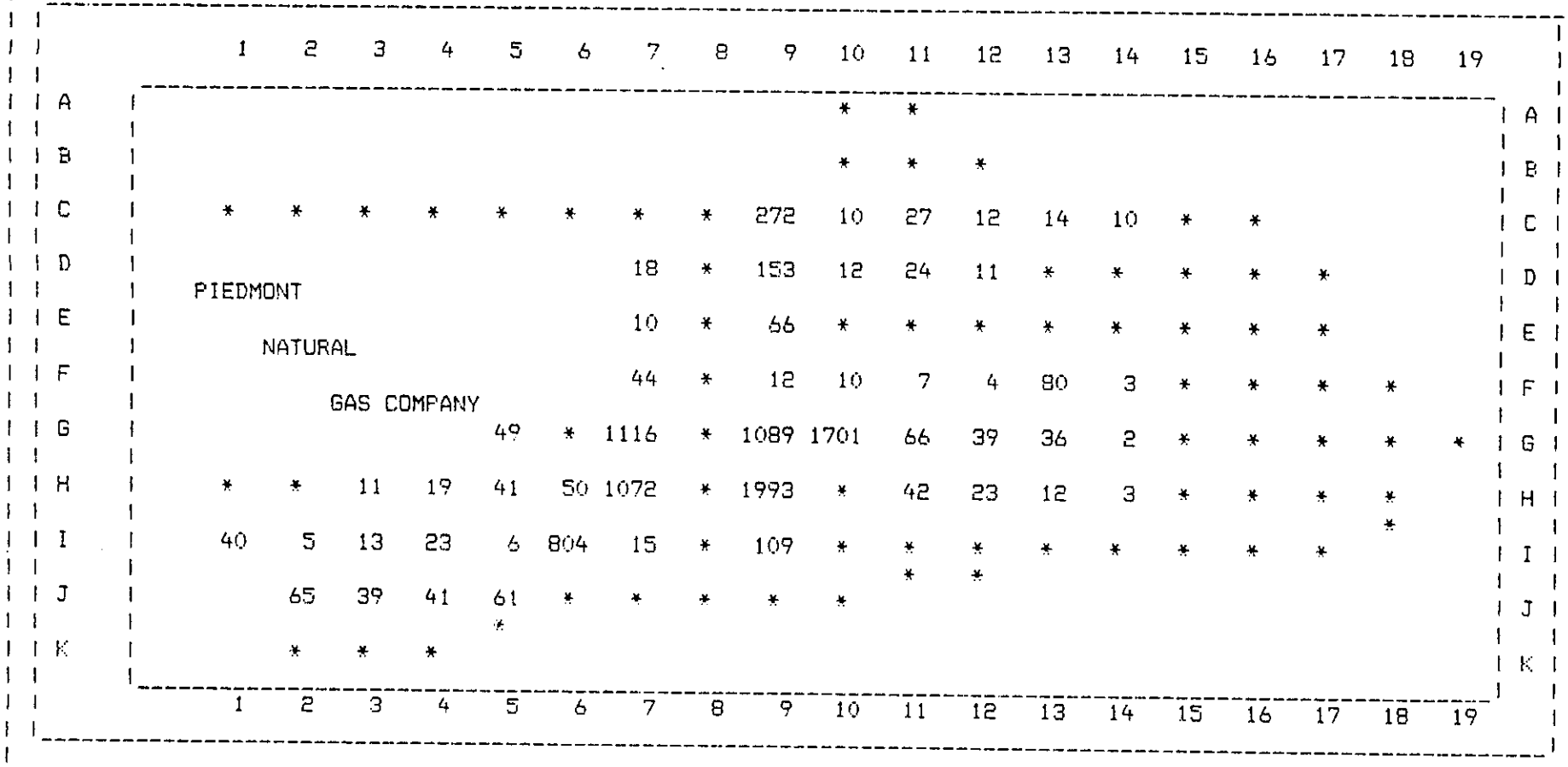
Table 3. Surface Water Quality
Preliminary Site Environmental Assessment
Burlington Operations Center
May 25, 1989

PARAMETER	UNITS	S-1 Above	S-2 Above	S-3 Onsite	S-4 Below
Temperature	deg C	20.2	31.0	25.5	24.5
pH	SU	6.5	7.3	7.8	7.2
Sp Conductivity	umhos/cm	208	354	310	310
Alkalinity	mg/l as CaCO3	51	102	91	92
Total Arsenic	mg/l	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total Barium	mg/l	0.060	0.06	0.06	0.06
Total Cadmium	mg/l	0.00033	0.00052	0.00038	0.00076
Total Chromium	mg/l	0.0031	0.0027	0.00044	0.0026
Total Copper	mg/l	0.030	< 0.030	< 0.030	< 0.030
Total Iron	mg/l	0.99	0.49	0.79	0.87
Total Mercury	mg/l	< 0.010	< 0.010	< 0.010	< 0.010
Total Manganese	mg/l	0.10	0.04	0.06	0.11
Total Lead	mg/l	0.0027	< 0.0020	< 0.0020	< 0.0020
Total Selenium	mg/l	< 0.0020	< 0.0020	< 0.0020	< 0.0020
Total Silver	mg/l	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Total Zinc	mg/l	0.08	0.04	0.02	0.04
Benzene	ug/l	< 4.4	< 4.4	< 4.4	< 4.4
Toluene	ug/l	< 6.0	< 6.0	< 6.0	< 6.0
Ethylbenzene	ug/l	< 7.2	< 7.2	< 7.2	< 7.2
Benzo(a)pyrene	ug/l	< 2.5	< 2.5	< 2.5	< 2.5
Pyrene	ug/l	< 1.9	< 1.9	< 1.9	< 1.9
Naphthalene	ug/l	< 1.6	< 1.6	< 1.6	< 1.6

< = Below the Detection Limit

SOIL VAPOR SURVEY
BURLINGTON RETAIL OPERATIONS CENTER

PARAMETER:.....AREA COUNT (TOTAL VOLTS)
DATE OF SURVEY:..5/22/89 --> 5/24/89



Burlington Operations Center

UST Closure Report
Summary Data

June 1998

DUKE POWER COMPANY
BURLINGTON OPERATIONS CENTER
UNDERGROUND STORAGE TANK
CLOSURE REPORT

Tamara Carpenter
July 15, 1998

Ralph C. Roberts
July 15, 1998

Duke Power Company
526 S. Church Street
Charlotte, NC 28202-1802

Ralph C Roberts 7/15/98

NORTH CAROLINA PROFESSIONAL SEAL 10354 ENGINEER RALPH C. ROBERTS

UNDERGROUND STORAGE TANK CLOSURE REPORT

The closure report should contain, at a minimum, the following information. Any other information that is pertinent to the site should be included.

I. General Information

A. Ownership of UST(s)

1. Name of UST owner.

   Duke Power Company

2. Owner address and telephone number.

   526 S. Church St, Charlotte, NC 28202-1802 (704)373-7891

B. Operator of UST(s)

1. Name of UST operator.

   Duke Power Company

2. Operator address and telephone number.

   526 S. Church St, Charlotte, NC 28202-1802 (704)373-7891

C. Facility Information

1. Facility name.

   Burlington Operations Center

2. Facility ID #.

   0-023474

3. Facility address, telephone number, and county.

   1205 N. Church St., Burlington, NC 27215, Alamance County

D. Contacts

1. Name, address, telephone number, and job title of primary contact person.

   Tamara Carpenter, Engineer,
   526 S. Church St, Charlotte, NC 28202-1802 (704)373-7891

2. Name, address, and telephone number of closure contractor.

SEI Environmental, 130 Penmarc Dr, Suite 108, Raleigh, NC 27603, Attn: John Peters (919)832-2535

3. Name, address, and telephone number of primary consultant.

   Ralph C. Robert, 526 S. Church St, Charlotte, NC 28202-1802 (704)373-7888

4. Name, address, telephone number, and State certification number of laboratory.

   Duke Power - Environment, Health, and Safety Department,
   Laboratory Services
   13339 Hagers Ferry Road, Huntersville, NC 28078
   (704)875-5304
   NC Certificate #248

E. UST Information

Tank no.	Installation dates	Size in Gallons	Tank Dimensions	Last Contents	Previous Contents (if any)
1	**5/10/68**	**10,000**	**18' long x 10.5' dia**	**diesel**	**none**
2	**5/9/75**	**15,000**	**23.5' long x 10.5' dia**	**gasoline**	**none**

F. Site Characteristics

1. Describe any past releases at this site.

   The gasoline tank was overfilled in 1996 which resulted in a release. The soil around the fill port was removed and properly disposed of. Clean soil and gravel was replaced. An overfill also occured on 12/15/92 at the gas tank.

2. Is the facility active or inactive at this time? If the facility is inactive, note the last time the USTs were in operation.

   Active.

3. Describe surrounding property use (for example, residential, commercial, farming, etc.).

The property surrounding the Burlington Operations Center is primarily industrial and commercial.

4. Describe site geology/hydrogeology.

   Site soils are primarily silty clay. Site drainage in the area is southeast The depth to groundwater is unknown but expected to be greater than 13 feet. No groundwater was encountered during the excavation and removal. Other samplings at the site have found the groundwater at less than 13 feet.

5. Describe results of receptor survey (water wells, basements, etc., within 1500 feet of the facility). To be performed if a release has occurred.

   The receptors within 1500 feet of the site include a small creek approximately 200 feet southeast of the gasoline tank, and the basement of the operations center (see Figure 3). The drinking water wells have not been surveyed but the area is supplied by a public water supply. The surrounding receptors will be better determined during the MGP site investigation.

II. Closure Procedures

A. Describe preparations for closure including the steps taken to notify authorities, permits obtained, and the steps taken to clean and purge the tanks.

The GW/UST3- Form (see Appendix A) was submitted to the NCDEHNR Winston-Salem Regional Office on May 26, 1998. The local fire marshall was notified and was present at the time of the UST removal. Vapors were expelled from the tank using dry ice. The remaining product and sludge in the tanks was removed by Haz-Mat Transportation and Disposal on June 12, 1998 (see appendix D).

B. Note the amount of residual material pumped from the tank(s).

Approximately 3100 gallons of gasoline and diesel fuel were pumped from the tanks (see Appendix D).

C. Describe the storage, sampling, and disposal of the residual material.

The residual material was removed by Haz-Mat Transportation and Disposal on June 12, 1998. The disposal manifest for the handling of the residual material is included in Appendix D.

D. Excavation

1. Describe excavation procedures noting the condition of the soil encountered and the dimensions of the excavation in relation to the tanks, piping, and/or pumps.

   The gasoline and diesel tanks were excavated using a trackhoe. Groundwater was not encountered during the removal. As shown on Figure 4, an excavation with dimension 14' x 30' x 12' deep was made for the removal of the diesel tank. As shown on Figure 5, an excavation with dimensions 25' x 32' x 13' deep was made for the removal of the gasoline tank. An excavation

with the dimension of 6' x 10' x 4' deep was made for the removal of the dispensers. Approximately 78 cubic yards of contaminated soil was removed during the removal of the diesel tank and dispenser. No gasoline contaminated soil was found during the removal of the gasoline tank.

2. Note the depth of tank burial(s) (from land surface to top of tank).

   The diesel tank had approximately 2 feet of cover. The surface above the tanks was asphalt. The gasoline tank had approximately 3 feet of soil cover. The surface above the tank was gravel.

3. Note volume of soil excavated.

   Approximately 450 cubic yards of soil was excavated for the removal of the tanks, piping, and dispensers.

4. Describe soil type(s) encountered.

   The soil type was silty clay.

5. Describe type and source of backfill used.

   The soil removed during the excavation of the gasoline tank was reused as backfill. The soil removed during the excavation of the diesel tank and the gasoline and diesel dispensers was contaminated and was disposed of with Soil Solutions (see Appendix D). Soil samples were obtained around the piping with the Geoprobe Direct Push Technology. The remainder of the excavation was filled with clean soil and topped with gravel.

6. Describe condition of UST system(s) (i.e., pitting, holes, etc.)

   The UST, piping, and dispensers were in good condition. There was some minor pitting on the tanks but no holes were present.

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soil and Groundwater" on limiting excavations. The Trust Fund will not pay for excessive excavation. Potentially uncontaminated soil may be separated from potentially contaminated soil based on field screening readings; however, laboratory confirmation is required to document the presence or absence of contamination for disposal purposes.

E. Contaminated Soil

1. Describe how it was determined to what extent to excavate the soil.

   Minimal excavation was performed to facilitate the UST system removal. Soil samples were collected at the required sampling locations and field screened using a Photovac Microtip 2000 photoionization detector (PID) to determine the existence of any soil contamination. Field screening indicated contamination due to product overfills around the diesel tank and under both dispensers.

2. Describe method of temporary storage, sampling, and treatment/disposal of soil.

The contaminated soil removed during the excavation was disposed of with Soil Solutions, Inc. (see Appendix D). The clean soil was returned to the excavation and used as backfill. No temporary storage of soil was required.

Note: Suspected contaminated soil should be segregated from soil that appears to be uncontaminated and should be treated as contaminated until proven otherwise It should not be used as backfill.

III. Site investigation

A. Provide information on field screening and physical observations, as well as methods used to calibrate field screening instrument(s).

Soil initially removed from the excavation was screened using a Photovac Microtip 2000 photoionization detector (PID). The field screening was done periodically during the excavation to determine the condition of the soil removed. Contamination was encountered under the dispensers and around the diesel tank. Collected samples were also screened using the PID. The PID was calibrated in accordance with manufacturer's recommendations.

B. Describe soil sampling points and sampling procedures used, including:

- Location of samples;
- Type of samples (from excavation, stockpiled soil, etc.);
- Sample collection procedures (grab, split spoon, hand auger, etc.);
- Depth of soil samples (below land surface);
- Whether samples were taken from side or floor of an excavation;
- Sample identification;
- Sample analyses.

A total of 8 soil samples (all grab samples) were collected from the excavation of the diesel tank. Note: There was a concrete pad under the tank which required samples to be taken on each side of the pad. These samples were collected around the pad at a depth of 12 feet below the surface. Sample 05 was collected beneath the dispensers at a depth of 4 feet and samples 03 and 04 were collected beneath the product line at a depth of 4 feet. These samples were analyzed per EPA methods 8260, 8270, and MADEP VPH and EPH. The location of these samples is shown on Figure 4.

A total of 3 samples were collected from the excavation of the gasoline tank. Note: There was not a concrete pad beneath this tank. These samples were collected on the floor of the excavation at a depth of 13 feet. Samples 13, and 14 were collected beneath the gasoline product line at a depth of 4 feet and sample 12 was collected beneath the dispenser at a depth of 4 feet. The samples under the product line were collected using the Geoprobe direct push technology. These samples were analyzed per EPA methods 8260 and MADEP-VPH.

The sample analyses results summary is provided in Tables 1 and 2. The chain of custody sheet and the analytical results are provided in Appendices E and F, respectively.

The soil samples were placed in glass jars with teflon seals and screw caps leaving zero headspace and placed on ice for temporary storage and transport to the analytical laboratory. The MADEP-VPH samples were preserved in methanol and placed on ice for temporary storage. Sample containers were labeled in the field and consecutively numbered at the time of sample collection.

Laboratories: **Duke Power Company, Laboratory Services,**
13339 Hagers Ferry Rd
Huntersivlle, NC 28078

MADEP Method
Paradigm Analytical Laboratories, Inc
Willmington, NC

C. Describe groundwater or surface water sampling procedures used, including:

- Location of samples;
- Sample collection procedures (grab, bailer, etc.);
- Sample identification;
- Sample analyses.

Note. Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soil and Groundwater" for information about sampling requirements.

Not Applicable. No groundwater was encountered during the removal of the tanks.

D. Describe quality control measures, including:

- Sample handling procedures including sample preservation and transportation;
- Decontamination procedures used;
- Time and date samples were collected and date submitted to lab;
- Samples collected for quality control purposes (e.g. duplicates, field blanks, trip blanks, etc.), including methods used to obtain these samples and analytical parameters;
- How results of quality control samples may have affected your interpretation of soil, groundwater, or surface water sample results.

Samples were preserved for temporary storage and transport to the laboratory by placing on ice in a cooler. The MADEP-VPH samples were preserved in methanol and placed on ice for temporary storage. Sample containers were received from the laboratory clean.

The soil samples were collected on June 15, 1998 for the removal of the diesel tank and on June 16, 1998 for the removal of the gasoline tank and delivered to the

laboratory on June 17, 1998. Soil was placed in jars by hand using latex gloves. New gloves were used for each sample collected. A trip blank was only collected for the MADEP method. No other field or trip blanks were collected.

E. Describe investigation results, including:

- Results of Site Sensitivity Evaluation (SSE), (if SSE was not conducted, explain why not);
- Methods of analyses used (include U. S. EPA method number);
- Analytical results for samples; discuss in relation to site specific cleanup level or action level, as appropriate

The samples collected during the removal of the diesel tank system were anaylzed per EPA Methods 8260, 8270, and MADEP - VPH and MADEP-EPH. The location of these samples is shown on Figure 4. The samples collected during the removal of the gasoline tank system were analyzed per EPA Methods 8260 and MADEP-VPH. The location of these samples is shown on Figure 5. The results of the analyses are provided in Table 1 and Table 2.

The contaminated soil removed during the excavation of the diesel tank and the dispensers most likely resulted from product overfills and in the dispensers leaking. The analyses results presented in Tables 1 and 2 showed contamination remaining in both excavations. Analytical results indicate a limited volume of diesel fuel contaminated soil and additional polycyclic aromatic hydrocarbon (PAH) from a manufactured gas plant (MGP) formerly located at the site. The levels of contaminants present did not exceed the Maximum Soil Contaminant Concentrations (MSCC) for the industrial/commercial classification. However, the several of the contaminants exceeded the MSCC soil-to-groundwater levels.

An SSE was not performed for this tank closure because the soil has been impacted with MGP residues and the site will be investigated and remediated under the Hazardous Waste site program.

IV. Conclusions and Recommendations

Include probable sources of contamination, further investigation or remediation tasks, or whether no further action is required.

The Burlington Operations Center is the location of a former Manufactured Gas Plant (MGP) Site. The MGP operated from 1925 until the early 1950's. Regulatory oversite for the MGP sites is provided by the NCDENR Sperfund Section (Bruce Nicholson). Duke has scheduled to investigate the MGP site in the fall of 1998.

Duke recommends no additional investigation be performed as part of the tank closure. Any contamination remaining from the UST systems is minor when compared to the impacts of the MGP and will be handled as part of the MGP investigation and remediation.

V. Signature and Seal of Professional Engineer or Licensed Geologist

Professional Engineer Registration # 10354
Licensed Geologist License #. Ralph C. Roberts

Note. Required if a release or discharge of product from the tank(s) has occurred. If a release or discharge has not occurred, the signature or seal of a P. E. or L. G. is not required.

VI. Enclosures

A. Figures

1. Area map(s) (can be USGS Topographic Quadrangle) showing:
   - Adjacent streets, roads, highways with names and numbers;
   - Buildings;
   - Surface water bodies;
   - Groundwater flow direction (if available);
   - North arrow;
   - Scale;
   - If a release has occurred show:
     Public and private water supply well(s) within 1,500 feet of the site -

See Figures 1 and 2.

2. Site map of UST excavation area drawn to scale, showing.
   - Buildings;
   - Underground utilities such as sewer lines and other conduits; **NA**
   - Orientation of UST(s), pumps, and product lines (current and former);
   - Length, diameter and volume of USTs (current and former);
   - Type of material(s) stored in USTs (current and former);
   - Sample locations (identified by letter or number);
   - Groundwater well locations; **NA**
   - Groundwater flow direction (if available); **NA**
   - Final limits of excavation;
   - North arrow;
   - Scale.

See Figures 3, 4, and 5.

3. Maps depicting analytical results, to include.
   - Orientation of UST(s), pumps, and product lines;
   - Sample locations, depths, and identifications;
   - Analytical results;
   - Final limits of excavation(s).

See Tables 1 and 2, Figures 4 and 5.

B. Tables

1. Field screening results. **NA**
2. Sample identifications, depths and analyses.
3. Sample identifications with results and dates that samples were taken.

See Tables 1 and 2.

C. Appendices

Appendix A. Notification of intent to close (GW/UST-3)
Appendix B. Site Investigation Report for Permanent Closure or Change-in-Service UST (GW/UST-2)
Appendix C. Certificate of UST disposal
Appendix D. Soil, water, sludge disposal manifests
Appendix E. Complete chain-of-custody records
Appendix F. Copy of all laboratory analytical records
Appendix G. Site Sensitivity Evaluation (SSE) (if applicable) **NA**
Appendix H. Photographs of Closure Activities (optional) **NA**
Appendix I. Geologic logs for excavation(s)/borings **NA**

ENCLOSURES

USGS Topo Map

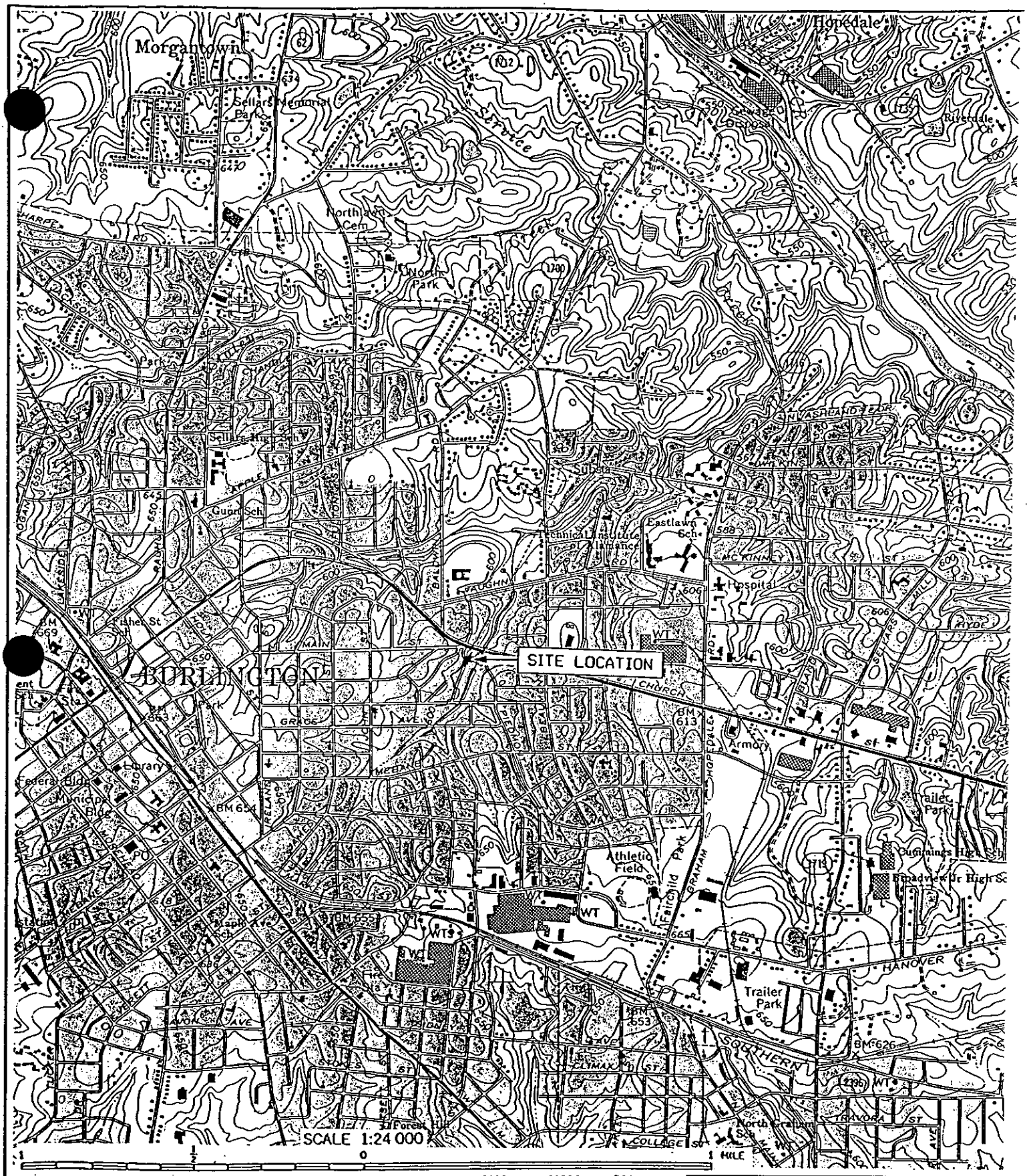
Location Maps

Site Map of UST Excavation Area

Map of Sample Locations

Tables of Analytical Results

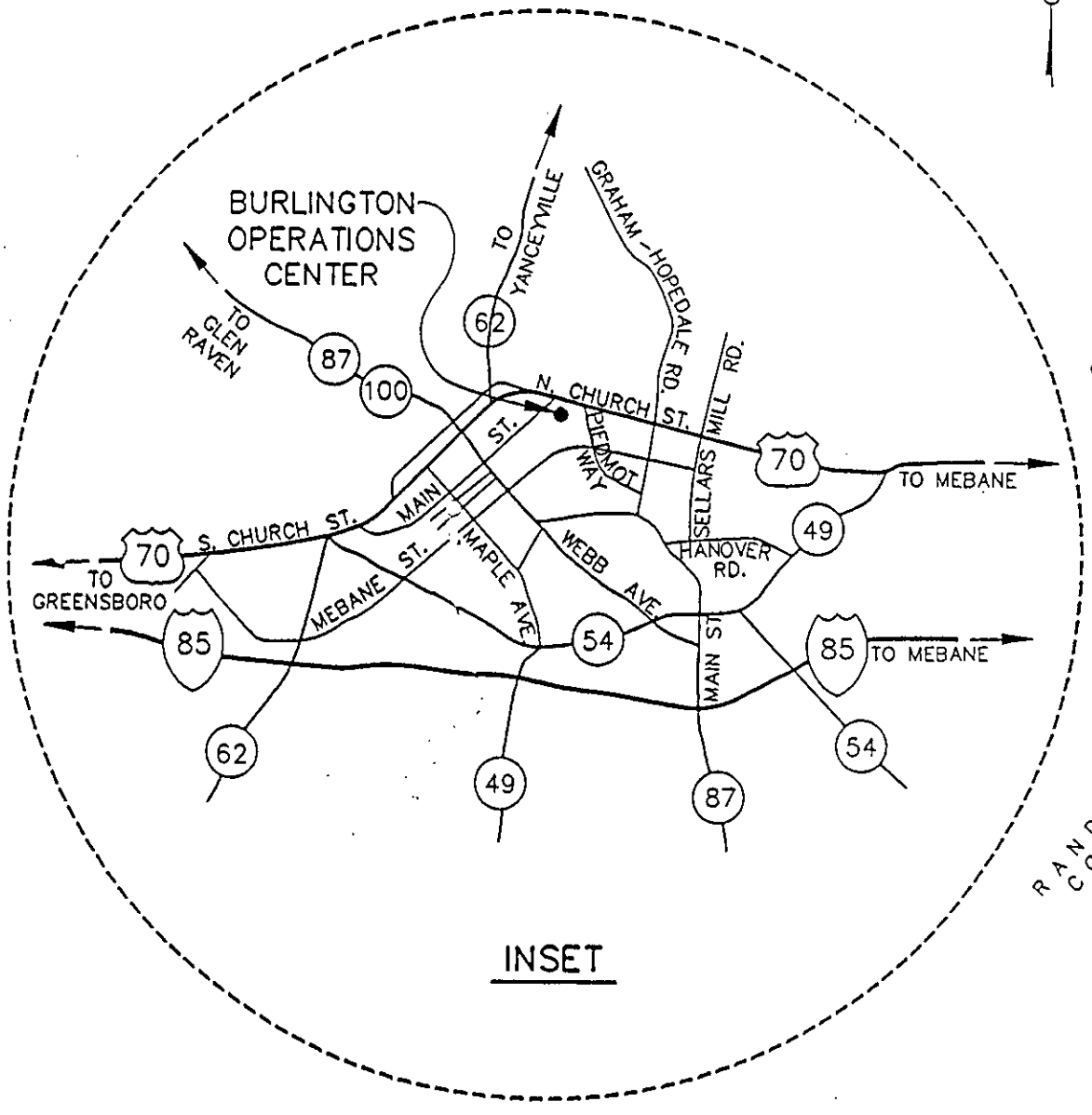
Appendices A thru F

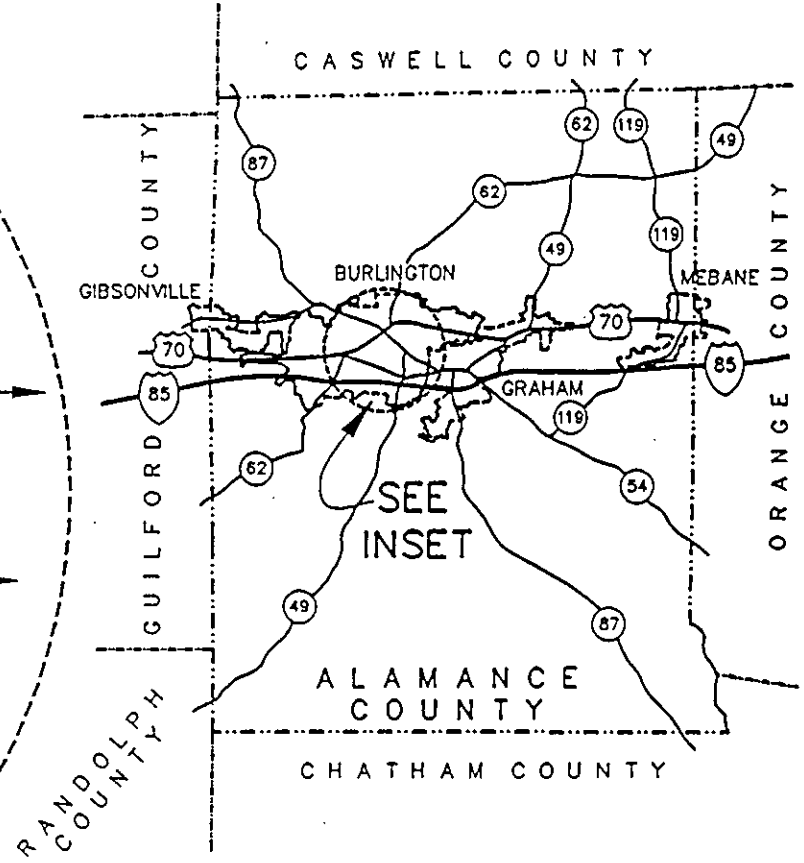


DUKE POWER

BURLINGTON OPERATION CENTER
USGS TOPO MAP
BURLINGTON, N.C.
1969

FIGURE: 1

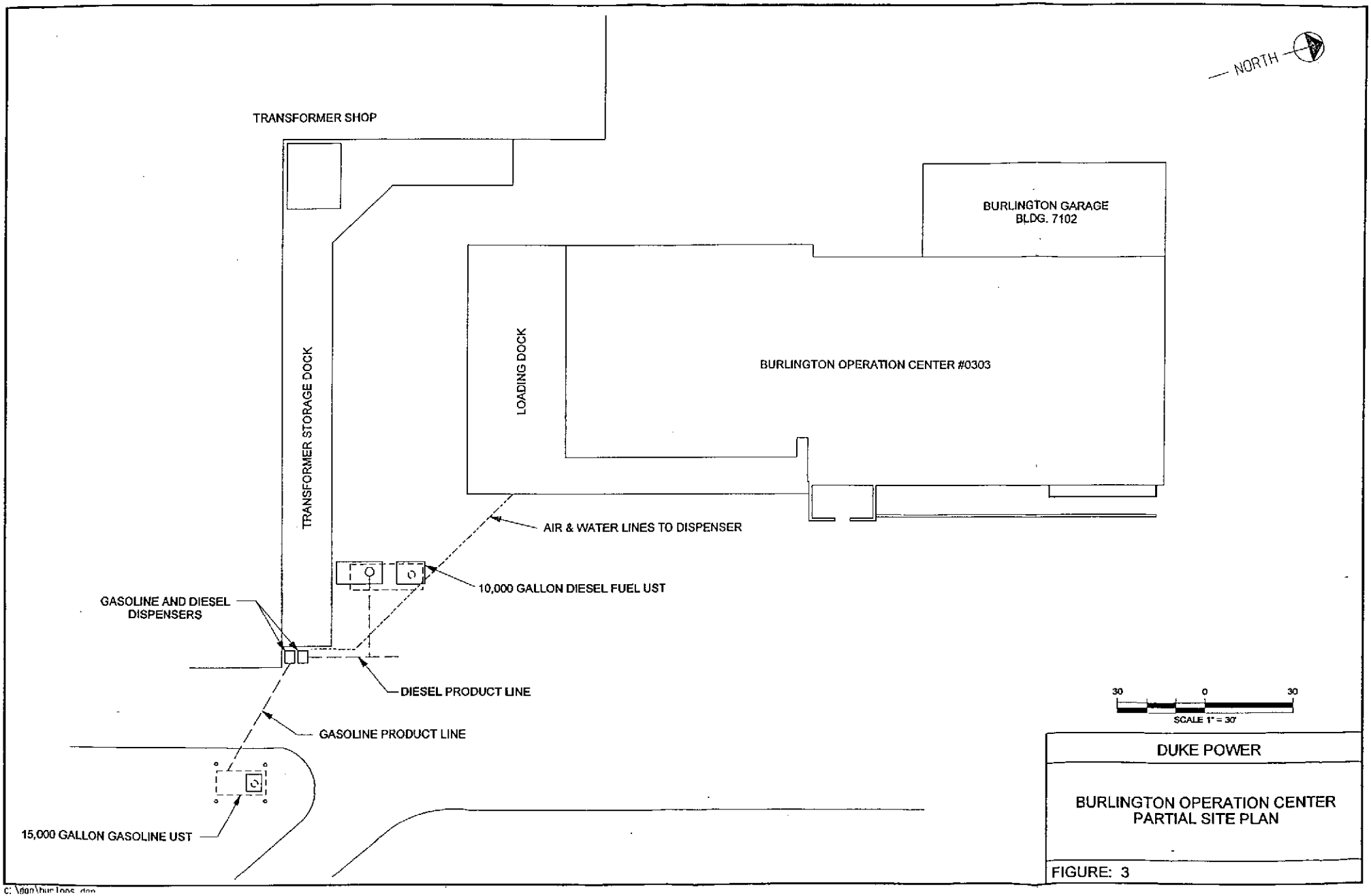


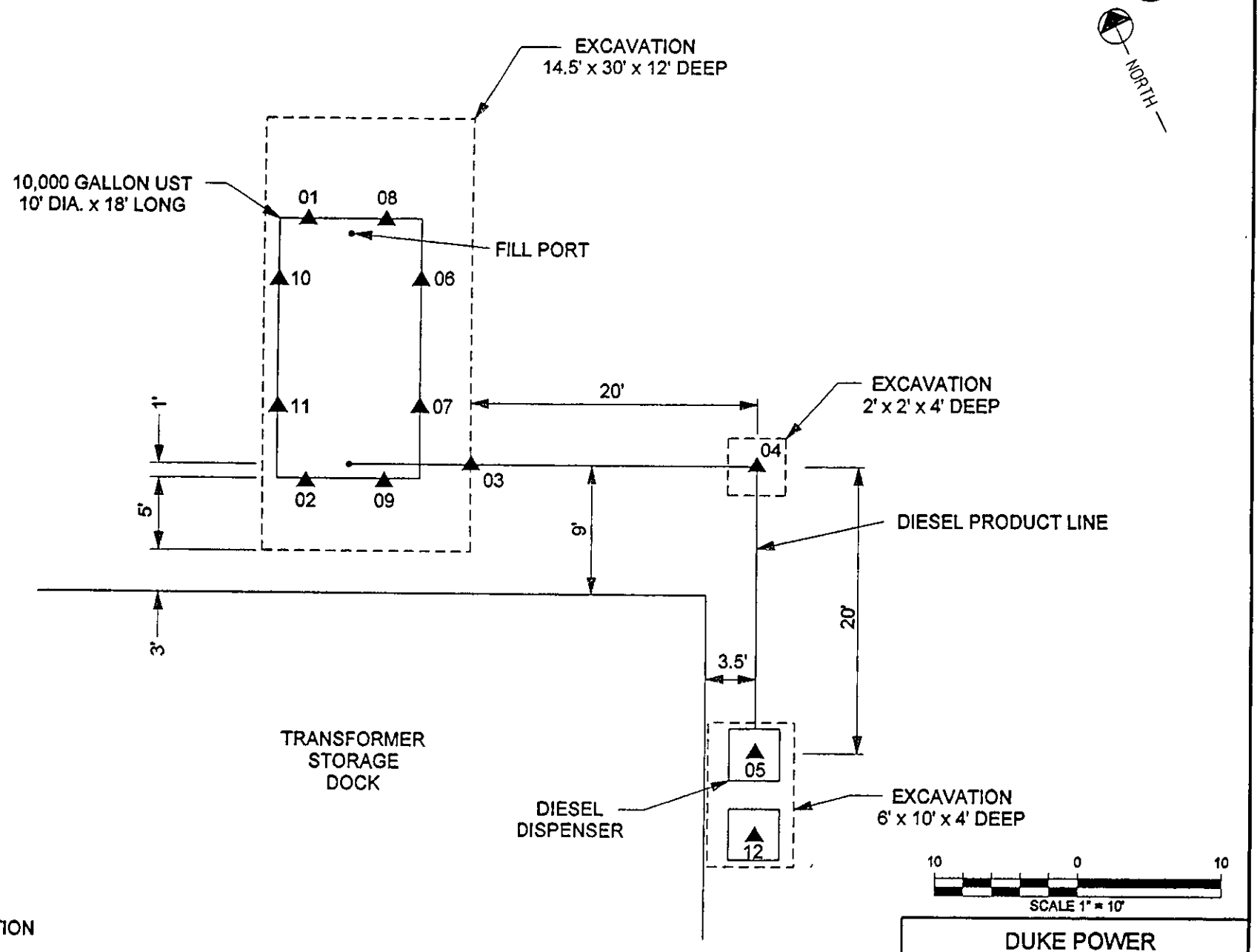


DUKE POWER

BURLINGTON OPERATION CENTER
SITE LOCATION MAP

FIGURE: 2


NORTH
TRANSFORMER SHOP
BURLINGTON GARAGE
BLDG. 7102
LOADING DOCK
BURLINGTON OPERATION CENTER #0303
TRANSFORMER STORAGE DOCK
AIR & WATER LINES TO DISPENSER
10,000 GALLON DIESEL FUEL UST
GASOLINE AND DIESEL
DISPENSERS
DIESEL PRODUCT LINE
GASOLINE PRODUCT LINE
15,000 GALLON GASOLINE UST
30
0
30
SCALE 1" = 30'
DUKE POWER
BURLINGTON OPERATION CENTER
PARTIAL SITE PLAN
FIGURE: 3



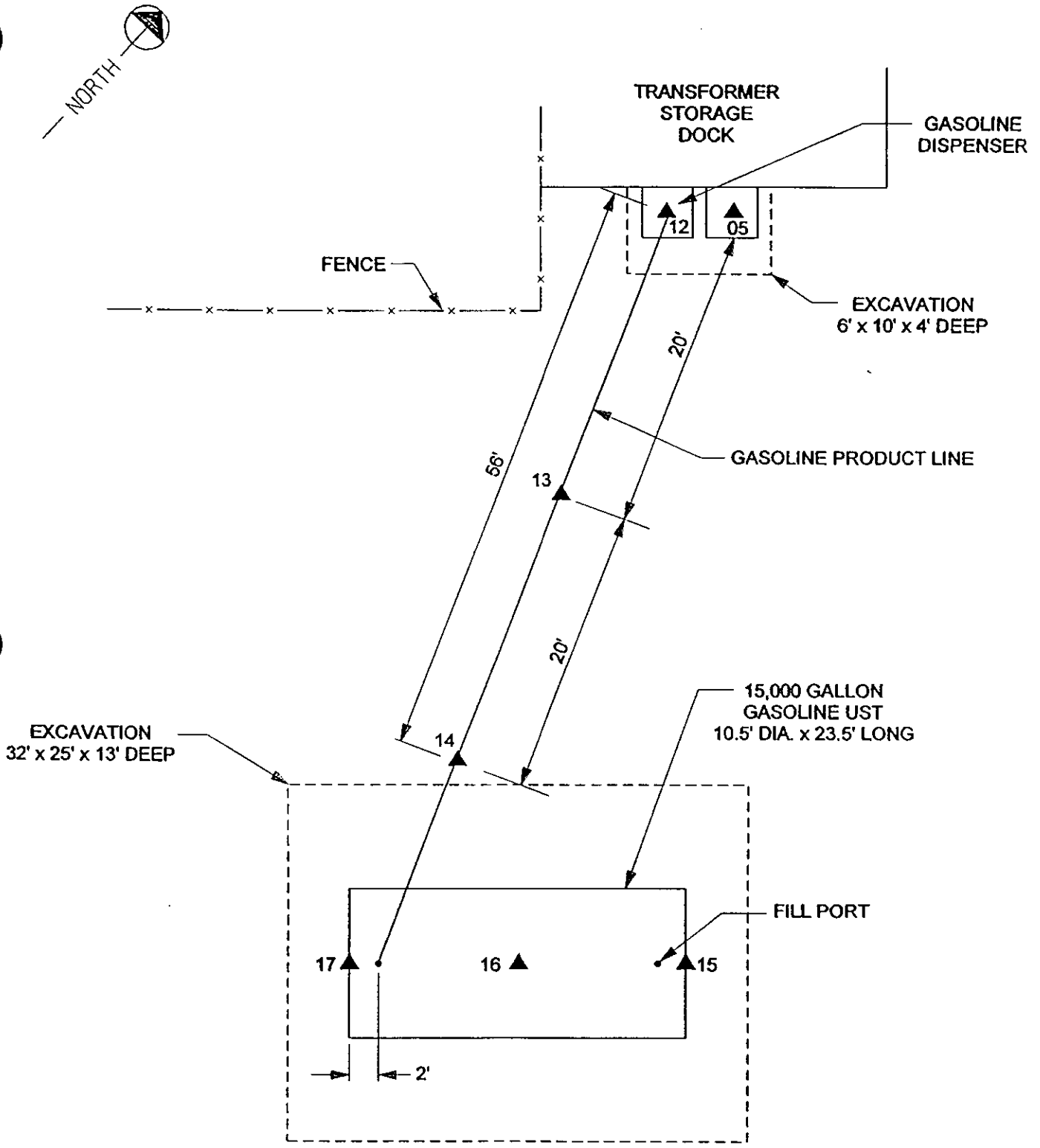
LEGEND:

▲ SAMPLE LOCATION

DUKE POWER

BURLINGTON OPERATION CENTER
DIESEL TANK
SAMPLE LOCATIONS

FIGURE: 4



LEGEND:

▲ SAMPLE LOCATION

10 0 10

SCALE 1" = 10'

DUKE POWER

BURLINGTON OPERATION CENTER
GAS TANK
SAMPLE LOCATIONS

FIGURE: 5

Burlington Operations Center
UST Closure Report
Analytical Results - Table 1

Sample ID	Depth (ft)	Analytical Method	Results	ug/kg
BOC 01	12	8260	ND	
		8270	bis(2-Ethylhexyl)phalate	630
BOC 02	12	8260	Napthalene	4900
		8270	Napthalene	330
			2-Methylnapthalene	3300
			Acenaphthene	3300
			Phenathrene	2500
			Anthracene	1100
			Fluoranthene	780
			Pyrene	340 ✓
			Chrysene	5200 ✓
BOC 03	4	8260	n-Butylbenzene	39
			Napthalene	87
		8270	ND	
BOC 04	4	8260	Benzene	230
			Ethylbenzene	450
			m-p-Xylene	1100
			o-Xylene	240
			n-Propyl benzene	94
			1,3,5-trimethylbenzene	140
			1,2,4-trimethylbenzene	560
			Napthalene	70
		8270	Napthalene	480
			2-Methylnapthalene	360
			Phenathrene	1200
			Fluoranthene	1100
			Benzo(a)anthracene	990 ✓
			Chrysene	1000 ✓
			Benzo(k)fluorathene	1600 ✓
			Benzo(a)pyrene	680 ✓
			Indeno(1,2,3-c,d)pyrene	850 ✓
			Dibenzo(a,h)anthracene	470 ✓
			Benzo(g,h,I)perylene	820 ✓
BOC 05	4	8260	ND	
		8270	bis(2-Ethylhexyl)phalate	600
BOC 06	12	8260	Napthalene	310
		8270	Phenanthrene	460
BOC 07	12	8260	Napthalene	12000
		8270	Phenanthrene	430
			bis(2-Ethylhexyl)phalate	750

Burlington Operations Center
UST Closure Report
Analytical Results - Table 1

Sample ID	Depth (ft)	Analytical Method	Results	ug/kg
BOC 08	12	8260	ND	
		8270	ND	
BOC 09	12	8260	ND	
		8270	ND	
BOC 10	12	8260	Napthalene	15000
		8270	Napthalene	24000
			2-Methylnapthalene	51000
			Acenaphthene	25000
			Dibenzofuran	4500
			Fluorene	13000
			Phenanthrene	32000
			Anthracene	10000
			Fluoranthene	9000
			Pyrene	5100 ✓
			Benzo(a)anthracene	5000 ✓
			Chrysene	6700 ✓
			Benzo(k)fluorathene	4100 ✓
			Benzo(a)pyrene	3400 ✓
BOC 11	12	8260	ND	
		8270	Phenanthrene	650
			Fluoranthene	1100
			Benzo(a)anthracene	1200 ✓
			Chrysene	1300 ✓
			bis(2-Ethylhexyl)phalate	570
			Benzo(k)fluorathene	1800 ✓
			Benzo(a)pyrene	840 ✓
			Indeno(1,2,3-c,d)pyrene	870 ✓
			Dibenzo(a,h)anthracene	480 ✓
			Benzo(g,h,I)perylene	830 ✓
BOC 12	4	8260	ND	
BOC 13	4	8260	n-Propyl benzene	96
			1,3,5-trimethylbenzene	360
			1,2,4-trimethylbenzene	1100
			sec-Butylbenzene	230
			p-Isopropyltoluene	260
			Napthalene	430
BOC 14	4	8260	Napthalene	190
BOC 15	13	8260	ND	
		8270	Napthalene	610
			2-Methylnapthalene	780

Burlington Operations Center
UST Closure Report
Analytical Results - Table 1

Sample ID	Depth (ft)	Analytical Method	Results	ug/kg	
			Phenanthrene	610	
			Fluoranthene	1100	
			Benzo(a)anthracene	1100	✓
			Chrysene	1200	✓
			bis(2-Ethylhexyl)phalate	640	
			Benzo(k)fluorathene	1700	✓
			Benzo(a)pyrene	770	✓
			Indeno(1,2,3-c,d)pyrene	820	✓
			Dibenzo(a,h)anthracene	470	✓
			Benzo(g,h,I)perylene	780	✓
BOC 16	13	8260	Ethylbenzene	13	
			m-p-Xylene	31	
			o-Xylene	15	
			n-Propyl benzene	9.9	
			1,3,5-trimethylbenzene	23	
			1,2,4-trimethylbenzene	60	
			Napthalene	12	
BOC 17	13	8260	ND		

Burlington Operations Center
MADEP Analytical Results
Table 2

Location: ton Operations Center
Sample ID: BOC 01

Toxicologically Defined Hydrocarbon Fraction	Analytical Hydrocarbon Fractions	Analytical Method	Laboratory Results Concentration (mg/kg)	Sum of VPH & EPH Concentration (mg/kg)
C5-C8 Aliphatics	C5-C8 Aliphatics	VPH	17	NA
C9-C18 Aliphatics	C9-C12 Aliphatics	VPH	23	48
	C9-C18 Aliphatics	EPH	25	
C19-C36 Aliphatics	C19-C36 Aliphatics	EPH	25	NA
C9-C22 Aromatics	C9-C10 Aromatics	VPH	13	38
	C11-C22 Aromatics	EPH	25	

Sample ID: BOC 04

Toxicologically Defined Hydrocarbon Fraction	Analytical Hydrocarbon Fractions	Analytical Method	Laboratory Results Concentration (mg/kg)	Sum of VPH & EPH Concentration (mg/kg)
C5-C8 Aliphatics	C5-C8 Aliphatics	VPH	2.8	NA
C9-C18 Aliphatics	C9-C12 Aliphatics	VPH	2	53
	C9-C18 Aliphatics	EPH	51	
C19-C36 Aliphatics	C19-C36 Aliphatics	EPH	34	NA
C9-C22 Aromatics	C9-C10 Aromatics	VPH	1.1	121.1
	C11-C22 Aromatics	EPH	120	

Sample ID: BOC 05

Toxicologically Defined Hydrocarbon Fraction	Analytical Hydrocarbon Fractions	Analytical Method	Laboratory Results Concentration (mg/kg)	Sum of VPH & EPH Concentration (mg/kg)
C5-C8 Aliphatics	C5-C8 Aliphatics	VPH	3.8	NA
C9-C18 Aliphatics	C9-C12 Aliphatics	VPH	3.6	28.6
	C9-C18 Aliphatics	EPH	25	
C19-C36 Aliphatics	C19-C36 Aliphatics	EPH	47	NA
C9-C22 Aromatics	C9-C10 Aromatics	VPH	3.2	123.2
	C11-C22 Aromatics	EPH	120	

Burlington Operations Center
MADEP Analytical Results
Table 2

Sample ID: BOC 12

Toxicologically Defined Hydrocarbon Fraction	Analytical Hydrocarbon Fractions	Analytical Method	Laboratory Results Concentration (mg/kg)	Sum of VPH & EPH Concentration (mg/kg)
C5-C8 Aliphatics	C5-C8 Aliphatics	VPH	7.6	NA
C9-C18 Aliphatics	C9-C12 Aliphatics	VPH	32	142
	C9-C18 Aliphatics	EPH	110	
C19-C36 Aliphatics	C19-C36 Aliphatics	EPH	43	NA
C9-C22 Aromatics	C9-C10 Aromatics	VPH	24	214
	C11-C22 Aromatics	EPH	190	

Sample ID: BOC 14

Toxicologically Defined Hydrocarbon Fraction	Analytical Hydrocarbon Fractions	Analytical Method	Laboratory Results Concentration (mg/kg)	Sum of VPH & EPH Concentration (mg/kg)
C5-C8 Aliphatics	C5-C8 Aliphatics	VPH	1	NA
C9-C18 Aliphatics	C9-C12 Aliphatics	VPH	1.1	29.1
	C9-C18 Aliphatics	EPH	28	
C19-C36 Aliphatics	C19-C36 Aliphatics	EPH	25	NA
C9-C22 Aromatics	C9-C10 Aromatics	VPH	1	85
	C11-C22 Aromatics	EPH	84	

Sample ID: BOC 15

Toxicologically Defined Hydrocarbon Fraction	Analytical Hydrocarbon Fractions	Analytical Method	Laboratory Results Concentration (mg/kg)	Sum of VPH & EPH Concentration (mg/kg)
C5-C8 Aliphatics	C5-C8 Aliphatics	VPH	1	NA
C9-C18 Aliphatics	C9-C12 Aliphatics	VPH	1	26
	C9-C18 Aliphatics	EPH	25	
C19-C36 Aliphatics	C19-C36 Aliphatics	EPH	25	NA
C9-C22 Aromatics	C9-C10 Aromatics	VPH	1	26
	C11-C22 Aromatics	EPH	25	

Appendix A

Notification of Intent to Close (GW/UST-3)

Duke Power
A Duke Energy Company

Duke Power Company
A Duke Energy Company
Energy Center
P.O. Box 1006
Charlotte, NC 28201-1006

May 26, 1998

Ms. Sherry Knight
North Carolina Department of Environment
and Natural Resources
Winston Salem Regional Office
585 Waughtown St.
Winston-Salem, NC 27107-2241

Re: Duke Power Company
Burlington Operations Center
GW/UST- 3 Notification of Intent
File: ENV-0309

Dear Ms. Knight:

Please find attached the GW/UST-3 Form for the removal of two underground storage tanks located at Duke Power's Burlington Operations Center. These tanks are currently scheduled to be removed beginning June 16, 1998.

Please call me at (704)373-7891 if you have questions or require additional information.

Sincerely,

Tamara Carpenter, Engineer
Environmental Engineering
Environment, Health, and Safety

xc: DEM Sullivan
WA Carter
WA Hefner
Central Records

Appendix B

Site Investigation Report for Permanent Closure or Change in Service of UST (GW/UST-2)

GW/UST-2 **Site Investigation Report For Permanent Closure or Change-in-Service of U.S.T.**

FOR TANKS IN **NC**

Return Completed Form To:
The appropriate DWQ Regional Office according to the county of the facility's location. [SEE MAP ON REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL OFFICE ADDRESS].

State Use Only
I.D. Number _____
Date Received _____

INSTRUCTIONS

Complete and return within (30) days following completion of site investigation.

I. Ownership of Tank(s)

Owner Name: Duke Power Company
Corporation, Individual, Public Agency, or Other Entity)
Street Address: 526 S. Church St.
County: Mecklenburg
City: Charlotte State: NC Zip Code: 28202
Telephone Number: (704) 373-7891
(Area Code)

II. Location of Tank(s)

Facility Name: Burlington Operation Center
(or Company)
Facility ID # (if available): 6-023474
Street Address 1205 N. Church St.
(or State Road)
County: Alamance City: Burlington Zip Code: 27215
Telephone Number: (919) 229 5529
(Area Code)

III. Contact Person

Name: Tamara Carpenter Job Title: Engineer Tel. No.: (704) 373 7891
Closure Contractor: SEI Environmental Address: 130 Promare Dr Suite 108, Raleigh 27603 Tel. No.: (919) 832 2535
Primary Consultant: Ralph Roberts. Duke Power Address: 526 S. Church St Charlotte Tel. No.: (704) 373-7888
Lab: Duke Power Co. Address: 13339 Hagers Ferry Rd Huntersville NC Tel. No.: (704) 875-5301

IV. U.S.T. Information

Tank No.	Size in Gallons	Tank Dimensions	Last Contents
1	10,000	10.5' dia x 18' long	Diesel fuel
2	15,000	10.5' dia x 23.5'	Gasoline

V. Excavation Condition

Water In Excavation		Free Product		Notable Odor or Visible Soil Contamination	
Yes	No	Yes	No	Yes	No
	X		X	X	
	X		X	X	

VI. Additional Information Required

See reverse side of pink copy (owner's copy) for additional information required by N.C. - DWQ in the written report and sketch.

NOTE: If a release from the tank(s) has occurred, the site assessment portion of the tank closure must be conducted under the supervision of a P.E. or L.G., with all closure site assessment reports bearing the signature and seal of the P.E. or L.G.

VII. Check List (Check the activities completed)

PERMANENT CLOSURE (For Removing or Abandoning-In-place)

- [X] Contact local fire marshal.
- [X] Notify DWQ Regional Office before abandonment.
- [X] Drain & flush piping into tank.
- [X] Remove all product and residuals from tank.
- [X] Excavate down to tank.
- [ ] Clean and inspect tank.
- [X] Remove drop tube, fill pipe, gauge pipe, vapor recovery tank connections, submersible pumps and other tank fixtures.
- [ ] Cap or plug all lines except the vent and fill lines.
- [X] Purge tank of all product & flammable vapors.
- [ ] Cut one or more large holes in the tanks.
- [X] Backfill the area.

Date Tank(s) Permanently closed: 6-16-98
Date of Change-In-Service: _____

ABANDONMENT IN PLACE

- [ ] Fill tank until material overflows tank opening.
- [ ] Plug or cap all openings.
- [ ] Disconnect and cap or remove vent line.
- [ ] Solid inert material used - specify: _____

REMOVAL

- [ ] Create vent hole.
- [X] Label tank.
- [X] Dispose of tank in approved manner.

Final tank destination: 2018 Lawyers Rd. Indian Trail, NC

VIII. Certification (Read and Sign)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Print name and official title of owner or owner's authorized representative	Signature	Date Signed
Tamara Carpenter, Engineer	Tamara Carpenter	7/15/98

Appendix C

Certificate of Disposal

SOUTHERN TANK & ENVIRONMENTAL, INC.

CERTIFICATE OF DISPOSAL

FEDERAL/CERTIFICATE # 56-1669418/11108 DATE 6/18/98

CONTRACTOR	LOCATION
SPATCO Environmental, Inc	Duke Power
130 Penmarc Dr Suite 112	Burlington, N.C.
Raleigh, N.C. 27603	

TYPE OF TANK	SIZE	CONTENT IN GAL.	TANK ID#
UST 15,000 gallon	10'6"x 24'	Less than 1%	STDS-6264
UST 10,000 gallon	10'6"x 16'	Less than 1%	STDS-6265

Southern Tank & Environmental, Inc. certifies that the above mentioned tanks have been properly disposed of at 2018 Lawyers Rd., Indian Trail, NC, and the contents and sludges processed in full compliance with Local, State and Federal regulations.

Southern Tank & Environmental, Inc.

Randy L. Williams

Appendix D

Disposal Manifest

HAZ~MAT

TRANSPORTATION AND DISPOSAL
P. O. BOX 37392 • CHARLOTTE, N.C. 28237
(704) 332-5600
FAX (704) 375-7183

Manifest No. 6263
P.O. No. FH47957
Job No. 98-3039

NON-HAZARDOUS SPECIAL WASTE

Section I. GENERATOR (Generator completes all of Section I)

GENERATOR LOCATION

NAME Duke Power
ORIGINATING ADDRESS Church ST
MAILING ADDRESS 1205 N. Church St.
CITY Lincolnton STATE NC ZIP 28092
PHONE NO. 222-5529
CONTACT NAME Randy Councilman

WORK CONTRACTED BY
Bill To (If different from information at left)

NAME Duke Power
ADDRESS 13339 Hagers Ferry Rd
CITY Huntersville STATE NC ZIP 28007
PHONE NO.
CONTACT NAME David Rorie

DES. OF WASTE:

No.	Type	Units	Quantity
			3100

Section II. INVOICE INFORMATION

DESCRIPTION	GALLONS QUANTITY	DRUMS QUANTITY	LINE TOTAL
1. WATER, OIL & COOLANT PUMPED FROM TANKS OR DRUMS			
2. OFF SPEC LIGHT OIL, WATER & GAS PUMPED FROM TANKS OR DRUMS			
3. 55 GALLON DRUMS REMOVED - SOLID			
4. 55 GALLON DRUMS REMOVED - LIQUID			
5. Diesel Oil Contaminated from Tanks	3100		3100 GAL
6.			
7.			
8.			
9. SERVICE CHARGE			
10. TRANSPORTATION			

GENERATOR'S CERTIFICATION: I hereby certify that the above named material is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations; AND, if the waste is a treatment residue of a previously restricted hazardous waste subject to the Land Disposal Restrictions, I certify and warrant that the waste has been treated in accordance with the requirements of 40 CFR Part 268 and is no longer a hazardous waste as defined by 40 CFR Part 261.

Randall Councilman — Generator Authorized Agent Name
Randall Councilman — Signature
05/12/98 — Shipment Date

Section III. TRANSPORTER

TRANSPORTER (Generator complete a-d; Transporter I complete e-g; Transporter II complete h-e)

HAZ~MAT
TRANSPORTATION AND DISPOSAL
P. O. BOX 37392 • CHARLOTTE, N.C. 28237

a. Driver Name / Title Randy Wilcox
b. Phone No. (704) 332-5600 c. Truck No. UT-1

Hazardous Waste Transporter Permits
EPA NCR 000003186
EPA NCD048461370

d. Randy Wilcox — Driver Signature
05/12/98 — Shipment Date

TRANSPORTER II

e. Name
f. Address
g. Driver Name / Title
h. Phone No. i. Truck No.
j. Transporter II Permit Nos.

Driver Signature
Shipment Date

Section IV. FACILITY INFORMATION AND CERTIFICATE OF DISPOSAL

a. Site Name Haz-Mat Transportation & Disposal
Physical Address 210 Dalton Avenue Charlotte, NC 28237
a. Phone No. 704-332-5600
b. Mailing Address Post Office Box 37392 Charlotte, NC 28237

c. Discrepancy Indication Space

This is to certify that all non-hazardous material removed from above location has been received and will be disposed of in accordance with applicable local, state and federal regulations in the following manner: (1) Petroleum products are blended into a beneficial reuseable fuel for use in large industrial burners. (2) Waste waters are treated with polymers, pH adjusters, and a flocculant, then flows through a dissolved air flotation system for pretreatment separation, then into the WSACC sanitary sewer system under permit #UP#1030. (3) Sludges from these treatment systems are hauled to E.P.A. approved incineration facilities for proper disposal. Manifest and certificate of disposal are on file. (4) Our treatment system operates on a first in, first out basis and product should be processed within seven days.

SIGNATURE OF FACILITY AGENT | DATE | MONTH | DAY | YEAR

SOIL SOLUTIONS, INCORPORATED

1703 Vargrave Street, Winston-Salem, NC 27107

NON-HAZARDOUS MATERIALS MANIFEST

Truck # **Load #** No 8067

GENERATOR INFORMATION

Generator: Duke Energy Phone: 336-854-4885

Site Address: ~~2500 Rt~~ 1245 N. Church St.

Burlington, NC 27217 Contact: Buddy Carter

Material Description	Contaminant	Units	Weight Certification/Quantity
Diesel Contaminated Soil	Diesel	(Tons)	24,000 Empty
		Yds³	64,080 Gross
		Drums	20.04 Tons

CARRIER INFORMATION

Carrier: Hilco Transport Phone: 3369935664

1824 E Mountain St

Kernersville NC Contact:

As the carrier, I certify that the materials described above being shipped under this non-hazardous materials manifest are properly classified, packaged, labeled, secured, and are in proper condition for transport in commerce under the applicable regulations governing transportation, and I hereby receive this material for delivery to the facility designate.

Carrier Signature: David Foster Date: 6-15-98

RECEIVER INFORMATION

Soil Solutions, Inc. SSI Project #: SF069827

1703 Vargrave St. Phone: 336-725-5844

Winston-Salem, NC 27107 Contact: Tony Dishon

I certify that the carrier has delivered the materials described above to this facility, and I hereby accept this material for treatment and/or disposal in a manner that has been authorized by the State of North Carolina.

Facility Signature: HUBERT BLACE Date: 6-15-98

White/Facility Canary/Invoice Goldenrod/Generator Pink/Carrier

SOIL SOLUTIONS, INCORPORATED

1703 Vargrave Street, Winston-Salem, NC 27107

NON-HAZARDOUS MATERIALS MANIFEST

Truck # **Load #** 2 No 8066

GENERATOR INFORMATION

Generator: Duke Energy Phone: 336-854-4845

Site Address: 128 INChurch St

Burlington, NC 27217 Contact: Buddy Carter

Material Description	Contaminant	Units	Weight Certification/Quantity
Soil	Diesel	(Tons)	20.82 Net
		Yds³	17.00 Empty
		Drums	32.92 Gross

CARRIER INFORMATION

Carrier: Hilco Transport Phone: 336-993-5664

1494 E. Mountain St.

Kernersville Contact:

As the carrier, I certify that the materials described above being shipped under this non-hazardous materials manifest are properly classified, packaged, labeled, secured, and are in proper condition for transport in commerce under the applicable regulations governing transportation, and I hereby receive this material for delivery to the facility designate.

Carrier Signature: Randall Hass Date: 6-15-98

RECEIVER INFORMATION

Soil Solutions, Inc SSI Project #: SF069807

1703 Vargrave St. Phone: 336-725-5844

Winston-Salem, NC 27107 Contact: Tony Disher

I certify that the carrier has delivered the materials described above to this facility, and I hereby accept this material for treatment and/or disposal in a manner that has been authorized by the State of North Carolina.

Facility Signature: ROBERT BLACE Date: 6/15/98

White/Facility Canary/Invoice Goldenrod/Generator Pink/Carrier

SOIL SOLUTIONS, INCORPORATED

1703 Vargrave Street, Winston-Salem, NC 27107

NON-HAZARDOUS MATERIALS MANIFEST

Truck # 98 Load # 3 No 8065

GENERATOR INFORMATION

Generator: Duke Energy Phone: 336-854-9865

Site Address: 120 IN Church St
Burlington NC 27217 Contact: Buddy Carter

Material Description	Contaminant	Units	Weight Certification/Quantity
Soil	Diesel	(Tons)	23.34 Tons Net
		Yds³	12.00 Tons Empty
		Drums	35.34 Gross

CARRIER INFORMATION

Carrier: Hilco Transport Phone: 336-993-5564
1804 E. Mountain St
Kernersville, NC 27284 Contact:

As the carrier, I certify that the materials described above being shipped under this non-hazardous materials manifest are properly classified, packaged, labeled, secured, and are in proper condition for transport in commerce under the applicable regulations governing transportation, and I hereby receive this material for delivery to the facility designate.

Carrier Signature: Claude Hall Date: 6-15-98

RECEIVER INFORMATION

Soil Solutions, Inc. SSI Project #: SF069827
1703 Vargrave St. Phone: 336-725-5844
Winston-Salem, NC 27107 Contact: Tony Disher

I certify that the carrier has delivered the materials described above to this facility, and I hereby accept this material for treatment and/or disposal in a manner that has been authorized by the State of North Carolina.

Facility Signature: HUBERT BLEE Date: 6/15-98

White/Facility Canary/Invoice Goldenrod/Generator Pink/Carrier

PO 41884

SOIL SOLUTIONS, INCORPORATED

1703 Vargrave Street, Winston-Salem, NC 27107

NON-HAZARDOUS MATERIALS MANIFEST

Truck # 94 Load # 4 No 8064

GENERATOR INFORMATION

Generator: Duke Energy Phone: 336-854-4885

Site Address: 1201 N. Church St.
Burlington NC 27217 Contact: Buddy Carter

Material Description	Contaminant	Units	Weight Certification/Quantity
soil	Diesel	(Tons) Yds Drums	1200 (12.98) METRIC WEIGHT loaded 20.97 TONS

20.97

CARRIER INFORMATION

Carrier: Hilco Transport Phone: 336-993-5664
1004 E Mountain Rd.
Kernersville NC 27 Contact:

As the carrier, I certify that the materials described above being shipped under this non-hazardous materials manifest are properly classified, packaged, labeled, secured, and are in proper condition for transport in commerce under the applicable regulations governing transportation, and I hereby receive this material for delivery to the facility designate.

Carrier Signature: Bobby Weaver Date: 06-15-98

RECEIVER INFORMATION

Soil Solutions Inc. SSI Project #: SF069827
1703 Vargrave St. Phone: 336-725-5844
Winston-Salem, NC 27107 Contact: Tony Disher

I certify that the carrier has delivered the materials described above to this facility, and I hereby accept this material for treatment and/or disposal in a manner that has been authorized by the State of North Carolina.

Facility Signature: Hubert Blake Date: 6-15-98

White/Facility Canary/Invoice Goldenrod/Generator Pink/Carrier

SOIL SOLUTIONS, INCORPORATED

1703 Vargrave Street, Winston-Salem, NC 27107

NON-HAZARDOUS MATERIALS MANIFEST

Truck # 2886 Load # 5 No 8063

GENERATOR INFORMATION

Generator: Duke Energy Phone: 336-854-4885

Site Address: 1281 N. Church St
Burlington, NC 27217 Contact: Buddy Carter

Material Description	Contaminant	Units	Weight Certification/Quantity
Soil	Diesel	(Tons)	63,320
		Yds³	19.66 24,000
		Drums	12.00 39,320

19.66

CARRIER INFORMATION

Carrier: Hilco Transport Phone: 336-993-5664
1284 E Mountain Rd
Kernersville NC Contact:

As the carrier, I certify that the materials described above being shipped under this non-hazardous materials manifest are properly classified, packaged, labeled, secured, and are in proper condition for transport in commerce under the applicable regulations governing transportation, and I hereby receive this material for delivery to the facility designate.

Carrier Signature: Jim Mickle Date: 06-15-98

RECEIVER INFORMATION

Soil Solutions, Inc. SSI Project #: SF069807
1703 Vargrave St. Phone: 336-725-5844
Winston-Salem, NC 27107 Contact: Tony Disher

I certify that the carrier has delivered the materials described above to this facility, and I hereby accept this material for treatment and/or disposal in a manner that has been authorized by the State of North Carolina.

Facility Signature: Date: 6/16/98

White/Facility Canary/Invoice Goldenrod/Generator Pink/Carrier

Appendix E

Complete Chain-of-Custody Records

DUKE POWER COMPANY
Laboratory Services
MNS Bldg. # [redacted](MG03A1)
13339 Hagers Ferry Road
Huntersville, NC 28078
LS CLIENT CONTACT/PHONE[1]:

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM *

MN 42692

G243-3

CLIENT[1]: Tim Hunsucker
Project Name[2]: Burlington OP Center
Results to/Phone[1]: Tim Hunsucker / Tammi Carpenter
Address and/or PROFS[1]: MG03A / EG12ZA
Matrix (type of samples)/QC Level[4]: Soil
SAM No.[1]: 98-JUN-02-19

FRAC #	CHEMPLOT Number	Sample Description or ID[10]	Collected using sampling instructions[11] Date	Time	Name	MADEP-VPH ICE PATHWAY	MADEP-EPH & % Solids ICE	% Solids ICE	(may note special DL or Method)[13]
9801	5662	BOC-01-061598	clustr	1457	TSH	2	1		
9801	5663	BOC-04-061598	clustr	1525		2	1		
9801	5665	BOC-05-061598	clustr	1640		2	1		
9801	5667	BOC-12-061598	clustr	1650		2		1	
9801	5668	BOC-14-061698	clustr	1040		2		1	
9801	5669	BOC-15-061698	clustr	1240	TSH	2		1	
9801	5671	TRIP BLANK	—	—	TSH	2			

Sample Preserved ☑ Yes ☐ No [14]
Name: Tim Hunsucker

Total # of samples[15]: 14 | 3 | 3

Delivered by[16]:	Delivered by:	Delivered by:
Tim Hunsucker		
Date/Time: 6/17/98 @ 0820	Date/Time:	Date/Time:
Received by: 0820 John Bannister 6-17-98	Received by:	Received by: 6/18/98 10:10

Turnaround Requested[18]:
☑ Routine (3 weeks) WIP 8411sa970482r
☐ Rush (2 weeks)
☐ Emergency Rush
☑ Date Results Requested

Comments[17]:

Received @ 1.2°C

* See Instructions on back of form.
[16] White, canary — LS Files Pink — Client Copy

DUKE POWER COMPANY
Laboratory Services
MNS Bldg. # 7405 (MG03A1)
13339 Hagers Ferry Road
Huntersville, NC 28078

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM *

XC: KLR
RTN-TSC

Form (R10-93)

LS CLIENT CONTACT/PHONE[1]:
CLIENT[2]: Tim Hunsucker
Project Name[3]: Burlington OP Center
Results to/Phone[4]: Tim Hunsucker / Tammi Carpenter
Address and/or PROFS[5]: MG03A / EC12ZB
Matrix (type of samples)/QC Level[6]: Soil
SAM No.[7]: 98-JUN-0217

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]	Date	Time	Name	8270 (ICE)	8260 (ICE)
98	015589	BOC-01 - 061598	6/15/98	1457	TSH	1	1
	5590	BOC-02 - 061598		1512		1	1
	5591	BOC-03 - 061598		1518		1	1
	5592	BOC-04 - 061598		1525		1	1
	5593	BOC-05 - 061598		1640		1	1
	5594	BOC-06 - 061598		1445		1	1
	5595	BOC-07 - 061598		1450		1	1
	5596	BOC-08 - 061598		1455		1	1
	5597	BOC-09 - 061598		1510		1	1
	5598	BOC-10 - 061598		1500		1	1
	5599	BOC-11 - 061598		1505		1	1
	5600	BOC-12 - 061598	6/15/98	1650			1
	5601	BOC-13 - 061698	6/16/98	1625			1
	5602	BOC-14 - 061698		1040			1
	5603	BOC-15 - 061698		1240		1	1
	5604	BOC-16 - 061698		1245			1
	5605	BOC-17 - 061698	6/16/98	1248			1
Sample Preserved ☒ Yes ☐ No [14] ICE			Total # of samples[15]:			12	17

Name: Tim Hunsucker

Delivered by[16]: Tim Hunsucker	Delivered by:	Delivered by:
Date/Time: 6/17/98 @ 0820	Date/Time:	Date/Time:
Received by: John Dunndon 6-17-98 0820	Received by:	Received by:

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

WID 8411sa970482r

Comments[17]: "SOIL"

* See instructions on back of form.
[18] White, canary — LS Files Pink — Client Copy

Appendix F

Copy of All Laboratory Analytical Records

PARADIGM ANALYTICAL LABORATORIES, INC.

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Duke Power Analytical Laboratories

Project Name: Burlington OP Center

Sample Information and Analytical Results	
Sample Identification	BOC-01-061598
Sample Matrix	Soil
Collection Option (for Soil)*	3
Date Collected	06/15/98
Date Received	06/18/98
Date Extracted	06/15/98
Date Analyzed	06/23/98
Dry Weight	84
Dilution Factor	1
C_5-C_8 Aliphatics**	17000 (µg/Kg)
C_9-C_{12} Aliphatics**	23000 (µg/Kg)
C_9-C_{10} Aromatics**	13000 (µg/Kg)
Surrogate % Recovery - PID	130
Surrogate % Recovery - FID	98

* = Option 1 = Established fill line on vial, Option 2 = Sampling Device/Brand, or Option 3 = Field weight of soil.

** = Excludes any surrogates or internal standards.

Lab Info: G243-3-43145

Revieved By: [signature]

PARADIGM ANALYTICAL LABORATORIES, INC.

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Duke Power Analytical Laboratories

Project Name: Burlington OP Center

Sample Information and Analytical Results	
Sample Identification	BOC-04-061598
Sample Matrix	Soil
Collection Option (for Soil)*	3
Date Collected	06/15/98
Date Received	06/18/98
Date Extracted	06/15/98
Date Analyzed	06/23/98
Dry Weight	84
Dilution Factor	1
C_5-C_8 Aliphatics**	2800 (µg/Kg)
C_9-C_{12} Aliphatics**	2000 (µg/Kg)
C_9-C_{10} Aromatics**	1100 (µg/Kg)
Surrogate % Recovery - PID	92
Surrogate % Recovery - FID	87

* = Option 1 = Established fill line on vial, Option 2 = Sampling Device/Brand, or Option 3 = Field weight of soil.

** = Excludes any surrogates or internal standards.

Lab Info: G243-3-43146

Revieved By: RNC

PARADIGM ANALYTICAL LABORATORIES, INC.

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Duke Power Analytical Laboratories

Project Name: Burlington OP Center

Sample Information and Analytical Results	
Sample Identification	BOC-05-061598
Sample Matrix	Soil
Collection Option (for Soil)*	3
Date Collected	06/15/98
Date Received	06/18/98
Date Extracted	06/15/98
Date Analyzed	06/23/98
Dry Weight	81
Dilution Factor	1
C_5-C_8 Aliphatics**	3800 (µg/Kg)
C_9-C_{12} Aliphatics**	3600 (µg/Kg)
C_8-C_{10} Aromatics**	3200 (µg/Kg)
Surrogate % Recovery - PID	100
Surrogate % Recovery - FID	80

* = Option 1 = Established fill line on vial, Option 2 = Sampling Device/Brand, or Option 3 = Field weight of soil.

** = Excludes any surrogates or internal standards.

Lab Info: G243-3-43147

Revieved By: SAC

PARADIGM ANALYTICAL LABORATORIES, INC.

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Duke Power Analytical Laboratories

Project Name: Burlington OP Center

Sample Information and Analytical Results	
Sample Identification	BOC-12-061598
Sample Matrix	Soil
Collection Option (for Soil)*	3
Date Collected	06/15/98
Date Received	06/18/98
Date Extracted	06/15/98
Date Analyzed	06/23/98
Dry Weight	73
Dilution Factor	1
C_5-C_8 Aliphatics**	7600 (µg/Kg)
C_9-C_{12} Aliphatics**	32000 (µg/Kg)
C_9-C_{10} Aromatics**	24000 (µg/Kg)
Surrogate % Recovery - PID	100
Surrogate % Recovery - FID	130

* = Option 1 = Established fill line on vial, Option 2 = Sampling Device/Brand, or Option 3 = Field weight of soil.

** = Excludes any surrogates or internal standards.

PARADIGM ANALYTICAL LABORATORIES, INC.

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Duke Power Analytical Laboratories

Project Name: Burlington OP Center

Sample Information and Analytical Results	
Sample Identification	BOC-15-061598
Sample Matrix	Soil
Collection Option (for Soil)*	3
Date Collected	06/16/98
Date Received	06/18/98
Date Extracted	06/15/98
Date Analyzed	06/23/98
Dry Weight	82
Dilution Factor	1
C_5-C_8 Aliphatics**	< 1000 (µg/Kg)
C_9-C_{12} Aliphatics**	< 1000 (µg/Kg)
C_9-C_{10} Aromatics**	< 1000 (µg/Kg)
Surrogate % Recovery - PID	79
Surrogate % Recovery - FID	78

* = Option 1 = Established fill line on vial, Option 2 = Sampling Device/Brand, or Option 3 = Field weight of soil.
** = Excludes any surrogates or internal standards.

Lab Info: G243-3-43150

Revieved By: FJV

PARADIGM ANALYTICAL LABORATORIES, INC.

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Duke Power Analytical Laboratories

Project Name: Burlington OP Center

Sample Information and Analytical Results	
Sample Identification	BOC-14-061598
Sample Matrix	Soil
Collection Option (for Soil)*	3
Date Collected	06/16/98
Date Received	06/18/98
Date Extracted	06/15/98
Date Analyzed	06/23/98
Dry Weight	84
Dilution Factor	1
C_5-C_8 Aliphatics**	< 1000 (µg/Kg)
C_8-C_{12} Aliphatics**	1100 (µg/Kg)
C_9-C_{10} Aromatics**	< 1000 (µg/Kg)
Surrogate % Recovery - PID	60
Surrogate % Recovery - FID	78

* = Option 1 = Established fill line on vial, Option 2 = Sampling Device/Brand, or Option 3 = Field weight of soil.

** = Excludes any surrogates or internal standards.

Lab Info: G243-3-43149

Revieved By: PNV

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Extractable Petroleum Hydrocarbons
by MADEP-EPH-98-1

Client Sample ID:	BOC-01-061598	Date Collected:	6/15/98
Client Project ID:	Burlington OP Center	Date Received:	6/18/98
Lab Sample ID:	43145	Analyzed By:	JPW
Lab Project ID:	G243-3	%Solids:	84.3
Matrix:	Soil		

Compound	Result (MG/KG)	Quantitation Limit	Dilution Factor	Date Analyzed
C11-C22 Aromatics	BQL	25	1.0	7/8/98
C9-C18 Aliphatic Hydrocarbons (Alkanes)	BQL	25	1.0	7/8/98
C19-C36 Aliphatic Hydrocarbons (Alkanes)	BQL	25	1.0	7/8/98

Comments:

Quantitation Limits are fully calculated using dilution factors and % solids.

BQL = Undetected or below quantitation limit

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Extractable Petroleum Hydrocarbons by MADEP-EPH-98-1

Client Sample ID:	BOC-04-061598	Date Collected:	6/15/98
Client Project ID:	Burlington OP Center	Date Received:	6/18/98
Lab Sample ID:	43146	Analyzed By:	JPW
Lab Project ID:	G243-3	%Solids:	83.6
Matrix:	Soil		

Compound	Result (MG/KG)	Quantitation Limit	Dilution Factor	Date Analyzed
C11-C22 Aromatics	120	25	1.0	7/3/98
C9-C18 Aliphatic Hydrocarbons (Alkanes)	51	25	1.0	7/8/98
C19-C36 Aliphatic Hydrocarbons (Alkanes)	34	25	1.0	7/8/98

Comments:

Quantitation Limits are fully calculated using dilution factors and % solids.

BQL = Undetected or below quantitation limit

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Extractable Petroleum Hydrocarbons by MADEP-EPH-98-1

Client Sample ID:	BOC-05-061598	Date Collected:	6/15/98
Client Project ID:	Burlington OP Center	Date Received:	6/18/98
Lab Sample ID:	43147	Analyzed By:	JPW
Lab Project ID:	G243-3	%Solids:	80.9
Matrix:	Soil		

Compound	Result (MG/KG)	Quantitation Limit	Dilution Factor	Date Analyzed
C11-C22 Aromatics	120	25	1.0	7/3/98
C9-C18 Aliphatic Hydrocarbons (Alkanes)	25	25	1.0	7/8/98
C19-C36 Aliphatic Hydrocarbons (Alkanes)	47	25	1.0	7/8/98

Comments:

Quantitation Limits are fully calculated using dilution factors and % solids.

BQL = Undetected or below quantitation limit

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Extractable Petroleum Hydrocarbons by MADEP-EPH-98-1

Client Sample ID:	BOC-12-061598	Date Collected:	6/15/98
Client Project ID:	Burlington OP Center	Date Received:	6/18/98
Lab Sample ID:	43148	Analyzed By:	JPW
Lab Project ID:	G243-3	%Solids:	72.7
Matrix	Soil		

Compound	Result (MG/KG)	Quantitation Limit	Dilution Factor	Date Analyzed
C11-C22 Aromatics	190	25	1.0	7/3/98
C9-C18 Aliphatic Hydrocarbons (Alkanes)	110	25	1.0	7/3/98
C19-C36 Aliphatic Hydrocarbons (Alkanes)	43	25	1.0	7/3/98

Comments:

Quantitation Limits are fully calculated using dilution factors and % solids.

BQL = Undetected or below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Extractable Petroleum Hydrocarbons by MADEP-EPH-98-1

Client Sample ID:	BOC-14-061598	Date Collected:	6/16/98
Client Project ID:	Burlington OP Center	Date Received:	6/18/98
Lab Sample ID:	43149	Analyzed By:	JPW
Lab Project ID:	G243-3	%Solids:	83.6
Matrix:	Soil		

Compound	Result (MG/KG)	Quantitation Limit	Dilution Factor	Date Analyzed
C11-C22 Aromatics	84	25	1.0	7/3/98
C9-C18 Aliphatic Hydrocarbons (Alkanes)	28	25	1.0	7/3/98
C19-C36 Aliphatic Hydrocarbons (Alkanes)	BQL	25	1.0	7/3/98

Comments:

Quantitation Limits are fully calculated using dilution factors and % solids.

BQL = Undetected or below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Extractable Petroleum Hydrocarbons
by MADEP-EPH-98-1

Client Sample ID:	BOC-15-061598	Date Collected:	6/16/98
Client Project ID:	Burlington OP Center	Date Received:	6/18/98
Lab Sample ID:	43150	Analyzed By:	JPW
Lab Project ID:	G243-3	%Solids:	81.6
Matrix	Soil		

Compound	Result (MG/KG)	Quantitation Limit	Dilution Factor	Date Analyzed
C11-C22 Aromatics	BQL	25	1.0	7/8/98
C9-C18 Aliphatic Hydrocarbons (Alkanes)	BQL	25	1.0	7/8/98
C19-C36 Aliphatic Hydrocarbons (Alkanes)	BQL	25	1.0	7/8/98

Comments:

Quantitation Limits are fully calculated using dilution factors and % solids.
BQL = Undetected or below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Attachment 2

VPH Laboratory Reporting Form

Calibration and QA/QC Information

FID Initial Calibration Date: 05/28/98 PID Initial Calibration Date: 05/28/98

Calibration Ranges and Limits

Range	MDL (µg/L)	MDL (µg/Kg)	ML (µg/L)	ML (µg/Kg)	RL (µg/L)	RL (µg/Kg)
C_5-C_8 Aliphatics	2.4	120	7.5	380	200	1000
C_9-C_{12} Aliphatics	1.3	65	4.0	210	200	1000
C_9-C_{10} Aromatics	0.5	25	1.6	80	200	1000

Calibration Concentration Levels

Range	Levels (µg/L)	Levels (µg/Kg)	%RSD or CCC	Method of Quantitation
C_5-C_8 Aliphatics	40	2000	9.7	Calibration Factor
	160	8000		
	400	20000		
	1600	80000		
	4000	200000		
C_9-C_{12} Aliphatics	30	1500	18.6	Calibration Factor
	120	6000		
	300	15000		
	1200	60000		
	3000	150000		
C_9-C_{10} Aromatics	65	3250	21.6	Calibration Factor
	260	13000		
	650	32500		
	2600	130000		
	6500	325000		

Calibration Check Date: 06/22/98

Calibration Check

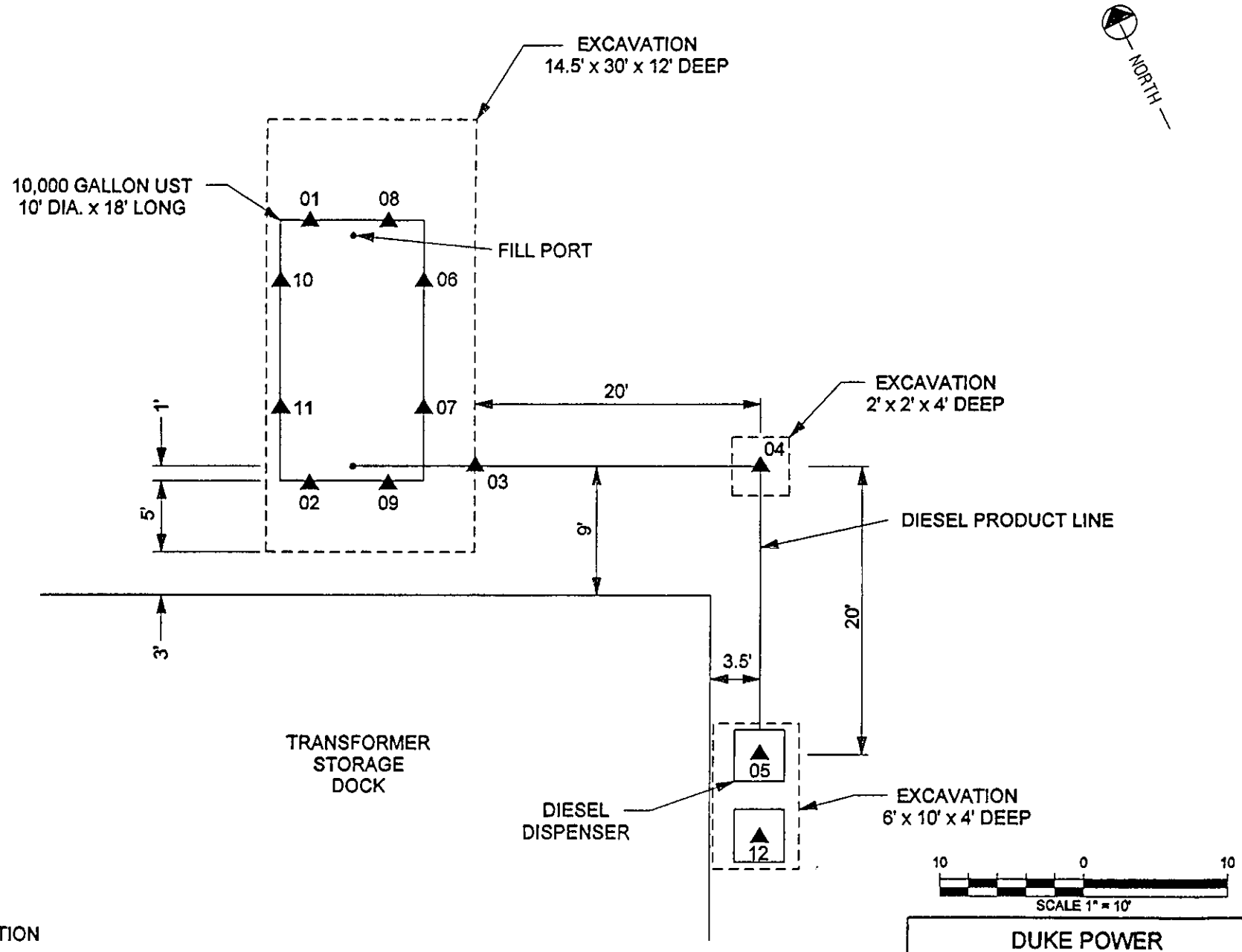
Range	Levels (µg/L)	Levels (µg/Kg)	RPD
C_5-C_8 Aliphatics	400	20000	13.8
C_9-C_{12} Aliphatics	300	15000	-12.9
C_9-C_{10} Aromatics	650	32500	1.5

MDL = Method Detection Limit
ML = Minimum Limit
RL = Reportable Limit
RPD = Relative Percent Difference
%RSD = Percent Relative Standard Deviation
CCC = Correlation Coefficient of Curve

Reviewed By: _____

Lab Info: G243-3-43148

Revieved By: _____



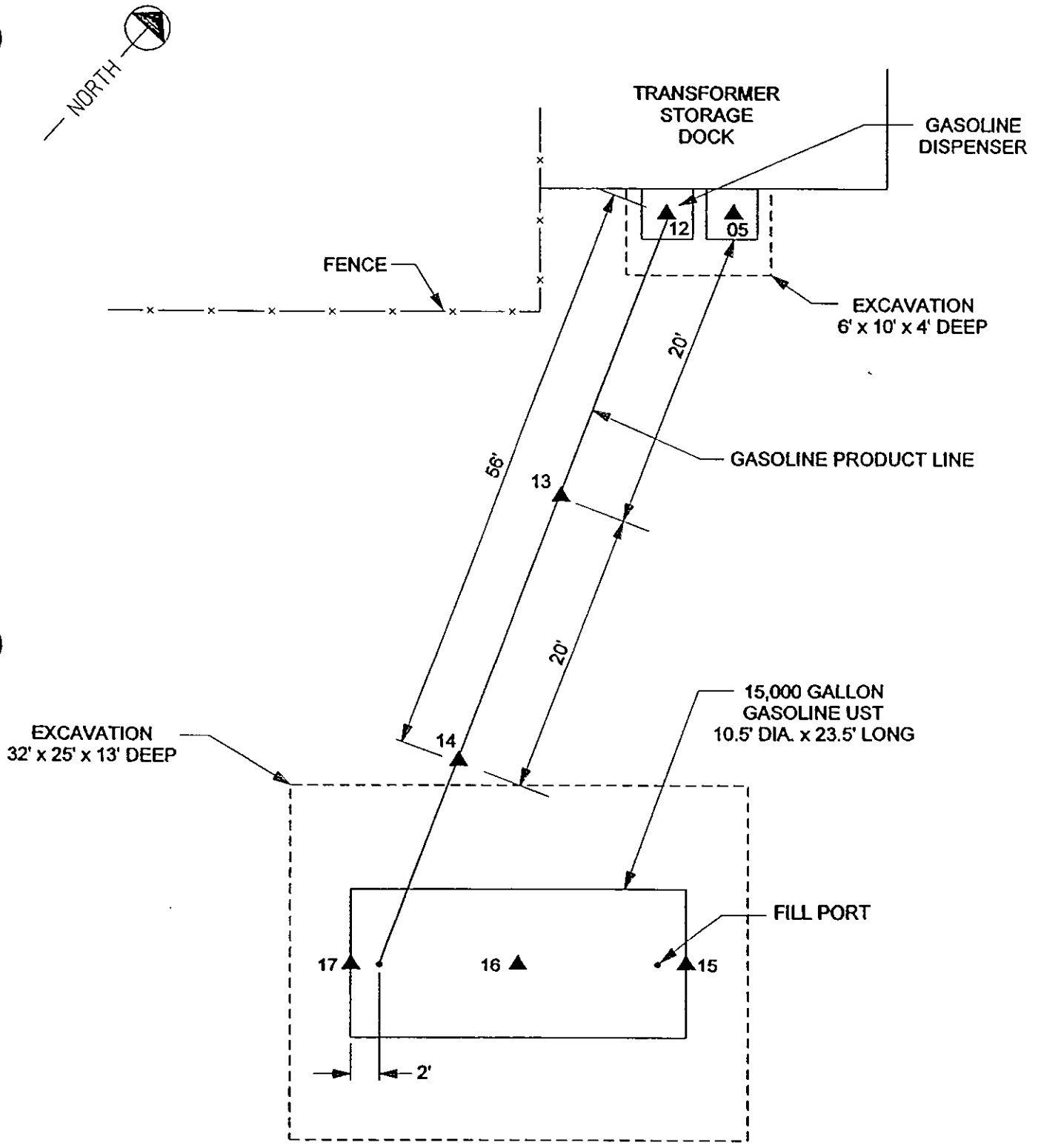
LEGEND:

▲ SAMPLE LOCATION

DUKE POWER

BURLINGTON OPERATION CENTER
DIESEL TANK
SAMPLE LOCATIONS

FIGURE: 4



LEGEND:

▲ SAMPLE LOCATION

10 0 10

SCALE 1" = 10'

DUKE POWER

BURLINGTON OPERATION CENTER
GAS TANK
SAMPLE LOCATIONS

FIGURE: 5

Burlington Operations Center
UST Closure Report
Analytical Results - Table 1

Sample ID	Depth (ft)	Analytical Method	Results	ug/kg
BOC 01	12	8260	ND	
		8270	bis(2-Ethylhexyl)phalate	630
BOC 02	12	8260	Napthalene	4900
		8270	Napthalene	330
			2-Methylnapthalene	3300
			Acenaphthene	3300
			Phenathrene	2500
			Anthracene	1100
			Fluoranthene	780
			Pyrene	340
			Chrysene	5200
BOC 03	4	8260	n-Butylbenzene	39
			Napthalene	87
		8270	ND	
BOC 04	4	8260	Benzene	230
			Ethylbenzene	450
			m-p-Xylene	1100
			o-Xylene	240
			n-Propyl benzene	94
			1,3,5-trimethylbenzene	140
			1,2,4-trimethylbenzene	560
			Napthalene	70
		8270	Napthalene	480
			2-Methylnapthalene	360
			Phenathrene	1200
			Fluoranthene	1100
			Benzo(a)anthracene	990
			Chrysene	1000
			Benzo(k)fluorathene	1600
			Benzo(a)pyrene	680
			Indeno(1,2,3-c,d)pyrene	850
			Dibenzo(a,h)anthracene	470
			Benzo(g,h,I)perylene	820
BOC 05	4	8260	ND	
		8270	bis(2-Ethylhexyl)phalate	600
BOC 06	12	8260	Napthalene	310
		8270	Phenanthrene	460
BOC 07	12	8260	Napthalene	12000
		8270	Phenanthrene	430
			bis(2-Ethylhexyl)phalate	750

Burlington Operations Center
UST Closure Report
Analytical Results - Table 1

Sample ID	Depth (ft)	Analytical Method	Results	ug/kg
BOC 08	12	8260	ND	
		8270	ND	
BOC 09	12	8260	ND	
		8270	ND	
BOC 10	12	8260	Napthalene	15000
		8270	Napthalene	24000
			2-Methylnapthalene	51000
			Acenaphthene	25000
			Dibenzofuran	4500
			Fluorene	13000
			Phenanthrene	32000
			Anthracene	10000
			Fluoranthene	9000
			Pyrene	5100
			Benzo(a)anthracene	5000
			Chrysene	6700
			Benzo(k)fluorathene	4100
			Benzo(a)pyrene	3400
BOC 11	12	8260	ND	
		8270	Phenanthrene	650
			Fluoranthene	1100
			Benzo(a)anthracene	1200
			Chrysene	1300
			bis(2-Ethylhexyl)phalate	570
			Benzo(k)fluorathene	1800
			Benzo(a)pyrene	840
			Indeno(1,2,3-c,d)pyrene	870
			Dibenzo(a,h)anthracene	480
			Benzo(g,h,I)perylene	830
BOC 12	4	8260	ND	
BOC 13	4	8260	n-Propyl benzene	96
			1,3,5-trimethylbenzene	360
			1,2,4-trimethylbenzene	1100
			sec-Butylbenzene	230
			p-Isopropyltoluene	260
			Napthalene	430
BOC 14	4	8260	Napthalene	190
BOC 15	13	8260	ND	
		8270	Napthalene	610
			2-Methylnapthalene	780

Burlington Operations Center
UST Closure Report
Analytical Results - Table 1

Sample ID	Depth (ft)	Analytical Method	Results	ug/kg
			Phenanthrene	610
			Fluoranthene	1100
			Benzo(a)anthracene	1100
			Chrysene	1200
			bis(2-Ethylhexyl)phalate	640
			Benzo(k)fluorathene	1700
			Benzo(a)pyrene	770
			Indeno(1,2,3-c,d)pyrene	820
			Dibenzo(a,h)anthracene	470
			Benzo(g,h,I)perylene	780
BOC 16	13	8260	Ethylbenzene	13
			m-p-Xylene	31
			o-Xylene	15
			n-Propyl benzene	9.9
			1,3,5-trimethylbenzene	23
			1,2,4-trimethylbenzene	60
			Napthalene	12
BOC 17	13	8260	ND	

Burlington Operations Center
MADEP Analytical Results
Table 2

Location: ton Operations Center
Sample ID: BOC 01

Toxicologically Defined Hydrocarbon Fraction	Analytical Hydrocarbon Fractions	Analytical Method	Laboratory Results Concentration (mg/kg)	Sum of VPH & EPH Concentration (mg/kg)
C5-C8 Aliphatics	C5-C8 Aliphatics	VPH	17	NA
C9-C18 Aliphatics	C9-C12 Aliphatics	VPH	23	48
	C9-C18 Aliphatics	EPH	25	
C19-C36 Aliphatics	C19-C36 Aliphatics	EPH	25	NA
C9-C22 Aromatics	C9-C10 Aromatics	VPH	13	38
	C11-C22 Aromatics	EPH	25	

Sample ID: BOC 04

Toxicologically Defined Hydrocarbon Fraction	Analytical Hydrocarbon Fractions	Analytical Method	Laboratory Results Concentration (mg/kg)	Sum of VPH & EPH Concentration (mg/kg)
C5-C8 Aliphatics	C5-C8 Aliphatics	VPH	2.8	NA
C9-C18 Aliphatics	C9-C12 Aliphatics	VPH	2	53
	C9-C18 Aliphatics	EPH	51	
C19-C36 Aliphatics	C19-C36 Aliphatics	EPH	34	NA
C9-C22 Aromatics	C9-C10 Aromatics	VPH	1.1	121.1
	C11-C22 Aromatics	EPH	120	

Sample ID: BOC 05

Toxicologically Defined Hydrocarbon Fraction	Analytical Hydrocarbon Fractions	Analytical Method	Laboratory Results Concentration (mg/kg)	Sum of VPH & EPH Concentration (mg/kg)
C5-C8 Aliphatics	C5-C8 Aliphatics	VPH	3.8	NA
C9-C18 Aliphatics	C9-C12 Aliphatics	VPH	3.6	28.6
	C9-C18 Aliphatics	EPH	25	
C19-C36 Aliphatics	C19-C36 Aliphatics	EPH	47	NA
C9-C22 Aromatics	C9-C10 Aromatics	VPH	3.2	123.2
	C11-C22 Aromatics	EPH	120	

Burlington Operations Center
MADEP Analytical Results
Table 2

Sample ID: BOC 12

Toxicologically Defined Hydrocarbon Fraction	Analytical Hydrocarbon Fractions	Analytical Method	Laboratory Results Concentration (mg/kg)	Sum of VPH & EPH Concentration (mg/kg)
C5-C8 Aliphatics	C5-C8 Aliphatics	VPH	7.6	NA
C9-C18 Aliphatics	C9-C12 Aliphatics	VPH	32	142
	C9-C18 Aliphatics	EPH	110	
C19-C36 Aliphatics	C19-C36 Aliphatics	EPH	43	NA
C9-C22 Aromatics	C9-C10 Aromatics	VPH	24	214
	C11-C22 Aromatics	EPH	190	

Sample ID: BOC 14

Toxicologically Defined Hydrocarbon Fraction	Analytical Hydrocarbon Fractions	Analytical Method	Laboratory Results Concentration (mg/kg)	Sum of VPH & EPH Concentration (mg/kg)
C5-C8 Aliphatics	C5-C8 Aliphatics	VPH	1	NA
C9-C18 Aliphatics	C9-C12 Aliphatics	VPH	1.1	29.1
	C9-C18 Aliphatics	EPH	28	
C19-C36 Aliphatics	C19-C36 Aliphatics	EPH	25	NA
C9-C22 Aromatics	C9-C10 Aromatics	VPH	1	85
	C11-C22 Aromatics	EPH	84	

Sample ID: BOC 15

Toxicologically Defined Hydrocarbon Fraction	Analytical Hydrocarbon Fractions	Analytical Method	Laboratory Results Concentration (mg/kg)	Sum of VPH & EPH Concentration (mg/kg)
C5-C8 Aliphatics	C5-C8 Aliphatics	VPH	1	NA
C9-C18 Aliphatics	C9-C12 Aliphatics	VPH	1	26
	C9-C18 Aliphatics	EPH	25	
C19-C36 Aliphatics	C19-C36 Aliphatics	EPH	25	NA
C9-C22 Aromatics	C9-C10 Aromatics	VPH	1	26
	C11-C22 Aromatics	EPH	25	

Appendix A

Notification of Intent to Close (GW/UST-3)

Duke Power
A Duke Energy Company

Duke Power Company
A Duke Energy Company
Energy Center
P.O. Box 1006
Charlotte, NC 28201-1006

May 26, 1998

Ms. Sherry Knight
North Carolina Department of Environment
and Natural Resources
Winston Salem Regional Office
585 Waughtown St.
Winston-Salem, NC 27107-2241

Re: Duke Power Company
Burlington Operations Center
GW/UST- 3 Notification of Intent
File: ENV-0309

Dear Ms. Knight:

Please find attached the GW/UST-3 Form for the removal of two underground storage tanks located at Duke Power's Burlington Operations Center. These tanks are currently scheduled to be removed beginning June 16, 1998.

Please call me at (704)373-7891 if you have questions or require additional information.

Sincerely,

Tamara Carpenter, Engineer
Environmental Engineering
Environment, Health, and Safety

xc: DEM Sullivan
WA Carter
WA Hefner
Central Records

Appendix B

Site Investigation Report for Permanent Closure or Change in Service of UST (GW/UST-2)

Duke Power Company
Burlington Op. Center

All Weights In Grams

Vial #	Empty wt.	+Methanol wt	+Soil wt.		Methanol wt.	Methanol ml.	Soil wt.
01	27.17	38.67	53.54		11.50	14.56	14.87
02	27.26	38.87	53.82		11.61	14.70	14.95
03	27.25	39.10	53.96		11.85	15.00	14.86
04	27.67	39.43	54.36		11.76	14.89	14.93
05	27.45	39.02	53.86		11.57	14.65	14.84
06	27.20	38.74	53.64		11.54	14.61	14.90
07	27.19	39.04	53.98		11.85	15.00	14.94
08	27.73	39.51	54.48		11.78	14.92	14.97
09	27.49	39.08	53.87		11.59	14.68	14.79
10	27.72	39.32	54.27		11.60	14.69	14.95
11	27.34	39.20	NA		11.86	15.02	NA
12	27.51	39.33	NA		11.82	14.97	NA
13	27.55	38.95	53.86		11.40	14.44	14.91
14	27.46	39.06	53.92		11.60	14.69	14.86

USEPA Method 8260 Analysis Results

Duke Power
A Duke Energy Company

ORGANIC CHEMISTRY GROUP

>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-01-061598

File Name:: 23U05.D
Lab ID:: 98015589
Reviewed by:: GCA 2/6/99

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
Dichlorodifluoromethane	NOT DETECTED	8.5
Chloromethane	NOT DETECTED	8.5
Vinyl chloride	NOT DETECTED	8.5
Bromomethane	NOT DETECTED	8.5
Chloroethane	NOT DETECTED	8.5
Trichlorofluoromethane	NOT DETECTED	8.5
Acrolein	NOT DETECTED	85
1,1-Dichloroethene	NOT DETECTED	8.5
1,1,2-Trichloro-1,2,2-Trifluoroethane	NOT DETECTED	8.5
Acetone	NOT DETECTED	8.5
Methyl iodide	NOT DETECTED	8.5
Carbon disulfide	NOT DETECTED	8.5
Methylene chloride	NOT DETECTED	8.5
Acrylonitrile	NOT DETECTED	85
MTBE	NOT DETECTED	8.5
trans-1,2-Dichloroethene	NOT DETECTED	8.5
Isopropyl ether	NOT DETECTED	8.5
1,1-Dichloroethane	NOT DETECTED	8.5
Vinyl acetate	NOT DETECTED	8.5
2,2-Dichloropropane	NOT DETECTED	8.5
cis-1,2-Dichloroethene	NOT DETECTED	8.5
2-Butanone	NOT DETECTED	8.5
Chloroform	NOT DETECTED	8.5
1,1-Dichloropropene	NOT DETECTED	8.5
1,1,1-Trichloroethane	NOT DETECTED	8.5
Carbon tetrachloride	NOT DETECTED	8.5
Bromochloromethane	NOT DETECTED	8.5
Benzene	NOT DETECTED	8.5
1,2-Dichloroethane	NOT DETECTED	8.5
Trichloroethene	NOT DETECTED	8.5
1,2-Dichloropropane	NOT DETECTED	8.5
Dibromomethane	NOT DETECTED	8.5
Bromodichloromethane	NOT DETECTED	8.5
2-Chloroethyl vinyl ether	NOT DETECTED	8.5
cis-1,3-Dichloropropene	NOT DETECTED	8.5
4-Methyl-2-pentanone (MIBK)	NOT DETECTED	8.5
Toluene	NOT DETECTED	8.5
trans-1,3-Dichloropropene	NOT DETECTED	8.5

Duke Power
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ORGANIC CHEMISTRY GROUP

>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-01-061598

File Name:: 23U05.D
Lab ID:: 98015589
Reviewed by:: 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
1,1,2-Trichloroethane	NOT DETECTED	8.5
1,3-Dichloropropane	NOT DETECTED	8.5
Tetrachloroethene	NOT DETECTED	8.5
2-Hexanone	NOT DETECTED	8.5
Dibromochloromethane	NOT DETECTED	8.5
1,2-Dibromoethane (EDB)	NOT DETECTED	8.5
Chlorobenzene	NOT DETECTED	8.5
Isopropylbenzene	NOT DETECTED	8.5
1,1,1,2-tetrachloroethane	NOT DETECTED	8.5
Ethylbenzene	NOT DETECTED	8.5
m-p-Xylene	NOT DETECTED	17
o-Xylene	NOT DETECTED	8.5
Styrene	NOT DETECTED	8.5
Bromoform	NOT DETECTED	8.5
1,4-Dichlorobutane	NOT DETECTED	8.5
1,1,2,2-Tetrachloroethane	NOT DETECTED	8.5
1,2,3-Trichloropropane	NOT DETECTED	8.5
n-Propyl benzene	NOT DETECTED	8.5
Bromobenzene	NOT DETECTED	8.5
1,3,5-trimethylbenzene	NOT DETECTED	8.5
2-Chlorotoluene	NOT DETECTED	8.5
4-Chlorotoluene	NOT DETECTED	8.5
t-Butylbenzene	NOT DETECTED	8.5
1,2,4-Trimethylbenzene	NOT DETECTED	8.5
sec-Butylbenzene	NOT DETECTED	8.5
p-Isopropyltoluene	NOT DETECTED	8.5
1,3-Dichlorobenzene	NOT DETECTED	8.5
1,4-Dichlorobenzene	NOT DETECTED	8.5
n-Butylbenzene	NOT DETECTED	8.5
1,2-Dichlorobenzene	NOT DETECTED	8.5
1,2-Dibromo-3-chloropropane	NOT DETECTED	8.5
1,2,4-Trichlorobenzene	NOT DETECTED	8.5
Hexachlorobutadiene	NOT DETECTED	8.5
Naphthalene	NOT DETECTED	8.5
1,2,3-Trichlorobenzene	NOT DETECTED	8.5

DATA FILE:: 23009.D | FIELD ID:: BOC-01-061598 | LAB ID:: 98-JUN-0217

Tentatively Identified Compound Report

Compound	Probable Molecular Weight	Estimated Concentration (ug/kg)	Library Match Probability (%)	Retention Rime (RT) (Minutes)	Identification: Library Match	Identification: Manual Interpretation	Identification: RT	Scan Number
NO TICS								

Internal Standard	RT
Pentafluorobenzene	17.77
D4-1,4-Difluorobenzene	21.38
Chlorobenzene D-5	32.06
D-4 1,4-Dichlorobenzene	40.70

Surrogates	% Recovery
Dibromofluoromethane	95%
Toluene D-8	103%
1,4-Bromofluorobenze	96%

USEPA - 8260 G.C. Conditions

105 m x 0.53 mm x 1.0 um / Restek 502.2
He, 0.5 ml/min, 35 C hold 10 mins, 35 C to 180 C @ 4 C/min, 180 to 200 C @ 10 C/min, hold 5 min

USEPA Method 8260 Analysis Results

Duke Power
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ORGANIC CHEMISTRY GROUP

>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-02-061598

File Name:: 25U02.D
Lab ID:: 98015590
Reviewed by:: GCL 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
Dichlorodifluoromethane	NOT DETECTED	740
Chloromethane	NOT DETECTED	740
Vinyl chloride	NOT DETECTED	740
Bromomethane	NOT DETECTED	740
Chloroethane	NOT DETECTED	740
Trichlorofluoromethane	NOT DETECTED	740
Acrolein	NOT DETECTED	7400
1,1-Dichloroethene	NOT DETECTED	740
1,1,2-Trichloro-1,2,2-Trifluoroethane	NOT DETECTED	740
Acetone	NOT DETECTED	740
Methyl iodide	NOT DETECTED	740
Carbon disulfide	NOT DETECTED	740
Methylene chloride	NOT DETECTED	740
Acrylonitrile	NOT DETECTED	7400
MTBE	NOT DETECTED	740
trans-1,2-Dichloroethene	NOT DETECTED	740
Isopropyl ether	NOT DETECTED	740
1,1-Dichloroethane	NOT DETECTED	740
Vinyl acetate	NOT DETECTED	740
2,2-Dichloropropane	NOT DETECTED	740
cis-1,2-Dichloroethene	NOT DETECTED	740
2-Butanone	NOT DETECTED	740
Chloroform	NOT DETECTED	740
1,1-Dichloropropene	NOT DETECTED	740
1,1,1-Trichloroethane	NOT DETECTED	740
Carbon tetrachloride	NOT DETECTED	740
Bromochloromethane	NOT DETECTED	740
Benzene	NOT DETECTED	740
1,2-Dichloroethane	NOT DETECTED	740
Trichloroethene	NOT DETECTED	740
1,2-Dichloropropane	NOT DETECTED	740
Dibromomethane	NOT DETECTED	740
Bromodichloromethane	NOT DETECTED	740
2-Chloroethyl vinyl ether	NOT DETECTED	740
cis-1,3-Dichloropropene	NOT DETECTED	740
4-Methyl-2-pentanone (MIBK)	NOT DETECTED	740
Toluene	NOT DETECTED	740
trans-1,3-Dichloropropene	NOT DETECTED	740

Duke Power
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>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-02-061598

File Name:: 25U02.D
Lab ID:: 98015590
Reviewed by:: GS 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
1,1,2-Trichloroethane	NOT DETECTED	740
1,3-Dichloropropane	NOT DETECTED	740
Tetrachloroethene	NOT DETECTED	740
2-Hexanone	NOT DETECTED	740
Dibromochloromethane	NOT DETECTED	740
1,2-Dibromoethane (EDB)	NOT DETECTED	740
Chlorobenzene	NOT DETECTED	740
Isopropylbenzene	NOT DETECTED	740
1,1,1,2-tetrachloroethane	NOT DETECTED	740
Ethylbenzene	NOT DETECTED	740
m-p-Xylene	NOT DETECTED	1500
o-Xylene	NOT DETECTED	740
Styrene	NOT DETECTED	740
Bromoform	NOT DETECTED	740
1,4-Dichlorobutane	NOT DETECTED	740
1,1,2,2-Tetrachloroethane	NOT DETECTED	740
1,2,3-Trichloropropane	NOT DETECTED	740
n-Propyl benzene	NOT DETECTED	740
Bromobenzene	NOT DETECTED	740
1,3,5-trimethylbenzene	NOT DETECTED	740
2-Chlorotoluene	NOT DETECTED	740
4-Chlorotoluene	NOT DETECTED	740
t-Butylbenzene	NOT DETECTED	740
1,2,4-Trimethylbenzene	NOT DETECTED	740
sec-Butylbenzene	NOT DETECTED	740
p-Isopropyltoluene	NOT DETECTED	740
1,3-Dichlorobenzene	NOT DETECTED	740
1,4-Dichlorobenzene	NOT DETECTED	740
n-Butylbenzene	NOT DETECTED	740
1,2-Dichlorobenzene	NOT DETECTED	740
1,2-Dibromo-3-chloropropane	NOT DETECTED	740
1,2,4-Trichlorobenzene	NOT DETECTED	740
Hexachlorobutadiene	NOT DETECTED	740
Naphthalene	4900	740
1,2,3-Trichlorobenzene	NOT DETECTED	740

Tentatively Identified Compound Report

Compound	Probable Molecular Weight	Estimated Concentration (ug/kg)	Library Match Probability (%)	Retention Rime (RT) (Minutes)	Identification: Library Match	Identification: Manual Interpretation	Identification: RT	Scan Number
unknown		1400		43.78				
methyl naphthalene		8000	94	51.96	x			
methyl naphthalene		4800	94	52.7	x			
ethyl naphthalene		2800	95	54.92	x			

Internal Standard	RT
Pentafluorobenzene	17.79
D4-1,4-Difluorobenzene	21.41
Chlorobenzene D-5	32.08
D-4 1,4-Dichlorobenzene	40.72

Surrogates	% Recovery
Dibromofluoromethane	93%
Toluene D-8	104%
1,4-Bromofluorobenze	99%

USEPA - 8260 G.C. Conditions

105 m x 0.53 mm x 1.0 um / Restek 502.2
He, 0.5 ml/min, 35 C hold 10 mins, 35 C to 180 C @ 4 C/min, 180 to 200 C @ 10 C/min, hold 5 min

USEPA Method 8260 Analysis Results

Duke Power
A Duke Energy Company

ORGANIC CHEMISTRY GROUP

>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-03-061598

File Name:: 23U11.D
Lab ID:: 98015591
Reviewed by:: GSA 7/16/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
Dichlorodifluoromethane	NOT DETECTED	31
Chloromethane	NOT DETECTED	31
Vinyl chloride	NOT DETECTED	31
Bromomethane	NOT DETECTED	31
Chloroethane	NOT DETECTED	31
Trichlorofluoromethane	NOT DETECTED	31
Acrolein	NOT DETECTED	310
1,1-Dichloroethene	NOT DETECTED	31
1,1,2-Trichloro-1,2,2-Trifluoroethane	NOT DETECTED	31
Acetone	NOT DETECTED	31
Methyl iodide	NOT DETECTED	31
Carbon disulfide	NOT DETECTED	31
Methylene chloride	NOT DETECTED	31
Acrylonitrile	NOT DETECTED	310
MTBE	NOT DETECTED	31
trans-1,2-Dichloroethene	NOT DETECTED	31
Isopropyl ether	NOT DETECTED	31
1,1-Dichloroethane	NOT DETECTED	31
Vinyl acetate	NOT DETECTED	31
2,2-Dichloropropane	NOT DETECTED	31
cis-1,2-Dichloroethene	NOT DETECTED	31
2-Butanone	NOT DETECTED	31
Chloroform	NOT DETECTED	31
1,1-Dichloropropene	NOT DETECTED	31
1,1,1-Trichloroethane	NOT DETECTED	31
Carbon tetrachloride	NOT DETECTED	31
Bromochloromethane	NOT DETECTED	31
Benzene	NOT DETECTED	31
1,2-Dichloroethane	NOT DETECTED	31
Trichloroethene	NOT DETECTED	31
1,2-Dichloropropane	NOT DETECTED	31
Dibromomethane	NOT DETECTED	31
Bromodichloromethane	NOT DETECTED	31
2-Chloroethyl vinyl ether	NOT DETECTED	31
cis-1,3-Dichloropropene	NOT DETECTED	31
4-Methyl-2-pentanone (MIBK)	NOT DETECTED	31
Toluene	NOT DETECTED	31
trans-1,3-Dichloropropene	NOT DETECTED	31

Duke Power
A Duke Energy Company

ORGANIC CHEMISTRY GROUP
>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<
North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-03-061598

File Name:: 23U11.D
Lab ID:: 98015591
Reviewed by:: GCA 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
1,1,2-Trichloroethane	NOT DETECTED	31
1,3-Dichloropropane	NOT DETECTED	31
Tetrachloroethene	NOT DETECTED	31
2-Hexanone	NOT DETECTED	31
Dibromochloromethane	NOT DETECTED	31
1,2-Dibromoethane (EDB)	NOT DETECTED	31
Chlorobenzene	NOT DETECTED	31
Isopropylbenzene	NOT DETECTED	31
1,1,1,2-tetrachloroethane	NOT DETECTED	31
Ethylbenzene	NOT DETECTED	31
m-p-Xylene	NOT DETECTED	61
o-Xylene	NOT DETECTED	31
Styrene	NOT DETECTED	31
Bromoform	NOT DETECTED	31
1,4-Dichlorobutane	NOT DETECTED	31
1,1,2,2-Tetrachloroethane	NOT DETECTED	31
1,2,3-Trichloropropane	NOT DETECTED	31
n-Propyl benzene	NOT DETECTED	31
Bromobenzene	NOT DETECTED	31
1,3,5-trimethylbenzene	NOT DETECTED	31
2-Chlorotoluene	NOT DETECTED	31
4-Chlorotoluene	NOT DETECTED	31
t-Butylbenzene	NOT DETECTED	31
1,2,4-Trimethylbenzene	NOT DETECTED	31
sec-Butylbenzene	NOT DETECTED	31
p-Isopropyltoluene	NOT DETECTED	31
1,3-Dichlorobenzene	NOT DETECTED	31
1,4-Dichlorobenzene	NOT DETECTED	31
n-Butylbenzene	39	31
1,2-Dichlorobenzene	NOT DETECTED	31
1,2-Dibromo-3-chloropropane	NOT DETECTED	31
1,2,4-Trichlorobenzene	NOT DETECTED	31
Hexachlorobutadiene	NOT DETECTED	31
Naphthalene	87	31
1,2,3-Trichlorobenzene	NOT DETECTED	31

Tentatively Identified Compound Report

Compound	Probable Molecular Weight	Estimated Concentration (ug/kg)	Library Match Probability (%)	Retention Rime (RT) (Minutes)	Identification: Library Match	Identification: Manual Interpretation	Identification: RT	Scan Number
unknown		52		33.4				
unknown		72		34.55				
unknown		76		34.75				
unknown		52		37.38				
diethyl benzene		81	96	41.33	x			
Indane		100	74	41.85	x			
Isopropyl toluene		250	97	43.06	x			
methyl propenyl benzene		68	93	43.47	x			
dihydro methyl Indene		170	90	43.83	x			
tetramethyl benzene		110	94	44.45	x			
dihydro methyl Indene		110	87	46.12	x			
tetramethyl benzene		52	94	46.43	x			
dihydro methyl Indene		200	90	46.76	x			
dihydro dimethyl Indene		93	94	47.71	x			
dihydro dimethyl Indene		82	90	48.24	x			
methyl naphthalene		100	94	52.68	x			

Internal Standard	RT
Pentafluorobenzene	17.78
D4-1,4-Difluorobenzene	21.39
Chlorobenzene D-5	32.06
D-4 1,4-Dichlorobenzene	40.70

Surrogates	% Recovery
Dibromofluoromethane	104%
Toluene D-8	107%
1,4-Bromofluorobenze	94%

USEPA - 8260 G.C. Conditions

105 m x 0.53 mm x 1.0 um / Restek 502.2
He, 0.5 ml/min, 35 C hold 10 mins, 35 C to 180 C @ 4 C/min, 180 to 200 C @ 10 C/min, hold 5 min

USEPA Method 8260 Analysis Results

Duke Power
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ORGANIC CHEMISTRY GROUP

>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-04-061598

File Name:: 23U06.D
Lab ID:: 98015592
Reviewed by:: GCA 7/6/99

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
Dichlorodifluoromethane	NOT DETECTED	65
Chloromethane	NOT DETECTED	65
Vinyl chloride	NOT DETECTED	65
Bromomethane	NOT DETECTED	65
Chloroethane	NOT DETECTED	65
Trichlorofluoromethane	NOT DETECTED	65
Acrolein	NOT DETECTED	650
1,1-Dichloroethene	NOT DETECTED	65
1,1,2-Trichloro-1,2,2-Trifluoroethane	NOT DETECTED	65
Acetone	NOT DETECTED	65
Methyl iodide	NOT DETECTED	65
Carbon disulfide	NOT DETECTED	65
Methylene chloride	NOT DETECTED	65
Acrylonitrile	NOT DETECTED	650
MTBE	NOT DETECTED	65
trans-1,2-Dichloroethene	NOT DETECTED	65
Isopropyl ether	NOT DETECTED	65
1,1-Dichloroethane	NOT DETECTED	65
Vinyl acetate	NOT DETECTED	65
2,2-Dichloropropane	NOT DETECTED	65
cis-1,2-Dichloroethene	NOT DETECTED	65
2-Butanone	NOT DETECTED	65
Chloroform	NOT DETECTED	65
1,1-Dichloropropene	NOT DETECTED	65
1,1,1-Trichloroethane	NOT DETECTED	65
Carbon tetrachloride	NOT DETECTED	65
Bromochloromethane	NOT DETECTED	65
Benzene	230	65
1,2-Dichloroethane	NOT DETECTED	65
Trichloroethene	NOT DETECTED	65
1,2-Dichloropropane	NOT DETECTED	65
Dibromomethane	NOT DETECTED	65
Bromodichloromethane	NOT DETECTED	65
2-Chloroethyl vinyl ether	NOT DETECTED	65
cis-1,3-Dichloropropene	NOT DETECTED	65
4-Methyl-2-pentanone (MIBK)	NOT DETECTED	65
Toluene	NOT DETECTED	65
trans-1,3-Dichloropropene	NOT DETECTED	65

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>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-04-061598

File Name:: 23U06.D
Lab ID:: 98015592
Reviewed by:: GGA 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
1,1,2-Trichloroethane	NOT DETECTED	65
1,3-Dichloropropane	NOT DETECTED	65
Tetrachloroethene	NOT DETECTED	65
2-Hexanone	NOT DETECTED	65
Dibromochloromethane	NOT DETECTED	65
1,2-Dibromoethane (EDB)	NOT DETECTED	65
Chlorobenzene	NOT DETECTED	65
Isopropylbenzene	NOT DETECTED	65
1,1,1,2-tetrachloroethane	NOT DETECTED	65
Ethylbenzene	450	65
m-p-Xylene	1100	130
o-Xylene	240	65
Styrene	NOT DETECTED	65
Bromoform	NOT DETECTED	65
1,4-Dichlorobutane	NOT DETECTED	65
1,1,2,2-Tetrachloroethane	NOT DETECTED	65
1,2,3-Trichloropropane	NOT DETECTED	65
n-Propyl benzene	94	65
Bromobenzene	NOT DETECTED	65
1,3,5-trimethylbenzene	140	65
2-Chlorotoluene	NOT DETECTED	65
4-Chlorotoluene	NOT DETECTED	65
t-Butylbenzene	NOT DETECTED	65
1,2,4-Trimethylbenzene	560	65
sec-Butylbenzene	NOT DETECTED	65
p-Isopropyltoluene	NOT DETECTED	65
1,3-Dichlorobenzene	NOT DETECTED	65
1,4-Dichlorobenzene	NOT DETECTED	65
n-Butylbenzene	NOT DETECTED	65
1,2-Dichlorobenzene	NOT DETECTED	65
1,2-Dibromo-3-chloropropane	NOT DETECTED	65
1,2,4-Trichlorobenzene	NOT DETECTED	65
Hexachlorobutadiene	NOT DETECTED	65
Naphthalene	70	65
1,2,3-Trichlorobenzene	NOT DETECTED	65

Tentatively Identified Compound Report

Compound	Probable Molecular Weight	Estimated Concentration (ug/kg)	Library Match Probability (%)	Retention Rime (RT) (Minutes)	Identification: Library Match	Identification: Manual Interpretation	Identification: RT	Scan Number
ethyl toluene		284	95	37.35	x			

Internal Standard	RT
Pentafluorobenzene	17.77
D4-1,4-Difluorobenzene	21.38
Chlorobenzene D-5	32.06
D-4 1,4-Dichlorobenzene	40.70

Surrogates	% Recovery
Dibromofluoromethane	98%
Toluene D-8	108%
1,4-Bromofluorobenze	97%

USEPA - 8260 G.C. Conditions

105 m x 0.53 mm x 1.0 um / Restek 502.2
He, 0.5 ml/min, 35 C hold 10 mins, 35 C to 180 C @ 4 C/min, 180 to 200 C @ 10 C/min, hold 5 min

USEPA Method 8260 Analysis Results

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ORGANIC CHEMISTRY GROUP

>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-05-061598

File Name:: 23U07.D
Lab ID:: 98015593
Reviewed by:: 2/21/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
Dichlorodifluoromethane	NOT DETECTED	7.6
Chloromethane	NOT DETECTED	7.6
Vinyl chloride	NOT DETECTED	7.6
Bromomethane	NOT DETECTED	7.6
Chloroethane	NOT DETECTED	7.6
Trichlorofluoromethane	NOT DETECTED	7.6
Acrolein	NOT DETECTED	76
1,1-Dichloroethene	NOT DETECTED	7.6
1,1,2-Trichloro-1,2,2-Trifluoroethane	NOT DETECTED	7.6
Acetone	NOT DETECTED	7.6
Methyl iodide	NOT DETECTED	7.6
Carbon disulfide	NOT DETECTED	7.6
Methylene chloride	NOT DETECTED	7.6
Acrylonitrile	NOT DETECTED	76
MTBE	NOT DETECTED	7.6
trans-1,2-Dichloroethene	NOT DETECTED	7.6
Isopropyl ether	NOT DETECTED	7.6
1,1-Dichloroethane	NOT DETECTED	7.6
Vinyl acetate	NOT DETECTED	7.6
2,2-Dichloropropane	NOT DETECTED	7.6
cis-1,2-Dichloroethene	NOT DETECTED	7.6
2-Butanone	NOT DETECTED	7.6
Chloroform	NOT DETECTED	7.6
1,1-Dichloropropene	NOT DETECTED	7.6
1,1,1-Trichloroethane	NOT DETECTED	7.6
Carbon tetrachloride	NOT DETECTED	7.6
Bromochloromethane	NOT DETECTED	7.6
Benzene	NOT DETECTED	7.6
1,2-Dichloroethane	NOT DETECTED	7.6
Trichloroethene	NOT DETECTED	7.6
1,2-Dichloropropane	NOT DETECTED	7.6
Dibromomethane	NOT DETECTED	7.6
Bromodichloromethane	NOT DETECTED	7.6
2-Chloroethyl vinyl ether	NOT DETECTED	7.6
cis-1,3-Dichloropropene	NOT DETECTED	7.6
4-Methyl-2-pentanone (MIBK)	NOT DETECTED	7.6
Toluene	NOT DETECTED	7.6
trans-1,3-Dichloropropene	NOT DETECTED	7.6

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>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-05-061598

File Name:: 23U07.D
Lab ID:: 98015593
Reviewed by:: GSH 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
1,1,2-Trichloroethane	NOT DETECTED	7.6
1,3-Dichloropropane	NOT DETECTED	7.6
Tetrachloroethene	NOT DETECTED	7.6
2-Hexanone	NOT DETECTED	7.6
Dibromochloromethane	NOT DETECTED	7.6
1,2-Dibromoethane (EDB)	NOT DETECTED	7.6
Chlorobenzene	NOT DETECTED	7.6
Isopropylbenzene	NOT DETECTED	7.6
1,1,1,2-tetrachloroethane	NOT DETECTED	7.6
Ethylbenzene	NOT DETECTED	7.6
m-p-Xylene	NOT DETECTED	15
o-Xylene	NOT DETECTED	7.6
Styrene	NOT DETECTED	7.6
Bromoform	NOT DETECTED	7.6
1,4-Dichlorobutane	NOT DETECTED	7.6
1,1,2,2-Tetrachloroethane	NOT DETECTED	7.6
1,2,3-Trichloropropane	NOT DETECTED	7.6
n-Propyl benzene	NOT DETECTED	7.6
Bromobenzene	NOT DETECTED	7.6
1,3,5-trimethylbenzene	NOT DETECTED	7.6
2-Chlorotoluene	NOT DETECTED	7.6
4-Chlorotoluene	NOT DETECTED	7.6
t-Butylbenzene	NOT DETECTED	7.6
1,2,4-Trimethylbenzene	NOT DETECTED	7.6
sec-Butylbenzene	NOT DETECTED	7.6
p-Isopropyltoluene	NOT DETECTED	7.6
1,3-Dichlorobenzene	NOT DETECTED	7.6
1,4-Dichlorobenzene	NOT DETECTED	7.6
n-Butylbenzene	NOT DETECTED	7.6
1,2-Dichlorobenzene	NOT DETECTED	7.6
1,2-Dibromo-3-chloropropane	NOT DETECTED	7.6
1,2,4-Trichlorobenzene	NOT DETECTED	7.6
Hexachlorobutadiene	NOT DETECTED	7.6
Naphthalene	NOT DETECTED	7.6
1,2,3-Trichlorobenzene	NOT DETECTED	7.6

DATA FILE:: 23007.D | FIELD ID:: BOC-05-061598 | LAB ID:: 98-JUN-0217

Tentatively Identified Compound Report

Compound	Probable Molecular Weight	Estimated Concentration (ug/kg)	Library Match Probability (%)	Retention Rime (RT) (Minutes)	Identification			Scan Number
					Library Match	Manual Interpretation	RT	
NO TICS								

Internal Standard	RT
Pentafluorobenzene	17.77
D4-1,4-Difluorobenzene	21.38
Chlorobenzene D-5	32.06
D-4 1,4-Dichlorobenzene	40.70

Surrogates	% Recovery
Dibromofluoromethane	101%
Toluene D-8	105%
1,4-Bromofluorobenze	98%

USEPA - 8260 G.C. Conditions

105 m x 0.53 mm x 1.0 um / Restek 502.2
He, 0.5 ml/min, 35 C hold 10 mins, 35 C to 180 C @ 4 C/min, 180 to 200 C @ 10 C/min, hold 5 min

USEPA Method 8260 Analysis Results

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>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248

South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-06-061598

File Name:: 23U12.D
Lab ID:: 98015594
Reviewed by:: GGT 7/14/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
Dichlorodifluoromethane	NOT DETECTED	20
Chloromethane	NOT DETECTED	20
Vinyl chloride	NOT DETECTED	20
Bromomethane	NOT DETECTED	20
Chloroethane	NOT DETECTED	20
Trichlorofluoromethane	NOT DETECTED	20
Acrolein	NOT DETECTED	200
1,1-Dichloroethene	NOT DETECTED	20
1,1,2-Trichloro-1,2,2-Trifluoroethane	NOT DETECTED	20
Acetone	NOT DETECTED	20
Methyl iodide	NOT DETECTED	20
Carbon disulfide	NOT DETECTED	20
Methylene chloride	NOT DETECTED	20
Acrylonitrile	NOT DETECTED	200
MTBE	NOT DETECTED	20
trans-1,2-Dichloroethene	NOT DETECTED	20
Isopropyl ether	NOT DETECTED	20
1,1-Dichloroethane	NOT DETECTED	20
Vinyl acetate	NOT DETECTED	20
2,2-Dichloropropane	NOT DETECTED	20
cis-1,2-Dichloroethene	NOT DETECTED	20
2-Butanone	NOT DETECTED	20
Chloroform	NOT DETECTED	20
1,1-Dichloropropene	NOT DETECTED	20
1,1,1-Trichloroethane	NOT DETECTED	20
Carbon tetrachloride	NOT DETECTED	20
Bromochloromethane	NOT DETECTED	20
Benzene	NOT DETECTED	20
1,2-Dichloroethane	NOT DETECTED	20
Trichloroethene	NOT DETECTED	20
1,2-Dichloropropane	NOT DETECTED	20
Dibromomethane	NOT DETECTED	20
Bromodichloromethane	NOT DETECTED	20
2-Chloroethyl vinyl ether	NOT DETECTED	20
cis-1,3-Dichloropropene	NOT DETECTED	20
4-Methyl-2-pentanone (MIBK)	NOT DETECTED	20
Toluene	NOT DETECTED	20
trans-1,3-Dichloropropene	NOT DETECTED	20

USEPA Method 8260 Analysis Results

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>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-06-061598

File Name:: 23U12.D
Lab ID:: 98015594
Reviewed by:: GM 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
1,1,2-Trichloroethane	NOT DETECTED	20
1,3-Dichloropropane	NOT DETECTED	20
Tetrachloroethene	NOT DETECTED	20
2-Hexanone	NOT DETECTED	20
Dibromochloromethane	NOT DETECTED	20
1,2-Dibromoethane (EDB)	NOT DETECTED	20
Chlorobenzene	NOT DETECTED	20
Isopropylbenzene	NOT DETECTED	20
1,1,1,2-tetrachloroethane	NOT DETECTED	20
Ethylbenzene	NOT DETECTED	20
m-p-Xylene	NOT DETECTED	39
o-Xylene	NOT DETECTED	20
Styrene	NOT DETECTED	20
Bromoform	NOT DETECTED	20
1,4-Dichlorobutane	NOT DETECTED	20
1,1,2,2-Tetrachloroethane	NOT DETECTED	20
1,2,3-Trichloropropane	NOT DETECTED	20
n-Propyl benzene	NOT DETECTED	20
Bromobenzene	NOT DETECTED	20
1,3,5-trimethylbenzene	NOT DETECTED	20
2-Chlorotoluene	NOT DETECTED	20
4-Chlorotoluene	NOT DETECTED	20
t-Butylbenzene	NOT DETECTED	20
1,2,4-Trimethylbenzene	NOT DETECTED	20
sec-Butylbenzene	NOT DETECTED	20
p-Isopropyltoluene	NOT DETECTED	20
1,3-Dichlorobenzene	NOT DETECTED	20
1,4-Dichlorobenzene	NOT DETECTED	20
n-Butylbenzene	NOT DETECTED	20
1,2-Dichlorobenzene	NOT DETECTED	20
1,2-Dibromo-3-chloropropane	NOT DETECTED	20
1,2,4-Trichlorobenzene	NOT DETECTED	20
Hexachlorobutadiene	NOT DETECTED	20
Naphthalene	310	20
1,2,3-Trichlorobenzene	NOT DETECTED	20

DATA FILE:: 23012.D | FIELD ID:: BOC-06-061598 | LAB ID:: 98-JUN-0217

Tentatively Identified Compound Report

Compound	Probable Molecular Weight	Estimated Concentration (ug/kg)	Library Match Probability (%)	Retention Rime (RT) (Minutes)	Identification			Scan Number
					Library Match	Manual Interpretation	RT	
Indane		41	80	41.84	x			
dihydro methyl indene		34	93	46.75	x			
methyl naphthalene		99	94	51.95	x			
methyl naphthalene		130	94	52.69	x			

Internal Standard	RT
Pentafluorobenzene	17.78
D4-1,4-Difluorobenzene	21.39
Chlorobenzene D-5	32.06
D-4 1,4-Dichlorobenzene	40.70

Surrogates	% Recovery
Dibromofluoromethane	101%
Toluene D-8	109%
1,4-Bromofluorobenze	96%

USEPA - 8260 G.C. Conditions

105 m x 0.53 mm x 1.0 um / Restek 502.2
He, 0.5 ml/min, 35 C hold 10 mins, 35 C to 180 C @ 4 C/min, 180 to 200 C @ 10 C/min, hold 5 min

USEPA Method 8260 Analysis Results

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>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-07-061598

File Name:: 23U13.D
Lab ID:: 98015595
Reviewed by:: 7/16/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
Dichlorodifluoromethane	NOT DETECTED	6600
Chloromethane	NOT DETECTED	6600
Vinyl chloride	NOT DETECTED	6600
Bromomethane	NOT DETECTED	6600
Chloroethane	NOT DETECTED	6600
Trichlorofluoromethane	NOT DETECTED	6600
Acrolein	NOT DETECTED	66000
1,1-Dichloroethene	NOT DETECTED	6600
1,1,2-Trichloro-1,2,2-Trifluoroethane	NOT DETECTED	6600
Acetone	NOT DETECTED	6600
Methyl iodide	NOT DETECTED	6600
Carbon disulfide	NOT DETECTED	6600
Methylene chloride	NOT DETECTED	6600
Acrylonitrile	NOT DETECTED	66000
MTBE	NOT DETECTED	6600
trans-1,2-Dichloroethene	NOT DETECTED	6600
Isopropyl ether	NOT DETECTED	6600
1,1-Dichloroethane	NOT DETECTED	6600
Vinyl acetate	NOT DETECTED	6600
2,2-Dichloropropane	NOT DETECTED	6600
cis-1,2-Dichloroethene	NOT DETECTED	6600
2-Butanone	NOT DETECTED	6600
Chloroform	NOT DETECTED	6600
1,1-Dichloropropene	NOT DETECTED	6600
1,1,1-Trichloroethane	NOT DETECTED	6600
Carbon tetrachloride	NOT DETECTED	6600
Bromochloromethane	NOT DETECTED	6600
Benzene	NOT DETECTED	6600
1,2-Dichloroethane	NOT DETECTED	6600
Trichloroethene	NOT DETECTED	6600
1,2-Dichloropropane	NOT DETECTED	6600
Dibromomethane	NOT DETECTED	6600
Bromodichloromethane	NOT DETECTED	6600
2-Chloroethyl vinyl ether	NOT DETECTED	6600
cis-1,3-Dichloropropene	NOT DETECTED	6600
4-Methyl-2-pentanone (MIBK)	NOT DETECTED	6600
Toluene	NOT DETECTED	6600
trans-1,3-Dichloropropene	NOT DETECTED	6600

USEPA Method 8260 Analysis Results

Duke Power
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ORGANIC CHEMISTRY GROUP

>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-07-061598

File Name:: 23U13.D
Lab ID:: 98015595
Reviewed by:: GCA 6/19/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
1,1,2-Trichloroethane	NOT DETECTED	6600
1,3-Dichloropropane	NOT DETECTED	6600
Tetrachloroethene	NOT DETECTED	6600
2-Hexanone	NOT DETECTED	6600
Dibromochloromethane	NOT DETECTED	6600
1,2-Dibromoethane (EDB)	NOT DETECTED	6600
Chlorobenzene	NOT DETECTED	6600
Isopropylbenzene	NOT DETECTED	6600
1,1,1,2-tetrachloroethane	NOT DETECTED	6600
Ethylbenzene	NOT DETECTED	6600
m-p-Xylene	NOT DETECTED	13000
o-Xylene	NOT DETECTED	6600
Styrene	NOT DETECTED	6600
Bromoform	NOT DETECTED	6600
1,4-Dichlorobutane	NOT DETECTED	6600
1,1,2,2-Tetrachloroethane	NOT DETECTED	6600
1,2,3-Trichloropropane	NOT DETECTED	6600
n-Propyl benzene	NOT DETECTED	6600
Bromobenzene	NOT DETECTED	6600
1,3,5-trimethylbenzene	NOT DETECTED	6600
2-Chlorotoluene	NOT DETECTED	6600
4-Chlorotoluene	NOT DETECTED	6600
t-Butylbenzene	NOT DETECTED	6600
1,2,4-Trimethylbenzene	NOT DETECTED	6600
sec-Butylbenzene	NOT DETECTED	6600
p-Isopropyltoluene	NOT DETECTED	6600
1,3-Dichlorobenzene	NOT DETECTED	6600
1,4-Dichlorobenzene	NOT DETECTED	6600
n-Butylbenzene	NOT DETECTED	6600
1,2-Dichlorobenzene	NOT DETECTED	6600
1,2-Dibromo-3-chloropropane	NOT DETECTED	6600
1,2,4-Trichlorobenzene	NOT DETECTED	6600
Hexachlorobutadiene	NOT DETECTED	6600
Naphthalene	12000	6600
1,2,3-Trichlorobenzene	NOT DETECTED	6600

DATA FILE:: 23013.D | FIELD ID:: BOC-07-061598 | LAB ID:: 98-JUN-0217

Tentatively Identified Compound Report

Compound	Probable Molecular Weight	Estimated Concentration (ug/kg)	Library Match Probability (%)	Retention Rime (RT) (Minutes)	Identification: Library Match	Identification: Manual Interpretation	Identification: RT	Scan Number
methyl naphthalene		15000	93	52.69	x			

Internal Standard	RT
Pentafluorobenzene	17.78
D4-1,4-Difluorobenzene	21.39
Chlorobenzene D-5	32.05
D-4 1,4-Dichlorobenzene	40.70

Surrogates	% Recovery
Dibromofluoromethane	104%
Toluene D-8	108%
1,4-Bromofluorobenze	94%

USEPA - 8260 G.C. Conditions

105 m x 0.53 mm x 1.0 um / Restek 502.2
He, 0.5 ml/min, 35 C hold 10 mins, 35 C to 180 C @ 4 C/min, 180 to 200 C @ 10 C/min, hold 5 min

USEPA Method 8260 Analysis Results

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ORGANIC CHEMISTRY GROUP

>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-08-061598

File Name:: 23U08.D
Lab ID:: 98015596
Reviewed by:: 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
Dichlorodifluoromethane	NOT DETECTED	14
Chloromethane	NOT DETECTED	14
Vinyl chloride	NOT DETECTED	14
Bromomethane	NOT DETECTED	14
Chloroethane	NOT DETECTED	14
Trichlorofluoromethane	NOT DETECTED	14
Acrolein	NOT DETECTED	140
1,1-Dichloroethene	NOT DETECTED	14
1,1,2-Trichloro-1,2,2-Trifluoroethane	NOT DETECTED	14
Acetone	NOT DETECTED	14
Methyl iodide	NOT DETECTED	14
Carbon disulfide	NOT DETECTED	14
Methylene chloride	NOT DETECTED	14
Acrylonitrile	NOT DETECTED	140
MTBE	NOT DETECTED	14
trans-1,2-Dichloroethene	NOT DETECTED	14
Isopropyl ether	NOT DETECTED	14
1,1-Dichloroethane	NOT DETECTED	14
Vinyl acetate	NOT DETECTED	14
2,2-Dichloropropane	NOT DETECTED	14
cis-1,2-Dichloroethene	NOT DETECTED	14
2-Butanone	NOT DETECTED	14
Chloroform	NOT DETECTED	14
1,1-Dichloropropene	NOT DETECTED	14
1,1,1-Trichloroethane	NOT DETECTED	14
Carbon tetrachloride	NOT DETECTED	14
Bromochloromethane	NOT DETECTED	14
Benzene	NOT DETECTED	14
1,2-Dichloroethane	NOT DETECTED	14
Trichloroethene	NOT DETECTED	14
1,2-Dichloropropane	NOT DETECTED	14
Dibromomethane	NOT DETECTED	14
Bromodichloromethane	NOT DETECTED	14
2-Chloroethyl vinyl ether	NOT DETECTED	14
cis-1,3-Dichloropropene	NOT DETECTED	14
4-Methyl-2-pentanone (MIBK)	NOT DETECTED	14
Toluene	NOT DETECTED	14
trans-1,3-Dichloropropene	NOT DETECTED	14

USEPA Method 8260 Analysis Results

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>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-08-061598

File Name:: 23U08.D
Lab ID:: 98015596
Reviewed by:: 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
1,1,2-Trichloroethane	NOT DETECTED	14
1,3-Dichloropropane	NOT DETECTED	14
Tetrachloroethene	NOT DETECTED	14
2-Hexanone	NOT DETECTED	14
Dibromochloromethane	NOT DETECTED	14
1,2-Dibromoethane (EDB)	NOT DETECTED	14
Chlorobenzene	NOT DETECTED	14
Isopropylbenzene	NOT DETECTED	14
1,1,1,2-tetrachloroethane	NOT DETECTED	14
Ethylbenzene	NOT DETECTED	14
m-p-Xylene	NOT DETECTED	29
o-Xylene	NOT DETECTED	14
Styrene	NOT DETECTED	14
Bromoform	NOT DETECTED	14
1,4-Dichlorobutane	NOT DETECTED	14
1,1,2,2-Tetrachloroethane	NOT DETECTED	14
1,2,3-Trichloropropane	NOT DETECTED	14
n-Propyl benzene	NOT DETECTED	14
Bromobenzene	NOT DETECTED	14
1,3,5-trimethylbenzene	NOT DETECTED	14
2-Chlorotoluene	NOT DETECTED	14
4-Chlorotoluene	NOT DETECTED	14
t-Butylbenzene	NOT DETECTED	14
1,2,4-Trimethylbenzene	NOT DETECTED	14
sec-Butylbenzene	NOT DETECTED	14
p-Isopropyltoluene	NOT DETECTED	14
1,3-Dichlorobenzene	NOT DETECTED	14
1,4-Dichlorobenzene	NOT DETECTED	14
n-Butylbenzene	NOT DETECTED	14
1,2-Dichlorobenzene	NOT DETECTED	14
1,2-Dibromo-3-chloropropane	NOT DETECTED	14
1,2,4-Trichlorobenzene	NOT DETECTED	14
Hexachlorobutadiene	NOT DETECTED	14
Naphthalene	NOT DETECTED	14
1,2,3-Trichlorobenzene	NOT DETECTED	14

DATA FILE:: 23U08.D | FIELD ID:: BOC-08-061598 | LAB ID:: 98-JUN-0217

Tentatively Identified Compound Report

Compound	Probable Molecular Weight	Estimated Concentration (ug/kg)	Library Match Probability (%)	Retention Rime (RT) (Minutes)	Identification			Scan Number
					Library Match	Manual Interpretation	RT	
methyl naphthalene		37	89	52.67	x			
decahydro pentamethyl naphthalene		39	70	54.29	x			

Internal Standard	RT
Pentafluorobenzene	17.77
D4-1,4-Difluorobenzene	21.38
Chlorobenzene D-5	32.05
D-4 1,4-Dichlorobenzene	40.70

Surrogates	% Recovery
Dibromofluoromethane	102%
Toluene D-8	103%
1,4-Bromofluorobenze	97%

USEPA - 8260 G.C. Conditions

105 m x 0.53 mm x 1.0 um / Restek 502.2
He, 0.5 ml/min, 35 C hold 10 mins, 35 C to 180 C @ 4 C/min, 180 to 200 C @ 10 C/min, hold 5 min

USEPA Method 8260 Analysis Results

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ORGANIC CHEMISTRY GROUP

>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-09-061598

File Name:: 23U09.D
Lab ID:: 98015597
Reviewed by:: 6/16/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
Dichlorodifluoromethane	NOT DETECTED	8.3
Chloromethane	NOT DETECTED	8.3
Vinyl chloride	NOT DETECTED	8.3
Bromomethane	NOT DETECTED	8.3
Chloroethane	NOT DETECTED	8.3
Trichlorofluoromethane	NOT DETECTED	8.3
Acrolein	NOT DETECTED	83
1,1-Dichloroethene	NOT DETECTED	8.3
1,1,2-Trichloro-1,2,2-Trifluoroethane	NOT DETECTED	8.3
Acetone	NOT DETECTED	8.3
Methyl iodide	NOT DETECTED	8.3
Carbon disulfide	NOT DETECTED	8.3
Methylene chloride	NOT DETECTED	8.3
Acrylonitrile	NOT DETECTED	83
MTBE	NOT DETECTED	8.3
trans-1,2-Dichloroethene	NOT DETECTED	8.3
Isopropyl ether	NOT DETECTED	8.3
1,1-Dichloroethane	NOT DETECTED	8.3
Vinyl acetate	NOT DETECTED	8.3
2,2-Dichloropropane	NOT DETECTED	8.3
cis-1,2-Dichloroethene	NOT DETECTED	8.3
2-Butanone	NOT DETECTED	8.3
Chloroform	NOT DETECTED	8.3
1,1-Dichloropropene	NOT DETECTED	8.3
1,1,1-Trichloroethane	NOT DETECTED	8.3
Carbon tetrachloride	NOT DETECTED	8.3
Bromochloromethane	NOT DETECTED	8.3
Benzene	NOT DETECTED	8.3
1,2-Dichloroethane	NOT DETECTED	8.3
Trichloroethene	NOT DETECTED	8.3
1,2-Dichloropropane	NOT DETECTED	8.3
Dibromomethane	NOT DETECTED	8.3
Bromodichloromethane	NOT DETECTED	8.3
2-Chloroethyl vinyl ether	NOT DETECTED	8.3
cis-1,3-Dichloropropene	NOT DETECTED	8.3
4-Methyl-2-pentanone (MIBK)	NOT DETECTED	8.3
Toluene	NOT DETECTED	8.3
trans-1,3-Dichloropropene	NOT DETECTED	8.3

USEPA Method 8260 Analysis Results

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North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-09-061598

File Name:: 23U09.D
Lab ID:: 98015597
Reviewed by:: 6/17/99

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
1,1,2-Trichloroethane	NOT DETECTED	8.3
1,3-Dichloropropane	NOT DETECTED	8.3
Tetrachloroethene	NOT DETECTED	8.3
2-Hexanone	NOT DETECTED	8.3
Dibromochloromethane	NOT DETECTED	8.3
1,2-Dibromoethane (EDB)	NOT DETECTED	8.3
Chlorobenzene	NOT DETECTED	8.3
Isopropylbenzene	NOT DETECTED	8.3
1,1,1,2-tetrachloroethane	NOT DETECTED	8.3
Ethylbenzene	NOT DETECTED	8.3
m-p-Xylene	NOT DETECTED	17
o-Xylene	NOT DETECTED	8.3
Styrene	NOT DETECTED	8.3
Bromoform	NOT DETECTED	8.3
1,4-Dichlorobutane	NOT DETECTED	8.3
1,1,2,2-Tetrachloroethane	NOT DETECTED	8.3
1,2,3-Trichloropropane	NOT DETECTED	8.3
n-Propyl benzene	NOT DETECTED	8.3
Bromobenzene	NOT DETECTED	8.3
1,3,5-trimethylbenzene	NOT DETECTED	8.3
2-Chlorotoluene	NOT DETECTED	8.3
4-Chlorotoluene	NOT DETECTED	8.3
t-Butylbenzene	NOT DETECTED	8.3
1,2,4-Trimethylbenzene	NOT DETECTED	8.3
sec-Butylbenzene	NOT DETECTED	8.3
p-Isopropyltoluene	NOT DETECTED	8.3
1,3-Dichlorobenzene	NOT DETECTED	8.3
1,4-Dichlorobenzene	NOT DETECTED	8.3
n-Butylbenzene	NOT DETECTED	8.3
1,2-Dichlorobenzene	NOT DETECTED	8.3
1,2-Dibromo-3-chloropropane	NOT DETECTED	8.3
1,2,4-Trichlorobenzene	NOT DETECTED	8.3
Hexachlorobutadiene	NOT DETECTED	8.3
Naphthalene	NOT DETECTED	8.3
1,2,3-Trichlorobenzene	NOT DETECTED	8.3

DATA FILE:: 23009.D | FIELD ID:: BOC-09-061598 | LAB ID:: 98-JUN-0217

Tentatively Identified Compound Report

Compound	Probable Molecular Weight	Estimated Concentration (ug/kg)	Library Match Probability (%)	Retention Rime (RT) (Minutes)	Identification			Scan Number
					Library Match	Manual Interpretation	RT	
dihydro methyl indene		15	94	46.75	x			

Internal Standard	RT
Pentafluorobenzene	17.77
D4-1,4-Difluorobenzene	21.39
Chlorobenzene D-5	32.06
D-4 1,4-Dichlorobenzene	40.70

Surrogates	% Recovery
Dibromofluoromethane	102%
Toluene D-8	107%
1,4-Bromofluorobenze	100%

USEPA - 8260 G.C. Conditions

105 m x 0.53 mm x 1.0 um / Restek 502.2
He, 0.5 ml/min, 35 C hold 10 mins, 35 C to 180 C @ 4 C/min, 180 to 200 C @ 10 C/min, hold 5 min

USEPA Method 8260 Analysis Results

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>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-10-061598

File Name:: 23U14.D
Lab ID:: 98015598
Reviewed by:: 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
Dichlorodifluoromethane	NOT DETECTED	7200
Chloromethane	NOT DETECTED	7200
Vinyl chloride	NOT DETECTED	7200
Bromomethane	NOT DETECTED	7200
Chloroethane	NOT DETECTED	7200
Trichlorofluoromethane	NOT DETECTED	7200
Acrolein	NOT DETECTED	72000
1,1-Dichloroethene	NOT DETECTED	7200
1,1,2-Trichloro-1,2,2-Trifluoroethane	NOT DETECTED	7200
Acetone	NOT DETECTED	7200
Methyl iodide	NOT DETECTED	7200
Carbon disulfide	NOT DETECTED	7200
Methylene chloride	NOT DETECTED	7200
Acrylonitrile	NOT DETECTED	72000
MTBE	NOT DETECTED	7200
trans-1,2-Dichloroethene	NOT DETECTED	7200
Isopropyl ether	NOT DETECTED	7200
1,1-Dichloroethane	NOT DETECTED	7200
Vinyl acetate	NOT DETECTED	7200
2,2-Dichloropropane	NOT DETECTED	7200
cis-1,2-Dichloroethene	NOT DETECTED	7200
2-Butanone	NOT DETECTED	7200
Chloroform	NOT DETECTED	7200
1,1-Dichloropropene	NOT DETECTED	7200
1,1,1-Trichloroethane	NOT DETECTED	7200
Carbon tetrachloride	NOT DETECTED	7200
Bromochloromethane	NOT DETECTED	7200
Benzene	NOT DETECTED	7200
1,2-Dichloroethane	NOT DETECTED	7200
Trichloroethene	NOT DETECTED	7200
1,2-Dichloropropane	NOT DETECTED	7200
Dibromomethane	NOT DETECTED	7200
Bromodichloromethane	NOT DETECTED	7200
2-Chloroethyl vinyl ether	NOT DETECTED	7200
cis-1,3-Dichloropropene	NOT DETECTED	7200
4-Methyl-2-pentanone (MIBK)	NOT DETECTED	7200
Toluene	NOT DETECTED	7200
trans-1,3-Dichloropropene	NOT DETECTED	7200

USEPA Method 8260 Analysis Results

Duke Power
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ORGANIC CHEMISTRY GROUP

>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-10-061598

File Name:: 23U14.D
Lab ID:: 98015598
Reviewed by:: GSL 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
1,1,2-Trichloroethane	NOT DETECTED	7200
1,3-Dichloropropane	NOT DETECTED	7200
Tetrachloroethene	NOT DETECTED	7200
2-Hexanone	NOT DETECTED	7200
Dibromochloromethane	NOT DETECTED	7200
1,2-Dibromoethane (EDB)	NOT DETECTED	7200
Chlorobenzene	NOT DETECTED	7200
Isopropylbenzene	NOT DETECTED	7200
1,1,1,2-tetrachloroethane	NOT DETECTED	7200
Ethylbenzene	NOT DETECTED	7200
m-p-Xylene	NOT DETECTED	14000
o-Xylene	NOT DETECTED	7200
Styrene	NOT DETECTED	7200
Bromoform	NOT DETECTED	7200
1,4-Dichlorobutane	NOT DETECTED	7200
1,1,2,2-Tetrachloroethane	NOT DETECTED	7200
1,2,3-Trichloropropane	NOT DETECTED	7200
n-Propyl benzene	NOT DETECTED	7200
Bromobenzene	NOT DETECTED	7200
1,3,5-trimethylbenzene	NOT DETECTED	7200
2-Chlorotoluene	NOT DETECTED	7200
4-Chlorotoluene	NOT DETECTED	7200
t-Butylbenzene	NOT DETECTED	7200
1,2,4-Trimethylbenzene	NOT DETECTED	7200
sec-Butylbenzene	NOT DETECTED	7200
p-Isopropyltoluene	NOT DETECTED	7200
1,3-Dichlorobenzene	NOT DETECTED	7200
1,4-Dichlorobenzene	NOT DETECTED	7200
n-Butylbenzene	NOT DETECTED	7200
1,2-Dichlorobenzene	NOT DETECTED	7200
1,2-Dibromo-3-chloropropane	NOT DETECTED	7200
1,2,4-Trichlorobenzene	NOT DETECTED	7200
Hexachlorobutadiene	NOT DETECTED	7200
Naphthalene	15000	7200
1,2,3-Trichlorobenzene	NOT DETECTED	7200

Tentatively Identified Compound Report

Compound	Probable Molecular Weight	Estimated Concentration (ug/kg)	Library Match Probability (%)	Retention Rime (RT) (Minutes)	Identification			Scan Number
					Library Match	Manual Interpretation	RT	
methyl naphthalene		12000	94	51.93	x			

Internal Standard	RT
Pentafluorobenzene	17.75
D4-1,4-Difluorobenzene	21.36
Chlorobenzene D-5	32.04
D-4 1,4-Dichlorobenzene	40.69

Surrogates	% Recovery
Dibromofluoromethane	103%
Toluene D-8	107%
1,4-Bromofluorobenze	96%

USEPA - 8260 G.C. Conditions

105 m x 0.53 mm x 1.0 um / Restek 502.2
He, 0.5 ml/min, 35 C hold 10 mins, 35 C to 180 C @ 4 C/min, 180 to 200 C @ 10 C/min, hold 5 min

USEPA Method 8260 Analysis Results

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>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-11-061598

File Name:: 22U10.D
Lab ID:: 98015599
Reviewed by:: 6/16/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
Dichlorodifluoromethane	NOT DETECTED	7.6
Chloromethane	NOT DETECTED	7.6
Vinyl chloride	NOT DETECTED	7.6
Bromomethane	NOT DETECTED	7.6
Chloroethane	NOT DETECTED	7.6
Trichlorofluoromethane	NOT DETECTED	7.6
Acrolein	NOT DETECTED	76
1,1-Dichloroethene	NOT DETECTED	7.6
1,1,2-Trichloro-1,2,2-Trifluoroethane	NOT DETECTED	7.6
Acetone	NOT DETECTED	7.6
Methyl iodide	NOT DETECTED	7.6
Carbon disulfide	NOT DETECTED	7.6
Methylene chloride	NOT DETECTED	7.6
Acrylonitrile	NOT DETECTED	76
MTBE	NOT DETECTED	7.6
trans-1,2-Dichloroethene	NOT DETECTED	7.6
Isopropyl ether	NOT DETECTED	7.6
1,1-Dichloroethane	NOT DETECTED	7.6
Vinyl acetate	NOT DETECTED	7.6
2,2-Dichloropropane	NOT DETECTED	7.6
cis-1,2-Dichloroethene	NOT DETECTED	7.6
2-Butanone	NOT DETECTED	7.6
Chloroform	NOT DETECTED	7.6
1,1-Dichloropropene	NOT DETECTED	7.6
1,1,1-Trichloroethane	NOT DETECTED	7.6
Carbon tetrachloride	NOT DETECTED	7.6
Bromochloromethane	NOT DETECTED	7.6
Benzene	NOT DETECTED	7.6
1,2-Dichloroethane	NOT DETECTED	7.6
Trichloroethene	NOT DETECTED	7.6
1,2-Dichloropropane	NOT DETECTED	7.6
Dibromomethane	NOT DETECTED	7.6
Bromodichloromethane	NOT DETECTED	7.6
2-Chloroethyl vinyl ether	NOT DETECTED	7.6
cis-1,3-Dichloropropene	NOT DETECTED	7.6
4-Methyl-2-pentanone (MIBK)	NOT DETECTED	7.6
Toluene	NOT DETECTED	7.6
trans-1,3-Dichloropropene	NOT DETECTED	7.6

USEPA Method 8260 Analysis Results

Duke Power
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>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-11-061598

File Name:: 22U10.D
Lab ID:: 98015599
Reviewed by:: GH 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
1,1,2-Trichloroethane	NOT DETECTED	7.6
1,3-Dichloropropane	NOT DETECTED	7.6
Tetrachloroethene	NOT DETECTED	7.6
2-Hexanone	NOT DETECTED	7.6
Dibromochloromethane	NOT DETECTED	7.6
1,2-Dibromoethane (EDB)	NOT DETECTED	7.6
Chlorobenzene	NOT DETECTED	7.6
Isopropylbenzene	NOT DETECTED	7.6
1,1,1,2-tetrachloroethane	NOT DETECTED	7.6
Ethylbenzene	NOT DETECTED	7.6
m-p-Xylene	NOT DETECTED	15
o-Xylene	NOT DETECTED	7.6
Styrene	NOT DETECTED	7.6
Bromoform	NOT DETECTED	7.6
1,4-Dichlorobutane	NOT DETECTED	7.6
1,1,2,2-Tetrachloroethane	NOT DETECTED	7.6
1,2,3-Trichloropropane	NOT DETECTED	7.6
n-Propyl benzene	NOT DETECTED	7.6
Bromobenzene	NOT DETECTED	7.6
1,3,5-trimethylbenzene	NOT DETECTED	7.6
2-Chlorotoluene	NOT DETECTED	7.6
4-Chlorotoluene	NOT DETECTED	7.6
t-Butylbenzene	NOT DETECTED	7.6
1,2,4-Trimethylbenzene	NOT DETECTED	7.6
sec-Butylbenzene	NOT DETECTED	7.6
p-Isopropyltoluene	NOT DETECTED	7.6
1,3-Dichlorobenzene	NOT DETECTED	7.6
1,4-Dichlorobenzene	NOT DETECTED	7.6
n-Butylbenzene	NOT DETECTED	7.6
1,2-Dichlorobenzene	NOT DETECTED	7.6
1,2-Dibromo-3-chloropropane	NOT DETECTED	7.6
1,2,4-Trichlorobenzene	NOT DETECTED	7.6
Hexachlorobutadiene	NOT DETECTED	7.6
Naphthalene	NOT DETECTED	7.6
1,2,3-Trichlorobenzene	NOT DETECTED	7.6

DATA FILE::	22U10.D	FIELD ID::	BOC-11-061598	LAB ID::	98-JUN-0217

Tentatively Identified Compound Report

Compound	Probable Molecular Weight	Estimated Concentration (ug/kg)	Library Match Probability (%)	Retention Rime (RT) (Minutes)	Identification			Scan Number
					Library Match	Manual Interpretation	RT	
NO TICS								

Internal Standard	RT
Pentafluorobenzene	17.77
D4-1,4-Difluorobenzene	21.39
Chlorobenzene D-5	32.07
D-4 1,4-Dichlorobenzene	40.72

Surrogates	% Recovery
Dibromofluoromethane	95%
Toluene D-8	107%
1,4-Bromofluorobenze	93%

USEPA - 8260 G.C. Conditions

105 m x 0.53 mm x 1.0 um / Restek 502.2
He, 0.5 ml/min, 35 C hold 10 mins, 35 C to 180 C @ 4 C/min, 180 to 200 C @ 10 C/min, hold 5 min

USEPA Method 8260 Analysis Results

Duke Power
A Duke Energy Company

ORGANIC CHEMISTRY GROUP

>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-12-061598

File Name:: 22U11.D
Lab ID:: 98015600
Reviewed by:: [illegible]

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
Dichlorodifluoromethane	NOT DETECTED	8.3
Chloromethane	NOT DETECTED	8.3
Vinyl chloride	NOT DETECTED	8.3
Bromomethane	NOT DETECTED	8.3
Chloroethane	NOT DETECTED	8.3
Trichlorofluoromethane	NOT DETECTED	8.3
Acrolein	NOT DETECTED	83
1,1-Dichloroethene	NOT DETECTED	8.3
1,1,2-Trichloro-1,2,2-Trifluoroethane	NOT DETECTED	8.3
Acetone	NOT DETECTED	8.3
Methyl iodide	NOT DETECTED	8.3
Carbon disulfide	NOT DETECTED	8.3
Methylene chloride	NOT DETECTED	8.3
Acrylonitrile	NOT DETECTED	83
MTBE	NOT DETECTED	8.3
trans-1,2-Dichloroethene	NOT DETECTED	8.3
Isopropyl ether	NOT DETECTED	8.3
1,1-Dichloroethane	NOT DETECTED	8.3
Vinyl acetate	NOT DETECTED	8.3
2,2-Dichloropropane	NOT DETECTED	8.3
cis-1,2-Dichloroethene	NOT DETECTED	8.3
2-Butanone	NOT DETECTED	8.3
Chloroform	NOT DETECTED	8.3
1,1-Dichloropropene	NOT DETECTED	8.3
1,1,1-Trichloroethane	NOT DETECTED	8.3
Carbon tetrachloride	NOT DETECTED	8.3
Bromochloromethane	NOT DETECTED	8.3
Benzene	NOT DETECTED	8.3
1,2-Dichloroethane	NOT DETECTED	8.3
Trichloroethene	NOT DETECTED	8.3
1,2-Dichloropropane	NOT DETECTED	8.3
Dibromomethane	NOT DETECTED	8.3
Bromodichloromethane	NOT DETECTED	8.3
2-Chloroethyl vinyl ether	NOT DETECTED	8.3
cis-1,3-Dichloropropene	NOT DETECTED	8.3
4-Methyl-2-pentanone (MIBK)	NOT DETECTED	8.3
Toluene	NOT DETECTED	8.3
trans-1,3-Dichloropropene	NOT DETECTED	8.3

USEPA Method 8260 Analysis Results

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>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-12-061598

File Name:: 22U11.D
Lab ID:: 98015600
Reviewed by:: GCA 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
1,1,2-Trichloroethane	NOT DETECTED	8.3
1,3-Dichloropropane	NOT DETECTED	8.3
Tetrachloroethene	NOT DETECTED	8.3
2-Hexanone	NOT DETECTED	8.3
Dibromochloromethane	NOT DETECTED	8.3
1,2-Dibromoethane (EDB)	NOT DETECTED	8.3
Chlorobenzene	NOT DETECTED	8.3
Isopropylbenzene	NOT DETECTED	8.3
1,1,1,2-tetrachloroethane	NOT DETECTED	8.3
Ethylbenzene	NOT DETECTED	8.3
m-p-Xylene	NOT DETECTED	17
o-Xylene	NOT DETECTED	8.3
Styrene	NOT DETECTED	8.3
Bromoform	NOT DETECTED	8.3
1,4-Dichlorobutane	NOT DETECTED	8.3
1,1,2,2-Tetrachloroethane	NOT DETECTED	8.3
1,2,3-Trichloropropane	NOT DETECTED	8.3
n-Propyl benzene	NOT DETECTED	8.3
Bromobenzene	NOT DETECTED	8.3
1,3,5-trimethylbenzene	NOT DETECTED	8.3
2-Chlorotoluene	NOT DETECTED	8.3
4-Chlorotoluene	NOT DETECTED	8.3
t-Butylbenzene	NOT DETECTED	8.3
1,2,4-Trimethylbenzene	NOT DETECTED	8.3
sec-Butylbenzene	NOT DETECTED	8.3
p-Isopropyltoluene	NOT DETECTED	8.3
1,3-Dichlorobenzene	NOT DETECTED	8.3
1,4-Dichlorobenzene	NOT DETECTED	8.3
n-Butylbenzene	NOT DETECTED	8.3
1,2-Dichlorobenzene	NOT DETECTED	8.3
1,2-Dibromo-3-chloropropane	NOT DETECTED	8.3
1,2,4-Trichlorobenzene	NOT DETECTED	8.3
Hexachlorobutadiene	NOT DETECTED	8.3
Naphthalene	NOT DETECTED	8.3
1,2,3-Trichlorobenzene	NOT DETECTED	8.3

DATA FILE:: 22U11.D | FIELD ID:: BOC-12-061598 | LAB ID:: 98-JUN-0217

Tentatively Identified Compound Report

Compound	Probable Molecular Weight	Estimated Concentration (ug/kg)	Library Match Probability (%)	Retention Rime (RT) (Minutes)	Identification			Scan Number
					Library Match	Manual Interpretation	RT	
Indane		17	81	41.86	x			
dihydro methyl Indene		15	87	53.84	x			

Internal Standard	RT
Pentafluorobenzene	17.74
D4-1,4-Difluorobenzene	21.37
Chlorobenzene D-5	32.07
D-4 1,4-Dichlorobenzene	40.71

Surrogates	% Recovery
Dibromofluoromethane	92%
Toluene D-8	106%
1,4-Bromofluorobenze	94%

USEPA - 8260 G.C. Conditions

105 m x 0.53 mm x 1.0 um / Restek 502.2
He, 0.5 ml/min, 35 C hold 10 mins, 35 C to 180 C @ 4 C/min, 180 to 200 C @ 10 C/min, hold 5 min

USEPA Method 8260 Analysis Results

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>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-13-061698

File Name:: 25U07.D
Lab ID:: 98015601
Reviewed by:: 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
Dichlorodifluoromethane	NOT DETECTED	71
Chloromethane	NOT DETECTED	71
Vinyl chloride	NOT DETECTED	71
Bromomethane	NOT DETECTED	71
Chloroethane	NOT DETECTED	71
Trichlorofluoromethane	NOT DETECTED	71
Acrolein	NOT DETECTED	710
1,1-Dichloroethene	NOT DETECTED	71
1,1,2-Trichloro-1,2,2-Trifluoroethane	NOT DETECTED	71
Acetone	NOT DETECTED	71
Methyl iodide	NOT DETECTED	71
Carbon disulfide	NOT DETECTED	71
Methylene chloride	NOT DETECTED	71
Acrylonitrile	NOT DETECTED	710
MTBE	NOT DETECTED	71
trans-1,2-Dichloroethene	NOT DETECTED	71
Isopropyl ether	NOT DETECTED	71
1,1-Dichloroethane	NOT DETECTED	71
Vinyl acetate	NOT DETECTED	71
2,2-Dichloropropane	NOT DETECTED	71
cis-1,2-Dichloroethene	NOT DETECTED	71
2-Butanone	NOT DETECTED	71
Chloroform	NOT DETECTED	71
1,1-Dichloropropene	NOT DETECTED	71
1,1,1-Trichloroethane	NOT DETECTED	71
Carbon tetrachloride	NOT DETECTED	71
Bromochloromethane	NOT DETECTED	71
Benzene	NOT DETECTED	71
1,2-Dichloroethane	NOT DETECTED	71
Trichloroethene	NOT DETECTED	71
1,2-Dichloropropane	NOT DETECTED	71
Dibromomethane	NOT DETECTED	71
Bromodichloromethane	NOT DETECTED	71
2-Chloroethyl vinyl ether	NOT DETECTED	71
cis-1,3-Dichloropropene	NOT DETECTED	71
4-Methyl-2-pentanone (MIBK)	NOT DETECTED	71
Toluene	NOT DETECTED	71
trans-1,3-Dichloropropene	NOT DETECTED	71

USEPA Method 8260 Analysis Results

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>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-13-061698

File Name:: 25U07.D
Lab ID:: 98015601
Reviewed by:: JCN 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
1,1,2-Trichloroethane	NOT DETECTED	71
1,3-Dichloropropane	NOT DETECTED	71
Tetrachloroethene	NOT DETECTED	71
2-Hexanone	NOT DETECTED	71
Dibromochloromethane	NOT DETECTED	71
1,2-Dibromoethane (EDB)	NOT DETECTED	71
Chlorobenzene	NOT DETECTED	71
Isopropylbenzene	NOT DETECTED	71
1,1,1,2-tetrachloroethane	NOT DETECTED	71
Ethylbenzene	NOT DETECTED	71
m-p-Xylene	NOT DETECTED	140
o-Xylene	NOT DETECTED	71
Styrene	NOT DETECTED	71
Bromoform	NOT DETECTED	71
1,4-Dichlorobutane	NOT DETECTED	71
1,1,2,2-Tetrachloroethane	NOT DETECTED	71
1,2,3-Trichloropropane	NOT DETECTED	71
n-Propyl benzene	96	71
Bromobenzene	NOT DETECTED	71
1,3,5-trimethylbenzene	360	71
2-Chlorotoluene	NOT DETECTED	71
4-Chlorotoluene	NOT DETECTED	71
t-Butylbenzene	NOT DETECTED	71
1,2,4-Trimethylbenzene	1100	71
sec-Butylbenzene	230	71
p-Isopropyltoluene	260	71
1,3-Dichlorobenzene	NOT DETECTED	71
1,4-Dichlorobenzene	NOT DETECTED	71
n-Butylbenzene	NOT DETECTED	71
1,2-Dichlorobenzene	NOT DETECTED	71
1,2-Dibromo-3-chloropropane	NOT DETECTED	71
1,2,4-Trichlorobenzene	NOT DETECTED	71
Hexachlorobutadiene	NOT DETECTED	71
Naphthalene	430	71
1,2,3-Trichlorobenzene	NOT DETECTED	71

DATA FILE:: 25007.D | FIELD ID:: BOC-13-061598 | LAB ID:: 98-JUN-0217

Tentatively Identified Compound Report

Compound	Probable Molecular Weight	Estimated Concentration (ug/kg)	Library Match Probability (%)	Retention Rime (RT) (Minutes)	Identification			Scan Number
					Library Match	Manual Interpretation	RT	
undecane		870	87	41.01	x			
propyl toluene		500	93	41.34	x			
isopropyl toluene		440	95	43.07	x			
unknown		540		43.52				
methyl Indan		810	70	43.84	x			
unknown		670		45.52				
dihydro methyl Indene		610	93	46.77	x			
tetrahydro naphthalene		1900	93	47.54	x			
dihydro dimethyl Indene		540	91	48.25	x			
dodecane		1100	87	48.56	x			
tetrahydro methyl naphthalene		630	90	49.08	x			
tetrahydro methyl naphthalene		730	94	49.49	x			
dihydro dimethyl Indene		570	96	49.88	x			
tetrahydro methyl naphthalene		1400	93	50.58	x			
tetradecane		870	96	51.17	x			
tetrahydro methyl naphthalene		660	95	51.58	x			
tetrahydro dimethyl naphthalene		540	93	51.81	x			
methyl naphthalene		610	90	51.97	x			
methyl naphthalene		1100	83	52.69	x			
pentadecane		440	82	53.82	x			

Internal Standard	RT
Pentafluorobenzene	17.79
D4-1,4-Difluorobenzene	21.40
Chlorobenzene D-5	32.09
D-4 1,4-Dichlorobenzene	40.72

Surrogates	% Recovery
Dibromofluoromethane	97%
Toluene D-8	104%
1,4-Bromofluorobenze	93%

USEPA - 8260 G.C. Conditions

105 m x 0.53 mm x 1.0 um / Restek 502.2
He, 0.5 ml/min, 35 C hold 10 mins, 35 C to 180 C @ 4 C/min, 180 to 200 C @ 10 C/min, hold 5 min

USEPA Method 8260 Analysis Results

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>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-14-061698

File Name:: 25U08.D
Lab ID:: 98015602
Reviewed by:: 7/9/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
Dichlorodifluoromethane	NOT DETECTED	28
Chloromethane	NOT DETECTED	28
Vinyl chloride	NOT DETECTED	28
Bromomethane	NOT DETECTED	28
Chloroethane	NOT DETECTED	28
Trichlorofluoromethane	NOT DETECTED	28
Acrolein	NOT DETECTED	280
1,1-Dichloroethene	NOT DETECTED	28
1,1,2-Trichloro-1,2,2-Trifluoroethane	NOT DETECTED	28
Acetone	NOT DETECTED	28
Methyl iodide	NOT DETECTED	28
Carbon disulfide	NOT DETECTED	28
Methylene chloride	NOT DETECTED	28
Acrylonitrile	NOT DETECTED	280
MTBE	NOT DETECTED	28
trans-1,2-Dichloroethene	NOT DETECTED	28
Isopropyl ether	NOT DETECTED	28
1,1-Dichloroethane	NOT DETECTED	28
Vinyl acetate	NOT DETECTED	28
2,2-Dichloropropane	NOT DETECTED	28
cis-1,2-Dichloroethene	NOT DETECTED	28
2-Butanone	NOT DETECTED	28
Chloroform	NOT DETECTED	28
1,1-Dichloropropene	NOT DETECTED	28
1,1,1-Trichloroethane	NOT DETECTED	28
Carbon tetrachloride	NOT DETECTED	28
Bromochloromethane	NOT DETECTED	28
Benzene	NOT DETECTED	28
1,2-Dichloroethane	NOT DETECTED	28
Trichloroethene	NOT DETECTED	28
1,2-Dichloropropane	NOT DETECTED	28
Dibromomethane	NOT DETECTED	28
Bromodichloromethane	NOT DETECTED	28
2-Chloroethyl vinyl ether	NOT DETECTED	28
cis-1,3-Dichloropropene	NOT DETECTED	28
4-Methyl-2-pentanone (MIBK)	NOT DETECTED	28
Toluene	NOT DETECTED	28
trans-1,3-Dichloropropene	NOT DETECTED	28

USEPA Method 8260 Analysis Results

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>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-14-061698

File Name:: 25U08.D
Lab ID:: 98015602
Reviewed by: 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
1,1,2-Trichloroethane	NOT DETECTED	28
1,3-Dichloropropane	NOT DETECTED	28
Tetrachloroethene	NOT DETECTED	28
2-Hexanone	NOT DETECTED	28
Dibromochloromethane	NOT DETECTED	28
1,2-Dibromoethane (EDB)	NOT DETECTED	28
Chlorobenzene	NOT DETECTED	28
Isopropylbenzene	NOT DETECTED	28
1,1,1,2-tetrachloroethane	NOT DETECTED	28
Ethylbenzene	NOT DETECTED	28
m-p-Xylene	NOT DETECTED	56
o-Xylene	NOT DETECTED	28
Styrene	NOT DETECTED	28
Bromoform	NOT DETECTED	28
1,4-Dichlorobutane	NOT DETECTED	28
1,1,2,2-Tetrachloroethane	NOT DETECTED	28
1,2,3-Trichloropropane	NOT DETECTED	28
n-Propyl benzene	NOT DETECTED	28
Bromobenzene	NOT DETECTED	28
1,3,5-trimethylbenzene	NOT DETECTED	28
2-Chlorotoluene	NOT DETECTED	28
4-Chlorotoluene	NOT DETECTED	28
t-Butylbenzene	NOT DETECTED	28
1,2,4-Trimethylbenzene	NOT DETECTED	28
sec-Butylbenzene	NOT DETECTED	28
p-Isopropyltoluene	NOT DETECTED	28
1,3-Dichlorobenzene	NOT DETECTED	28
1,4-Dichlorobenzene	NOT DETECTED	28
n-Butylbenzene	NOT DETECTED	28
1,2-Dichlorobenzene	NOT DETECTED	28
1,2-Dibromo-3-chloropropane	NOT DETECTED	28
1,2,4-Trichlorobenzene	NOT DETECTED	28
Hexachlorobutadiene	NOT DETECTED	28
Naphthalene	190	28
1,2,3-Trichlorobenzene	NOT DETECTED	28

Tentatively Identified Compound Report

Compound	Probable Molecular Weight	Estimated Concentration (ug/kg)	Library Match Probability (%)	Retention Rime (RT) (Minutes)	Identification			Scan Number
					Library Match	Manual Interpretation	RT	
unknown		140		40.89				
tetradecane		68	98	51.17	x			
methyl naphthalene		120	93	52.71	x			
pentadecane		130	93	53.81	x			
unknown		81		54.74				

Internal Standard	RT
Pentafluorobenzene	17.77
D4-1,4-Difluorobenzene	21.39
Chlorobenzene D-5	32.08
D-4 1,4-Dichlorobenzene	40.73

Surrogates	% Recovery
Dibromofluoromethane	94%
Toluene D-8	108%
1,4-Bromofluorobenze	97%

USEPA - 8260 G.C. Conditions

105 m x 0.53 mm x 1.0 um / Restek 502.2
He, 0.5 ml/min, 35 C hold 10 mins, 35 C to 180 C @ 4 C/min, 180 to 200 C @ 10 C/min, hold 5 min

USEPA Method 8260 Analysis Results

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>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-15-061698

File Name:: 22U12.D
Lab ID:: 98015603
Reviewed by:: GCA 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
Dichlorodifluoromethane	NOT DETECTED	7.2
Chloromethane	NOT DETECTED	7.2
Vinyl chloride	NOT DETECTED	7.2
Bromomethane	NOT DETECTED	7.2
Chloroethane	NOT DETECTED	7.2
Trichlorofluoromethane	NOT DETECTED	7.2
Acrolein	NOT DETECTED	72
1,1-Dichloroethene	NOT DETECTED	7.2
1,1,2-Trichloro-1,2,2-Trifluoroethane	NOT DETECTED	7.2
Acetone	NOT DETECTED	7.2
Methyl iodide	NOT DETECTED	7.2
Carbon disulfide	NOT DETECTED	7.2
Methylene chloride	NOT DETECTED	7.2
Acrylonitrile	NOT DETECTED	72
MTBE	NOT DETECTED	7.2
trans-1,2-Dichloroethene	NOT DETECTED	7.2
Isopropyl ether	NOT DETECTED	7.2
1,1-Dichloroethane	NOT DETECTED	7.2
Vinyl acetate	NOT DETECTED	7.2
2,2-Dichloropropane	NOT DETECTED	7.2
cis-1,2-Dichloroethene	NOT DETECTED	7.2
2-Butanone	NOT DETECTED	7.2
Chloroform	NOT DETECTED	7.2
1,1-Dichloropropene	NOT DETECTED	7.2
1,1,1-Trichloroethane	NOT DETECTED	7.2
Carbon tetrachloride	NOT DETECTED	7.2
Bromochloromethane	NOT DETECTED	7.2
Benzene	NOT DETECTED	7.2
1,2-Dichloroethane	NOT DETECTED	7.2
Trichloroethene	NOT DETECTED	7.2
1,2-Dichloropropane	NOT DETECTED	7.2
Dibromomethane	NOT DETECTED	7.2
Bromodichloromethane	NOT DETECTED	7.2
2-Chloroethyl vinyl ether	NOT DETECTED	7.2
cis-1,3-Dichloropropene	NOT DETECTED	7.2
4-Methyl-2-pentanone (MIBK)	NOT DETECTED	7.2
Toluene	NOT DETECTED	7.2
trans-1,3-Dichloropropene	NOT DETECTED	7.2

USEPA Method 8260 Analysis Results

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>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-15-061698

File Name:: 22U12.D
Lab ID:: 98015603
Reviewed by:: GCL 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
1,1,2-Trichloroethane	NOT DETECTED	7.2
1,3-Dichloropropane	NOT DETECTED	7.2
Tetrachloroethene	NOT DETECTED	7.2
2-Hexanone	NOT DETECTED	7.2
Dibromochloromethane	NOT DETECTED	7.2
1,2-Dibromoethane (EDB)	NOT DETECTED	7.2
Chlorobenzene	NOT DETECTED	7.2
Isopropylbenzene	NOT DETECTED	7.2
1,1,1,2-tetrachloroethane	NOT DETECTED	7.2
Ethylbenzene	NOT DETECTED	7.2
m-p-Xylene	NOT DETECTED	14
o-Xylene	NOT DETECTED	7.2
Styrene	NOT DETECTED	7.2
Bromoform	NOT DETECTED	7.2
1,4-Dichlorobutane	NOT DETECTED	7.2
1,1,2,2-Tetrachloroethane	NOT DETECTED	7.2
1,2,3-Trichloropropane	NOT DETECTED	7.2
n-Propyl benzene	NOT DETECTED	7.2
Bromobenzene	NOT DETECTED	7.2
1,3,5-trimethylbenzene	NOT DETECTED	7.2
2-Chlorotoluene	NOT DETECTED	7.2
4-Chlorotoluene	NOT DETECTED	7.2
t-Butylbenzene	NOT DETECTED	7.2
1,2,4-Trimethylbenzene	NOT DETECTED	7.2
sec-Butylbenzene	NOT DETECTED	7.2
p-Isopropyltoluene	NOT DETECTED	7.2
1,3-Dichlorobenzene	NOT DETECTED	7.2
1,4-Dichlorobenzene	NOT DETECTED	7.2
n-Butylbenzene	NOT DETECTED	7.2
1,2-Dichlorobenzene	NOT DETECTED	7.2
1,2-Dibromo-3-chloropropane	NOT DETECTED	7.2
1,2,4-Trichlorobenzene	NOT DETECTED	7.2
Hexachlorobutadiene	NOT DETECTED	7.2
Naphthalene	NOT DETECTED	7.2
1,2,3-Trichlorobenzene	NOT DETECTED	7.2

DATA FILE:: 22012.D | FIELD ID:: BOC-15-061598 | LAB ID:: 98-JUN-0217

Tentatively Identified Compound Report

Compound	Probable Molecular Weight	Estimated Concentration (ug/kg)	Library Match Probability (%)	Retention Rime (RT) (Minutes)	Identification			Scan Number
					Library Match	Manual Interpretation	RT	
NO TICS								

Internal Standard	RT
Pentafluorobenzene	17.76
D4-1,4-Difluorobenzene	21.38
Chlorobenzene D-5	32.06
D-4 1,4-Dichlorobenzene	40.70

Surrogates	% Recovery
Dibromofluoromethane	93%
Toluene D-8	102%
1,4-Bromofluorobenze	99%

USEPA - 8260 G.C. Conditions

105 m x 0.53 mm x 1.0 um / Restek 502.2
He, 0.5 ml/min, 35 C hold 10 mins, 35 C to 180 C @ 4 C/min, 180 to 200 C @ 10 C/min, hold 5 min

USEPA Method 8260 Analysis Results

Duke Power
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ORGANIC CHEMISTRY GROUP

>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-16-061698

File Name:: 22U13.D
Lab ID:: 98015604
Reviewed by:: 7/16/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
Dichlorodifluoromethane	NOT DETECTED	8
Chloromethane	NOT DETECTED	8
Vinyl chloride	NOT DETECTED	8
Bromomethane	NOT DETECTED	8
Chloroethane	NOT DETECTED	8
Trichlorofluoromethane	NOT DETECTED	8
Acrolein	NOT DETECTED	80
1,1-Dichloroethene	NOT DETECTED	8
1,1,2-Trichloro-1,2,2-Trifluoroethane	NOT DETECTED	8
Acetone	NOT DETECTED	8
Methyl iodide	NOT DETECTED	8
Carbon disulfide	NOT DETECTED	8
Methylene chloride	NOT DETECTED	8
Acrylonitrile	NOT DETECTED	80
MTBE	NOT DETECTED	8
trans-1,2-Dichloroethene	NOT DETECTED	8
Isopropyl ether	NOT DETECTED	8
1,1-Dichloroethane	NOT DETECTED	8
Vinyl acetate	NOT DETECTED	8
2,2-Dichloropropane	NOT DETECTED	8
cis-1,2-Dichloroethene	NOT DETECTED	8
2-Butanone	NOT DETECTED	8
Chloroform	NOT DETECTED	8
1,1-Dichloropropene	NOT DETECTED	8
1,1,1-Trichloroethane	NOT DETECTED	8
Carbon tetrachloride	NOT DETECTED	8
Bromochloromethane	NOT DETECTED	8
Benzene	NOT DETECTED	8
1,2-Dichloroethane	NOT DETECTED	8
Trichloroethene	NOT DETECTED	8
1,2-Dichloropropane	NOT DETECTED	8
Dibromomethane	NOT DETECTED	8
Bromodichloromethane	NOT DETECTED	8
2-Chloroethyl vinyl ether	NOT DETECTED	8
cis-1,3-Dichloropropene	NOT DETECTED	8
4-Methyl-2-pentanone (MIBK)	NOT DETECTED	8
Toluene	NOT DETECTED	8
trans-1,3-Dichloropropene	NOT DETECTED	8

USEPA Method 8260 Analysis Results

Duke Power
A Duke Energy Company

ORGANIC CHEMISTRY GROUP

>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248

South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-16-061698

File Name:: 22U13.D
Lab ID:: 98015604
Reviewed by:: 7/14/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
1,1,2-Trichloroethane	NOT DETECTED	8
1,3-Dichloropropane	NOT DETECTED	8
Tetrachloroethene	NOT DETECTED	8
2-Hexanone	NOT DETECTED	8
Dibromochloromethane	NOT DETECTED	8
1,2-Dibromoethane (EDB)	NOT DETECTED	8
Chlorobenzene	NOT DETECTED	8
Isopropylbenzene	NOT DETECTED	8
1,1,1,2-tetrachloroethane	NOT DETECTED	8
Ethylbenzene	13	8
m-p-Xylene	31	16
o-Xylene	15	8
Styrene	NOT DETECTED	8
Bromoform	NOT DETECTED	8
1,4-Dichlorobutane	NOT DETECTED	8
1,1,2,2-Tetrachloroethane	NOT DETECTED	8
1,2,3-Trichloropropane	NOT DETECTED	8
n-Propyl benzene	9.9	8
Bromobenzene	NOT DETECTED	8
1,3,5-trimethylbenzene	23	8
2-Chlorotoluene	NOT DETECTED	8
4-Chlorotoluene	NOT DETECTED	8
t-Butylbenzene	NOT DETECTED	8
1,2,4-Trimethylbenzene	60	8
sec-Butylbenzene	NOT DETECTED	8
p-Isopropyltoluene	NOT DETECTED	8
1,3-Dichlorobenzene	NOT DETECTED	8
1,4-Dichlorobenzene	NOT DETECTED	8
n-Butylbenzene	NOT DETECTED	8
1,2-Dichlorobenzene	NOT DETECTED	8
1,2-Dibromo-3-chloropropane	NOT DETECTED	8
1,2,4-Trichlorobenzene	NOT DETECTED	8
Hexachlorobutadiene	NOT DETECTED	8
Naphthalene	12	8
1,2,3-Trichlorobenzene	NOT DETECTED	8

DATA FILE:: 22013.D | FIELD ID:: BOC-16-061598 | LAB ID:: 98-JUN-0217

Tentatively Identified Compound Report

Compound	Probable Molecular Weight	Estimated Concentration (ug/kg)	Library Match Probability (%)	Retention Rime (RT) (Minutes)	Identification			Scan Number
					Library Match	Manual Interpretation	RT	
trimethyl pentane		39	83	19	x			
trimethyl pentane		24	83	23.5	x			
trimethyl pentane		30	59	24	x			
unknown		15		24.99				
ethyl toluene		37	95	37.35	x			
ethyl toluene		14	94	38.45	x			
unknown		15		41.31				
ethyl dimethyl benzene		13	94	43.04	x			
dihydro methyl Inden		14	93	46.76	x			

Internal Standard	RT
Pentafluorobenzene	17.76
D4-1,4-Difluorobenzene	21.38
Chlorobenzene D-5	32.06
D-4 1,4-Dichlorobenzene	40.70

Surrogates	% Recovery
Dibromofluoromethane	97%
Toluene D-8	108%
1,4-Bromofluorobenze	98%

USEPA - 8260 G.C. Conditions

105 m x 0.53 mm x 1.0 um / Restek 502.2
He, 0.5 ml/min, 35 C hold 10 mins, 35 C to 180 C @ 4 C/min, 180 to 200 C @ 10 C/min, hold 5 min

USEPA Method 8260 Analysis Results

Duke Power
A Duke Energy Company

ORGANIC CHEMISTRY GROUP

>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-17-061698

File Name:: 22U14.D
Lab ID:: 98015605
Reviewed by:: GA 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
Dichlorodifluoromethane	NOT DETECTED	8.1
Chloromethane	NOT DETECTED	8.1
Vinyl chloride	NOT DETECTED	8.1
Bromomethane	NOT DETECTED	8.1
Chloroethane	NOT DETECTED	8.1
Trichlorofluoromethane	NOT DETECTED	8.1
Acrolein	NOT DETECTED	81
1,1-Dichloroethene	NOT DETECTED	8.1
1,1,2-Trichloro-1,2,2-Trifluoroethane	NOT DETECTED	8.1
Acetone	NOT DETECTED	8.1
Methyl iodide	NOT DETECTED	8.1
Carbon disulfide	NOT DETECTED	8.1
Methylene chloride	NOT DETECTED	8.1
Acrylonitrile	NOT DETECTED	81
MTBE	NOT DETECTED	8.1
trans-1,2-Dichloroethene	NOT DETECTED	8.1
Isopropyl ether	NOT DETECTED	8.1
1,1-Dichloroethane	NOT DETECTED	8.1
Vinyl acetate	NOT DETECTED	8.1
2,2-Dichloropropane	NOT DETECTED	8.1
cis-1,2-Dichloroethene	NOT DETECTED	8.1
2-Butanone	NOT DETECTED	8.1
Chloroform	NOT DETECTED	8.1
1,1-Dichloropropene	NOT DETECTED	8.1
1,1,1-Trichloroethane	NOT DETECTED	8.1
Carbon tetrachloride	NOT DETECTED	8.1
Bromochloromethane	NOT DETECTED	8.1
Benzene	NOT DETECTED	8.1
1,2-Dichloroethane	NOT DETECTED	8.1
Trichloroethene	NOT DETECTED	8.1
1,2-Dichloropropane	NOT DETECTED	8.1
Dibromomethane	NOT DETECTED	8.1
Bromodichloromethane	NOT DETECTED	8.1
2-Chloroethyl vinyl ether	NOT DETECTED	8.1
cis-1,3-Dichloropropene	NOT DETECTED	8.1
4-Methyl-2-pentanone (MIBK)	NOT DETECTED	8.1
Toluene	NOT DETECTED	8.1
trans-1,3-Dichloropropene	NOT DETECTED	8.1

USEPA Method 8260 Analysis Results

Duke Power
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ORGANIC CHEMISTRY GROUP

>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Burlington BOC-17-061698

File Name:: 22U14.D
Lab ID:: 98015605
Reviewed by:: 7/6/98

Lab Set:: 98-JUN-0217
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
1,1,2-Trichloroethane	NOT DETECTED	8.1
1,3-Dichloropropane	NOT DETECTED	8.1
Tetrachloroethene	NOT DETECTED	8.1
2-Hexanone	NOT DETECTED	8.1
Dibromochloromethane	NOT DETECTED	8.1
1,2-Dibromoethane (EDB)	NOT DETECTED	8.1
Chlorobenzene	NOT DETECTED	8.1
Isopropylbenzene	NOT DETECTED	8.1
1,1,1,2-tetrachloroethane	NOT DETECTED	8.1
Ethylbenzene	NOT DETECTED	8.1
m-p-Xylene	NOT DETECTED	16
o-Xylene	NOT DETECTED	8.1
Styrene	NOT DETECTED	8.1
Bromoform	NOT DETECTED	8.1
1,4-Dichlorobutane	NOT DETECTED	8.1
1,1,2,2-Tetrachloroethane	NOT DETECTED	8.1
1,2,3-Trichloropropane	NOT DETECTED	8.1
n-Propyl benzene	NOT DETECTED	8.1
Bromobenzene	NOT DETECTED	8.1
1,3,5-trimethylbenzene	NOT DETECTED	8.1
2-Chlorotoluene	NOT DETECTED	8.1
4-Chlorotoluene	NOT DETECTED	8.1
t-Butylbenzene	NOT DETECTED	8.1
1,2,4-Trimethylbenzene	NOT DETECTED	8.1
sec-Butylbenzene	NOT DETECTED	8.1
p-Isopropyltoluene	NOT DETECTED	8.1
1,3-Dichlorobenzene	NOT DETECTED	8.1
1,4-Dichlorobenzene	NOT DETECTED	8.1
n-Butylbenzene	NOT DETECTED	8.1
1,2-Dichlorobenzene	NOT DETECTED	8.1
1,2-Dibromo-3-chloropropane	NOT DETECTED	8.1
1,2,4-Trichlorobenzene	NOT DETECTED	8.1
Hexachlorobutadiene	NOT DETECTED	8.1
Naphthalene	NOT DETECTED	8.1
1,2,3-Trichlorobenzene	NOT DETECTED	8.1

Tentatively Identified Compound Report

Compound	Probable Molecular Weight	Estimated Concentration (ug/kg)	Library Match Probability (%)	Retention Rime (RT) (Minutes)	Identification			Scan Number
					Library Match	Manual Interpretation	RT	
unknown		15		34.71				

Internal Standard	RT
Pentafluorobenzene	17.70
D4-1,4-Difluorobenzene	21.33
Chlorobenzene D-5	32.04
D-4 1,4-Dichlorobenzene	40.69

Surrogates	% Recovery
Dibromofluoromethane	96%
Toluene D-8	109%
1,4-Bromofluorobenze	98%

USEPA - 8260 G.C. Conditions

105 m x 0.53 mm x 1.0 um / Restek 502.2
He, 0.5 ml/min, 35 C hold 10 mins, 35 C to 180 C @ 4 C/min, 180 to 200 C @ 10 C/min, hold 5 min

USEPA Method 8260 Analysis Results

Duke Power
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ORGANIC CHEMISTRY GROUP

>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Laboratory Blank

File Name:: 23U01.D
Lab ID:: 98016466
Reviewed by:: 7/14/98

Lab Set:: 98-JUN-0292
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
Dichlorodifluoromethane	NOT DETECTED	6
Chloromethane	NOT DETECTED	6
Vinyl chloride	NOT DETECTED	6
Bromomethane	NOT DETECTED	6
Chloroethane	NOT DETECTED	6
Trichlorofluoromethane	NOT DETECTED	6
Acrolein	NOT DETECTED	60
1,1-Dichloroethene	NOT DETECTED	6
1,1,2-Trichloro-1,2,2-Trifluoroethane	NOT DETECTED	6
Acetone	NOT DETECTED	6
Methyl iodide	NOT DETECTED	6
Carbon disulfide	NOT DETECTED	6
Methylene chloride	NOT DETECTED	6
Acrylonitrile	NOT DETECTED	60
MTBE	NOT DETECTED	6
trans-1,2-Dichloroethene	NOT DETECTED	6
Isopropyl ether	NOT DETECTED	6
1,1-Dichloroethane	NOT DETECTED	6
Vinyl acetate	NOT DETECTED	6
2,2-Dichloropropane	NOT DETECTED	6
cis-1,2-Dichloroethene	NOT DETECTED	6
2-Butanone	NOT DETECTED	6
Chloroform	NOT DETECTED	6
1,1-Dichloropropene	NOT DETECTED	6
1,1,1-Trichloroethane	NOT DETECTED	6
Carbon tetrachloride	NOT DETECTED	6
Bromochloromethane	NOT DETECTED	6
Benzene	NOT DETECTED	6
1,2-Dichloroethane	NOT DETECTED	6
Trichloroethene	NOT DETECTED	6
1,2-Dichloropropane	NOT DETECTED	6
Dibromomethane	NOT DETECTED	6
Bromodichloromethane	NOT DETECTED	6
2-Chloroethyl vinyl ether	NOT DETECTED	6
cis-1,3-Dichloropropene	NOT DETECTED	6
4-Methyl-2-pentanone (MIBK)	NOT DETECTED	6
Toluene	NOT DETECTED	6
trans-1,3-Dichloropropene	NOT DETECTED	6

USEPA Method 8260 Analysis Results

Duke Power SM
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ORGANIC CHEMISTRY GROUP

>>> Environmental Center McGuire Nuclear Complex (704) 875-5325 <<<

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248
South Carolina Department of Health and Environmental Control (DHEC) Certification # 99005

Client Report Form

Laboratory Blank

File Name:: 23U01.D
Lab ID:: 98016466
Reviewed by:: 6/98

Lab Set:: 98-JUN-0292
Dilution Factor:: 1

Compound Name	Concentration (ug/kg)	Reporting Limit (ug/kg)
1,1,2-Trichloroethane	NOT DETECTED	6
1,3-Dichloropropane	NOT DETECTED	6
Tetrachloroethene	NOT DETECTED	6
2-Hexanone	NOT DETECTED	6
Dibromochloromethane	NOT DETECTED	6
1,2-Dibromoethane (EDB)	NOT DETECTED	6
Chlorobenzene	NOT DETECTED	6
Isopropylbenzene	NOT DETECTED	6
1,1,1,2-tetrachloroethane	NOT DETECTED	6
Ethylbenzene	NOT DETECTED	6
m-p-Xylene	NOT DETECTED	12
o-Xylene	NOT DETECTED	6
Styrene	NOT DETECTED	6
Bromoform	NOT DETECTED	6
1,4-Dichlorobutane	NOT DETECTED	6
1,1,2,2-Tetrachloroethane	NOT DETECTED	6
1,2,3-Trichloropropane	NOT DETECTED	6
n-Propyl benzene	NOT DETECTED	6
Bromobenzene	NOT DETECTED	6
1,3,5-trimethylbenzene	NOT DETECTED	6
2-Chlorotoluene	NOT DETECTED	6
4-Chlorotoluene	NOT DETECTED	6
t-Butylbenzene	NOT DETECTED	6
1,2,4-Trimethylbenzene	NOT DETECTED	6
sec-Butylbenzene	NOT DETECTED	6
p-Isopropyltoluene	NOT DETECTED	6
1,3-Dichlorobenzene	NOT DETECTED	6
1,4-Dichlorobenzene	NOT DETECTED	6
n-Butylbenzene	NOT DETECTED	6
1,2-Dichlorobenzene	NOT DETECTED	6
1,2-Dibromo-3-chloropropane	NOT DETECTED	6
1,2,4-Trichlorobenzene	NOT DETECTED	6
Hexachlorobutadiene	NOT DETECTED	6
Naphthalene	NOT DETECTED	6
1,2,3-Trichlorobenzene	NOT DETECTED	6

DATA FILE::	23U01.D	FIELD ID::	Lab Blank	LAB ID::	98-JUN-0292

Tentatively Identified Compound Report

Compound	Probable Molecular Weight	Estimated Concentration (ug/kg)	Library Match Probability (%)	Retention Rime (RT) (Minutes)	Identification			Scan Number
					Library Match	Manual Interpretation	RT	
NO TICS								

Internal Standard	RT
Pentafluorobenzene	17.75
D4-1,4-Difluorobenzene	21.37
Chlorobenzene D-5	32.05
D-4 1,4-Dichlorobenzene	40.70

Surrogates	% Recovery
Dibromofluoromethane	89%
Toluene D-8	108%
1,4-Bromofluorobenze	100%

USEPA - 8260 G.C. Conditions

105 m x 0.53 mm x 1.0 um / Restek 502.2
He, 0.5 ml/min, 35 C hold 10 mins, 35 C to 180 C @ 4 C/min, 180 to 200 C @ 10 C/min, hold 5 min

USEPA SW 846 Method 8270 // Soil Sample

Duke Power SM
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Organic Chemistry Group

ENVIRONMENTAL CENTER. MCGUIRE NUCLEAR COMPLEX. (704) 875-5325

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248

Client Report Form

Field ID # **BURLINGTON-BOC-01-061598**

Date Collected::	06/15/98	*Reviewed by::*	GSH 7/6/98
L.I.M.S. Number::	98JUN0217 / 98015589	*Lab ID #*	30U01.D

Compound Name	Concentration (ug/Kg)		Quantitative Limit (ug/Kg)
n-Nitrosodimethylamine	Not Detected		330
Phenol	Not Detected		330
Aniline	Not Detected	***	330
2-Chlorophenol	Not Detected		330
bis(2-Chloroethyl)ether	Not Detected		330
1,3-Dichlorobenzene	Not Detected		330
1,4-Dichlorobenzene	Not Detected		330
Benzyl alcohol	Not Detected		330
1,2-Dichlorobenzene	Not Detected		330
2-Methylphenol	Not Detected		330
bis(2-Chloroisopropyl)ether	Not Detected		330
4-Methylphenol	Not Detected		330
Hexachloroethane	Not Detected		330
n-Nitrosodi-n-propylamine	Not Detected		330
Nitrobenzene	Not Detected		330
Isophorone	Not Detected		330
2-Nitrophenol	Not Detected		330
2,4-Dimethylphenol	Not Detected		330
bis(2-Chloroethoxy)methane	Not Detected		330
2,4-Dichlorophenol	Not Detected		330
Benzoic acid	Not Detected	***	330
1,2,4-Trichlorobenzene	Not Detected		330
Naphthalene	Not Detected		330
4-Chloroaniline	Not Detected		330

(Flags are described on page # 3)

30U01.D 98JUN0217 / 98015589 BURLINGTON-BOC-01-061598 (Continued)

Compound Name	Concentration (ug/Kg)	Quantitative Limit (ug/Kg)
Hexachlorobutadiene	Not Detected	330
4-Chloro-3-methylphenol	Not Detected	330
2-Methylnaphthalene	Not Detected	330
Hexachlorocyclopentadiene	Not Detected	330
2,4,6-Trichlorophenol	Not Detected	330
2,4,5-Trichlorophenol	Not Detected	330
2-Chloronaphthalene	Not Detected	330
2-Nitroaniline	Not Detected	330
Dimethylphthalate	Not Detected	330
Acenaphthylene	Not Detected	330
2,6-Dinitrotoluene	Not Detected	330
3-Nitroaniline	Not Detected	330
Acenaphthene	Not Detected	330
2,4-Dinitrophenol	Not Detected	330
4-Nitrophenol	Not Detected	330
Dibenzofuran	Not Detected	330
2,4-Dinitrotoluene	Not Detected	330
Diethylphthalate	Not Detected	330
Fluorene	Not Detected	330
4-Chlorophenylphenylether	Not Detected	330
4-Nitroaniline	Not Detected	330
2-Methyl-4,6-dinitrophenol	Not Detected	330
n-Nitrosodiphenylamine	Not Detected	330
1,2-Diphenylhydrazine	Not Detected	330
4-Bromophenylphenylether	Not Detected	330
Hexachlorobenzene	Not Detected	330
Pentachlorophenol	Not Detected	330
Phenanthrene	Not Detected	330
Anthracene	Not Detected	330
di-n-Butylphthalate	Not Detected	330
Fluoranthene	Not Detected	330
Pyrene	Not Detected	330
Butylbenzylphthalate	Not Detected	330
3,3-Dichlorobenzidine	Not Detected	330
Benzo(a)anthracene	Not Detected	330
Chrysene	Not Detected	330
bis(2-Ethylhexyl)phthalate	630	330
di-n-Octylphthalate	Not Detected	330
Benzo(b)fluoranthene	Not Detected	330
Benzo(k)fluoranthene	Not Detected	330
Benzo(a)pyrene	Not Detected	330
Indeno(1,2,3-c,d)pyrene	Not Detected	330
Dibenzo(a,h)anthracene	Not Detected	330
Benzo(g,h,i)perylene	Not Detected	330

(Flags are described on page # 3)

30U01.D 98JUN0217 / 98015589 BURLINGTON-BOC-01-061598 (Continued)

Tentatively Identified Compounds Report

Scan #	Compound	Estimated Concentration (ug/Kg)

NO TIC'S REPORTED

Not Detected = Less than Quantitative Limit (J) = Estimated Conccentration
(B) = Compound also identified in Laboratory Blank
All reported concentrations have been rounded to two significant figures
*Note: Compounds flagged with *** cannot be accurately quantitated using EPA Method 8270.*
The EPA has recognized this problem, and has deleted these compounds from CLP protocol.
Any concentrations reported for these compounds should be regarded as approximations.

(Flags are described on page # 3)

USEPA SW 846 Method 8270 // Soil Sample

Duke Power SM
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Organic Chemistry Group

Environmental Center. McGuire Nuclear Complex. (704) 875-5325

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248

Client Report Form

Field ID # **BURLINGTON-BOC-02-061598**

Date Collected::	06/15/98	*Reviewed by::*	7/8/98
L.I.M.S. Number::	98JUN0217 / 98015590	*Lab ID #*	30U02.D

Compound Name	*Concentration (ug/Kg)*		*Quantitative Limit (ug/Kg)*
n-Nitrosodimethylamine	*Not Detected*		*330*
Phenol	*Not Detected*		*330*
Aniline	*Not Detected*	***	*330*
2-Chlorophenol	*Not Detected*		*330*
bis(2-Chloroethyl)ether	*Not Detected*		*330*
1,3-Dichlorobenzene	*Not Detected*		*330*
1,4-Dichlorobenzene	*Not Detected*		*330*
Benzyl alcohol	*Not Detected*		*330*
1,2-Dichlorobenzene	*Not Detected*		*330*
2-Methylphenol	*Not Detected*		*330*
bis(2-Chloroisopropyl)ether	*Not Detected*		*330*
4-Methylphenol	*Not Detected*		*330*
Hexachloroethane	*Not Detected*		*330*
n-Nitrosodi-n-propylamine	*Not Detected*		*330*
Nitrobenzene	*Not Detected*		*330*
Isophorone	*Not Detected*		*330*
2-Nitrophenol	*Not Detected*		*330*
2,4-Dimethylphenol	*Not Detected*		*330*
bis(2-Chloroethoxy)methane	*Not Detected*		*330*
2,4-Dichlorophenol	*Not Detected*		*330*
Benzoic acid	*Not Detected*	***	*330*
1,2,4-Trichlorobenzene	*Not Detected*		*330*
Naphthalene	*330*		*330*
4-Chloroaniline	*Not Detected*		*330*

(Flags are described on page # 3)

30U02.D 98JUN0217 / 98015590 BURLINGTON-BOC-02-061598 (Continued)

Compound Name	Concentration (ug/Kg)	Quantitative Limit (ug/Kg)
Hexachlorobutadiene	Not Detected	330
4-Chloro-3-methylphenol	Not Detected	330
2-Methylnaphthalene	3,300	330
Hexachlorocyclopentadiene	Not Detected	330
2,4,6-Trichlorophenol	Not Detected	330
2,4,5-Trichlorophenol	Not Detected	330
2-Chloronaphthalene	Not Detected	330
2-Nitroaniline	Not Detected	330
Dimethylphthalate	Not Detected	330
Acenaphthylene	Not Detected	330
2,6-Dinitrotoluene	Not Detected	330
3-Nitroaniline	Not Detected	330
Acenaphthene	3,300	330
2,4-Dinitrophenol	Not Detected	330
4-Nitrophenol	Not Detected	330
Dibenzofuran	Not Detected	330
2,4-Dinitrotoluene	Not Detected	330
Diethylphthalate	Not Detected	330
Fluorene	Not Detected	330
4-Chlorophenylphenylether	Not Detected	330
4-Nitroaniline	Not Detected	330
2-Methyl-4,6-dinitrophenol	Not Detected	330
n-Nitrosodiphenylamine	Not Detected	330
1,2-Diphenylhydrazine	Not Detected	330
4-Bromophenylphenylether	Not Detected	330
Hexachlorobenzene	Not Detected	330
Pentachlorophenol	Not Detected	330
Phenanthrene	2,500	330
Anthracene	1,100	330
di-n-Butylphthalate	Not Detected	330
Fluoranthene	780	330
Pyrene	340	330
Butylbenzylphthalate	Not Detected	330
3,3-Dichlorobenzidine	Not Detected	330
Benzo(a)anthracene	Not Detected	330
Chrysene	Not Detected	330
bis(2-Ethylhexyl)phthalate	5,200	330
di-n-Octylphthalate	Not Detected	330
Benzo(b)fluoranthene	Not Detected	330
Benzo(k)fluoranthene	Not Detected	330
Benzo(a)pyrene	Not Detected	330
Indeno(1,2,3-c,d)pyrene	Not Detected	330
Dibenzo(a,h)anthracene	Not Detected	330
Benzo(g,h,i)perylene	Not Detected	330

(Flags are described on page # 3)

30U02.D 98JUN0217 / 98015590 BURLINGTON-BOC-02-061598 (Continued)

Tentatively Identified Compounds Report

Scan #	Compound	Estimated Concentration (ug/Kg)
1,697	Substituted Decane	696

Not Detected = Less than Quantitative Limit (J) = Estimated Conccentration
(B) = Compound also identified in Laboratory Blank
All reported concentrations have been rounded to two significant figures
*Note: Compounds flagged with *** cannot be accurately quantitated using EPA Method 8270.*
The EPA has recognized this problem, and has deleted these compounds from CLP protocol.
Any concentrations reported for these compounds should be regarded as approximations.

(Flags are described on page # 3)

USEPA SW 846 Method 8270 // Soil Sample

Duke Power SM
A Duke Energy Company

Organic Chemistry Group
Environmental Center, Mcguire Nuclear Complex, (704) 875-5325
North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248

Client Report Form

Field ID # **BURLINGTON-BOC-03-061598**

Date Collected:: 06/15/98 *Reviewed by::* GM 7/8/98

L.I.M.S. Number:: 98-JUN-0217 // 98015591 *Lab ID #* 30U01.D

Compound Name	Concentration (ug/Kg)		Quantitative Limit (ug/Kg)
n-Nitrosodimethylamine	Not Detected		390
Aniline	Not Detected	***	390
Phenol	Not Detected		390
bis(2-Chloroethyl)ether	Not Detected		390
2-Chlorophenol	Not Detected		390
1,3-Dichlorobenzene	Not Detected		390
1,4-Dichlorobenzene	Not Detected		390
Benzyl alcohol	Not Detected		390
1,2-Dichlorobenzene	Not Detected		390
2-Methylphenol	Not Detected		390
bis(2-Chloroisopropyl)ether	Not Detected		390
4-Methylphenol	Not Detected		390
Hexachloroethane	Not Detected		390
n-Nitrosodi-n-propyl amine	Not Detected		390
Nitrobenzene	Not Detected		390
Isophorone	Not Detected		390
2-Nitrophenol	Not Detected		390
2,4-Dimethylphenol	Not Detected		390
bis(2-Chloroethoxy)methane	Not Detected		390
2,4-Dichlorophenol	Not Detected		390
Benzoic acid	Not Detected	***	390
1,2,4-Trichlorobenzene	Not Detected		390
Naphthalene	Not Detected		390
4-Chloroaniline	Not Detected		390

(Flags are described on page # 3)

30U01.D 98-JUN-0217 // 98015591BURLINGTON-BOC-03-061598 (Continued)

Compound Name	Concentration (ug/Kg)	Quantitative Limit (ug/Kg)
Hexachlorobutadiene	Not Detected	390
4-Chloro-3-methylphenol	Not Detected	390
2-Methylnaphthalene	Not Detected	390
Hexachlorocyclopentadiene	Not Detected	390
2,4,6-Trichlorophenol	Not Detected	390
2,4,5-Trichlorophenol	Not Detected	390
2-Chloronaphthalene	Not Detected	390
2-Nitroaniline	Not Detected	390
Dimethylphthalate	Not Detected	390
Acenaphthylene	Not Detected	390
2,6-Dinitrotoluene	Not Detected	390
3-Nitroaniline	Not Detected	390
Acenaphthene	Not Detected	390
2,4-Dinitrophenol	Not Detected	390
4-Nitrophenol	Not Detected	390
Dibenzofuran	Not Detected	390
2,4-Dinitrotoluene	Not Detected	390
Diethylphthalate	Not Detected	390
Fluorene	Not Detected	390
4-Chlorophenylphenylether	Not Detected	390
4-Nitroaniline	Not Detected	390
2-Methyl-4,6-dinitrophenol	Not Detected	390
n-Nitrosodiphenylamine	Not Detected	390
1,2-Diphenylhydrazine	Not Detected	390
4-Bromophenylphenylether	Not Detected	390
Hexachlorobenzene	Not Detected	390
Pentachlorophenol	Not Detected	390
Phenanthrene	Not Detected	390
Anthracene	Not Detected	390
di-n-Butylphthalate	Not Detected	390
Fluoranthene	Not Detected	390
Pyrene	Not Detected	390
Butylbenzylphthalate	Not Detected	390
3,3'-Dichlorobenzidine	Not Detected	390
Benzo(a)anthracene	Not Detected	390
Chrysene	Not Detected	390
bis(2-Ethylhexyl)phthalate	Not Detected	390
di-n-Octylphthalate	Not Detected	390
Benzo(b)fluoranthene	Not Detected	390
Benzo(k)fluoranthene	Not Detected	390
Benzo(a)pyrene	Not Detected	390
Indeno(1,2,3-c,d)pyrene	Not Detected	390
Dibenzo(a,h)anthracene	Not Detected	390
Benzo(g,h,i)perylene	Not Detected	390

(Flags are described on page # 3)

30U01.D 98-JUN-0217 // 98015591BURLINGTON-BOC-03-061598 (Continued)

Tentatively Identified Compounds Report

Scan #	Compound	Estimated Concentration (ug/Kg)

NO TIC'S REPORTED

Not Detected = Less than Quantitative Limit *(J) = Estimated Conccentration*
(B) = Compound also identified in Laboratory Blank

All reported concentrations have been rounded to two significant figures

Note: *Compounds flagged with *** cannot be accurately quantitated using EPA Method 8270.*
The EPA has recognized this problem, and has deleted these compounds from CLP protocol.
Any concentrations reported for these compounds should be regarded as approximations.

(Flags are described on page # 3)

USEPA SW 846 Method 8270 // Soil Sample

Duke Power SM
A Duke Energy Company

Organic Chemistry Group

Environmental Center, McGuire Nuclear Complex, (704) 875-5325

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248

Client Report Form

Field ID # **BURLINGTON-BOC-04-061598**

Date Collected::	06/15/98	*Reviewed by::*	GCL 7/6/98
L.I.M.S. Number::	98JUN0217 / 98015592	*Lab ID #*	30U15.D

Compound Name	Concentration (ug/Kg)		Quantitative Limit (ug/Kg)
n-Nitrosodimethylamine	Not Detected		340
Phenol	Not Detected		340
Aniline	Not Detected	***	340
2-Chlorophenol	Not Detected		340
bis(2-Chloroethyl)ether	Not Detected		340
1,3-Dichlorobenzene	Not Detected		340
1,4-Dichlorobenzene	Not Detected		340
Benzyl alcohol	Not Detected		340
1,2-Dichlorobenzene	Not Detected		340
2-Methylphenol	Not Detected		340
bis(2-Chloroisopropyl)ether	Not Detected		340
4-Methylphenol	Not Detected		340
Hexachloroethane	Not Detected		340
n-Nitrosodi-n-propylamine	Not Detected		340
Nitrobenzene	Not Detected		340
Isophorone	Not Detected		340
2-Nitrophenol	Not Detected		340
2,4-Dimethylphenol	Not Detected		340
bis(2-Chloroethoxy)methane	Not Detected		340
2,4-Dichlorophenol	Not Detected		340
Benzoic acid	Not Detected	***	340
1,2,4-Trichlorobenzene	Not Detected		340
Naphthalene	480		340
4-Chloroaniline	Not Detected		340

(Flags are described on page # 3)

30U15.D 98JUN0217 / 98015592 BURLINGTON-BOC-04-061598 (Continued)

Compound Name	Concentration (ug/Kg)	Quantitative Limit (ug/Kg)
Hexachlorobutadiene	Not Detected	340
4-Chloro-3-methylphenol	Not Detected	340
2-Methylnaphthalene	360	340
Hexachlorocyclopentadiene	Not Detected	340
2,4,6-Trichlorophenol	Not Detected	340
2,4,5-Trichlorophenol	Not Detected	340
2-Chloronaphthalene	Not Detected	340
2-Nitroaniline	Not Detected	340
Dimethylphthalate	Not Detected	340
Acenaphthylene	Not Detected	340
2,6-Dinitrotoluene	Not Detected	340
3-Nitroaniline	Not Detected	340
Acenaphthene	Not Detected	340
2,4-Dinitrophenol	Not Detected	340
4-Nitrophenol	Not Detected	340
Dibenzofuran	Not Detected	340
2,4-Dinitrotoluene	Not Detected	340
Diethylphthalate	Not Detected	340
Fluorene	Not Detected	340
4-Chlorophenylphenylether	Not Detected	340
4-Nitroaniline	Not Detected	340
2-Methyl-4,6-dinitrophenol	Not Detected	340
n-Nitrosodiphenylamine	Not Detected	340
1,2-Diphenylhydrazine	Not Detected	340
4-Bromophenylphenylether	Not Detected	340
Hexachlorobenzene	Not Detected	340
Pentachlorophenol	Not Detected	340
Phenanthrene	1,200	340
Anthracene	Not Detected	340
di-n-Butylphthalate	Not Detected	340
Fluoranthene	1,100	340
Pyrene	Not Detected	340
Butylbenzylphthalate	Not Detected	340
3,3-Dichlorobenzidine	Not Detected	340
Benzo(a)anthracene	990	340
Chrysene	1,000	340
bis(2-Ethylhexyl)phthalate	Not Detected	340
di-n-Octylphthalate	Not Detected	340
Benzo(b)fluoranthene	Not Detected	340
Benzo(k)fluoranthene	1,600	340
Benzo(a)pyrene	680	340
Indeno(1,2,3-c,d)pyrene	850	340
Dibenzo(a,h)anthracene	470	340
Benzo(g,h,i)perylene	820	340

(Flags are described on page # 3)

30U15.D 98JUN0217 / 98015592 BURLINGTON-BOC-04-061598 (Continued)

Tentatively Identified Compounds Report

Scan #	Compound	Estimated Concentration (ug/Kg)
544	Substituted Ethyl Benzene	1,600
577	Substituted Dimethylbenzene	3,000
4,009	Substituted Decane	1,000
4,149	Substituted Decane	1,000
4,701	Substituted Decane	1,200

Not Detected = Less than Quantitative Limit (J) = Estimated Conccentration
(B) = Compound also identified in Laboratory Blank
All reported concentrations have been rounded to two significant figures
*Note: Compounds flagged with *** cannot be accurately quantitated using EPA Method 8270.*
The EPA has recognized this problem, and has deleted these compounds from CLP protocol.
Any concentrations reported for these compounds should be regarded as approximations.

(Flags are described on page # 3)

USEPA SW 846 Method 8270 // Soil Sample

Duke Power SM
A Duke Energy Company

Organic Chemistry Group
Environmental Center, Mcguire Nuclear Complex, (704) 875-5325
North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248

Client Report Form

Field ID # **BURLINGTON-BOC-05-061598**

Date Collected:: **06/15/98** *Reviewed by::* GSA 7/6/98

L.I.M.S. Number:: **98-JUN-0217 // 98015593** *Lab ID #* **30U02.D**

Compound Name	*Concentration (ug/Kg)*		*Quantitative Limit (ug/Kg)*
n-Nitrosodimethylamine	*Not Detected*		*340*
Aniline	*Not Detected*	***	*340*
Phenol	*Not Detected*		*340*
bis(2-Chloroethyl)ether	*Not Detected*		*340*
2-Chlorophenol	*Not Detected*		*340*
1,3-Dichlorobenzene	*Not Detected*		*340*
1,4-Dichlorobenzene	*Not Detected*		*340*
Benzyl alcohol	*Not Detected*		*340*
1,2-Dichlorobenzene	*Not Detected*		*340*
2-Methylphenol	*Not Detected*		*340*
bis(2-Chloroisopropyl)ether	*Not Detected*		*340*
4-Methylphenol	*Not Detected*		*340*
Hexachloroethane	*Not Detected*		*340*
n-Nitrosodi-n-propyl amine	*Not Detected*		*340*
Nitrobenzene	*Not Detected*		*340*
Isophorone	*Not Detected*		*340*
2-Nitrophenol	*Not Detected*		*340*
2,4-Dimethylphenol	*Not Detected*		*340*
bis(2-Chloroethoxy)methane	*Not Detected*		*340*
2,4-Dichlorophenol	*Not Detected*		*340*
Benzoic acid	*Not Detected*	***	*340*
1,2,4-Trichlorobenzene	*Not Detected*		*340*
Naphthalene	*Not Detected*		*340*
4-Chloroaniline	*Not Detected*		*340*

(Flags are described on page # 3)

30U02.D 98-JUN-0217 // 98015593BURLINGTON-BOC-05-061598 (Continued)

Compound Name	Concentration (ug/Kg)	Quantitative Limit (ug/Kg)
Hexachlorobutadiene	Not Detected	340
4-Chloro-3-methylphenol	Not Detected	340
2-Methylnaphthalene	Not Detected	340
Hexachlorocyclopentadiene	Not Detected	340
2,4,6-Trichlorophenol	Not Detected	340
2,4,5-Trichlorophenol	Not Detected	340
2-Chloronaphthalene	Not Detected	340
2-Nitroaniline	Not Detected	340
Dimethylphthalate	Not Detected	340
Acenaphthylene	Not Detected	340
2,6-Dinitrotoluene	Not Detected	340
3-Nitroaniline	Not Detected	340
Acenaphthene	Not Detected	340
2,4-Dinitrophenol	Not Detected	340
4-Nitrophenol	Not Detected	340
Dibenzofuran	Not Detected	340
2,4-Dinitrotoluene	Not Detected	340
Diethylphthalate	Not Detected	340
Fluorene	Not Detected	340
4-Chlorophenylphenylether	Not Detected	340
4-Nitroaniline	Not Detected	340
2-Methyl-4,6-dinitrophenol	Not Detected	340
n-Nitrosodiphenylamine	Not Detected	340
1,2-Diphenylhydrazine	Not Detected	340
4-Bromophenylphenylether	Not Detected	340
Hexachlorobenzene	Not Detected	340
Pentachlorophenol	Not Detected	340
Phenanthrene	Not Detected	340
Anthracene	Not Detected	340
di-n-Butylphthalate	Not Detected	340
Fluoranthene	Not Detected	340
Pyrene	Not Detected	340
Butylbenzylphthalate	Not Detected	340
3,3'-Dichlorobenzidine	Not Detected	340
Benzo(a)anthracene	Not Detected	340
Chrysene	Not Detected	340
bis(2-Ethylhexyl)phthalate	600	340
di-n-Octylphthalate	Not Detected	340
Benzo(b)fluoranthene	Not Detected	340
Benzo(k)fluoranthene	Not Detected	340
Benzo(a)pyrene	Not Detected	340
Indeno(1,2,3-c,d)pyrene	Not Detected	340
Dibenzo(a,h)anthracene	Not Detected	340
Benzo(g,h,i)perylene	Not Detected	340

(Flags are described on page # 3)

30U02.D 98-JUN-0217 // 98015593BURLINGTON-BOC-05-061598 (Continued)

Tentatively Identified Compounds Report

Scan #	Compound	Estimated Concentration (ug/Kg)

NO TIC'S REPORTED

Not Detected = Less than Quantitative Limit *(J) = Estimated Conccentration*
(B) = Compound also identified in Laboratory Blank
All reported concentrations have been rounded to two significant figures
*Note: Compounds flagged with *** cannot be accurately quantitated using EPA Method 8270.*
The EPA has recognized this problem, and has deleted these compounds from CLP protocol.
Any concentrations reported for these compounds should be regarded as approximations.

(Flags are described on page # 3)

USEPA SW 846 Method 8270 // Soil Sample

Duke Power SM
A Duke Energy Company

Organic Chemistry Group

Environmental Center, Mcguire Nuclear Complex, (704) 875-5325

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248

Client Report Form

Field ID # **BURLINGTON-BOC-06-061598**

Date Collected:: **06/15/98** *Reviewed by::* GCM 7/6/98

L.I.M.S. Number:: **98-JUN-0217 // 98015594** *Lab ID #* **30U03.D**

Compound Name	Concentration (ug/Kg)		Quantitative Limit (ug/Kg)
n-Nitrosodimethylamine	Not Detected		330
Aniline	Not Detected	***	330
Phenol	Not Detected		330
bis(2-Chloroethyl)ether	Not Detected		330
2-Chlorophenol	Not Detected		330
1,3-Dichlorobenzene	Not Detected		330
1,4-Dichlorobenzene	Not Detected		330
Benzyl alcohol	Not Detected		330
1,2-Dichlorobenzene	Not Detected		330
2-Methylphenol	Not Detected		330
bis(2-Chloroisopropyl)ether	Not Detected		330
4-Methylphenol	Not Detected		330
Hexachloroethane	Not Detected		330
n-Nitrosodi-n-propyl amine	Not Detected		330
Nitrobenzene	Not Detected		330
Isophorone	Not Detected		330
2-Nitrophenol	Not Detected		330
2,4-Dimethylphenol	Not Detected		330
bis(2-Chloroethoxy)methane	Not Detected		330
2,4-Dichlorophenol	Not Detected		330
Benzoic acid	Not Detected	***	330
1,2,4-Trichlorobenzene	Not Detected		330
Naphthalene	Not Detected		330
4-Chloroaniline	Not Detected		330

(Flags are described on page # 3)

30U03.D 98-JUN-0217 // 98015594BURLINGTON-BOC-06-061598 (Continued)

Compound Name	Concentration (ug/Kg)	Quantitative Limit (ug/Kg)
Hexachlorobutadiene	Not Detected	330
4-Chloro-3-methylphenol	Not Detected	330
2-Methylnaphthalene	Not Detected	330
Hexachlorocyclopentadiene	Not Detected	330
2,4,6-Trichlorophenol	Not Detected	330
2,4,5-Trichlorophenol	Not Detected	330
2-Chloronaphthalene	Not Detected	330
2-Nitroaniline	Not Detected	330
Dimethylphthalate	Not Detected	330
Acenaphthylene	Not Detected	330
2,6-Dinitrotoluene	Not Detected	330
3-Nitroaniline	Not Detected	330
Acenaphthene	Not Detected	330
2,4-Dinitrophenol	Not Detected	330
4-Nitrophenol	Not Detected	330
Dibenzofuran	Not Detected	330
2,4-Dinitrotoluene	Not Detected	330
Diethylphthalate	Not Detected	330
Fluorene	Not Detected	330
4-Chlorophenylphenylether	Not Detected	330
4-Nitroaniline	Not Detected	330
2-Methyl-4,6-dinitrophenol	Not Detected	330
n-Nitrosodiphenylamine	Not Detected	330
1,2-Diphenylhydrazine	Not Detected	330
4-Bromophenylphenylether	Not Detected	330
Hexachlorobenzene	Not Detected	330
Pentachlorophenol	Not Detected	330
Phenanthrene	460	330
Anthracene	Not Detected	330
di-n-Butylphthalate	Not Detected	330
Fluoranthene	Not Detected	330
Pyrene	Not Detected	330
Butylbenzylphthalate	Not Detected	330
3,3'-Dichlorobenzidine	Not Detected	330
Benzo(a)anthracene	Not Detected	330
Chrysene	Not Detected	330
bis(2-Ethylhexyl)phthalate	Not Detected	330
di-n-Octylphthalate	Not Detected	330
Benzo(b)fluoranthene	Not Detected	330
Benzo(k)fluoranthene	Not Detected	330
Benzo(a)pyrene	Not Detected	330
Indeno(1,2,3-c,d)pyrene	Not Detected	330
Dibenzo(a,h)anthracene	Not Detected	330
Benzo(g,h,i)perylene	Not Detected	330

(Flags are described on page # 3)

30U03.D 98-JUN-0217 // 98015594BURLINGTON-BOC-06-061598 (Continued)

Tentatively Identified Compounds Report

Scan #	Compound	Estimated Concentration (ug/Kg)

NO TIC'S REPORTED

Not Detected = Less than Quantitative Limit *(J) = Estimated Conccentration*
(B) = Compound also identified in Laboratory Blank
All reported concentrations have been rounded to two significant figures
*Note: Compounds flagged with *** cannot be accurately quantitated using EPA Method 8270.*
The EPA has recognized this problem, and has deleted these compounds from CLP protocol.
Any concentrations reported for these compounds should be regarded as approximations.

(Flags are described on page # 3)

USEPA SW 846 Method 8270 // Soil Sample

Duke Power SM
A Duke Energy Company

Organic Chemistry Group
Environmental Center, Mcguire Nuclear Complex, (704) 875-5325
North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248

Client Report Form

Field ID # **BURLINGTON-BOC-07-061598**

Date Collected:: **06/15/98** *Reviewed by::* _____

L.I.M.S. Number:: **98-JUN-0217 // 98015595** *Lab ID #* **30U04.D**

Compound Name	Concentration (ug/Kg)		Quantitative Limit (ug/Kg)
n-Nitrosodimethylamine	Not Detected		320
Aniline	Not Detected	***	320
Phenol	Not Detected		320
bis(2-Chloroethyl)ether	Not Detected		320
2-Chlorophenol	Not Detected		320
1,3-Dichlorobenzene	Not Detected		320
1,4-Dichlorobenzene	Not Detected		320
Benzyl alcohol	Not Detected		320
1,2-Dichlorobenzene	Not Detected		320
2-Methylphenol	Not Detected		320
bis(2-Chloroisopropyl)ether	Not Detected		320
4-Methylphenol	Not Detected		320
Hexachloroethane	Not Detected		320
n-Nitrosodi-n-propyl amine	Not Detected		320
Nitrobenzene	Not Detected		320
Isophorone	Not Detected		320
2-Nitrophenol	Not Detected		320
2,4-Dimethylphenol	Not Detected		320
bis(2-Chloroethoxy)methane	Not Detected		320
2,4-Dichlorophenol	Not Detected		320
Benzoic acid	Not Detected	***	320
1,2,4-Trichlorobenzene	Not Detected		320
Naphthalene	Not Detected		320
4-Chloroaniline	Not Detected		320

(Flags are described on page # 3)

30U04.D 98-JUN-0217 // 98015595BURLINGTON-BOC-07-061598 (Continued)

Compound Name	Concentration (ug/Kg)	Quantitative Limit (ug/Kg)
Hexachlorobutadiene	Not Detected	320
4-Chloro-3-methylphenol	Not Detected	320
2-Methylnaphthalene	Not Detected	320
Hexachlorocyclopentadiene	Not Detected	320
2,4,6-Trichlorophenol	Not Detected	320
2,4,5-Trichlorophenol	Not Detected	320
2-Chloronaphthalene	Not Detected	320
2-Nitroaniline	Not Detected	320
Dimethylphthalate	Not Detected	320
Acenaphthylene	Not Detected	320
2,6-Dinitrotoluene	Not Detected	320
3-Nitroaniline	Not Detected	320
Acenaphthene	Not Detected	320
2,4-Dinitrophenol	Not Detected	320
4-Nitrophenol	Not Detected	320
Dibenzofuran	Not Detected	320
2,4-Dinitrotoluene	Not Detected	320
Diethylphthalate	Not Detected	320
Fluorene	Not Detected	320
4-Chlorophenylphenylether	Not Detected	320
4-Nitroaniline	Not Detected	320
2-Methyl-4,6-dinitrophenol	Not Detected	320
n-Nitrosodiphenylamine	Not Detected	320
1,2-Diphenylhydrazine	Not Detected	320
4-Bromophenylphenylether	Not Detected	320
Hexachlorobenzene	Not Detected	320
Pentachlorophenol	Not Detected	320
Phenanthrene	430	320
Anthracene	Not Detected	320
di-n-Butylphthalate	Not Detected	320
Fluoranthene	Not Detected	320
Pyrene	Not Detected	320
Butylbenzylphthalate	Not Detected	320
3,3'-Dichlorobenzidine	Not Detected	320
Benzo(a)anthracene	Not Detected	320
Chrysene	Not Detected	320
bis(2-Ethylhexyl)phthalate	750	320
di-n-Octylphthalate	Not Detected	320
Benzo(b)fluoranthene	Not Detected	320
Benzo(k)fluoranthene	Not Detected	320
Benzo(a)pyrene	Not Detected	320
Indeno(1,2,3-c,d)pyrene	Not Detected	320
Dibenzo(a,h)anthracene	Not Detected	320
Benzo(g,h,i)perylene	Not Detected	320

(Flags are described on page # 3)

30U04.D 98-JUN-0217 // 98015595BURLINGTON-BOC-07-061598 (Continued)

Tentatively Identified Compounds Report

Scan #	Compound	Estimated Concentration (ug/Kg)

NO TIC'S REPORTED

Not Detected = Less than Quantitative Limit *(J) = Estimated Conccentration*
(B) = Compound also identified in Laboratory Blank
All reported concentrations have been rounded to two significant figures
Note: *Compounds flagged with *** cannot be accurately quantitated using EPA Method 8270.*
The EPA has recognized this problem, and has deleted these compounds from CLP protocol.
Any concentrations reported for these compounds should be regarded as approximations.

(Flags are described on page # 3)

USEPA SW 846 Method 8270 // Soil Sample

Duke Power SM
A Duke Energy Company

Organic Chemistry Group

ENVIRONMENTAL CENTER, MCGUIRE NUCLEAR COMPLEX, (704) 875-5325

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248

Client Report Form

Field ID # **BURLINGTON-BOC-08-061598**

Date Collected:: 06/15/98 *Reviewed by::* GLA 7/6/98

L.I.M.S. Number:: 98JUN0217 / 98015596 *Lab ID #* 30U10.D

Compound Name	Concentration (ug/Kg)		Quantitative Limit (ug/Kg)
n-Nitrosodimethylamine	Not Detected		410
Phenol	Not Detected		410
Aniline	Not Detected	***	410
2-Chlorophenol	Not Detected		410
bis(2-Chloroethyl)ether	Not Detected		410
1,3-Dichlorobenzene	Not Detected		410
1,4-Dichlorobenzene	Not Detected		410
Benzyl alcohol	Not Detected		410
1,2-Dichlorobenzene	Not Detected		410
2-Methylphenol	Not Detected		410
bis(2-Chloroisopropyl)ether	Not Detected		410
4-Methylphenol	Not Detected		410
Hexachloroethane	Not Detected		410
n-Nitrosodi-n-propylamine	Not Detected		410
Nitrobenzene	Not Detected		410
Isophorone	Not Detected		410
2-Nitrophenol	Not Detected		410
2,4-Dimethylphenol	Not Detected		410
bis(2-Chloroethoxy)methane	Not Detected		410
2,4-Dichlorophenol	Not Detected		410
Benzoic acid	Not Detected	***	410
1,2,4-Trichlorobenzene	Not Detected		410
Naphthalene	Not Detected		410
4-Chloroaniline	Not Detected		410

(Flags are described on page # 3)

30U10.D 98JUN0217 / 98015596 BURLINGTON-BOC-08-061598 (Continued)

Compound Name	Concentration (ug/Kg)	Quantitative Limit (ug/Kg)
Hexachlorobutadiene	Not Detected	410
4-Chloro-3-methylphenol	Not Detected	410
2-Methylnaphthalene	Not Detected	410
Hexachlorocyclopentadiene	Not Detected	410
2,4,6-Trichlorophenol	Not Detected	410
2,4,5-Trichlorophenol	Not Detected	410
2-Chloronaphthalene	Not Detected	410
2-Nitroaniline	Not Detected	410
Dimethylphthalate	Not Detected	410
Acenaphthylene	Not Detected	410
2,6-Dinitrotoluene	Not Detected	410
3-Nitroaniline	Not Detected	410
Acenaphthene	Not Detected	410
2,4-Dinitrophenol	Not Detected	410
4-Nitrophenol	Not Detected	410
Dibenzofuran	Not Detected	410
2,4-Dinitrotoluene	Not Detected	410
Diethylphthalate	Not Detected	410
Fluorene	Not Detected	410
4-Chlorophenylphenylether	Not Detected	410
4-Nitroaniline	Not Detected	410
2-Methyl-4,6-dinitrophenol	Not Detected	410
n-Nitrosodiphenylamine	Not Detected	410
1,2-Diphenylhydrazine	Not Detected	410
4-Bromophenylphenylether	Not Detected	410
Hexachlorobenzene	Not Detected	410
Pentachlorophenol	Not Detected	410
Phenanthrene	Not Detected	410
Anthracene	Not Detected	410
di-n-Butylphthalate	Not Detected	410
Fluoranthene	Not Detected	410
Pyrene	Not Detected	410
Butylbenzylphthalate	Not Detected	410
3,3-Dichlorobenzidine	Not Detected	410
Benzo(a)anthracene	Not Detected	410
Chrysene	Not Detected	410
bis(2-Ethylhexyl)phthalate	Not Detected	410
di-n-Octylphthalate	Not Detected	410
Benzo(b)fluoranthene	Not Detected	410
Benzo(k)fluoranthene	Not Detected	410
Benzo(a)pyrene	Not Detected	410
Indeno(1,2,3-c,d)pyrene	Not Detected	410
Dibenzo(a,h)anthracene	Not Detected	410
Benzo(g,h,i)perylene	Not Detected	410

(Flags are described on page # 3)

30U10.D 98JUN0217 / 98015596 BURLINGTON-BOC-08-061598 (Continued)

Tentatively Identified Compounds Report

Scan #	Compound	Estimated Concentration (ug/Kg)

NO TIC'S REPORTED

Not Detected = Less than Quantitative Limit (J) = Estimated Conccentration
(B) = Compound also identified in Laboratory Blank
All reported concentrations have been rounded to two significant figures
*Note: Compounds flagged with *** cannot be accurately quantitated using EPA Method 8270.*
The EPA has recognized this problem, and has deleted these compounds from CLP protocol.
Any concentrations reported for these compounds should be regarded as approximations.

(Flags are described on page # 3)

USEPA SW 846 Method 8270 // Soil Sample

Duke Power SM
A Duke Energy Company

Organic Chemistry Group
Environmental Center, Mcguire Nuclear Complex, (704) 875-5325
North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248

Client Report Form

Field ID # **BURLINGTON-BOC-09-061598**

Date Collected:: 06/15/98 *Reviewed by::* GH 7/6/98

L.I.M.S. Number:: 98-JUN-0217 // 98015597 *Lab ID #* 30U05.D

Compound Name	Concentration (ug/Kg)		Quantitative Limit (ug/Kg)
n-Nitrosodimethylamine	Not Detected		340
Aniline	Not Detected	***	340
Phenol	Not Detected		340
bis(2-Chloroethyl)ether	Not Detected		340
2-Chlorophenol	Not Detected		340
1,3-Dichlorobenzene	Not Detected		340
1,4-Dichlorobenzene	Not Detected		340
Benzyl alcohol	Not Detected		340
1,2-Dichlorobenzene	Not Detected		340
2-Methylphenol	Not Detected		340
bis(2-Chloroisopropyl)ether	Not Detected		340
4-Methylphenol	Not Detected		340
Hexachloroethane	Not Detected		340
n-Nitrosodi-n-propyl amine	Not Detected		340
Nitrobenzene	Not Detected		340
Isophorone	Not Detected		340
2-Nitrophenol	Not Detected		340
2,4-Dimethylphenol	Not Detected		340
bis(2-Chloroethoxy)methane	Not Detected		340
2,4-Dichlorophenol	Not Detected		340
Benzoic acid	Not Detected	***	340
1,2,4-Trichlorobenzene	Not Detected		340
Naphthalene	Not Detected		340
4-Chloroaniline	Not Detected		340

(Flags are described on page # 3)

30U05.D 98-JUN-0217 // 98015597BURLINGTON-BOC-09-061598 (Continued)

Compound Name	Concentration (ug/Kg)	Quantitative Limit (ug/Kg)
Hexachlorobutadiene	Not Detected	340
4-Chloro-3-methylphenol	Not Detected	340
2-Methylnaphthalene	Not Detected	340
Hexachlorocyclopentadiene	Not Detected	340
2,4,6-Trichlorophenol	Not Detected	340
2,4,5-Trichlorophenol	Not Detected	340
2-Chloronaphthalene	Not Detected	340
2-Nitroaniline	Not Detected	340
Dimethylphthalate	Not Detected	340
Acenaphthylene	Not Detected	340
2,6-Dinitrotoluene	Not Detected	340
3-Nitroaniline	Not Detected	340
Acenaphthene	Not Detected	340
2,4-Dinitrophenol	Not Detected	340
4-Nitrophenol	Not Detected	340
Dibenzofuran	Not Detected	340
2,4-Dinitrotoluene	Not Detected	340
Diethylphthalate	Not Detected	340
Fluorene	Not Detected	340
4-Chlorophenylphenylether	Not Detected	340
4-Nitroaniline	Not Detected	340
2-Methyl-4,6-dinitrophenol	Not Detected	340
n-Nitrosodiphenylamine	Not Detected	340
1,2-Diphenylhydrazine	Not Detected	340
4-Bromophenylphenylether	Not Detected	340
Hexachlorobenzene	Not Detected	340
Pentachlorophenol	Not Detected	340
Phenanthrene	Not Detected	340
Anthracene	Not Detected	340
di-n-Butylphthalate	Not Detected	340
Fluoranthene	Not Detected	340
Pyrene	Not Detected	340
Butylbenzylphthalate	Not Detected	340
3,3'-Dichlorobenzidine	Not Detected	340
Benzo(a)anthracene	Not Detected	340
Crysene	Not Detected	340
bis(2-Ethylhexyl)phthalate	Not Detected	340
di-n-Octylphthalate	Not Detected	340
Benzo(b)fluoranthene	Not Detected	340
Benzo(k)fluoranthene	Not Detected	340
Benzo(a)pyrene	Not Detected	340
Indeno(1,2,3-c,d)pyrene	Not Detected	340
Dibenzo(a,h)anthracene	Not Detected	340
Benzo(g,h,i)perylene	Not Detected	340

(Flags are described on page # 3)

30U05.D 98-JUN-0217 / / 98015597BURLINGTON-BOC-09-061598 (Continued)

Tentatively Identified Compounds Report

Scan #	Compound	Estimated Concentration (ug/Kg)

NO TIC'S REPORTED

Not Detected = Less than Quantitative Limit *(J) = Estimated Conccentration*
(B) = Compound also identified in Laboratory Blank
All reported concentrations have been rounded to two significant figures
*Note: Compounds flagged with *** cannot be accurately quantitated using EPA Method 8270.*
The EPA has recognized this problem, and has deleted these compounds from CLP protocol.
Any concentrations reported for these compounds should be regarded as approximations.

(Flags are described on page # 3)

USEPA SW 846 Method 8270 // Soil Sample

Duke Power SM
A Duke Energy Company

Organic Chemistry Group

Environmental Center, McGuire Nuclear Complex, (704) 875-5325

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248

Client Report Form

Field ID # **BURLINGTON-BOC-10-061598**

Date Collected::	06/15/98	Reviewed by::	7/6/98 GSH
L.I.M.S. Number::	98JUN0217 / 98015598	Lab ID #	30U12.D

Compound Name	Concentration (ug/Kg)		Quantitative Limit (ug/Kg)
n-Nitrosodimethylamine	Not Detected		3200
Phenol	Not Detected		3200
Aniline	Not Detected	***	3200
2-Chlorophenol	Not Detected		3200
bis(2-Chloroethyl)ether	Not Detected		3200
1,3-Dichlorobenzene	Not Detected		3200
1,4-Dichlorobenzene	Not Detected		3200
Benzyl alcohol	Not Detected		3200
1,2-Dichlorobenzene	Not Detected		3200
2-Methylphenol	Not Detected		3200
bis(2-Chloroisopropyl)ether	Not Detected		3200
4-Methylphenol	Not Detected		3200
Hexachloroethane	Not Detected		3200
n-Nitrosodi-n-propylamine	Not Detected		3200
Nitrobenzene	Not Detected		3200
Isophorone	Not Detected		3200
2-Nitrophenol	Not Detected		3200
2,4-Dimethylphenol	Not Detected		3200
bis(2-Chloroethoxy)methane	Not Detected		3200
2,4-Dichlorophenol	Not Detected		3200
Benzoic acid	Not Detected	***	3200
1,2,4-Trichlorobenzene	Not Detected		3200
Naphthalene	24,000		3200
4-Chloroaniline	Not Detected		3200

(Flags are described on page # 3)

30U12.D 98JUN0217 / 98015598 BURLINGTON-BOC-10-061598 (Continued)

Compound Name	Concentration (ug/Kg)	Quantitative Limit (ug/Kg)
Hexachlorobutadiene	Not Detected	3200
4-Chloro-3-methylphenol	Not Detected	3200
2-Methylnaphthalene	51,000	3200
Hexachlorocyclopentadiene	Not Detected	3200
2,4,6-Trichlorophenol	Not Detected	3200
2,4,5-Trichlorophenol	Not Detected	3200
2-Chloronaphthalene	Not Detected	3200
2-Nitroaniline	Not Detected	3200
Dimethylphthalate	Not Detected	3200
Acenaphthylene	Not Detected	3200
2,6-Dinitrotoluene	Not Detected	3200
3-Nitroaniline	Not Detected	3200
Acenaphthene	25,000	3200
2,4-Dinitrophenol	Not Detected	3200
4-Nitrophenol	Not Detected	3200
Dibenzofuran	4,500	3200
2,4-Dinitrotoluene	Not Detected	3200
Diethylphthalate	Not Detected	3200
Fluorene	13,000	3200
4-Chlorophenylphenylether	Not Detected	3200
4-Nitroaniline	Not Detected	3200
2-Methyl-4,6-dinitrophenol	Not Detected	3200
n-Nitrosodiphenylamine	Not Detected	3200
1,2-Diphenylhydrazine	Not Detected	3200
4-Bromophenylphenylether	Not Detected	3200
Hexachlorobenzene	Not Detected	3200
Pentachlorophenol	Not Detected	3200
Phenanthrene	32,000	3200
Anthracene	10,000	3200
di-n-Butylphthalate	Not Detected	3200
Fluoranthene	9,000	3200
Pyrene	5,100	3200
Butylbenzylphthalate	Not Detected	3200
3,3-Dichlorobenzidine	Not Detected	3200
Benzo(a)anthracene	5,000	3200
Chrysene	4,200	3200
bis(2-Ethylhexyl)phthalate	6,700	3200
di-n-Octylphthalate	Not Detected	3200
Benzo(b)fluoranthene	Not Detected	3200
Benzo(k)fluoranthene	4,100	3200
Benzo(a)pyrene	3,400	3200
Indeno(1,2,3-c,d)pyrene	Not Detected	3200
Dibenzo(a,h)anthracene	Not Detected	3200
Benzo(g,h,i)perylene	Not Detected	3200

(Flags are described on page # 3)

30U12.D 98JUN0217 / 98015598 BURLINGTON-BOC-10-061598 (Continued)

Tentatively Identified Compounds Report

Scan #	Compound	Estimated Concentration (ug/Kg)
2,265	SUBSTITUTED NAPHTHALENE	9,700

Not Detected = Less than Quantitative Limit (J) = Estimated Conccentration
(B) = Compound also identified in Laboratory Blank
All reported concentrations have been rounded to two significant figures
*Note: Compounds flagged with *** cannot be accurately quantitated using EPA Method 8270.*
The EPA has recognized this problem, and has deleted these compounds from CLP protocol.
Any concentrations reported for these compounds should be regarded as approximations.

(Flags are described on page # 3)

USEPA SW 846 Method 8270 // Soil Sample

Duke Power SM
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Organic Chemistry Group

Environmental Center, McGuire Nuclear Complex, (704) 875-5325

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248

Client Report Form

Field ID # **BURLINGTON-BOC-11-061598**

Date Collected::	06/15/98	Reviewed by::	GCN 7/6/98
L.I.M.S. Number::	98JUN0217 / 98015599	Lab ID #	30U17.D

Compound Name	Concentration (ug/Kg)		Quantitative Limit (ug/Kg)
n-Nitrosodimethylamine	Not Detected		330
Phenol	Not Detected		330
Aniline	Not Detected	***	330
2-Chlorophenol	Not Detected		330
bis(2-Chloroethyl)ether	Not Detected		330
1,3-Dichlorobenzene	Not Detected		330
1,4-Dichlorobenzene	Not Detected		330
Benzyl alcohol	Not Detected		330
1,2-Dichlorobenzene	Not Detected		330
2-Methylphenol	Not Detected		330
bis(2-Chloroisopropyl)ether	Not Detected		330
4-Methylphenol	Not Detected		330
Hexachloroethane	Not Detected		330
n-Nitrosodi-n-propylamine	Not Detected		330
Nitrobenzene	Not Detected		330
Isophorone	Not Detected		330
2-Nitrophenol	Not Detected		330
2,4-Dimethylphenol	Not Detected		330
bis(2-Chloroethoxy)methane	Not Detected		330
2,4-Dichlorophenol	Not Detected		330
Benzoic acid	Not Detected	***	330
1,2,4-Trichlorobenzene	Not Detected		330
Naphthalene	Not Detected		330
4-Chloroaniline	Not Detected		330

(Flags are described on page # 3)

30U17.D 98JUN0217 / 98015599 BURLINGTON-BOC-11-061598 (Continued)

Compound Name	Concentration (ug/Kg)	Quantitative Limit (ug/Kg)
Hexachlorobutadiene	Not Detected	330
4-Chloro-3-methylphenol	Not Detected	330
2-Methylnaphthalene	Not Detected	330
Hexachlorocyclopentadiene	Not Detected	330
2,4,6-Trichlorophenol	Not Detected	330
2,4,5-Trichlorophenol	Not Detected	330
2-Chloronaphthalene	Not Detected	330
2-Nitroaniline	Not Detected	330
Dimethylphthalate	Not Detected	330
Acenaphthylene	Not Detected	330
2,6-Dinitrotoluene	Not Detected	330
3-Nitroaniline	Not Detected	330
Acenaphthene	Not Detected	330
2,4-Dinitrophenol	Not Detected	330
4-Nitrophenol	Not Detected	330
Dibenzofuran	Not Detected	330
2,4-Dinitrotoluene	Not Detected	330
Diethylphthalate	Not Detected	330
Fluorene	Not Detected	330
4-Chlorophenylphenylether	Not Detected	330
4-Nitroaniline	Not Detected	330
2-Methyl-4,6-dinitrophenol	Not Detected	330
n-Nitrosodiphenylamine	Not Detected	330
1,2-Diphenylhydrazine	Not Detected	330
4-Bromophenylphenylether	Not Detected	330
Hexachlorobenzene	Not Detected	330
Pentachlorophenol	Not Detected	330
Phenanthrene	650	330
Anthracene	Not Detected	330
di-n-Butylphthalate	Not Detected	330
Fluoranthene	1,100	330
Pyrene	Not Detected	330
Butylbenzylphthalate	Not Detected	330
3,3-Dichlorobenzidine	Not Detected	330
Benzo(a)anthracene	1,200	330
Chrysene	1,300	330
bis(2-Ethylhexyl)phthalate	570	330
di-n-Octylphthalate	Not Detected	330
Benzo(b)fluoranthene	Not Detected	330
Benzo(k)fluoranthene	1,800	330
Benzo(a)pyrene	840	330
Indeno(1,2,3-c,d)pyrene	870	330
Dibenzo(a,h)anthracene	480	330
Benzo(g,h,i)perylene	830	330

(Flags are described on page # 3)

30U17.D 98JUN0217 / 98015599 BURLINGTON-BOC-11-061598 (Continued)

Tentatively Identified Compounds Report

Scan #	Compound	Estimated Concentration (ug/Kg)
580	Unknown	1,300
603	Substituted Phenol	1,600
3,322	Unknown	4,500
3,695	Susbstituted Anamide	1,700

Not Detected = Less than Quantitative Limit (J) = Estimated Conccentration
(B) = Compound also identified in Laboratory Blank
All reported concentrations have been rounded to two significant figures
*Note: Compounds flagged with *** cannot be accurately quantitated using EPA Method 8270.*
The EPA has recognized this problem, and has deleted these compounds from CLP protocol.
Any concentrations reported for these compounds should be regarded as approximations.

(Flags are described on page # 3)

USEPA SW 846 Method 8270 // Soil Sample

Duke Power SM
A Duke Energy Company

Organic Chemistry Group

Environmental Center, McGuire Nuclear Complex, (704) 875-5325

North Carolina Department of Environment, Health and Natural Resources (DEHNR) Certification # 248

Client Report Form

Field ID # **BURLINGTON-BOC-15-061598**

Date Collected:: 06/15/98 *Reviewed by::* GSK 7/6/98

L.I.M.S. Number:: 98JUN0217 / 98015603 *Lab ID #* 30U18.D

Compound Name	Concentration (ug/Kg)		Quantitative Limit (ug/Kg)
n-Nitrosodimethylamine	Not Detected		330
Phenol	Not Detected		330
Aniline	Not Detected	***	330
2-Chlorophenol	Not Detected		330
bis(2-Chloroethyl)ether	Not Detected		330
1,3-Dichlorobenzene	Not Detected		330
1,4-Dichlorobenzene	Not Detected		330
Benzyl alcohol	Not Detected		330
1,2-Dichlorobenzene	Not Detected		330
2-Methylphenol	Not Detected		330
bis(2-Chloroisopropyl)ether	Not Detected		330
4-Methylphenol	Not Detected		330
Hexachloroethane	Not Detected		330
n-Nitrosodi-n-propylamine	Not Detected		330
Nitrobenzene	Not Detected		330
Isophorone	Not Detected		330
2-Nitrophenol	Not Detected		330
2,4-Dimethylphenol	Not Detected		330
bis(2-Chloroethoxy)methane	Not Detected		330
2,4-Dichlorophenol	Not Detected		330
Benzoic acid	Not Detected	***	330
1,2,4-Trichlorobenzene	Not Detected		330
Naphthalene	610		330
4-Chloroaniline	Not Detected		330

(Flags are described on page # 3)

30U18.D 98JUN0217 / 98015603 BURLINGTON-BOC-15-061598 (Continued)

Compound Name	Concentration (ug/Kg)	Quantitative Limit (ug/Kg)
Hexachlorobutadiene	Not Detected	330
4-Chloro-3-methylphenol	Not Detected	330
2-Methylnaphthalene	780	330
Hexachlorocyclopentadiene	Not Detected	330
2,4,6-Trichlorophenol	Not Detected	330
2,4,5-Trichlorophenol	Not Detected	330
2-Chloronaphthalene	Not Detected	330
2-Nitroaniline	Not Detected	330
Dimethylphthalate	Not Detected	330
Acenaphthylene	Not Detected	330
2,6-Dinitrotoluene	Not Detected	330
3-Nitroaniline	Not Detected	330
Acenaphthene	Not Detected	330
2,4-Dinitrophenol	Not Detected	330
4-Nitrophenol	Not Detected	330
Dibenzofuran	Not Detected	330
2,4-Dinitrotoluene	Not Detected	330
Diethylphthalate	Not Detected	330
Fluorene	Not Detected	330
4-Chlorophenylphenylether	Not Detected	330
4-Nitroaniline	Not Detected	330
2-Methyl-4,6-dinitrophenol	Not Detected	330
n-Nitrosodiphenylamine	Not Detected	330
1,2-Diphenylhydrazine	Not Detected	330
4-Bromophenylphenylether	Not Detected	330
Hexachlorobenzene	Not Detected	330
Pentachlorophenol	Not Detected	330
Phenanthrene	610	330
Anthracene	Not Detected	330
di-n-Butylphthalate	Not Detected	330
Fluoranthene	1,100	330
Pyrene	Not Detected	330
Butylbenzylphthalate	Not Detected	330
3,3-Dichlorobenzidine	Not Detected	330
Benzo(a)anthracene	1,100	330
Chrysene	1,200	330
bis(2-Ethylhexyl)phthalate	640	330
di-n-Octylphthalate	Not Detected	330
Benzo(b)fluoranthene	Not Detected	330
Benzo(k)fluoranthene	1,700	330
Benzo(a)pyrene	770	330
Indeno(1,2,3-c,d)pyrene	820	330
Dibenzo(a,h)anthracene	470	330
Benzo(g,h,i)perylene	780	330

(Flags are described on page # 3)

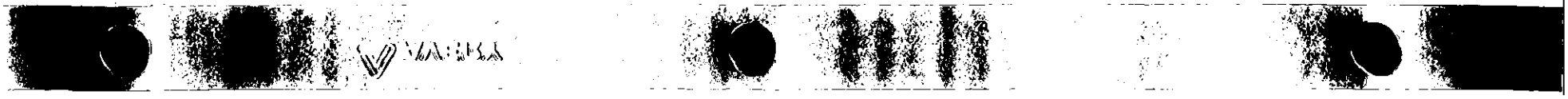
30U18.D 98JUN0217 / 98015603 BURLINGTON-BOC-15-061598 (Continued)

Tentatively Identified Compounds Report

Scan #	Compound	Estimated Concentration (ug/Kg)
1,939	SUBSTITUTED NAPHTHALENE	670

Not Detected = Less than Quantitative Limit (J) = Estimated Conccentration
(B) = Compound also identified in Laboratory Blank
All reported concentrations have been rounded to two significant figures
*Note: Compounds flagged with *** cannot be accurately quantitated using EPA Method 8270.*
The EPA has recognized this problem, and has deleted these compounds from CLP protocol.
Any concentrations reported for these compounds should be regarded as approximations.

(Flags are described on page # 3)

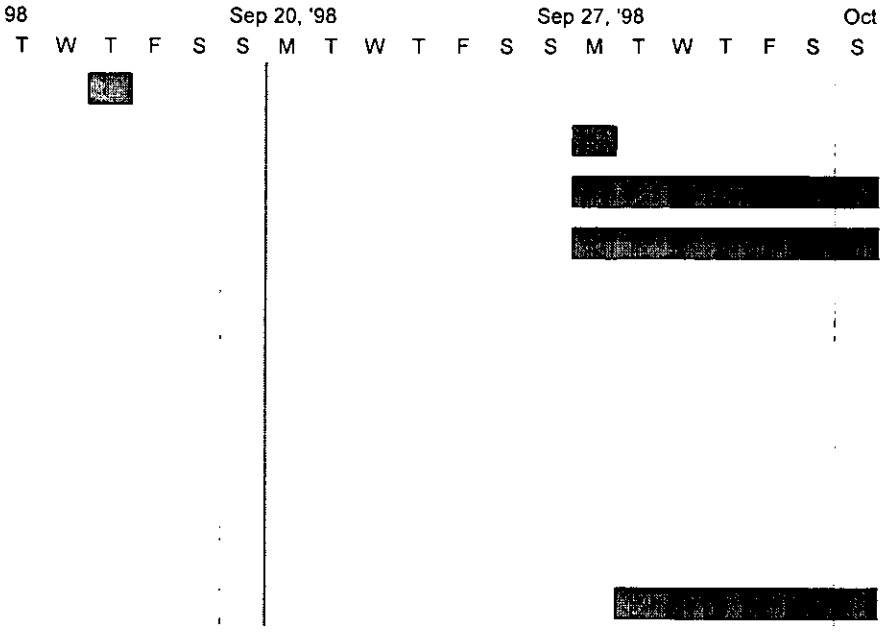


APPENDIX V.A.17

Schedule

BURLINGTON MGP SITE INVESTIGATION

ID	Task Name	Duration	Start	Finish
1	Submit IAOC	1 day	Thu 9/17/98	Thu 9/17/98
2	Submit Remedial Investigation Plan	1 day	Mon 9/28/98	Mon 9/28/98
3	Air, Surface Water & Sediment Sampling	10 days	Mon 9/28/98	Fri 10/9/98
4	Installation of outlying wells	10 days	Mon 9/28/98	Fri 10/9/98
5	HASP Kickoff Meeting	1 day	Mon 10/12/98	Mon 10/12/98
6	GEOPROBE Sampling	30 days	Tue 10/13/98	Mon 11/23/98
7	Rock coring & deep well installations	20 days	Mon 10/26/98	Fri 11/20/98
8	Exploratory Trenching (if required)	10 days	Mon 11/2/98	Fri 11/13/98
9	Geologic Assessment	25 days	Mon 11/2/98	Fri 12/4/98
10	LAB ANALYSES - soils & groundwater	75 days	Mon 10/19/98	Fri 1/29/99
11	LAB ANALYSES - air, surface water, sediments	19 days	Tue 9/29/98	Fri 10/23/98



Project: Invest schedule
Date: Mon 9/21/98

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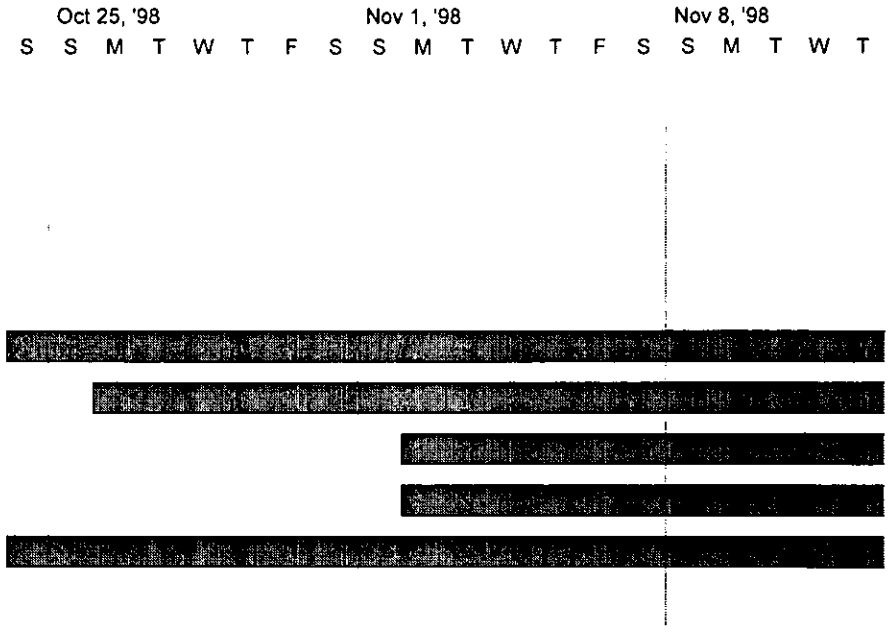

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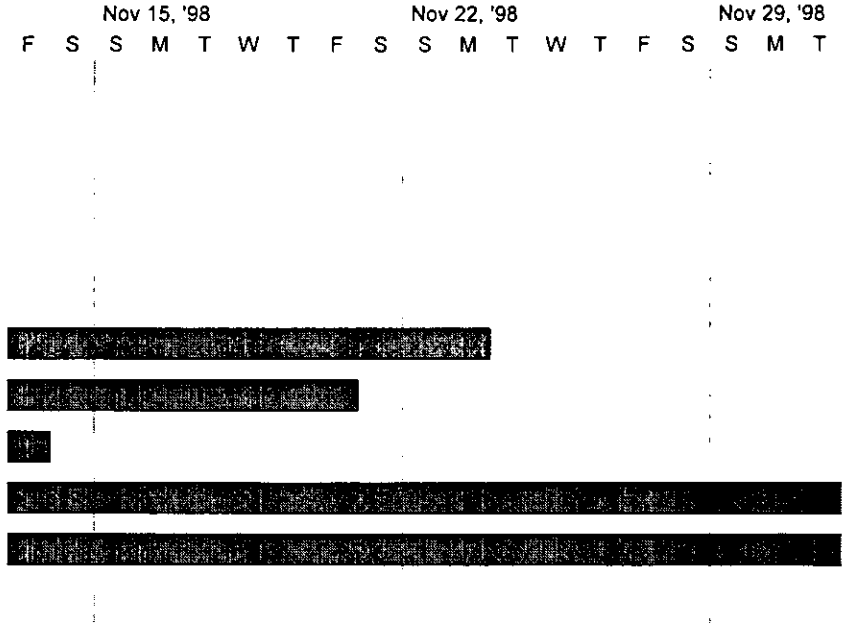

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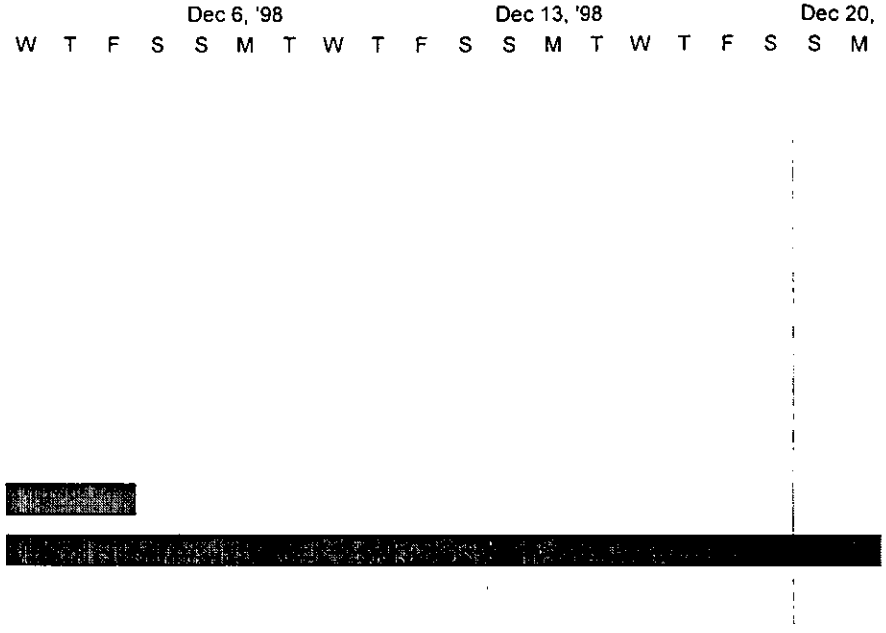

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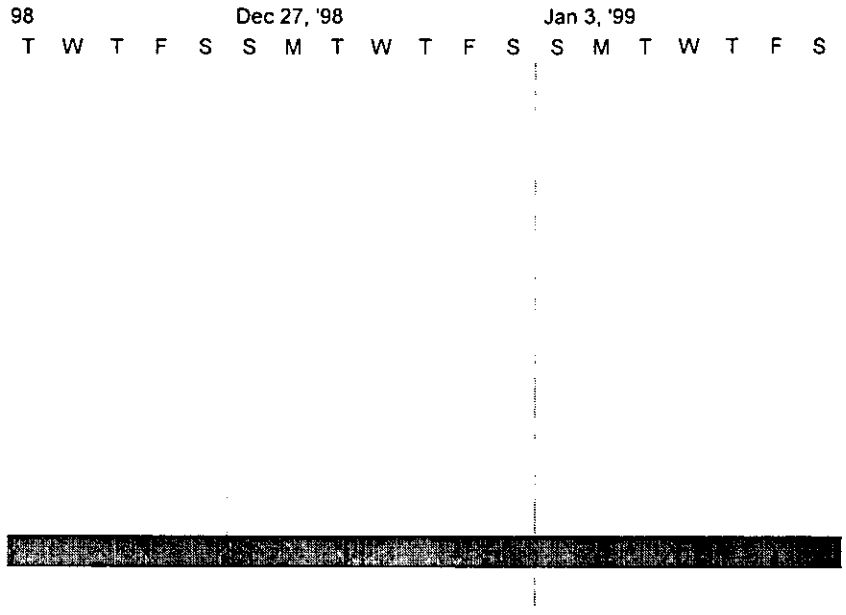

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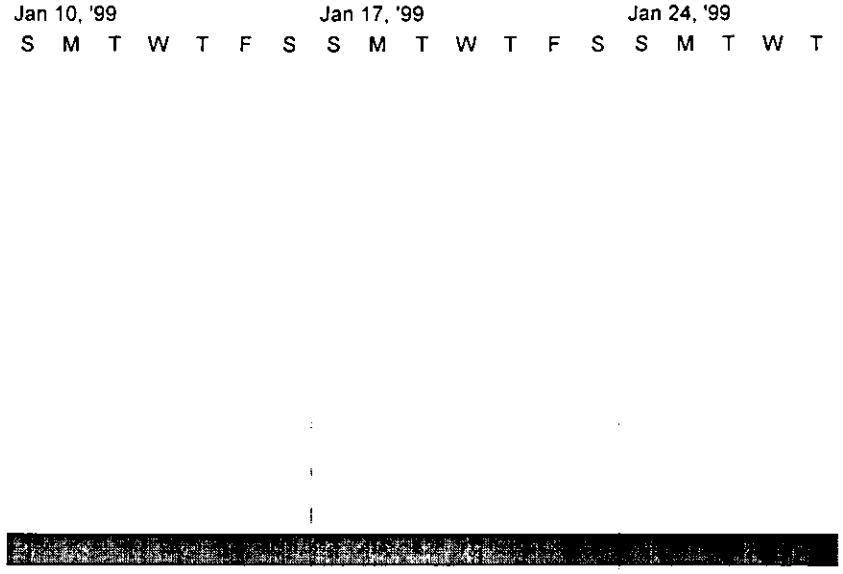

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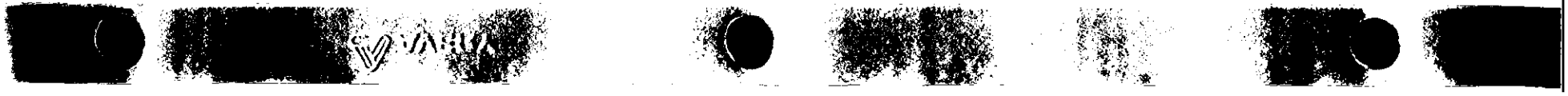
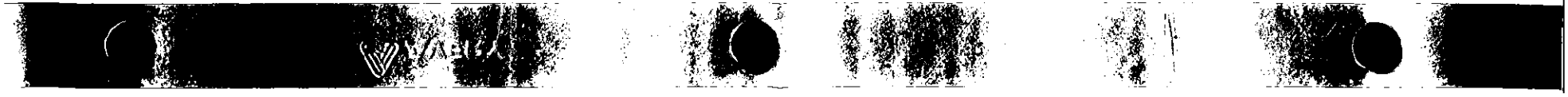


APPENDIX V.A.18

Refer to Section V.A.18



APPENDIX V.A.19

Health & Safety Plan

SITE-SPECIFIC HEALTH AND SAFETY PLAN FOR DRILLING, SOIL SAMPLING, AND GROUNDWATER WELL INSTALLATION AT THE CHURCH STREET MGP SITE

BURLINGTON, NORTH CAROLINA

SEPTEMBER, 1998

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1.0 INTRODUCTION

This document describes the Health & Safety (H&S) protocols developed for the 1205 N. Church Street MGP site, located in Burlington, North Carolina. This plan was developed to protect on-site personnel, visitors, and the public from known or suspected health and safety hazards. These procedures and guidelines contained herein are based on the most up-to-date information available at the time of the drafting of this document. Specific sections of this plan will be changed or revised when additional information is received or when conditions at the site change. Any changes or revisions to this plan will be by a written amendment which will become a permanent part of this plan and placed in Appendix A. Where appropriate, specific OSHA or other standards will be cited. In addition, information pertaining to each site may contain individual sections, if necessary.

1.1 Site Safety Plan Acknowledgment & Acceptance

The site manager/safety officer, site engineer, and/or other designated representative shall be responsible for informing all individuals assigned to or visiting the site of the contents of this plan and ensuring that each person signs the Safety Plan Acknowledgment Form in Appendix B. By signing the Safety Plan Acknowledgment Plan, individuals are recognizing the Health & Safety hazards known or suspected on-site, and the protocols required to minimize exposure to such hazards.

1.2 Site Health & Safety Meetings

An initial "Kick-Off" Health & Safety meeting shall be held on the first day of mobilization to the site and prior to the commencement of any work activities. Mandatory attendance is required for all personnel initially assigned to the site. At the conclusion of the "Kick-Off" meeting, personnel are to sign the Safety Plan Acknowledgment Form in Appendix B indicating their attendance and understanding of the Health & Safety protocols. As additional personnel are assigned to the site, it is the responsibility of the project manager/site manager to ensure that the personnel are briefed on health & safety protocols and that they also sign the Safety Plan Acknowledgment Form.

Additional health & safety meetings will be held on a regularly scheduled basis throughout the duration of the project. In no case shall more than one week elapse between health & safety meetings. These meetings shall be scheduled to inform all personnel of changing site conditions, to ensure that personal protective equipment is being used properly and sufficiently stocked, and to address worker health & safety concerns.

1.3 Training Requirements

All personnel assigned to the site must have completed the level of training for hazardous waste site work in accordance with OSHA 29 CFR 1910.120(e)(3) which is commensurate with the work they perform. General workers on site working in areas with exposure or potential exposure to health hazards must receive 40 hrs. Other workers on site with specific limited tasks who are unlikely to be exposed and those who work only in fully characterized areas with no potential for exposure shall receive 24 hrs. or training. If it has been more than 12 months since either these relevant initial 24 or 40 hr courses, the workers must be current with their 8-hour refresher training in accordance with OSHA 29 CFR 1910.120(e)(8). Documentation of OSHA training is required prior to personnel being permitted to work on-site.

1.4 Medical Monitoring Requirements

All personnel assigned to the site must be enrolled in a medical surveillance program meeting the requirements of OSHA 29 CFR 1910.120(f). Documentation of personnel being enrolled in a medical surveillance program is required prior to personnel being permitted to work on-site.

1.5 Fit Testing Requirements

If any personnel assigned to the site must wear a respirator, they must have successfully passed a respirator fit test within the past 12 months. Documentation of a successful respirator fit test for the appropriate type of respirator needed for work on this specific site (e.g., half-face or full-face) will be required. The project manager, project site engineer, or site health & safety officer is to ensure the respirator being worn by personnel is the same size, make, and model as that specified on any respirator fit test records from the past twelve month period.

1.6 Responsibilities

The project manager or site manager is responsible for overall project administration and for coordinating health & safety protocols and procedures for all personnel on-site at all times. All U.S. EPA health & safety requirements and all applicable OSHA standards shall be applicable. This health & safety plan covers all personnel on-site, however, each sub-contractor is also responsible for the health & safety of its employees. If there is a dispute with regards to health & safety, the following procedures shall be followed:

1) Site manager shall attempt to resolve the issue with a complete written follow-up to the Health & Safety Officer; or

2) If the issue cannot be resolved, the site manager shall consult the Health & Safety Officer immediately and the specific task operation in dispute shall be discontinued until the issue is resolved.

Any persons who observe health & safety problems or infractions should immediately report the problem or infraction to the appropriate personnel.

1.7 Access to Employee Exposure and Medical Records

The Occupational Safety & Health Act provides employees and their designated representatives a right of access to relevant exposure and medical records (29 CFR 1910.20). The "notification" of access to employee exposure and medical records (Appendix G) is to be posted in a prominent location in the field office.

GENERAL INFORMATION

PROJECT:	**Drilling, Soil Sampling & Groundwater Well Installation**	**PROJ. NO.:**
SITE NAME:	**Burlington, NC - Former MGP Site**	
SITE LOCATION:	1205 N. Church Street, Burlington, NC	
PURPOSE OF VISIT:	**To assess soil contamination at the site. To install groundwater wells at site.**	
DATES OF FIELD ACTIVITIES:	**October, 1998 - February, 1999**	
PROJECT MANAGER:	**Ralph Roberts**	
SITE ENGINEER/MANAGER:	**1Mark McGary / Steve Hemby**	
DESIGNATED SITE H&S OFFICER:	**James Gartland/Randy Cardoso**	

PERSONNEL ASSIGNED TO SITE

NAME	GROUP	OSHA TRAINING DATE			PHYSICAL DATE
		40 HR	Super-visor Trng.	8 HR	
Ralph Roberts	EHS/Env/Elrm	1/94	3/96	1/98	3/98
Mark McGary	EHS/Env/Elrm	3/96	1/98	1/98	4/98
Ron Santini	EHS/Env/SCI Svcs	4/94	6/96	3/98	7/98
Tim Hunsucker	EHS/Env/Sci Svcs	4/94	6/96	3/98	5/98
Giorgina Franklin	EHS/Env/Sci Svcs	4/94	6/96	3/98	5/98
Steve Hemby	EHS/Env/Elrm	9/97 (24 hr)	8/98	8/98	7/98
Randy Cardoso	EHS/S&H	4/97	4/98	4/98	3/98
James Gartland	EHS/S&H	4/97	4/98	4/98	7/98

SUB-CONTRACTOR PERSONNEL ON-SITE

NAME	SUB-CONTRACTOR	OSHA TRAINING			PHYSICAL DATE
		40 HR	Super-visor Trng.	8 HR	
Kenny Ramsey	DE&S	4/97	3/98	3/98	2/98

BACKGROUND

Burlington, NC

OVERALL HAZARD IS:			
HIGH:	LOW: X	MODERATE:	UNKNOWN:

FACILITY DESCRIPTION:

Former MGP facility. Currently an active electric utility operations center.

STATUS: Active electric utility operations center.

UNUSUAL FEATURES (containers, dikes, buildings, power lines, terrain, etc.):

MGP facilities demolished to ground surface. Active electric utility operations center.

SITE HISTORY (worker injury, complaints, regulatory agency action):

WASTE TYPES:

LIQUID:	SOLID: X	SLUDGE:	GAS:

CHARACTERISTICS:

CORROSIVE:	IGNITABLE:	VOLATILE: X	TOXIC:
REACTIVE:	UNKNOWN:	RADIOACTIVE:	

OTHER (name):

HAZARDS POSED BY SITE ACTIVITIES:

Hazards working around drilling and equipment, and exposure to Polynuclear Aromatic Hydrocarbons (PNAHs), PCB's and benzene. Health hazard exposure potential is expected primarily to occur only via dermal contact.

UNUSUAL HAZARDS:

2.0 Health & Safety Risk Analysis

This analysis identifies the general hazards associated with specific site operations and presents an analysis of documented or potential chemical hazards that exist at the site. Every effort must be made to reduce or eliminate these hazards. Those which cannot be eliminated must be guarded against by use of engineering controls and/or personal protective equipment.

2.1 HAZARDS ASSOCIATED WITH WORKING AROUND HEAVY EQUIPMENT

- All equipment must have back-up alarms.
- Personnel must make eye contact with the operator before approaching the equipment.
- Operators must be aware of personnel in the area and use proper hand signals before maneuvering.
- Operators must wear hard hats when operating machines unless equipment has an enclosed cab or cage cover.
- Operators must wear hard hats when going to and from their equipment.
- Operators must be cautious when maneuvering equipment near overhead power lines.
- Use of high visibility reflective (ie. orange or yellow) vests is recommended.

2.2 GENERAL SITE HAZARDS

Lighting

Work areas must have adequate lighting for employees to see to work and identify hazards (5-foot candles minimum, comparable to a single 75-100 watt bulb). Personnel should carry flashlights in all dark areas for use in the event of a power failure. Applicable OSHA standards for lighting 29 CFR 1910.210(m) shall apply.

Electric Power

All electrical power must have a ground fault circuit interrupter as part of the circuit. All equipment must be suitable and approved for the class of hazard. Applicable OSHA standards for electric 29 CFR 1910 Subpart S shall apply.

Lockout/Tagout

Operations where the unexpected energization or start-up of equipment or release of stored energy could cause injury to personnel, will be protected by the implementation of a lockout/tagout program meeting the requirements of 29 CFR 1910.147.

Fall Protection

Fall accidents can result in an injury or fatality. Requirements to help prevent falls will be implemented. Elevated work where a fall potential exists will be performed using appropriate ladders and/or fall protection (i.e., body harness or lifeline). Applicable OSHA standards for fall protection 29 CFR 1910.21 through 29 CFR 1910.32, and 29 CFR 1910.104 through 29 CFR 1910.107 shall apply.

Heat Stress

When the temperature exceeds 70°F, and personnel are wearing personal protective clothing, a heat stress monitoring program shall be implemented. Employees shall have periodic break periods and access to drinking water. Heat stress is discussed in detail in Appendix C.

Eye Wash Protection

All operations involving the potential for eye injury, splash, etc., must have approved eye wash units locally available as per 29 CFR 1910.151 (c).

Hearing Protection

When the noise level of any operation exceeds the 8 hr. TWA of 85 decibels, a hearing protection program meeting the requirements of 29 CFR 1910.95 will be implemented.

Fire Protection/Fire Prevention

Operations involving the potential for fire hazards shall be conducted in a manner as to minimize the risk. Non-sparking tools and fire extinguishers shall be used or available as required. Fire extinguishers are to be used only by those employees trained in their use. Sources of ignition shall be removed. When necessary, explosion-proof instruments and/or bonding and grounding will be used to prevent fire or explosion.

Utilities

Overhead and underground utility hazards shall be identified and/or inspected prior to conducting operations involving potential contact.

Machine Guarding

Moving machine parts can be very dangerous; even smooth, slowly rotating shafts can grip clothing, forcing an arm or hand into a dangerous position. Drilling, milling, and boring machines must be safeguarded in compliance with ANSI B11.8-1983, Safety Requirements For Construction, Care and Use of Drilling, Milling, and Boring Machines.

2.3 CHEMICAL HAZARDS

Previous sampling and analytical data or previous site history and investigation have indicated that the following chemical hazards, either documented or suspected, exist at the site. Detailed hazard information for these chemicals is available through MSDS sheets in Appendix E.

CONTAMINANT	SKIN HAZ.	PEL (1)	TLV (2)	REL (3)	STEL (4)	IDLH (5)	ODOR THRES-HOLD	IP (6)
Benzene	Yes	1 ppm	.1 ppm	0.1 ppm	5 ppm	500 ppm CA	34-119 ppm	9.24
Toluene	Yes	200 ppm	50 ppm	100 ppm	150 ppm	500 ppm	4.68 ppm	8.82
Ethylbenzene	No	100 ppm	100 ppm	100 ppm	125 ppm	800 ppm	0.092-0.60 ppm	8.76
Xylene	Yes	100 ppm	100 ppm	100 ppm	150 ppm	900 ppm	20 ppm	8.56
Acetonitrile	No	40 ppm	40 ppm	20 ppm	60 ppm	500 ppm	1160 ppm	12.20
Chloroform	No	50 ppm (C)	10 ppm	2 ppm	2 ppm	500 ppm	133-276 ppm	11.42
PAHs	No	0.2 mg/m³	0.2 mg/m³	0.01 mg/m³	-	80 mg/m³	-	N/A
Cadmium	No	0.005 mg/m³	0.01 mg/m³	-	-	9 mg/m³	-	N/A
Arsenic	Yes	0.01 mg/m³	0.01 mg/m³	0.002 mg/m³	-	5 mg/m³	-	N/A
Lead	No	0.05 mg/m³	0.05 mg/m³	0.100 mg/m³	-	100 mg/m³	-	N/A
Chromium	Yes	1.0 mg/m³	0.05 mg/m³	0.50 mg/m³	-	25 mg/m³	-	N/A
PCB (54% chlorine)	Yes	0.5 mg/m³	0.5 mg/m³	0.001 mg/m³	-	5 mg/m³	-	N/A
Mercury	Yes	0.1 mg/m³ (c)	0.025 mg/m³	0.05 mg/m³	-	10 mg/m³	-	N/A

NOTE:

(1) OSHA Permissible Exposure Limit (PEL)
(2) ACGIH Threshold Limit Value (TLV)
(3) NIOSH Recommended Exposure Limit (REL)

USE LOWEST FIGURE OF THE THREE LIMITS.

(4) Short-Term Exposure Limit
(5) Immediately Dangerous to Life & Health
(6) Ionization Potential
(c) Ceiling Limit

3.0 PERSONNEL PROTECTIVE EQUIPMENT

The following is a brief description of the personnel protective equipment which may be required during various phases of the project. The U.S. EPA terminology for protective equipment will be used: Levels A, B, C and D. For the purpose of this project, work will not continue at conditions requiring protection greater than level C. This work is not expected to require greater than Level D protection. Work should be stopped temporarily and site health and safety officers should be consulted if abnormal conditions suggest the need for Level C protection, particularly the need for respiratory protection.

Respiratory protective equipment shall be NIOSH approved and use shall conform to OSHA 29 CFR 1910.134.

3.1 LEVEL C

Level C protection shall be used when:

- Substance(s) require the same level of skin protection as Level B, but a lesser level of respiratory protection;
- The types of air contaminants have been identified, concentrations measured, and respirator decision logic indicates that APR's are sufficient to remove the contaminants; or
- The substance has adequate warning properties and all criteria for the selection of APR has been met.

LEVEL C PPE TO BE UTILIZED: (Check Appropriate PPE)

X	Full-face APR (MSHA/NIOSH Approved) (REQUIRED) NOTE: Can be PAPR.
X	TYPE OF CARTRIDGES TO BE USED: Combination Organic Vapor/HEPA
X	FOR MODERATE SKIN CONTACT RISK Disposable clothing (bag design providing hood and boot covers) (i.e., Tyvek) **FABRIC TYPE:** Tyvek OR FOR SIGNIFICANT SKIN CONTACT RISK Chemical-resistant clothing (one-piece coverall; hooded, two-piece, chemical splash suit, chemical-resistant hood and apron, disposable chemical-resistant coveralls (i.e., Tyvek) **FABRIC TYPE:** Non-Porous Tyvek
X	BOOT PROTECTION • Rain boots (placed over coverall booties)
X	Chemical glove protection (REQUIRED), to include: • Cotton glove liners • Disposable chemical-resistant outer gloves **MATERIAL TYPE:** Teflon or Viton (for long term contact) Nitrile (Only for short, limited contact with materials)
X	Sleeves to be duct-taped over gloves and pants to be duct-taped over boots (REQUIRED)
X	Face shield for hard hat (REQUIRED IF SPLASH POTENTIAL EXISTS)
X	Ear muffs attached to hard hat (REQUIRED if site noise levels are greater than 85 dB based on an 8 hr. TWA.)
	Two-way radio communication (intrinsically safe) (OPTIONAL)
	Modifications:

3.2 LEVEL D

Level D protection will be used when:

- The atmosphere contains no known hazard;
- Work functions preclude splashes, immersions, or the potential for unexpected inhalation of, or contact with, hazardous concentrations of chemicals.
- Atmospheric concentrations of contaminants are less than the TLV.

LEVEL D PPE (Minimum Work Uniform Permitted)

X	Standard work uniform/coveralls (REQUIRED) NOTE: Tyvek disposable coveralls may be worn.

X	Gloves (REQUIRED)
	
	FOR NO HAND CONTAMINATION POTENTIAL
	
	• Work gloves
	
	FOR HAND CONTAMINATION POTENTIAL (NO OTHER SKIN CONTACT POSSIBLE)
	
	• Chemical protective gloves (REQUIRED), to include:
	  • Cotton glove liners
	  • Disposable chemical-resistant outer gloves
	MATERIAL TYPE: Teflon or Viton

X	Face shield for hard hat (REQUIRED IF SPLASH POTENTIAL EXISTS)
X	Ear muffs attached to hard hat (REQUIRED if site noise levels are greater than 85 dB based on an 8 hr. TWA.)
X	BOOT PROTECTION (REQUIRED IF MUST WALK THROUGH CONTAMINATED AREAS SUCH AS EXITING OF EXCAVATOR) • Disposable booties (covering work boots) • Rain boots (covering disposables)
	Two-way radio communication (intrinsically safe) (OPTIONAL)
	Modifications:

ACTIVITY VS. LEVEL OF PROTECTION

ACTIVITY	LEVEL OF PPE	SPECIAL REQUIREMENTS
Drilling/Soil Sampling	D	Upgrade to Level C PPE based on air monitoring results and/or dermal contact beyond hand contact.
Groundwater Well Installation	D	Upgrade to Level C PPE based on air monitoring results and/or dermal contact beyond hand contact.

4.0 EXPOSURE MONITORING

An exposure monitoring program will be conducted at the discretion of the site safety and health officer if significant change in potential exposures warrant it. If such a program is implemented, field screening techniques will be used to measure constituents of chemical and physical agents of interest during drilling, soil sampling, and groundwater well installation. Chemical constituents of interest for the exposure monitoring program will include total volatile organics (VOCs), benzene, and total suspended particulate matter (TSP). Physical agents that will be monitored include noises and heat stress.

4.1 Monitoring Equipment

When needed, field screening will be conducted using direct reading instruments which are designed to detect contaminants/agents on a real-time basis. Direct reading instruments provide information at the time of sampling. This enables rapid decision making regarding required levels of respiratory protection, hearing protection, etc. The types of direct reading instruments to be used during the exposure monitoring program are described below:

- Organic Vapor Analyzer: Detects the presence of VOCs in part per million by volume (ppmv) concentration. An organic vapor analyzer equipped with a photoionization detector (PID) calibrated to a known concentration of a benzene substitute compound, such as isobutylene, will be used.

- Colorimetric Tubes: Detects individual VOCs in ppmv. A known volume of air is pulled across an indicator tube. The specific contaminant reacts with the indicator producing a stain whose length or color is proportional to its concentration.

- Aerosol Meter: Detects the presence and concentration of TSP matter in milligrams per cubic meter of air (mg/m^3). The meter continuously senses the population of particles present in the atmosphere with an electromagnetic radiation source, near the infrared spectrum.

- Sound Level Meter: Measures sound pressure levels in decibels (dB) The A-weighting scale will be used to survey this project.

- Heat Stress Monitor: Measures several ambient air parameters. These parameter measurements are used to compute a heat stress index. This index is used to predict the amount of heat load on the body.

4.1.1 Action Threshold Levels

Direct reading instruments provide information as to the level of agents in the work place. Section 2.3 previously discussed the regulatory exposure levels for the chemical agents of interest. These exposure levels were used to define action threshold values. Levels measured by the instruments have been associated with action threshold values. Action threshold values are for level of agents in the immediate work area that would warrant PPE. Action threshold values, the type of PPE required, and site monitoring frequency are presented in Table 4-1.

TABLE 4-1
ACTION THRESHOLD VALUES

Constituents	Direct Reading Instrument	Levels	Action	Retest Frequency (Real time monitor)
Volatile Organics	OVA Meter (PID)	< 1 ppmv	None	Minimum of twice daily, increased at discretion of site safety officer
		> 1 ppmv sustained for 5 minutes	Check w/ benzene detector tube	15 minutes
		> 25 ppmv sustained for 5 minutes	• Upgrade to level C with min. HF APR with combination organic/HEPA cartridges • Perform personal monitoring for laboratory analysis using charcoal tubes and sampling pumps for rest of day.	15 minutes
		> 250 ppmv sustained for 5 minutes	• Upgrade to modified level C with min. FF APR with combination organic/HEPA cartridges • Perform personal monitoring for laboratory analysis using charcoal tubes and sampling pumps for rest of day.	hourly
		> 500 ppmv sustained for 5 minutes	Evacuate site and notify H & S Officer	hourly
Volatile Organics (benzene)	Detector Tubes	< 0.5 ppmv	None	Minimum of twice daily, increased at discretion of site safety officer
		0.5-9 ppmv	• Upgrade to level C with min. HF APR with combination organic/HEPA cartridges • Perform personal monitoring for laboratory analysis using charcoal tubes and sampling pumps for rest of day.	15 minutes
		10-50 ppmv	• Upgrade to modified level C with min. FF APR with combination organic/HEPA cartridges • Perform personal monitoring for laboratory analysis using charcoal tubes and sampling pumps for rest of day.	15 minutes
		> 50 ppmv	Evacuate site and notify H & S Officer	hourly

5.0 SITE CONTROL

5.1 Work Zones

The primary purpose for site controls is to establish the work zone perimeter, to reduce migration of contaminants into clear areas, and to prevent access or exposure to potentially hazardous materials by unauthorized personnel. At the end of each workday, the site should be secured or guarded to prevent unauthorized entry. Site work zones will include:

- Clean Zone/Support Zone. This uncontaminated zone will be the area outside the exclusion and decontamination zone and within the geographic perimeters of the site. This area is used for staging of materials, parking of vehicles, office and laboratory facilities, sanitation facilities, and receipt of deliveries. Personnel entering this zone may include delivery personnel, visitors, security guards, etc., who will not necessarily be permitted in the work zone. All personnel arriving in the support zone will report to the site office and sign a site entry/exit log. There will be only one controlled entry/exit point from the clean zone to the decontamination zone.

- Decontamination Zone. The decontamination zone will provide a location for removal of contaminated personnel protective equipment and final decontamination of personnel and equipment. All personnel and equipment should exit via the decon area. Individual small decon areas can be set up next to each work area where the potential for contamination exists (ie. next to each drilling site). A separate decontamination area will be established for heavy equipment.

5.2 General Field Safety and Standard Operating Procedures

- The "Buddy System" will be used at all times by all field personnel in the exclusion zone. No one is to perform field work alone. Maintain visual, voice, or radio communication at all times.

- Whenever possible, avoid contact with contaminated (or potentially contaminated) surfaces. Walk around (not through) puddles and discolored surfaces. Do not kneel or set equipment on the ground.

- Eating, drinking and/or smoking is only permitted in designated areas in the support zone.

- Hands and face must be thoroughly washed upon leaving the decon area.

- If the work zone changes to the point that respirators are required, beards or other facial hair that interferes with respirator fit will preclude admission to the work zone.

- All equipment must be decontaminated or properly discarded upon exit from the work zone as determined by the project manager.

- All personnel exiting the work zone must go through the decontamination procedures as described in this H&S Plan.

- PPE as described in the H&S Plan will be required for all field personnel working on-site.

6.0 DECONTAMINATION

In general, everything that enters the work zone must either be decontaminated or properly discarded upon exit from the work zone. All personnel, including any state or local officials, must enter and exit the work zone through the decon area. Prior to demobilization of each work zone, contaminated equipment will be decontaminated and inspected by the site manager before it is moved into the clean zone. Any material that is generated by decontamination procedures will be stored in a designated area in the work zone pending disposal approvals and disposition. Detergent and water will be used as a decontamination solution.

6.1 Personnel Decontamination

Personnel may become contaminated in a number of ways including:

- contacting vapors, gases, mists, or particulates in the air;
- walking through puddles of liquids or on contaminated soil; or
- using contaminated instruments or equipment.

Even with safeguards, contamination may occur. Harmful materials can be transferred into clear area, exposing unprotected personnel. In removing contaminated clothing, personnel may contact contaminants on clothing or inhale them. To prevent such occurrences, decontamination procedures must be developed and established before anyone enters the site and must continue throughout site operation.

Personnel decontamination procedures will be based on the contaminant associated with the specific site and the level of protection being worn by site personnel.

6.2 Sampling equipment

Sampling devices when used on-site, require special cleaning procedures which are delineated in the chart in Section 6.7.

6.3 Equipment Decontamination

Heavy equipment will be decontaminated by moving the equipment to the designated decon area and brushing off the heavy contamination with a broom, etc. If required, the equipment will be steam cleaned with the decon waters collected for proper disposition. Following the decontamination and prior to exiting the decontamination zone, the project manager/site engineer will inspect the equipment, and if properly decontaminated, make note of the date, time, method, and name of decon personnel in the field notebook.

6.4 Disposal of Contaminated Materials

All materials and equipment used for decontamination must be disposed of properly. Clothing, tools, buckets, brushes, and all other equipment that is contaminated must be properly packaged and stored on-site until disposal arrangements are finalized. Clothing not completely decontaminated on-site should be secured in plastic bags before being removed from the site.

The proper disposal methods for the site are outlined in the chart in Section 6.7.

6.4 Emergency Decontamination

Personnel with medical problems or injuries may also require decontamination. There is the possibility that the decontamination may aggravate or cause more serious health effects. If prompt lifesaving, first aid, and medical treatment is required, decontamination procedures will be omitted. In either case, a member of the site management team will accompany contaminated personnel to the medical facility to advise on matters involving decontamination.

Emergency decontamination procedures for this site are discussed in the chart in Section 6.7. It is expected that all situations to be encountered in this work will require only Level D decon. If it appears that Level C decon is needed, contact the site safety and health officers.

6.6 Sanitizing of Personnel Protective Equipment

Respirator, reusable protective clothing, and other personnel articles not only must be decontaminated before

being reused, but also sanitized. The inside of masks and clothing becomes soiled due to exhalation, body oils, and perspiration. Manufacturer's instructions should be used to sanitize the respirator masks. If practical, reusable protective clothing should be machine washed after a thorough decontamination; otherwise it must be cleaned by hand.

6.7 Decontamination Procedures

	LEVEL A: Segregated equipment drop, boot cover and glove wash, boot cover and glove rinse, tape removal, boot cover removal, outer glove removal, suit/hard hat removal, SCBA removal, inner glove wash, inner glove removal, inner clothing removal, field wash, re-dress. Modifications:
	LEVEL B: Segregated equipment drop, boot cover and glove wash, boot cover and glove rinse, boot cover removal, outer glove removal, suit/safety boot wash, suit/SCBA/boot/glove rinse, (tank change), safety boot removal, splash suite removal, inner glove wash, face piece removal, inner glove removal, inner clothing removal, field wash, re-dress. Modifications:
X	LEVEL C: • Segregated equipment drop, • Boot cover and glove dry brush removal of gross contamination, • Outer glove removal and placement for re-use, • Suit/outer boot dry brush removal wash • Outer boot removal and placement for re-use • Disposable suit removal and disposal • Inner glove dry brush • Face piece removal • Inner glove removal Modifications:
X	LEVEL D: • Segregated equipment drop • Boot and glove wash dry brush • Boot and glove removal Modifications:
X	HEAVY EQUIPMENT DECONTAMINATION: Brush gross contamination from equipment, then steam clean.
X	DECONTAMINATION DISPOSAL PROCEDURES: Grossly contaminated PPE to be drummed while awaiting disposal. Waters generated during decontamination will be collected, drummed, and sampled to determine appropriate disposal procedures.
	EMERGENCY DECONTAMINATION EQUIPMENT/PROCEDURES:

7.0 EMERGENCY RESPONSE/CONTINGENCY PLAN

It is essential that site personnel be prepared in the event of an emergency. Emergencies can take many forms: illnesses or injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in weather. The following outlines the general procedures for emergencies.

7.1 Personnel Responsibilities During Emergencies

The project manager/site engineer, as the site administrator for the project, has primary responsibility for responding to and correcting emergency situations. The on-site project manager/site engineer will:

- Take appropriate measures to protect personnel including withdrawal from the exclusion zone, total evacuation and securing of the site, or upgrading or downgrading the level of protective clothing and respiratory protection.
- Take appropriate measures to protect the public and the environment including isolating and securing the site, preventing run-off to surface waters and ending or controlling the emergency to the extent possible.
- Ensure that the appropriate Federal, State and Local agencies are informed, and emergency response plans are coordinated. In the event of a fire or explosion, the local fire department should be summoned immediately. In the event of an air release of toxic materials, the local authorities should be informed in order to assess the need for evacuation. In the event of a spill, sanitary districts and drinking water systems may need to be alerted.
- Ensure that appropriate decon treatment or testing for exposed or injured personnel is obtained.
- Determine the cause of the incident and make recommendations to prevent recurrence.
- Ensure that all required reports have been prepared.
- If an injury has occurred, depending on the type and severity, notify Medical (General Office).
- Notify the Health & Safety Officer.

7.2 Emergency Contacts/Telephone Numbers

Burlington, NC

FIRE:	Burlington 911	
POLICE:	Burlington 911	
AMBULANCE: (Alamance County EMS)	Burlington 911 (Inform EMS if emergency involves contaminated individuals)	
Capable of Transporting Contaminated Personnel?	YES: X	NO:
HOSPITAL: Alamance Regional Medical Center		
1240 Huffman Mill Road	336-538-7000	
Chemical Trauma Capabilities?	YES: X	NO:
Decontamination Capabilities?	YES: X	NO:
Directions From Church St. Op. Ctr. To Hospital: Turn right onto Church St. from Op. Ctr and head approximately 1 mile to Highway 49. Turn right onto Highway 49. Go about 2 miles and turn left onto Highway 87 S. Go about 0.5 miles and turn onto Interstate 40 West/85 South. Turn off onto Huffman Mill Road South exit. Medical Center is less than 0.25 miles from exit.		
NOTE: The route to the hospital was verified by: James Gartland Distance from the site to the hospital is: Approximately 8 miles.		
POISON CONTROL CENTER:	(800) 382-9092	
ELECTRIC COMPANY (Duke Power):	(704) 525-3882 or 525-3620 (emergency)	
GAS COMPANY: (Piedmont Natural Gas Co.)	(800) 752-7504	
NATIONAL RESPONSE CENTER:	(800) 424-8802	
CENTER FOR DISEASE CONTROL:	(404) 488-4100 (24 hours)	
AT&F (explosion information)	(800) 424-9555	
CHEMTREC:	(800) 424-9300	
U.S. EPA REGION NAME: Region IV - Atlanta	Region Number: (404) 347-3864	
PROJECT HEALTH & SAFETY OFFICER:	James Gartland (704)-382-5976 Randy Cardoso (704)-382-7357	
EHS - SAFETY AND INDUSTRIAL HYGIENE:	Jeff Almond (704) 382-4903	
MEDICAL (FAIRFAX)	Sue Perkins (910) 854-4958	
PROJECT MANAGER:	Ralph Roberts (704) 373-7888	

The following individuals are current with their certifications in First Aid/CPR:

NAME	FIRST AID DATE	CPR DATE

EMERGENCY EQUIPMENT AVAILABLE ON-SITE:

COMMUNICATION EQUIPMENT:	
X	PUBLIC TELEPHONES
X	PRIVATE TELEPHONES
	CELLULAR TELEPHONES
X	TWO-WAY RADIO (WALKIE-TALKIE)
	EMERGENCY ALARMS/HORNS
MEDICAL EQUIPMENT:	
X	FIRST AID KITS
	STRETCHER
X	EYE WASH STATION
X	SAFETY SHOWER
	BLANKETS
	OTHER:
FIRE FIGHTING EQUIPMENT:	
X	FIRE EXTINGUISHER TYPES: A, B, C, Dry Chemical
	OTHER:
SPILL/LEAK EQUIPMENT:	
	ABSORBENT BOOM PADS
	DRY ABSORBENT
ADDITIONAL SAFETY EQUIPMENT:	

- Notify the injured person's supervisor.
- Complete an IIR (Appendix F)

7.3 Medical Emergencies

Any person who becomes ill or injured in the exclusion zone must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and, if possible, first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed (i.e., complete disrobing of the victim and redressing in clean overalls or wrapping in a blanket). First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must be reported to the project manager/site engineer.

Any person transporting an injured/exposed person to a hospital for treatment should take directions to the hospital with them, and information on the chemicals involved.

Any vehicle used to transport contaminated personnel will be cleaned or decontaminated as necessary.

7.4 Fire or Explosion

In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival the project manager/site engineer will advise the fire commander of the location and nature of the fire, and the location and identification of all hazardous materials on-site.

If it is safe to do so, site personnel may use fire fighting equipment available on-site or remove or isolate flammable or other hazardous materials which may contribute to the fire.

7.5 Spill or Leaks

In the event of a spill or leak, site personnel will locate the source of the spillage and stop the flow, if it can be done safely, and begin containment and recovery of the spilled material.

7.6 Evacuation Routes and Resources

Evacuation routes have been established by work area locations for the site. Evacuation should be conducted immediately, without regard for equipment under conditions of extreme emergency.

- Evacuation notification will be a continuous blast on an air horn, vehicle horn, or by verbal communication via radio.
- Keep upwind of smoke, vapors, or spill location.
- Exit through the decontamination corridor if possible.
- If evacuation is not via the decontamination corridor, site personnel should remove contaminated clothing once they are in a location of safety and leave the clothing near the exclusion zone or in a safe place.
- The project manager/site engineer will conduct a head count to insure all personnel have been evacuated safely.
- In the event that a site evacuation is necessary, all personnel are to:
    - ⇒ Escape the emergency situation;
    - ⇒ Decontaminate to the maximum extend practical; and
    - ⇒ Meet at site office or some other pre-arranged location.

8.0 EXCAVATION & TRENCHING

Will this project require any excavations or trenches greater than 4 ft. in depth?

NO:	X	YES:

If the excavations or trenches are required and are greater than 4 ft. in depth, will personnel be required to enter the excavations and/or trenches?

NO:	X	YES:

If the answer to both of these questions is NO, proceed to the next section. If the answer to both of these questions is YES, OSHA's Final Rule for Excavation (29 CFR 1926 Subpart P) must be implemented, and personnel must comply with all excavation guidelines.

- **Remove all surface encumbrances.**
- **Locate all underground installations prior to opening excavation.**
- **Supply means of egress so that no more than 25 feet of lateral travel is required by personnel in the excavation.**
- **Supply warning vests for personnel exposed to vehicular traffic.**
- **Utilize barricades, hand signals, or stop logs for equipment operating next to excavations and slope grade away from excavation.**
- **Check for hazardous atmospheres.**
- **Protect excavation and personnel from water accumulation.**
- **Check stability of adjacent structures.**
- **Protect personnel from loose rock or soil.**
- **Inspect excavations and record information from the inspection in the field log book.**
- **Provide for fall protection.**
- **Describe in detail any protective system used for personnel protection (slopping and benching of sides, support systems or shield systems).**

NOTE: SEE THE "TRENCHING GUIDELINES" (PAGE 23-1 OF THE SAFETY & INDUSTRIAL HYGIENE MANUAL)

9.0 LOCKOUT/TAGOUT

Does this project involve the operation of machines and/or equipment in which the unexpected energization or start up of the machinery or equipment, or release of stored energy, could cause injury to personnel?

NO:	X	YES:	

If the answer is NO, proceed to the next section. If the answer is YES, OSHA regulations for Lockout/Tagout (29 CFR 1910.147) must be implemented and personnel must comply with all Lockout/Tagout procedures.

NOTE: SEE THE "LOCKOUT/TAGOUT" PROGRAM (PAGE 14-1 OF THE SAFETY & INDUSTRIAL HYGIENE MANUAL)

10.0 FALL PROTECTION

Does this project involve the use of any floors, platforms, and/or runways four feet or more above adjacent flooring or ground level, or the use of ladders, scaffolding, or power platforms?

NO:	X	YES:

If the answer is NO, proceed to the next section. If the answer is YES, OSHA regulations for Fall Protection (29 CFR 1910.21 through 29 CFR 1910.32) must be implemented and appropriate fall protection devices must be utilized.

NOTE: SEE THE "WALKING/WORKING SURFACES AND FALL PROTECTION" PROGRAM (PAGE 24-1 OF THE SAFETY & INDUSTRIAL HYGIENE MANUAL)

APPENDIX A

SITE SAFETY PLAN AMENDMENTS

HEALTH & SAFETY PLAN
AMENDMENT RECORD

Project Name:	**Church Street, Burlington MGP**
Project No.:	
Project Manager:	**Ralph Roberts**
Site Engineer/Scientist:	**Mark McGary**

AMENDMENT NO.	DATE	DESCRIPTION

NOTE: SEE SAFETY PLAN AMENDMENTS (APPENDIX A) FOR COMPLETE DESCRIPTION.

APPENDIX B

SITE SAFETY PLAN ACKNOWLEDGMENT FORM

SITE SAFETY PLAN
ACKNOWLEDGMENT FORM

I have been informed and understand and will abide by all the procedures and protocols set forth in the Site Health & Safety Plan for the E. Friendly - Greensboro, MGP site.

NAME (PRINT)	SIGNATURE	AFFILIATION	DATE

APPENDIX C

HEAT STRESS

HEAT STRESS AND OTHER PHYSIOLOGICAL FACTORS

Wearing PPE put a hazardous waste worker at considerable risk of developing heat stress. This can result in health effects ranging from transient heat, fatigue to serious illness or death. Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and the individual characteristic of the worker. Because heat stress is probably one of the most common (and potentially serious) illness at hazardous wastes sites, regular monitoring and other preventative precautions are vital.

Individuals vary in their susceptibility to heat stress. Factors that may predispose someone to heat stress include:

- Lack of physical fitness
- Lack of acclimatization
- Age
- Dehydration
- Obesity
- Alcohol and drug use
- Infection
- Sunburn
- Diarrhea
- Chronic disease

Reduced work tolerance and the increased risk of excessive heat stress is directly influenced by the amount and type of PPE worn. PPE adds weight and bulk, severely reduces the body's access to normal heat exchange mechanisms (evaporation, convection, and radiation), and increases energy expenditure. Therefore, when selecting PPE, each item's benefit should be carefully evaluated in relation to its potential for increase the risk of heat stress. Once PPE is selected, the safe duration of work/rest periods should be determined based on the following:

- Anticipated work rate
- Ambient temperature and other environmental factors
- Type of protective ensemble
- Individual worker characteristics and fitness

Monitoring

Because the incidence of heat stress depends on a variety of actors, all workers, even those not wearing protective equipment, should be monitored.

- For workers wearing permeable clothing (e.g., standard cotton or synthetic work clothes), follow recommendations for monitoring requirements and suggested work/rest schedules in the current American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values for Heat Stress [4]. If the actual work clothing differs from the ACGIH standard ensemble in insulation value and/or wind and vapor permeability, change the monitoring requirements and work/rest schedules accordingly [5].

- For workers wearing semipermeable or impermeable[1] encapsulating ensembles, the ACGIH standard cannot be used. For these situations, workers should be monitored when temperature in the work area is above 70°F (21°C) [2].

To monitor the worker, measure the following:

- Heart rate. Count the radial pulse during a 30 second period as early as possible in the rest period.

  If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.

  If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following work cycle by one-third [5].

- Oral temperature. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).

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[1] Although no protective ensembles is "completely" impermeable, for practical purposes an outfit may be considered impermeable when calculating heat stress risk.

If oral temperature exceed 99.6°F (37.7°C) at the beginning of the next rest period, shorten the following work cycle by one-third [5].

Do not permit a worker to wear a semipermeable or impermeable garment when his/her oral temperature exceeds 100.6°F (38.1°C [5].

- Body water loss, if possible. Measure weight on a scale accurate to + 0.25 lb. at the beginning and end of each work day to see if enough fluids are being taken to prevent dehydration. Weights should be taken while the employee wears similar clothing. The body water loss should not exceed 1.5 percent total body weight loss in a work day [12].

Initially, the frequency of physiological monitoring depends on the air temperature adjusted for solar radiation and the level of physical work (see Table 1). The length of the work cycle will be governed by the frequency of the required physiological monitoring.

Table 1
Suggested Frequency of Physiological Monitoring for Fit & Acclimatized Workers[2]

Adjusted Temp.[3]	Normal Work Ensemble[4]	Impermeable Ensemble
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5° -87.5°F(30.8°-32.2°C)	After each 60 minutes of work	After each 30 minutes of work
87.5° -87.5°F(28.1°-30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5°-82.5°F(25.3°-28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5°-77.5°F(22.5°-25.3°C)	After each 150 minutes of work	After each 120 minutes of work

Prevention

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat stroke or heat exhaustion, the person may be predisposed to additional heat injuries. To avoid heat stress, management should take the following steps.

- Adjust work schedules:

  Modify work/rest schedules according to monitoring requirements.
  Mandate work slowdowns as needed.
  Rotate personnel: alternate job functions to minimize overstress or overexertion at one task.
  Add additional personnel to work team.
  Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.

- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.

- Maintain workers' body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drank to replace lost water [7]. When heavy seating occurs, encourage the worker to drink more. The following strategies may be useful:

  Maintain water temperature at 50° to 60°F (10° to 15.6°C.
  Provide small disposable cups that hold about 4 ounces (0.1 liter).
  Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.

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[2] For work levels of 250 Kilocalories/hour.

[3] Calculate the adjusted air temperature (ta adj) using this equation: ta adj = ta° = (13 x % sunshine). Measure air temp. (ta) with a standard thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distant shadow, 0 percent sunshine = no shadows).

[4] A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

Urge workers to drink a cup or two every 15 - 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.
Weight workers before and after work to determine if fluid replacement is adequate.

- Provide cooling devices to aid natural body heat exchange during prolonged work or severe heat exposure. Cooling devices include:

  Field showers or hose-down areas to reduce body temperature and/or to cool off protective clothing.
  Cooling jackets, vest, or suits.

- Train workers to recognize and treat heat stress. As part of training, identify the signs and symptoms of heat stress.

Other Factors

PPE decreases worker performance as compared to an unequipped individual. The magnitude of this effect varies considerable, depending on both the individual and the PPE ensemble used. This section discusses the demonstrated physiological responses to PPE, the individual human traits that play a factor in these responses, and some of the precautionary and training measures that need to be taken to avoid PPE-induced injury.

The physiological factors may affect worker ability to function using PPE include:

- Physical condition
- Level of acclimatization
- Age
- Gender
- Weight

Physical Condition: Physical fitness is a major factor influencing a person's ability to perform work under heat stress. The more fit someone is, the more work they can safety perform. At a given level of work, a fit person, relative to an unfit person, will have (1,3,8,9):

- Less physiological strain
- A lower heart rate
- A lower body temperature, which indicates less retained body heat (a rise in internal temperature precipitates heat injury)
- A more efficient sweating mechanism
- Slightly lower oxygen consumption
- Slightly lower carbon dioxide production

Level of Acclimatization: The degree to which a worker's body has physiologically adjusted or acclimatized to working under hot conditions affects his or her ability to do work. Acclimatized individuals generally have lower heart rates and body temperatures than unacclimatized individuals (10), and sweat sooner and more profusely. This enables them to maintain lower skin and body temperatures at a given level of environmental heat and work loads than unacclimatized workers (11). Sweat composition also becomes more dilute with acclimatization, which reduces salt loss (3).

Acclimatization can occur after just a few days of exposure to a hot environment (8,9). NIOSH recommends a progressive 6-day acclimatization period for the unacclimatized worker before allowing him/her to do full work on a hot job. Under this regimen, the first day of work on site is begun using only 50 percent of the anticipated workload and exposure time, and 10 period may be shortened 2 or 3 days. However, workers can lose acclimatization in a matter of days, and work regimens should be adjusted to account for this.

When enclosed in an impermeable suit, fit acclimatized individuals sweat more profusely than unfit or unacclimatized individuals and may therefore actually face a greater danger of heat exhaustion due to rapid dehydration. This can be prevented by consuming adequate quantities of water. See previous section of *Prevention* for additional information.

Age: Generally, maximum work capacity declines with increasing age, but this is not always the case. Active, well-conditioned seniors often have performance capabilities equal to or greater than young sedentary individuals. However, there is some evident, indicated by lower sweat rate and higher body core temperatures, that older individuals are less effective in compensating for a given level of environmental heat and work loads (12). At moderate thermal loads, however, the physiological responses of "young" and "old" are similar and performance is not affected (12).

Age should not be the sole criterion for judging whether or not an individual should be subjected to moderate heat stress. Fitness level is a more important factor.

Gender: The literature indicates that females tolerate heat stress at least as well as their male counterparts (13). Generally, a female's work capacity averages 10 to 30 percent less than that of a male (3). The primary reasons for this are the greater oxygen-carrying capacity and the stronger heart in the male (8). However, a similar situation exists as with aging: not all males have greater work capacities than all females.

Weight: The ability of a body to dissipate heat depends on the ratio of its surface area to its mass (surface area/weight). Heat loss (dissipation) is a function of surface area and heat production is dependent on mass. Therefore, heat balance is described by the ratio of the two.

Since overweight individuals (those with a low ratio) produce more heat per units of surface area than thin individuals (those with a high ratio), overweight individuals should be given special consideration in heat stress situations. However, when wearing impermeable clothing, the weight of an individual is not a critical factor in determining the ability to dissipate excess heat.

Signs and Symptoms of Heat Stress

- Heat rash may result from continuous exposure to heat or humid air.
- Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include:
  - muscle spasms
  - pain in the hands, feet and abdomen
- Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:
  - pale, cool, moist skin
  - heavy sweating
  - dizziness
  - nausea
  - fainting
- Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical health must be obtained. Signs and symptoms are:
  - red, hot, usually dry skin
  - lack of or reduced perspiration
  - nausea
  - dizziness and confusion
  - strong, rapid pulse
  - coma

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APPENDIX D

MSDS's

Inorganic Ventures, Inc.
1555 Route 37 West, Suite 9
Toms River, N.J. 08753
(201) 240-6700
Telex 9102400855

18244 IN

MATERIAL SAFETY DATA SHEET

EMERGENCY TELEPHONE #'S

Inorganic Ventures: (201) 240-6700 Chemtrec: (800) 424-9300 National Response Center: (800) 424-8802

Issue Date: 03-01-88 Effective Date: 03-01-88

SECTION II- PRODUCT IDENTIFICATION/ HAZARDOUS INGREDIENTS

Product Name: Chromium 1000 ug/ml (0.1% w/v) 10,000 ug/ml (1.0% w/v) Formula: Cr in dilute HNO_3 Form. Wt.: 52.00

Cas #: 00000-00-0 NIOSH/RTECS #: N/A

Common Names: N/A

Component: Ammonium Dichromate 0-1% Nitric Acid 0-5% CAS NO. 7789-09-5 7697-37-2 TLV/TWA: 0.5 mg/m^3 (ppm)

STEL: suspected carcinogen PEL: 0.5 mg/m^3 (ppm) Toxicity: LD_{50} (oral-rat) 1870 mg/kg

SECTION III- PHYSICAL/CHEMICAL CHARACTERISTICS

B.P. 100°C (212°F) Vapor Pressure (mmHg): N/A Vapor Density (air=1): N/A

M.P. : N/A Sp.G (H_2O =1): 1 SOL./H_2O: complete

APPEARANCE/ODOR: Pale yellow, clear solution with no odor.

SECTION IV- FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A NFPA- Rating: N/A Extinguishing Media: Use appropriate

Special Fire-Fighting Procedures: Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece in positive pressure mode.

Unusual Fires Explosion Hazards: N/A

Toxic Gases Produced: Nitrogen Oxides

SECTION V- REACTING DATA

Unstable ( ): Conditions to Avoid: N/A
Stable (X):

Incompatibles: Organic materials, strong reducing agents

Hazardous Decomposition: Oxides of Nitrogen

SECTION VI- HEALTH HAZARD DATA

Routes of Entry: Inhalation, ingestion, eye contact, skin contact.

Signs and Symptoms of Exposure: Burns, irritation, coughing, difficult breathing.

Medical Conditions Generally Aggravated by Exposure: Liquid may cause burns to skin and eyes. Vapors may be irritating to eyes, nose and throat. Inhalation of vapors may cause coughing and difficult breathing. Carcinogen of lungs, stomach and larynx.

Carcinogenicity: NTP: Yes IARC: Yes Z LIST: Yes OSHA: Yes

Emergency First Aid Procedures: If swallowed, do NOT induce vomiting, if conscious give water, milk or milk of magnesia. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before re-use.

SECTION VII- PRECAUTIONS FOR SAFE HANDLING AND USE

Special Precautions: Keep container tightly closed. Store in corrosion proof area.

In Case of Spill or Discharge: Wear self-contained breathing apparatus and full protective clothing. Stop leak of you can do so without risk. Use water spray to reduce vapors. Take up with sand or other non-combustible absorbent material and place into container for later disposal. Flush spill area with water.

Disposal Procedures: Dispose in accordance with all applicable federal, state, and local environmental regulations

EPA Hazardous Waste #: D002 (Corrosive Waste)

SECTION VIII- PROTECTIVE EQUIPMENT

Respiratory Protection: NIOSH approved respirator

Ventilation: Local Exhaust (X) Mechanical ( )

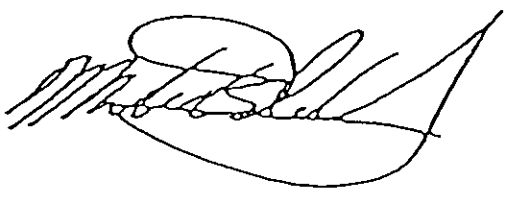
Protective Gloves: Proper gloves

Eye Protection: Safety glasses with side shields.

Other: Lab coat/apron; vent hood

NOTICE

The above information is believed to be accurate and represents the best information currently available to us. It has been compiled from the data presented in various technical publications and our experience. It is the user's responsibility to determine the suitability of this information for their particular purposes. We assume that only qualified individuals, trained and familiar with procedures suitable to this product will handle this material.



(2281)

Charter International Oil Company

P. O. Box 5008. Houston, Texas 77012 • 713 / 923-3300

MATERIAL SAFETY DATA SHEET

SECTION I

MANUFACTURER'S NAME: Charter Chemicals / Charter International Oil Company	EMERGENCY TELEPHONE NO.: Charter AC 713 / 923-6641
ADDRESS (Number, Street, City, State, and ZIP Code): P. O. Box 5008 Houston, Texas 77012	Chemtrec AC 800/ 424-9300
CHEMICAL NAME AND SYNONYMS: Xylenes, Xylols CAS # 1330-20-7	TRADE NAME AND SYNONYMS: Xylene
CHEMICAL FAMILY: Aromatic Hydrocarbons	FORMULA: $C_6H_4(CH_3)_2$

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS	100	100	FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES		ppm	OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)

SECTION III - PHYSICAL DATA

BOILING POINT (°F.) ATSM: 0-850	279/291	SPECIFIC GRAVITY (H_2O=1) @60/60°F	0.866
VAPOR PRESSURE (mm Hg.) @60°F/100°F	5/18	PERCENT, VOLATILE BY VOLUME (%)	100%
VAPOR DENSITY (AIR=1)	3.665	EVAPORATION RATE (n-BuAc = 1)	0.61
SOLUBILITY IN WATER	Neglible		
APPEARANCE AND ODOR	White Water Liquid - typical aromatic hydrocarbon		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) Tag Closed Cup 80 °F	FLAMMABLE LIMITS	Lel 1.0	Uel 6.0

EXTINGUISHING MEDIA
(1) Mechanical Foam (2) Dry Chemical (3) Water Fog (4) CO_2

SPECIAL FIRE FIGHTING PROCEDURES
A straight water stream would spread hydrocarbon fires. Avoid breathing vapors.

Use fresh air respirators.

UNUSUAL FIRE AND EXPLOSION HAZARDS
A vapor accumulation would flash and/or explode if ignited.

Flammable liquid

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
100 ppm

EFFECTS OF OVEREXPOSURE
to vapors might damage central nervous system and cause respiratory irritation, muscular weakness, confusion, impaired coordination, headache and nausea. (Liver and kidney damage)

EMERGENCY AND FIRST AID PROCEDURES
SKIN CONTACT: Wash immediately with soap and water. EYE CONTACT: Wash immediately with plenty of water for 15 minutes. INHALATION: Remove from exposure. Provide fresh air and rest. Use artificial respiration if needed. INGESTION: Do not induce vomiting. Call a physician immediately.

SECTION VI - REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		Avoid heat, sparks, flame and
	STABLE	X	other sources of ignition.

INCOMPATABILITY (Materials to avoid)
Avoid strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS
Carbon monoxide if burned with insufficient air.

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
~~Avoid breathing vapors. Provide adequate ventilation. In case of spillage, absorb~~ Remove all possible ignition sources and dispose of in accordance with local applicable regulations. Call emergency number if spillage poses threat to man or environment.

WASTE DISPOSAL METHOD
Dispose in accordance with local, state and federal regulations. Use qualified disposal company to incinerate, or otherwise discard, at an approved facility. Do not incinerate closed containers.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)
If TLV is exceeded, use self-contained breathing apparatus.

VENTILATION		
	LOCAL EXHAUST: To a danger safe area.	SPECIAL: Use only with adequate ventilation.*
	MECHANICAL (General): Use explosion-proof equipment.	OTHER: Avoid potential ignition sources.

PROTECTIVE GLOVES
Use chemical resistant.

EYE PROTECTION
Use safety goggles.

OTHER PROTECTIVE EQUIPMENT
As required to avoid skin contact or breathing vapors.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
Keep closures tight and upright to prevent leakage. Keep closed when not in use. Do not transfer to unmarked container. Read all warning labels. Store in cool, well ventilated area. Ground containers when filling or emptying.

OTHER PRECAUTIONS

*Adequate means equivalent to outdoors ventilation

20132
INV.

MATERIAL SAFETY DATA SHEET

Johnson Matthey
Alfa Aesar
30 Bond Street
Ward Hill, MA 01835-0747
Emergency Phone-(508) 521-6300
CHEMTREC-(800) 424-9300

SECTION 1-IDENTIFICATION

Product Code: 14668 Revision Date: 7/6/94
Product Name: Arsenic (V) oxide
Synonyms: Arsenic acid, arsenic anhydride, arsenic pentoxide, diarsenic pentoxide, arsenic oxide
Chemical Family: Inorganic arsenic compound
CAS#: 1303-28-2
Molecular Formula: As_2O_5

SECTION 2-INGREDIENTS

Chemical: Arsenic (V) oxide

CAS#	%		
1303-28-2	100	PEL	0.01mg As/m³
		TLV	0.01mg As/m³

SECTION 3- PHYSICAL DATA

Boiling Point: Decomposes
% Volatiles: 0
Solubility in Water : soluble
Specific Gravity (H_2O=1): 4.32
Freezing/Melting Point: Decomposes @ 800°C
Evaporation Rate (butyl acetate=1): 0
Vapor Density (air=1): Not applicable
Vapor Pressure : Essentially 0
Appearance and Odor: White powder, odorless
Other: No data

SECTION 4-FIRE AND EXPLOSION HAZARD DATA

Flash Point:(°F) Not applicable
Flammable Limits in Air, % by volume: Lower Not applicable
Upper Not applicable
Autoignition Temperature: No data
Extinguishing Media: Use water, carbon dioxide, dry chemical extinguishing agents, dry sand, or dry ground dolomite.
Special Fire Fighting Procedures: No special firefighting procedures needed. Use normal procedures which include wearing NIOSH-MSHA approved self-contained breathing apparatus, flame and chemical resistant clothing: boots and gloves. If without risk

remove material from fire area. Cool container with water from maximu
distance.

****

SECTION 5-HEALTH DATA

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OSHA (PEL): 0.01mg/m³ as As
ACGIH (TLV): 0.01mg/m³ as As

A. ANIMAL TOXICITY

LD_{50}: Oral-rat: 8 mg/kg;
Oral-mouse: 55 mg/kg
LC_{50}: No data
Other: No data

B. EFFECTS OF EXPOSURE

ACUTE EFFECTS

Ingestion: Highly toxic. May cause burning in esophagus, vomiting and bloody diarrhea. Symptoms of cold and clammy skin, low blood pressure, weakness, headache, cramps, convulsions and coma may follow. Death may occur form circulatory failure.
Skin Contact: May cause irritation, with redness and pain
Eye Contact: May cause irritation and conjunctiva damage
Inhalation: May cause inflammation of mucous membranes with cough and foamy sputum, restlessness, dyspnea, cyanosis and rales. Symptoms like those from ingestion exposure may follow. May cause pulmonary edema.
Medical Conditions, if any, Aggravated by the Chemical: None known
Other Health Hazards: None known
Most Likely Routes of Entry: Ingestion

CHRONIC EFFECTS

Ingestion: Hair and weight loss, central nervous system damage, hepatitis and cardiovascular, kidney and liver damage
Skin Contact: Repeated or prolonged contact may cuase bronzing, edema, dermatitis, lesions and skin cancer
Eye Contact: None known
Inhalation: Lung cancer, damage to nasal septum and same effects as chronic ingestion
Other: Inorganic arsenic compounds are considered carcinogenic by OSHA, NTP, IARC

C. EMERGENCY AND FIRST AID PROCEDURES

Ingestion: If swallowed induce vomiting immediately by giving two glasses of water and sticking fingers down throat. Never give anythi by mouth to an unconscious person. Call a physician immediately.
Skin Contact: Remove contaminated clothing. Flood skin with large amounts of water. If irritation persists seek medical attention.
Eye Contact: Immediately flush eyes, including under eyelids, with large amounts of water for at least 15 minutes. Call a physician.
Inhalation: No specific information available, one should obtain medical attention.

SECTION 6-REACTIVITY

Incompatibility: Rb_2Cl_2, acids, Zn, Al and water solutions of active metals
Hazardous Decomposition Products: Produces highly toxic arsenic containing fumes upon decomposition
Conditions to Avoid: Incompatibles, thermal decomposition
Stability: Stable
Hazardous Polymerization: Will not occur
Other: None

SECTION 7-ENVIRONMENTAL INFORMATION

RCRA Code: P012
TSCA Registered: Yes
Spill and Leak Procedures: Wearing full protective equipment, cover spill with dry sand or vermiculite. Mix well and carefully transfer to a container.
Waste Disposal: Consult state, local or federal EPA regulations for proper disposal.

SECTION 8-PROTECTION INFORMATION

Ventilation Requirements: Laboratory fume hood. See section 11
Respiratory Protection: High efficiency particle respirator. See section 11
Protective Gloves: Rubber
Eye/Face Protection: ANSI approved safety goggles and/or face shield.

SECTION 9-SPECIAL PRECAUTIONS

Handling and Storage: Keep container tightly closed. Store in a cool, dry, well-ventilated area. Wash thoroughly after use.
Other Precautions: Lab coat and apron, flame and chemical resistant coveralls, eyewash capable of sustained flushing, safety drench shower and hygienic facilities for washing.

SECTION 10-TRANSPORTATION INFORMATION-U.S. D.O.T.

Per 49 CFR 172.101 (HM181)
Name and Description: Arsenic pentoxide
Hazard Class: 6.1
Packing Group: II
Identification Number: UN1559
Labels Required: Poison, 49CFR 172.4
ERG#: 54

SECTION 11-COMMENTS

DANGER: Poison, causes skin and lung cancer
Refer to 29 CFR 1910.1018 for regulations concerning inorganic arsenic compounds.

Warning: This product contains a chemical known to the State of California to cause cancer.

This product contains an arsenic compound which is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and 40CFR 372.

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

MATERIAL SAFETY DATA SHEET

04/29/97
LAST REVISED: January 25, 1995

SECTION I PRODUCT SPECIFICATIONS

AT NO. F38 CAS NO. 100-41-4
thylbenzene
THER NAME: Phenylethane

upplied by CHEM SERVICE, Inc. PO BOX 3108, WEST CHESTER, PA. 19381 (610)692-3026
MERGENCY PHONE: 610-692-3026

SECTION II TOXICITY DATA

ORAL RAT OR MOUSE LD50	RTECS#	OSHA PEL (TWA)	ACGIH TLV (TWA)
3500mg/kg	DA0700000	100 ppm (435 mg/m3)	100ppm (434mg/m3)

his compound is considered to be slightly toxic.
his statement is based upon OSHA's assessment of the LD50

SECTION III PHYSICAL DATA

MELTING POINT	BOILING POINT	DENSITY	VAPOR PRESSURE	VAPOR DENSITY
-95 C	136.25 C	0.866	7.0mm @20 C	NOT AVAILABLE

ODOR	COLOR	PHASE
Aromatic	Colorless	Liquid

VAPORATION RATE	SOLUBILITY IN WATER
utyl acetate=1	
OT AVAILABLE	Insoluble (immiscible)

FPA Hazard Rating:

Health	Flammability	Reactivity
2	3	0

) - Least, 1 - Slight, 2 - Moderate, 3 - High, 4 - Severe

SECTION IV FIRE AND EXPLOSION HAZARD DATA

LASH POINT: 18 C This is a flammable chemical.

EXTINGUISHING MEDIA: Carbon dioxide or dry chemical powder. DO NOT USE WATER!
UPPER EXPLOSION LIMIT: 6.7% LOWER EXPLOSION LIMIT: 0.8%

SECTION V HEALTH HAZARD DATA

Contact lenses should not be worn in the laboratory.
All chemicals should be considered hazardous - Avoid direct physical contact!
Can cause skin irritation. Can cause eye irritation.
May be harmful if absorbed through the skin. May be harmful if inhaled.
May be harmful if swallowed. Can be irritating to mucous membranes.
Prolonged exposure may cause nausea/headache/dizziness and/or eye damage.
Can cause nervous system injury. Dust and/or vapors can cause irritation to respiratory tract.

SECTION VI FIRST AID

An antidote is a substance intended to counteract the effect of a poison. It should be administered only by a physician or trained emergency personnel. Medical advice can be obtained from a POISON CONTROL CENTER.

In case of contact: Flush eyes continuously with water for 15-20 minutes. Flush skin with water for 15-20 minutes. If no burns have occurred-use soap and water to cleanse skin.
If inhaled remove patient to fresh air. Administer oxygen if patient is having difficulty breathing. If patient has stopped breathing administer artificial respirations.
If patient is in cardiac arrest administer CPR.
Continue life supporting measures until medical assistance has arrived.
Remove and wash contaminated clothing.
If patient is exhibiting signs of shock - Keep warm and quiet.
Contact Poison Control Center immediately if necessary.
Do not administer liquids or induce vomiting to an unconscious or convulsing person.
If patient is vomiting-watch closely to make sure airway does not become obstructed by vomit.
Get medical attention if necessary.

SECTION VII REACTIVITY DATA

Flammable. Incompatible with strong oxidizing agents. Emits toxic fumes under fire conditions.

SECTION VIII SPILL OR LEAK PROCEDURES

Spills or leaks: Evacuate area. Wear appropriate OSHA regulated equipment. Ventilate area.
Absorb on vermiculite or similar material. Sweep up and place in an appropriate container.
Hold for disposal. Wash contaminated surfaces to remove any residues.
DISPOSAL: Burn in a chemicals incinerator equipped with an afterburner and scrubber.

SECTION IX PRECAUTIONS TO BE TAKEN IN HANDLING

This chemical should be handled only in a hood. Eye shields should be worn. Use appropriate OSHA/MSHA approved safety equipment. Avoid contact with skin, eyes and clothing. Do not breathe vapors. Keep tightly closed.
Store in a cool dry place. Store only with compatible chemicals.

SECTION X SPECIAL PRECAUTIONS AND COMMENTS

The above information is believed to be correct on the date it is published and must not be considered all inclusive. The information has been obtained only by a search of available literature and is only a guide for handling the chemicals. OSHA

ner hazards become evident, an upgraded MSDS must be made avalible to the employee within three months. Responsibility for updates lies with the employer and not with CHEM SERVICE, Inc. Persons not specifically and properly trained should not handle this chemical or its container. This MSDS is provided without any warranty expressed or implied, including merchantability or fitness for any particular purpose.

This product is furnished FOR LABORATORY USE ONLY! Our products may NOT BE USED as drugs, cosmetics, agricultural or pesticidal products, food additives or as household chemicals.

Please Note - This MSDS is a courtesy MSDS. No order accompanied this MSDS.

2809

xxLEADxx
xxLEADxx
xxLEADxx

MATERIAL SAFETY DATA SHEET

ISHER SCIENTIFIC
HEMICAL DIVISION
REAGENT LANE
AIR LAWN NJ 07410
201) 796-7100

EMERGENCY CONTACTS
GASTON L. PILLORI
(201) 796-7100

DATE 06/12/87
PO NBR: N/A
ACCT: 218820-01
INDEX: N/A
CAT NO: L246

HE INFORMATION BELOW IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST NFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, WE MAKE NO WARRANTY OF ERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO UCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS HOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE NFORMATION FOR THEIR PARTICULAR PURPOSES.

JUN 2 2 1987

SUBSTANCE IDENTIFICATION

CAS-NUMBER 7439-92-1

JBSTANCE: xxLEADxx

RADE NAMES/SYNONYMS:
WHITE LEAD; C.I. PIGMENT METAL 4; C.I. 77575; LEAD FLAKE; KS-4; LEAD S2; SI; SO; PLUMBUM; S1; L-18; L-24; L-29; L-27; T-134; ACC12510

EMICAL FAMILY:
ETAL

OLECULAR FORMULA: PB MOL WT: 207.19

RCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=2 PERSISTENCE=3

COMPONENTS AND CONTAMINANTS

MPONENT: LEAD PERCENT: 99.8

HER CONTAMINANTS: BISMUTH, COPPER, ARSENIC, ANTIMONY, TIN, IRON, LVER, ZINC

POSURE LIMITS:
05 MG(PB)/M3 OSHA TWA;
10 MG(PB)/M3 NIOSH RECOMMENDED CEILING
15 MG(PB)/M3 ACGIH TWA; 0.45 MG(PB)/M3 ACGIH STEL (NOTICE OF INTENDED CHANGE 84-1985)

PHYSICAL DATA

SCRIPTION: BLUISH-WHITE, SILVERY GRAY METAL

ILING POINT: 3164 F (1740 C) MELTING POINT: 622 F (328 C)

PECIFIC GRAVITY: 11.3 VAPOR PRESSURE: 1.3 MM @ 970 C

OLUBILITY IN [redacted]ER: INSOLUBLE

OLVENT SOLUBILITY: HNO3, HOT CONC H2SO4

FIRE AND EXPLOSION DATA

RE AND EXPLOSION HAZARD:
)DERATE HAZARD IN DUST FORM WHEN EXPOSED TO HEAT OR FLAME.

.ASH POINT: NON-FLAMMABLE

REFIGHTING MEDIA:
:Y CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR FOAM
984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

R LARGER FIRES, USE WATER SPRAY, FOG OR ALCOHOL FOAM
984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

REFIGHTING:
VE CONTAINERS FROM FIRE AREA IF POSSIBLE (1984 EMERGENCY RESPONSE GUIDEBOOK,
T P 5800.3, GUIDE PAGE 53).

TINGUISH USING AGENT INDICATED. USE FLOODING AMOUNTS OF WATER AS A FOG.
OID BREATHING DUSTS AND FUMES FROM BURNING MATERIAL; KEEP UPWIND.
UREAU OF EXPLOSIVE, EMERGENCY HANDLING OF HAZARDOUS MATERIALS IN SURFACE
ANSPORTATION, 1981).

TOXICITY

0 MG/KG/6 YEAR ORAL-WOMAN TDLO; 1000 MG/KG INTRAPERITONEAL-RAT LDLO;
0 MG/KG ORAL-PIGEON LDLO; MUTAGENIC DATA (RTEC); CARCINOGEN STATUS: NONE.
LEAD IS A CUMULATIVE NEUROTOXIN. POISONING AFFECTS THE CENTRAL NERVOUS
STEM, GASTROINTESTINAL TRACT, BLOOD AND KIDNEYS.

HEALTH EFFECTS AND FIRST AID

HALATION:
UROTOXIN/NEPHROTOXIN/TERATOGEN.
ACUTE EXPOSURE- INHALATION AND SUBSEQUENT ABSORPTION OF LARGE AMOUNTS OF LEAD MAY CAUSE THIRST, A METALLIC TASTE, A BURNING SENSATION IN THE MOUTH AND THROAT, EXCESSIVE SALIVATION, ABDOMINAL PAIN WITH SEVERE COLIC, VOMITING, DIARRHEA OF BLACK OR BLOODY STOOLS, CONSTIPATION, FATIGUE, SLEEP DISTURBANCES, DULLNESS, RESTLESSNESS, IRRITABILITY, MEMORY LOSS, LOSS OF CONCENTRATION, DELIRIUM, OLIGURIA OFTEN WITH HEMATURIA AND ALBUMINURIA, ENCEPHALOPATHY WITH VISUAL FAILURE, PARESTHESIAS, MUSCLE PAIN AND WEAKNESS, CONVULSIONS, AND PARALYSIS. DEATH MAY RESULT FROM CARDIORESPIRATORY ARREST, COMA, OR DEHYDRATION FROM FLUID LOSS AND SHOCK WHICH MAY BE DELAYED FOR 1-2 DAYS. SURVIVAL FROM ACUTE EXPOSURE MAY RESULT IN THE ONSET OF CHRONIC INTOXICATION. LIVER DAMAGE MAY INCLUDE ENLARGEMENT AND TENDERNESS, ICTERUS, AND JAUNDICE. THE APPROXIMATE FATAL DOSE OF ABSORBED LEAD IS APPROXIMATELY 0.5 GRAMS. PATHOLOGIC FINDINGS FROM ACUTE POISONING INCLUDE GASTROINTESTINAL INFLAMMATION AND RENAL TUBULAR DEGENERATION.

CHRONIC EXPOSURE- PROLONGED OR REPEATED EXPOSURE TO LOW LEVELS OF LEAD MAY RESULT IN ACCUMULATION IN BODY TISSUES AND EXERT ADVERSE EFFECTS ON THE BLOOD, NERVOUS SYSTEMS, HEART, ENDOCRINE AND IMMUNE SYSTEMS, KIDNEYS, AND REPRODUCTION. EARLY STAGES OF LEAD POISONING, "PLUMBISM", MAY BE EVIDENCED BY ANOREXIA, WEIGHT LOSS, CONSTIPATION, APATHY OR IRRITABILITY, OCCASIONAL VOMITING, FATIGUE, HEADACHE, WEAKNESS, METALLIC TASTE IN THE MOUTH, GINGIVAL LEAD LINE IN PERSONS WITH POOR DENTAL HYGIENE, AND ANEMIA. LOSS OF RECENTLY DEVELOPED MOTOR SKILLS IS GENERALLY OBSERVED ONLY IN CHILDREN. MORE ADVANCED STAGES OF POISONING MAY BE CHARACTERIZED BY INTERMITTENT VOMITING, IRRITABILITY AND NERVOUSNESS, MYALGIA OF THE ARMS, LEGS, JOINTS AND ABDOMEN, PARALYSIS OF THE EXTENSOR MUSCLES OF THE ARMS AND LEGS WITH WRIST AND/OR FOOT DROP. DISTURBANCES OF MENSTRUAL CYCLES AND SPONTANEOUS ABORTIONS MAY OCCUR IN WOMEN. SEVERE "PLUMBISM" MAY RESULT IN PERSISTENT VOMITING, ATAXIA, PERIODS OF STUPOR OR LETHARGY, ENCEPHALOPATHY WITH VISUAL DISTURBANCES WHICH MAY PROGRESS TO OPTIC NEURITIS AND ATROPHY, HYPERTENSION, PAPILLEDEMA, CRANIAL NERVE PARALYSIS, DELIRIUM, CONVULSIONS, AND COMA. NEUROLOGIC SEQUELAE MAY INCLUDE MENTAL RETARDATION, SEIZURES, CEREBRAL PALSY, AND DYSTONIA MUSCULORUM DEFORMANS. IRREVERSIBLE KIDNEY DAMAGE HAS BEEN ASSOCIATED WITH INDUSTRIAL EXPOSURE. REPRODUCTIVE EFFECTS HAVE BEEN EXHIBITED IN BOTH MALES AND FEMALES. PATERNAL EFFECTS MAY INCLUDE DECREASED SEX DRIVE, IMPOTENCE, STERILITY AND ADVERSE EFFECTS ON THE SPERM WHICH MAY INCREASE THE RISK OF BIRTH DEFECTS. MATERNAL EFFECTS MAY INCLUDE MISCARRIAGE AND STILLBIRTHS IN EXPOSED WOMEN OR WOMEN WHOSE HUSBANDS WERE EXPOSED, ABORTION, STERILITY OR DECREASED FERTILITY, AND ABNORMAL MENSTRUAL CYCLES. LEAD CROSSES THE PLACENTA AND MAY AFFECT THE FETUS CAUSING BIRTH DEFECTS, MENTAL RETARDATION, BEHAVIORAL DISORDERS, AND DEATH DURING THE FIRST YEAR OF CHILDHOOD. ANIMAL STUDIES INDICATE THAT REPRODUCTIVE EFFECTS MAY BE ADDITIVE IF BOTH PARENTS ARE EXPOSED TO LEAD.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND AT REST. GET MEDICAL ATTENTION. (DREISBACH, HANDBOOK OF POISONING, 11TH ED.)

SKIN CONTACT:

ACUTE EXPOSURE- CONTACT WITH LEAD POWDERS OR DUST MAY BE IRRITATING. LEAD IS NOT ABSORBED THROUGH THE SKIN, BUT MAY BE TRANSFERRED TO THE MOUTH INADVERTENTLY BY CIGARETTES, CHEWING TOBACCO, FOOD, OR MAKE-UP.

CHRONIC EXPOSURE- PROLONGED OR REPEATED EXPOSURE TO THE POWDER OR DUST MAY RESULT IN DERMATITIS. SYSTEMIC TOXICITY MAY DEVELOP IF LEAD IS TRANFERRED TO THE MOUTH BY CIGARETTES, CHEWING TOBACCO, FOOD, OR MAKE-UP.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMDEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER (APPROXIMATELY 15-20 MINUTES) UNTIL NO EVIDENCE OF CHEMICAL REMAINS.

EYE CONTACT:

ACUTE EXPOSURE- LEAD DUST OR POWDERS MAY BE IRRITATING. METALLIC LEAD PARTICLES MAY CAUSE AN INFLAMMATORY FOREIGN BODY REACTION AND INJURY IS GENERALLY THOUGHT TO BE MECHANICAL AND NOT TOXIC.

CHRONIC EXPOSURE- PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY

LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION.

INGESTION:
NEUROTOXIN.
ACUTE EXPOSURE- INGESTION OF LEAD MAY PRODUCE HEADACHE, NAUSEA, VOMITING, CONSTIPATION, ABDOMINAL SPASMS, METALLIC TASTE IN MOUTH, BLACK STOOLS, EXCESSIVE URINATION, HYPOTENSION, COLLAPSE AND COMA.

FIRST AID- DO NOT INDUCE VOMITING. GET IMMEDIATE MEDICAL ATTENTION.

REACTIVITY

REACTIVITY:
REACTS WITH STRONG OXIDIZERS, HYDROGEN PEROXIDE, CHLORINE TRIFLUORIDE AND ACTIVE METALS. THE FINELY DIVIDED LEAD PRODUCED BY REDUCTION OF OXIDE WITH FURFURAL VAPOR AT 290 C IS PYROPHORIC AND CHEMICALLY REACTIVE, THIS IS ASCRIBED TO OXIDE FORMATION ON EXPOSURE TO AIR. UPON SOLDERING, MELTING AND LEAD COATING LEAD FUME IS FORMED WHICH CAN BE INHALED.

INCOMPATIBILITIES:
LEAD:
AMMONIUM NITRATE: EXPLOSIVE REACTION.
CHLORINE TRIFLUORIDE: VIOLENT REACTION.
DISODIUM ACETYLIDE: TRITURATION IN MORTAR MAY BE VIOLENT AND LIBERATE CARBON.
HYDROGEN PEROXIDE, 60% TRIOXANE SOLUTION: SPONTANEOUSLY DETONABLE.
NITRIC ACID: LEAD-CONTAINING RUBBER MAY IGNITE.
SODIUM AZIDE: FORMS LEAD AZIDE IN COPPER PIPE.
SODIUM CARBIDE: VIGOROUS REACTION.
SULFURIC ACID (HOT): REACTS.
ZIRCONIUM-LEAD ALLOYS: IGNITION ON IMPACT.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS ARE TOXIC OXIDES OF LEAD.

POLYMERIZATION:
NONE KNOWN.

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CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY.

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SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR SMALL DRY SPILLS, WITH A CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL.
KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:
PROVIDE LOCAL EXHAUST VENTILATION SYSTEM TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:
0.5 MG(PB)/M3- HIGH-EFICIENCY PARTICULATE RESPIRATOR.

2.5 MG(PB)/M3- HIGH-EFFICIENCY PARTICULATE RESPIRATOR WITH A FULL FACEPIECE.

50 MG(PB)/M3- TYPE 'C' SUPPLIED-AIR RESPIRATOR OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE OR CONTINUOUS-FLOW MODE.

100 MG(PB)/M3- TYPE 'C' SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE OR WITH A FULL FACEPIECE, HELMET OR HOOD OPERATED IN CONTINUOUS FLOW MODE.

FIFIREFIGHTING- SELF CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

AUTHORIZED - FISHER SCIENTIFIC GROUP, INC.
CREATION DATE: 02/08/85 REVISION DATE: 09/27/85

-ADDITIONAL INFORMATION-

 18578

CADMIUM
CADMIUM
CADMIUM

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
CHEMICAL DIVISION
1 REAGENT LANE
FAIR LAWN NJ 07410
(201) 796-7100

EMERGENCY NUMBER: (201) 796-7100
CHEMTREC ASSISTANCE: (800) 424-9300

SUBSTANCE IDENTIFICATION

CAS-NUMBER 7440-43-9

SUBSTANCE: **CADMIUM**

TRADE NAMES/SYNONYMS:
CADMIUM, GRANULAR; C.I. NO. 77180; C3; CD;

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: CD

MOLECULAR WEIGHT: 112.41

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=2 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=4 FIRE=3 REACTIVITY=2

COMPONENTS AND CONTAMINANTS

COMPONENT: CADMIUM PERCENT: <100.0
CAS: 7440-43-9

OTHER CONTAMINANTS: ZINC, COPPER, LEAD, TIN, SILVER, ANTIMONY, ARSENIC, THALLIUM

EXPOSURE LIMITS:
CADMIUM (AS CD):
0.005 MG/M3 OSHA TWA; 0.0025 MG/M3 OSHA ACTION LEVEL
0.01 MG/M3 ACGIH TWA (TOTAL DUST); 0.002 MG/M3 ACGIH TWA (RESPIRABLE DUST)
ACGIH A2-SUSPECTED HUMAN CARCINOGEN.
0.05 MG/M3 ACGIH CEILING LIMIT (CADMIUM OXIDE FUME)
(NOTICE OF INTENDED CHANGES 1990-91)
LOWEST FEASIBLE LIMIT NIOSH RECOMMENDED EXPOSURE CRITERIA

MEASUREMENT METHOD: PARTICULATE FILTER; ACID; ATOMIC ABSORPTION SPECTROMETRY; (NIOSH VOL. III # 7048).

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR

CADMIUM:
10 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY

PHYSICAL DATA

DESCRIPTION: SOFT, DUCTILE, MALLEABLE SILVER-WHITE, BLUE-TINGED, LUSTROUS METAL OR GRAYISH-WHITE POWDER BOILING POINT: 1409 F (765 C)

MELTING POINT: 610 F (321 C) SPECIFIC GRAVITY: 8.64

VAPOR PRESSURE: 1 MMHG @ 394 C SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: ACIDS, AMMONIUM NITRATE SOLUTION, HOT SULFURIC ACID

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
THE FINELY DIVIDED METAL IS PYROPHORIC; THE DUST IS A SEVERE FIRE HAZARD AND MODERATE EXPLOSION HAZARD WHEN EXPOSED TO HEAT OR FLAME. THE SUBSTANCE REACTS VIOLENTLY WITH EXTINGUISHING AGENTS SUCH AS WATER, FOAM, CARBON DIOXIDE AND HALONS.

FLASH POINT: FLAMMABLE (DUST)

FIREFIGHTING MEDIA:
USE DRY SAND; DOLOMITE, GRAPHITE, SODIUM CHLORIDE, SODA ASH, OR APPROPRIATE METAL-EXTINGUISHING POWDER. DO NOT APPLY WATER TO BURNING MATERIAL (NFPA FIRE PROTECTION HANDBOOK, 16TH EDITION).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. DO NOT SCATTER SPILLED MATERIAL WITH HIGH-PRESSURE WATER STREAMS. DIKE FIRE-CONTROL WATER FOR LATER DISPOSAL (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 31).

USE AGENTS SUITABLE FOR TYPE OF SURROUNDING FIRE. AVOID BREATHING HAZARDOUS VAPORS, KEEP UPWIND.

TOXICITY

CADMIUM:
TOXICITY DATA: 88 UG/M3/8.6 YEARS INHALATION-MAN TCLO; 39 MG/M3/20 MINUTES INHALATION-HUMAN LCLO; 25 MG/M3/30 MINUTES INHALATION-RAT LC50; 170 MG/M3 INHALATION-MOUSE LCLO; 225 MG/KG ORAL-RAT LD50; 70 MG/KG ORAL-RABBIT LDLO; 890 MG/KG ORAL-MOUSE LD50; 9 MG/KG SUBCUTANEOUS-RAT LD50; 6 MG/KG SUBCUTANEOUS-RABBIT LDLO; 1800 UG/KG INTRAVENOUS-RAT LD50; 5 MG/KG INTRAVENOUS-RABBIT LDLO; 4 MG/KG INTRAPERITONEAL-RAT LD50; 5700 UG/KG INTRAPERITONEAL-MOUSE LD50; 15 MG/KG UNREPORTED-MAN LDLO; 1140 MG/KG UNREPORTED-RAT LD50; 890 MG/KG UNREPORTED-MOUSE LD50; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).
CARCINOGEN STATUS: ANTICIPATED HUMAN CARCINOGEN (NTP); HUMAN LIMITED EVIDENCE, ANIMAL SUFFICIENT EVIDENCE (IARC GROUP-2A). CADMIUM HAS PRODUCED LOCAL SARCOMAS IN RATS FOLLOWING INTRAMUSCULAR ADMINISTRATION. EXPOSURE TO

CADMIUM, PR[illegible]LY AS THE OXIDE, HAS BEEN ASSOCIATED WITH INCREASED RISKS OF PROSTATIC AND RESPIRATORY CANCERS.
LOCAL EFFECTS: IRRITANT- INHALATION.
ACUTE TOXICITY LEVEL: HIGHLY TOXIC BY INHALATION; TOXIC BY INGESTION.
TARGET EFFECTS: NEPHROTOXIN. POISONING MAY AFFECT THE LIVER, BONE, BLOOD, LUNGS, AND THE NERVOUS SYSTEM.
AT INCREASED RISK FROM EXPOSURE: PERSONS WITH KIDNEY OR RESPIRATORY DISORDERS.
ADDITIONAL DATA: DEFICIENCIES IN IRON, CALCIUM, ZINC, PROTEIN AND VITAMINS C AND D MAY ENHANCE THE TOXIC EFFECTS. ALTERATIONS OF DRUG METABOLIZING ACTIVITY HAVE BEEN INDUCED IN ANIMALS. SMOKING MAY RESULT IN HIGHER BLOOD CADMIUM LEVELS.

HEALTH EFFECTS AND FIRST AID

INHALATION:
CADMIUM:
IRRITANT/NEPHROTOXIN/HIGHLY TOXIC.
ACUTE EXPOSURE- THE AVERAGE CONCENTRATION OF FUME RESPONSIBLE FOR FATALITIES IS 40-50 MG/M3 FOR 1 HOUR OR 9 MG/M3 FOR 5 HOURS. EARLY SYMPTOMS MAY INCLUDE MILD IRRITATION OF THE UPPER RESPIRATORY TRACT, RHINITIS, VERTIGO, A SENSATION OF CONSTRICTION OF THE THROAT, A METALLIC TASTE IN THE MOUTH AND COUGH. A LATENT PERIOD FROM 1-10 HOURS MAY PRECEDE THE ONSET OF RAPIDLY PROGRESSING DYSPNEA, CYANOSIS, SUBSTERNAL OR PRECORDIAL CHEST PAIN, AND A FLU-LIKE SYNDROME WITH WEAKNESS, MALAISE, NAUSEA, VOMITING, HEADACHE, FEVER, CHILLS, SHIVERING, PROFUSE SWEATING, AND MUSCULAR PAINS IN THE BACK AND LIMBS. COUGH WITH FOAMY OR BLOODY SPUTUM AND PULMONARY RALES MARK THE ONSET OF ACUTE PULMONARY EDEMA WHICH USUALLY DEVELOPS WITHIN 24 HOURS AND REACHES A MAXIMUM BY 3 DAYS. IF DEATH FROM ASPHYXIA DOES NOT OCCUR, AND EXPOSURE WAS MILD, SYMPTOMS MAY RESOLVE WITHIN A WEEK. IN MORE SEVERE EXPOSURES, ALL SYMPTOMS INCLUDING PROLIFERATIVE INTERSTITIAL PNEUMONITIS MAY PERSIST FROM 3-10 DAYS. PERMANENT PULMONARY FIBROSIS AND HYPERTROPHY OF BRONCHIAL VESSELS MAY OCCUR. THE FATALITY RATE HAS BEEN ESTIMATED TO BE BETWEEN 15-20%. ACUTE RENAL NECROSIS AND/OR LIVER DAMAGE MAY DEVELOP FOLLOWING MASSIVE ACUTE EXPOSURE. SEQUELAE FROM NON-FATAL EXPOSURE MAY INCLUDE MICROCYTIC, HYPOCHROMIC ANEMIA, TESTICULAR ATROPHY, CARDIOVASCULAR EFFECTS, EMPHYSEMA, ANEMIA AND OSTEOMALACIA.
CHRONIC EXPOSURE- CADMIUM IS HIGHLY CUMULATIVE. REPEATED OR PROLONGED EXPOSURE MAY CAUSE IRREVERSIBLE LUNG INJURY OF THE EMPHYSEMATOUS TYPE WITH COUGH AND SHORTNESS OF BREATH, ABNORMAL LUNG FUNCTION, AIRWAYS OBSTRUCTION AND POSSIBLY PULMONARY FIBROSIS. ULCERATION OF THE NASAL SEPTUM AND YELLOW DISCOLORATION OF THE TEETH MAY OCCUR. CADMIUM INDUCED KIDNEY DAMAGE IS IRREVERSIBLE AND MAY PROGRESS AFTER EXPOSURE CEASES. PROTEINURIA MAY BE THE FIRST SIGN OF DAMAGE AND MAY BE ASSOCIATED WITH GLUCOSURIA, AMINOACIDURIA, IMPAIRED EXCRETION, DECREASED CONCENTRATING CAPACITY, INCREASED EXCRETION OF CALCIUM AND PHOSPHORUS, AND INCREASED PLASMA CREATININE. CALCIURIA MAY FAVOR THE DEVELOPMENT OF KIDNEY STONES. SOME CASES OF KIDNEY FAILURE HAVE BEEN REPORTED. OSTEOMALACIA, OSTEOPOROSIS, AND SPONTANEOUS FRACTURES MAY OCCUR AND MAY BE MANIFESTED AS BACK PAIN, PAIN IN THE EXTREMITIES; DIFFICULTY IN WALKING, AND PAIN ON BONE PRESSURE. OTHER SYMPTOMS MAY INCLUDE DAMAGE TO THE OLFACTORY NERVE AND ANOSMIA, HEMOLYTIC AND IRON-DEFICIENCY ANEMIA, WEIGHT LOSS, AND IRRITABILITY. SOME STUDIES SUGGEST A RELATIONSHIP BETWEEN CADMIUM LEVELS IN AIR AND HUMAN CARDIOVASCULAR DISEASE AND HYPERTENSION, BUT CAUSAL ASSOCIATION HAS NOT BEEN PROVEN. LONG-TERM SEQUELAE MAY INCLUDE RENAL TUBULAR NECROSIS, CARDIOVASCULAR EFFECTS, AND LIVER DAMAGE.
OCCUPATIONAL EXPOSURE TO CADMIUM IS IMPLICATED IN A SIGNIFICANT INCREASE IN THE INCIDENCE OF PROSTATIC AND RESPIRATORY CANCERS. ONE STUDY ALSO

REPORTS [redacted]NIFICANT INCREASE IN RENAL CANCERS IN THOSE WITH INFERRED OCCUPATIONAL EXPOSURE TO CADMIUM. THERE IS ALSO LIMITED INFORMATION SUGGESTING THAT CADMIUM MAY INTERFERE WITH SPERM PRODUCTION IN HUMANS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
CADMIUM:
ACUTE EXPOSURE- DIRECT CONTACT MAY RESULT IN IRRITATION.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY RESULT IN DERMATITIS.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
CADMIUM:
ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE IRRITATION, REDNESS, PAIN AND SMARTING, BUT NO INJURY HAS BEEN REPORTED.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
CADMIUM:
NEPHROTOXIN/TOXIC.
ACUTE EXPOSURE- CADMIUM IS A POWERFUL EMETIC WHICH INDUCES VOMITING SO THAT LESS IS RETAINED AND ABSORBED. IF SUFFICIENT AMOUNTS ARE ABSORBED SYSTEMIC TOXICITY MAY OCCUR. SYMPTOMS, WHICH MAY BEGIN WITHIN 1-60 MINUTES AFTER INGESTION, ARE SALIVATION, CHOKING, SEVERE NAUSEA, PERSISTENT VOMITING, DIARRHEA, TENESMUS, ABDOMINAL PAIN, BLURRED VISION, DIZZINESS, VERTIGO, HEADACHE, MUSCULAR CRAMPS AND RARELY, CONVULSIONS, EXHAUSTION, COLLAPSE, SHOCK AND UNCONSCIOUSNESS. IF DEATH OCCURS, IT IS USUALLY WITHIN 24 HOURS FROM SHOCK DUE TO FLUID LOSS, OR, IT MAY BE DELAYED 7-14 DAYS AND RESULT FROM ACUTE RENAL FAILURE OR CARDIOPULMONARY DEPRESSION. IF VICTIM SURVIVES, DELAYED LIVER AND/OR KIDNEY DAMAGE MAY OCCUR. A DOSE EXCEEDING 300 MG MAY BE FATAL.
CHRONIC EXPOSURE- CADMIUM IS HIGHLY CUMULATIVE. PROLONGED LOW LEVEL EXPOSURE MAY CAUSE IRREVERSIBLE RENAL TUBULAR DYSFUNCTION AS DESCRIBED IN CHRONIC INHALATION. ANIMAL EXPERIMENTS INDICATE ANTAGONISTIC ACTIVITY BETWEEN CADMIUM AND ZINC SUCH THAT ABNORMAL ZINC METABOLISM WAS FOUND TO CONTRIBUTE SIGNIFICANTLY TO THE TOXIC SYNDROME FOLLOWING PROLONGED INGESTION OF CADMIUM. FUNCTIONAL CHANGES IN THE LIVER, PANCREAS AND ADRENAL GLANDS WHICH ALTER GLUCOSE METABOLISM MAY OCCUR. ALTHOUGH INCONCLUSIVE, SOME STUDIES SUGGEST A RELATIONSHIP BETWEEN PROLONGED EXPOSURE TO CADMIUM AND HUMAN CARDIOVASCULAR DISEASE AND HYPERTENSION. A STUDY WHICH SUPPORTS THIS THEORY WAS REPORTED WHERE FEMALE RATS EXHIBITED HYPERTENSION AFTER CHRONICALLY INGESTING CADMIUM THROUGH THEIR DRINKING WATER. REPRODUCTIVE EFFECTS SUCH AS CONGENITAL ABNORMALITIES, INCREASED MORTALITY, AND REDUCED RATES OF GROWTH HAVE BEEN

FOUND IN [redacted]ALS AFTER PROLONGED INGESTION OF CADMIUM.

FIRST AID: GIVE MILK OR BEATEN EGGS EVERY 4 HOURS TO RELIEVE GASTROINTESTINAL IRRITATION. REMOVE UNABSORBED CADMIUM BY CATHARSIS WITH FLEET'S PHOSPHO-SODA, 30-60 ML DILUTED 1:4 IN WATER (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). TREATMENT MUST BE ADMINISTERED MEDICAL PERSONNEL.

ANTIDOTE:
THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

CADMIUM POISONING:
DO NOT GIVE DIMERCAPROL (BAL). IF SYMPTOMS PERSIST, THE ADMINISTRATION OF CALCIUM DISODIUM EDETATE IS RECOMMENDED. GIVE 15-25 MG/KG (0.08-0.125 ML OF 20% SOLUTION PER KILOGRAM OF BODY WEIGHT) IN 250-500 ML OF 5% DEXTROSE INTRAVENOUSLY OVER A 1 TO 2 HOUR PERIOD, TWICE DAILY. THE MAXIMUM DOSE SHOULD NOT EXCEED 50 MG/KG/DAY. THE DRUG SHOULD BE GIVEN IN 5-DAY COURSES WITH A REST PERIOD OF AT LEAST 2 DAYS BETWEEN COURSES. AFTER THE FIRST COURSE, SUBSEQUENT COURSES SHOULD NOT EXCEED 50 MG/KG/DAY. DAILY URINALYSES SHOULD BE DONE DURING THE TREATMENT PERIOD. THE DOSAGE SHOULD BE REDUCED IF ANY UNUSUAL URINARY FINDINGS APPEAR.
FOR INTRAMUSCULAR ADMINISTRATION, GIVE 20% SOLUTION (200 MG/ML), 12.5 MG/KG BODY WEIGHT EVERY 4-6 HOURS. DILUTE EACH DOSE WITH AN EQUAL VOLUME OF 1% PROCAINE. DOSE LIMITATION IS THE SAME AS THAT GIVEN ABOVE (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:
CADMIUM:
STABLE WHEN KEPT IN SEALED CONTAINERS UNDER NORMAL TEMPERATURES AND PRESSURES, BUT DUST MAY IGNITE UPON CONTACT WITH AIR. METAL TARNISHES IN MOIST AIR. REACTS VIOLENTLY WITH WATER.

INCOMPATIBILITIES:
CADMIUM:
AMMONIUM NITRATE (FUSED): VIOLENT OR EXPLOSIVE REACTION.
HYDRAZOIC ACID: MAY EXPLODE VIOLENTLY.
NITRYL FLUORIDE: INCANDESCENT REACTION WHEN HEATED SLIGHTLY.
OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.
SELENIUM: EXOTHERMIC REACTION.
SULFUR: FIRE AND EXPLOSION HAZARD.
TELLURIUM: INCANDESCENT REACTION IN HYDROGEN ATMOSPHERE.
ZINC: INTENSE EXOTHERMIC REACTION.

DECOMPOSITION:
CADMIUM:
THE HEATED METAL RAPIDLY FORMS HIGHLY TOXIC, BROWNISH FUMES OF OXIDES OF CADMIUM.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE.

"DISPOSAL"

CADMIUM - REGULATORY LEVEL: 1.0 MG/L (TCLP-40 CFR 261 APPENDIX II)
MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE TCLP REGULATORY LEVEL MEET THE EPA TOXICITY CHARACTERISTIC, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D006.

CONDITIONS TO AVOID

MAY IGNITE ITSELF IF EXPOSED TO AIR AND MAY RE-IGNITE AFTER FIRE IS EXTINGUISHED. MAY BURN RAPIDLY WITH FLARE-BURNING EFFECT. RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. DO NOT GET WATER INSIDE CONTAINER. FOR SMALL SPILLS, FLUSH AREA WITH FLOODING AMOUNTS OF WATER. FOR LARGER SPILLS, DIKE SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

REPORTABLE QUANTITY (RQ): 1 POUND
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:
PROCESS ENCLOSURE VENTILATION RECOMMENDED TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

CADMIUM:
VENTILATION SHOULD MEET THE REQUIREMENTS OF 29 CFR 1910.1027(f).

RESPIRATOR:
THE FOLLOWING RESPIRATORS ARE THE MINIMUM LEGAL REQUIREMENTS AS SET FORTH BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION FOUND IN 29 CFR 1910, SUBPART Z.

CADMIUM:

LESS THAN OR EQUAL TO 10X PEL-	A HALF MASK, AIR-PURIFYING RESPIRATOR EQUIPPED WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

LESS THAN OR EQUAL TO 25X PEL.	A POWERED AIR-PURIFYING RESPIRATOR WITH A LOOSE-FITTING HOOD OR HELMET EQUIPPED WITH A HIGH-EFFICIENCY PARTICULATE FILTER. A SUPPLIED-AIR RESPIRATOR WITH A LOOSE-FITTING HOOD OR HELMET FACEPIECE OPERATED IN THE CONTINUOUS FLOW MODE.
LESS THAN OR EQUAL TO 50X PEL.	A FULL FACEPIECE AIR-PURIFYING RESPIRATOR EQUIPPED WITH A HIGH-EFFICIENCY PARTICULATE FILTER. A POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING HALF MASK EQUIPPED WITH A HIGH-EFFICIENCY PARTICULATE FILTER. A SUPPLIED-AIR RESPIRATOR WITH A TIGHT-FITTING HALF MASK OPERATED IN THE CONTINUOUS FLOW MODE.
LESS THAN OR EQUAL TO 250X PEL.	A POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING FULL FACEPIECE EQUIPPED WITH A HIGH-EFFICIENCY PARTICULATE FILTER. A SUPPLIED-AIR RESPIRATOR WITH A TIGHT-FITTING FULL FACEPIECE OPERATED IN THE CONTINUOUS FLOW MODE.
LESS THAN OR EQUAL TO 1000X PEL.	A SUPPLIED-AIR RESPIRATOR WITH HALF MASK OR FULL FACEPIECE OPERATED IN THE PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.
GREATER THAN 1000X PEL OR UNKNOWN CONCENTRATIONS.	A SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN THE PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE. A SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN THE PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE AND EQUIPPED WITH AN AUXILIARY ESCAPE TYPE SELF-CONTAINED BREATHING APPARATUS OPERATED IN THE PRESSURE DEMAND MODE.

' - A FULL FACEPIECE RESPIRATOR IS REQUIRED WHEN EYE IRRITATION IS EXPERIENCED.

THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO CHEMICAL HAZARDS OR NIOSH CRITERIA DOCUMENTS.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION.

CADMIUM DUST AND FUME (AS CD):
AT ANY DETECTABLE CONCENTRATION:

ANY SELF-CONTAINED BREATHING APPARATUS THAT HAS A FULL FACEPIECE AND IS OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE.
ANY SUPPLIED-AIR RESPIRATOR THAT HAS A FULL FACEPIECE AND IS OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE: ANY [redacted] PURIFYING, FULL-FACEPIECE RESPIRATOR WITH HIGH-EFFICIENCY PARTICULATE FILTER.
ANY APPROPRIATE ESCAPE-TYPE, SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

ANY SELF-CONTAINED BREATHING APPARATUS THAT HAS A FULL FACEPIECE AND IS OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE.

ANY SUPPLIED-AIR RESPIRATOR THAT HAS A FULL FACEPIECE AND IS OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE-PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

CADMIUM:
PROTECTIVE CLOTHING SHOULD MEET THE REQUIREMENTS FOR PROTECTIVE WORK CLOTHING AND EQUIPMENT IN 29 CFR 1910.1027(I).

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

CADMIUM:
PROTECTIVE GLOVES SHOULD MEET THE REQUIREMENTS FOR PROTECTIVE WORK CLOTHING AND EQUIPMENT IN 29 CFR 1910.1027(I).

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

CADMIUM:
PROTECTIVE EYE EQUIPMENT SHOULD MEET THE REQUIREMENTS FOR PROTECTIVE WORK CLOTHING AND EQUIPMENT IN 29 CFR 1910.1027(I).

AUTHORIZED - FISHER SCIENTIFIC, INC.
CREATION DATE: 12/03/84 REVISION DATE: 07/23/93

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TOLUENE
TOLUENE
TOLUENE

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
CHEMICAL DIVISION
REAGENT LANE
FAIR LAWN NJ 07410
(201) 796 7100

EMERGENCY NUMBER: (201) 796-7100
CHEMTREC ASSISTANCE: (800) 424-9300

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SUBSTANCE IDENTIFICATION

CAS-NUMBER 108-88-3

SUBSTANCE **TOLUENE**

TRADE NAMES/SYNONYMS:
BENZENE, METHYL-; METHYLBENZENE; TOLUOL; METHYLBENZOL; PHENYLMETHANE; METHACIDE T2110, T289, T330; T324; T3245; T3245K, T323; T313; T2905K; T291; T3125K, C7118, ACRA U220, UN 1294; STCC 4909305; ACC23590

CHEMICAL FAMILY
Hydrocarbon, aromatic

MOLECULAR FORMULA C6-H5-C-H3

MOLECULAR WEIGHT 92 14

NFPA RATINGS (SCALE 0-3): HEALTH=2 FIRE=3 REACTIVITY=0 PERSISTENCE=1
HMIS RATINGS (SCALE 0-4): HEALTH=2 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT TOLUENE PERCENT: 100.0
CAS# 108 88-3

OTHER CONTAMINANTS NONE

EXPOSURE LIMITS
TOLUENE
100 ppm (377 mg/m3) OSHA TWA; 150 ppm (565 mg/m3) OSHA STEL
50 ppm (188 mg/m3) ACGIH TWA (skin)
100 ppm (377 mg/m3) NIOSH recommended 10 hour TWA;
150 ppm (565 mg/m3) NIOSH recommended STEL
100 ppm (377 mg/m3) OEG MAK TWA;
200 ppm (1885 mg/m3) OEG MAK 30 minute peak, average value, 2 times/shift

Measurement method: Charcoal tube; carbon disulfide; gas chromatography with flame ionization detection; (NIOSH III # 1500, Hydrocarbons).

1000 pounds CERCLA Section 102 Reportable Quantity
Subject to SARA Section 313 Annual Toxic Chemical Release Reporting
Subject to California Proposition 65 cancer and/or reproductive toxicity warning and release requirements. (January 1, 1991)

OSHA revoked the final rule limits of January 19, 1989 in response to the 11th Circuit Court of Appeals decision (AFL-CIO v. OSHA) effective June 30, 1993 See 29 CFR 1910.1000 (58 FR 35338)**

PHYSICAL DATA

DESCRIPTION Clear, colorless liquid with an aromatic odor.

BOILING POINT 231 F (111 C) MELTING POINT: -139 F (-95 C)

SPECIFIC GRAVITY 0 8669 VOLATILITY: 100% VAPOR PRESSURE: 22 mmHg @ 20 C

EVAPORATION RATE (butyl acetate=1) 2 24 SOLUBILITY IN WATER: 0 05% @ 20 C

ODOR THRESHOLD 10 15 ppm VAPOR DENSITY 3 14

SOLVENT SOLUBILITY Soluble in alcohol, ether, benzene, ligroin, acetone, chloroform, glacial acetic acid, carbon disulfide

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD
Dangerous fire hazard when exposed to heat or flame

NOV 15 1995

NOV 15 1995

+ NV. REV.

Vapors are heavier than air and may travel a considerable distance to a source of ignition and flash back

Vapor-air mixtures are explosive

Due to low electroconductivity of the substance, flow or agitation may generate electrostatic charges resulting in sparks with possible ignition

FLASH POINT: 40 F (4 C) (CC) UPPER EXPLOSIVE LIMIT 7 1%

LOWER EXPLOSIVE LIMIT: 1 2% AUTOIGNITION TEMP 896 F (480 C)

FLAMMABILITY CLASS(OSHA): IB

FIREFIGHTING MEDIA:
Dry chemical, carbon dioxide, water spray or regular foam
(1993 Emergency Response Guidebook, RSPA P 5800 6)

For larger fires, use water spray, fog or regular foam
(1993 Emergency Response Guidebook, RSPA P 5800 6)

FIREFIGHTING:
Move container from fire area if you can do it without risk Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in fire (1993 Emergency Response Guidebook, RSPA P 5800 6, Guide Page 27)

Extinguish only if flow can be stopped; use water in flooding quantities as fog, solid streams may spread fire. Cool containers with flooding amounts of water, apply from as far a distance as possible Avoid breathing toxic vapors, keep upwind.

Water may be ineffective (NFPA 325M, Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids, 1991)

TRANSPORTATION DATA

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER. 49 CFR 172 101
Toluene-UN 1294

U.S DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION. 49 CFR 172 101
3 - Flammable liquid

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP. 49 CFR 172 101
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS. 49 CFR 172 101 AND SUBPART E:
Flammable liquid

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS
EXCEPTIONS: 49 CFR 173.150
NON-BULK PACKAGING. 49 CFR 173.202
BULK PACKAGING: 49 CFR 173.242

U.S DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172 101
PASSENGER AIRCRAFT OR RAILCAR: 5 L
CARGO AIRCRAFT ONLY: 60 L

TOXICITY

TOLUENE:
IRRITATION DATA: 300 ppm eye-human; 870 ug eye-rabbit mild, 2 mg/24 hours eye-rabbit severe; 100 mg/30 seconds rinsed eye-rabbit mild, 435 mg skin-rabbit mild; 500 mg skin-rabbit moderate; 20 mg/24 hours skin-rabbit moderate.
TOXICITY DATA: 200 ppm inhalation-human TCLo; 100 ppm inhalation-man TCLo 49 gm/m3/4 hours inhalation-rat LC50; 1600 ppm/20 hours/7 days intermittent inhalation-rat TCLo; 80 ppm/8 hours/4 weeks-intermittent inhalation rat TCLo; 12000 ppm/10 minutes/8 weeks-intermittent inhalation rat TCLo, 2500 ppm/8.5 hours/15 weeks-intermittent inhalation-rat TCLo, 1500 ppm/8 hours/26 weeks-intermittent inhalation-rat TCLo, 200 ppm/8 hours/2 years intermittent inhalation-rat TCLo, 400 ppm/24 hours inhalation-mouse LC50, 12000 ppm/10 minutes/8 weeks-intermittent inhalation-mouse TCLo, 1250 ppm/8 hours/14 weeks-intermittent inhalation-mouse TCLo; 55000 ppm/40 minutes inhalation-rabbit LCLo; 50 mg/m3/4 hours/26 weeks intermittent inhalation-rabbit TCLo; 1800 ppm inhalation-guinea pig LCLo, 30 gm/m3 inhalation-mammal LC50; 12124 mg/kg skin-rabbit LD50; 636 mg/kg oral rat LD50; 162 gm/kg/13 weeks-intermittent oral rat TDLo; 227 gm/kg/13 weeks intermittent oral-mouse TDLo; 2940 mg/kg/4 weeks-continuous oral mouse TDLo; 4 gm/kg oral mammal LD50; 2250 mg/kg subcutaneous mouse LD50; 1960 mg/kg intravenous-rat LD50; 130 mg/kg intravenous-rabbit LDLo; 500 mg/kg intraperitoneal guinea pig LD50, 1332 mg/kg intraperitoneal-rat LD50.

Inside storage should be in a standard flammable liquids storage room or cabinet. Separate from oxidizing materials (NFPA 49, hazardous chemicals data, 1975)

Bonding and grounding. Substances with low electroconductivity, which may be ignited by electrostatic sparks, should be stored in containers which meet the bonding and grounding guidelines specified in NFPA 77-1983, Recommended Practice on Static Electricity.

Keep container closed

Keep cool

Store away from incompatible substances.

Disposal

Disposal must be in accordance with standards applicable to generators of hazardous waste, 40CFR 262, EPA Hazardous Waste Number U220.

CONDITIONS TO AVOID

Avoid contact with heat, sparks, flames, or other sources of ignition. Vapors may be explosive. Avoid overheating of containers; containers may violently rupture in heat of fire. Avoid contamination of water sources.

SPILL AND LEAK PROCEDURES

OIL SPILL
Dig holding area such as lagoon, pond or pit for containment.

Dike flow of spilled material using soil or sandbags or foamed barriers such as polyurethane or concrete

Use cement powder or fly ash to absorb liquid mass.

Immobilize spill with universal gelling agent.

Reduce vapor and fire hazard with appropriate foam

AIR SPILL
Knock down vapors with water spray. Keep upwind.

WATER SPILL
If material dissolved, apply activated carbon. Use dredges or lifts to extract masses of pollution and precipitates. Apply universal gelling agent to immobilize trapped spill and increase efficiency of removal. Limit spill dilution and dispersion with natural barriers or oil spill control booms. Use soaps, detergents, alcohols or other surface active agent to thicken spilled material. Use suction hoses to remove trapped spill material.

The California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) prohibits contaminating any known source of drinking water with substances known to cause cancer and/or reproductive toxicity.

OCCUPATIONAL SPILL:
Shut off ignition sources. Stop leak if you can do it without risk. Use water spray to reduce vapors. For small spills, take up with sand or other absorbent material and place into containers for later disposal. For larger spills, dike far ahead of spill for later disposal. No smoking, flames or flares in hazard area. Keep unnecessary people away; isolate hazard area and restrict entry.

Reportable Quantity (RQ) 1000 pounds
The Superfund Amendments and Reauthorization Act (SARA) Section 304 requires that a release equal to or greater than the reportable quantity for this substance be immediately reported to the local emergency planning committee and the state emergency response commission (40 CFR 355.40). If the release of this substance is reportable under CERCLA Section 102, the National Response Center must be notified immediately at (800) 424-8802 or (202) 426-2675 in the Metropolitan Washington, D.C. area (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION
Provide local exhaust or general dilution ventilation to meet published exposure limits. Ventilation equipment should be explosion-proof if explosive concentrations of dust, vapor or fume are present.

RESPIRATOR
The following respirators and maximum use concentrations are recommendations of the U.S. Department of Health and Human Services, NIOSH Pocket Guide to Chemical Hazards, NIOSH criteria documents or by the U.S. Department of Labor, 29 CFR 1910 Subpart Z.
The specific respirator selected must be based on contamination levels found in the work place, must not exceed the working limits of the respirator and be jointly approved by the National Institute for Occupational Safety and

Health and the Mine Safety and Health Administration (NIOSH-MSHA)

TOLUENE:
500 ppm: Any chemical cartridge respirator with organic vapor cartridge(s)
Any powered air-purifying respirator with organic vapor cartridge(s).
Any air-purifying full facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister.
Any supplied-air respirator.
Any self-contained breathing apparatus that has a full facepiece

Escape: Any air-purifying, full facepiece respirator (gas mask) with a chin-style, front- or back mounted organic vapor canister.
Any appropriate escape-type, self-contained breathing apparatus.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

CLOTHING:
Employee must wear appropriate protective (impervious) clothing and equipment to prevent repeated or prolonged skin contact with this substance

GLOVES:
Employee must wear appropriate protective gloves to prevent contact with this substance.

EYE PROTECTION:
Employee must wear splash-proof or dust-resistant safety goggles to prevent eye contact with this substance.

Emergency eye wash: Where there is any possibility that an employee's eyes may be exposed to this substance, the employer should provide an eye wash fountain within the immediate work area for emergency use

AUTHORIZED - FISHER SCIENTIFIC, INC
CREATION DATE: 10/25/84 REVISION DATE 07/15/95

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MATERIAL SAFETY DATA SHEET #20214

SIGMA#: CS164S60 11/05/96 PO#: MH20728

DATE PREPARED: November 5, 1996

INV. REV.

SECTION I PRODUCT SPECIFICATIONS

NO. PP-HC6

ture #6-Polynuclear Aromatic Hydrocarbons in Methylene chloride:Benzene (50:50)

plied by CHEM SERVICE, Inc. PO BOX 3108, WEST CHESTER, PA, 19381 (610)692-3026
RGENCY PHONE: 610-692-3026

following compounds are contained in this mixture at the stated concentrations:

	2000ug/ml	83-32-9	Acenaphthene
7	2000ug/ml	208-96-8	Acenaphthylene
8	2000ug/ml	120-12-7	Anthracene
2	2000ug/ml	56-55-3	1.2-Benzanthracene
3	2000ug/ml	50-32-8	Benzo(a)pyrene
4	2000ug/ml	205-99-2	Benzo(b)fluoranthene
9	2000ug/ml	191-24-2	1.12-Benzoperylene
5	2000ug/ml	207-08-9	Benzo(K)fluoranthene
6	2000ug/ml	218-01-9	Chrysene
2	2000ug/ml	53-70-3	1.2:5.6-Dibenzanthracene
9	2000ug/ml	206-44-0	Fluoranthene
0	2000ug/ml	86-73-7	Fluorene
3	2000ug/ml	193-39-5	Indeno(1.2.3-C.D)pyrene
5	2000ug/ml	91-20-3	Naphthalene
1	2000ug/ml	85-01-8	Phenanthrene
4	2000ug/ml	129-00-0	Pyrene

FEB 2 5 1997

BY

SECTION II TOXICITY DATA

primary hazards for this mixture are predominantly from the solvent.
LOSO for the individual components are:

naphthene	NO TOXICITY DATA HAS BEEN FOUND.
naphthylene	NO TOXICITY DATA HAS BEEN FOUND.
hracene	2000mg/kg
-Benzanthracene	240mg/kg
zo(a)pyrene	4095mg/kg
zo(b)fluoranthene	72mg/kg
2-Benzoperylene	NO TOXICITY DATA HAS BEEN FOUND.
zo(K)fluoranthene	2820mg/kg
ysene	99mg/kg
:5.6-Dibenzanthracene	360mg/kg
oranthene	2000mg/kg
orene	NO TOXICITY DATA HAS BEEN FOUND.
eno(1.2.3-C.D)pyrene	72mg/kg
hthalene	490mg/kg
nanthrene	700mg/kg
ene	2700mg/kg

following information is for the solvent: Methylene chloride

AL RAT OR MOUSE LOSO	RTECS#	OSHA PEL (TWA)	ACGIH TLY (TWA)
2136mg/kg	PA8050000	500 ppm	50ppm (174mg/m3)

s compound is considered to be slightly toxic.
s statement is based upon OSHA's assessment of the LD50

following information is for the solvent: Benzene

AL RAT OR MOUSE LD50	RTECS#	OSHA PEL (TWA)	ACGIH TLV (TWA)
3800mg/kg	CY1400000	10 ppm (30 mg/m3)	0.1ppm (0.3mg/m3)SKI

s compound is considered to be slightly toxic.
s statement is based upon OSHA's assessment of the LD50

the solvent: Methylene chloride
RCINOGENICITY: OSHA: (NO) IARC: (YES) NTP: (YES) ACGIH: (YES) NIOSH: (YES) OTHER: (NO)

the solvent: Benzene
RCINOGENICITY: OSHA: (YES) IARC: (YES) NTP: (YES) ACGIH: (YES) NIOSH: (YES) OTHER: (NO)

the minor component: Anthracene
RCINOGENICITY: OSHA: (NO) IARC: (NO) NTP: (NO) ACGIH: (NO) NIOSH: (NO) OTHER: (YES)

the minor component: 1.2-Benzanthracene
RCINOGENICITY: OSHA: (NO) IARC: (YES) NTP: (YES) ACGIH: (YES) NIOSH: (NO) OTHER: (YES)

the minor component: Benzo(a)pyrene
RCINOGENICITY: OSHA: (NO) IARC: (YES) NTP: (YES) ACGIH: (YES) NIOSH: (NO) OTHER: (NO)

minor component: Benzo(b)fluoranthene
RCINOGENICITY: OSHA: (NO) IARC: (YES) NTP: (YES) ACGIH: (YES) NIOSH: (NO) OTHER: (NO)

the minor component: Benzo(K)fluoranthene
RCINOGENICITY: OSHA: (NO) IARC: (YES) NTP: (NO) ACGIH: (NO) NIOSH: (NO) OTHER: (YES)

the minor component: Chrysene
RCINOGENICITY: OSHA: (NO) IARC: (NO) NTP: (NO) ACGIH: (YES) NIOSH: (NO) OTHER: (NO)

the minor component: 1.2:5.6-Dibenzanthracene
RCINOGENICITY: OSHA: (NO) IARC: (YES) NTP: (YES) ACGIH: (NO) NIOSH: (NO) OTHER: (YES)

the minor component: Fluoranthene
RCINOGENICITY: OSHA: (NO) IARC: (YES) NTP: (NO) ACGIH: (NO) NIOSH: (NO) OTHER: (NO)

the minor component: Indeno(1.2.3-C.D)pyrene
RCINOGENICITY: OSHA: (NO) IARC: (YES) NTP: (YES) ACGIH: (NO) NIOSH: (NO) OTHER: (YES)

SECTION III PHYSICAL DATA

the solvent: Methylene chloride

LTING POINT	BOILING POINT	DENSITY	VAPOR PRESSURE	VAPOR DENSITY
C	39.75 C	1.3255	350 mm@20 C	2.9

ODOR	COLOR	PHASE
Ether like	Colorless	Liquid

APORATION RATE (cetate=1)	SOLUBILITY IN WATER
.5	Slightly soluble

PA Hazard Rating:

Health	Flammability	Reactivity
2	1	0

- Least, 1 - Slight, 2 - Moderate, 3 - High, 4 - Severe

r the solvent: Benzene

LTING POINT	BOILING POINT	DENSITY	VAPOR PRESSURE	VAPOR DENSITY
5.5 C	80.2 C	0.874	75 mm@20 C	2.8

ODOR	COLOR	PHASE
romatic	Colorless	Liquid

APORATION RATE (cetate=1)	SOLUBILITY IN WATER
T AVAILABLE	Very slightly soluble

PA Hazard Rating:

Health	Flammability	Reactivity
2	3	0

- Least, 1 - Slight, 2 - Moderate, 3 - High, 4 - Severe

SECTION IV FIRE AND EXPLOSION HAZARD DATA

r the solvent: Methylene chloride
ASH POINT: Non-flammable
TINGUISHING MEDIA: Carbon dioxide, dry chemical powder or spray.
PER EXPLOSION LIMIT: 23.0% LOWER EXPLOSION LIMIT: 13.0%

r the solvent: Benzene
ASH POINT: -11 C This is a flammable chemical.
TINGUISHING MEDIA: Carbon dioxide or dry chemical powder. DO NOT USE WATER!
PER EXPLOSION LIMIT: 7.8% LOWER EXPLOSION LIMIT: 1.2%

SECTION V HEALTH HAZARD DATA

[redacted] lenses should not be worn in the laboratory.
[redacted]emicals should be considered hazardous - Avoid direct physical contact!

r the solvent: Methylene chloride
spected Carcinogen-may produce cancer.
y be harmful by inhalation, ingestion, or skin absorption. Can cause eye irritation.
n cause skin irritation. Dust and/or vapors can cause irritation to respiratory tract.
n be irritating to mucous membranes. Exposure can cause liver damage.

r the solvent: Benzene
OWN CARCINOGEN-cancer producing agent. Can cause eye irritation. Can cause skin irritation.
y be harmful if absorbed through the skin. May be harmful if inhaled.
y be harmful if swallowed. Can cause blood disorders. Can be irritating to mucous membranes.
olonged exposure may cause nausea/headache/dizziness and/or eye damage.
rcotic at high concentrations. Exposure can cause Dermatitis.
posure can cause nausea, headache dizziness and/or vomiting. Target Organ - Blood.
rget Organ - Central Nervous System. Target Organ - Skin. Target Organ - Bone Marrow.
get Organ - Eyes. Target Organ - Respiratory system.

SECTION V.1 PROPOSITION 65

the solvent: Methylene chloride
is chemical is considered to be a CARCINOGEN by the state of California.

the solvent: Benzene
is [redacted]emical is considered to be a CARCINOGEN by the state of California.

SECTION VI FIRST AID

antidote is a substance intended to counteract the effect of a poison. It should be
inistered only by a physician or trained emergency personnel. Medical advice can be
ained from a POISON CONTROL CENTER.

the solvent: Methylene chloride

case of contact: Flush eyes continuously with water for 15-20 minutes. Flush skin with water
15-20 minutes. If no burns have occurred-use soap and water to cleanse skin.
inhaled remove patient to fresh air. Administer oxygen if patient is having difficulty
athing. If patient has stopped breathing administer artificial respirations.
patient is in cardiac arrest administer CPR.
tinue life supporting measures until medical assistance has arrived.
ove and wash contaminated clothing.
patient is exhibiting signs of shock - Keep warm and quiet.
tact Poison Control Center immediately if necessary.
not administer liquids or induce vomiting to an unconscious or convulsing person.
patient is vomiting-watch closely to make sure airway does not become obstructed by vomit.
medical attention if necessary.

the solvent: Benzene

Ca[redacted]f contact: Flush eyes continuously with water for 15-20 minutes. Flush skin with water
15-20 minutes. If no burns have occurred-use soap and water to cleanse skin.
inhaled remove patient to fresh air. Administer oxygen if patient is having difficulty
ithing.

SECTION VI FIRST AID CONTINUED

ient has stopped breathing administer artificial respirations.
patient is in cardiac arrest administer CPR.
ntinue life supporting measures until medical assistance has arrived.
move and wash contaminated clothing.
patient is exhibiting signs of shock - Keep warm and quiet.
swallowed DO NOT induce vomiting.
taken internally give milk, milk of magnesia or egg whites beaten with water.
not administer liquids or induce vomiting to an unconscious or convulsing person.
patient is vomiting-watch closely to make sure airway does not become obstructed by vomit.
ntact Poison Control Center immediately if necessary. Get medical attention if necessary.

SECTION VII REACTIVITY DATA

r the solvent: Methylene chloride
compatible with strong bases. Incompatible with strong oxidizing agents. Sensitive to heat.
not use Magnesium/Aluminum or their alloys as containers.
composition liberates toxic fumes. Decomposition products are corrosive. Volatile.

r the solvent: Benzene
ammable. Incompatible with strong oxidizing agents. Decomposition liberates toxic fumes.

SECTION VIII SPILL OR LEAK PROCEDURES

ills or leaks: Evacuate area. Wear appropriate OSHA regulated equipment. Ventilate area.
so on vermiculite or similar material. Sweep up and place in an appropriate container.
l r disposal. Wash contaminated surfaces to remove any residues.
SPOSAL: Burn in a chemicals incinerator equipped with an afterburner and scrubber.

SECTION IX PRECAUTIONS TO BE TAKEN IN HANDLING

is chemical should be handled only in a hood. Eye shields should be worn. Use appropriate
HA/MSHA approved safety equipment. Avoid contact with skin, eyes and clothing. Do not
eath vapors. Keep tightly closed.
ORE UNDER REFRIGERATION. Store only with compatible chemicals.

SECTION X SPECIAL PRECAUTIONS AND COMMENTS

e above information is believed to be correct on the date it is published and must not be
nsidered all inclusive. The information has been obtained only by a search of available
terature and is only a guide for handling the chemicals. OSHA regulations require that
other hazards become evident, an upgraded MSDS must be made avalible to the employee
thin three months. Responsibility for updates lies with the employer and not with
EM SERVICE, Inc. Persons not specifically and properly trained should not handle this
emical or its container. This MSDS is provided without any warranty expressed or implied,
cluding merchantability or fitness for any particular purpose.

is product is furnished FOR LABORATORY USE ONLY! Our products may NOT BE USED as drugs,
smetics, agricultural or pesticidal products, food additives or as household chemicals.

BENZENE
BENZENE
BENZENE

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
CHEMICAL DIVISION
1 REAGENT LANE
FAIR LAWN NJ 07410
(201) 796 7100

EMERGENCY NUMBER: (201) 796 7100
CHEMTREC ASSISTANCE: (800) 424 9300

SUBSTANCE IDENTIFICATION

CAS-NUMBER 71-43-2

SUBSTANCE: **BENZENE**

TRADE NAMES/SYNONYMS:
BENZOL; CYCLOHEXATRIENE; BENZOLE; PHENE; PYROBENZOL; PYROBENGOLE;
CARBON OIL; COAL TAR NAPHTHA; PHENYL HYDRIDE; BENZOLENE;
BICARBURET OF HYDROGEN; COAL NAPHTHA; MOTOR BENZOL; ANNULENE, (6)ANNULENE;
RCRA U019; STCC 4908110; UN 1114;
B-426; 13067, B 243; B 245-S; B-245; B 411; C6H6;

CHEMICAL FAMILY:
HYDROCARBON, AROMATIC

MOLECULAR FORMULA: C6-H6

MOLECULAR WEIGHT: 78.11

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=0 PERSISTENCE=1
NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: BENZENE PERCENT: >99
CAS# 71-43-2

OTHER CONTAMINANTS: 0.15% NON AROMATICS; 1 PPM THIOPHENE

EXPOSURE LIMITS:
BENZENE:
1 PPM OSHA TWA; 5 PPM OSHA 15 MINUTE STEL;
0.5 PPM OSHA ACTION LEVEL
10 PPM (30 MG/M3) ACGIH TWA;
ACGIH A2-SUSPECTED HUMAN CARCINOGEN
(NOTICE OF INTENDED CHANGES 1990-91)
0.1 PPM (0.32 MG/M3) NIOSH RECOMMENDED 8 HOUR TWA;
1 PPM (3.2 MG/M3) NIOSH RECOMMENDED 15 MINUTE CEILING

10 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

INVENTORIED
REV
10313

PHYSICAL DATA

DESCRIPTION: COLORLESS TO LIGHT YELLOW LIQUID WITH AN AROMATIC ODOR

BOILING POINT: 176 F (80 C) MELTING POINT: 42 F (6 C)

SPECIFIC GRAVITY: 0.8765 @ 20 C VISCOSITY: 0.6468 CP @ 20 C

VOLATILITY: 100% VAPOR PRESSURE: 75 MMHG @ 20 C

EVAPORATION RATE: (BUTYL ACETATE = 1) 3.1 SOLUBILITY IN WATER: 0.18% @ 25 C

ODOR THRESHOLD: 4.68 PPM VAPOR DENSITY: 2.8

SOLVENT SOLUBILITY: ACETONE, ALCOHOL, CARBON DISULFIDE, ACETIC ACID, CARBON TETRACHLORIDE, CHLOROFORM, ETHER, OILS

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

MODERATE EXPLOSION HAZARD WHEN EXPOSED TO HEAT OR FLAME.

VAPOR-AIR MIXTURES ARE EXPLOSIVE ABOVE FLASH POINT.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.

DUE TO LOW ELECTROCONDUCTIVITY OF THE SUBSTANCE, FLOW OR AGITATION MAY GENERATE ELECTROSTATIC CHARGES RESULTING IN SPARKS WITH POSSIBLE IGNITION.

FLASH POINT: 12 F (-11 C) (CC) UPPER EXPLOSIVE LIMIT: 7.8%

LOWER EXPLOSIVE LIMIT: 1.2% AUTOIGNITION TEMP.: 920 F (490 C)

FLAMMABILITY CLASS(OSHA): IB

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM (1980 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM (1980 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF TANK DUE TO FIRE. ISOLATE FOR 1/2 MILE IN ALL DIRECTIONS IF TANK, RAIL CAR OR TANK TRUCK IS INVOLVED IN FIRE

EXTINGUISH SMALL FIRES IF FLOW CAN BE STOPPED. USE WATER IN FLOODING QUANTITIES AS A FOG, SOME STREAMS MAY SPREAD FIRE. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER; APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING HAZARDOUS MATERIALS; KEEP UPWIND. EVACUATE TO A RADIUS OF 1500 FEET FOR UNCONTROLLABLE FIRES. CONSIDER EVACUATION OF DOWNWIND AREA IF MATERIAL IS LEAKING.

WATER MAY BE INEFFECTIVE (NFPA 325M, FIRE HAZARD PROPERTIES OF FLAMMABLE LIQUIDS, GASES, AND VOLATILE SOLIDS, 1984)

FIRE FIGHTING PHASES: DRY CHEMICAL, ALCOHOL FOAM OR CARBON DIOXIDE. WATER MAY BE INEFFECTIVE. USE WATER TO KEEP FIRE EXPOSED CONTAINERS COOL. IF A LEAK OR SPILL HAS NOT IGNITED, USE WATER SPRAY TO DISPERSE THE VAPORS AND TO PROVIDE PROTECTION FOR THE MEN ATTEMPTING TO STOP THE LEAK. WATER SPRAY MAY BE USED TO FLUSH SPILLS AWAY FROM EXPOSURES (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND SUBPART E:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.119
EXCEPTIONS: 49 CFR 173.118

TOXICITY

BENZENE.
IRRITATION DATA: 20 MG/24 HOURS SKIN RABBIT MODERATE; 15 MG/24 HOURS OPEN SKIN RABBIT MILD; 88 MG EYE RABBIT MODERATE; 2 MG/24 HOURS EYE RABBIT SEVERE.
TOXICITY DATA: 3000 PPM/5 MINUTES INHALATION HUMAN LCLO; 2 PPM/5 MINUTES INHALATION HUMAN LCLO, 65 MG/M3/5 YEARS INHALATION HUMAN LCLO; 100 PPM INHALATION HUMAN TCLO; 150 PPM/1 YEAR INTERMITTENT INHALATION-MAN TCLO; 10,000 PPM/5 MINUTES INHALATION-MAMMAL LCLO; 10,000 PPM/7 HOURS INHALATION RAT LC50; 9980 PPM INHALATION MOUSE LC50; 146,000 MG/M3 INHALATION DOG LCLO; 170,000 MG/M3 INHALATION-CAT LCLO; 45,000 PPM/30 MINUTES INHALATION RABBIT LCLO; 50 MG/KG ORAL-MAN LDLO, 930 MG/KG ORAL RAT LD50; 3800 MG/KG ORAL MOUSE LD50; 2000 MG/KG ORAL DOG LDLO; 35 MG/KG INTRAVENOUS RABBIT LDLO; 2890 UG/KG INTRAPERITONEAL RAT LD50; 340 MG/KG INTRAPERITONEAL-MOUSE LD50; 527 MG/KG INTRAPERITONEAL GUINEA PIG LDLO; 124 MG/KG UNREPORTED-MAN LDLO; 1500 MG/KG INTRAPERITONEAL-MAMMAL LDLO; 1400 MG/KG SUBCUTANEOUS FROG LDLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).
CARCINOGEN STATUS: OSHA CARCINOGEN; KNOWN HUMAN CARCINOGEN (NTP); HUMAN SUFFICIENT EVIDENCE, ANIMAL SUFFICIENT EVIDENCE (IARC GROUP 1). NUMEROUS CASE REPORTS AND SERIES HAVE SUGGESTED A RELATIONSHIP BETWEEN EXPOSURE TO BENZENE AND THE OCCURRENCE OF VARIOUS TYPES OF LEUKEMIA. SEVERAL CASE-CONTROL STUDIES HAVE ALSO SHOWN INCREASED ODDS RATIOS FOR EXPOSURE TO BENZENE, BUT MIXED EXPOSURE PATTERNS AND POORLY DEFINED EXPOSURES RENDER THEIR INTERPRETATION DIFFICULT. THREE INDEPENDENT COHORT STUDIES HAVE

CARCINOGEN: AN INCREASED INCIDENCE OF ACUTE NONLYMPHOCYTIC LEUKEMIA IN WORKERS EXPOSED TO BENZENE (29 3).
LOCAL EFFECTS: IRRITANT. INHALATION, SKIN AND EYE.
ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INHALATION AND INGESTION.
TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT; BONE MARROW DEPRESSANT.
POISONING MAY ALSO AFFECT THE IMMUNE SYSTEM AND THE HEART.
AT INCREASED RISK FROM EXPOSURE: PERSONS WITH CERTAIN IMMUNOLOGICAL TENDENCIES, POOR NUTRITION, ANEMIA AND DRUG OR CHEMICALLY INDUCED AGRANULOCYTOSIS.
ADDITIONAL DATA: USE OF ALCOHOLIC BEVERAGES MAY ENHANCE THE TOXIC EFFECTS. USE OF STIMULANTS SUCH AS EPINEPHRINE MAY CAUSE CARDIAC ARRHYTHMIAS. MAY CROSS THE PLACENTA. INTERACTIONS WITH MEDICATIONS HAVE BEEN REPORTED.

HEALTH EFFECTS AND FIRST AID

INHALATION.
BENZENE:
IRRITANT/NARCOTIC/BONE MARROW DEPRESSANT/CARCINOGEN.
ACUTE EXPOSURE: CONCENTRATIONS OF 3000 PPM MAY CAUSE RESPIRATORY TRACT IRRITATION, MORE SEVERE EXPOSURES MAY RESULT IN PULMONARY EDEMA. SYSTEMIC EFFECTS ARE MAINLY ON THE CENTRAL NERVOUS SYSTEM AND DEPEND ON EXPOSURE TIME AND CONCENTRATION. NO EFFECTS WERE NOTED AT 25 PPM FOR 8 HOURS; SIGNS OF INTOXICATION BEGAN AT 50 150 PPM WITHIN 6 HOURS; AT 500-1500 PPM, WITHIN 1 HOUR; WERE SEVERE AT 7500 PPM, WITHIN 30-60 MINUTES; AND 20,000 PPM WAS FATAL WITHIN 5 10 MINUTES. EFFECTS MAY INCLUDE NAUSEA, VOMITING, HEADACHE, DIZZINESS, DROWSINESS, WEAKNESS, SOMETIMES PRECEDED BY A BRIEF PERIOD OF EXHILARATION OR EUPHORIA, IRRITABILITY, MALAISE, CONFUSION, ATAXIA, STAGGERING, WEAK, RAPID PULSE, CHEST PAIN AND TIGHTNESS WITH BREATHLESSNESS, PALLOR, CYANOSIS OF THE LIPS AND FINGERTIPS, AND TINNITUS. IN SEVERE EXPOSURES THERE MAY BE BLURRED VISION, SHALLOW, RAPID BREATHING, DELIRIUM, CARDIAC ARRHYTHMIAS, UNCONSCIOUSNESS, DEEP ANESTHESIA, PARALYSIS, AND COMA CHARACTERIZED BY MOTOR RESTLESSNESS, TREMORS AND HYPERREFLEXIA, SOMETIMES PRECEDED BY CONVULSIONS. RECOVERY DEPENDS ON THE SEVERITY OF EXPOSURE. POLYNEURITIS MAY OCCUR AND THERE MAY BE PERSISTENT NAUSEA, ANOREXIA, MUSCULAR WEAKNESS, HEADACHE, DROWSINESS, INSOMNIA, AND AGITATION. NERVOUS IRRITABILITY, BREATHLESSNESS, AND UNSTEADY GAIT MAY PERSIST FOR 2-3 WEEKS; A PECULIAR SKIN COLOR AND CARDIAC DISTRESS MAY PERSIST FOR 4 WEEKS. LIVER AND KIDNEY EFFECTS MAY OCCUR, BUT ARE USUALLY MILD, TEMPORARY IMPAIRMENTS. CHROMOSOMAL DAMAGE HAS BEEN FOUND AFTER EXPOSURE TO TOXIC LEVELS. ALTHOUGH GENERALLY HEMATOTOXICITY IS NOT A SIGNIFICANT CONCERN IN ACUTE EXPOSURE, DELAYED HEMATOLOGICAL EFFECTS, INCLUDING ANEMIA AND THROMBOCYTOPENIA, HAVE BEEN REPORTED, AS HAVE PETECHIAL HEMORRHAGES, SPONTANEOUS INTERNAL BLEEDING AND SECONDARY INFECTIONS. IN FATAL EXPOSURES, DEATH MAY BE DUE TO ASPHYXIA, CENTRAL NERVOUS SYSTEM DEPRESSION, CARDIAC OR RESPIRATORY FAILURE AND CIRCULATORY COLLAPSE, OR OCCASIONALLY, SUDDEN VENTRICULAR FIBRILLATION. IT MAY OCCUR WITHIN A FEW MINUTES TO SEVERAL HOURS; OR CARDIAC ARRYTHMIA MAY OCCUR AT ANYTIME WITHIN 24 HOURS. ALSO, DEATH FROM CENTRAL NERVOUS SYSTEM, RESPIRATORY OR HEMORRHAGIC COMPLICATIONS MAY OCCUR UP TO 5 DAYS AFTER EXPOSURE. PATHOLOGIC FINDINGS HAVE INCLUDED RESPIRATORY INFLAMMATION WITH EDEMA AND HEMORRHAGE OF THE LUNGS, RENAL CONGESTION, CEREBRAL EDEMA, AND EXTENSIVE PETECHIAL HEMORRHAGES IN THE BRAIN, PLEURAE, PERICARDIUM, URINARY TRACT, MUCOUS MEMBRANES, AND SKIN.
CHRONIC EXPOSURE: LONGTERM EXPOSURE MAY CAUSE SYMPTOMS REFERABLE TO THE CENTRAL NERVOUS, HEMATOPOIETIC AND IMMUNE SYSTEMS. EARLY EFFECTS ARE VAGUE AND VARIED AND MAY INCLUDE HEADACHE, LIGHT HEADEDNESS, DIZZINESS, NAUSEA, ANOREXIA, ABDOMINAL DISCOMFORT, AND FATIGUE. SORE, DRY THROAT, WEARNESS,

LETHARGY, MALAISE, DROWSINESS, NERVOUSNESS, AND IRRITABILITY HAVE ALSO BEEN REPORTED. LATER THERE MAY BE DYSPNEA, PALLOR, SLIGHTLY INCREASED TEMPERATURE, DECREASED BLOOD PRESSURE, RAPID PULSE, PALPITATIONS, AND VISUAL DISTURBANCES. DIZZINESS WHEN COLD WATER IS PLACED IN THE EAR AND HEARING IMPAIRMENT HAVE BEEN REPORTED, AS HAVE DIFFUSE CEREBRAL ATROPHY ASSOCIATED WITH ATAXIA, TREMORS AND EMOTIONAL LABILITY. WORKERS EXPOSED TO BENZENE IN COMBINATION WITH OTHER SOLVENTS HAVE EXHIBITED POLYNEURITIS. SEVERAL CASE REPORTS, ONE OF THEM AN ACUTE EXPOSURE, SUGGEST THE POSSIBILITY THAT SYSTEMIC EXPOSURE MAY BE ASSOCIATED WITH RETROBULBAR OR OPTIC NEURITIS. OCCASIONALLY HEMORRHAGES IN RETINA AND CONJUNCTIVA OCCUR AND RARELY NEURORETINAL EDEMA AND PAPILLEDEMA HAVE ACCOMPANIED THE RETINAL HEMORRHAGES. HEMATOLOGICAL EFFECTS VARY WIDELY AND MAY APPEAR AFTER A FEW WEEKS OR MANY YEARS OF EXPOSURE OR EVEN MANY YEARS AFTER EXPOSURE HAS CEASED. THE DEGREE OF EXPOSURE BELOW WHICH NO BLOOD EFFECTS WILL OCCUR CANNOT BE ESTABLISHED WITH CERTAINTY. IN THE EARLY STAGES, THERE MAY BE BLOOD CLOTTING DEFECTS DUE TO MORPHOLOGICAL, FUNCTIONAL AND QUANTITATIVE PLATELET ALTERATION WITH RESULTANT BLEEDING FROM THE NOSE AND GUMS, EASY BRUISING AND PETECHIAE; LEUKOPENIA WITH PREDOMINANT LYMPHOCYTOPENIA OR NEUTROPENIA; AND ANEMIA WHICH MAY BE NORMOCHROMIC OR MACROCYTIC AND HYPOCHROMIC. EXTRAMEDULLARY HEMATOPOIESIS, SPLENOMEGALY, CIRCULATING IMMATURE MARROW CELLS, AND AN INITIAL INCREASE IN LEUKOCYTES, ERYTHROCYTES AND PLATELETS HAVE ALSO BEEN REPORTED. THE BONE MARROW MAY BE HYPER-, HYPO- OR NORMOPLASTIC AND DOES NOT ALWAYS CORRELATE WITH THE PERIPHERAL BLOOD PICTURE. ALSO, THE SYMPTOMS DO NOT ALWAYS PARALLEL THE LABORATORY FINDINGS. IF TREATED AT THIS STAGE, THE EFFECTS APPEAR REVERSIBLE, ALTHOUGH RECOVERY MAY BE PROTRACTED AND THERE MAY BE RELAPSES. DECREASED ERYTHROCYTE SURVIVAL, HEMOLYSIS, CAPILLARY FRAGILITY, INTERNAL HEMORRHAGES, IRON METABOLISM DISTURBANCES, AND HYPERBILIRUBINEMIA HAVE ALSO BEEN REPORTED. EXPOSURE TO HIGH LEVELS FOR LONGER PERIODS MAY RESULT IN APLASIA AND FATTY-DEGENERATION OF THE BONE MARROW WITH PANCYTOPENIA. THE MOST SERIOUS CASES OF APLASTIC ANEMIA MAY BE FATAL DUE TO HEMORRHAGE AND INFECTION; DEATH MAY OCCUR WITHIN 3 MONTHS OF DIAGNOSIS. ENORMOUS VARIABILITY IN INDIVIDUAL RESPONSE, INCLUDIN NON-DOSE DEPENDENT APLASIA, AND THE FINDING OF EOSINOPHILIA SUGGESTS THAT, IN SOME CASES, THE BLOOD DYSCRASIA MAY PARTIALLY BE AN ALLERGIC REACTION. NUMEROUS CASE REPORTS AND SERIES HAVE SUGGESTED A RELATIONSHIP BETWEEN EXPOSURE TO BENZENE AND THE OCCURRENCE OF VARIOUS TYPES OF LEUKEMIA. SEVERAL CASE-CONTROL STUDIES HAVE ALSO SHOWN INCREASED ODDS RATIOS FOR EXPOSURE TO BENZENE, BUT MIXED EXPOSURE PATTERNS AND POORLY DEFINED EXPOSURES RENDER THEIR INTERPRETATION DIFFICULT. THREE INDEPENDENT COHORT STUDIES HAVE DEMONSTRATED AN INCREASED INCIDENCE OF ACUTE NONLYMPHOCYTIC LEUKEMIA IN WORKERS EXPOSED TO BENZENE. SEVERAL STUDIES HAVE ALSO SUGGESTED A LINK BETWEEN OCCUPATIONAL EXPOSURE AND MULTIPLE MYELOMA AND LYMPHOMA, BOTH HODGKIN'S AND NONHODGKIN'S. ALTHOUGH APLASTIC ANEMIA IS PROBABLY THE MORE LIKELY CONSEQUENCE OF LONGTERM EXPOSURE, IT IS NOT UNCOMMON FOR AN INDIVIDUAL SURVIVING THIS, TO GO THROUGH A PRELEUKEMIC PHASE INTO FRANK LEUKEMIA. CONVERSELY, LEUKEMIA WITHOUT PRECEDENT APLASTIC ANEMIA CAN OCCUR. IN ONE STUDY THE RANGE OF TIME FROM THE START OF THE EXPOSURE TO THE DIAGNOSIS OF LEUKEMIA WAS 3 24 YEARS. IT HAS BEEN SUGGESTED THAT THE CHROMOSOMAL ABERRATIONS WHICH CAN ARISE IN PERIPHERAL BLOOD AND BONE MARROW CELLS AND PERSIST FOR A LONG TIME AFTER EXPOSURE CEASES, MAY BE ASSOCIATED WITH THE INCREASED INCIDENCE OF LEUKEMIA. THE IMMUNOSUPPRESSIVE EFFECT HAS ALSO BEEN SUGGESTED AS BEING ASSOCIATED WITH THE LEUKEMOGENESIS. ADVERSE EFFECTS ON THE IMMUNOLOGICAL SYSTEM HAVE BEEN SHOWN TO MAKE RABBITS MORE SUSCEPTIBLE TO TUBERCULOSIS AND PNEUMONIA AND MAY EXPLAIN WHY THE TERMINAL EVENT IN SOME CASES OF BENZENE INTOXICATION MAY BE OVERWHELMING INFECTION. EXPOSED MICE EXHIBITED A TENDENCY TOWARD INDUCTION OF LYMPHOID

[illegible] CARCINOMAS AT VARIOUS SITES. MENSTRUAL DISTURBANCES HAVE BEEN REPORTED MORE FREQUENTLY IN EXPOSED WOMEN. TESTICULAR DAMAGE HAS BEEN REPORTED IN RATS, RABBITS AND GUINEA PIGS. SOME ANIMAL STUDIES HAVE DEMONSTRATED EMBRYO/FETOTOXICITY, SOMETIMES AT LEVELS AS LOW AS 10 PPM AND THE POTENTIAL FOR TERATOGENIC EFFECTS SUCH AS DECREASED BODY WEIGHT AND SKELETAL VARIANTS, HAVE ALSO BEEN SHOWN. OTHER STUDIES HAVE NOT PRODUCED ANY ABNORMALITIES OR EMBRYOLETHALITY.

FIRST AID: REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT.
BENZENE.
IRRITANT.
ACUTE EXPOSURE: DIRECT CONTACT MAY CAUSE IRRITATION. EFFECTS MAY INCLUDE ERYTHEMA, A BURNING SENSATION, AND WITH PROLONGED CONTACT, BLISTERING AND EDEMA. UNDER NORMAL CONDITIONS, SIGNIFICANT SIGNS OF SYSTEMIC TOXICITY ARE UNLIKELY FROM SKIN CONTACT ALONE DUE TO THE SLOW RATE OF ABSORPTION; IT MAY HOWEVER, CONTRIBUTE TO THE TOXICITY FROM INHALATION. APPLICATION TO GUINEA PIGS RESULTED IN INCREASED DERMAL PERMEABILITY.
CHRONIC EXPOSURE: REPEATED OR PROLONGED CONTACT DEFATS THE SKIN AND MAY RESULT IN DERMATITIS WITH ERYTHEMA, SCALING, DRYNESS, VESICULATION, AND FISSURING, POSSIBLY ACCOMPANIED BY PARESTHESIAS OF THE FINGERS WHICH MAY PERSIST [illegible] AFTER THE DERMATITIS SUBSIDES. PERIPHERAL NEURITIS HAS ALSO BEEN REPORTED. SECONDARY INFECTIONS MAY OCCUR. TESTS ON GUINEA PIGS INDICATE SENSITIZATION IS POSSIBLE. ALTHOUGH ANIMAL STUDIES HAVE FAILED TO ESTABLISH A RELATIONSHIP BETWEEN SKIN CONTACT AND A CARCINOGENIC EFFECT, MOST OF THE STUDIES WERE INADEQUATE; SOME PAPILLOMAS AND HEMATOPOIETIC EFFECTS HAVE BEEN REPORTED.

FIRST AID: REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT.
BENZENE.
IRRITANT.
ACUTE EXPOSURE: [illegible] MAY CAUSE IRRITATION. VAPOR CONCENTRATIONS OF 3000 PPM ARE VERY [illegible] IRRITATING, EVEN ON BRIEF EXPOSURE. DROPLETS CAUSE A MODERATE BURNING [illegible] SENSATION, BUT ONLY A SLIGHT, TRANSIENT CORNEAL EPITHELIAL INJURY WITH RAPID RECOVERY.
CHRONIC EXPOSURE: REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS. [illegible] OF CATS EXPOSED TO 50 PPM FOR MORE THAN 600 HOURS DEVELOPED CATARACTS.

FIRST AID: WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15 TO 20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
BENZENE:
NARCOTIC/CARCINOGEN.

MOUTH, THROAT AND STOMACH, AND HEMORRHAGIC INFLAMMATORY LESIONS OF THE MUCOUS MEMBRANES IN CONTACT WITH THE LIQUID. SIGNS AND SYMPTOMS OF SYSTEMIC INTOXICATION MAY INCLUDE NAUSEA, VOMITING, HEADACHE, DIZZINESS, WEAKNESS, STAGGERING, CHEST PAIN AND TIGHTNESS, SHALLOW, RAPID PULSE AND RESPIRATION, BREATHLESSNESS, PALLOR FOLLOWED BY FLUSHING, AND A FEAR OF IMPENDING DEATH. THERE MAY BE VISUAL DISTURBANCES, TREMORS, CONVULSIONS, VENTRICULAR IRREGULARITIES, AND PARALYSIS. EXCITEMENT, EUPHORIA OR DELIRIUM MAY PRECEDE WEAKNESS, FATIGUE, SLEEPINESS AND FOLLOWED BY STUPOR AND UNCONSCIOUSNESS, COMA AND DEATH FROM RESPIRATORY FAILURE. THOSE WHO SURVIVE THE CENTRAL NERVOUS SYSTEM EFFECTS MAY DEVELOP BRONCHITIS, PNEUMONIA, PULMONARY EDEMA, AND INTRAPULMONARY HEMORRHAGE. ASPIRATION MAY CAUSE IMMEDIATE PULMONARY EDEMA AND HEMORRHAGE. THE USUAL LETHAL DOSE IN HUMANS IS 10 TO 15 MILLILITERS, BUT SMALLER AMOUNTS HAVE BEEN REPORTED TO CAUSE DEATH. A SINGLE EXPOSURE MAY PRODUCE LONGTERM EFFECTS WITH PANCYTOPENIA PERSISTING UP TO A YEAR.

CHRONIC EXPOSURE. DAILY ADMINISTRATION TO HUMANS OF 2-5 GRAMS IN OLIVE OIL CAUSED HEADACHE, VERTIGO, BLADDER IRRITABILITY, IMPOTENCE, GASTRIC DISTURBANCES, AND EVIDENCE OF RENAL CONGESTION. IN FEMALE RATS TREATED WITH [illegible] SINGLE DAILY DOSES OVER 182 DAYS, NO EFFECTS WERE OBSERVED AT [illegible] AND LEUKOPENIA AT 10 MG/KG; AND BOTH LEUKOPENIA AND ANEMIA AT [illegible] MG/KG. ORAL ADMINISTRATION TO RATS AND MICE AT VARIOUS DOSE LEVELS INDUCED NECROSIS AT MULTIPLE SITES IN MALES AND FEMALES. IN A ONE YEAR FEEDING STUDY, RATS GIVEN 50 OR 250 MG/KG, 4-5 DAYS/WEEK FOR 52 WEEKS DID NOT EXHIBIT ACUTE OR SUBACUTE TOXIC EFFECTS, BUT A DOSE CORRELATED INCREASE OF LEUKEMIAS AND MAMMARY CARCINOMAS WAS OBSERVED; SOME OTHER TUMOR TYPES WERE ALSO REPORTED. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

FIRST AID: EXTREME CARE MUST BE USED TO PREVENT ASPIRATION. GASTRIC LAVAGE WITH A CUFFED ENDOTRACHEAL TUBE IN PLACE TO PREVENT FURTHER ASPIRATION SHOULD BE DONE WITHIN 15 MINUTES. IN THE ABSENCE OF DEPRESSION OR CONVULSIONS OR IMPAIRED GAG REFLEX, EMESIS CAN ALSO BE INDUCED USING SYRUP OF IPECAC WITHOUT INCREASING THE HAZARD OF ASPIRATION (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GASTRIC LAVAGE SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:
BENZENE:
ACIDS (STRONG): INCOMPATIBLE.
ALLYL CHLORIDE WITH DICHLOROETHYL ALUMINUM OR ETHYLALUMINUM SESQUICHLORIDE: POSSIBLE EXPLOSION.
ARSENIC PENTAFLUORIDE + POTASSIUM METHOXIDE: EXPLOSIVE INTERACTION.
BASES (STRONG): INCOMPATIBLE.
BROMINE + IRON: INCOMPATIBLE.
BROMINE PENTAFLUORIDE: FIRE AND EXPLOSION HAZARD.
BROMINE TRIFLUORIDE: POSSIBLE EXPLOSION OR IGNITION.
CHLORINE: EXPLOSION IN THE PRESENCE OF LIGHT.

[illegible] REACTION WITH POSSIBLE EXPLOSION.
CHROMIC ANHYDRIDE (POWDERED): IGNITION.
DIBORANE: [illegible]ANEOUSLY EXPLOSIVE REACTION IN AIR.
DIOXYGEN DIFLUORIDE: IGNITION, EVEN AT REDUCED TEMPERATURES.
DIOXYNITRYL TETRAFLUOROBORATE: IGNITION REACTION.
INTERHALOGEN COMPOUNDS: IGNITION OR EXPLOSION.
IODINE HEPTAFLUORIDE: IGNITION ON CONTACT.
IODINE PENTAFLUORIDE: VIOLENT INTERACTION ABOVE 50 C.
NITRIC ACID: VIOLENT OR EXPLOSIVE UNLESS PROPERLY AGITATED AND COOLED.
NITRYL [illegible]ORATE: EXPLOSIVE INTERACTION.
[illegible]: FIRE AND EXPLOSION HAZARD.
OXYGEN [illegible]: EXPLOSIVE MIXTURE.
OZONE: FORMATION OF EXPLOSIVE GELATINOUS OXONIDE.
PERCHLORATES (METALS): FORMATION OF EXPLOSIVE COMPLEX.
PERCHLORYL FLUORIDE + ALUMINUM CHLORIDE: FORMATION OF SHOCK SENSITIVE COMPOUND.
PERMANGANATES + SULFURIC ACID: POSSIBLE EXPLOSION.
PERMANGANIC ACID: EXPLOSION HAZARD.
PEROXOMONOSULFURIC ACID: EXPLOSION HAZARD.
PEROXOMONOSULFURIC ACID: EXPLOSIVE INTERACTION.
POTASSIUM PEROXIDE: IGNITION.
SILVER PERCHLORATE: FORMATION OF EXPLOSIVE COMPLEX..
SODIUM PEROXIDE + WATER: IGNITION.
URANIUM HEXAFLUORIDE: VIOLENT REACTION.

DECOMPOSITION
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON.

POLYMERIZATION
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL [illegible] AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

''STORAGE''

STORE IN ACCORDANCE WITH 29 CFR 1910.106.

BONDING AND GROUNDING: SUBSTANCES WITH LOW ELECTROCONDUCTIVITY, WHICH MAY BE IGNITED BY ELECTROSTATIC SPARKS, SHOULD BE STORED IN CONTAINERS WHICH MEET THE BONDING AND GROUNDING GUIDELINES SPECIFIED IN NFPA 77 1982, RECOMMENDED PRACTICE ON STATIC ELECTRICITY.

PROTECT AGAINST PHYSICAL DAMAGE. OUTSIDE OR DETACHED STORAGE IS PREFERABLE. INSIDE STORAGE SHOULD BE IN A STANDARD FLAMMABLE LIQUIDS STORAGE ROOM OR CABINET. SEPARATE FROM OXIDIZING MATERIALS (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

''DISPOSAL''

DISPOSAL ... IS IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDS ... 40CFR 262. EPA HAZARDOUS WASTE NUMBER U019.

BENZENE REGULATORY LEVEL: 0.5 MG/L
MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262 ... EPA HAZARDOUS WASTE NUMBER D018.

CONDITIONS TO AVOID

AVOID CONTACT WITH HEAT, SPARKS, FLAMES, OR OTHER SOURCES OF IGNITION. VAPORS MAY BE EXPLOSIVE. AVOID OVERHEATING OF CONTAINERS; CONTAINERS MAY VIOLENTLY RUPTURE IN HEAT OR FIRE. AVOID CONTAMINATION OF WATER SOURCES.

SPILL AND LEAK PROCEDURES

SOIL SPILL:
... AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.
DIKE ... SPILLED MATERIAL USING SOIL OR SANDBAGS OR FOAMED BARRIERS SUCH AS POLY ... OR CONCRETE.
USE SEMI- ... POWDER, FLY ASH, SAWDUST OR COMMERCIAL SORBENT TO ABSORB BULK LIQUID.
REDUCE VAPOR AND FIRE HAZARD WITH FLUOROCARBON WATER FOAM.

AIR SPILL:
KNOCK DOWN VAPORS WITH WATER SPRAY. KEEP UPWIND.

WATER SPILL:
LIMIT SPILL MOTION AND DISPERSION WITH NATURAL BARRIERS OR OIL SPILL CONTROL BOOMS.
APPLY DETERGENTS, SOAPS, ALCOHOLS OR ANOTHER SURFACE ACTIVE AGENT TO THICKEN SPILLED MATERIAL.
APPLY UNIVERSAL GELLING AGENT TO IMMOBILIZE TRAPPED SPILL AND INCREASE EFFICIENCY OF REMOVAL.
IF DISSOLVED, APPLY ACTIVATED CARBON AT TEN TIMES THE SPILLED AMOUNT IN THE REGION OF 10 PPM OR GREATER CONCENTRATION.
USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.
USE DREDGES OR LIFTS TO EXTRACT IMMOBILISED MASSES OF POLLUTION AND PRECIPITATES.

OCCUPATIONAL SPILL:
SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA. REST UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND RESTRICT ENTRY.

REPORTABLE QUANTITY (RQ): 1000 POUNDS
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424 8802 OR (202) 426-2675 IN THE

PROTECTIVE EQUIPMENT

VENTILATION.
PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET THE PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

GENERAL.
VENTILATION SHOULD MEET THE REQUIREMENTS IN 29 CFR 1910.1000(f).

RESPIRATOR.
THE FOLLOWING RESPIRATORS ARE THE MINIMUM LEGAL REQUIREMENTS AS SET FORTH BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION FOUND IN 29 CFR 1910, SUBPART I.

ESCAPE.

CONCENTRATION.	REQUIRED RESPIRATOR:
LESS THAN OR EQUAL TO 10 PPM	HALF MASK AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE.
LESS THAN OR EQUAL TO 50 PPM	FULL FACEPIECE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGES. FULL FACEPIECE GAS MASK WITH CHIN STYLE CANISTER.
LESS THAN OR EQUAL TO 100 PPM	FULL FACEPIECE POWERED AIR PURIFYING RESPIRATOR WITH ORGANIC VAPOR CANISTER.
LESS THAN OR EQUAL TO 1000 PPM	SUPPLIED AIR RESPIRATOR WITH FULL FACEPIECE IN POSITIVE PRESSURE MODE.
GREATER THAN 1000 PPM OR UNKNOWN CONCENTRATION	SELF CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE IN POSITIVE PRESSURE MODE. FULL FACEPIECE POSITIVE PRESSURE SUPPLIED AIR RESPIRATOR WITH AUXILIARY SELF CONTAINED AIR SUPPLY.
ESCAPE	ANY ORGANIC VAPOR GAS MASK. ANY SELF CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE.
FIREFIGHTING	FULL FACEPIECE SELF CONTAINED BREATHING APPARATUS IN POSITIVE PRESSURE MODE.

THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO CHEMICAL HAZARDS OR NIOSH CRITERIA DOCUMENTS.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION.

AT ANY [illegible] CONCENTRATION.

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.
SUPPLIED AIR RESPIRATOR WITH FULL FACEPIECE OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE: AIR PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN STYLE OR FRONT OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ESCAPE TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

ANY SELF CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

ANY SUPPLIED AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT RELEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

BENZENE:
PROTECTIVE CLOTHING SHOULD MEET THE REQUIREMENTS FOR PERSONAL PROTECTIVE EQUIPMENT IN 29 CFR 1910.1028(H).

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

BENZENE:
PROTECTIVE GLOVES SHOULD MEET THE REQUIREMENTS FOR PERSONAL PROTECTIVE EQUIPMENT IN 29 CFR 1910.1028(H).

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

BENZENE:
PROTECTIVE WORK EQUIPMENT SHOULD MEET THE REQUIREMENTS FOR PROTECTIVE CLOTHING AND EQUIPMENT IN 29 CFR 1910.1028(H).

ADDITIONAL INFORMATION

THIS INFORMATION IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, WE MAKE NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO SUCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION FOR THEIR PARTICULAR PURPOSES.

APPENDIX E

RECORD OF HAZARDOUS WASTE ACTIVITY

RECORD OF HAZARDOUS WASTE ACTIVITY

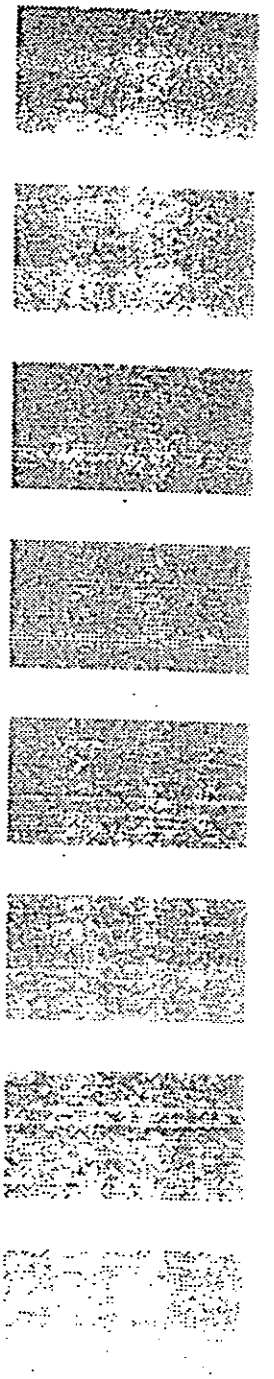
CLIENT;					PROJ. NO.:
LOCATION:					DATE:
PROJ. MGR.:					SITE ENG.:
SITE HEALTH & SAFETY OFFICER:					
		DAYS AT THE SITE IN:			
NAME	TOTAL DAYS ON-SITE	LEVEL A/B	LEVEL C	LEVEL D	JOB FUNCTION

APPENDIX F

INCIDENT INVESTIGATION REPORT

INCIDENT INVESTIGATION REPORT

Form 00892



Instructions for Completing the Incident Investigation Report

Form 00892

PURPOSE

The purpose of this form is to document an injury or non-injury incident and to help in the Company's continuous improvement efforts to prevent injuries.

INSTRUCTIONS

- **For Employee Incidents (full or part time)**

The first 5 Sections must be completed for any work-related incident involving a Duke Power employee during work. (A separate form must be completed for each employee injured in a multiple-injury incident.) Depending on the injury's severity, Section 6 may also have to be completed for Risk Management to appropriately file for worker's compensation benefits. Answer all questions as completely and specifically as possible. If no answer is available or the question does not apply, indicate so on the form. Attach supplementary pages for additional details, drawings, and sketches as needed. Send copies of the completed form, with any attachments, to the appropriate SIMS data enterer and worker's compensation coordinator. If an injury/illness results in a doctor visit, emergency room visit or other outside expense, send a copy of the completed form to Risk Management Department, PB05A.

If the employee is hospitalized or fatally injured, do not complete sections 3, 4, 5, or 6. Contact Risk Management immediately at 382-8296 or 382-8287 (Fax: 382-1241).

- **For Suppliers**

The first 5 Sections of this report should be completed, and entered on the SIMS system OR contractor should complete modified IIR and mail to the appropriate Duke contact person as directed by contractor management.

Do not complete Section 6.

Do not contact Risk Management for this type incident unless it involves a contractor/vendor being admitted to the hospital or if a fatality occurs.

In either of these situations, follow the directions for public incident. Do not complete any other sections of this report.

- **For Public Incidents Occurring On Duke Premises Or Jobsites**

Only Duke Power personnel should fill out the following portions of the IIR.

Section 1 — 1, 3, 5, 6, 8, 13, 15, 18, 19, 20, 21, 23, 24, 25, 26

Section 2 — 28, 29, 30, 31, 32, 33, 34

STOP! Do not fill out any other lines on the IIR. Contact Risk Management and follow their direction.

EXPLANATIONS:

Date of Incident: For an injury, near-misses, flashes, etc., the Date of Incident should be the date the incident occurred. For illnesses, the Date of Incident should be the date of diagnosis of the condition. Diagnosis does not necessarily have to be made by a physician. For STS cases, the Date of Incident is the date of the annual audiogram, not the retest date to verify the STS.

BLS CODE: Classify the injury according to the OSHA classification system (Bureau of Labor Statistics) listed below. If you have questions about this classification system, contact your safety professional.

F(1) FOR RECORD ONLY — Usually used for standard threshold shifts that turn out not to be shifts and other cases where a work relationship cannot be established.

N(2) NON-RECORDABLE — Injury requiring some care, but under the guidelines is not significant enough to be classified as a recordable incident. Normally, the injured person receives care from a medical professional; however, the care is more for diagnostic procedures (e.g., x-ray), for the reduction of pain (e.g., single dose of pain medication), or for the relief of discomfort (e.g., single dose of Benadryl or Cortisone after an insect bite or sting). Tetanus shots are also classified as non-recordable care, since they are not actual treatment but rather preventive.

R(3) RECORDABLE — Significant injury requiring professional medical attention (e.g., treatment of second or third degree burns, application of sutures, administration of prescription medication other than a single dose, admission to a hospital for treatment, not just observation). All work-related illnesses are recordable regardless of medical treatment.

LR(4) LOST TIME-RESTRICTED ACTIVITY — Employee is able to return to work, but the injury or illness prevents complete fulfillment of job requirements beyond the day of the incident (e.g., a Line Technician is treated for a knee injury, is released by the doctor to return to work, but cannot climb poles (part of the normal job assignment) for a specific period of time because of the injury).

LWCDAW(5) LOST WORKDAY CASE DAYS AWAY FROM WORK — Injury or illness is so serious that the employee cannot report to work on the next scheduled workday after the day of the incident. (This does not include the day of the incident.) The case must be classified as LWCDAW if:

- One day is missed.
- The employee is injured to such an extent that he/she can return but cannot perform productive work.

Fatality(6) If employee dies

First aid case(7) Employee not sent to doctor or outside medical facilities

Near miss incident(8) A "near-miss," also called a "close call," is any work-related incident that did not result in any bodily injury but had the potential of bodily injury if circumstances such as worker positioning, timing, etc. had been different. The supervisor of the employee involved must complete an Incident Investigation Report (IIR).

Electrical flash with no injury(9) Had an electrical flash, but no injury occurred.

Code: After an annual audiogram, if a Standard Threshold Shift (STS) is indicated, it must be entered into the Safety Information Management System (SIMS) as a pending (P) case. OSHA allows employers a maximum of 30 calendar days to retest the individual to verify the STS. If after retest the STS still exists, then the record must be updated to confirmed (C). If after retest no hearing loss is indicated, then the record must be updated to (N) for "no STS." Pending (P) and Confirmed (C) STS cases must carry a BLS Code of R(3). "No STS" (N) cases must be updated to F(1). The retest date must be entered into the STS Retest Date field.

SECTION 1

1-6. Self-explanatory

7. Best estimate

8-9. Self-explanatory

10. Job title (e.g., personnel assistant, distribution line tech., control room operator). Job class code is the same as the employee's OCC code.

11. If the injured was working out of his/her normal job assignment, list that job code.

12. Best estimate or defined period from doctor (See the definition of restricted activity under BLS class guidelines.)

13. Self-explanatory

14. Total number of months in the classification involved in the incident.

15. This is a 4-digit responsibility number that does not begin with a zero and comes from the Responsibility Reporting Rollup Table. The approval numbers are in BookManager for each site.

16. This is a 4-digit responsibility number that does not begin with a zero and comes from the Responsibility Reporting Rollup Table.

17. Full department name

18. Normally used in nuclear facilities

19a. Three-digit code normally used by PG locations

19b. Indicate whether the incident occurred during an outage situation. For Customer Operations or Power Delivery, outage means storm duty or other abnormal conditions.

20. Be as specific as possible (e.g., Duke Power Building, 422 South Church Street, Charlotte, NC, 4th floor, room 416; Dan River Steam Station, Transfer House, 3rd level, adjacent to belt #2; 230 KV Transmission tower #8 between Riverbend and Marshall Stations; McGuire Nuclear Station, #1 turbine building, column line BB-21, west side of column).

21. If there is any known or possible connection, be as specific as possible. If incident occurred indoors, specify. If outdoors, list temperature, humidity (if known), wind conditions, rain, fog, etc. Estimate if not known.

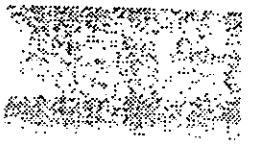
22. All recordable incidents in the injured's working career with Duke Power.

23. Were you seen by a doctor or other medical professional for this injury? If yes, list doctor's name, address, and phone number.

24. Were you ADMITTED to the hospital (not just visiting the emergency room)? If yes, hospital's name and address.

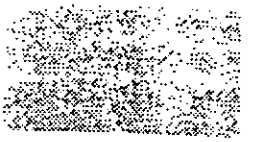
25-26. Self-explanatory

SECTION 2



LINES 27-35 ARE TO BE HANDWRITTEN BY INJURED EMPLOYEE, IF POSSIBLE.

27. In the injured employee's own words, describe what happened as completely and specifically as possible. What were you doing at the time of the incident? What relevant events immediately preceded the incident? What objects, substances, or equipment were involved? List anything else potentially relevant.

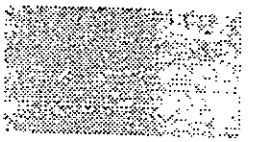


28. Injured employee relates the first time he/she knew there was an on-the-job injury.

29. In the injured employee's own words, describe exactly the kind of injury (e.g., laceration to right hand, broken lower left leg, strained lower back). It's important to use "right," "left," "big toe," "little toe," etc. here.

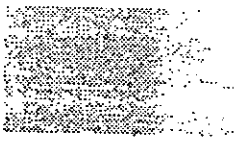
30-31. Self-explanatory

32. What was done immediately for the injury (e.g., wrapped injured hand in clean cloth, applied antiseptic)?

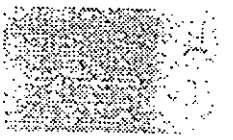


33. Exactly when did you tell your supervisor about this injury? Give best estimate if you can't remember exactly.

34. Check the body part(s) injured. Check a maximum of 6 as applicable, and list any part not listed on the "other" line.
Note: Back strains, sprains, etc. should be marked as [16] Back Strain. All other cuts, burns, etc. to the back should be marked as [32] Back (other).

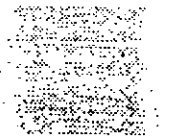


35-36. Self-explanatory



SECTION 3

37-40. Self-explanatory



41. Ergonomics: Ergonomic incidents are identified by a combination of certain triggers in Body Part Injured (Line 34), Type of Injury (Line 39) and Incident Type (Line 41). These triggers are identified by **bold-face** type in these sections of the IIR. Item 33 - Ergonomics in the Incident Type section (Line 41) must be checked whenever a **bold-faced** item is checked in <u>all three</u> sections (Body Part Injured, Type of Injury, Incident Type). If all three sections do not have a bold-faced item checked, then the incident is not ergonomically related and Item 33 should not be checked.

42. List the sequence of events leading to the incident. Example: A bursting steam line burns an employee's hand. Events preceding this event may have contributed to the incident. These events may be things that did not happen that should have happened. In the steam line bursting example, preceding events may have been excess pressure in the line. The pressure relief valve may have corroded shut, preventing the safe release of excess pressure. The corrosion may not have been discovered and corrected because a regular valve inspection and test was not carried out. The investigator should ask whether the occurrence or non-occurrence of any event permitted the incident to occur, regardless of whether it actually caused the incident.

43-45. Self-explanatory

46. Date investigation is completed (up to line 50).

47. This date will automatically be entered by system

48-51. Normally used by Power Generation Group; complete if applicable.

52-53. Self-explanatory

54. If the incident is an illness, place the appropriate OSHA illness code in this field.

OSHA Illness Codes:

7A: Occupational skin diseases or disorders
7B: Dust diseases of the lungs
7C: Respiratory conditions due to toxic agents
7D: Poisoning (systemic effects of toxic materials)
7E: Disorders due to physical agents
7F: Disorders associated with repeated trauma
7G: All other occupational illnesses

SECTION 4

55. List in order of importance any recommendations to prevent recurrence.

SECTION 5

Complete this section as soon as possible. If sufficient root cause analysis has not already been performed, list additional details about the actual root cause of the incident here along with the followup of each item recommended in Section 4. It is critical that each individual recommendation in Section 4 be addressed in Section 5. If a recommendation was not followed, explain in detail the rationale.

57. Area/location manager's signature and date.

SECTION 6

THE FOLLOWING QUESTIONS RELATE SPECIFICALLY TO WORKER'S COMPENSATION ISSUES.

58. Includes rights-of-way, parking lots, etc.

59-99. Self-explanatory. Fill out with best available answers.

If a particular question has no answer, or if the question doesn't apply, please specify in each applicable blank.

Risk Management will use the information in Section 6, with data from the other parts of the incident investigation form, to complete the necessary state Worker's Compensation forms. In North Carolina, a copy of the completed Worker's Compensation form must be given to the injured employee. A completed copy will be mailed to the Worker's Compensation Coordinator listed on line 94.

Reorder by ID No. 059400892

Form 00892 (R6-96)

Duke Power Company

INCIDENT INVESTIGATION REPORT

Instructions:
- For an injury/illness resulting in a doctor or emergency room visit: complete entire report.
- If the employee is hospitalized or fatally injured: contact Risk Management for instructions.
- For First Aid cases: complete all sections except Section 6.

For near-miss or non-injury flash incidents, complete only shaded areas of this report.

Date of Incident: ___ / ___ / ___
Time of Incident: ___ a.m. ___ p.m.
Social Security Number: ___-___-___
Supplier Tax ID Number ___
BLS Code: ☐ F(1) ☐ N(2) ☐ R(3) ☐ LR(4) ☐ LWCDAW(5) ☐ Fatality(6) ☐ First aid case(7)
☐ Near Miss(8)
☐ Electrical flash with no injury(9)
STS Code: ☐ P ☐ C ☐ N

Section 1

1a. Supplier Name (where applicable): ___

1b. Name of injured employee: *Last* ___ *First* ___ *M.I.* ___

2. Week day ___

3. Date of birth: mo/day/yr: ___ / ___ / ___

4. ☐ Straight time ☐ Overtime

5. Sex: ☐ M ☐ F

6. Fatality? ☐ Yes ☐ No

7. Probable length of disability in days: ___

8. Injured's phone # and home address: ___

9. Employment Date: ___

10. Employee's title and job class code: ___ / ___

11. Job class code at time of incident (if different than # 10) ___

12. Probable number of days restricted duty: ___

13. Employment category: ☐ Full-Time ☐ Part-Time ☐ Duke Temporary ☐ Contractor ☐ Public

14. Number of months employee has worked in job class involved in incident? ___ (enter 0 for less than 1 month)

15. Location code # where injury occurred: ___ ___ ___ ___

16. Claim Employee responsibility #: ___ ___ ___ ___

17. Department name: ___

18. Building/elevation (if applicable): ___

19a. Facility # (If applicable): ___ ___ ___

19b. Outage related: ☐ Yes ☐ No

20. Specific location of incident: ___

21. Weather conditions: ___

22. Number of previous recordable injuries/occupational illnesses: ___

23. Doctor consulted: ☐ Yes ☐ No If yes, doctor's name, address, and phone number: ___

24. Was employee admitted to hospital? ☐ Yes ☐ No If yes, name and address of hospital: ___

NOTE: IF LINE 23 OR LINE 24 IS ANSWERED YES, COMPLETE SECTION 6 OF THIS REPORT. IF NEITHER IS ANSWERED YES, OMIT SECTION 6.

25. Names and social security number of others injured in same incident (if applicable): ___

26. Names and addresses of witnesses: ___

Section 2

IF POSSIBLE, LINES 27-35 SHOULD BE HANDWRITTEN BY INJURED INVOLVED EMPLOYEE. EMPLOYEE AND SUPERVISOR MUST SIGN.

27. Employee description of how the incident happened. (Use additional sheet if necessary.) This item not entered into SIMS.

28. When did you first realize you were injured/ill? _____

29. Describe extent of injury: _____

30. If this was a sprain, strain or joint inflammation, were you in an awkward or strained position? ☐ Yes ☐ No

31. If this was a sprain, strain or joint inflammation, have you had a similar injury before? ☐ Yes ☐ No

If yes, what date? _____

32. Describe first aid rendered: _____

33. When did you tell your supervisor about the injury/illness? Date: _____ Time: _____a.m. _____p.m.

34. Body part injured * (check up to six):

[1] Brain	[2] Ear(s)	[3] Eye(s)	[4] Face	[5] Scalp
[6] Skull	[7] Head	[8] Nose	[9] Teeth	[10] Neck
[11] Arms	[12] Wrist	[13] Hand(s)	[14] Finger(s)	[15] Abdomen
[16] Back strain	[17] Chest	[18] Hip(s)	[19] Shoulder(s)	[20] Trunk
[21] Leg(s)	[22] Ankle(s)	[23] Foot (feet)	[24] Toe(s)	[25] Skin surface
[26] Digestive system	[27] Nervous system	[28] Circulatory system	[29] Excretory system	[30] Respiratory system
[31] Auditory system	[32] Back (other)	[33] Groin	[34] Knee	

[35] Other (list) _____

35. Injured's signature: _____ Date: _____

36. Supervisor in charge signature: _____ Date: _____

Section 3

TO BE FILLED OUT BY SUPERVISOR OR INVESTIGATOR

PRELIMINARY ASSESSMENT (SUBJECT TO FURTHER INVESTIGATION) — CHECK ALL BLOCKS THAT APPLY

37. Unsafe Action:

[1] Cleaning, oiling, adjusting, or repairing of moving, energized, or pressurized equipment
[2] Failure to use personal protective equipment/incorrect PPE
[3] Failure to wear safe personal attire
[4] Failure to secure or warn of observed hazardous situation or hazardous exposure
[5] Horseplay
[6] Improper use of equipment
[7] Improper use of hands or body parts
[8] Inattention to footing or surroundings
[9] Defeating/making safety devices inoperative
[10] Operation or working at unsafe speed
[11] Taking sustained or unsafe position or posture
[12] Result of preventable vehicle incident
[13] Unsafe placing, mixing, combining
[14] Failure to follow procedure
[15] Other (list) _____
[16] Over exertion
17] Failure to recognize hazard
[18] Improper positioning/placement of equipment/materials

38. Unsafe Condition:

[1] Poor ventilation and/or lighting
[2] Unsafe design and/or construction
[3] Poor and/or defective equipment
[4] Hazardous arrangement/storage
[5] Slip hazard (water, oil, mud, etc.)
[6] Chemical leak/spill
[7] Hot uninsulated surface
[8] Pinch hazard
[9] Trip/bump hazard
[10] Inadequately guarded machine
[11] No procedure
[12] Procedure less than adequate
[13] Specific procedure not available
[14] Hazardous exposure (chemicals, poison ivy, etc.)
[15] Other (list) _____
[16] Poor visibility
[17] Animal/insect

39. Type of Injury/Illness: (Check all that apply; circle primary type)

[1] Amputation
[2] Asphyxia
[3] Burn or scald (heat)
[4] Burn (chemical)
[5] Concussion
[6] Contagious disease
[7] Contusion
[8] Crushing/pinching
[9] Bruise/cut/laceration
[10] Puncture/open wound
[11] Dermatitis/skin irritation/rash
[12] Dislocation
[13] Electric shock
[14] Electrocution
[15] Fracture
[16] Freezing/frostbite
[17] Hearing loss/impairment
[18] Heat stroke/sunstroke/heat cramps, heat exhaustion
[19] Hernia
[20] Rupture
[21] Inflammation or irritation of joints/tendonitis
[22] Poisoning
[23] Asbestosis, silicosis, etc.
[24] Scratches
[25] Abrasions (superficial wounds)
[26] Sprains/strains
[27] Other (list) _____
[28] Bloodborne pathogens contact
[29] Chronic muscle or joint pain
[30] Flashburn/eye irritation
[31] Animal/insect bite/sting
[32] Respiratory irritation

40. Source of Injury/Illness: (Check all that apply; circle primary source)

[1] Air pressure
[2] Animals/insects
[3] Bodily position or motion
[4] Boxes/containers
[5] Buildings/structures
[6] Chemicals/chemical compounds
[7] Clothing/apparel/shoes
[8] Coal/petroleum products
[9] Cold (atmospheric or environmental)
[10] Conveyors
[11] Drugs/medicine
[12] Electrical apparatus (overhead/underground)
[13] Electrical flame/fire/smoke
[14] Electrical flash (list voltage _____)
[15] Electrical contact (list voltage _____)
[16] Furniture/furnishings/fixtures
[17] Office equipment
[18] Glass items
[19] Hand tools (not powered)
[20] Hand tools (powered)
[21] Heat (atmospheric or environmental)
[22] Heating equipment
[23] Hoisting or lifting apparatus/valves/chains
[24] Infectious agents
[25] Insulation fibers
[26] Knives/sharp instruments
[27] Ladders
[28] Liquids
[29] Mechanical power transmission apparatus
[30] Metal items
[31] Noise
[32] Particles
[33] Plants/trees/vegetation
[34] Pumps/prime movers
[35] Radiation substances and equipment
[36] Soaps/detergents/cleaning compounds
[37] Open neutral
[38] Loose/corroded connector
[39] Capacitor/transformer failure
[40] Single phase
[41] Low/down wire
[42] Line in tree
[43] Voltage imbalance
[44] Underground cable failure
[45] Other (list) _____
[46] Dog bite
[47] Hot/cold surface
[48] Walking surface

41. Incident Type: (Check all that apply; circle primary type)

[1] Hand tool/machinery in use [2] Falling/flying/rolling object [3] Object(s) being handled
[4] Broken object(s) [5] Sharp object(s) [6] Equipment failure
[7] Lifting [8] Pushing/pulling [9] Holding/carrying
[10] Reaching/bending [11] Climbing/descending [12] Leaning/twisting
[13] Fall on same level [14] Fall from elevation [15] Slipped, did not fall
[16] Welding operation [17] Foreign body in eye [18] Explosion/flareback
[19] Sports injury [20] Caught in/under/between [21] Rubbed or abraded
[22] Bodily reaction [23] Overexertion [24] Contact with elec. current (any voltage)
[25] Contact with temp. extremes [26] Contact with radiation [27] Caustics/toxic/noxious materials
[28] Motor vehicle incident [29] Other
[30] Animal/insect bite/sting [31] Repetitive motion [32] Sustained awkward position
[33] Ergonomic (see instructions)

42. Incident description. Describe the sequence of events leading up to the incident. (Use additional sheet if necessary; attach sketch if needed for explanation.) Enter into SIMS:

43. At the time of incident, supervisor in charge (name and social security number): _____

_____

44. Base supervisor's name and social security number, if different than line 43: _____

_____

45. How often does the injured or involved employee perform this specific task?

☐ once a month or more ☐ once a quarter ☐ once a year ☐ less than once a year

46. Date Incident Investigation Report (IIR) completed _____

47. Date incident information entered on SIMS: _____

IF APPLICABLE, COMPLETE. (NORMALLY USED BY PGG)

48. Written work request #: _____ 49. PIP #: _____

50. Incident occurred on which shift: ☐ A ☐ B ☐ C ☐ D ☐ E

51. Last date trained for task: _____

52. Investigator's name (printed): _____

53. Supervisor's or investigator's signature: _____ Date: _____

OSHA illness code ___ ___ (See instructions for Code list.)

Note: OSHA Illness Code is required for STS, poison ivy, cumulative trauma disorder, respiratory illnesses, skin disorders, etc.

Section 4

55. **Recommendations to prevent recurrence:** Be as specific as possible. Use additional sheet, if necessary. Include findings from Root Cause Analysis if done. Root cause analysis is required for all fatalities, hospitalizations, lost workday cases and serious near misses. For information on root cause analysis, refer to "Occupational Injury Root Cause Analysis Process" manual (Reorder No. 0594413719 in Office Supply).

Section 5

FOLLOW-UP TO RECOMMENDATIONS

Management completes this section and forwards it to the appropriate person for data entry into the SIMS data base. List follow-up actions taken to respond to recommendations listed above. This section MUST be completed for all recommendations made.

Was a root cause analysis done on this incident? ☐ Yes ☐ No Date completed: _____

If so, what root cause method was used?

☐ Rohm & Haas

☐ FPI

☐ [redacted]0

57. Manager's Signature: _____ Date: _____

Section 6

COMPLETE THIS SECTION ONLY IF EMPLOYEE WAS TREATED BY A MEDICAL PROFESSIONAL. (NOTE: TREATED BY MEDICAL PROFESSIONAL INCLUDES TRIP TO HOSPITAL)

58. Did the incident occur on employer's premises? ☐ Yes ☐ No

59. Where injury occurred. Plant: _____
City: _____
County: _____
State or province: _____ Country: _____

60. If this is a lost workday case, date disability began: _____

61. Was injured paid in full for the day of the incident? ☐ Yes ☐ No

62. Is injured ☐ Single ☐ Married ☐ Divorced ☐ Widowed

63. Injured's nationality: _____

64 Number of children under 18: _____

65. Occupation when injured: _____

66. Was this his/her regular occupation? ☐ Yes ☐ No

67. If line 66 is no, list department or branch of work regularly employed in: _____

68. Number of hours worked per day: _____

69. Number of days worked per week: _____

70. Wages per hour $ _____

71. Wages per day $ _____

72. Wages per week $ _____

73. If board, lodging, fares, or other advantages were furnished in addition to wages, estimated value per week $ _____

74. Value per month $ _____

75. Machine, tool, substance, or object most closely connected with the accident: _____

76. Kind of power (e.g., hand, foot, electrical, steam): _____

77. Part of machine on which injury occurred: _____

78. Was safety appliance or regulation provided? ☐ Yes ☐ No

79. Was safety appliance or regulation in use at the time of the incident? ☐ Yes ☐ No

80. In what way, if any, was the machine, tool, or object defective? _____

81. How could the injured have prevented the accident? _____

82. First date of medical treatment: _____

83. Has employee returned to work? ☐ Yes ☐ No

84. If yes, give date: _____

85. At what weekly wage did he/she return? $ _____

86. Are you continuing the employee's salary in full? ☐ Yes ☐ No

87. At what occupation? _____

88. If fatally injured, date of death: _____

89. In case of death, name and address of nearest relative: _____

90. Date of this report: _____

91. Report completed by (signature): _____

92. Name typed: _____

93. Official position of person completing report: _____

94. Worker's comp. coordinator: _____

95. SS # _____

96. Worker's comp. coordinator phone #: _____

97. Worker's comp. case to be filed in which state? ☐ NC ☐ SC

98. Interoffice address: _____

99. Co. MD/RN and location: _____

APPENDIX G

NOTIFICATION OF ACCESS TO EMPLOYEE EXPOSURE AND MEDICAL RECORDS

NOTICE

TO ALL EMPLOYEES: THIS NOTICE IS TO PROVIDE INFORMATION FOR COMPLIANCE WITH 29 CFR PART 1910 SUBPART C - GENERAL SAFETY AND HEALTH PROVISIONS - PARAGRAPH 1910.20, ACCESS TO EMPLOYEE EXPOSURE AND MEDICAL RECORDS.

i. The existence, location, and availability of any records covered by this section is as follows:

EMPLOYEE EXPOSURE RECORDS	MEDICAL RECORDS
See your supervisor	See your regional nurses.

ii. Each employee has the right to access these records.

iii. A copy of this standard and its appendices are available to all affected employees at your base location's safety and industrial hygiene office.

MGPBUWELL