ASSESSMENT OF CORRECTIVE MEASURES REPORT

ASSESSMENT OF CORRECTIVE MEASURES

RANDOLPH COUNTY CLOSED MUNICIPAL SOLID WASTE LANDFILL, PERMIT No. 76-01

Submitted To: North Carolina Department of Environment and Natural Resources
Division of Waste Management
1646 Mail Service Center
Raleigh, North Carolina 24699-1646

Prepared For: Randolph County Public Works
P.O. Box 4728
Asheboro, NC 27204

Submitted By: Golder Associates NC, Inc.
5B Oak Branch Drive
Greensboro, NC 27407 USA

Distribution: Paxton Arthurs, P.E., Randolph County
Ervin Lane, NC-DENR – Solid Waste Section

October 2013 **0739-612713.500**

DENR USE ONLY: ☐Paper Report ☐Electronic Data - Email CD (data loaded: Yes / No) Doc/Event #:

NC DENR
Division of Waste Management - Solid Waste

Environmental Monitoring Reporting Form

Notice: This form and any information attached to it are "Public Records" as defined in NC General Statute 132-1. As such, these documents are available for inspection and examination by any person upon request (NC General Statute 132-6).

Instructions:

- **Prepare one form for each individually monitored unit.**
- **Please type or print legibly.**
- Attach a notification table with values that attain or exceed NC 2L groundwater standards or NC 2B surface water standards. The notification must include a preliminary analysis of the cause and significance of each value. (e.g. naturally occurring, off-site source, pre-existing condition, etc.).
- Attach a notification table of any groundwater or surface water values that equal or exceed the reporting limits.
- Attach a notification table of any methane gas values that attain or exceed explosive gas levels. This includes any structures on or nearby the facility (NCAC 13B .1629 (4)(a)(i).
- Send the original signed and sealed form, any tables, and Electronic Data Deliverable to: Compliance Unit, NCDENR-DWM, Solid Waste Section, 1646 Mail Service Center, Raleigh, NC 27699-1646.

Solid Waste Monitoring Data Submittal Information

Name of entity submitting data (laboratory, consultant, facility owner):

Golder Associates NC, Inc. on behalf of Randolph County

Contact for questions about data formatting. Include data preparer's name, telephone number and E-mail address:

Name: David Y. Reedy, P.G. Phone: (336) 852-4903

E-mail: dreedy@golder.com

Facility name:	Facility Address:	Facility Permit #	NC Landfill Rule: (.0500 or .1600)	Actual sampling dates (e.g., October 20-24, 2006)
Closed Randolph County Landfill	1254 County Land Road Asheboro, NC	76-01	.1600	

Environmental Status: (Check all that apply)

☐ Initial/Background Monitoring ☐ Detection Monitoring ☐ Assessment Monitoring ☒ Corrective Action

Type of data submitted: (Check all that apply)

☐ Groundwater monitoring data from monitoring wells
☐ Groundwater monitoring data from private water supply wells
☐ Leachate monitoring data
☐ Surface water monitoring data
☐ Methane gas monitoring data
☒ Corrective action data (specify) Assessment of Corrective Measures
☐ Other(specify)

Notification attached?

☐ No. No groundwater or surface water standards were exceeded.
☐ Yes, a notification of values exceeding a groundwater or surface water standard is attached. It includes a list of groundwater and surface water monitoring points, dates, analytical values, NC 2L groundwater standard, NC 2B surface water standard or NC Solid Waste GWPS and preliminary analysis of the cause and significance of any concentration.
☐ Yes, a notification of values exceeding an explosive methane gas limit is attached. It includes the methane monitoring points, dates, sample values and explosive methane gas limits.

Certification

To the best of my knowledge, the information reported and statements made on this data submittal and attachments are true and correct. Furthermore, I have attached complete notification of any sampling values meeting or exceeding groundwater standards or explosive gas levels, and a preliminary analysis of the cause and significance of concentrations exceeding groundwater standards. I am aware that there are significant penalties for making any false statement, representation, or certification including the possibility of a fine and imprisonment.

David Y. Reedy, P.G.	Senior Project Hydrogeologist	(336) 852-4903
Facility Representative Name (Print)	Title	(Area Code) Telephone Number

[signature] 10-3-13

Signature Date

Affix NC Licensed/ Professional Geologist Seal

NORTH CAROLINA LICENSED SEAL 1963 GEOLOGIST DAVID YATES REEDY, II 10-3-13

Golder Associates NC, Inc., 5B Oak Branch Drive, Greensboro, NC 27407

Facility Representative Address

C-2862

NC PE Firm License Number (if applicable effective May 1, 2009)

Revised 6/2009

Golder Associates

October 3, 2013 0739-612713.500

Mr., Ervin Lane, Hydrogeologist
North Carolina Department of Environment and Natural Resources
Division of Waste Management Solid Waste Section
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

**RE: ASSESSMENT OF CORRECTIVE MEASURES
RANDOLPH COUNTY CLOSED MUNICPAL SOLID WASTE LANDFILL, PERMIT NO. 76-01
RANDOLPH COUNTY, NORTH CAROLINA**

Dear Ervin:

On behalf of Randolph County, Golder Associates NC, Inc. (Golder) is submitting the enclosed Assessment of Corrective Measures (ACM) in response to confirmed exceedances of NC 2L Drinking Water Standards (NC 2L Standards) for NC Appendix II parameters in groundwater samples at the above-referenced facility. The attached ACM is submitted to comply with the requirements of Title 15A of the North Carolina Administrative Code (NCAC) Subchapter 13B .1635, which require Randolph County to analyze the effectiveness of potential corrective measures.

Upon approval of this submittal, the County will hold a public meeting to discuss the results of the ACM with interested and affected parties in accordance with 15A NCAC 13B .1635(d). After the public meeting, the County will select a remedy and prepare a Corrective Action Plan and Corrective Action Monitoring Plan per 15A NCAC 13B .1636. If you have any questions regarding the NES, please contact the undersigned at (336) 852-4903.

Sincerely,

GOLDER ASSOCIATES NC, INC.

David "Dusty" Y. Reedy II, P.G.
Senior Project Hydrogeologist

Rachel P. Kirkman, P.G.
Associate and Senior Geologist

Enclosure: Assessment of Corrective Measures, Randolph County Closed Municipal Solid Waste Landfill, Permit No. 76-01

C: Paxton Arthurs, P.E., Randolph County Public Works Director, 725 McDowell Road, Asheboro, NC, 27205. 336-318-6605.

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1.0 INTRODUCTION

Randolph County owns and maintains the closed Randolph County Landfill, which consists of a closed municipal solid waste (MSW) and a customer convenience area under Permit No. 76-01 issued by the North Carolina Department of Environment and Natural Resources (NC DENR). The County also owns an active transfer station, which is currently operated by Republic Services under permit 76-03T. This report is the *Assessment of Corrective Measures* (ACM) required per 15A NCAC 13B.1635 of the NC Solid Waste Management Rules (SWMRs).

1.1 Site Background

The location of the facility is shown on the inlay on Drawing 1. As presented, the Randolph County Landfill is located approximately 3 miles northeast of the city of Asheboro, near the town of Central Falls in Randolph County, NC, off County Land Road. Randolph County operated an unlined MSW landfill from 1973 to 1985. The County operated a second, unlined landfill for MSW, construction and demolition (C&D) debris, and land clearing and inert debris (LCID) from 1985 to December 31, 1997. The total facility comprises approximately 600 acres, approximately half of which contain landfilled waste or are associated with waste management activities at the active customer convenience area and solid waste transfer station, operated by Republic Services. The transfer station was built before final landfill closure in 1997, and remains in operation.

Monitoring wells for the second unlined MSW facility have been sampled since 1987. Since this facility operated past October 9, 1993, the landfill is subject to Title 15A NCAC 13B.1630-37 of the NC SWMRs. Due to low-level detections of volatile organic compounds (VOCs) in groundwater samples at concentrations above applicable standards, the facility has been in the Assessment Monitoring Program since 1996. This landfill is the subject of this ACM.

The current monitoring network consists of six monitoring wells (MW-1, MW-5, MW-6, MW-7, MW-8, and MW-9). Four surface water monitoring points (SW-1, SW-2, SW-3, and SW-4) are also monitored in accordance with the Water Quality Monitoring Plan (WQMP) detailed in the facility's Transition Plan, dated October 8, 1994, and approved by NC DENR in 1995.

Based on the documented VOC exceedances of applicable groundwater standards (i.e., NC 2L standards), the County submitted a *Groundwater Assessment Workplan (Workplan)* to NC DENR on December 15, 2009. NC DENR approved the *Workplan* on January 15, 2010. As part of the *Assessment Report*, monitoring wells MW-10S, MW-10D, MW-11S, and MW-11D (which are not included in the compliance monitoring well network) were installed in December 2010. Field measurements and samples for the evaluation of Monitored Natural Attenuation (MNA) were collected from the compliance monitoring wells in April 2011 during the routine semi-annual water quality monitoring event. Existing non-compliance well MW-2 and the newly installed non-compliance wells MW-10S, MW-10D, MW-11S, and MW-11D were sampled and analyzed for the NC Appendix I list of parameters and MNA parameters during the April 2011 event. Headspace gas samples from monitoring wells MW-1, MW-7, and MW-8 were also collected during the event and analyzed for VOCs.

In April 2013, Randolph County submitted a Nature and Extent Study (NES) to NC DENR with the purpose of delineating the vertical and horizontal extent of VOCs detected in samples from monitoring wells MW-1 and MW-7 at concentrations above the Solid Waste Section Limits (SWSLs) and the NC 2L Standards. The NC DENR granted approval of the NES on July 8, 2013, which requires the County to initiate an ACM per 15A NCAC 13B.1635 of the NC SWMRs.

1.2 Contaminant Distribution

In the NES, six VOCs were identified at concentrations that exceed their respective NC 2L Standards (benzene; 1,4-dichlorobenzene; 1,1-dichloroethane; 1,2-dichloroethane; tetrachloroethene; and vinyl chloride) in samples collected from downgradient monitoring wells. These VOCs are considered the constituents-of-concern (COCs) for the facility. The sum of the VOC concentrations (including all aromatic and chlorinated VOCs) detected at each groundwater sampling location during the NES investigation is presented on Table 1 and in an isopleth map of total VOC concentrations is included as Drawing 1. Historical VOC concentrations in samples collected from monitoring wells and surface water sampling locations are summarized in Tables 2 and 3, respectively. Table 2 shows that methylene chloride has been detected in samples from downgradient wells at concentrations above the NC 2L Standard during recent sampling events and has been added to the list of COCs. Table 2 also shows that cis-1,2-dichlorothene has been detected in samples collected in the past three years from downgradient wells at concentrations above the SWSL and NC 2L Standard and has been added to the list of COCs.

As shown on Drawing 1, four separate dissolved-phase groundwater plumes extend beyond the limits of waste, as interpreted from VOC detections in groundwater samples from monitoring wells. Samples from compliance monitoring wells downgradient of the eastern limits of waste (MW-8 and MW-9) did not have detections of VOCs above the SWSLs and NC 2L Standards during the April 2011 event; however, the sample from MW-8 for the April 2013 event had a detection of one COC (1,1-dichloroethane) above the SWSL and NC 2L Standard and a detection of tetrachloroethene below the SWSL, but above the NC 2L Standard. Recent samples from MW-9 have had sporadic detections of one COC (vinyl chloride) below the SWSL, but above the NC 2L Standard. Because VOCs in the southeastern plume at MW-9 does not exceed both the SWSL and NC 2L Standard for vinyl chloride, the ACM does not include remedial alternatives for this plume.

The plumes shown along the western and northern limits of waste contain monitoring wells from which groundwater samples were collected during the April 2011 monitoring event that had detections of VOCs exceeding the NC 2L Standards. The estimated lateral extent of each dissolved-phase groundwater plume is shown on Drawing 1, which shows that the plumes are well within the property boundary. The plumes appear to originate from the waste mass, the interpreted source of the COCs, and extend downgradient.

2.0 CONTAMINANT CHARACTERIZATION

The COCs in groundwater at the Randolph County Landfill are VOCs that have generally been detected at relatively low concentrations. The COCs are further classified into either aromatic hydrocarbons or chlorinated aliphatic hydrocarbons.

2.1 Contaminant Source Confirmation

The results of the April 2013 NES confirm that the Randolph County Landfill has experienced a release of VOCs into the upper-most aquifer. The source of the release is determined to be the waste mass within the landfill, due to the extension of the groundwater plume from the landfill to downgradient locations.

2.2 Source Control Measures

The COC impacts to the uppermost aquifer that underlies the site originate from the waste mass of the closed landfill. The vertical and horizontal extent of the release is documented in the approved July 2013 NES Report. The majority of the source control measures that the County currently has in place at the closed landfill are directed by the NC SWMR. These rules govern the operation and maintenance of the closed landfills. Current source control measures include, but are not limited to, the maintenance of the cap (portions of which are clay and others synthetic) and vegetative cover at the landfill, which is designed to minimize additional leachate that could be generated from precipitation percolating through the waste mass to the uppermost aquifer. The County recently (October 2012) re-graded and re-seeded the southern portion of the landfill cap to promote positive drainage and minimize standing water in this area, which will in turn limit leachate production. A passive landfill gas management system is maintained at the facility to reduce the potential impacts from landfill gas migration into the soil and groundwater at the facility. Additional source control measures may be evaluated and, if necessary, implemented based on the remedial technology(ies) that are approved as part of this ACM.

2.3 Groundwater End Use

As shown on Drawing 1, there are no residences located between the landfill and Deep River, which is located downgradient of the landfill; the County owns the property between the landfill and the Deep River. The closest residences to the landfill's limits of waste are more than 1,600 feet northwest of the landfill across Deep River. Other residences are located more than 1,700 feet east of the landfill limits of waste, side-gradient of the landfill. An aerial photograph of the landfill and surround area is included as Drawing 2.

The watershed classification of the landfill property was determined by examining the County's online GIS website and water supply watershed data obtained from the NC OneMap website. It was determined that the landfill property is not located in or near (within 2 miles) of a critical area of a water supply watershed or in the watershed for a stream segment classified as WS-1.

3.0 RISK ASSESSMENT

A quantitative risk assessment (RA) of the cumulative risk related to the concentrations of COCs at the landfill is provided as part of this ACM. The purpose of the RA is to assess the potential risk to future receptors under a residential land-use scenario related to the quantified groundwater COC concentrations at monitoring points associated with the documented release. The calculated cumulative risk values are compared the EPA's generally acceptable cumulative excess cancer risk value of 1E-06 and a hazard index of 1.00.

3.1 Impacted Media

Groundwater is interpreted to be impacted directly by the landfill, and surface water may be impacted by the discharge of impacted groundwater to surface water features. Due to the interpretation of landfill waste as the direct source of groundwater impacts, soil as an impacted media is not included in the risk assessment. This RA is conducted using above-standard (i.e., > NC 2L standards), quantified concentrations of the COCs in groundwater samples collected since September 2010.

3.2 Risk Assessment Methods and Results

A quantitative risk assessment was performed to evaluate potential risk to human receptors related to the following potential exposure pathways:

- Ingestion of impacted groundwater
- Dermal contact with impacted groundwater
- Inhalation of vapors related to impacted groundwater

COCs for the risk assessment were identified as volatile organic compounds detected at concentrations in groundwater in exceedance of the NC 2L standards since 2010 (i.e., the past three years). Representative concentrations were selected as the maximum COC groundwater concentration measured since 2010, as presented in the following table:

Constituents of Concern and Representative Concentrations

COC	Representative Concentration (ug/L)	Sample Date and Well
Tetrachloroethene	2.8	4-11-11 at MW-10S
Vinyl Chloride	13	10-12-10 at MW-1
Methylene Chloride	12	10-12-10 at MW-7
1,4-Dichlorobenzene	7.9	4-28-10 at MW-1
1,2-Dichloroethane	4.2	10-15-12 at MW-1
1,1-Dichloroethane	280	10-12-10 at MW-1
cis-1,2-Dichloroethene	88	4-28-10 at MW-1
Benzene	7.5	10-12-10 at MW-1

Notes: ug/L = micrograms per liter

The quantitative risk evaluation utilized the Virginia Department of Environmental Quality (DEQ) Risk Exposure and Analysis Modeling System (REAMS; DEQ, 1994) software for the calculation of cumulative risk. COC chemical properties, reference doses, and carcinogenic slope factors were updated in REAMS using values provided by the most recent (May 2013) US EPA Regional Screening Levels tables, when available. The REAMS software calculates hazard indices related to risk associated with both carcinogenic and non-carcinogenic COCs, and calculates carcinogenic risk associated with carcinogenic COCs. Risk is evaluated for a conservative residential exposure scenario using exposure factors for children to calculate non-carcinogenic risk and age-adjusted exposure factors to calculate carcinogenic risk.

It is noted that since the risk assessment is based on residential land use, the transport of simulated groundwater COC concentrations to a potential downgradient receptor is not required because the risk at the point of release, prior to the simulation of natural attenuation processes during contaminant transport, is evaluated. The REAMS quantitative risk assessment output is presented in Appendix A. A summary of the resulting hazard index and cumulative carcinogenic risk calculated is presented in the following table:

Groundwater Cumulative Risk (Residential Scenario)

Calculation	Risk Assessment Result	Threshold for Acceptable Risk
Hazard Index (Non-Carcinogenic Effects)	9.48	1.0
Cumulative Carcinogenic Risk	3.64×10^{-4}	1×10^{-6}

As presented in above, the hazard index for the COCs (9.48) exceeds the hazard index threshold of 1.0, and the cumulative carcinogenic risk is calculated to be 3.64×10^{-4}, which exceeds the acceptable cumulative risk threshold of 1.0×10^{-6}. Therefore, an unacceptable level of risk is calculated for the measured groundwater impacts under a residential land-use scenario, requiring controls to minimize the potential for exposure to potential receptors and/or corrective actions to reduce or eliminate groundwater impacts until such time that an acceptable level of risk present.

4.0 CORRECTIVE MEASURES SCREENING AND EVALUATION

Numerous technologies are available that can be used to remediate groundwater with dissolved phase concentrations of VOCs. The selection of a remedy for VOC-impacted groundwater is influenced by the geologic and hydrogeologic site setting and the risk associated with the release. Some remedial alternatives are more aggressive than others, and tend to have higher capital costs associated with implementation. The aggressiveness of the selected remedial alternative is generally controlled by the risk associated with the release. With a higher risk level, a more aggressive technology may be appropriate due to an immediate need to reduce the risk and protect potential receptors.

The objective of the ACM is to identify viable remedies that satisfy the requirements of 15A NCAC 13B.1635, and are also protective of human health and the environment. Taking into consideration the above-listed factors, as well as the evaluation criteria specified in 15A NCAC 13B.1635 of the NC SWMR, a screening matrix was used to objectively rate the available and proven remedial alternatives that can remediate groundwater containing the COCs. The matrix is presented in Table 4.

4.1 Overview

The following sections discuss the possible physical and administrative controls and remedial technologies that are considered as part of the Corrective Action Program for the Randolph County Landfill. As required by 15A NCAC 13B.1635, this ACM includes an analysis of the effectiveness of potential corrective measures and addresses the performance, reliability, ease of implementation, and potential impacts of the potential remedies. The ACM also addresses the time required to begin and complete the remedy, cost of remedy implementation, and the institutional requirements that may affect the potential remedy. The NC SWMR indicate that remediation will be complete when COCs, as measured in all points within the plume of contamination that lie beyond the facility compliance boundary, are less than the approved groundwater protection standards for three consecutive years.

4.2 Institutional Controls

Institutional controls are administrative or legal controls that help minimize the potential for human exposure to contamination or protect the integrity of a remedy. Institutional controls include, but are not limited to, restricting land use, activity, and access to properties with residual contamination. When appropriate, and if necessary, the use of additional institutional controls may be considered in corrective action assessments in an effort to reduce risk and/or attain acceptable risk levels. These evaluations may be considered in the selection and/or periodic evaluation of corrective action remedies. With or without the consideration of institutional controls, the County recognizes that the ultimate goal of the Corrective Action Program is to reduce risk associated with environmental impacts to a level that allows unrestricted land and drinking water use.

4.3 Groundwater Remediation Technologies

Twenty two potential remedial alternatives were evaluated utilizing the screening matrix presented in Table 4. The matrix was developed to evaluate the effectiveness, feasibility, cost, and ease of implementation of each remediation alternative. The performance criteria of each remediation alternative were evaluated as follows:

- Effectiveness and Feasibility:

  The ability to achieve target contaminant levels in the groundwater and/or soil matrix; protect human health and the environment; provide long-term effectiveness; address the mobility, toxicity, and volume of the contaminants; and the potential residuals during the remediation.

- Cost:

  The initial capital cost, operation and maintenance cost, implementation time, and total remediation completion time.

- Ease of Implementation:

  System reliability/maintenance, permitting/regulatory acceptance, difficulty of implementation, and community reception to the proposed technology.

Based on the results of the initial screening summarized on the screening matrix (Table 4), and taking into consideration the potential receptor survey conducted in the RA, the following four remedial alternatives were selected as the most applicable options for the site because they had the highest scores and/or were above the cut-off level of 39, and were further evaluated in detail:

- MNA with site access/usage restrictions
- In Situ Enhanced Bioremediation
- In Situ Oxidation
- In Situ Nano-Scale Zero Valent Iron

4.4 Monitored Natural Attenuation

4.4.1 Method Description

Natural attenuation requires relatively low capital costs and infrastructure and relies on naturally occurring physical processes such as dilution, adsorption, dispersion, and microbial and chemical reactions to remediate contaminants in groundwater. To be accepted as a cleanup remedy, the attenuation processes that degrade or destroy contaminants are preferred (USEPA, April 1999). To be the sole method of remediation, three tiers of evidence documenting natural attenuation are valuable, as follows:

1. Historical groundwater data that demonstrate a trend of stable or decreasing contaminant mass and/or concentration over time at appropriate monitoring points.
2. Hydrogeologic and geochemical data that can be used to demonstrate indirectly the type of natural attenuation processes active at the site, and the rate at which such processes will reduce contaminant concentrations to required levels.
3. Data from field or microcosm studies, which directly demonstrate the occurrence of a particular natural attenuation process at the site and its ability to degrade the COCs.

MNA consists of monitoring natural attenuation processes (both biological and physical), and is a proven remedial alternative for sites where sufficient attenuation processes are documented and a more aggressive remedy is not required (i.e., the site does not pose an immediate or substantial risk). The physical / chemical attenuation processes (dispersion, dilution, adsorption, volatilization, abiotic degradation, etc.) are important parts of MNA; however, with long-term sources such as landfills, it is the biological processes (biodegradation by naturally occurring bacteria) that often provides the primary transformation and/or destruction mechanisms for organic contaminants in the soil, surface water, and groundwater.

Under an MNA remedial alternative, a site is monitored at regular intervals to demonstrate that attenuation processes (or indicators thereof) are occurring at a rate sufficient to prevent potential exposures, and that the dissolved-phase contaminants are not migrating to a receptor at unacceptable concentrations. It may also include measurements of contaminant concentrations in soil, groundwater, or soil gas, or measurements of bioactivity indicators such as carbon dioxide production or oxygen consumption.

MNA is widely used for sites with aromatic and chlorinated organic compounds. In anaerobic conditions, bacteria may degrade chlorinated hydrocarbons in a process called reductive dehalogenation. The microorganisms use chlorinated hydrocarbons as electron acceptors just as aerobic organisms use oxygen. This use, in turn, requires a suitable electron donor such as hydrogen or organic compounds. Evidence suggests that reductive dehalogenation can shrink plumes of chlorinated compounds, provided site conditions are conducive to the existence and reproduction of the bacteria. A primary environmental requirement is the presence of sufficient concentrations of other organic molecules that can serve as electron donors for energy metabolism.

There is substantial guidance from the EPA concerning MNA, including the appropriateness of the remedy and cleanup levels. When restoration of groundwater is not practicable, EPA "expects to prevent further migration of the plume, prevent exposure to the contaminated groundwater, and evaluate further risk reduction" (USEPA, April 1999). Cleanup levels appropriate for the expected beneficial use "should generally be attained throughout the contaminated plume, or at and beyond the edge of the waste management area when waste is left in place" (USEPA, April 1999). The objectives for a natural attenuation groundwater remedy include the following:

- Demonstrate that natural attenuation is occurring
- Be protective of human health and the environment
- Monitor natural attenuation and environmental impact
- Restore groundwater at the edges of the plume to below groundwater protection standards

Acceptance of this option requires a conceptual model of the site, a quantification of attenuation, and establishment of a long-term monitoring program. A conceptual model was proposed in the April 12, 2013, NES. The model described the groundwater flow system, and characterized and delineated the four separate plumes.

Quantification of attenuation requires documentation that the proposed mechanisms were occurring at a rate that achieves groundwater protection standards within a timeframe comparable with other methods.

The potential for natural attenuation was quantified using the analytical results from the 2013 NES and the EPA's Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater Table 2.3 and 2.4 (April 1999). As presented in summary Table 5, the average natural attenuation screening score at the Randolph County MSW Landfill is 12. Based on this score, there is limited evidence for anaerobic biodegradation of chlorinated organics at the Randolph County MSW Landfill. However, the natural attenuation screening results appear differently when evaluated for each plume. The two easternmost plumes, where MW-8 and MW-9 are located, show limited evidence of natural attenuation. The northernmost plume (MW-2, MW-7, MW-11S, and MW-11D) shows limited to inadequate evidence of natural attenuation. The low scores are partly due to no VOCs being detected in MW-10S and MW-10D. The western plume, where MW-1, MW-10S, and MW-10D are located, shows adequate to strong evidence of natural attenuation.

An evaluation of the risks posed to human health and the environment by the release from the landfills was prepared in conjunction with this ACM (Section 3). The evaluation indicates that there is risk associated with exposure to contaminated groundwater; however, with the absence of downgradient receptors to impacted groundwater, MNA becomes an appropriate remedial measure for impacted groundwater beneath the site. Since the County owns significant property buffer around the closed landfill, the contaminants have not migrated off-site based on available data. Therefore, MNA may be implemented as a remedial measure that would control or prevent future migration from the landfill.

The demonstration and documentation of measurable MNA processes are key in the application of this measure. Typically, MNA programs indicate the status of the groundwater plume at different locations in the plume (stable, shrinking, or expanding), enable estimation of remediation rates, and warn of potential impact on sensitive receptors. Primary evidence of natural attenuation includes demonstration of a stable or shrinking plume. Secondary evidence of natural attenuation includes monitoring for an inverse correlation between electron acceptors and contaminant concentrations, alkalinity, and the presence of expected daughter products.

Downgradient well and surface water, located within and parallel to the groundwater flow path, would be sampled periodically for measurable changes in contaminant concentrations. The monitoring frequency for MNA depends on the plume status, water table fluctuations and seasonal variability, groundwater velocity, and distance from the plume to a sensitive receptor. One year of quarterly monitoring is often sufficient to establish the relationship between readily degraded contaminants and electron acceptor/reduction product concentrations (USEPA, May 1996).

4.4.2 Performance and Reliability

MNA is a proven remedial alternative, which has been used at Resource Conservation and Recovery Act (RCRA), Underground Storage Tank (UST), Superfund, Voluntary Remediation Program (VRP), and Brownfield sites to treat both impacted groundwater and soils. MNA alone may be adequate when there is no identified risk to current receptors, or when proactive remediation is no more effective than MNA.

MNA performance differs at every site and is dependent on site conditions. Therefore, performance of MNA is typically determined by long-term monitoring for the COCs, daughter products (if any), and other indicators of attenuation such as electron acceptors (oxygen, sulfate, nitrate, and ferrous iron) and waste / end products (ethene, ethane, methane, chloride, carbon dioxide, etc.).

4.4.3 Implementation Requirements

Implementation of MNA requires a Corrective Action Monitoring Program (CAMP) designed to address the uncertainty regarding the mass of contaminants and predictive analyses. Per the OSWER Directive (EPA, April 1999), "Performance monitoring to evaluate remedy effectiveness and to ensure protection of human health and the environment is a critical element of all response actions." The CAMP should be designed to accomplish the following:

- Demonstrate that natural attenuation is occurring according to expectations
- Detect changes in environmental conditions that may reduce the efficiency of any of the natural attenuation processes
- Identify any potentially toxic and/or mobile transformation products
- Verify that the plume(s) is not expanding
- Verify no unacceptable impact to downgradient receptors
- Detect new releases of contaminants to the environment that could impact the effectiveness of the natural attenuation remedy
- Demonstrate that institutional controls that were put in place to protect potential receptors are performing as desired
- Verify attainment of remediation objectives

Randolph County would implement the CAMP program through a Corrective Action Plan (CAP) submitted to NC DENR upon approval of the ACM. Existing monitoring wells would be utilized for the CAMP. Monitoring well MW-5, the upgradient well, would allow determination of geochemical conditions in the groundwater prior to entering the source areas. Monitoring wells MW-1, MW-10S, MW-10D, and a proposed monitoring well are located within the VOC plume to the west of the Randolph County MSW Landfill and will be utilized to collect data for attenuation rate calculations. Similarly, monitoring wells MW-7, MW-2, MW-11S, and a proposed monitoring well are within the northern VOC plume and will assist with providing data and evaluating geochemical conditions. Monitoring wells MW-8, MW-3, and a proposed monitoring well are within the northeastern VOC plume and will be utilized to collect data for natural attenuation calculations.

4.4.4 Remediation Impacts

There are no major remediation-related impacts associated with MNA, since MNA includes the destruction of the contamination. Safety impacts, in the form of residual risk, would be present on site, since the source would not be removed.

4.4.5 Remediation Time Frame

The timeframe for achieving objectives should be reasonable compared to other alternatives. Because the County would continue to implement source controls (cap maintenance and landfill gas venting and control) at the Randolph County MSW Landfill and implement groundwater prohibitions, it is expected that significant reductions in contaminant concentrations will be observed in 5 to 7 years, with approximately 25 years estimated for completion of the Corrective Action Program.

4.4.6 Remedy Costs

The costs associated with MNA would include preparing the CAP and CAMP Plan, permitting costs, installing additional monitoring wells as required, sampling and analysis costs, and data evaluation and reporting costs. Based on the existing site conditions, the estimated implementation costs for MNA are summarized in Table 6 and presented below as follows:

CAP / CAMP:		$20,000
NC DENR Permitting Costs:		$1,500
Construction Activity Costs:		
	Drilling and Well Installation Costs and Pumps	$29,570
	Contingency (10%)	$2,957
Monitoring and Reporting Costs (Annualized):		
	Annual GW Sampling Costs	$30,222
	Annual Reporting Costs	$8,749
	Annual EPA Screening Model/Report	$6,734
	Contingency (10%)	$4,570

Total Estimated Remedy Implementation Costs: **$1,300,000 – $1,600,000**

(Assuming 25-year remediation period)

The actual cost and design of the MNA program will be determined if MNA is selected as a remedial alternative. Depending on the final design, the MNA monitoring network and the monitoring frequency, the annual monitoring and reporting costs associated with MNA are estimated at $38,000 to $43,000 per year for the first two years and then $46,000 to $52,000 each year after until remediation goals are achieved.

4.4.7 Institutional Requirements

The NC DENR may require modification to the operating permit for the landfill, which will include incorporating a CAP as a major permit amendment.

4.5 In Situ Enhanced Bioremediation

4.5.1 Method Description

Enhanced Bioremediation (EB) is similar to natural attenuation, except that chemicals and/or bacteria are introduced to the contaminated media to enhance the biodegradation process. Bioremediation is a process in which indigenous or inoculated microorganisms degrade contaminants by metabolizing organic contaminants in groundwater. The rate of bioremediation can be enhanced by increasing the concentration of electron acceptors/donors and/or nutrients in the groundwater. Most organic compounds are degraded by microbial bacteria if they are present at concentrations that are not toxic to the bacteria. Groundwater may contain low concentrations of oxygen because of the minimal reaeration resulting from flow beneath the surface; the subsurface may be nutrient-starved as well. Other factors affecting biological treatment of impacted groundwater include moisture, oxidation-reduction potential, temperature, and pH.

4.5.1 Performance and Reliability

EB is a proven remedial alternative that has been used at a variety of contaminated sites to treat organic contamination in soil and groundwater (Hinchee et al., 1994). If properly designed, monitored, and maintained, EB is a reliable remedial alternative that can rapidly destroy contaminants in the subsurface. At the site, EB would likely involve a two-step program of injection well installation for use in introducing an electron-donor to the aquifer, and, if required, the introduction of a genetically designed microorganism specifically designed to metabolize chlorinated compounds to below EPA drinking water standards. Once the injection points are located and installed, the commercially available electron-donor substance would be introduced and allowed to bring the groundwater conditions to an anaerobic state most favorable for the chlorinated VOC metabolizing microorganisms to colonize quickly. The next step would be the injection of anaerobic microbes into the plume area and the monitoring of their growth and colonization through separate downgradient monitoring wells, as well as monitoring the degradation and reduction of chlorinated VOC compounds.

4.5.2 Implementation Requirements

Implementation requirements for EB include preliminary laboratory-scale testing (treatability study) conducted prior to field implementation. Upon a successful treatability study, a field-scale pilot study would be undertaken to identify if site conditions are conducive to EB; finally, an application plan for the electron-donor substance would be developed. Fieldwork would be required to install injection wells and perform the injection of the electron-donor substance, followed by regular monitoring activities to monitor the progress of the EB effort. Periodic reinjections could be required until the landfill stops producing leachate and/or gas at quantities resulting in NC 2L exceedances in groundwater.

4.5.3 Remediation Impacts

There are no cross-media impacts associated with EB. Safety impacts, in the form of residual risk, would be present on site, since the source would not be removed.

4.5.4 Remediation Time Frame

The timeframe for an observable decrease in concentration is estimated at one to three years depending on the location of the injection and the groundwater flow rate, while the timeframe for an observable decrease in concentrations to be observed at all points within the plumes is estimated at two to five years, and completion of the Corrective Action Program in ten years. Since the source is long-term, follow-up injections of the electron-donor substance would likely be required based on monitoring results. The ultimate success is dependent upon soil properties and the biodegradability of the contaminants.

4.5.5 Remedy Costs

Costs associated with EB result from the engineering design, CAP, permitting, capital costs to purchase the electron-donor substance and microorganisms (if needed), bench treatability testing, and installation, monitoring, and evaluation costs. The estimated full-scale implementation cost for the EB remedy is as follows:

CAP / CAMP:	$20,000
NC DENR Permitting Costs:	$1,500

Construction Activity Costs:

Drilling and Well Installation Costs and Pumps	$29,570
Initial Injection Well Construction & Costs	$100,256
Contingency (10%)	$12,982

Follow-Up Construction Activity Costs:

Follow-Up Injection Costs	$287,796
Contingency (10%)	$3,088

Monitoring and Reporting Costs (Annualized):

Semi-Annual GW Sampling Costs	$31,134
Semi-Annual Reporting Costs	$8,749
Annual Corrective Action Status Evaluation Report	$6,734
Contingency (10%)	$4,662

Total Estimated Remedy Implementation Costs: $759,000 - $779,000

(Assuming a 10-year remediation period)

Depending on the final design of the monitoring network and the monitoring frequency, annual monitoring and reporting costs for the EB alternative are estimated at $38,000 to $43,000 per year for the first two years and then 46,000 to 52,000 until remediation goals are achieved. Additional injections of ESO may be required every 3 to 4 years, or as required based on aquifer response. Estimated follow-up injection costs, including supplies, subcontractors, and oversight are $25,000 to $35,000 per event.

4.5.6 Institutional Requirements

The NC DENR may require a major permit amendment to the landfill operating permit if EB is approved as an acceptable alternative and is implemented as a remedy to incorporate a CAP via a major permit amendment. An Underground Injection Control (UIC) permit may be required if EB is approved and implemented as a remedy.

4.6 In Situ Chemical Oxidation

4.6.1 Method Description

In Situ Chemical Oxidation involves injecting oxidants and other amendments as necessary directly into the source zone and downgradient plume. The oxidant chemicals that are commonly used with *In Situ* Chemical Oxidation are hydrogen peroxide, potassium permanganate, sodium permanganate, persulfate, ozone, and atmospheric oxygen. The oxidant chemicals react with the contaminant, producing carbon dioxide, heat, water, and inorganic chloride. Contaminants that are amenable to treatment by *In Situ* Chemical Oxidation include most VOCs and some semi-volatile organic compounds.

In Situ Chemical Oxidation offers advantages over conventional treatment technologies such as pump-and-treat; the technology does not generate large volumes of waste material that must be disposed of and/or treated. *In Situ* Chemical Oxidation is also implemented over a shorter timeframe. Both of these advantages should result in savings on disposal costs, and monitoring and maintenance costs. The technology also has various limitations and may actually disrupt other remedies. For example, application of *In Situ* Chemical Oxidation on a site that is benefiting from natural biodegradation may temporarily upset the geochemistry that facilitates the biodegradation process. Additionally, nearby receptors (surface water receptors) can be impacted by the Chemical Oxidation injections and breakdown components, disrupting biological processes and contributing to water quality degradation within the surface waters.

4.6.2 Performance and Reliability

Based on a limited set of projects surveyed, several conclusions on the effectiveness of *In Situ* Chemical Oxidation can be drawn. In general, *In Situ* Chemical Oxidation is more effective in higher permeability soils because the oxidant can more easily reach sorbed contaminants. The level of hydrogeologic investigation may need to be increased to implement *In Situ* Chemical Oxidation when compared to other *in situ* remedies. Projects where *In Situ* Chemical Oxidation was ineffective typically showed a significant rebound in pollutant concentrations within several months after the injection period. This is likely due to contaminants that are sorbed in low permeability aquifer material and not easily accessible to injected oxidants. A thorough understanding of the site is essential to a successful implementation of any remedial technology, especially *In Situ* Chemical Oxidation, the migration of both the contaminants and the oxidants is highly dependent on the hydrogeology of the subsurface.

Performance of *In Situ* Chemical Oxidation may reduce COCs to at least their respective NC 2L Standards at the landfill boundary. The most important criterion for success is to deliver the oxidizing agent to contact and mix with contaminated groundwater.

4.6.3 Implementation Requirements

Implementation requirements for *In Situ* Chemical Oxidation are the necessity of a successful, laboratory-scale test (treatability study) conducted prior to field implementation. Upon a successful treatability study, a field-scale pilot study would be undertaken to identify if site conditions are conducive to *In Situ* Chemical Oxidation; finally, an application plan for the oxidant would be developed. Fieldwork would be required to install injection wells and perform the injection of the oxidant, followed by regular monitoring activities to monitor the progress of the effort. Periodic reinjections will likely be required until the landfill stops producing leachate and landfill gas at quantities resulting in NC 2L Standard exceedances in groundwater.

4.6.4 Remediation Impacts

There are no significant cross-media impacts associated with *In Situ* Chemical Oxidation unless a receiving stream is located near the injection area, in which case impacts to the stream system may occur. Minor cross-media impacts would include the generation of contaminated purge water, which requires disposal. Safety impacts would be present on site both during the application and afterwards, as the process can generate significant heat during the application; the chemicals used for oxidation can be dangerous if mishandled; and finally, the source of contaminated groundwater would still exist. Health and safety issues include the following: (1) safely handling the oxidants, as hydrogen peroxide, potassium permanganate, persulfate, and sodium permanganate solutions are strong nonspecific oxidants; (2) permanganate dust is hazardous; (3) the presence of ozone will increase the flammability of many materials; and (4) the generation of ozone usually includes high-voltage equipment concerns.

Site specific concerns associated with the use of *In Situ* Chemical Oxidation at this facility include the potential discharge of the chemical oxidants or their residuals to boundary surface waters. Each of the delineated contaminate plumes at the site were identified to potentially discharge into unnamed receiving steams.

4.6.5 Remediation Time Frame

The timeframe for an observable decrease in concentration is almost immediate with *In Situ* Chemical Oxidation, when contact occurs, while the timeframe for an observable decrease in concentrations at all points within the plume is estimated at three to six months depending on the location of the injection points and the groundwater flow rate. Since the source is long-term, follow-up injections of the oxidant would likely be required based on monitoring results. The ultimate success is dependent upon soil properties and the hydrogeology.

4.6.6 Remedy Costs

Costs associated with *In Situ* Chemical Oxidation result from the engineering design, permitting, capital costs to purchase the oxidant, and installation, monitoring, and evaluation. The estimated full-scale implementation cost for the remedy is as follows:

CAP / CAMP:		$20,000
NC DENR Permitting Costs:		$1,500
Construction Activity Costs:		
	Drilling and Well Installation Costs and Pumps	$29,570
	Initial Injection Well Construction & Costs	$60,656
	Contingency (10%)	$9,023
Follow-Up Construction Activity Costs:		
	Follow-Up Injection Costs	$20,364
	Contingency (10%)	$2,036
Monitoring and Reporting Costs (Annualized):		
	Semi-Annual GW Sampling Costs	$31,846
	Semi-Annual Reporting Costs	$8,749
	Annual Corrective Action Status Evaluation Report	$6,734
	Contingency (10%)	$4,733

Total Estimated Remedy Implementation Costs: $664,000 - $674,000
(Assuming a 9-year remediation period)

Depending on the final design of the monitoring network and the monitoring frequency, annual monitoring and reporting costs for the *In Situ* Chemical Oxidation alternative are estimated at $40,000 to $45,000 per year for the first two years and then approximately $47,000 to $52,000 per year until remediation goals are achieved. Additional injections of oxidant may be necessary every two to three years on an as required based on aquifer response. Estimated follow-up injection costs, including supplies, subcontractors, and oversight are $20,000 to $25,000 per event.

4.6.7 Institutional Requirements

Regulatory issues associated with *In Situ* Chemical Oxidation may include the state or federal programs associated with Underground Injection Control (UIC) and Air Quality. Permitting will likely not be an issue, as there are no plans to re-inject groundwater. Air Quality concerns should be limited to controlling fugitive vapors that may be produced by the heat of reaction.

A major permit amendment may be required to the landfill operating permit if *In Situ* Chemical Oxidation is approved by NC DENR as an acceptable alternative and is implemented as a remedy to incorporate a CAP.

4.7 In Situ Nano-Scale Zero Valent Iron

4.7.1 Method Description

In Situ Nano-Scale Zero Valent Iron (NZVI) is a bimetallic material using iron as the base and palladium as the catalyst, as developed by Lehigh University. Nanoparticles can be transported effectively by the flow of groundwater. Due to this attribute, the nanoparticle–water slurry can be injected under pressure and/or by gravity to the contaminated plume where treatment is needed. The nanoparticles can also remain in suspension for extended periods of time to establish an *in situ* treatment zone. Metallic or zero-valent iron (Fe^0) is a moderate reducing reagent, which can react with dissolved oxygen (DO) and, to some extent, with water. Contaminants such as tetrachloroethene (C_2Cl_4), a common solvent, can readily accept the electrons from iron oxidation and be reduced to ethene.

In Situ NZVI offers advantages over Chemical Oxidation largely due to absence of any known toxicity induced by the use of iron. Unlike conventional treatment technologies such as pump-and-treat; *In Situ* NZVI technology does not generate large volumes of waste material that must be disposed of and/or treated. *In Situ* NZVI is also implemented over a much shorter timeframe. Both of these advantages should result in savings on disposal costs, and monitoring and maintenance costs. The technology also has various limitations and may actually disrupt other remedies.

As with other *in situ* technologies, NZVI technology is limited based on site conditions. Specifically, permeability, porosity, organic carbon content, groundwater flow rate, and the particle size distribution for the aquifer matrix will affect the remedy to a certain extent.

4.7.2 Performance and Reliability

Based on the projects surveyed, several conclusions on the effectiveness of *In Situ* NZVI can be drawn. In general, *In Situ* NZVI behaves similarly to *In Situ* Chemical Oxidation in effectiveness and potential for rebound based on sorbed contaminants in low-permeability lithologies. Specifically, NZVI is more effective in higher permeability soils because the relatively small size of the nano-particles can more easily reach sorbed contaminants. The level of hydrogeologic investigation may need to be increased to implement *In Situ* NZVI compared to traditional pump-and-treat methods. Projects where *In Situ* NZVI was ineffective typically showed a significant rebound in pollutant concentrations within several months after the injection period. This is probably due to contaminants that are sorbed in low permeability aquifer material and not easily accessible to injected nano-iron. A thorough understanding of the site is essential to a successful implementation of any remedial technology, especially *In Situ* NZVI. The migration of both the contaminants and the nano-particles is highly dependent on the hydrogeology of the subsurface.

Performance of *In Situ* NZVI may reduce COCs to at least their respective NC 2L Standards at the landfill boundary. The most important criterion for success is to deliver the iron-water slurry to groundwater where it is contaminated. *In Situ* NZVI will prevent the transport of additional COCs past the facility property boundary.

4.7.3 Implementation Requirements

Implementation requirements for *In Situ* NZVI include a successful, laboratory-scale test (treatability study) conducted prior to field implementation. Upon a successful treatability study, a field-scale pilot study would be undertaken to identify if site conditions are conducive to *In Situ* NZVI; finally, an application plan for the NZVI would be developed. Fieldwork would be required to install injection wells and perform the injection of the NZVI, followed by regular monitoring activities to monitor the progress of the effort. Periodic reinjections will likely be required until the landfill stops producing leachate at quantities resulting in NC 2L Standard exceedances in groundwater.

4.7.4 Remediation Impacts

There are no significant cross-media impacts associated with *In Situ* NZVI. Safety impacts would be present on site both during the application and afterwards, as the process involves nano-scale particles that are still under scientific review regarding their interaction with humans, care should be advised in handling the iron-water slurry to prevent possible contact with the injecting material. Finally, the source of contaminated groundwater would still exist.

Site specific concerns associated *with In Situ* NZVI include the discharge of the iron-water slurry to boundary surface waters. As previously discussed, the two plumes are bisected by streams with receiving properties. NZVI injections within proximity of these discharge points could potentially discharge residual chemical oxidants to the adjacent surface water bodies.

4.7.5 Remediation Timeframe

The timeframe for an observable decrease in concentration is almost immediate with *In Situ* NZVI, when contact is achieved, while the timeframe for an observable decrease in concentrations at all points within the plume is estimated at three to six months with completion of the Corrective Action Program expected to take up to seven years depending on rebound conditions. Since the source is long-term, follow-up injections of NZVI would likely be required based on monitoring results. The ultimate success is dependent upon soil properties and the hydrogeology.

4.7.6 Remedy Costs

Costs associated with *In Situ* NZVI result from the engineering design, permitting, capital costs to purchase the NZVI, and installation, monitoring, and evaluation costs. The estimated full-scale implementation cost for the remedy is as follows:

CAP / CAMP:		$20,000
NC DENR Permitting Costs:		$1,500
Construction Activity Costs:		
	Drilling and Well Installation Costs and Pumps	$29,570
	Initial Injection Costs	$143,066
	Contingency (10%)	$17,264
Follow-Up Construction Activity Costs:		
	Follow-Up Injection Costs	$48,369
	Contingency (10%)	$4,837
Monitoring and Reporting Costs (Annualized):		
	Semi-Annual GW Sampling Costs	$31,806
	Semi-Annual Reporting Costs	$8,749
	Annual Corrective Action Status Evaluation Report	$6,734
	Contingency (10%)	$4,729

Total Estimated Remedy Implementation Costs: $681,000 - $693,000
(Assuming a 7-year remediation period)

Depending on the final design of the monitoring network and the monitoring frequency, annual monitoring and reporting costs for the *In Situ* NZVI alternative are estimated at $38,000 to $43,000 for the first two years and then approximately $48,000 to 53,000 per year until remediation goals are achieved. Additional injections of NZVI may be required 2 to 4 years after the initial construction activities or as required based on aquifer response. Estimated follow-up injection costs, including supplies, subcontractors, and oversight are $48,000 to $55,000 per event.

4.7.7 Institutional Requirements

Regulatory issues associated with *In Situ* NZVI may include the state or federal programs associated with Underground Injection Control (UIC). Permitting will likely not be an issue, as there are no plans to re-inject groundwater.

4.8 Public Meeting

As part of the ACM process and in accordance with 15A NCAC 13B. 1635 (d), the County is required to host a public meeting with interested and affected parties. The public meeting will discuss the results of the ACM and the proposed remedies. The County will provide a public notice of the meeting at least 30-days prior to the meeting. The notice will include the time, place, date, and purpose of the meeting. A copy of the public notice will be forwarded to the Division at least five days prior to publication. The County will also mail a copy of this public notice to those persons requesting notification in addition to a legal advertisement placed in a newspaper or newspapers serving the county, and provision of a news release to at least one newspaper, one radio station, and one television station serving the County. Upon receipt of approval of this ACM by the Solid Waste Section, the County will proceed with the public meeting requirements of this regulatory requirement.

4.9 Financial Assurance

15A. NCAC 13B .1628 established the financial assurance rules for owners and operators of MSW landfill units that received waste on or after October 9, 1993. This Rule requires owners or operators of a MSW landfill unit required to undertake a corrective action program per Rule .1637 to have a detailed written estimate, in current dollars, of the cost of hiring a third party to perform the corrective action. The corrective action cost estimate shall account for the total costs of corrective action activities described in the CAP for the entire corrective action period and therefore, must be reported after NC DENR approval of the CAP. This estimate must be adjusted annually for inflation, within 60-days of the anniversary date of the established financial instrument until corrective action program in complete. The owner or operator also must increase the corrective action cost estimate and the amount of financial assurance provided if changes in the corrective action program increase the maximum cost of corrective action. Allowable mechanisms of financial assurance include: Trust Fund, Surety Bond Guaranteeing Payment or Performance, Letter of Credit, Insurance, Corporate Financial Test, Local Government Financial Test, or Capital Reserve Fund.

5.0 CONCLUSIONS

The available laboratory data depict groundwater contaminated with chlorinated and aromatic hydrocarbons in excess of NC 2L Standards in two distinct plumes located on the southwestern and southern boundaries of the Randolph County MSW Landfill. These groundwater plumes are associated with anaerobic geochemical conditions induced by the landfill leachate and/or landfill gas. As documented in the 2013 NES and subsequent semi-annual water quality monitoring reports, data trends of the relatively low-level COC concentrations within each plume are demonstrating predominately decreasing concentrations within the plumes.

Based on the findings presented in the 2013 NES and this ACM, the County has identified the most applicable remedies for impacts by the landfill, based on their potential effectiveness in remediating the COCs in the water table aquifer downgradient of the landfill. Specifically, the following remedial alternatives for remediating the impacted groundwater were identified for further, relatively detailed evaluations:

- Monitored Natural Attenuation
- *In Situ* Enhanced Bioremediation
- *In Situ* Chemical Oxidation
- *In Situ* Nano-Scale Zero Valent Iron

Each method requires a pilot study consisting of either a laboratory treatability test and/or a small-scale field test to accurately assess the cost and efficacy of the selected method(s). Finally, since there were no off-site receptors identified, risk can be controlled with conventional institutional controls to minimize the costs associated with the remediation activities.

6.0 REFERENCES

Golder Associates Inc. (Golder). 2013. *Nature and Extent Study* Randolph County Landfill, Permit Number 76-01.

Hinchee, R.E., A. Leeson, L. Semprini, and S.K. Ong. 1994. *Bioremediation of Chlorinated and Polycyclic Aromatic Hydrocarbon Compounds*. Lewis Publishers, Boca Raton.

Howard, P., et al. 1991. *Handbook of Environmental Degradation Rates*. Lewis Publishers, Inc., Chelsea, Michigan.

Hinchee, R.E., A. Leeson, L. Semprini, and S.K. Ong. 1994. *Bioremediation of Chlorinated and Polycyclic Aromatic Hydrocarbon Compounds*. Lewis Publishers, Boca Raton.

ITRC (Interstate Technology and Regulatory Cooperation Work Group). September 1999. *Natural Attenuation of Chlorinated Solvents in Groundwater: Principles and Practices*. Technical/Regulatory Guidelines.

Los Alamos National Laboratory. August 1996. *A Compendium of Cost Data for Environmental Remediation Technologies*.

Lyman, W.J., Reidy, P.J., & Levy, B. 1992. *Mobility and Degradation of Organic Contaminants in Subsurface Environments*. S.K. Smoley, Inc. Chelsea, Michigan.

McBean, E.A., F.A. Rovers, and G.J. Farquar. 1995. *Solid Waste Landfill Engineering and Design*. Prentice Hall PTR, Englewood Cliffs, New Jersey.

McCarty, P.L. and L. Semprini. 1994. Groundwater treatment for chlorinated solvents, IN: *Handbook of Bioremediation*, Norris, R.D., et al. (eds.) Lewis Publishers, Boca Raton, Florida.

Mitchell, J.K. 1993. *Fundamentals of Soil Behavior*, 2nd ed. John Wiley and Sons, New York. pp. 250 - 285.

Neuman, S.P. 1990. Universal scaling of hydraulic conductivities and dispersivities in geologic media. *Water Resources Research* 26, no. 8:1749-1758.

Nyer, E.K. 1992. *Groundwater Treatment Technology*, 2nd ed. Van Nostrand-Reinhold, New York.

Nyer, E.K. 1993. *Practical Techniques for Groundwater and Soil Remediation*. Lewis Publishers/CRC Press, Boca Raton, FL.

Nyer, E.K., P.L. Palmer, S.S. Suthersan, S. Fam, F.J. Johns II, D.F. Kidd, T.L. Crossman, and G. Boettcher. 1996. *In Situ Treatment Technology*. Lewis Publishers/CRC Press, Boca Raton.

USDE (U.S. Department of Energy). May 1999. *Decision-Making Framework Guide for the Evaluation and Selection of Monitored Natural Attenuation Remedies at Department of Energy Sites*.

USEPA (U.S. Environmental Protection Agency). October 1988. *Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA*. Office of Solid Waste and Emergency Response (OSWER) Directive 9355.3-01, EPA/540/G-89/004.

USEPA. February 1991. *Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites*. OSWER Directive 9355.3-11, EPA/540/P-91/001.

USEPA. November 1993. *Solid Waste Disposal Facility Criteria Technical Manual*. OSWER, EPA/530/R-93/017 and PB94-100-450.

USEPA. January 1995. *Manual: Ground-Water and Leachate Treatment Systems*. Office of Research and Development (ORD), EPA/625/R-94/005.

USEPA. May 1996. *Seminars on Bioremediation of Hazardous Waste Sites: Practical Approaches to Implementation*. ORD, EPA/625/K-96/001. Chapters 15 (Natural Attenuation of Ground Water) and 17 (Natural Attenuation of Landfills).

USEPA. September 1997. Analysis of Selected Enhancements for Soil Vapor Extraction. Office of Emergency Response. EPA-542-R-97-0.

USEPA. 1998. *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water.* EPA/600-R-98/128, National Risk Management Research Laboratory, Ada, Oklahoma.

USEPA. September 1998. *Seminars: Monitored Natural Attenuation for Ground Water*. ORD, EPA/625/K-98/001.

USEPA. April 1999. *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites*. OSWER Directive 9200.4-17P.

USEPA. September 1999. *Groundwater Cleanup: Overview of Operating Experience at 28 Sites*. EPA 524-R-99-06.

USEPA, July 2004. *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), OSWER 9285.7-02EP.*

USEPA, July 2004. *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment). OSWER 9285.7-82*

USEPA, March 2005. *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens.* EPA/630/R-03/003F.

USEPA, November 2012. *Regional Screening Level (RSL) Summary Table*.

USEPA and U.S. Air Force (USAF). July 1993. *Remediation Technologies Screening Matrix Reference Guide, Version I.* Joint Project of OSWER and Environics Directorate, PB93-2118212.

Verschueren, K., 1983. *Handbook of Environmental Data on Organic Chemicals, 2nd Edition*. Van Nostrand Reinhold Co., Inc., New York, New York.

Zhang, W. 2003. Nanoscale iron particles for environmental remediation: An overview. Journal of Nanoparticle Research, 5: 323-332.

TABLES

TABLE 1

Summary of Detected VOCs in Groundwater Samples during Nature and Extent Study
Assessment of Corrective Measures
Randolph County Landfill, Permit No. 76-01

Parameter	Units	SWSL	NC 2L	GWPS	Monitoring Well and Sampling Date										
					MW-5	**MW-1**	**MW-2**	**MW-6**	**MW-7**	**MW-8**	**MW-9**	**MW-10S**	**MW-10D**	**MW-11S**	**MW-11D**
Acetone	ug/L	100	6000	--	ND	140	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ug/L	1	1	--	ND	6.2	ND	ND	1.3	ND	ND	ND	ND	ND	ND
Chlorobenzene	ug/L	3	50	--	ND	ND	ND	ND	1.5 J	ND	ND	ND	ND	ND	ND
Chloroethane	ug/L	10	--	3000	ND	15	2.4 J	ND	ND	ND	ND	3.4 J	6.4 J	ND	ND
1,4-Dichlorobenzene	ug/L	1	6	--	ND	6.7	ND	ND	ND	ND	ND	ND	0.93 J	ND	ND
Dichlorodifluoromethane	ug/L	5	1000	--	ND	ND	ND	ND	0.63 J	ND	ND	4.0 J	ND	ND	ND
1,1-Dichloroethane	ug/L	5	6	--	ND	170	28	ND	5.8	3.7 J	1.7 J	26	23	ND	ND
1,2-Dichloroethane	ug/L	1	0.4	--	ND	3.3	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ug/L	5	7	--	ND	ND	0.89 J	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ug/L	5	70	--	ND	45	ND	ND	1.3 J	0.83 J	1.2 J	2.6 J	3.7 J	ND	ND
Methylene chloride	ug/L	1	5	--	ND	1.5 J	0.90 J	ND	4.4	0.45 J	ND	0.72 J	0.52 J	ND	ND
2-Butanone	ug/L	100	4000	--	ND	110	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone	ug/L	100	--	560	ND	12 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ug/L	1	0.7	--	ND	ND	0.74 J	ND	ND	ND	ND	2.8	ND	ND	ND
Toluene	ug/L	1	600	--	ND	4.3	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ug/L	1	3	--	ND	ND	ND	ND	ND	1.4	ND	2.2	ND	ND	ND
Trichlorofluoromethane	ug/L	1	2000	--	ND	ND	ND	ND	ND	ND	ND	3.9	ND	ND	ND
Vinyl chloride	ug/L	1	0.03	--	ND	8.8	ND	ND	0.70 J	ND	ND	ND	0.63 J	ND	ND
Xylenes (Total)	ug/L	5	500	--	ND	4.5 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
		Total VOCs:			**0.0**	**527**	**32.9**	**0.0**	**15.6**	**6.4**	**2.9**	**45.6**	**35.2**	**0.0**	**0.0**

Notes:
ug/L = micrograms per liter
ND = Not detected at the stated reporting limit
J = estimated concentration
SWSL = Solid Waste Section Reporting Limit
NC 2L = North Carolina 2L Groundwater Standard
Shaded = concentrations above the NC 2L Groundwater Standards have been shaded.
VOCs = volatile organic compounds

TABLE 2

Summary of Detected VOCs and Semi-VOCs in Groundwater Samples
Assessment of Corrective Measures
Randolph County Landfill, Permit No. 76-01

Detected Monitoring Constituent/Parameter	Units	Date	SWS Reporting Limit	Upgradient Wells		Downgradient Wells										Blanks
				MW-5	MW-A3	MW-1	MW-2	MW-6	MW-7	MW-8	MW-9	MW-10S	MW-10D	MW-11S	MW-11D	
Acetone	ug/L	09/22/94	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 6000 ug/L	ug/L	11/08/94	100	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	100	ND	--	438	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	100	ND	ND	514	1.5 J	1.3 J	--	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	100	ND	--	39 J	--	ND	ND	ND	ND	--	--	--	--	2.7 J
	ug/L	10/23/08	100	ND	--	38 B	--	4.3 B	5.1 B	4.6 B	4.2 B	--	--	--	--	5.3 J
	ug/L	04/07/09	100	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/19/09	100	ND	--	120	--	ND	ND	ND	ND	--	--	--	--	8.2 J
	ug/L	04/28/10	100	ND	--	130	1.9 J	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/12/10	100	ND	--	300	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	100	ND	--	140	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ug/L	10/04/11	100	ND	--	770	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	100	ND	--	460	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/15/12	100	ND	--	640	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	100	ND	--	760	--	ND	ND	ND	ND	--	--	--	--	ND
Benzene	ug/L	09/22/94	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 1 ug/L	ug/L	11/08/94	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	5	ND	ND	5.1	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	5	ND	ND	5	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	5	ND	ND	5.2	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	5	ND	ND	6	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	5	ND	ND	5.1	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	5	ND	ND	5.9	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	5	ND	ND	5.2	ND	ND	--	--	--	--	--	--	--	--
	ug/L	10/06/05	5	ND	ND	5.6	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	5	ND	ND	6.7	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	5	ND	ND	6	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	3	ND	ND	7.3	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	1	ND	ND	3.7	ND	ND	--	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	1	ND	--	7.4	--	ND	0.78 J	ND	ND	--	--	--	--	ND
	ug/L	10/23/08	1	ND	--	6.6	--	ND	1.8	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/19/09	1	ND	--	6.3	--	ND	1.9	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	1	ND	--	7.2	ND	ND	1.3	ND	ND	--	--	--	--	ND
	ug/L	10/12/10	1	ND	--	7.5	--	ND	2.0	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	1	ND	--	6.2	ND	ND	1.3	ND	ND	ND	ND	ND	ND	ND
	ug/L	10/04/11	1	ND	--	ND	--	ND	2.0	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	1	ND	--	5.4 J	--	ND	1.3	ND	ND	--	--	--	--	ND
	ug/L	10/15/12	1	ND	--	4.0 J	--	ND	1.9	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	1	ND	--	ND	--	ND	1.3	ND	ND	--	--	--	--	ND
Chlorobenzene	ug/L	09/22/94	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 50 ug/L	ug/L	11/08/94	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	3	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	3	ND	ND	ND	ND	ND	--	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	3	ND	--	ND	--	ND	1.0 J	ND	ND	--	--	--	--	ND
	ug/L	10/23/08	3	ND	--	ND	--	ND	2.5 J	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	3	ND	--	ND	--	ND	0.84 J	ND	ND	--	--	--	--	ND
	ug/L	10/19/09	3	ND	--	ND	--	ND	2.7 J	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	3	ND	--	ND	ND	ND	1.3 J	ND	ND	--	--	--	--	ND
	ug/L	10/12/10	3	ND	--	ND	--	ND	2.6 J	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	3	ND	--	ND	ND	ND	1.5 J	ND	ND	ND	ND	ND	ND	ND
	ug/L	10/04/11	3	ND	--	ND	--	ND	2.7 J	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	3	ND	--	ND	--	ND	1.3 J	ND	ND	--	--	--	--	ND
	ug/L	10/15/12	3	ND	--	ND	--	ND	2.6 J	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	3	ND	--	ND	--	ND	1.5 J	ND	ND	--	--	--	--	ND
Chloroethane	ug/L	09/22/94	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
GWPS = 3000 ug/L	ug/L	11/08/94	10	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	10	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	10	ND	ND	41	--	ND	38	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	10	ND	ND	12	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	10	ND	ND	33	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	10	ND	ND	33	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	10	ND	ND	47	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	10	ND	ND	40	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	10	ND	ND	50	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	10	ND	ND	38	--	ND	15	ND	ND	--	--	--	--	ND
	ug/L	04/04/02	10	ND	ND	35.1	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	10	ND	ND	22.9	ND	ND	10.2	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	10	ND	ND	20.2	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	10	ND	ND	78.3	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	10	ND	ND	67.3	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	10	ND	ND	25.9	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	10	ND	ND	23.5	ND	ND	--	--	--	--	--	--	--	ND
	ug/L	10/06/05	10	ND	ND	19.9	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	10	ND	ND	43.3	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	10	ND	ND	14.4	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	10	ND	ND	10.4	ND	ND	--	ND	0.4 J	--	--	--	--	ND
	ug/L	04/29/08	10	ND	--	14	--	ND	3.1 J	ND	ND	--	--	--	--	ND
	ug/L	10/23/08	10	ND	--	12	--	ND	7.2 J	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	10	ND	--	14	--	ND	3.1 J	ND	0.91 J	--	--	--	--	ND
	ug/L	10/19/09	10	ND	--	5.8 J	--	ND	3.4 J	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	10	ND	--	15	2.3 J	0.75 J	3.4 J	ND	ND	--	--	--	--	ND
	ug/L	10/12/10	10	ND	--	15	--	ND	5.3 J	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	10	ND	--	15	2.4 J	ND	ND	ND	ND	3.4 J	6.4 J	ND	ND	ND
	ug/L	10/04/11	10	ND	--	60	--	ND	7.3 J	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	10	ND	--	53	--	ND	1.5 J	ND	ND	--	--	--	--	ND
	ug/L	10/15/12	10	ND	--	93	--	ND	3.5 J	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	10	ND	--	110	--	ND	ND	ND	ND	--	--	--	--	ND

TABLE 2

Summary of Detected VOCs and Semi-VOCs in Groundwater Samples
Assessment of Corrective Measures
Randolph County Landfill, Permit No. 76-01

Detected Monitoring Constituent/Parameter	Units	Date	SWS Reporting Limit	Upgradient Wells MW-5	Upgradient Wells MW-A3	Downgradient Wells MW-1	MW-2	MW-6	MW-7	MW-8	MW-9	MW-10S	MW-10D	MW-11S	MW-11D	Blanks
Chloroform	ug/L	09/22/94	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 70 ug/L	ug/L	11/08/94	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	5	ND	ND	19	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	5	ND	ND	18	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	5	ND	ND	17	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	5	ND	ND	11	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	5	ND	ND	7.6	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	5	ND	ND	5.8	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/02	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	5	ND	ND	0.2 J	ND	ND	--	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/23/08	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/19/09	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	5	ND	--	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/12/10	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	5	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ug/L	10/04/11	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/15/12	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
1,4-Dichlorobenzene	ug/L	09/22/94	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 6 ug/L	ug/L	11/08/94	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/02	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	5	ND	ND	6	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	5	ND	ND	5.6	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	5	ND	ND	5.3	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	5	ND	ND	7.1	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	5	ND	ND	6.7	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	5	ND	ND	8.4	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	3	ND	ND	6.9	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	1	ND	ND	5.3	ND	ND	--	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	1	ND	--	5.4	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/23/08	1	ND	--	6.1	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	1	ND	--	5.4	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/19/09	1	ND	--	7.1	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	1	ND	--	7.9	ND	ND	0.67 J	ND	ND	--	--	--	--	ND
	ug/L	10/12/10	1	ND	--	7.7	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	1	ND	--	6.7	ND	ND	ND	ND	ND	ND	0.93 J	ND	ND	ND
	ug/L	10/04/11	1	ND	--	ND	--	ND	1.0	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	1	ND	--	6.7 J	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/15/12	1	ND	--	6.6	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/15/12	1	ND	--	6.4	--	ND	0.84 J	ND	ND	--	--	--	--	ND
Dichlorodifluoromethane	ug/L	09/22/94	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 1000 ug/L	ug/L	11/08/94	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	5	ND	ND	166	--	ND	38	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	5	ND	ND	40	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	5	ND	ND	7.2	--	ND	ND	--	--	--	--	--	--	--
	ug/L	04/21/98	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	5	ND	ND	22	--	ND	5.8	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	5	ND	ND	39	--	ND	8.8	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	5	ND	ND	12	--	ND	8.1	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	5	ND	ND	14.4	ND	ND	7.2	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	5	ND	ND	9.6	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	5	ND	ND	ND	ND	ND	6.2	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	5	ND	ND	9	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	5	ND	ND	6.3	ND	ND	7.1	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	5	ND	ND	5.2	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	5	ND	ND	5.4	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	5	ND	ND	6.5	ND	ND	8.1	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	5	ND	ND	6.8	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	5	ND	ND	14.8	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	5	ND	ND	14.8	0.4 J	ND	--	0.8 J	ND	--	--	--	--	ND
	ug/L	04/29/08	5	ND	--	ND	--	ND	1.2 J	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	5	ND	--	ND	--	ND	1.8 J	0.71 J	ND	--	--	--	--	ND
	ug/L	10/19/09	5	ND	--	1.3 J	--	ND	2.0 J	0.58 J	ND	--	--	--	--	ND
	ug/L	04/28/10	5	ND	--	1.4 J	ND	ND	1.1 J	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	5	ND	--	ND	ND	ND	0.63 J	ND	ND	4.0 J	ND	ND	ND	ND
	ug/L	04/10/12	5	ND	--	ND	--	ND	0.52 J	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
1,1-Dichloroethane	ug/L	09/22/94	5	ND	ND	38	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 6 ug/L	ug/L	11/08/94	5	ND	--	22	--	ND	17	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	5	ND	--	44	--	ND	13	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	5	ND	ND	89	--	ND	21	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	5	ND	ND	141	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	5	ND	ND	191	--	ND	13	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	5	ND	ND	197	--	ND	13	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	5	ND	ND	242	--	ND	17	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	5	ND	ND	307	--	ND	20	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	5	ND	ND	259	--	ND	26	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	5	ND	6.9	227	--	ND	31	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	5	ND	ND	328	--	ND	39	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	5	ND	ND	291	ND	ND	15.6	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	5	ND	ND	257	ND	ND	35.6	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	5	ND	ND	262	ND	ND	12.8	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	5	ND	ND	257	ND	ND	6.1	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	5	ND	ND	234	ND	ND	13.5	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	5	ND	ND	168	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	5	ND	ND	237	ND	ND	--	--	--	--	--	--	--	--
	ug/L	10/06/05	5	ND	ND	305	ND	ND	16.4	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	5	ND	ND	347	ND	ND	5.4	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	5	ND	ND	306	ND	ND	12	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	5	ND	ND	298	ND	ND	6	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	5	ND	ND	272	3.7 J	ND	--	2.2 J	1.2 J	--	--	--	--	ND
	ug/L	04/29/08	5	ND	--	260	--	ND	7.8	1.7 J	2.5 J	--	--	--	--	ND
	ug/L	10/23/08	5	ND	--	250	--	ND	15	2.6 J	1.4 J	--	--	--	--	ND
	ug/L	04/07/09	5	ND	--	240	--	ND	6.8	2.5 J	3.0 J	--	--	--	--	ND
	ug/L	10/19/09	5	ND	--	210	--	ND	11	2.6 J	1.1 J	--	--	--	--	ND
	ug/L	04/28/10	5	ND	--	250	21	1.1 J	6.9	2.4 J	2.7 J	--	--	--	--	ND
	ug/L	10/12/10	5	ND	--	280	--	0.59 J	12	3.9 J	1.5 J	--	--	--	--	ND
	ug/L	04/11/11	5	ND	--	170	28	ND	5.8	3.7 J	1.7 J	26	23	ND	ND	ND
	ug/L	10/04/11	5	ND	--	81	--	ND	13	5.6	1.9 J	--	--	--	--	ND
	ug/L	04/10/12	5	ND	--	99	--	ND	5.1	4.3 J	2.5 J	--	--	--	--	ND
	ug/L	10/15/12	5	ND	--	32	--	ND	6.6	5.7	0.9 J	--	--	--	--	ND
	ug/L	04/09/13	5	ND	--	23	--	ND	4.3 J	6.9	1.0 J	--	--	--	--	ND
1,2-Dichloroethane	ug/L	09/22/94	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 0.4 ug/L	ug/L	11/08/94	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	5	ND	ND	5.6	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	5	ND	ND	10.4	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	3	ND	ND	4	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	1	ND	ND	3.5	ND	ND	--	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/23/08	1	ND	--	3.6	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	1	ND	--	4.6	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/19/09	1	ND	--	4.1	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	1	ND	--	3.7	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/12/10	1	ND	--	3.9	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	1	ND	--	3.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ug/L	10/04/11	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/15/12	1	ND	--	4.2 J	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND

TABLE 2

Summary of Detected VOCs and Semi-VOCs in Groundwater Samples
Assessment of Corrective Measures
Randolph County Landfill, Permit No. 76-01

Detected Monitoring Constituent/Parameter	Units	Date	SWS Reporting Limit	Upgradient Wells MW-5	Upgradient Wells MW-A3	Downgradient Wells MW-1	MW-2	MW-6	MW-7	MW-8	MW-9	MW-10S	MW-10D	MW-11S	MW-11D	Blanks
1,1-Dichloroethene	ug/L	09/22/94	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 7 ug/L	ug/L	11/08/94	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	5	ND	ND	10	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	5	ND	ND	8.9	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	5	ND	ND	6	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	5	ND	ND	5.2	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	5	ND		ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	5	ND	ND	5.2	ND	ND	11.2	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	5	ND	ND	4.7 J	0.3 J	ND	--	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/23/08	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/19/09	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	5	ND	--	ND	0.50 J	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/12/10	5	ND	--	ND	--	ND	0.42 J	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	5	ND	--	ND	0.89 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ug/L	10/04/11	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/15/12	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
cis-1,2-Dichloroethene	ug/L	09/22/94	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 70 ug/L	ug/L	11/08/94	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	5	ND	ND	5.3	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	5	ND	ND	29	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	5	ND	ND	10	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	5	ND	ND	19	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	5	ND	ND	40	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	5	ND	ND	32.7	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	5	ND	ND	69	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	5	ND	ND	57.1	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	5	ND	ND	21.1	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	5	ND	ND	38.2	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	5	ND	ND	34.8	ND	ND	--	--	--	--	--	--	--	--
	ug/L	10/06/05	5	ND	ND	51.6	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	5	ND	ND	92.1	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	5	ND	ND	125	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	5	ND	ND	118	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	5	ND	ND	138	ND	ND	--	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	5	ND	--	63	--	ND	0.63 J	ND	1.8 J	--	--	--	--	ND
	ug/L	10/23/08	5	ND	--	70	--	ND	1.4 J	0.40 J	0.80 J	--	--	--	--	ND
	ug/L	04/07/09	5	ND	--	64	--	ND	0.49 J	ND	1.8 J	--	--	--	--	ND
	ug/L	10/19/09	5	ND	--	69	--	ND	1.6 J	0.48 J	0.73 J	--	--	--	--	ND
	ug/L	04/28/10	5	ND	--	88	ND	ND	1.1 J	0.49 J	2.5 J	--	--	--	--	ND
	ug/L	10/12/10	5	ND	--	74	--	ND	1.9 J	0.69 J	0.90 J	--	--	--	--	ND
	ug/L	04/11/11	5	ND	--	45	ND	ND	1.3 J	0.83 J	1.2 J	2.6 J	3.7 J	ND	ND	ND
	ug/L	10/04/11	5	ND	--	16	--	ND	1.8 J	0.84 J	0.86 J	--	--	--	--	ND
	ug/L	04/10/12	5	ND	--	27	--	ND	1.2 J	0.85 J	3.3 J	--	--	--	--	ND
	ug/L	10/15/12	5	ND	--	11	--	ND	1.9 J	1.20 J	0.56 J	--	--	--	--	ND
	ug/L	04/09/13	5	ND	--	11	--	ND	1.5 J	0.91 J	ND	--	--	--	--	ND
trans-1,2-Dichloroethene	ug/L	09/22/94	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 100 ug/L	ug/L	11/08/94	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	5	ND	ND	0.9 J	ND	ND	--	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/23/08	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/19/09	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	5	ND	--	0.98 J	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/12/10	5	ND	--	0.88 J	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	5	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ug/L	10/04/11	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/15/12	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
Ethylbenzene	ug/L	09/22/94	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 600 ug/L	ug/L	11/08/94	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	1	ND	ND	0.6 J	ND	ND	--	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/23/08	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/19/09	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	1	ND	--	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/12/10	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	1	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ug/L	10/04/11	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/15/12	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND

TABLE 2

Summary of Detected VOCs and Semi-VOCs in Groundwater Samples
Assessment of Corrective Measures
Randolph County Landfill, Permit No. 76-01

Detected Monitoring Constituent/Parameter	Units	Date	SWS Reporting Limit	Upgradient Wells		Downgradient Wells										Blanks
				MW-5	MW-A3	MW-1	MW-2	MW-6	MW-7	MW-8	MW-9	MW-10S	MW-10D	MW-11S	MW-11D	
2-Hexanone	ug/L	09/22/94	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
GWPS = 40 ug/L	ug/L	11/08/94	50	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	50	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	50	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	50	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	50	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	50	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	50	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	50	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	50	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	50	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	50	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	50	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	50	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	50	ND	ND	12 J	ND	ND	--	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	50	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/23/08	50	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	50	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/19/09	50	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	50	ND	--	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/12/10	50	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	50	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ug/L	10/04/11	50	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	50	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/15/12	50	ND	--	6.0 J	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	50	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
Chloromethane	ug/L	09/22/94	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
GWPS = 3 ug/L	ug/L	11/08/94	10	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	10	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	10	ND	ND	17	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	10	ND	ND	40	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	1	0.5 J	0.4 J	0.7 J	1	0.5 J	--	0.4 J	0.5 J	--	--	--	--	ND
	ug/L	04/29/08	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/23/08	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/19/09	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	1	ND	--	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/12/10	1	ND	--	1.0 B	--	0.51 B	0.94 B	0.51 B	0.53 B	--	--	--	--	0.49 J
	ug/L	04/11/11	1	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ug/L	10/04/11	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/15/12	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
Methylene chloride	ug/L	09/22/94	10	ND	ND	75	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 5 ug/L	ug/L	11/08/94	10	ND	--	71	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	10	ND	--	48	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	10	ND	ND	189	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	10	ND	ND	164	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	10	ND	ND	429	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	10	ND	ND	210	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	10	ND	ND	242	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	10	ND	ND	126	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	10	ND	ND	184	--	ND	35	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	10	ND	ND	126	--	ND	44	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	10	ND	ND	28	--	ND	49	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	10	ND	ND	38.4	ND	ND	18.9	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	10	ND	ND	ND	ND	ND	33.6	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	10	ND	ND	40.7	ND	ND	17.4	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	10	ND	ND	46.1	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	10	ND	ND	14.8	ND	ND	14.6	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	10	ND	ND	12.2	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	10	ND	ND	ND	ND	ND	10.4	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	1	ND	ND	4.2	ND	ND	--	0.3 B	ND	--	--	--	--	0.2 J
	ug/L	04/29/08	1	ND	--	8.6	--	ND	7.0	ND	ND	--	--	--	--	ND
	ug/L	10/23/08	1	ND	--	ND	--	ND	11	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	1	ND	--	ND	--	ND	5.4	ND	ND	--	--	--	--	ND
	ug/L	10/19/09	1	ND	--	ND	--	ND	8.5	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	1	ND	--	ND	ND	ND	7.5	ND	ND	--	--	--	--	ND
	ug/L	10/12/10	1	ND	--	1.2 J	--	ND	12	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	1	ND	--	1.5 J	0.90 J	ND	4.4	0.45 J	ND	0.72 J	0.52 J	ND	ND	ND
	ug/L	10/04/11	1	ND	--	ND	--	ND	7.4	0.75 J	ND	--	--	--	--	ND
	ug/L	04/10/12	1	ND	--	4.4 J	--	ND	3.8	0.34 J	ND	--	--	--	--	ND
	ug/L	10/15/12	1	ND	--	5.4	--	ND	4.6	0.47 J	ND	--	--	--	--	ND
	ug/L	04/09/13	1	ND	--	ND	--	ND	1.8	ND	ND	--	--	--	--	ND
2-Butanone	ug/L	09/22/94	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 4000 ug/L	ug/L	11/08/94	100	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	100	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	100	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	100	ND	ND	1140	0.9 J	ND	--	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	100	ND	--	20 J	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/23/08	100	ND	--	10 J	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	100	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/19/09	100	ND	--	91 J	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	100	ND	--	130	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/12/10	100	ND	--	280	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	100	ND	--	110	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ug/L	10/04/11	100	ND	--	1000	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	100	ND	--	740	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/15/12	100	ND	--	1100	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	100	ND	--	1200	--	ND	ND	ND	ND	--	--	--	--	ND

Golder Associates

TABLE 2

Summary of Detected VOCs and Semi-VOCs in Groundwater Samples
Assessment of Corrective Measures
Randolph County Landfill, Permit No. 76-01

Detected Monitoring Constituent/Parameter	Units	Date	SWS Reporting Limit	Upgradient Wells		Downgradient Wells										Blanks
				MW-5	MW-A3	MW-1	MW-2	MW-6	MW-7	MW-8	MW-9	MW-10S	MW-10D	MW-11S	MW-11D	
4-Methyl-2-pentanone	ug/L	09/22/94	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
GWPS = 560 ug/L	ug/L	11/08/94	50	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	50	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	50	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	50	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	100	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	100	ND	ND	241	ND	ND	--	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	100	ND	--	2.8 J	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/23/08	100	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	100	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/19/09	100	ND	--	9.4 J	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	100	ND	--	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/12/10	100	ND	--	19 J	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	100	ND	--	12 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ug/L	10/04/11	100	ND	--	140	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	100	ND	--	120	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/15/12	100	ND	--	200	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	100	ND	--	220	--	ND	ND	ND	ND	--	--	--	--	ND
Naphthalene	ug/L	09/22/94	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 6 ug/L	ug/L	11/08/94	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	10	ND	ND	0.4 J	ND	ND	--	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	10	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	10	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	10	ND	--	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	10	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ug/L	04/10/12	10	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	10	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
Tetrachloroethene	ug/L	09/22/94	5	ND	--	12	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 0.7 ug/L	ug/L	11/08/94	5	ND	--	11	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	5	ND	--	14	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	5	ND	ND	15	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	5	ND	ND	12	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	5	ND	ND	29	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	5	ND	ND	53	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	5	ND	ND	65	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	5	ND	ND	67	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	5	ND	ND	133	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	5	ND	ND	85	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	5	ND	ND	146	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	5	ND	ND	66.4	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	5	ND	ND	111	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	5	ND	ND	146	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	5	ND	ND	124	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	5	ND	ND	97.1	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	5	ND	ND	99.1	ND	ND	--	--	--	--	--	--	--	--
	ug/L	10/06/05	5	ND	ND	96.6	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	5	ND	ND	73.9	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	5	ND	ND	38.9	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	3	ND	ND	24.9	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	1	ND	ND	6.8	ND	ND	--	0.2 J	0.3 J	--	--	--	--	ND
	ug/L	04/29/08	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/23/08	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/19/09	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	1	ND	--	ND	0.43 J	ND	ND	ND	0.49 J	--	--	--	--	ND
	ug/L	10/12/10	1	ND	--	ND	--	ND	ND	0.48 J	ND	--	--	--	--	ND
	ug/L	04/11/11	1	ND	--	ND	0.74 J	ND	ND	ND	ND	2.8	ND	ND	ND	ND
	ug/L	10/04/11	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	1	ND	--	ND	--	ND	ND	0.56 J	ND	--	--	--	--	ND
	ug/L	10/15/12	1	ND	--	ND	--	ND	ND	0.46 J	ND	--	--	--	--	ND
	ug/L	04/09/13	1	ND	--	ND	--	ND	ND	0.77 J	ND	--	--	--	--	ND
Toluene	ug/L	09/22/94	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 600 ug/L	ug/L	11/08/94	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	1	ND	ND	5.5	ND	ND	--	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/23/08	1	ND	--	2.0 J	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/19/09	1	ND	--	3.5	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	1	ND	--	3.5	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/12/10	1	ND	--	5.2	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	1	ND	--	4.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ug/L	10/04/11	1	ND	--	14	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	1	ND	--	16	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/15/12	1	ND	--	20	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	1	ND	--	21	--	ND	ND	ND	ND	--	--	--	--	ND
1,1,1-Trichloroethane	ug/L	09/22/94	5	ND	ND	64	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 200 ug/L	ug/L	11/08/94	5	ND	--	67	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	5	ND	ND	16	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	5	ND	ND	35	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	5	ND	ND	23	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	5	ND	ND	18	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	5	ND	ND	14	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	5	ND	ND	13	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	5	ND	ND	12	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	5	ND	ND	9.3	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	5	ND	ND	6.6	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	5	ND	ND	6.6	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	1	ND	ND	4	ND	ND	--	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/23/08	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/19/09	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	1	ND	--	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/12/10	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	1	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ug/L	10/04/11	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/15/12	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	1	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND

TABLE 2

Summary of Detected VOCs and Semi-VOCs in Groundwater Samples
Assessment of Corrective Measures
Randolph County Landfill, Permit No. 76-01

Detected Monitoring Constituent/Parameter	Units	Date	SWS Reporting Limit	Upgradient Wells		Downgradient Wells										Blanks
				MW-5	MW-A3	MW-1	MW-2	MW-6	MW-7	MW-8	MW-9	MW-10S	MW-10D	MW-11S	MW-11D	
Trichloroethene	ug/L	09/22/94	5	ND	ND	68	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 3 ug/L	ug/L	11/08/94	5	ND	--	37	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	5	ND	--	64	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	5	ND	ND	34	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	5	ND	ND	42	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	5	ND	ND	39	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	5	ND	ND	52	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	5	ND	ND	52	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	5	ND	ND	56	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	5	ND	ND	56	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	5	ND	ND	52	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	5	ND	ND	57.8	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	5	ND	ND	44.3	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	5	ND	ND	40.7	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	5	ND	ND	54.6	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	5	ND	ND	44.3	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	5	ND	ND	44.1	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	5	ND	ND	39.3	ND	ND	--	--	--	--	--	--	--	--
	ug/L	10/06/05	5	ND	ND	36.6	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	5	ND	ND	30.6	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	5	ND	ND	16.5	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	3	ND	ND	16.5	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	1	ND	ND	4.8	0.5 J	ND	--	0.7 J	0.2 J	--	--	--	--	ND
	ug/L	04/29/08	1	ND	--	ND	--	ND	ND	0.67 J	0.41 J	--	--	--	--	ND
	ug/L	10/23/08	1	ND	--	ND	--	ND	0.51 J	0.95 J	ND	--	--	--	--	ND
	ug/L	04/07/09	1	ND	--	ND	--	ND	ND	0.90 J	0.46 J	--	--	--	--	ND
	ug/L	10/19/09	1	ND	--	ND	--	ND	0.53 J	1.2	ND	--	--	--	--	ND
	ug/L	04/28/10	1	ND	--	ND	ND	ND	ND	1.1	0.51 J	--	--	--	--	ND
	ug/L	10/12/10	1	ND	--	ND	--	ND	0.46 J	1.5	ND	--	--	--	--	ND
	ug/L	04/11/11	1	ND	--	ND	ND	ND	ND	1.4	ND	2.2	ND	ND	ND	ND
	ug/L	10/04/11	1	ND	--	ND	--	ND	ND	1.6	ND	--	--	--	--	ND
	ug/L	04/10/12	1	ND	--	ND	--	ND	ND	1.6	0.39 J	--	--	--	--	ND
	ug/L	10/15/12	1	ND	--	ND	--	ND	ND	1.8	ND	--	--	--	--	ND
	ug/L	04/09/13	1	ND	--	ND	--	ND	ND	2.4	ND	--	--	--	--	ND
Trichlorofluoromethane	ug/L	09/22/94	5	ND	ND	78	--	ND	19	ND	ND	--	--	--	--	ND
NC 2L = 2000 ug/L	ug/L	11/08/94	5	ND	--	138	--	ND	29	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	5	ND	--	40	--	ND	20	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	5	ND	ND	110	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	5	ND	ND	43	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	5	ND	ND	54	--	ND	14	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	5	ND	ND	54	--	ND	15	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	5	ND	ND	31	--	ND	9.9	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	5	ND	ND	9.2	--	ND	7	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	5	ND	ND	26	--	ND	6.5	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	5	ND	ND	12	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	5	ND	ND	9.2	--	ND	6	ND	ND	--	--	--	--	ND
	ug/L	04/08/02	5	ND	ND	8.2	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	5	ND	ND	ND	ND	ND	6.9	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	5	ND	ND	6.6	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	1	ND	ND	1.3	ND	ND	--	0.5 J	ND	--	--	--	--	ND
	ug/L	04/29/08	1	ND	--	ND	--	ND	1.1	ND	ND	--	--	--	--	ND
	ug/L	10/23/08	1	ND	--	3.2 J	--	ND	1.1	0.65 J	ND	--	--	--	--	ND
	ug/L	04/07/09	1	ND	--	ND	--	ND	1.1	0.86 J	ND	--	--	--	--	ND
	ug/L	10/19/09	1	ND	--	ND	--	ND	1.1	0.62 J	ND	--	--	--	--	ND
	ug/L	04/28/10	1	ND	--	ND	ND	ND	1.0	0.49 J	ND	--	--	--	--	ND
	ug/L	10/12/10	1	ND	--	ND	--	ND	1.8	0.66 J	ND	--	--	--	--	ND
	ug/L	04/11/11	1	ND	--	ND	ND	ND	ND	ND	ND	3.9	ND	ND	ND	ND
	ug/L	10/04/11	1	ND	--	ND	--	ND	1.7	0.73 J	ND	--	--	--	--	ND
	ug/L	04/10/12	1	ND	--	ND	--	ND	0.55 J	0.36 J	ND	--	--	--	--	ND
	ug/L	10/15/12	1	ND	--	ND	--	ND	0.72 J	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	1	ND	--	ND	--	ND	0.47 J	0.70 J	ND	--	--	--	--	ND
Vinyl chloride	ug/L	09/22/94	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 0.03 ug/L	ug/L	11/08/94	10	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	10	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	10	ND	ND	12	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	10	ND	ND	16	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	10	ND	ND	18	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/02	10	ND	ND	11.1	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	10	ND	ND	14.2	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	10	ND	ND	14.3	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	10	ND	ND	12.7	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	10	ND	ND	10.8	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	10	ND	ND	10.9	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	10	ND	ND	14.1	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	10	ND	ND	15.9	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	10	ND	ND	13	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	1	ND	ND	24.4	ND	ND	--	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	1	ND	--	17	--	ND	0.41 J	ND	0.54 J	--	--	--	--	ND
	ug/L	10/23/08	1	ND	--	13	--	ND	0.93 J	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	1	ND	--	11	--	ND	0.46 J	ND	0.71 J	--	--	--	--	ND
	ug/L	10/19/09	1	ND	--	16	--	ND	1.2	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	1	ND	--	12	ND	ND	0.63 J	ND	0.64 J	--	--	--	--	ND
	ug/L	10/12/10	1	ND	--	13	--	ND	1.0	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	1	ND	--	8.8	ND	ND	0.70 J	ND	ND	ND	0.63 J	ND	ND	ND
	ug/L	10/04/11	1	ND	--	ND	--	ND	1.1	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	1	ND	--	6.2 J	--	ND	0.51 J	ND	0.34 J	--	--	--	--	ND
	ug/L	10/15/12	1	ND	--	ND	--	ND	1.0	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	1	ND	--	ND	--	ND	0.75 J	ND	ND	--	--	--	--	ND
Xylenes (Total)	ug/L	09/22/94	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 500 ug/L	ug/L	11/08/94	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	5	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/02	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	5	ND	ND	7.2	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	5	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	4	ND	ND	4.4	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	5	ND	ND	6.6	ND	ND	--	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	5	ND	--	3.6 J	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/23/08	5	ND	--	3.1 J	--	ND	1.2 J	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/19/09	5	ND	--	4.5 J	--	ND	1.2 J	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	5	ND	--	3.8 J	ND	ND	0.54 J	ND	ND	--	--	--	--	ND
	ug/L	10/12/10	5	ND	--	6.0	--	ND	1.0 J	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	5	ND	--	4.5 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ug/L	10/04/11	5	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	5	ND	--	8.5 J	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/15/12	5	ND	--	11	--	ND	0.64 J	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	5	ND	--	14	--	ND	0.57 J	ND	ND	--	--	--	--	ND
Diethylphthalate	ug/L	04/21/98	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 6000 ug/L	ug/L	04/07/99	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/13/99	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/02	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	10	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	10	ND	--	1.5 J	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	10	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	10	ND	--	1.8 J	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	6000	2.2 J	--	2.6 J	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	6000	ND	--	14 J	--	14 J	ND	9.4 J	15 J	--	--	--	--	ND
	ug/L	04/09/13	6000	ND	--	6.1 J	--	ND	ND	ND	ND	--	--	--	--	ND

TABLE 2

Summary of Detected VOCs and Semi-VOCs in Groundwater Samples
Assessment of Corrective Measures
Randolph County Landfill, Permit No. 76-01

Detected Monitoring Constituent/Parameter	Units	Date	SWS Reporting Limit	Upgradient Wells		Downgradient Wells										Blanks
				MW-5	MW-A3	MW-1	MW-2	MW-6	MW-7	MW-8	MW-9	MW-10S	MW-10D	MW-11S	MW-11D	
Bis(2-ethylhexyl)phthalate	ug/L	09/22/94	20	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 3 ug/L	ug/L	11/08/94	20	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	01/18/95	20	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/23/96	20	34	ND	26	--	ND	150	ND	ND	--	--	--	--	ND
	ug/L	06/17/97	20	21	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/16/97	20	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	20	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	20	ND	ND	ND	--	ND	62.23	15.04	ND	--	--	--	--	ND
	ug/L	10/13/99	20	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	20	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/25/00	20	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	20	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/02	20	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/21/02	20	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	20	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/01/03	20	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	20	ND	24	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/04	20	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	20	35	ND	ND	ND	36	ND	ND	ND	--	--	--	--	ND
	ug/L	10/06/05	20	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	20	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/03/06	20	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	15	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	10/18/07	15	ND	ND	ND	ND	ND	--	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	15	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	15	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	15	ND	--	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	15	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	15	ND	--	7.2 B	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	15	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
Phenol	ug/L	04/23/96	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 30 ug/L	ug/L	06/17/97	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/21/98	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/02	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	10	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	10	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	10	ND	--	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	10	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	10	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	10	ND	--	3.2 J	--	ND	ND	ND	ND	--	--	--	--	ND
3 & 4-Methylphenol	ug/L	04/23/96	10	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 400 ug/L (3-Methylphenol)	ug/L	06/17/97	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
NC 2L = 40 ug/L (4-Methylphenol)	ug/L	04/21/98	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/99	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/00	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/01	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/04/02	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/14/03	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/04	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/05	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/03/06	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/05/07	10	ND	ND	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/29/08	10	ND	--	ND	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/07/09	10	ND	--	3.6 J	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/28/10	10	ND	--	ND	ND	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/11/11	10	ND	--	3.4 J	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/10/12	10	ND	--	6.3 J	--	ND	ND	ND	ND	--	--	--	--	ND
	ug/L	04/09/13	10	ND	--	12	--	ND	ND	ND	ND	--	--	--	--	ND
Verification Event	ug/L	05/22/13	10	ND	--	14	--	ND	ND	ND	ND	--	--	--	--	ND

Notes:
ug/L = micrograms per liter
ND = Not detected at the stated reporting limit for data before October 2007 and not detected at the laboratory detection limit for data from October 2007 forward
NM = Not measured
J = estimated concentration
B = Blank-qualified result
-- = no data available
Blanks = field, trip and method blanks
Shaded = concentrations above the NC 2L Groundwater Standards or Solid Waste Section Groundwater Protection Standards (GWPS) have been shaded.
SWS Reporting Limit = NCPQL or lab-specific reporting limit prior to October 2007 and NCSWSL starting in October 2007
Wells MW-2, MW-3, MW-4, MW-A1, MW-A2, and MW-A3 are not sampled as part of the compliance network.
Historical data prior to April 2008 provided by the County as taken from historical reports from Hazen and Sawyer and Environment 1.

TABLE 3

Summary of Detected VOCs in Surface Water Samples
Assessment of Corrective Measures
Randolph County Landfill, Permit No. 76-01

Detected Monitoring Constituent/Parameter	Units	Date	SWS Reporting Limit	Upstream				Downstream				Blanks	
				SW-1		SW-3		SW-2		SW-4			
Acetone	ug/L	09/22/94	100	ND		ND		ND		ND		ND	
SW Standard = 2000 ug/L	ug/L	11/08/94	100	ND		ND		ND		ND		ND	
	ug/L	01/18/95	100	ND		ND		ND		ND		ND	
	ug/L	04/23/96	100	ND		ND		ND		ND		ND	
	ug/L	06/17/97	100	ND		ND		ND		ND		ND	
	ug/L	10/16/97	100	ND		ND		ND		ND		ND	
	ug/L	04/21/98	100	ND		ND		ND		ND		ND	
	ug/L	04/07/99	100	ND		ND		ND		ND		ND	
	ug/L	10/13/99	100	ND		ND		ND		ND		ND	
	ug/L	04/05/00	100	ND		ND		ND		ND		ND	
	ug/L	10/25/00	100	ND		ND		ND		ND		ND	
	ug/L	04/04/01	100	ND		ND		ND		ND		ND	
	ug/L	04/08/02	100	ND		ND		ND		ND		ND	
	ug/L	10/21/02	100	ND		ND		ND		ND		ND	
	ug/L	04/14/03	100	ND		ND		ND		ND		ND	
	ug/L	10/01/03	100	ND		ND		ND		ND		ND	
	ug/L	04/05/04	100	ND		ND		ND		ND		ND	
	ug/L	10/18/04	100	ND		ND		ND		ND		ND	
	ug/L	04/07/05	100	ND		ND		ND		ND		ND	
	ug/L	10/06/05	100	ND		ND		ND		ND		ND	
	ug/L	04/03/06	100	ND		ND		ND		ND		ND	
	ug/L	10/03/06	100	ND		ND		ND		ND		ND	
	ug/L	04/05/07	100	ND		ND		ND		ND		ND	
	ug/L	10/18/07	100	--		2.3	J	--		1.8	J	ND	
	ug/L	04/29/08	100	3.9	B	ND		ND		10	B	2.7	J
	ug/L	10/23/08	100	Dry		5.9	B	6.2	B	5.1	B	5.3	J
	ug/L	04/07/09	100	ND		ND		ND		ND		ND	
	ug/L	10/19/09	100	Dry		ND		Dry		ND		8.2	J
	ug/L	04/29/10	100	ND		ND		ND		ND		ND	
	ug/L	10/13/10	100	ND		ND		ND		ND		ND	
	ug/L	04/11/11	100	ND		ND		ND		ND		ND	
	ug/L	10/03/11	100	ND		ND		ND		ND		ND	
	ug/L	04/10/12	100	ND		ND		ND		ND		ND	
	ug/L	10/15/12	100	ND		ND		ND		ND		ND	
	ug/L	04/09/13	100	ND		ND		ND		ND		ND	

TABLE 3

Summary of Detected VOCs in Surface Water Samples
Assessment of Corrective Measures
Randolph County Landfill, Permit No. 76-01

Detected Monitoring Constituent/Parameter	Units	Date	SWS Reporting Limit	Upstream		Downstream		Blanks
				SW-1	SW-3	SW-2	SW-4	
Bromodichloromethane	ug/L	09/22/94	5	ND	ND	ND	ND	ND
No SW Standard	ug/L	11/08/94	5	ND	ND	ND	ND	ND
	ug/L	01/18/95	5	ND	ND	ND	ND	ND
	ug/L	04/23/96	5	ND	ND	ND	ND	ND
	ug/L	06/17/97	5	ND	ND	ND	ND	ND
	ug/L	10/16/97	5	ND	ND	ND	ND	ND
	ug/L	04/21/98	5	ND	ND	ND	ND	ND
	ug/L	04/07/99	5	ND	ND	ND	ND	ND
	ug/L	10/13/99	5	ND	ND	ND	ND	ND
	ug/L	04/05/00	5	ND	ND	ND	ND	ND
	ug/L	10/25/00	5	ND	ND	ND	ND	ND
	ug/L	04/04/01	5	ND	ND	ND	ND	ND
	ug/L	04/08/02	5	ND	ND	ND	ND	ND
	ug/L	10/21/02	5	ND	ND	ND	ND	ND
	ug/L	04/14/03	5	ND	ND	ND	ND	ND
	ug/L	10/01/03	5	ND	ND	ND	ND	ND
	ug/L	04/05/04	5	ND	ND	ND	ND	ND
	ug/L	10/18/04	5	ND	ND	ND	ND	ND
	ug/L	04/07/05	5	ND	ND	ND	ND	ND
	ug/L	10/06/05	5	ND	ND	ND	ND	ND
	ug/L	04/03/06	5	ND	ND	ND	ND	ND
	ug/L	10/03/06	5	ND	ND	ND	ND	ND
	ug/L	04/05/07	3	ND	ND	ND	ND	ND
	ug/L	10/18/07	1	--	1.2 J	--	0.3 J	ND
	ug/L	04/29/08	1	ND	ND	ND	ND	ND
	ug/L	10/23/08	1	Dry	ND	ND	ND	ND
	ug/L	04/07/09	1	ND	ND	ND	ND	ND
	ug/L	10/19/09	1	Dry	ND	Dry	ND	ND
	ug/L	04/29/10	1	ND	ND	ND	ND	ND
	ug/L	10/13/10	1	ND	3.3	ND	ND	ND
	ug/L	04/11/11	1	ND	ND	ND	ND	ND
	ug/L	10/03/11	1	ND	ND	ND	ND	ND
	ug/L	04/10/12	1	ND	ND	ND	ND	ND
	ug/L	10/15/12	1	ND	ND	ND	ND	ND
	ug/L	04/09/13	1	ND	ND	ND	ND	ND

TABLE 3

Summary of Detected VOCs in Surface Water Samples
Assessment of Corrective Measures
Randolph County Landfill, Permit No. 76-01

Detected Monitoring Constituent/Parameter	Units	Date	SWS Reporting Limit	Upstream				Downstream				Blanks
				SW-1		SW-3		SW-2		SW-4		
Chloroform	ug/L	09/22/94	5	ND		ND		ND		ND		ND
No SW Standard	ug/L	11/08/94	5	ND		ND		ND		ND		ND
	ug/L	01/18/95	5	ND		ND		ND		ND		ND
	ug/L	04/23/96	5	ND		ND		ND		ND		ND
	ug/L	06/17/97	5	ND		ND		ND		ND		ND
	ug/L	10/16/97	5	ND		ND		ND		ND		ND
	ug/L	04/21/98	5	ND		ND		ND		ND		ND
	ug/L	04/07/99	5	ND		ND		ND		ND		ND
	ug/L	10/13/99	5	ND		ND		ND		ND		ND
	ug/L	04/05/00	5	ND		ND		ND		ND		ND
	ug/L	10/25/00	5	ND		ND		ND		ND		ND
	ug/L	04/04/01	5	ND		ND		ND		ND		ND
	ug/L	04/08/02	5	ND		ND		ND		ND		ND
	ug/L	10/21/02	5	ND		ND		ND		ND		ND
	ug/L	04/14/03	5	ND		ND		ND		ND		ND
	ug/L	10/01/03	5	ND		ND		ND		ND		ND
	ug/L	04/05/04	5	ND		ND		ND		ND		ND
	ug/L	10/18/04	5	ND		ND		ND		ND		ND
	ug/L	04/07/05	5	ND		ND		ND		ND		ND
	ug/L	10/06/05	5	ND		ND		ND		ND		ND
	ug/L	04/03/06	5	ND		ND		ND		ND		ND
	ug/L	10/03/06	5	ND		ND		ND		ND		ND
	ug/L	04/05/07	5	ND		ND		ND		ND		ND
	ug/L	10/18/07	5	--		2.3	J	--		0.9	J	ND
	ug/L	04/29/08	5	ND		ND		ND		ND		ND
	ug/L	10/23/08	5	Dry		0.51	J	ND		0.57	J	ND
	ug/L	04/07/09	5	ND		ND		ND		ND		ND
	ug/L	10/19/09	5	Dry		0.44	J	Dry		0.56	J	ND
	ug/L	04/29/10	5	ND		ND		ND		ND		ND
	ug/L	10/13/10	5	ND		1.6	J	ND		0.44	J	ND
	ug/L	04/11/11	5	ND		ND		ND		ND		ND
	ug/L	10/03/11	5	ND		ND		ND		ND		ND
	ug/L	04/10/12	5	ND		ND		ND		0.34	J	ND
	ug/L	10/15/12	5	ND		ND		ND		0.92	J	ND
	ug/L	04/09/13	5	ND		ND		ND		ND		ND

TABLE 3

Summary of Detected VOCs in Surface Water Samples
Assessment of Corrective Measures
Randolph County Landfill, Permit No. 76-01

Detected Monitoring Constituent/Parameter	Units	Date	SWS Reporting Limit	Upstream			Downstream			Blanks
				SW-1	SW-3		SW-2	SW-4		
Dibromochloromethane	ug/L	09/22/94	5	ND	ND		ND	ND		ND
No SW Standard	ug/L	11/08/94	5	ND	ND		ND	ND		ND
	ug/L	01/18/95	5	ND	ND		ND	ND		ND
	ug/L	04/23/96	5	ND	ND		ND	ND		ND
	ug/L	06/17/97	5	ND	ND		ND	ND		ND
	ug/L	10/16/97	5	ND	ND		ND	ND		ND
	ug/L	04/21/98	5	ND	ND		ND	ND		ND
	ug/L	04/07/99	5	ND	ND		ND	ND		ND
	ug/L	10/13/99	5	ND	ND		ND	ND		ND
	ug/L	04/05/00	5	ND	ND		ND	ND		ND
	ug/L	10/25/00	5	ND	ND		ND	ND		ND
	ug/L	04/04/01	5	ND	ND		ND	ND		ND
	ug/L	04/08/02	5	ND	ND		ND	ND		ND
	ug/L	10/21/02	5	ND	ND		ND	ND		ND
	ug/L	04/14/03	5	ND	ND		ND	ND		ND
	ug/L	10/01/03	5	ND	ND		ND	ND		ND
	ug/L	04/05/04	5	ND	ND		ND	ND		ND
	ug/L	10/18/04	5	ND	ND		ND	ND		ND
	ug/L	04/07/05	5	ND	ND		ND	ND		ND
	ug/L	10/06/05	5	ND	ND		ND	ND		ND
	ug/L	04/03/06	5	ND	ND		ND	ND		ND
	ug/L	10/03/06	5	ND	ND		ND	ND		ND
	ug/L	04/05/07	3	ND	ND		ND	ND		ND
	ug/L	10/18/07	3	--	0.8	J	--	0.2	J	ND
	ug/L	04/29/08	3	ND	ND		ND	ND		ND
	ug/L	10/23/08	3	Dry	ND		ND	ND		ND
	ug/L	04/07/09	3	ND	ND		ND	ND		ND
	ug/L	10/19/09	3	Dry	ND		Dry	ND		ND
	ug/L	04/29/10	3	ND	ND		ND	ND		ND
	ug/L	10/13/10	3	ND	4.0		ND	ND		ND
	ug/L	04/11/11	3	ND	ND		ND	ND		ND
	ug/L	10/03/11	3	ND	ND		ND	ND		ND
	ug/L	04/10/12	3	ND	ND		ND	ND		ND
	ug/L	10/15/12	3	ND	ND		ND	ND		ND
	ug/L	04/09/13	3	ND	ND		ND	ND		ND

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TABLE 3

Summary of Detected VOCs in Surface Water Samples
Assessment of Corrective Measures
Randolph County Landfill, Permit No. 76-01

Detected Monitoring Constituent/Parameter	Units	Date	SWS Reporting Limit	Upstream SW-1	Upstream SW-3	Downstream SW-2	Downstream SW-4	Blanks
1,1-Dichloroethane	ug/L	09/22/94	5	ND	ND	ND	ND	ND
SW Standard = 20,000 ug/L	ug/L	11/08/94	5	ND	ND	ND	ND	ND
	ug/L	01/18/95	5	ND	ND	ND	ND	ND
	ug/L	04/23/96	5	ND	ND	6	ND	ND
	ug/L	06/17/97	5	ND	ND	ND	ND	ND
	ug/L	10/16/97	5	ND	ND	ND	ND	ND
	ug/L	04/21/98	5	ND	ND	ND	ND	ND
	ug/L	04/07/99	5	ND	ND	ND	ND	ND
	ug/L	10/13/99	5	ND	ND	ND	ND	ND
	ug/L	04/05/00	5	ND	ND	ND	ND	ND
	ug/L	10/25/00	5	ND	ND	ND	ND	ND
	ug/L	04/04/01	5	ND	ND	ND	ND	ND
	ug/L	04/08/02	5	ND	ND	ND	ND	ND
	ug/L	10/21/02	5	ND	ND	ND	ND	ND
	ug/L	04/14/03	5	ND	ND	ND	ND	ND
	ug/L	10/01/03	5	ND	ND	ND	ND	ND
	ug/L	04/05/04	5	ND	ND	ND	ND	ND
	ug/L	10/18/04	5	ND	ND	ND	ND	ND
	ug/L	04/07/05	5	ND	ND	ND	ND	ND
	ug/L	10/06/05	5	ND	ND	ND	ND	ND
	ug/L	04/03/06	5	ND	ND	ND	ND	ND
	ug/L	10/03/06	5	ND	ND	ND	ND	ND
	ug/L	04/05/07	5	ND	ND	ND	ND	ND
	ug/L	10/18/07	5	ND	ND	ND	ND	ND
	ug/L	04/29/08	5	ND	ND	1.5 J	1.9 J	ND
	ug/L	10/23/08	5	Dry	ND	ND	ND	ND
	ug/L	04/07/09	5	ND	ND	0.55 J	ND	ND
	ug/L	10/19/09	5	Dry	ND	Dry	ND	ND
	ug/L	04/29/10	5	ND	ND	ND	ND	ND
	ug/L	10/13/10	5	ND	ND	ND	ND	ND
	ug/L	04/11/11	5	ND	ND	0.64 J	ND	ND
	ug/L	10/03/11	5	ND	1.0 J	ND	ND	ND
	ug/L	04/10/12	5	ND	0.48 J	ND	ND	ND
	ug/L	10/15/12	5	ND	ND	ND	ND	ND
	ug/L	04/09/13	5	ND	ND	0.75 J	ND	ND

TABLE 3

Summary of Detected VOCs in Surface Water Samples
Assessment of Corrective Measures
Randolph County Landfill, Permit No. 76-01

Detected Monitoring Constituent/Parameter	Units	Date	SWS Reporting Limit	Upstream		Downstream		Blanks
				SW-1	SW-3	SW-2	SW-4	
Chloromethane	ug/L	09/22/94	10	ND	ND	ND	ND	ND
No SW Standard	ug/L	11/08/94	10	ND	ND	ND	ND	ND
	ug/L	01/18/95	10	ND	ND	ND	ND	ND
	ug/L	04/23/96	10	ND	ND	ND	ND	ND
	ug/L	06/17/97	10	ND	ND	ND	ND	ND
	ug/L	10/16/97	10	ND	ND	ND	ND	ND
	ug/L	04/21/98	10	ND	ND	ND	ND	ND
	ug/L	04/07/99	10	ND	ND	ND	ND	ND
	ug/L	10/13/99	10	ND	ND	ND	ND	ND
	ug/L	04/05/00	10	ND	ND	ND	ND	ND
	ug/L	10/25/00	10	ND	ND	ND	ND	ND
	ug/L	04/04/01	10	ND	ND	ND	ND	ND
	ug/L	04/08/02	10	ND	ND	ND	ND	ND
	ug/L	10/21/02	10	ND	ND	ND	ND	ND
	ug/L	04/14/03	10	ND	ND	ND	ND	ND
	ug/L	10/01/03	10	ND	ND	ND	ND	ND
	ug/L	04/05/04	10	ND	ND	ND	ND	ND
	ug/L	10/18/04	10	ND	ND	ND	ND	ND
	ug/L	04/07/05	10	ND	ND	ND	ND	ND
	ug/L	10/06/05	10	ND	ND	ND	ND	ND
	ug/L	04/03/06	10	ND	ND	ND	ND	ND
	ug/L	10/03/06	10	ND	ND	ND	ND	ND
	ug/L	04/05/07	5	ND	ND	ND	ND	ND
	ug/L	10/18/07	1	--	0.6 J	--	0.4 J	ND
	ug/L	04/29/08	1	ND	ND	ND	ND	ND
	ug/L	10/23/08	1	Dry	ND	ND	ND	ND
	ug/L	04/07/09	1	ND	ND	ND	ND	ND
	ug/L	10/19/09	1	Dry	ND	Dry	ND	ND
	ug/L	04/29/10	1	ND	ND	ND	ND	ND
	ug/L	10/13/10	1	ND	ND	ND	ND	0.49 J
	ug/L	04/11/11	1	ND	ND	ND	ND	ND
	ug/L	10/03/11	1	ND	ND	ND	ND	ND
	ug/L	04/10/12	1	ND	ND	ND	ND	ND
	ug/L	10/15/12	1	ND	ND	ND	ND	ND
	ug/L	04/09/13	1	ND	ND	ND	ND	ND

Notes:
ug/L = micrograms per liter
ND = Not detected at the stated reporting limit for data before October 2007 and not detected at the laboratory detection
J = Estimated concentration
B = Blank-qualified result
-- = no data available
SW Standard = Surface Water Standard based on Freshwater Aquatic Life Classification
Blanks = field, trip and method blanks
SWS Reporting Limit = NCPQL or lab-specific reporting limit prior to October 2007 and NCSWSL starting in October 2007
(N) = Narrative Standard
(AL) = Action Level Standard
Historical data prior to April 2008 provided by the County and taken from historical reports from Hazen and Sawyer and Environment 1.

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TABLE 4

Remediation Technologies Screening Matrix
Assessment of Corrective Measures
Randolph County Closed MSW Landfill, Permit No. 76-01

Remedial Technology	Feasibility and Effectiveness												Implementability					Cost					
	Achieve Target Contaminant Levels	Protective of Human Health & Environment (HHE)	Long-Term Effectiveness	Addresses (T)oxicity, (M)obility, or (V)olume		Safety Impacts	Cross-Media Impacts	Residuals Produced -- (S)olid, (L)iquid, (V)apor		Rating for VOCs	Exposure to Residual Contamination	Ease to Implement	Environmental Conditions	System Reliability and Maintainability	Regulatory/Permitting Acceptability	Community Acceptability	Capital Costs	O&M Costs	Time to Implement	Time to Complete Cleanup	SCORE	Comment
Ranking system:	Yes=3; Unkwn=2; No=1	Yes=3; Unkwn=2; No=1	Yes=3; Unkwn=2; No=1	1 Pt. Each		Best=3; Avg.=2; Worse=1	Best=3; Avg.=2; Worse=1	-1 Pt. Each		Best=3; Avg.=2; Worse=1	Best=3; Avg.=2; Worse=1	Best=3; Avg.=2; Worse=1	Best=3; Unkwn/Avg.=2; Worse=1	Best=3; Unkwn/Avg.=2; Worse=1	Best=3; Unkwn/Avg.=2; Worse=1	Best=3; Unkwn/Avg.=2; Worse=1	Best=3; Unkwn/Avg.=2; Worse=1	Best=3; Unkwn/Avg.=2; Worse=1	Best=3; Unkwn/Avg.=2; Worse=1	Best=3; Unkwn/Avg.=2; Worse=1		
Non-Intrusive Controls																						
Site Access Restrictions and Presumptive Remedies	2	3	2	0	---	3	3	0	---	1	3	3	3	3	2	1	3	3	3	1	39	Not to be considered as a primary alternative. Can be used in conjunction with a primary alternative.
Monitored Natural Attenuation	3	2	3	3	V	3	3	0	---	3	3	3	3	3	2	2	3	3	3	1	46	Analytical results demonstrate possible conditions for natural attenuation.
GroundWater Containment																						
Vertical Barrier Walls	1	1	3	1	M	3	3	-1	S	1	2	1	1	3	2	3	1	3	2	1	31	Site conditions would require a laterally extensive barrier system, resulting in high costs.
Groundwater Extraction System	3	3	3	3	T,M,V	2	1	-1	L	1	1	1	3	3	3	3	1	1	3	1	35	Highly visible remedial alternative. Performance is moderate to low since process will be diffusion controlled.
Hydraulic Gradient Controls (Injection)	1	2	2	1	M	3	3	0	---	1	3	1	3	1	1	2	1	1	2	1	29	While hydraulic gradients may be easily created at the site, it may result in undesirable redirection of contaminated groundwater or leachate, and/or discharge to surface waters.
In-Situ --Groundwater Biological/Chemical Treatment																						
Enhanced Bioremediation (EOS)	3	3	3	2	T,V	2	3	0	---	3	3	3	3	2	3	2	3	2	3	2	45	May be highly effective depending on site conditions. If the landfill continues to leak, costs will rise as additional electron-donor substance injection is required
Zero Valent Nano-Iron Remediation	3	3	2	2	T,V	3	3	0	---	3	3	3	3	2	2	2	2	3	3	2	44	May be highly effective depending on site conditions. Does not target the source, additional nZVI injections would be necessary if landfill contineus to leak.
Enhanced Remediation (O_2 Enhancement with H_2O_2, $KMnO_4$, O_3)	3	3	2	2	T,V	1	2	0	---	3	3	3	3	2	2	2	1	3	3	2	40	May be highly effective depending on site conditions. If the landfill continues to leak, costs will rise as additional oxidant injection is required.
Phytoremediation	3	3	3	2	T,V	3	3	0	---	2	2	1	1	1	2	2	3	3	1	1	36	Depth to water table aquifer precludes economic use.
In-Situ --Groundwater Abiotic Treatment																						
Passive Treatment Walls	3	3	2	2	T,V	3	3	-1	S	3	2	1	1	2	3	2	1	3	1	1	35	Full scale success not documented. Biofouling, loss of reactive capacity, may require replacement.
Air Sparging	3	3	3	2	T,V	2	1	-1	L	3	1	2	2	3	3	2	2	2	2	3	38	Limited by contaminant plume area; treatment will be limited to area of sparging.
Fenton's Reagent	3	3	3	1	T	2	2	-1	L	2	2	2	2	1	2	2	1	1	2	2	32	Limited effectiveness on halogenated volatiles.
Dual Phase Extraction	3	3	3	2	T,M	2	1	-2	L,V	3	1	2	2	3	3	2	2	1	2	2	35	Dual phase extraction requires both groundwater and vapor treatment. Vapor is not a substantial concern at this facility. Significant O & M costs.
Vacuum Vapor Extraction	3	3	3	1	T	2	1	-2	L,V	3	1	2	2	3	3	2	2	2	2	1	34	No full scale success has been achieved; fouling of system may occur by oxidized constituents in groundwater.

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TABLE 4

Remediation Technologies Screening Matrix
Assessment of Corrective Measures
Randolph County Closed MSW Landfill, Permit No. 76-01

	Feasibility and Effectiveness											Implementability					Cost					
Remedial Technology	Achieve Target Contaminant Levels	Protective of Human Health & Environment (HHE)	Long-Term Effectiveness	Addresses (T)oxicity, (M)obility, or (V)olume		Safety Impacts	Cross-Media Impacts	Residuals Produced -- (S)olid, (L)iquid, (V)apor		Rating for VOCs	Exposure to Residual Contamination	Ease to Implement	Environmental Conditions	System Reliability and Maintainability	Regulatory/Permitting Acceptability	Community Acceptability	Capital Costs	O&M Costs	Time to Implement	Time to Complete Cleanup	SCORE	Comment
Ranking system:	Yes=3; Unkwn=2; No=1	Yes=3; Unkwn=2; No=1	Yes=3; Unkwn=2; No=1	1 Pt. Each		Best=3; Avg.=2; Worse=1	Best=3; Avg.=2; Worse=1	-1 Pt. Each		Best=3; Avg.=2; Worse=1	Best=3; Avg.=2; Worse=1	Best=3; Avg.=2; Worse=1	Best=3; Unkwn/Avg.=2; Worse=1	Best=3; Unkwn/Avg.=2; Worse=1	Best=3; Unkwn/Avg.=2; Worse=1	Best=3; Unkwn/Avg.=2; Worse=1	Best=3; Unkwn/Avg.=2; Worse=1	Best=3; Unkwn/Avg.=2; Worse=1	Best=3; Unkwn/Avg.=2; Worse=1	Best=3; Unkwn/Avg.=2; Worse=1		
Ex-Situ Groundwater Treatment																						
Filtration / Sedimentation	3	3	3	3	T,M,V	2	1	-1	S	1	1	2	2	2	2	2	2	1	1	2	32	Used as pre-treatment or post-treatment process to remove suspended solids or precipitated metals.
Ion Exchange Filtration	3	3	3	3	T,M,V	2	1	-1	S	1	1	1	2	2	2	2	2	1	1	2	31	
Bioreactors	3	3	3	3	T,M,V	2	3	-1	S	3	1	1	2	2	2	2	2	2	2	2	37	Treatability study recommended; residuals from sludge processes require treatment or disposal; air pollution controls may need to be considered.
Constructed Wetlands	3	3	2	2	T,M	3	3	-1	L	2	1	1	1	3	1	2	1	3	2	1	33	Depth to water table aquifer precludes as viable use.
Air Stripping w/NPDES Disposal	3	3	3	2	M,V	2	1	-1	L	3	1	2	2	3	3	2	3	2	3	3	40	Biofouling of the equipment may require pre-treatment of groundwater or periodic column cleaning; off-gases may require treatment.
Carbon Adsorption (liquid phase)	3	3	3	3	T,M,V	2	2	-1	S	2	2	2	2	3	3	2	1	1	3	2	38	Water soluble compounds and small molecules are not adsorbed well.
Publicly Owned Treatment Work	3	3	3	3	T,M,V	3	2	-2	S,L	2	2	2	2	3	3	2	2	1	2	3	39	Pretreatment would likely be required prior to acceptance of wastewater. Volume-based fees could be exorbitant.
UV Oxidation	3	3	3	3	T,M,V	2	3	-1	L	3	2	1	2	2	2	2	1	1	2	2	36	Handling and storage of oxidizers requires special safety precautions; pre-treatment may be required to minimize cleaning and maintenance of UV reactor .

Notes:

Achieve Target Contaminant Levels — the remedial alternative will effectively reduce the concentration of contaminants identified in the Nature and Extent Study to levels equal to or less than the levels established for each constituent that are protective of human health and the environment.

Protective of Human Health and the Environment — implementation and/or operation of remedial alternative will not increase risk to human health or environment.

Long-Term Effectiveness — the effects of the remedial alternative are long-term as opposed to temporary.

Address Toxicity, Mobility, or Volume — the remedial alternative reduces the toxicity of the contaminant, the mobility of the contaminant, or the volume of contaminated media.

Safety Impacts — the alternative has short term impacts on the physical safety of humans.

Cross Media Impacts — the remedial alternative affects contaminant levels in media other than the media being treated.

Residuals Produced (Solid, Liquid, Vapor) — by-products produced by implementing or operating the remedial alternative.

Exposure to Residual Contamination — whether or not humans could come in contact with any residuals produced by the remedial alternative.

Ease to Implement — the degree to which implementing the remedial alternative can be accomplished.

Environmental Conditions — the effects of environmental conditions (e.g., structure of subsurface soils, presence of naturally occurring inorganics/organics in subsurface soil, microbial population) on the effectiveness of the remedial alternative.

System Reliability/Maintainability — the degree of system reliability and ease of maintenance when using the technology.

Regulatory/Permitting Acceptability — the acceptance by the regulatory agency of the remedial alternative as a viable means by which to mitigate any or this site, and the the ease in which a permit can be obtained.

Community Acceptability — the degree to which use of the technology is acceptable to the public.

Capital Cost — cost for design, construction, and initial implementation of the remedial system

O&M Cost — cost for operation and maintenance of the remedial system, following implementation and throughout the entire corrective action process

Time to Implement — the relative amount of time required to implement the alternative, including the time spent obtaining all required permits.

Time to Cleanup — the relative amount of time before remedial endpoints will be met.

TABLE 5

Summary of Natural Attenuation Screening Protocol
Assessment of Corrective Measures
Randolph County Closed MSW Landfill, Permit No. 76-01

Monitoring Well	Screening Score	Interpretation
MW-1	23	Strong
MW-2	11	Limited
MW-6	5	Inadequate
MW-7	14	Limited
MW-8	11	Limited
MW-9	12	Limited
MW-10S	19	Adequate
MW-10D	15	Adequate
MW-11S	4	Inadequate
MW-11D	7	Limited
Average	**12**	**Limited**

Notes:

Natural attenuation scoring was performed during the Nature and Extent Study.

Screening was conducted in accordance with the EPA's Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater (April 1999).

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TABLE 6

Summary of Remediation Costs for Potential Site Remedial Options
Assessment of Corrective Measures
Randolph Closed MSW County Landfill, Permit 76-01

Remedy Type:	Monitored Natural Attenuation		Enhanced Bioremediation		Chemical Oxidation		Nano-Iron	
Corrective Action Plan / CAMP	$	20,000	$	20,000	$	20,000	$	20,000
DENR Permit Cost:	$	1,500	$	1,500	$	1,500	$	1,500
Initial Construction Costs:	$	32,526	$	142,808	$	99,248	$	189,899
Follow-up Construction Costs:	$	-	$	30,884	$	22,400	$	53,206
Annual Monitoring Costs:	$	50,275	$	51,278	$	52,061	$	52,017
Year	--		--		--		--	
0	$	104,301	$	215,586	$	172,809	$	263,416
1	$	50,275	$	51,278	$	52,061	$	52,017
2	$	50,275	$	51,278	$	52,061	$	52,017
3	$	50,275	$	51,278	$	74,462	$	105,223
4	$	50,275	$	82,162	$	52,061	$	52,017
5	$	50,275	$	51,278	$	52,061	$	52,017
6	$	50,275	$	51,278	$	52,061	$	52,017
7	$	50,275	$	51,278	$	52,061	$	52,017
8	$	50,275	$	51,278	$	52,061	$	-
9	$	50,275	$	51,278	$	52,061	$	-
10	$	50,275	$	51,278	$	-	$	-
11	$	50,275	$	-	$	-	$	-
12	$	50,275	$	-	$	-	$	-
13	$	50,275	$	-	$	-	$	-
14	$	50,275	$	-	$	-	$	-
15	$	50,275	$	-	$	-	$	-
16	$	50,275	$	-	$	-	$	-
17	$	50,275	$	-	$	-	$	-
18	$	50,275	$	-	$	-	$	-
19	$	50,275	$	-	$	-	$	-
20	$	50,275	$	-	$	-	$	-
21	$	50,275	$	-	$	-	$	-
22	$	50,275	$	-	$	-	$	-
23	$	50,275	$	-	$	-	$	-
24	$	50,275	$	-	$	-	$	-
25	$	50,275	$	-	$	-	$	-
Cumulative Total:	$	1,361,172	$	759,250	$	663,761	$	680,743

Notes: Estimates in 2013 Dollars
Cost associated with residential water hook up is for one structure only.

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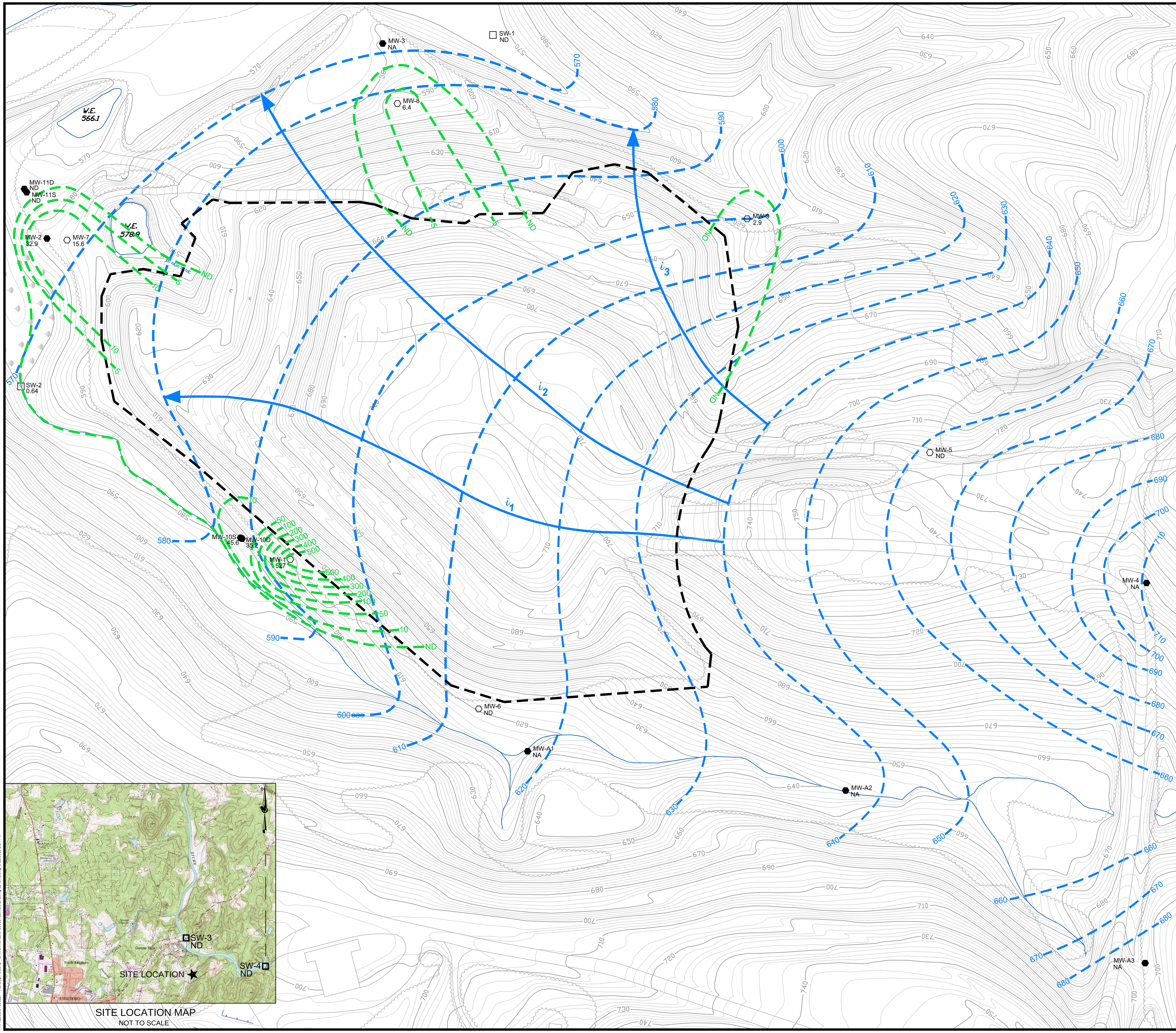
DRAWINGS



LEGEND

	EXISTING 10 FT GROUND SURFACE CONTOUR
	EXISTING 2 FT GROUND SURFACE CONTOUR
	APPROXIMATE LIMITS OF WASTE
	EXISTING ROAD
640	GROUNDWATER ELEVATION 10 FT CONTOURS
	GROUNDWATER FLOW ARROW
ND	TOTAL VOC ISOPLETH
MW-1 530	COMPLIANCE MONITORING WELL AND TOTAL VOC CONCENTRATION IN ug/L
MW-A2 NA	NON COMPLIANCE MONITORING WELL
GM-1	LANDFILL GAS MONITORING PROBE
SW-1 ND	SURFACE WATER MONITORING POINT AND TOTAL VOC CONCENTRATION IN ug/L

NOTES

1. TOPOGRAPHIC CONTOUR INTERVAL = 2 FEET
2. GROUNDWATER SURFACE CONTOUR INTERVAL = 10 FEET
3. GROUNDWATER ELEVATIONS MEASURED ON APRIL 11-13, 2011.
4. GROUNDWATER CONTOURS BASED ON LINEAR INTERPOLATION BETWEEN AND EXTRAPOLATION FROM KNOWN DATA, TOPOGRAPHIC CONTOURS, AND KNOWN FIELD CONDITIONS. THEREFORE, GROUNDWATER CONTOURS MAY NOT REFLECT ACTUAL CONDITIONS.
5. GROUNDWATER CONTOUR LINES SHOW THE WATER TABLE SHAPE AND ELEVATION. THESE CONTOURS ARE INFERRED LINES FOLLOWING THE GROUNDWATER SURFACE AT A CONSTANT ELEVATION ABOVE SEA LEVEL. THE GROUNDWATER FLOW DIRECTION IS GENERALLY PERPENDICULAR TO THE GROUNDWATER SURFACE CONTOURS, SIMILAR TO THE RELATIONSHIP BETWEEN SURFACE WATER FLOW AND TOPOGRAPHIC CONTOURS.
6. MW-A1, MW-A2, MW-A3, MW-2, MW-3 , MW-4, MW-10S. MW-10D, MW-11S, AND MW-11D ARE NOT SAMPLED AS PART OF THE COMPLIANCE NETWORK.
7. BASE MAP PROVIDED BY HAZEN AND SAWYER, INC. OVERALL GROUND SURFACE TOPOGRAPHY OBTAINED FROM AERIAL SURVEY CONDUCTED BY KUCERA INTERNATIONAL INC., WILLOUGHBY, OHIO ON 8/2/93.
8. COORDINATE SYSTEM IS N.C. STATE PLANE GRID.
9. ND = NOT DETECTED ABOVE LABORATORY DETECTION LIMIT.
10. NA = NOT ANALYZED
11. THE DETECTION OF DIETHYLETHELATE IN THE SAMPLE FROM MW-5 APPEARS TO BE ANOMALOUS AND WAS NOT INCLUDED.

SCALE 100 0 100 200 FEET

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW

PROJECT

RANDOLPH COUNTY LANDFILL
PERMIT NO. 76-01

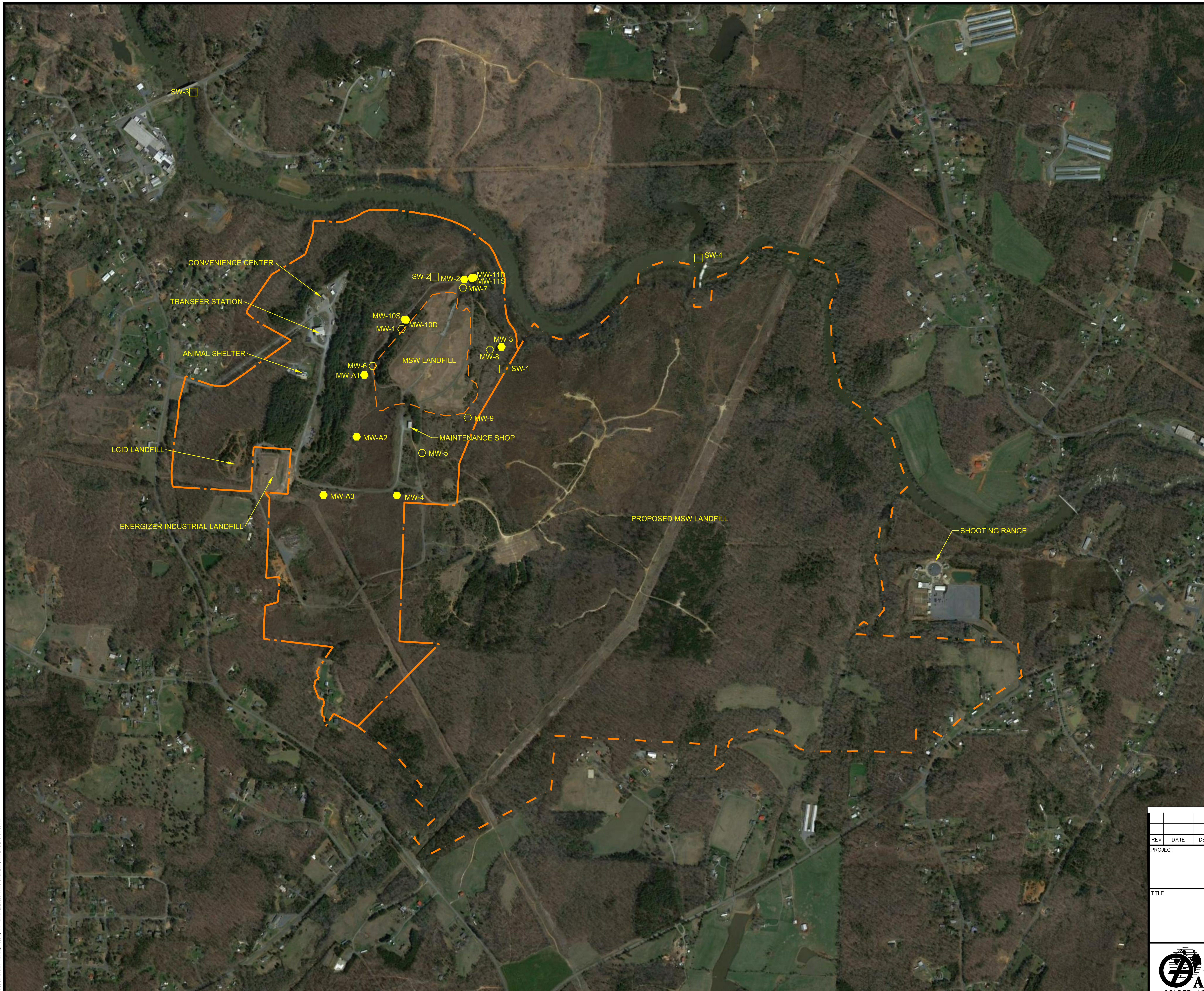
TITLE

TOTAL VOC ISOPLETH MAP WITH GROUNDWATER SURFACE CONTOURS-APRIL 2011

Golder Associates
GOLDER ASSOCIATES, NC INC.

PROJECT No.	073-9612712		FILE No.	Drawing 1(ACM)
DESIGN	DYR	3/11/13	SCALE AS SHOWN	REV. –
CADD	LKB	3/11/13		
CHECK				
REVIEW				

DWG. 1



LEGEND

(orange dash-dot line)	APPROXIMATE PROPERTY BOUNDARY
(orange dash-double-dot line)	PROPOSED MSW LANDFILL BOUNDARY
(orange dashed line)	APPROXIMATE LIMITS OF WASTE
⬡ MW-1	COMPLIANCE MONITORING WELL
⬢ MW-A2	NON-COMPLIANCE MONITORING WELL
☐ SW-1	SURFACE WATER MONITORING LOCATION

NOTES

1. MW-A1, MW-A2, MW-A3, MW-2, MW-3 , MW-4, MW-10S, MW-10D, MW-11S, AND MW-11D ARE NOT SAMPLED AS PART OF THE COMPLIANCE NETWORK.
2. BASE MAP PROVIDED BY HAZEN AND SAWYER, INC. OVERALL GROUND SURFACE TOPOGRAPHY OBTAINED FROM AERIAL SURVEY CONDUCTED BY KUCERA INTERNATIONAL INC., WILLOUGHBY, OHIO ON 8/2/93.
3. COORDINATE SYSTEM IS N.C. STATE PLANE GRID.
4. AERIAL PHOTO IS FROM GOOGLE EARTH ON 2-12-2012.

500 0 500 1000
SCALE FEET

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW

PROJECT

RANDOLPH COUNTY LANDFILL
PERMIT NO. 76-01

TITLE

SITE MAP

PG C-399

GOLDER ASSOCIATES, NC INC.

PROJECT No.	073-9612712		FILE No. Drawing 2	
DESIGN	DYR	03/19/2013	SCALE AS SHOWN	REV. –
CADD	LKB	03/19/2013	DWG. 2	
CHECK	–	–		
REVIEW	–	–		

APPENDIX A

REAMS Quantitative Risk Assessment Output

09/18/2013

16:38:25

OUTPUT FILE - C:\REAMS\REAMS.OUT

RISK EXPOSURE DEFAULT FILE USED - SYSTEM DEFAULTS

SETUP DEFAULT FILE USED - 9-12-13 RANDOLPH

FILE PARAMETER DEFAULT FILE USED - SYSTEM DEFAULTS

****
****

RISK ANALYSIS RESULTS

****
****

****

****

**   **

** TOTAL EXPOSURE RISK :   3.6382070E-4 **

** TOTAL HAZARD INDEX :   9.4759698638 **

**   **

****

****

****************************** TOTAL PATHWAY RISKS
****

MEDIA	HAZARD	RISK
SOIL	0.0000000000	0.0000000E+0

GROUND WATER	9.4759698638	3.6382070E-4
SURFACE WATER	0.0000000000	0.0000000E+0
FOOD	0.0000000000	0.0000000E+0
AIR	0.0000000000	0.0000000E+0

************************ HAZARD/RISK RESULTS BY CHEMICAL ***********************

RESIDENTIAL

CHEMICAL - 1,1-DICHLOROETHANE

MEDIA	HAZARD	RISK
TOTAL	0.8593394978	2.05836800000000E-4
SOIL INGESTION/CONTACT	0.0000000000	0.00000000000000E+0
GROUND WATER INGESTION/CONTACT/INHAL.	0.8593394978	2.05836800000000E-4
SURFACE WATER INGESTION/CONTACT	0.0000000000	0.00000000000000E+0
FOOD INGESTION	0.0000000000	0.00000000000000E+0
AIR INHALATION	0.0000000000	0.00000000000000E+0

CHEMICAL - 1,2-DICHLOROETHANE

MEDIA	HAZARD	RISK
TOTAL	1.2129561365	5.01194000000000E-5
SOIL INGESTION/CONTACT	0.0000000000	0.00000000000000E+0
GROUND WATER INGESTION/CONTACT/INHAL.	1.2129561365	5.01194000000000E-5
SURFACE WATER INGESTION/CONTACT	0.0000000000	0.00000000000000E+0
FOOD INGESTION	0.0000000000	0.00000000000000E+0
AIR INHALATION	0.0000000000	0.00000000000000E+0

CHEMICAL - 1,4-DICHLOROBENZENE

MEDIA	HAZARD	RISK
TOTAL	0.0284055708	3.59912000000001E-5
SOIL INGESTION/CONTACT	0.0000000000	0.00000000000000E+0
GROUND WATER INGESTION/CONTACT/INHAL.	0.0284055708	3.59912000000001E-5
SURFACE WATER INGESTION/CONTACT	0.0000000000	0.00000000000000E+0
FOOD INGESTION	0.0000000000	0.00000000000000E+0
AIR INHALATION	0.0000000000	0.00000000000000E+0

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CHEMICAL - BENZENE2

MEDIA	HAZARD	RISK
TOTAL	0.6643068967	3.32578000000001E-5
SOIL INGESTION/CONTACT	0.0000000000	0.00000000000000E+0
GROUND WATER INGESTION/CONTACT/INHAL.	0.6643068967	3.32578000000001E-5
SURFACE WATER INGESTION/CONTACT	0.0000000000	0.00000000000000E+0
FOOD INGESTION	0.0000000000	0.00000000000000E+0
AIR INHALATION	0.0000000000	0.00000000000000E+0

-------------------------------------- -------------------

CHEMICAL - METHYLENE CHLORIDE

MEDIA	HAZARD	RISK
TOTAL	0.1691214075	4.15100000000000E-7
SOIL INGESTION/CONTACT	0.0000000000	0.00000000000000E+0
GROUND WATER INGESTION/CONTACT/INHAL.	0.1691214075	4.15100000000000E-7

SURFACE WATER INGESTION/CONTACT 0.0000000000
0.00000000000000E+0

FOOD INGESTION 0.0000000000
0.00000000000000E+0

AIR INHALATION 0.0000000000
0.00000000000000E+0

-- --------------------

CHEMICAL - TETRACHLOROETHYLENE (TETRACHLOROETHENE)

MEDIA HAZARD RISK

-- --------------------

TOTAL 0.2154497043
5.47600000000001E-7

SOIL INGESTION/CONTACT 0.0000000000
0.00000000000000E+0

GROUND WATER INGESTION/CONTACT/INHAL. 0.2154497043
5.47600000000001E-7

SURFACE WATER INGESTION/CONTACT 0.0000000000
0.00000000000000E+0

FOOD INGESTION 0.0000000000
0.00000000000000E+0

AIR INHALATION 0.0000000000
0.00000000000000E+0

-- --------------------

CHEMICAL - VINYL CHLORIDE

MEDIA HAZARD RISK

-- --------------------

TOTAL 0.5379501453
3.76528000000001E-5

SOIL INGESTION/CONTACT 0.0000000000
0.00000000000000E+0

GROUND WATER INGESTION/CONTACT/INHAL. 0.5379501453
3.76528000000001E-5

SURFACE WATER INGESTION/CONTACT 0.0000000000
0.00000000000000E+0

FOOD INGESTION 0.0000000000
0.00000000000000E+0

AIR INHALATION 0.0000000000
0.00000000000000E+0

-- --------------------

CHEMICAL - CIS-1,2-DICHLOROETHYLENE

MEDIA HAZARD RISK

-- --------------------

TOTAL 5.7884405049
0.00000000000000E+0

SOIL INGESTION/CONTACT 0.0000000000
0.00000000000000E+0

GROUND WATER INGESTION/CONTACT/INHAL. 5.7884405049
0.00000000000000E+0

SURFACE WATER INGESTION/CONTACT 0.0000000000
0.00000000000000E+0

FOOD INGESTION 0.0000000000
0.00000000000000E+0

AIR INHALATION 0.0000000000
0.00000000000000E+0

-- --------------------

************************* HAZARD/RISK RESULTS BY MEDIA *************************

SOIL INGESTION - RESIDENTIAL

CHEMICAL	HAZARD	RISK
1,1-DICHLOROETHANE	0.0000000000	0.00000000000000E+0
1,2-DICHLOROETHANE	0.0000000000	0.00000000000000E+0
1,4-DICHLOROBENZENE	0.0000000000	0.00000000000000E+0
BENZENE2	0.0000000000	0.00000000000000E+0
METHYLENE CHLORIDE	0.0000000000	0.00000000000000E+0
TETRACHLOROETHYLENE (TETRACHLOROETHENE)	0.0000000000	0.00000000000000E+0
VINYL CHLORIDE	0.0000000000	0.00000000000000E+0
CIS-1,2-DICHLOROETHYLENE	0.0000000000	0.00000000000000E+0

SOIL CONTACT - RESIDENTIAL

CHEMICAL	HAZARD	RISK
1,1-DICHLOROETHANE	0.0000000000	0.00000000000000E+0

1,2-DICHLOROETHANE	0.0000000000	0.00000000000000E+0
1,4-DICHLOROBENZENE	0.0000000000	0.00000000000000E+0
BENZENE2	0.0000000000	0.00000000000000E+0
METHYLENE CHLORIDE	0.0000000000	0.00000000000000E+0
TETRACHLOROETHYLENE (TETRACHLOROETHENE)	0.0000000000	0.00000000000000E+0
VINYL CHLORIDE	0.0000000000	0.00000000000000E+0
CIS-1,2-DICHLOROETHYLENE	0.0000000000	0.00000000000000E+0

GROUND WATER INGESTION - RESIDENTIAL

CHEMICAL	HAZARD	RISK
1,1-DICHLOROETHANE	0.0894977169	2.38307000000000E-5
1,2-DICHLOROETHANE	0.0447488584	5.70680000000001E-6
1,4-DICHLOROBENZENE	0.0072146119	6.37000000000001E-7
BENZENE2	0.1198630137	6.15920000000001E-6
METHYLENE CHLORIDE	0.1278538813	3.58400000000000E-7
TETRACHLOROETHYLENE (TETRACHLOROETHENE)	0.0298325723	8.78000000000002E-8
VINYL CHLORIDE	0.2770167428	1.39759000000000E-5

CIS-1,2-DICHLOROETHYLENE 2.8127853881
0.00000000000000E+0

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GROUND WATER CONTACT - RESIDENTIAL

CHEMICAL	HAZARD	RISK
1,1-DICHLOROETHANE	0.0027184932	8.14600000000001E-7
1,2-DICHLOROETHANE	0.0008457534	1.21400000000000E-7
1,4-DICHLOROBENZENE	0.0020128767	2.00000000000000E-7
BENZENE2	0.0593321918	3.43110000000000E-6
METHYLENE CHLORIDE	0.0025890411	8.20000000000002E-9
TETRACHLOROETHYLENE (TETRACHLOROETHENE)	0.0496712329	1.64500000000000E-7
VINYL CHLORIDE	0.0091000000	5.16700000000001E-7
CIS-1,2-DICHLOROETHYLENE	0.1392328767	0.00000000000000E+0

SURFACE WATER INGESTION - RESIDENTIAL

CHEMICAL	HAZARD	RISK
1,1-DICHLOROETHANE	0.0000000000	0.00000000000000E+0

1,2-DICHLOROETHANE 0.0000000000
0.00000000000000E+0

1,4-DICHLOROBENZENE 0.0000000000
0.00000000000000E+0

BENZENE2 0.0000000000
0.00000000000000E+0

METHYLENE CHLORIDE 0.0000000000
0.00000000000000E+0

TETRACHLOROETHYLENE (TETRACHLOROETHENE) 0.0000000000
0.00000000000000E+0

VINYL CHLORIDE 0.0000000000
0.00000000000000E+0

CIS-1,2-DICHLOROETHYLENE 0.0000000000
0.00000000000000E+0

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SURFACE WATER CONTACT - RESIDENTIAL

CHEMICAL HAZARD RISK

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1,1-DICHLOROETHANE 0.0000000000
0.00000000000000E+0

1,2-DICHLOROETHANE 0.0000000000
0.00000000000000E+0

1,4-DICHLOROBENZENE 0.0000000000
0.00000000000000E+0

BENZENE2 0.0000000000
0.00000000000000E+0

METHYLENE CHLORIDE 0.0000000000
0.00000000000000E+0

TETRACHLOROETHYLENE (TETRACHLOROETHENE) 0.0000000000
0.00000000000000E+0

VINYL CHLORIDE 0.0000000000
0.00000000000000E+0

CIS-1,2-DICHLOROETHYLENE 0.0000000000
0.00000000000000E+0

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AIR INHALATION VIA SOIL - RESIDENTIAL

CHEMICAL	HAZARD	RISK
1,1-DICHLOROETHANE	0.0000000000	0.00000000000000E+0
1,2-DICHLOROETHANE	0.0000000000	0.00000000000000E+0
1,4-DICHLOROBENZENE	0.0000000000	0.00000000000000E+0
BENZENE2	0.0000000000	0.00000000000000E+0
METHYLENE CHLORIDE	0.0000000000	0.00000000000000E+0
TETRACHLOROETHYLENE (TETRACHLOROETHENE)	0.0000000000	0.00000000000000E+0
VINYL CHLORIDE	0.0000000000	0.00000000000000E+0
CIS-1,2-DICHLOROETHYLENE	0.0000000000	0.00000000000000E+0

AIR INHALATION VIA WATER - RESIDENTIAL

CHEMICAL	HAZARD	RISK
1,1-DICHLOROETHANE	0.7671232877	1.81191500000000E-4

1,2-DICHLOROETHANE	1.1673615247	4.42912000000001E-5
1,4-DICHLOROBENZENE	0.0191780822	3.51542000000001E-5
BENZENE2	0.4851116912	2.36675000000000E-5
METHYLENE CHLORIDE	0.0386784851	4.85000000000001E-8
TETRACHLOROETHYLENE (TETRACHLOROETHENE)	0.1359458991	2.95300000000000E-7
VINYL CHLORIDE	0.2518334025	2.31602000000000E-5
CIS-1,2-DICHLOROETHYLENE	2.8364222401	0.00000000000000E+0
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MEAT/EGG/DAIRY INGESTION - RESIDENTIAL

CHEMICAL	HAZARD	RISK
1,1-DICHLOROETHANE	0.0000000000	0.00000000000000E+0
1,2-DICHLOROETHANE	0.0000000000	0.00000000000000E+0
1,4-DICHLOROBENZENE	0.0000000000	0.00000000000000E+0
BENZENE2	0.0000000000	0.00000000000000E+0
METHYLENE CHLORIDE	0.0000000000	0.00000000000000E+0
TETRACHLOROETHYLENE (TETRACHLOROETHENE)	0.0000000000	0.00000000000000E+0
VINYL CHLORIDE	0.0000000000	0.00000000000000E+0

CIS-1,2-DICHLOROETHYLENE 0.0000000000
0.00000000000000E+0

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FRUIT/VEGETABLE INGESTION - RESIDENTIAL

CHEMICAL	HAZARD	RISK
1,1-DICHLOROETHANE	0.0000000000	0.00000000000000E+0
1,2-DICHLOROETHANE	0.0000000000	0.00000000000000E+0
1,4-DICHLOROBENZENE	0.0000000000	0.00000000000000E+0
BENZENE2	0.0000000000	0.00000000000000E+0
METHYLENE CHLORIDE	0.0000000000	0.00000000000000E+0
TETRACHLOROETHYLENE (TETRACHLOROETHENE)	0.0000000000	0.00000000000000E+0
VINYL CHLORIDE	0.0000000000	0.00000000000000E+0
CIS-1,2-DICHLOROETHYLENE	0.0000000000	0.00000000000000E+0

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FISH/SHELLFISH INGESTION - RESIDENTIAL

CHEMICAL	HAZARD	RISK
1,1-DICHLOROETHANE	0.0000000000	0.00000000000000E+0

1,2-DICHLOROETHANE 0.0000000000
0.00000000000000E+0

1,4-DICHLOROBENZENE 0.0000000000
0.00000000000000E+0

BENZENE2 0.0000000000
0.00000000000000E+0

METHYLENE CHLORIDE 0.0000000000
0.00000000000000E+0

TETRACHLOROETHYLENE (TETRACHLOROETHENE) 0.0000000000
0.00000000000000E+0

VINYL CHLORIDE 0.0000000000
0.00000000000000E+0

CIS-1,2-DICHLOROETHYLENE 0.0000000000
0.00000000000000E+0

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*************************** ACCEPTABLE CONCENTRATIONS
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MEDIA	CONCENTRATIONS (mg/Kg) or (mg/L) INITIAL	ACCEPTABLE
CHEMICAL: 1,1-Dichloroethane		
Soil, Non-carcinogenic	0.0000000000	0.0000000000
Soil, Carcinogenic	0.0000000000	0.0000000000

Groundwater, Non-carcinogenic	0.2800000000	0.3258316425
Groundwater, Carcinogenic	0.2800000000	0.0013603010
Surface Water, Non-carcinogenic	0.0000000000	0.0000000000
Surface Water, Carcinogenic	0.0000000000	0.0000000000
Air, Non-carcinogenic	0.0000000000	0.0000000000
Air, Carcinogenic	0.0000000000	0.0000000000
Meat/Eggs/Dairy, Non-carcinogenic	0.0000000000	0.0000000000
Meat/Eggs/Dairy, Carcinogenic	0.0000000000	0.0000000000
Fruit/Vegetables, Non-carcinogenic	0.0000000000	0.0000000000
Fruit/Vegetables, Carcinogenic	0.0000000000	0.0000000000
Fish/Shellfish, Non-carcinogenic	0.0000000000	0.0000000000
Fish/Shellfish, Carcinogenic	0.0000000000	0.0000000000

CHEMICAL: 1,2-Dichloroethane

Soil, Non-carcinogenic	0.0000000000	0.0000000000
Soil, Carcinogenic	0.0000000000	0.0000000000
Groundwater, Non-carcinogenic	0.0042000000	0.0034626149
Groundwater, Carcinogenic	0.0042000000	0.0000837999
Surface Water, Non-carcinogenic	0.0000000000	0.0000000000
Surface Water, Carcinogenic	0.0000000000	0.0000000000
Air, Non-carcinogenic	0.0000000000	0.0000000000
Air, Carcinogenic	0.0000000000	0.0000000000
Meat/Eggs/Dairy, Non-carcinogenic	0.0000000000	0.0000000000
Meat/Eggs/Dairy, Carcinogenic	0.0000000000	0.0000000000
Fruit/Vegetables, Non-carcinogenic	0.0000000000	0.0000000000
Fruit/Vegetables, Carcinogenic	0.0000000000	0.0000000000
Fish/Shellfish, Non-carcinogenic	0.0000000000	0.0000000000
Fish/Shellfish, Carcinogenic	0.0000000000	0.0000000000

CHEMICAL: 1,4-Dichlorobenzene

Soil, Non-carcinogenic	0.0000000000	0.0000000000
Soil, Carcinogenic	0.0000000000	0.0000000000
Groundwater, Non-carcinogenic	0.0079000000	0.2781144606
Groundwater, Carcinogenic	0.0079000000	0.0002194981
Surface Water, Non-carcinogenic	0.0000000000	0.0000000000
Surface Water, Carcinogenic	0.0000000000	0.0000000000
Air, Non-carcinogenic	0.0000000000	0.0000000000
Air, Carcinogenic	0.0000000000	0.0000000000
Meat/Eggs/Dairy, Non-carcinogenic	0.0000000000	0.0000000000
Meat/Eggs/Dairy, Carcinogenic	0.0000000000	0.0000000000
Fruit/Vegetables, Non-carcinogenic	0.0000000000	0.0000000000
Fruit/Vegetables, Carcinogenic	0.0000000000	0.0000000000
Fish/Shellfish, Non-carcinogenic	0.0000000000	0.0000000000
Fish/Shellfish, Carcinogenic	0.0000000000	0.0000000000

CHEMICAL: Benzene2

Soil, Non-carcinogenic	0.0000000000	0.0000000000
Soil, Carcinogenic	0.0000000000	0.0000000000
Groundwater, Non-carcinogenic	0.0075000000	0.0112899626
Groundwater, Carcinogenic	0.0075000000	0.0002255110
Surface Water, Non-carcinogenic	0.0000000000	0.0000000000
Surface Water, Carcinogenic	0.0000000000	0.0000000000
Air, Non-carcinogenic	0.0000000000	0.0000000000
Air, Carcinogenic	0.0000000000	0.0000000000
Meat/Eggs/Dairy, Non-carcinogenic	0.0000000000	0.0000000000
Meat/Eggs/Dairy, Carcinogenic	0.0000000000	0.0000000000

Fruit/Vegetables, Non-carcinogenic	0.0000000000	0.0000000000
Fruit/Vegetables, Carcinogenic	0.0000000000	0.0000000000
Fish/Shellfish, Non-carcinogenic	0.0000000000	0.0000000000
Fish/Shellfish, Carcinogenic	0.0000000000	0.0000000000

CHEMICAL: Methylene chloride

Soil, Non-carcinogenic	0.0000000000	0.0000000000
Soil, Carcinogenic	0.0000000000	0.0000000000
Groundwater, Non-carcinogenic	0.0120000000	0.0709549440
Groundwater, Carcinogenic	0.0120000000	0.0289086967
Surface Water, Non-carcinogenic	0.0000000000	0.0000000000
Surface Water, Carcinogenic	0.0000000000	0.0000000000
Air, Non-carcinogenic	0.0000000000	0.0000000000
Air, Carcinogenic	0.0000000000	0.0000000000
Meat/Eggs/Dairy, Non-carcinogenic	0.0000000000	0.0000000000
Meat/Eggs/Dairy, Carcinogenic	0.0000000000	0.0000000000
Fruit/Vegetables, Non-carcinogenic	0.0000000000	0.0000000000
Fruit/Vegetables, Carcinogenic	0.0000000000	0.0000000000
Fish/Shellfish, Non-carcinogenic	0.0000000000	0.0000000000
Fish/Shellfish, Carcinogenic	0.0000000000	0.0000000000

CHEMICAL: Tetrachloroethylene (Tetrachloroethene)

Soil, Non-carcinogenic	0.0000000000	0.0000000000
Soil, Carcinogenic	0.0000000000	0.0000000000
Groundwater, Non-carcinogenic	0.0028000000	0.0129960726
Groundwater, Carcinogenic	0.0028000000	0.0051132213
Surface Water, Non-carcinogenic	0.0000000000	0.0000000000
Surface Water, Carcinogenic	0.0000000000	0.0000000000

Air, Non-carcinogenic	0.0000000000	0.0000000000
Air, Carcinogenic	0.0000000000	0.0000000000
Meat/Eggs/Dairy, Non-carcinogenic	0.0000000000	0.0000000000
Meat/Eggs/Dairy, Carcinogenic	0.0000000000	0.0000000000
Fruit/Vegetables, Non-carcinogenic	0.0000000000	0.0000000000
Fruit/Vegetables, Carcinogenic	0.0000000000	0.0000000000
Fish/Shellfish, Non-carcinogenic	0.0000000000	0.0000000000
Fish/Shellfish, Carcinogenic	0.0000000000	0.0000000000

CHEMICAL: Vinyl chloride

Soil, Non-carcinogenic	0.0000000000	0.0000000000
Soil, Carcinogenic	0.0000000000	0.0000000000
Groundwater, Non-carcinogenic	0.0130000000	0.0241658081
Groundwater, Carcinogenic	0.0130000000	0.0003452598
Surface Water, Non-carcinogenic	0.0000000000	0.0000000000
Surface Water, Carcinogenic	0.0000000000	0.0000000000
Air, Non-carcinogenic	0.0000000000	0.0000000000
Air, Carcinogenic	0.0000000000	0.0000000000
Meat/Eggs/Dairy, Non-carcinogenic	0.0000000000	0.0000000000
Meat/Eggs/Dairy, Carcinogenic	0.0000000000	0.0000000000
Fruit/Vegetables, Non-carcinogenic	0.0000000000	0.0000000000
Fruit/Vegetables, Carcinogenic	0.0000000000	0.0000000000
Fish/Shellfish, Non-carcinogenic	0.0000000000	0.0000000000
Fish/Shellfish, Carcinogenic	0.0000000000	0.0000000000

CHEMICAL: cis-1,2-Dichloroethylene

Soil, Non-carcinogenic	0.0000000000	0.0000000000
Soil, Carcinogenic	0.0000000000	0.0000000000

Groundwater, Non-carcinogenic	0.0880000000	0.0152027130
Groundwater, Carcinogenic	0.0880000000	0.0000000000
Surface Water, Non-carcinogenic	0.0000000000	0.0000000000
Surface Water, Carcinogenic	0.0000000000	0.0000000000
Air, Non-carcinogenic	0.0000000000	0.0000000000
Air, Carcinogenic	0.0000000000	0.0000000000
Meat/Eggs/Dairy, Non-carcinogenic	0.0000000000	0.0000000000
Meat/Eggs/Dairy, Carcinogenic	0.0000000000	0.0000000000
Fruit/Vegetables, Non-carcinogenic	0.0000000000	0.0000000000
Fruit/Vegetables, Carcinogenic	0.0000000000	0.0000000000
Fish/Shellfish, Non-carcinogenic	0.0000000000	0.0000000000
Fish/Shellfish, Carcinogenic	0.0000000000	0.0000000000

***************************** CALCULATION ALGORITHMS *****************************

***************** Hazard/Risk Associated with INGESTION via SOIL *****************

Using the following Calculation :

$$\text{Intake (mg/Kg-day)} = \frac{CS \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$$

where :

CS is the Chemical Concentration in the Soil (mg/kg)

IR is the Ingestion Rate (mgsoil/day)

CF is the Conversion Factor (10 ^ -6 Kg/mg)

FI is the Fraction Ingested from the Contaminated Source

EF is the Exposure Frequency (day/years)

ED is the Exposure Duration (years)

BW is the Body Weight (Kg)

AT is the Averaging Time (days)

	RESIDENTIAL		COMMERCIAL	
	NON-CARCINOGENIC	CARCINOGENIC	NON-CARCINOGENIC	CARCINOGENIC
CS	User Defined	User Defined	User Defined	User Defined
IR	200.00	114.29	100.00	100.00
CF	0.000001	0.000001	0.000001	0.000001
FI	1.0	1.0	0.5	0.5
EF	350	350	250	250
ED	6	Incl. in IR Adj.	25	25
BW	15	Incl. in IR Adj.	70	70
AT	365 x 6	365 x 70	365 x 25	365 x 70

************** Hazard/Risk Associated with DERMAL CONTACT via SOIL ***************

Using the following Calculation :

$$\text{Intake (mg/Kg-day)} = \frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

where :

CS is the Chemical Concentration in the Soil (mg/kg)

CF is the Conversion Factor (10 ^ -6 Kg/mg)

SA is the Skin Surface Area for Contact (cm^2/event)

AF is the Soil to Skin Adherence Factor (unitless)

ABS is the Absorption Factor (unitless)

EF is the Exposure Frequency (day/years)

ED is the Exposure Duration (years)

BW is the Body Weight (Kg)

AT is the Averaging Time (days)

	RESIDENTIAL		COMMERCIAL	
	NON-CARCINOGENIC	CARCINOGENIC	NON-CARCINOGENIC	CARCINOGENIC
CS	User Defined	User Defined	User Defined	User Defined
CF	0.000001	0.000001	0.000001	0.000001
SA	1875	2290	4500	4500
AF	1.45	1.45	1.45	1.45

```
ABS      User Defined       User Defined       User Defined       User Defined

EF       350                350                250                250

ED        6                 Incl. in SA Adj.   25                 25

BW       15                 Incl. in SA Adj.   70                 70

AT       365 x  6           365 x 70           365 x 25           365 x 70

|---------------------------------------------------------------------------|



****************  Hazard/Risk Associated with DRINKING WELL WATER
*****************


Using the following Calculation :


                     CW x IR x EF x ED

Intake (mg/Kg-day) = -----------------

                         BW x AT

where :

 CW  is the Chemical Concentration in Water (mg/L)

 IR  is the Ingestion Rate ( Liters/day)

 EF  is the Exposure Frequency (days/year)

 ED  is the Exposure Duration (years)

 BW  is the Body Weight (Kg)

 AT  is the Averaging Time (days)




|---------------------------------------------------------------------------|

       |            RESIDENTIAL                 |            COMMERCIAL
|
```

	NON-CARCINOGENIC	CARCINOGENIC	NON-CARCINOGENIC	CARCINOGENIC
CW	User Defined	User Defined	User Defined	User Defined
IR	1.00	1.09	2.00	2.00
EF	350	350	250	250
ED	6	Incl. in IR Adj.	25	25
BW	15	Incl. in IR Adj.	70	70
AT	365 x 6	365 x 70	365 x 25	365 x 70

*********** Hazard/Risk Associated with DERMAL CONTACT via WELL WATER ************

Using the following Calculation :

$$\text{Intake} = \frac{CW \times SA \times PC \times ET \times EF \times ED \times CF}{BW \times AT}$$

where :

CW is the Chemical Concentration in Water (mg/L)

PC is the Dermal Permeability Constant (cm/hr)

SA is the Surface Area Exposed (cm^2)

ET is the Exposure Time (hours/day)

EF is the Exposure Frequency (days/year)

ED is the Exposure Duration (years)

CF is the Volumetric Conversion (1 Liter/1000 cm^3)

BW is the Body Weight (Kg)

AT is the Averaging Time (days)

	RESIDENTIAL		COMMERCIAL	
	NON-CARCINOGENIC	CARCINOGENIC	NON-CARCINOGENIC	CARCINOGENIC
CW	User Defined	User Defined	User Defined	User Defined
PC	User Defined	User Defined	User Defined	User Defined
SA	7500	9200	820	820
ET	0.6	0.6	1.0	1.0
EF	350	350	250	250
ED	6	Incl. in SA Adj.	25	25
CF	.001	.001	.001	.001
BW	15	Incl. in SA Adj.	70	70
AT	365 x 6	365 x 70	365 x 25	365 x 70

********* Hazard/Risk Associated with INCIDENTAL INGESTION via SWIMMING **********

Using the following Calculation :

CW x CR x EF x ET x ED

Intake (mg/Kg/day) = ---------------------

BW x AT

where :

CW is the Chemical Concentration in Water (mg/L)

CR is the Contact Rate (Liters/hour)

EF is the Exposure Frequency (events/year)

ET is the Exposure Time (hours/event)

ED is the Exposure Duration (years)

BW is the Body Weight (Kg)

AT is the Averaging Time (days)

	RESIDENTIAL		COMMERCIAL	
	NON-CARCINOGENIC	CARCINOGENIC	NON-CARCINOGENIC	CARCINOGENIC
CW	User Defined	User Defined	User Defined	User Defined
CR	0.05	.037	0.05	0.05
EF	7	7	7	7
ET	2.6	2.6	2.6	2.6
ED	6	Incl. in CR Adj.	25	25
BW	15	Incl. in CR Adj.	70	70
AT	365 x 6	365 x 70	365 x 25	365 x 70

********** Hazard/Risk Associated with DERMAL CONTACT via SURFACE WATER **********

Using the following Calculation :

```
                     CW x SA x PC x ET x EF x ED x CF
Intake (mg/Kg-day) = --------------------------------
                                BW x AT
```

where :

CW is the Chemical Concentration in Water (mg/L)

PC is the Dermal Permeability Constant (cm/hr)

SA is the Surface Area Exposed (cm^2)

ET is the Exposure Time (hours/day)

EF is the Exposure Frequency (days/year)

ED is the Exposure Duration (years)

CF is the Volumetric Conversion (1 Liter/1000 cm^3)

BW is the Body Weight (Kg)

AT is the Averaging Time (days)

```
|--------------------------------------------------------------------------|
       |            RESIDENTIAL             |            COMMERCIAL
|
       | NON-CARCINOGENIC     CARCINOGENIC   | NON-CARCINOGENIC
CARCINOGENIC  |
       | ---------------- | ---------------- | ---------------- |
----------------|
CW       User Defined       User Defined       User Defined       User Defined
```

PC	User Defined	User Defined	User Defined	User Defined
SA	7500	9200	18000	18000
ET	2.6	2.6	2.6	2.6
EF	7	7	7	7
ED	6	Incl. in SA Adj.	25	25
CF	.001	.001	.001	.001
BW	15	Incl. in SA Adj.	70	70
AT	365 x 6	365 x 70	365 x 25	365 x 70

|---|

*********** Hazard/Risk Associated with INHALATION via AIR due to Soil ***********

Using the following Calculation :

$$\text{Intake (mg/Kg-day)} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT}$$

where :

CA is the Chemical Concentration in Air (mg/m^3)

IR is the Inhalation Rate (m^3/hour)

ET is the Exposure Time (hours/day)

EF is the Exposure Frequency (days/year)

ED is the Exposure Duration (years)

BW is the Body Weight (Kg)

AT is the Averaging Time (days)

|--|

	RESIDENTIAL		COMMERCIAL	
	NON-CARCINOGENIC	CARCINOGENIC	NON-CARCINOGENIC	CARCINOGENIC
CA	User Defined	User Defined	User Defined	User Defined
IR	0.500	0.486	0.833	0.833
ET	24	24	8	8
EF	350	350	250	250
ED	6	Incl. in IR Adj.	25	25
BW	15	Incl. in IR Adj.	70	70
AT	365 x 6	365 x 70	365 x 25	365 x 70

|--|

* Hazard/Risk Assoc. with INHALATION via AIR due to Water (Whole House Scenario) *

Using the following Calculation :

$$\text{Intake (mg/Kg-day)} = \frac{CW \times IR \times EF \times ED \times K}{BW \times AT}$$

where :

CW is the Chemical Concentration in Water (mg/L)

IR is the Inhalation Rate (m^3/day)

EF is the Exposure Frequency (day/years)

ED is the Exposure Duration (year)

K is the Volitilization Factor (unitless)

BW is the Body Weight (Kg)

AT is the Averaging Time (days)

	RESIDENTIAL NON-CARCINOGENIC	RESIDENTIAL CARCINOGENIC
CW	User Defined	User Defined
IR	12.000	11.664
EF	350	350
ED	6	Incl. in IR Adj.
K	0.5	0.5
BW	15	Incl. in IR Adj.
AT	365 x 6	365 x 70

************* Hazard/Risk Associated with INGESTION of FOOD PRODUCTS *************

Using the following Calculation :

$$\text{Intake (mg/Kg-day)} = \frac{CF \times IR \times FI \times EF \times ED}{\quad}$$

BW x AT

where :

CF is the Chemical Concentration in the Food (mg/Kg)

IR is the Ingestion Rate (kg/day)

FI is the Fraction Ingested from the Contaminated Source

EF is the Exposure Frequency (meals/year)

ED is the Exposure Duration (years)

BW is the Body Weight (Kg)

AT is the Averaging Time (days)

MEAT/EGG/DAIRY PRODUCTS :

	RESIDENTIAL		COMMERCIAL	
	NON-CARCINOGENIC	CARCINOGENIC	NON-CARCINOGENIC	CARCINOGENIC
CF	User Defined	User Defined	User Defined	User Defined
IR	0.280	0.280	0.280	0.280
FI	1	1	1	1
EF	350	350	350	350
ED	30	Incl. in IR Adj.	25	25
BW	70	Incl. in IR Adj.	70	70
AT	365 x 30	365 x 70	365 x 25	365 x 70

FRUIT/VEGETABLE PRODUCTS :

	RESIDENTIAL		COMMERCIAL	
	NON-CARCINOGENIC	CARCINOGENIC	NON-CARCINOGENIC	CARCINOGENIC
CF	User Defined	User Defined	User Defined	User Defined
IR	0.122	0.122	0.122	0.122
FI	1	1	1	1
EF	350	350	350	350
ED	30	Incl. in IR Adj.	25	25
BW	70	Incl. in IR Adj.	70	70
AT	365 x 30	365 x 70	365 x 25	365 x 70

FISH/SHELLFISH PRODUCTS :

	RESIDENTIAL		COMMERCIAL	
	NON-CARCINOGENIC	CARCINOGENIC	NON-CARCINOGENIC	CARCINOGENIC
CF	User Defined	User Defined	User Defined	User Defined
IR	0.054	0.054	0.054	0.054
FI	1	1	1	1
EF	350	350	350	350

ED	30	Incl. in IR Adj.	25	25
BW	70	Incl. in IR Adj.	70	70
AT	365 x 30	365 x 70	365 x 25	365 x 70

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At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

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