Closure Plan
Third Creek Monofill
City of Statesville
Statesville, North Carolina
EPA ID Number NCR 000 001 602

July 12, 1996

Prepared For

City of Statesville
Statesville, North Carolina

For Submittal To

North Carolina Department of Environment,
Health, and Natural Resources
Division of Solid Waste Management
Hazardous Waste Section
Raleigh, North Carolina

OCT 4

Prepared By

Aquaterra, Inc.
Charlotte, North Carolina

aquaterra®
A GREAT LAKES CHEMICAL CORPORATION COMPANY
ENVIRONMENTAL CONSULTANTS:
POST OFFICE BOX 668107 • CHARLOTTE, NC 28266-8107 • (704) 525-8660 • FAX (704) 527-2792

July 12, 1996

Ms. Sharron Rogers
North Carolina Department of Environment,
Health, and Natural Resources
Division of Solid Waste Management
Hazardous Waste Section
Post Office Box 27687
Raleigh, North Carolina 27611-7687

Reference: Closure Plan
Third Creek Monofill
City of Statesville
Statesville, North Carolina
EPA ID Number NCR 000 001 602
Aquaterra Job No. 5205800

Dear Ms. Rogers:

On behalf of the City of Statesville, Aquaterra, Inc. (Aquaterra) is pleased to present the following revised closure plan detailing the closure activities required for the Third Creek Monofill site located southeast of the City of Statesville, North Carolina. This closure plan was prepared at the request of the City of Statesville pursuant to the Administrative Order on Consent (Docket #94-191) entered into by the City of Statesville and the North Carolina Department of Environment, Health, and Natural Resources (NCDEHNR). Revisions are in response to the NCDEHNR, Division of Solid Waste Management, Hazardous Waste Section letters, *Comments on Closure and Post-Closure Plans, Third Creek Monofill*, dated November 17, 1995, and *Revised Closure and Post Closure Plans*, dated April 11, 1996.

This Closure Plan is based on interim status (40 CFR Part 265 and as adopted by the State of North Carolina) under *Subpart G - Closure and Post-Closure* in accordance with 40 CFR 265.110 through 265.116; *Subpart H - Financial Requirements* in accordance with 40 CFR 265.140 through 265.142 and 265.146; and *Subpart N - Landfills* in accordance with 40 CFR 265.310.

If you have any questions or comments concerning this plan, please contact Mr. Neal McElveen at (704) 525-8680 or Ms. Susan Kite at (910) 852-5003.

AQUATERRA, INC.

M. Neal McElveen, P.E.
Project Manager

Susan Kite, P.G. 1-P
Senior Project Manager

Senior Peer Review

Bryson D. Trexler, Jr., Ph.D., P.G.
Senior Hydrogeologist/Program Manager

MNM/SK/rap
52213

pc: Mr. L. F. ("Joe") Hudson, Jr. - City of Statesville
Mr. Douglas D. Vaughn, P.E. - Pierson & Whitman
Mr. George House - Brooks, Peirce, McLendon, Humphrey & Leonard, L.L.P.

Closure Plan
Third Creek Monofill
City of Statesville
Statesville, North Carolina
EPA ID Number NCR 000 001 602

July 12, 1996

1 Introduction

1.1 Background

The City of Statesville (the "City") operates a wastewater treatment system at the Third Creek site located southeast of the city limits of Statesville, Iredell County, North Carolina (see Figure 1). The site is situated on a dirt road off of Third Creek Road southeast of Statesville. The site is bordered to the north by pasture land. To the south of the facility is Third Creek. To the east of the property is residential property and to the west woodlands. The site operates under an National Pollutant Discharge Elimination System (NPDES) permit (Permit No. 0020591) and a non-discharge permit (Permit No. WQ0004040). Concern from elevated concentrations of cadmium in the treatment system was raised in 1993. The non-discharge permit was modified to allow the removal and landfilling of over 20 years of accumulated solids from Aeration Basins 1 and 2 and the digester in an effort to reduce the amount of cadmium in the wastewater treatment system. A composite core sample of this sludge was taken at the start of the clean-out in April 1993, and it passed TCLP.

The sludge was placed in eight landfill trenches on property near the wastewater treatment plant (see Figure 2). Based on information obtained from the City of Statesville Water/Wastewater Treatment Department, a sump pump was initially utilized to draw down Aeration Basin No. 2 and the sludge was pumped to the digester followed by a belt press for dewatering. The dewatered solids were then transported to the trenches. The remaining sludge/solids from the aeration basin was initially removed utilizing a clam shell until a front end loader could be operated within the basin. The clam shell removed the sludge/solids in long narrow strips generally removing the top layers first. The sludge removed by the front end loader was first pushed into a pile and then loaded onto trucks for transport to the monofill.

During the final removal of the sludge from the basin, a second sample was collected and analyzed. The results of this sample revealed high concentration of cadmium; however, this sample was analyzed for total cadmium rather than cadmium by the TCLP method. Based upon this result, the City immediately ceased removal operations and contacted the North Carolina Department of Environment, Health, and Natural Resources (NCDEHNR). The City then contracted with International Technology Corporation ("IT") to sample the monofill trenches.

IT began sampling the monofill trenches on February 5, 1994, and completed sampling on February 10, 1994. Due to poor weather conditions and difficulty maneuvering the drill rig, borings were installed along the apparent center line of each trench. Sludge materials were not found in every boring. Samples were obtained using 5 feet long split spoon samplers. Generally, the trenches were divided

into four sections. As per Mr. Jesse Wells of the NCDEHNR, one composite sample from each trench was analyzed for TCLP organics and inorganics (the volatile constituents were collected as grab samples). One composite TCLP metals sample per trench section, except for the section where a full TCLP analysis was completed, was also analyzed. Subsequent sampling of the monofilled sludge identified cadmium levels in excess of the regulatory limit for cadmium according to TCLP in seven of the trenches. TCLP cadmium levels in one trench, Trench 20 (Trench H), were below action levels. Sampling protocols, boring locations, documentation, and analytical results were presented in the *IT Sampling and Analysis Trip Report*, dated February 1994.

The variation in TCLP cadmium levels could be directly related to the method in which the sludge/solids were removed from the basin and also the amount of digested sludge materials placed in these trenches. As discussed above, the dewatered solids, which would typically have a lower leachable metals concentration were separately transported and placed in the monofill trenches. In addition, the fact that sludge materials were not noted in all borings shows the variability in placement of sludge in the monofill. Furthermore, as the initial sampling indicates, some of the sludge placed in the monofill (i.e. the top layer) was not hazardous. Therefore, Trench 20 (Trench H) could contain a combination of non-hazardous sludge and non-hazardous dewatered solids. Because it was not required at the time, the City did not document the order in which the trenches received sludge and dewatered solids.

Based upon this investigation and the laboratory analytical results, the City entered into an Administrative Order on Consent (Order) with the NCDEHNR, Division of Solid Waste Management (DSWM) that was signed by the City of Statesville on March 8, 1995. In accordance with this Order, the City of Statesville submitted a *Phase I Subsurface Characterization Work Plan* and a *Ground Water Sampling and Analysis Plan* to address the requirements of the Order. This work plan was submitted on April 8, 1995. The subsurface characterization was completed in mid-April 1995, and a report of *Phase I Subsurface Characterization* was submitted on May 8, 1995. *The Ground Water Sampling and Analysis Plan* was also submitted on May 8, 1995. A *Revised Ground Water Sampling and Analysis Plan* was submitted on October 31, 1995, and approved by the Hazardous Waste Section (HWS) on December 6, 1995. A *Closure Plan*, *Post-Closure Care Plan*, and *Closure and Post-Closure Care Costs* were submitted on August 7, 1995. A *Revised Closure Plan*, *Revised Post-Closure Care Plan*, and *Revised Closure and Post-Closure Care Costs* were submitted on February 27, 1996, in response to the NCDEHNR DSWM, HWS letter, *Comments on Closure and Post-Closure Plans, Third Creek Monofill*, dated November 17, 1995. Additional comments were received in the HWS letter *Revised Closure and Post Closure Plans*, dated April 11, 1996. The following *Revised Closure Plan* addresses the comments from the HWS.

1.2 Closure Plan Development

The City of Statesville has contracted Aquaterra to develop and implement the Closure Plan in accordance with 40 CFR 265.110 through 265.116. The financial requirements for closure will be developed as outlined in 40 CFR 265.140 through

265.143 and 265.146. Also, 40 CFR 265.310 (*Subpart N - Landfills*) will be used as a guideline in developing the closure care activities.

The Closure Plan for the Third Creek Monofill is presented in Section 2.0.

1.3 Maintenance of Closure Plan

The City of Statesville will maintain an on-site copy of the approved Closure Plan and all revisions until the certificate of closure has been submitted and accepted by the HWS as outlined in 40 CFR 265.112(a). The Closure Plan copy and all revisions will be maintained at the Third Creek water treatment facility by a designated employee of the City of Statesville. The current facility designee's address and phone number are as follows:

Mr. L. F. ("Joe") Hudson, Jr., Director
Water/Wastewater Treatment Department
City of Statesville
Post Office Box 1111
Statesville, North Carolina 28687-1111
Phone: (704) 878-3438

2 Closure Plan

2.1 Introduction

The following Closure Plan has been prepared to address the closure performance standards outlined in 40 CFR 265.111. The City of Statesville will close the Third Creek Monofill site so that:

- there is minimal need for further maintenance of the Hazardous Waste Management Unit (HWMU) (265.111(a));
- the closure protects human health and the environment and minimizes or eliminates the post-closure escape of hazardous waste decomposition products to the ground water, surface water, and atmosphere (265.111(b)); and
- the Closure Plan complies with the requirements of Subpart G - Closure and Post-Closure and Subpart N - Landfills (40 CFR 265.310).

This plan addresses the eight trenches (Third Creek Monofill) varying in length from approximately 50 to 140 feet, width from approximately 10 to 15 feet and depth of approximately eight feet where the sludge was placed. Seven of the trenches exhibited cadmium concentrations above the TCLP regulatory level of 1.0 milligram per liter (mg/L). As required by the HWS, the eighth trench which had cadmium concentrations below the TCLP regulatory limit and trace amounts of volatile organic and semivolatile organic compounds will also be closed in accordance with the following this *Closure Plan*. The site is located approximately 2,000 feet west of Third Creek Road and 5,000 feet south of Highway 70.

2.2 Maximum Inventory of Hazardous Waste

In 1993, concerns arose over elevated cadmium levels in the wastewater treatment system. The Third Creek facility modified an existing non-discharge permit (Permit No. WQ0004040) to allow removal and landfilling of over 20 years of accumulated solids from Aeration Basins 1 and 2 and the facility digester. The solids were placed in eight trenches near the site. According to the Third Creek facility records, approximately 1,750 cubic yards of material were placed in the trenches. Based on the February 1994 sampling data collected by IT Corporation of Knoxville, Tennessee, concentrations of cadmium using the TCLP ranged from 0.15 to 38.0 parts per million. The estimated volume of hazardous waste generated (as required by (265.111(b)(3)) at the Third Creek facility is 1,750 cubic yards of solids (cadmium contaminated) from the aeration and digester basins. There are no records of additional hazardous wastes generated at the facility. The wastewater treatment plant has been in operation since the early 1970's.

2.3 Closure of the Third Creek Monofill

2.3.1 On-Site Stabilization

Prior to closure of the HWMU, a treatability study will be conducted on materials contaminated with high concentrations of cadmium. The objective of the treatability study will be to determine the effectiveness of stabilization/solidification for minimizing the leachability of cadmium. Testing will be conducted following a phased approach. The preliminary treatment phase will evaluate a number of reagents and reagent formulations for stabilation of the sludge materials. The preliminary treatment criteria will be leachability of cadmium as measured by TCLP. Optimum reagents/reagent formulations will be evaluated during a confirmation testing phase. Details of the treatability study are included in Appendix A.

The HWMU will be closed by stabilizing the sludge and installation of a capping system. A treatment plant consisting of a concrete staging pad, power screen, and pugmill will be set on-site. The concrete pad will be used to stage materials awaiting treatment. An estimated 2 to 3 feet of overburden soil from each trench will be excavated, staged on-site, and laboratory tested for potential use as fill material. The sludge/solids will be excavated and staged on a concrete pad. The sludges/solids will be loaded into the power screen and discharged into the pugmill batch mixer. A predetermined percentage of fixation chemical (determined from bench scale tests described in Appendix A) will be added and thoroughly mixed. The treated material will be staged on plastic, covered to prevent stormwater contact, and allowed to cure as determined in the treatability study. Following the curing time for the stabilized material, and prior to placement of the media back into the trenches, treated materials will be tested for leachable cadmium using TCLP on a 250 ton to 500 ton interval.

To determine baseline concentration levels of metals in on-site soils, four background soil samples will be obtained at locations upgradient from the monofill and in an area that has had limited or no development. The soil samples will be

obtained at approximately 5 feet below ground surface and will be analyzed for the eight RCRA metals.

To confirm that all the contaminated sludge/solids have been excavated from each trench, confirmatory soil samples will be obtained from the bottom of each trench at 20-foot intervals (5 soil samples per 100 feet) and from the side walls and end walls of the trench (4 soil samples) utilizing a decontaminated stainless steel hand auger. Each trench will be gridded on 5-foot intervals. For each 20-foot length, one sample will randomly be collected. In a similar manner, the sides and ends of the pit will be gridded, and one sample per side and end randomly chosen. The soil samples will be collected from bottom or wall surface to 6-inches deep, thoroughly mixed by quartering, and then a sample collected. The soil samples will be analyzed for total cadmium, total barium, total lead, total silver, volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) following SW-846 Methodology. The total metals analysis will be compared to the baseline total metals. Any contaminated soils will be excavated, placed on the concrete pad, and treated with the sludge/solids. The treated material will then be placed back into the trenches in 12-inch lifts and compacted to a density of 90 percent using a sheeps foot roller. The treated material will be capped following the procedures in Section 2.3.2.

2.3.2 Closure and Post-Closure of Landfills

For the purposes of closure, post-closure, and financial responsibility, the Third Creek Monofill is considered to be a landfill and the City of Statesville must meet the requirements for landfills specified in Subparts G, H, and F of 40 CFR 265 as per 40 CFR 265.310. Under Subpart N - Landfills (Section 40 CFR 265.310), Closure and Post-Closure requirements include:

(a) At final closure of the landfill, the owner or operator must cover the landfill with a final cover designed and constructed to:

(1) provide long-term minimization of migration of liquids through the closed landfill;
(2) function with minimum maintenance;
(3) promote drainage and minimize erosion or abrasion of the cover;
(4) accommodate settling and subsidence so that the cover's integrity is maintained; and
(5) have a hydraulic conductivity less than or equal to the hydraulic conductivity of any bottom liner system or natural subsoils present.

(b) After final closure, the owner or operator must comply with all post-closure requirements contained in Sections 265.117 - 265.120, including maintenance and monitoring throughout the post-closure care period. The owner or operator must:

(1) maintain the integrity and effectiveness of the final cover, including making repairs to the cover as necessary to correct the effects of settling, subsidence, erosion, or other events;

(2) maintain and monitor the ground water monitoring system and comply with all other applicable requirements of Subpart F of this part;
(3) prevent run-on and run-off from eroding or otherwise damaging the final cover; and
(4) protect and maintain surveyed benchmarks used in complying with Section 265.309.

The owner or operator of a landfill must maintain the following items in the operating record required in Section 265.73:

- on a map, the exact location and dimensions, including depth, of the landfill with respect to permanently survey benchmarks, and
- the contents of the landfill and the approximate location of each hazardous waste type within each landfill cell.

2.3.2.1 Impermeable CAP System

Following placement of the stabilized material, closure will be completed with an impermeable cap system that will cover each of the eight trenches.

The impermeable cap will consist of a geotextile fabric followed by a compacted two-foot layer of clayey silty sand to sandy silt with a hydraulic conductivity less than or equal to 1E-7 centimeters per second (cm/sec) after compaction or at a minimum have a hydraulic conductivity less than or equal to the underlying backfill and natural soil. Overlying the compacted soil layer will be a 30 mil high density polyethylene (HDPE) liner followed by a 12-inch sand layer for drainage. A geotextile filter fabric will be placed over the sand layer followed by two to three feet of lightly compacted topsoil or fill dirt. The topsoil will be seeded to prevent erosion. A grade of one to two percent will be maintained from the compacted impermeable soil layer up to the topsoil or fill layer to promote drainage.

After the capping of the trenches has been completed, the City of Statesville will upgrade the existing facility security system in accordance with 40 CFR 265.14 (a),(b). In addition, permanent monuments will be placed at the four corners of the landfill cap(s) and surveyed with respect to a permanent benchmark.

2.3.2.2 Placement of Compacted Layer

The two-foot layer of clayey silty sand to sandy silt shall be placed in horizontal lifts not to exceed 12-inches in uncompacted thickness. Each lift shall be compacted by compaction equipment to a minimum density of 90 percent of the maximum dry density as determined in accordance with ASTM D-698. Materials shall be placed at no less than 2 percentage points below the optimum moisture content as determined in accordance with ASTM D-698 and no greater than 3 percentage points over the optimum moisture content. At no time will the minimum number of passes be reduced. The soils shall be free of trash, perishables or other deleterious materials. No cobbles, stones, or rock greater than 3-inches in diameter will be placed in the compacted layer.

Upon completion of placement, the upper surface shall be trimmed to a smooth surface and then compacted by three passes of a smooth wheel roller to provide a smooth, flat surface. In addition, a hydraulic conductivity test will be conducted following the placement of the 2-foot compacted layer.

2.3.2.3 Placement of Topsoil Material

Topsoil material shall consist of clean off-site borrow materials. Topsoil shall be free of trash, perishable or other deleterious materials. No cobbles, stones, or rock fragments greater than 3 inches in diameter will be placed in the topsoil layer. Topsoil materials will be sufficiently compacted by placement activities; no further compaction of the topsoil will be required. No in-place density testing will be required on the topsoil materials.

2.3.2.4 Runoff/Run-on Control

The topsoil cover will be sloped such as to prevent drainage to the HWMU. The topsoil cover grade will be approximately one to two percent. In addition, the cover will be protected from erosion by planting vegetation such as perennial grasses. To control storm water run-on and runoff, trapezoidal ditches with vegetative cover will be constructed on the topographically upgradient side of each cell. The ditches will be constructed at a minimum of five feet from each cell to prevent compromise of the capping system. Based on a 25-year design storm and a conservative drainage area of 9.18 acres, the vegetative lined ditches will be constructed with a base of 4 feet, a depth of 1.5 feet (includes a 6-inch freeboard), a side slope of 2:1 and a total width of 10 feet. Details of the ditches are shown on Figure 3.

2.3.2.5 Testing and Monitoring

All borrow sources for the fill soil, capping soil, and topsoil will be sampled and analyzed for volatile organic compounds (VOCs) according to SW-846 Method 8240, semivolatile organic compounds (SVOCs) according to SW-846 Method 8270, and the eight Resource Conservation and Recovery Act (RCRA) metals. No contaminated borrow material will be allowed on-site.

Hydraulic conductivity testing will be conducted on natural soils at the site and following placement of the compacted two-foot cap layer. Hydraulic conductivity testings will be in accordance with the Fall-head Test.

All placement activities will be continuously monitored by a qualified engineer or geologist familiar with soil placement, testing techniques, and procedures. On-site testing will consist of determining in-place density by the Sand Cone method in accordance with ASTM D-1556, the Rubber Balloon method in accordance with ASTM D-2167, or by the Nuclear method in accordance with ASTM D-2922.

Prior to placement activities, moisture/density tests will be performed on representative samples of each material to be placed. The results of these tests will be the basis for determining acceptable in-place density criteria. If there is any discrepancy between testing results using different methods, the Sand Cone method

shall be the standard to which all results shall be compared. Natural subsoils on-site will be tested in-place by the Nuclear method in accordance with ASTM D-2922.

Testing frequency shall be a minimum of one test per lift. Any in-place materials not meeting the minimum density requirements shall be recompacted. Upon completion of the in-place test, the hole created for the test shall be cleaned of any remaining sand or other materials and shall be backfilled with commercially produced bentonite clay pellets, hydrated and hand compacted in a maximum of two inch lifts.

2.3.2.6 Subsidence

The potential subsidence of the capping system should be negligible. The materials placed in accordance with the above procedures will exist in a compacted condition and will be over-consolidated due to the compactive effort during placement. Since there will be no surcharge load placed on the area by surface load and minimal seepage will be flowing downward through the placed material, there is no mechanism available to cause further compression of the cap, fill, or subgrade materials.

2.3.2.7 Closure Schedule

The closure activities outlined above will be completed within 180 days in accordance with the AOC (Docket #94-191), 40 CFR 265.113(b)(codified at 15A NCAC 15A NCAC 13A.0010), and after receiving approval from the HWS. As the AOC sets forth, the site is considered one unit rather than eight separate units. Therefore, the City of Statesville is not submitting eight separate schedules for closure and post-closure care, but rather will adhere to the schedule set forth in the AOC.

2.4 Decontamination of Equipment

All equipment and tools will be decontaminated on-site using power washing with water (pH 6.0-7.0). A self-contained decontamination pad will be utilized to collect washdown from the decontamination process. Equipment will be positioned during decontamination so that washdown water or fluid is collected without runoff to any unlined portion of the soil. All washdown in the self-contained steel decon pad will be removed following completion of the project by a vacuum system and placed in drums and will be disposed of by the contractor. Additional materials, such as plastic sheeting, personnel protective equipment, etc., will be placed in drums. The decon wastewater from the washdown and other solid waste materials will be sampled and analyzed for leachable cadmium using total metals and TCLP, respectively. If the decon wastewater or other solid waste is hazardous, the material will be disposed of at a permitted Treatment, Storage, and Disposal Facility (TSDF). Documentation, manifests, and certification will be performed in accordance with all applicable regulations including 40 CFR 260, 261, 262, 263, and 268. Completion of decontamination will be determined by visual inspection to ensure all soils have been removed from the equipment.

2.5 Inspection and Maintenance

The City of Statesville will ensure that the closed Third Creek Monofill is properly maintained by inspecting it monthly for the following:

- erosion damage
- vegetative cover
- run-on/run-off control system

The capping system will be sloped to provide positive site drainage away from the HWMU. The cover grade will be approximately 1 to 2 percent. The cap's slope is designed so that the maximum drainage velocity leaving the cap is less than the velocity likely to cause erosion for the selected vegetation. The cap will be visually inspected annually by a professional engineer to ensure that the positive drainage slope is maintained. Should minor subsidence or spot irregularities be discovered, new topsoil will be placed on the cap and it will be regraded.

The cap will also be protected from erosion by maintaining an appropriate vegetative cap. Maintenance activities for the vegetative cap will include mowing, seeding, and fertilizing during the year. The activities will be performed on an as-needed basis due to the seasonal nature of vegetation.

2.6 Closure Cost and Financial Assurance

The closure costs required under 40 CFR 265.142 will be submitted under separate cover by the City of Statesville. The closure cost estimate and any revisions will be retained at the Third Creek Wastewater Treatment facility and updated on an annual basis to reflect cost changes as a result of inflation or changes in the Closure Plan activities.

The City of Statesville submitted financial assurance information pursuant to 40 CFR 265.143 on October 6, 1995, and a special report on November 5, 1995. The City's financial mechanism, Financial Test and Corporate Guarantee for Closure (265.143(e)) was approved by the HWS on December 12, 1995, with the requirement that a new test be submitted on or before September 30, 1996.

2.7 Certification of Closure

Within 60 days of completing closure, the City of Statesville will submit to the HWS a certification by both the City of Statesville and an independent professional engineer registered in the State of North Carolina that the Third Creek Monofill has been closed according to the approved Closure Plan. Documentation supporting the independent registered professional engineer's certification will be maintained until the HWS releases the City of Statesville from the financial assurance requirements for Closure under 40 CFR 265.143(h).

2.8 Notice to Local Land Authority

Within 60 days after closure is completed, the City of Statesville will submit to the Iredell County Register of Deeds and to the HWS a survey plat indicating the location and dimensions of the trenches with respect to permanently surveyed benchmarks. This plat will be prepared and certified by a professional land surveyor registered in the State of North Carolina. The plat will contain a note, prominently displayed, which states the City of Statesville's obligation to restrict disturbances of the site in accordance with the applicable Subpart G regulations (40 CFR 265.116 as adopted in 15 NCAC 13A .0010).

3 Post-Closure Care Plan

"Clean" closure of the Third Creek Monofill can be achieved by complete removal and fixation/solidification of the sludge. "Clean" closure can be confirmed through analysis of soil samples that show that all the materials have been removed from the trenches and that the constituent of concern is bound in the fixated sludge. If "clean" closure is unachievable, a Post-Closure Care Plan will be implemented after the closure is complete. This plan will be submitted to the HWS under separate cover. The following items will be included in the post-closure care plan:

- Ground Water Sampling and Analysis Plan – A ground water sampling and analysis plan prepared by a licensed geologist in accordance with 40 CFR 265.93(d)(2) was submitted to the HWS on May 8, 1995 (Aquaterra report number GR5041). A revised ground water sampling and analysis plan was submitted on October 31, 1995 and approved on December 6, 1995.

  The ground water sampling and analysis plan addresses:

  - the number, location, and depth of wells;
  - sampling and analytical methods for those hazardous wastes or hazardous waste constituents found present at the facility;
  - evaluation procedures, including use of previously gathered ground water quality information; and
  - a schedule of implementation.

- A description of the planned ground water monitoring activities and frequencies at which they will be performed.

- A description of the planned maintenance activities and frequencies at which they will be performed for the cap, security system, and monitoring wells.

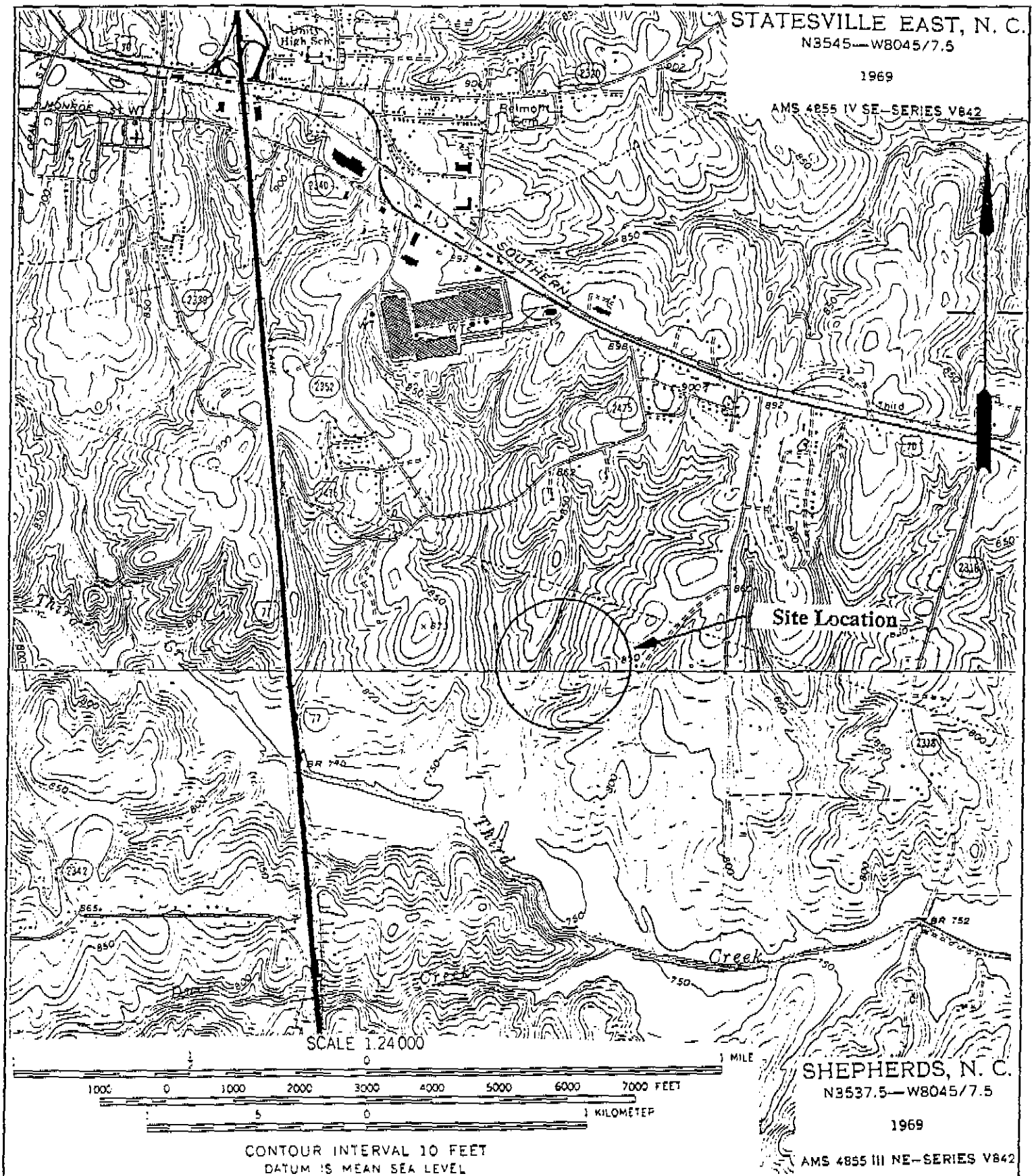
- The name, address, and phone number of the person or office to contact about the hazardous waste disposal unit during the post-closure care period.

- Recordkeeping and reporting during post-closure:
  - ground water monitoring data and evaluation of data;
  - annual report;
  - updates on costs of post-closure care; and
  - maintenance of all records for the post-closure care period.

- Copies of the Post-Closure Care Plan will be maintained at:

  City of Statesville
  Water/Wastewater Treatment Department
  Post Office Box 1111
  Statesville, North Carolina 28687-1111
  Attention: Mr. L .F. ("Joe") Hudson, Jr., Director

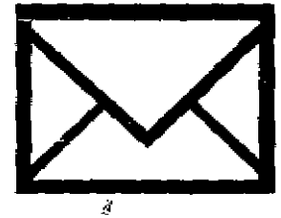
The person responsible for updating the Post-Closure Care Plan will be the facility representative mentioned or his designee. As the Post-Closure Care Plan is updated or amended, the date and number of the revision will be placed on the lower left corner of each page revised and the revision will be noted on the plan's title page.



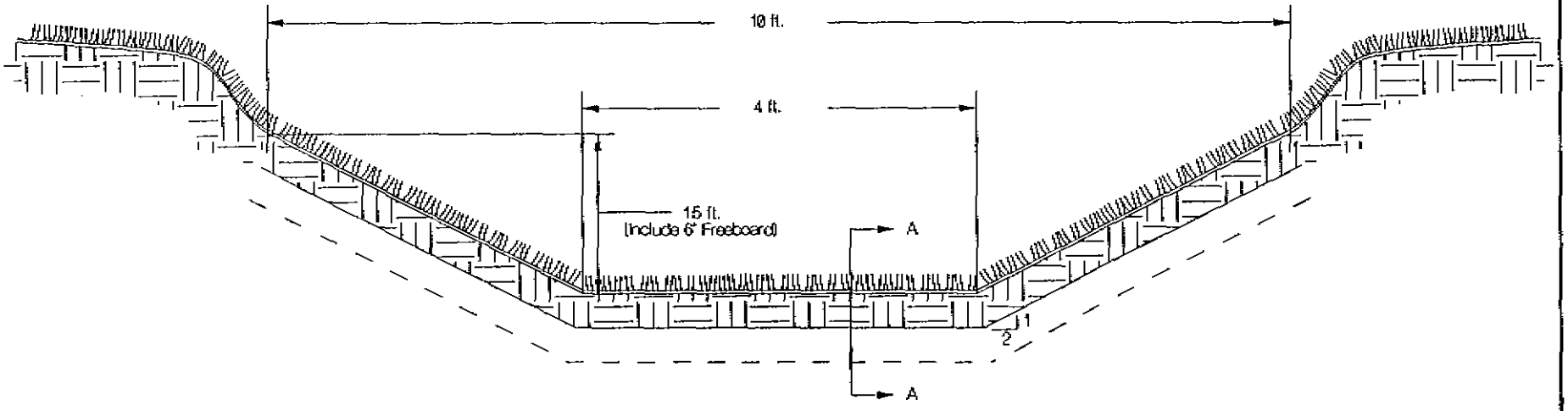
aquaterra — A GREAT LAKES CHEMICAL CORPORATION COMPANY	Author: sk	Drawing:	Layers:	Date: 4-07-95	Title: Site Location Map
	Job No.: 5205800	Revision:	Figure: 1	Scale: 1:24,000	Project: Third Creek Monofill, Statesville, North Carolina

PLEASE SEE OTHER MATERIALS

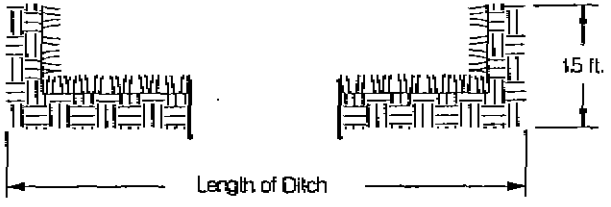
MAPS IN THE BOOK



Detail



Longitudinal Section A – A



aquaterra
A GREAT LAKES CHEMICAL CORPORATION COMPANY

Author	Drawing	Layers	Date	Title
EVC	T-52658-1	0,1	2-12-96	Run-on/Run-off Control
Job No.	**Revision**	**Figure**	**Scale**	**Project**
5205800	2-15-96	3	1" = 1'	Third Creek Monofill Statesville, North Carolina

KIBER ENVIRONMENTAL SERVICES, INC.
FOUR SEASONS ENVIRONMENTAL, INC.
TREATABILITY STUDY PROPOSAL

SCOPE OF WORK

Kiber Environmental Services, Inc. (Kiber) developed the following scope of work in accordance with information provided by Four Seasons Environmental, Inc. (Four Seasons). The following discussions include information on the untreated characterization and treatability testing program.

INTRODUCTION

The treatability study will be conducted on materials contaminated with high concentrations of cadmium. The objective of the treatability study will be to determine the effectiveness of solidification/stabilization for minimizing the leachability of cadmium from soils sampled from the site. Testing will be conducted using a phased approach. The preliminary treatment phase will evaluate a number of reagents and reagent formulations for stabilization treatment of materials sampled from the site. The performance criteria during preliminary treatment evaluations will be leachability of cadmium as measured in the extract produced by the Toxicity Characteristic Leaching Procedure (TCLP). Optimum reagents and reagent formulations developed during the preliminary treatment phase will be further evaluated during a confirmation testing phase.

UNTREATED MATERIAL CHARACTERIZATION

Upon receipt, Kiber will place the materials into refrigerated storage maintained at a temperature of 4 degrees Celsius (°C) until initiation of the treatability testing. Kiber will then homogenize the untreated material to better ensure uniform materials for treatability testing. Homogenization will be conducted on the material after cooling to a temperature of 4 degrees Celsius (°C). Kiber will utilize stainless steel mixing instruments and minimize volatilization of organic compounds through the use of low energy mixing techniques. For bench-scale testing, Kiber will remove all particles larger than 3/8 inches in diameter from each waste material.

After homogenizing the waste material, representative aliquots of the waste will be collected for characterization testing. The establishment of the baseline level of contamination is important for comparing and determining the effectiveness of solidification treatment. The results of the untreated characterization testing will also

allow Kiber to estimate the reagents and reagent concentrations necessary for effective treatment. The following chemical analyses will be conducted on aliquots of each untreated material in accordance with the specified methods:

Total Cadmium	EPA Method 6010
TCLP Cadmium	EPA Methods 1311/6010
Material pH	EPA Method 9045

Geotechnical characterization provides basic information on the handling properties of the contaminated soils. Physical properties are used to prepare cost estimates and design specifications with regard to full-scale treatment, material excavation, transport and storage. The information generated is critical to making sound engineering decisions. The following analyses will be conducted on the untreated treatability sample in accordance with the referenced American Society of Testing and Materials (ASTM) test methods:

Moisture Content	ASTM D 2216
Bulk Unit Weight / Bulk Specific Gravity	ASTM D 5057

Preliminary Treatment Evaluations

Kiber has found that the most effective approach for stabilizing difficult materials is to screen a wide range of treatment reagents and reagent concentrations. Non-proprietary reagents, including Type I Portland cement, cement kiln dust (CKD), pozzolime, blast furnace slag, hydrated lime, fly ash, ferric sulfate, ferrous sulfate, sodium silicate, organophillic clay, and quick lime may be evaluated for treatment of the waste materials. Whenever possible, Kiber will identify reagent suppliers located close to the site. Schedule permitting, samples of these reagents will be obtained prior to initiating the treatability study.

Due to the difficulty associated with treating high concentrations of cadmium, Kiber may also evaluate proprietary reagents for the treatment of the contaminated wastes. Proprietary reagents typically treat contaminants through fixation, a process which chemically alters the contaminants to a form less susceptible to leaching. Proprietary processes evaluated by Kiber include reagents developed by ETUS, Inc. and International Waste Technologies (IWT). In addition, Kiber may evaluate a patented technology developed by RMT, Inc. Note that Kiber has considerable experience evaluating the proprietary and patented reagents developed by these firms. These reagents often provide successful treatment where more traditional reagents have failed. Kiber can evaluate these or any other reagents or processes identified by Four Seasons.

Reagents and reagent addition rates will be selected based on 1) previous bench-scale testing results on the site materials, 2) Kiber's experience treating similar waste materials, 3) the results of the untreated characterization testing, and 4) recommendations from Four Seasons. Kiber requests that the results of any previous bench-scale stabilization studies be provided for review prior to initiation of the treatability study.

The blending process to be implemented for the treatability study is a cost-effective process intended to mimic full-scale stabilization processes as much as possible on the laboratory scale. This laboratory procedure will be modified as necessary to simulate full-scale systems suggested by Four Seasons for application of the stabilization treatment. Specifically, the process is intended to provide Four Seasons with a basis for valid comparison between the different treatment reagents.

Each mixture will be developed by placing aliquots of the untreated material into a blending chamber. To the untreated material, reagent will be added and blended at a rate of approximately 30 to 40 rotations per minute (rpm) until visually homogeneous, approximately 60 to 90 seconds. Water will be added based on 1) Kiber's experience performing full-scale solidification projects, or 2) review of the treatment processes to be implemented during pilot-scale treatment. Typically, Kiber will achieve a treated material with the consistency of a low slump concrete.

The treated materials will be compacted into cylinders and allowed to humid cure for a period of 7 days. During the curing period, Kiber will conduct penetrometer strength testing at cure times of 1, 2, 3 and 7 days. Penetrometer testing is used to estimate the setting and strength properties of the treated materials. A good correlation between unconfined compressive strength and penetrometer testing is often obtained. It is stressed, however, that penetrometer testing only provides an estimate of the strength of the treated materials.

Upon completion of the 7-day cure, aliquots of each mixture will be submitted for TCLP cadmium analyses in accordance with EPA Methods 1311/6010.

CONFIRMATION TREATMENT EVALUATIONS

Confirmation treatment evaluations will be performed to 1) evaluate the potential variability of the stabilization process, and 2) confirm the effectiveness of candidate processes. Kiber and Four Seasons will select two candidate treatment processes for the confirmation treatment evaluations. The candidate mixtures will be developed in general accordance with the procedures outlined for the preliminary evaluations.

Upon completion of the mixture preparation, each treated material will be compacted into molds and allowed to humid cure. Penetrometer evaluations will be performed throughout the curing process, at cure times of 1, 2, 3 and 7 days. Upon completion of the 7 day cure, Kiber will evaluate the volumetric increase due to addition of the treatment reagents. This information is useful for pilot and full-scale cost estimations concerning final waste placement or disposal. The volumetric expansion due to addition of the treatment reagents is performed by compacting a pre-weighed aliquot of soil into a cylindrical sample mold. The volume of the untreated soil is then measured and recorded. Next, the soil is removed from the mold, and treated in accordance with the protocols outlined above. Upon completion of the treatment process, the material is again compacted into the same type of sample mold and allowed to cure. After completion of the 7-day cure, the volume and weight of the treated material is measured and recorded. The percent volumetric expansion or shrinkage is determined based on the following equation: [(Final Volume - Initial Volume) / Initial Volume]*100.

Upon completion of 7 days of curing, each candidate mixture will be subjected to TCLP cadmium analysis in accordance with EPA Methods 1311/6010.