APPENDIX 4-E

CLOSURE AND POST-CLOSURE CARE PLANS FOR THE SURFACE IMPOUNDMENT UNIT AND CERTIFICATION

CLOSURE AND POST-CLOSURE PLANS
FOR THE SURFACE IMPOUNDMENT UNIT

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IC-1 CLOSURE PLAN

IC-1a INTRODUCTION

This plan identifies steps necessary to close the surface impoundment hazardous wastes management unit (settling pond portion of the unit and polishing pond portion of the unit) (hereafter surface impoundment unit) located at the William L Bonnell Company, Inc. (Bonnell) plant in Newnan, Georgia (EPA I.D. No. GAD003273224). The site is shown in Figure IC-1. This plan is submitted in accordance with the applicable requirements of the Georgia Hazardous Waste Management Rule (Georgia Rule) 391-3-11 (40 CFR 264 and 265, which are incorporated in the Georgia Rule by reference). Since the surface impoundment unit is not and will not be a permitted operating landfill, closure would be in accordance with 40 CFR 265. However, since Bonnell proposes to achieve closure by removal in the polishing pond portion of the surface impoundment unit, closure under 40 CFR 264 is proposed. For post closure care, 40 CFR 264 will apply.

IC-1a(1) Closure Performance Standards

The Georgia Rules for closure of surface impoundments incorporate by reference 40 C.F.R. § 264.111 and § 264.228. These performance standards require closure in a manner that minimizes the need for further maintenance; and controls, minimizes, or eliminates, to the extent necessary to protect human health and the environmen, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere; and complies with the closure requirements of § 264.228. In addition,

§ 264.228 provides for two closure methods. The first method requires the owner or operator to remove or decontaminate all waste residues, contaminated containment system components, contaminated subsoils, and structures and equipment contaminated with waste and leachate, and manage them as hazardous waste unless 40 CFR 261.3 applies. The second method requires the owner or operator to dewater and stabilize the wastes, and then cover the wastes with a low-permeability cap. As long as the method for closure is fully protective of human health and the environment, the Rules allow closure using a combination of these methods.

IC-1b PARTIAL CLOSURE AND FINAL ACTIVITIES

IC-1b(1) Primary Closure

Closure will be accomplished in several steps. First, all the sludge from the settling pond portion of the unit will be moved to the polishing pond portion of the unit. During this procedure and during dewatering, the surface impoundment unit (i.e., the settling pond portion and polishing pond portion of the unit) sludges will remain within the lateral boundaries of the surface impoundment unit. Since the surface impoundment unit is only one unit and the movement of the sludges that will occur do not constitute removal, the sludges can be moved from one pond to another and dewatered without violating the 40 CFR 268 land disposal restrictions.

Closure of the surface impoundment unit may involve the use of equipment to process or dewater the sludge. The equipment will be placed within the unit. The sludge will be moved through the equipment and repositioned in the unit. The sludge will not be moved outside the unit.

Next, the bottom sediments in the settling pond of the unit will be stabilized. After this operation is completed, the sludge in the polishing pond, including the sludge that was previously pumped from settling pond, will be dewatered. The dewatered sludge will be stabilized and moved to the settling pond, all within the lateral boundaries of the surface impoundment unit (i.e., without removal from the unit).

Next, the bottom sediments in the polishing pond will be moved to the settling pond. The bottom sediments will be stabilized. The bottom of the polishing pond will be visually inspected to determine that all wastes and waste residues have been moved to the settling pond. If any wastes or waste residues are observed, they will be moved to the settling pond. The area will again be visually inspected for waste and waste residues.

When no waste or waste residues remain, the soils will be tested to ensure compliance with § 264.228(a)(1). See Section IC-1f(3) for a discussion of the testing program.

Finally the dewatered sludge, bottom sediments, and soils moved to the settling pond will be capped with a low permeability cap system. The system will consist of six inches of subgrade overlain with high density polyethylene (HDPE). A geonet/drainage net layer, with the geonet on the bottom, will be placed on top of the HDPE. Next, geonet will be placed on top of the geonet/drainage layer. Two feet of topsoil will be placed on top of the final geonet layer, and will be seeded and fertilized. Surface run-on/run-off controls will be provided for the entire capped area. The final capped hazardous waste management unit is shown in Figure IC-2.

IC-1b(2) Contingent Closure Approach

As required by the Rules, Bonnell has prepared a contingent closure approach. If all the wastes cannot be removed from the polishing pond portion of the surface impoundment unit, the polishing pond will be capped in the manner described above (i.e., six-inch subgrade/HDPE/geonet-drainage net/geonet/topsoil/vegetative cover system). The total area covered under this contingent plan will be the limit of the surface impoundment unit (i.e., settling pond portion of the unit and polishing pond portion of the unit), as shown in Figure IC-3.

IC-1b(3) Meeting the Closure Performance Standards

This closure plan is designed so that the surface impoundment unit will require only minimal maintenance or controls, potential threats to human health and the environment will be minimized, and escape of hazardous waste to the ground, groundwater, surface waters, or the atmosphere will be avoided. To accomplish this, the closure plan consists of the following:

1. sludge dewatering, stabilization, and consolidation;
2. soil sampling and analysis;
3. cover construction, including run-off and run-on control;
4. removal and disposal of contaminated materials generated during the closure of the site; and
5. decontamination of equipment.

IC-1c MAXIMUM WASTE INVENTORY

The maximum waste inventory for the surface impoundment unit is derived by adding the maximum waste inventory of the settling pond to the maximum waste inventory of the polishing pond. All the wastes in the unit are F019 sludge (wastewater treatment sludges from the chemical conversion coating of aluminum). The listing constituents of F019 sludge are hexavalent chromium and cyanide (complexed). It should be noted that chromium is the only F019 constituent present in the sludge. The chemicals used at the Bonnell facility do not contain nor does the process generate any cyanides as verified by previous tests performed on sludge samples. The results of these tests were provided to the U.S. EPA Region IV by letter dated December 5, 1980 to Mr. Myles Morse, Hazardous and Industrial Waste Division (WH-565), Waste Characterization Branch. A copy of the letter is included as Appendix IC-A.

IC-1c(1) Settling Pond Portion of the Unit

Calculation of the approximate volume of sludge in the settling pond was performed using depth measurements to the supernatant/sludge interface and the sludge/soil interface obtained at various locations on September 10, 1990. Based on these data, the total volume was calculated to be approximately 9200 cubic yards.

The sludge contains an estimated 4.5 to 6.5 percent solids by weight, determined from sludge samples collected June 28, 1990. Therefore, the total weight of sludge was estimated to be approximately 465 tons (dry basis).

IC-1c(2) Polishing Pond Portion

In July of 1986, a survey of the polishing pond was performed by Jordan, Jones & Goulding of Atlanta, Georgia. The survey report states that, of the total polishing pond capacity of 100,000 cubic yards, 68,300 cubic yards is occupied by sludge. This material accumulated over an eighteen year period, resulting in an average accumulation rate of approximately 3,800 cubic yards per year. Following the survey, major improvements were made in the wastewater treatment system that reduced the rate of sludge accumulation. Based on Bonnell's experience and equipment upgrades in 1986 and 1987, the annual influent rate was determined to be reduced by an estimated 75 percent. The new accumulation rate became approximately 950 cubic yards per year. Based on this data, the total volume of sludge currently in the polishing pond is calculated to be approximately 72,100 cubic yards.

The sludge contains an estimated three to five percent total dry solids, determined from sludge samples collected July 2-5, 1990. Assuming an average of four percent solids, the estimated dry weight of the sludge is 2,500 tons. Based on a unit weight of 65 pounds per cubic foot, the total weight of sludge is approximately 63,300 wet tons.

IC-1c(3) Total Inventory

The maximum waste inventory for the surface impoundment unit is the sum of the maximum waste inventory of the settling pond and the maximum waste inventory of the polishing pond. Therefore, the maximum waste inventory for the surface impoundment unit is 9200 cubic yards plus 72,100 cubic yards, or 81,300 cubic yards. On a dry weight basis, the total weight of sludge is estimated to be approximately 465 tons plus 2,500 tons, or 2,965 dry tons.

IC-1d SCHEDULE OF CLOSURE AND CERTIFICATION

In accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.112(b)(6)), a schedule for each closure activity has been provided as Figure IC-2 for the primary closure alternative. As indicated on the schedule, completion of closure is expected to require approximately 44 months. Bonnell recognizes that this schedule exceeds the regulatory limit of 180 days established in Georgia Rule 391-3-11-.10 (40 CFR 264.113(b)) following initiation of closure activities. The time required to dewater the sludge will extend beyond the regulatory limit of 90 days as per Georgia Rule 391-3-11-.10 (40 CFR 264.113(a)). In accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.113(b)(1)(i)), Bonnell requests approval by EPD to extend the dewatering period and the closure period to 44 months because the closure period will, of necessity, take longer than 180 days to complete. Bonnell will also take all necessary steps to prevent any threat to human health and the environment.

As indicated on Figure IC-2, the closure item requiring the greatest time to complete is the sludge dewatering. The 44-month schedule has been developed based on past experience that Bonnell has gained in dewatering AlOH sludge at this and other facilities. Although the sludge in the surface impoundment is F019, Bonnell's experience with AlOH sludge is applicable to this closure. This schedule has been based on a eight-hour per day work schedule over a five-day work week. Dredging is limited to eight-hour work days for safety reasons. This schedule assumes that the filter presses complete their cycles after the eight-hour shift has ended. The presses will then operate for 12 to 16 hours per day. Bonnell will continue to assess alternative methods to dewater the sludge and/or accelerate the dewatering process in a cost-effective manner. Any modifications to the approved closure plan will be done in accordance with 40 CFR 264.112(c).

The certification of closure will be submitted via registered mail to the Georgia EPD Director within 60 days after completion of closure in accordance with the approved closure plan as per Georgia Rule 391-3-11-.10 (40 CFR 264.115). This certification will be signed by both Bonnell and an independent registered professional engineer. Documentation supporting the engineer's certification will be available to Georgia EPD upon request and will be maintained until Bonnell is released from financial assurance requirements.

Within 60 days after certification of closure, Bonnell will record a notation on the deed to the property as per Georgia Rule 391-3-11-.10 (40 CFR 264.119(b)(1)). The notation on the deed to the property will include:

1. that the surface impoundment unit has been used to manage hazardous wastes;
2. that its use is restricted under Georgia Rule 391-3-11-.10 (40 CFR 264 Subpart G regulations, 264.117(c)); and
3. that a survey plat and record of the type, location, and quantity of the wastes which have been stored there as required under Georgia Rule 391-3-11-.10 (40 CFR 264.116 and 264.119(a)), respectively, has been filed with the local zoning authority and with the Georgia EPD.

Bonnell will submit a certification of notice that the notation specified in 40 CFR 264.119(b)(1) has been recorded in accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.119(b)(2)) to the Director of Georgia EPD.

IC-1e CLOSURE PROCEDURES

During closure of the surface impoundment unit, access control devices (fences, gates, etc.) will be maintained to prevent unauthorized access by non-Bonnell employees.

Bonnell proposes to close the surface impoundment unit by consolidating and capping the sludge and contaminated sediments from the surface impoundment unit into the settling pond portion of the unit. Bonnell proposes to remove all wastes from the polishing pond portion of the unit. Closure will be accomplished in several steps as described below.

The cover system, described in Section IC-1e(6), was modeled using the U.S. EPA Hydrologic Evaluation of Landfill Performance (HELP) program utilizing the approximate slope and cover area for the primary cover plan and contingent (full cover) plan. A copy of each HELP model input and output for the primary closure is included as Appendix IC-B. A copy of each HELP model input and output for the contingent closure is included as Appendix IC-C. Details of closure activities are provided in the following sections of this plan.

As a first step to closing the surface impoundment, Bonnell will construct run-on diversion ditches to ensure that run-on to the unit does not occur. These run-on ditches may be revised after completion of construction of the surface impoundment cap to ensure proper drainage patterns consistent with final cover elevations.

IC-1e(1) Detailed Design and Bidding

Upon final approval of the closure plan by Georgia EPD, preparation of performance specifications will be initiated, which will allow Bonnell to obtain competitive bids for construction of the surface impoundment unit cover and run-on/off control ditch system. The performance specifications will include run-on/run-off control details for use during construction, sludge dewatering performance specifics, and installation details for the HDPE cap system. Final detailed design will be developed after all sludge has been moved to the settling pond. The closure activities will be initiated upon approval of the closure plan by EPD.

IC-1e(2) Movement of Settling Pond Sludges to Polishing Pond

All the sludge from the settling pond will be moved to the polishing pond. During this procedure, the sludges will remain within the lateral boundaries of the surface impoundment unit.

IC-1e(3) Stabilization of Sediments in Bottom of Settling Pond Portion of Surface Impoundment Unit

The bottom sediments in the settling pond portion of the unit will be stabilized. This will ensure that the wastes left in place will not migrate and that the materials will support the cover.

IC-1e(4) Sludge Dewatering

The sludge in the polishing pond (including the sludge moved from the settling pond) will be pumped to a filter press system and dewatered. The dewatered sludge will be stabilized and moved to the settling pond, all within the lateral boundaries of the surface impoundment unit (i.e., without removal from the unit).

For purposes of this closure plan, it has been assumed that two 100 cubic foot presses will be used to dewater the sludge. The presses will be located within the surface impoundment boundary.

A pilot study will be performed prior to sludge removal in order to determine existing sludge parameters and predict final dewater cake parameters. The pilot study will be designed to produce the following information for planning and executing the closure activities:

1. percent solids and unit weight of raw sludge,
2. percent solids and unit weight of filter cake,
3. estimate of production rate of filter press for predicting duration of filter press operations during closure as well as final cost estimates,
4. estimate of total quantities of effluent and filter cake to be produced during closure, and
5. determine volumes of additives necessary for sludge stabilization.

During the pilot study, excess effluent and filter cake from the trial run (amounts in excess of the quantities needed for analyses) will remain in the surface impoundment unit. More than one trial run may be needed to evaluate the range of sludge properties in the surface impoundment unit. To avoid triggering the RCRA Land

Disposal Restrictions, sludge dewatering equipment will remain within the surface impoundment unit boundary as shown on Figures IC-3 (primary closure) and IC-4 (contingent closure), during dewatering activities. Filter press effluent, sludge, or filter cake will not be placed outside the surface impoundment unit boundary. The impoundment dike will be utilized for equipment setup and access.

During the full scale filter press operations, the filter press effluent will remain within the surface impoundment unit until dredging operations are completed. Upon completion of the filter pressing activities or at intermediate stages as necessary for dredging, the impoundment water will be discharged through the NPDES-permitted outfall. A copy of this permit is included in Appendix IC-D. Water samples will be collected and analyzed to verify compliance with the NPDES permit limits.

When the filter pressing and impoundment drainage activities are completed, the remaining sludge and sludge residue not easily filter pressed will be stabilized in accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.228(a)(2)). Stabilization will be accomplished by adding a stabilization agent such as cement, cement kiln dust, fly ash, or a proprietary agent. As shown in Section C-6 and Table C-3, the chromium in the surface impoundment is in the trivalent state. Therefore, stabalization of the sludge with respect to metals leaching should be easy to accomplish.

After stabilization, the remaining sludge residue located in the polishing pond will be removed using earth-moving equipment and placed in lifts into the settling pond portion of the surface impoundment unit.

All sludge and sludge residue placed in the settling pond will be placed in six-inch compacted lifts. Compaction tests for sludges will be performed in accordance with ASTM D558-82, which determines the relationship between the moisture content and density of the stabalized sludge. A paint filter test will also be performed to determine the presence of free liquids in the stabalized sludge.

IC-1e(5) Polishing Pond Soil Sampling and Analysis

The Material Safety Data Sheets (MSDSs) for chemicals used at the Bonnell facility, included as Appendix IC-E, have been compared to the Appendix VIII list of hazardous constituents. In July 1990, Bonnell analyzed samples for the list of constituents presented in Table IC-1. The surface impoundment unit sludge was tested for all 70 listed constituents. Based on this analysis, a total of five metals and five organic compounds were detected in the sludge. These constituents, along with the range of concentrations detected, are summarized on Table IC-2.

Once the filter cake and stabilized bottom soil/sludge have been consolidated in the settling pond, the polishing pond (including the pond bottom and interior dike walls) will be sampled and analyzed.

The sampling locations will be based on establishment of a grid approximately 100 feet by 100 feet. These samples will be analyzed using EPA methods for the Appendix VIII constituents listed in Table IC-2. The complete sampling and analysis plan, the determination of background concentrations, and the method of comparing pond bottom concetrations to the background concentrations are presented in Appendix IC-F. EPD may decide to use the guidelines contained in the U.S. EPA Region IV clean closure equivalency document submitted to EPD in a letter to Jennifer Kaduck from James H. Scarborough dated February 20, 1991, for closure standards in lieu of background.

Pond bottom and dike sidewall soils that contain hazardous constituents at concentrations that are not statistically characteristic of background, as discussed in Appendix IC-F, will be placed in the settling pond or capped in place. If additional soil is excavated, confirmation sampling and analyses will be performed. A plan view of the surface impoundment unit primary cover is shown on Figure IC-3.

A contingent option has also been included as part of this closure plan. This plan consists of the cap extending over the complete surface impoundment unit area. If the primary closure plan is determined to be impractical after soil sampling and analyses, then the contingent option will be utilized. A plan view of the surface impoundment unit contingent (full) cover is shown on Figure IC-4.

IC-1e(6) Backfill and Cover

The area within the surface impoundment unit to be covered will be backfilled after the filter cake has been placed into the impoundment. Clean off-site soils (i.e., commercially available fill soil free of stumps and other foreign material) and that portion of the impoundment dike above the subgrade elevation will be placed in lifts and compacted in place prior to placement of the final cover. The filter cake and backfill soils support of vehicular traffic during placement and compaction will confirm its strength to support the impoundment cover.

The surface impoundment unit cover will consist of several layers. The cover layers from top to bottom will consist of two feet of a vegetative soil, a geofabric layer, a geofabric/geonet drainage layer (with the geofabric on bottom), a 40-mil high density polyethylene (HDPE) liner, and a clayey soil subgrade. A schematic of the cover is shown on Figure IC-5.

Prior to placement of the HDPE membrane, the surface of the surface impoundment unit will be prepared. The subgrade preparation will include removal of material (e.g., rocks and sticks) that could damage the membrane along with placement of a subgrade soil layer. The minimum depth of the subgrade soils will be six inches of compacted clay with a Unified Soil Classification of CL including a compacted hydraulic conductivity on the order of 3×10^{-6} cm/sec.. Material type will be determined in accordance with ASTM D2487-90, Standard Test Method for Classification of Soils for Engineering Purposes.

In order to achieve final grades, the subgrade will exceed six inches in the settling pond and most of the polishing pond. However, in case the subgrade layer is only six inches thick, the following steps will be followed to ensure the integrity of the subgrade soil layer:

1. The subgrade soil material will be adjusted to a moisture content between two and six percentage points over the optimum moisture content as determined by ASTM D-698-91, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.
2. The subgrade soil will be compacted to a density equal to or greater than 92 percent of the material's maximum dry density according to ASTM D-698-91, Test Method for

density according to ASTM D-698-91, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.

3. After compaction, the subgrade soil layer will be maintained at the moisture content at the time of compaction or higher during the period prior to placement of a temporary protective liner. The temporary liner will be a thin film plastic material to be disposed of prior to placement of the HDPE. The thin plastic film will be disposed of as non-hazardous material since it will not be in contact with waste layers.

The barrier portion of the cover will consist of a 40-mil HDPE membrane that will meet or exceed the U.S. EPA recommend design of 1×10^{-7} cm/sec for a barrier system. HDPE has been shown to have a permeability of 4.5×10^{-10} cm/sec.

On October 3, 1990, an insitu hydraulic conductivity test was conducted for monitoring wells 16S and 16D, installed near the surface impoundment unit. Monitoring well locations are shown on Figure IC-1. The test was utilized to determine the permeability of the surrounding soils. As shown on Table IC-3, the permeability of the soils range from 1.71×10^{-5} cm/sec to 1.36×10^{-3} cm/sec. Hence, the surface impoundment unit cover will have a permeability less than the natural subsoils present as per Georgia Rule 391-3-11-.10 (40 CFR 264.228(a)(2)). The manufacturers' literature summarizing physical properties of HDPE and the manufacturers'installation quality assurrance/quality control specifications are included in Appendix IC-g. The boring log for monitoring well 16D are included as Appendix IC-H.

The membrane layer will be overlain by a drainage layer consisting of a geonet having a coefficient of permeability equal to or lateral drainage medium within the cover. A filter fabric will be placed over the geonet to reduce the potential of silt entering and clogging the drainage layer. The geonet will convey infiltration from the vegetative soil layer to drainage collection pipes, as shown in the schematic diagram of Figure IC-5. The collection pipes will be located along the two downgradient sides of the capped area. At the southern side of the cap, the collected drainage will flow by gravity and discharge to an existing ditch as shown on Figure IC-3 (primary closure) and Figure IC-4 (contingent closure).

The upper filter fabric will be overlain by 24 inches of soil with a Unified Soil Classification of SM or an equivalent soil capable of supporting vegetation. The lower 18 inches will be compacted to at least 92 percent of the material's maximum dry density (ASTM D-698). The upper six inches will be disked in preparation for seeding. Following grading, the vegetative layer will be fertilized and seeded to minimize erosion.

In order to confirm that the subgrade and lower 18 inches of vegetative soil meet the compaction requirements, field density tests will be performed using method ASTM D-2937, Density of Soil in Place by the Drive-Cylinder Method. At least one test will be made for each six-inch lift and for each 5000 square feet or 100 cubic yards of vegetative or subgrade soil placed. Soil not meeting density requirements will be scarified, re-compacted and re-tested.

In addition to construction of the cover system, run-on control ditches will be constructed along the northern boundary of the surface impoundment unit. These ditches will be sized to convey run-on and run-off to the cover generated by the 24-hour, 25-year storm as determined by U.S. Weather Bureau Technical Paper No. 40.

The approximate location of the ditches is shown on Figure IC-3 (primary closure) and Figure IC-4 (contingent closure). Copies of the ditch sizing calculations are included in Appendix IC-I.

IC-1e(7) Design Considerations

a. Settlement: The filter cake and backfill soils will be placed in a series of compacted lifts. Also, there will be no substantial overburden to the soil. Therefore, any settlement will not be significant.

b. Erosion Potential: Analysis of the primary final grading plan of the surface impoundment unit shows that an erosion of less than 0.09 tons per acre could occur each year. This value is small enough to be considered insignificant. The soil loss calculation considered a maximum cover slope of 2.5 percent and indicates that significant erosion should not occur.

In addition, analysis of the contingent final grading plan shows that an erosion of less than 0.14 tons per acre could occur each year. This value is also considered insignificant. The soil loss calculation considered the cover slope of 3.0 percent and indicates that significant erosion should not occur. Copies of these calculations are included in Appendix IC-J.

c. Drainage: Storm water run-on and run-off will be controlled by the construction of diversion ditches designed to contain the water volume resulting from a 24-hour, 25-year storm. In addition to the control ditches, the run-off will be controlled through maintenance of the grassed condition of the cover surface. The uncapped area of the surface impoundment unit will be graded to prevent ponding of surface water.

During closure, temporary run-on diversion ditches may be required. Bonnell will construct these ditches as necessary to prevent run-on to the surface impoundment.

d. <u>Geosynthetic Materials</u>: Geosynthetic materials used in the primary and contingent cover construction include a 40-mil HDPE membrane, geonet, and filter fabric. The membrane will be placed over the subgrade soil layer to reduce the potential for infiltration into the closed surface impoundment. The filter fabric will separate the geonet from the vegetative layer, inhibiting the finer soil particles in the vegetative layer from clogging the drainage layer. Stability assessment calculations for the geocomposite cover system of each closure option are included as Appendix IC-K.

e. <u>Leak Detection and Leachate Collection Systems</u>: Since the surface impoundment unit is not and will not be a permitted operating landfill, leak detection and leachate collection systems are not required for closure. Thus, there is no clay liner or synthetic liner system to serve as a barrier or to collect and remove leachate from the surface impoundment unit. The cover system has been designed to restrict percolation into the underlying sludge/soil in accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.228(a)(2)).

f. <u>Prevention of Airborne Contaminant Release</u>: As discussed previously, the main constituent of concern at this facility is chromium. Possible airborne exposure to chromium could occur from dust that may be created during sludge removal and filter pressing and filter cake placement into the surface impoundment unit. Construction activities will be closely monitored for fugitive dust releases and actions taken, as necessary, to restrict airborne releases. Such actions might include the limited addition of water to minimize dust generation.

g. Other Considerations: As discussed previously, the closure plan and contingent plan cover systems have been modelled using the U.S. EPA HELP computer program. This program is used to predict the movement of surface water (from precipitation) throughout the cover system. The model considers run-off, evapotranspiration and lateral drainage as the mechanism for reducing the amount of percolation that penetrates the cover and moves into the waste. The model also predicts that for all rainfall events including peak rainfall events, no vertical percolation into the F019 waste is expected to occur in either the primary or contingent cover system.

The climatological conditions for the Bonnell facility in Newnan, Georgia were characterized by using synthetically generated rainfall, temperature and solar radiation data for Atlanta, Georgia for a 20-year period. Appendices IC-B and IC-C present the HELP model input and output for the primary closure plan and contingent closure plan cover systems for surface impoundment unit.

Input values for the various soil physics parameters were selected from the default data base contained within the

HELP model, as shown on Table IC-4. Fine sandy loam (No. 7, Unified Soil Classification - SM) values were used to describe layer 1, the vegetative soil layer. The specific characteristics of the vegetative soil layer have little effect on the amount of percolation through the unit cover. The purpose of the vegetative soil layer is to support vegetation and to provide a medium for evapotranspiration.

The input parameters that describe layer 2, the lateral drainage layer, were recommended by the author/developer of the HELP model, Dr. Paul Schroeder of the Waterways Experiment Station, U.S. Army Corps of Engineers, Vicksburg, Mississippi. Clay loam (No. 11, Unified Soil Classification - CL) values were used to describe layer 3, barrier soil liner with flexible membrane, a compacted layer. When compaction is specified such as in layer 3, the soil characteristics are automatically adjusted as follows: (1) the saturated hydraulic conductivity is reduced by a factor of 20, (2) the porosity is reduced by 25 percent, (3) the field capacity is reduced by 25 percent of the difference between uncompacted field capacity and wilting point and (4) the evaporation coefficient is assigned the minimum value of 3.3. Layer 3 contains a HDPE membrane which the model assumes is impermeable except for possible leaks. Therefore, a leakage fraction of 0.0001, as recommended by Dr. Paul Schroeder assuming installation with good QA/QC procedures, was entered to characterize the potential leaks in the HDPE membrane.

HELP model input values such as the maximum leaf area index (2.00) and evaporative zone depth (22.00 inches) are default values for fair grass in Atlanta, Georgia.

IC-1e(8) Rainwater Collection and Treatment During Closure

After sludge dewatering and bottom sediment stabalization are complete and during the soil sampling and final grade design periods, rainwater falling onto the surface impoundment will be collected and pumped through the

IC-1e(9) Extensions for Closure

As closure progresses, the Georgia EPD will be notified at least 30 days prior to expiration of the 90-day and 180-day periods in accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.113(c)(1) and (2)) and an extension to the schedule to reflect the additional time required will be requested under Georgia Rule 391-3-11-.10 (40 CFR 264.113(a)(1) and (b)(1)).

IC-1e(10) Groundwater Monitoring

During closure, groundwater monitoring activities will be performed as described in Sections E-5 and E-8 of the Part B Permit Application.

IC-1f DECONTAMINATION OF EQUIPMENT

Equipment or materials (including earth-moving vehicles, filter presses, and pipes and process equipment that have been in contact with hazardous wastes during this closure of the surface impoundment unit) will be decontaminated, as per Georgia Rule 391-3-11-.10 (40 CFR 264.112(b)(4) and 264.114), or will be disposed as a hazardous waste. The decontamination will be completed by triple rinsing using a low-volume pressure water wash and visual determination that all soil has been removed. Additional rinsing as needed, based on visual inspections of the equipment, will be implemented in order to ensure that all contaminants have been removed. A list of these equipment items that may become contaminated during closure activities is provided in Table IC-5.

A decontamination station, shown on Figure IC-6, will be constructed at the location shown on Figure IC-3 (primary) or Figure IC-4 (contingent). This station will contain the rinse water used in cleaning equipment. At the end of closure activities, the station will be pressure washed. The rinse water will be pumped through the carbon adsorption treatment units for treatment and disposal through the NPDES-permitted outfall. Soils that are collected in the decontamination tank that cannot be pumped through the treatment system will be disposed as a hazardous waste (F019). Material that cannot be easily decontaminated (e.g. protective clothing) will be bulk-loaded and shipped to an Interim Status or approved facility for disposal as hazardous waste.

A Safety Plan will be developed prior to initiating closure activities. This plan will be prepared and followed so that individuals participating in the closure are knowledgeable of potential dangers and take specific safety precautions. Only qualified personnel will participate in the closure activities.

surface impound closure / SPB

IC-2 POST-CLOSURE PLAN

IC-2a POST-CLOSURE ACTIVITIES

This Post-Closure Plan describes in general, the activities that will be performed to monitor the surface impoundment unit throughout the post-closure care period in accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.117-119 and 264.310). Property use during post-closure care will be restricted in accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.117(c)). The post-closure care period may be shortened or extended by the Georgia EPD under Georgia Rule 391-3-11-.10 (40 CFR 264.117(a)(2)).

The post-closure certification will be submitted via registered mail to the Georgia EPD Director within 60 days after completion of post-closure care period in accordance with the approved post-closure plan as per Georgia Rule 391-3-11-.10 (40 CFR 264.120). This certification will be signed by both Bonnell and an independent registered professional engineer. Documentation supporting the engineer's certification will be available to Georgia EPD upon request and will be maintained until Bonnell is released from financial assurance requirements.

During plant operation, the Technical Director of Bonnell will be responsible for retaining and updating the on-site copy of the post-closure plan. In accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.118(b)(3)), the following representative can be contacted concerning the post-closure activities of the facilities at the plant:

Mr. Mr. Terry D. Snell, P.E.
Environmental Manager
William L Bonnell Company, Inc.
25 Bonnell Street
Newnan, Georgia 30263

mailing address: P.O. Box 428
Newnan, Georgia 30264

phone number: (404) 253-2020

IC-2a(1) Groundwater Monitoring

Groundwater monitoring activities will be performed as described in Section E. The monitoring system, along with the sampling and analysis plan procedures, will be continued for the 30 year post-closure period or until Bonnell receives notification from the Georgia EPD of approval to discontinue monitoring.

IC-2a(2) Unsaturated Zone Monitoring Program

Since the surface impoundment unit will be closed by placement of a low permeability cap, unsaturated zone monitoring is not applicable.

IC-2a(3) Leachate Collection, Detection, and Removal Systems

As discussed in Section IC-1e(7), the surface impoundment unit was constructed prior to the regulatory requirement for such a system. Therefore, this section is not applicable.

IC-2a(4) Run-On/Run-Off Control System

Surface water run-on will be controlled by perimeter diversion ditches, designed to intercept and control the 25-year, 24-hour storm as determined by U.S. Weather Bureau Technical Paper No. 40. As discussed in Section IC-1e(7), the surface water run-off will be controlled by establishing and maintaining a vegetative (grass) cover over the backfilled impoundment to reduce surface water velocity and erosion. In addition, the ground surface will be sloped at an average grade of 2.5 percent in the primary plan and 3.0 percent in the contingent plan to further reduce the potential for erosion and soil loss.

IC-2a(5) Gas Venting System

As discussed previously, the main constituent of concern at this facility is chromium which does not generate gases. Therefore, the need for a gas venting system is not anticipated.

IC-2a(6) Inspection Program

The closed surface impoundment unit will be monitored and maintained throughout the post-closure period by regular inspections and groundwater monitoring as per Georgia Rule 391-3-11-.10 (40 CFR 264.118(b)(1) and (2)). Inspection items include:

1. cover and surrounding area,
2. groundwater monitoring wells,
3. run-on diversion ditches, and
4. permanent benchmarks.

Inspections will be made by Bonnell personnel trained for such purposes, on a quarterly basis and after major storm events to ascertain the condition of the cover and surrounding area. This inspection schedule is intended to insure proper monitoring of the closed unit. An inspection checklist has been included as Table IC-6. The purpose of this checklist is to assist the inspector in noticing particular items during the facility inspections including ground cover maintenance. Comments will include ground cover maintenance and any barrier repairs. The following sections describe the general procedures which will be followed during the post-closure care period.

Inspection and monitoring will continue for the 30-year post-closure period or until Bonnell receives approval from the Georgia EPD to discontinue the program. Inspection records will be kept at the Bonnell facility for a period of 5 years after the end of the post-closure care period.

IC-2a(7) Maintenance Activities

This section addresses maintenance of the closed surface impoundment unit as per Georgia Rule 391-3-11-.10 (40 CFR 265.228(b)) in the following areas:

1. Maintenance and Repair of the Final Cover: The cover will be inspected quarterly throughout the post-closure care period. Inspections will include checks for consistency of the soil cover, erosion, stability of the lower embankment, settlement, condition of the vegetation, and any other element of the system which may adversely affect the performance of the cover.

2. Run-on/off Control System: The run-on ditches and diversion structures will be inspected quarterly and after all major storm events to check for proper flow capacity and discharge. Ditches will be repaired and/or seeded as necessary to maintain grass cover and integrity.

3. Groundwater Monitoring System: Groundwater monitoring wells will be inspected quarterly to verify that accessible parts of the wells including the outer casing and cap, lock, apron, inner casing and cap, measuring point, and well identification number are maintained.

4. Security Control Devices: All access to the closed surface impoundment unit will be controlled by fences surrounding the Bonnell site. These fences will be repaired or replaced as necessary. These fences will be inspected at least quarterly and an inspection log will be completed. The inspection log is included as Figure IC-7.

5. Vegetative Cover: The surficial cover and perimeter run-on diversion ditch will be grassed. Fertilizer and seed will be applied as needed to assure continuous grass cover as a deterrent to erosion. Fertilizer will be applied a minimum of once a year.

   Post-closure care will include mowing the grass of the surface impoundment unit at least four times per year. Clippings will be left in place to provide nutrients and organic matter and to promote erosion control.

Also during post-closure, supplemental water will be applied as needed during dry weather to maintain the vegetative cover and help control wind erosion. Irrigation will be scheduled based on observations made during field inspections.

During post-closure care, Bonnell will inspect the grass cover quarterly and after major rainfall events. Inspections will be logged, and reports will be retained by Bonnell. The inspections will check for erosion, vegetative distress due to insect infestation or drought, or other factors which may adversely affect the vegetative cover.

6. Additional Considerations: The cover drainage system will be checked during inspections to assure that no ponding of water occurs on the surface of the cover. A list of equipment requirements necessary for the above maintenance activities is presented on Table IC-7.

IC-2a(8) Person Responsible for Post-Closure Care

The person responsible for storage and updating the facility copy of post-closure plan during post-closure period will be Mr. Terry D. Snell, Manager of Environmental, as identified in Section IC-2a.

IC-2a(9) Demonstration of Security at the Site

The plant site is monitored by security guards 24 hours per day, 365 days per year. Signs will be posted that read "DANGER - UNAUTHORIZED PERSONNEL KEEP OUT." The monitoring wells have been provided with locks to maintain the security of the individual monitoring wells.

IC-3 NOTICE IN DEED AND NOTICE TO LAND AUTHORITY

In conjunction with the closure certification, Bonnell will submit to the local zoning authority and to the Director of Georgia EPD, a survey plat indicating the location and dimensions of the closed surface impoundment unit. This plat will be prepared and certified by a professional land surveyor. The plat will be filed with the local zoning authority and will contain a note, prominently displayed, which states the owner's obligation to restrict disturbance of the unit as specified in Georgia Rule 391-3-11-.10 (40 CFR 264.116).

Within 60 days after certification of closure, Bonnell will record a notation on the deed to the property as per Georgia Rule 391-3-11-.10 (40 CFR 264.119(b)(1)). The notation on the deed to the property will include: (1) that the surface impoundment unit has been used to manage hazardous wastes, (2) that its use is restricted under Georgia Rule 391-3-11-.10 (40 CFR 264 Subpart G regulations, 264.117(c)), (3) that a survey plat and record of the type, location and quantity of the wastes which have been stored there as required under Georgia Rule 391-3-11-.10 (40 CFR 264.116 and 264.119(a)), respectively, has been filed with the local zoning authority and with the Georgia EPD. Bonnell will submit a certification of notice that the notation specified in 40 CFR 264.119(b)(1) has been recorded in accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.119(b)(2)) to the Director of Georgia EPD.

IC-4 CLOSURE COST ESTIMATE

The closure cost information presented is submitted in accordance with requirements of Georgia Rule 391-3-11-.10 (40 CFR 264.142 and 264.143). An estimated $1,147,000 will be needed to close the surface impoundment unit under the primary closure alternative. The closure costs for the area are presented by activity in Table IC-8. In addition, a contingent closure cost estimate of $1,450,000 will be needed to close the surface impoundment unit utilizing a full cover system if necessary as shown on Table IC-9.

These closure cost estimates will be kept on file by Bonnell. Until closure is completed, this estimate will be adjusted annually for inflation within 30 days after close of Bonnell's fiscal year in accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.142(b)). Whenever a change in the closure plan affects the cost of closure, the cost estimate will be adjusted within 30 days after the revision to the closure plan in accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.142(c)).

IC-5 POST-CLOSURE COST ESTIMATE

The post-closure cost information presented is submitted in accordance with requirements of Georgia Rule 391-3-11-.10 (40 CFR 264.144). The post-closure costs for primary closure are presented by activity in Table IC-10. For primary closure, an estimated $8,664 per year will be needed for post-closure inspections and maintenance procedures over the post-closure care period, for a total cost of $260,000. In addition, $5,040 per year is included for volatile organics plume monitoring for fourteen years, for a total of $71,000. Therefore, the total post-closure care costs presented in Table IC-10 are $331,000.

The post-closure costs for contingent closure are presented by activity in Table IC-11. For contingent closure, an estimated $15,000 per year will be needed for post-closure inspections and maintenance procedures over the post-closure care period, for a total cost of $450,000. In addition, $5,040 per year is included for volatile organics plume monitoring for fourteen years, for a total of $71,000. Therefore, the total post-closure care costs presented in Table IC-11 are $521,000.

This post-closure cost estimate will be kept on file by Bonnell. The cost estimate will be adjusted for inflation annually within 30 days after the close of Bonnell's fiscal year in accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.144(b). Whenever a change in the post-closure plan affects the cost of post closure, the cost estimate will be adjusted within 30 days after the revision to the post-closure plan in accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.144(c)).

IC-6 FINANCIAL ASSURANCE FOR CLOSURE/POST-CLOSURE AND LIABILITY COVERAGE

The documentation required to demonstrate financial assurance for closure and post-closure is included in Appendix IC-L. The documentation follows Georgia Rule 391-3-11-.05 (40 CFR 264.143, 264.145, and 264.147).

IC-7 FINANCIAL ASSURANCE MECHANISM FOR SUDDEN/NON-SUDDEN ACCIDENTAL OCCURRENCES

The documentation required to demonstrate financial assurance under Georgia Rule 391-3-11-.05 (40 CFR 264.147), for sudden and non-sudden accidental occurrences, is included in Appendix IC-L. The documentation reflects liability coverage in the amount of $4 million per occurrence and an $8 million annual aggregate.

M:\BONNELL\IC-1

LEGEND:

22D: "D" DEEP MONITORING WELL (SCREEN GERNEALLY INSTALLED TO AUGER REFUSAL DEPTH, TOP OF ROCK)

22S: "S" SHALLOW MONITORING WELL (SCREEN GERNERALLY SPANS THE GROUNDWATER SURFACE)

C-1: BORING WHERE ROCK CORING PERFORMED

HAZARDOUS WASTE MANAGEMENT UNIT

PROPOSED POINT OF COMPLIANCE

STREAMS

0 50 100 200 400 800

SCALE IN FEET
1" = 200'

REV.	DATE	DESCRIPTION	DWN.BY:	DES.BY:	CHK.BY:	APP.BY:

DATE OF ISSUE: DWN.BY: DES.BY: CHK.BY: APP.BY:

EMCON SOUTHEAST

WILLIAM L. BONNELL COMPANY
SETTLING POND CLOSURE PLAN
SITE PLAN

DRAWING NO. IC-1
PROJECT NO. 92013

FIGURE IC-2
IMPOUNDMENT CLOSURE SCHEDULE

Sheet 1 of 2

SCHEDULED ACTIVITIES	TIME (MONTHS) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Prepare Performance Specifications; Advertise and Receive Bids; Select Contractor				3 MONTHS																				
2. Pump Settling Pond Sludges to Polishing Pond					1 MONTH																			
3. Perform Pilot Study						1 MONTH																		
4. Stabilize Bottom Sediment in Settling Pond							2 MONTHS																	
5. Dewater Polishing Pond																								
6. Stabilize Bottom Sediment in Polishing Pond and Transfer to Settling Pond																								
7. Evaluate Polishing Pond Soils																								
8. Survey for and Design of Final Grading Plan																								
9. Backfill, Install Liner, and Place Topsoil																								
10. Decontaminate Equipment																								
11. Provide Engineering Certification																								

PROJECTED TIME LINE

CERTIFICATION TO BE SUBMITTED WITHIN 60 DAYS AFTER CLOSURE COMPLETION

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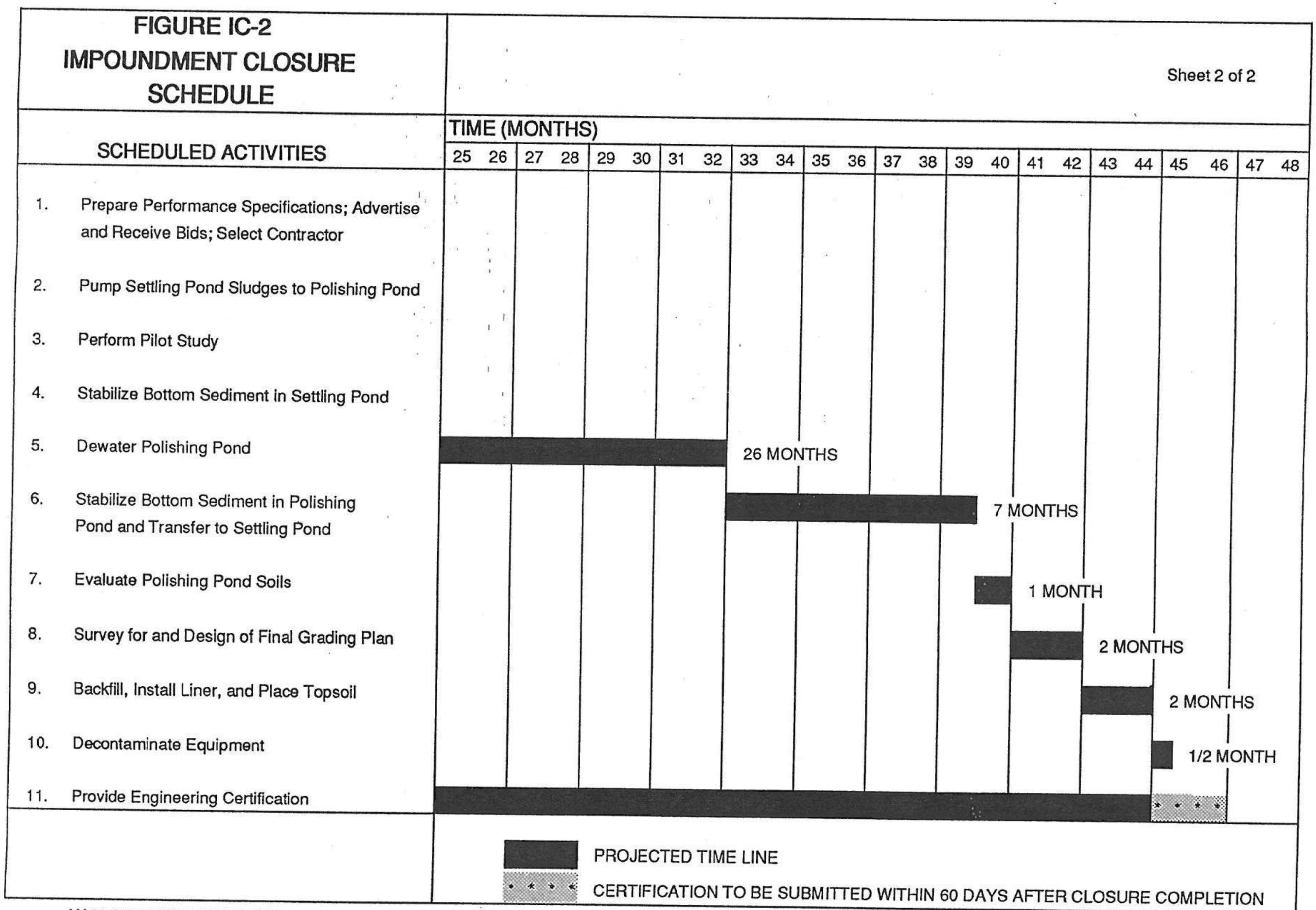

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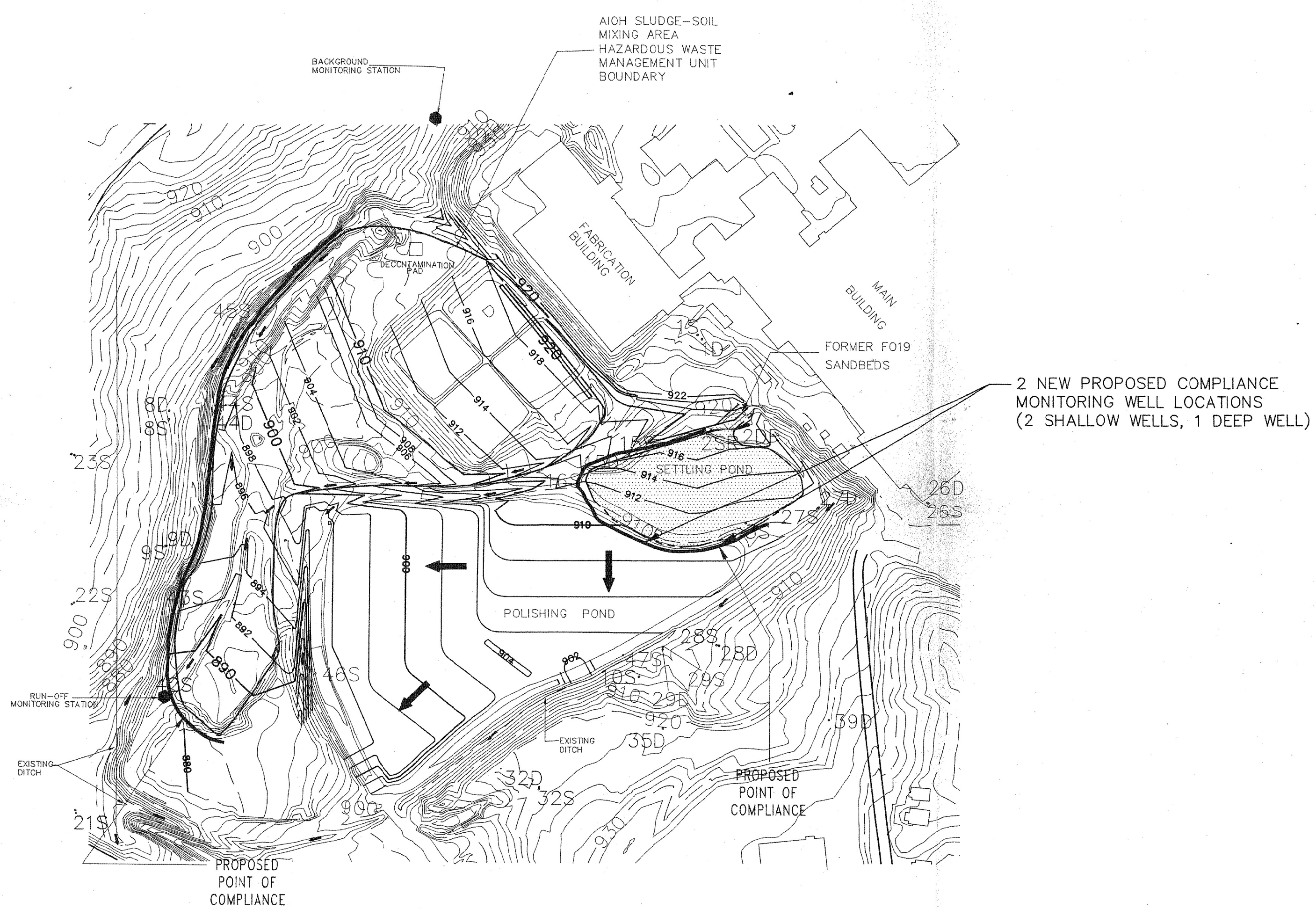
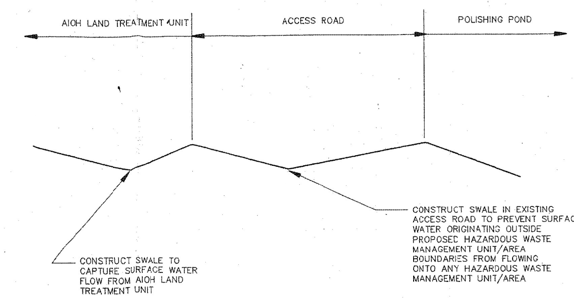




TYPICAL GRADING TO PREVENT RUN-ON/ RUN-OFF BETWEEN AIOH LAND TREATMENT UNIT AND SURFACE IMPOUNDMENT

NTS

LEGEND

39D	MONITORING WELL LOCATION
900	PROPOSED CONTOUR
	PERIMETER OF AIOH SLUDGE-SOIL MIXING AREA
	PROPOSED POINT OF COMPLIANCE
	MONITORING STATION
	SURFACE WATER FLOW
	SURFACE IMPOUNDMENT/CROH SAND DRYING BED HAZARDOUS WASTE MANAGEMENT AREA BOUNDARY
	AREA PROJECTED TO BE CAPPED

SCALE IN FEET

0 100 200 400

1" = 100'

REV.	DATE	DESCRIPTION	DWN.BY:	DES.BY:	CHK.BY:	APP.BY:
DATE OF ISSUE:		DWN.BY: DES.BY:	CHK.BY: APP.BY:			

EMCON SOUTHEAST

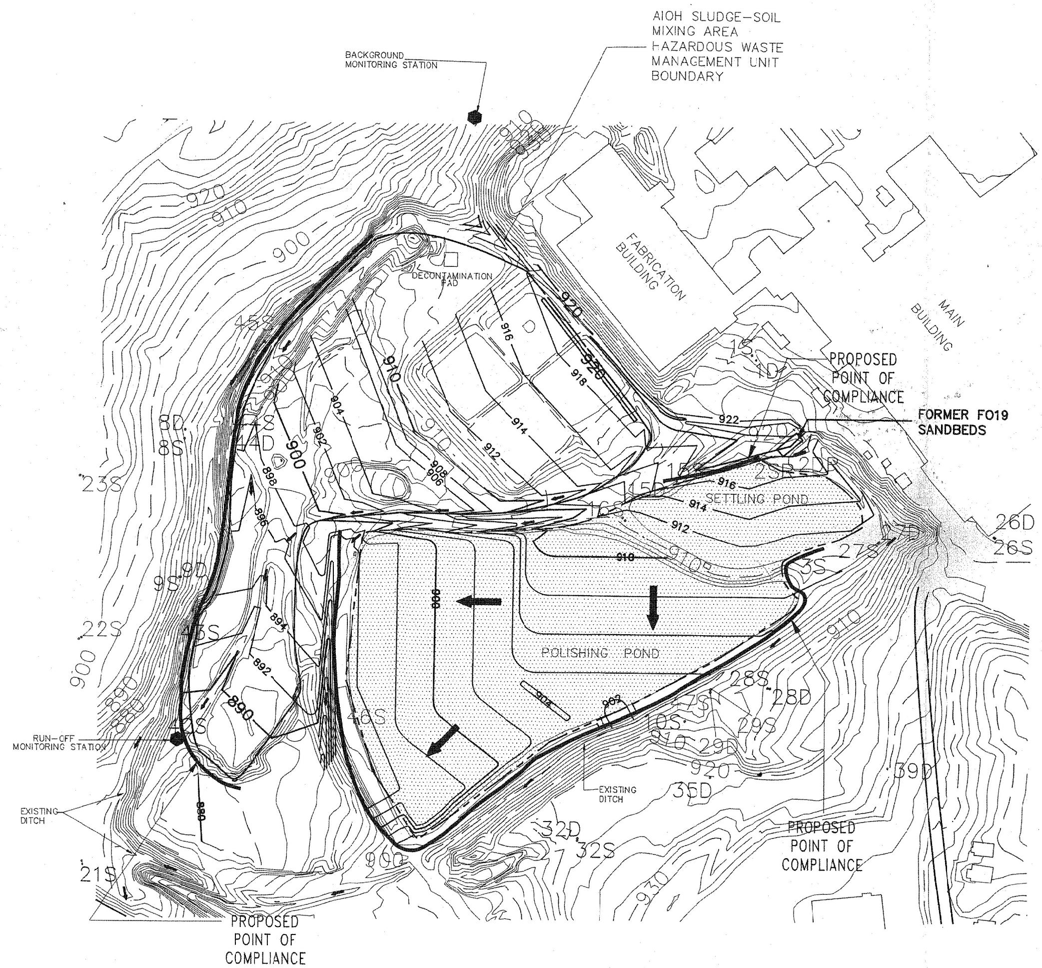
WILLIAM L BONNELL COMPANY
CLOSURE AND POST-CLOSURE PLANS

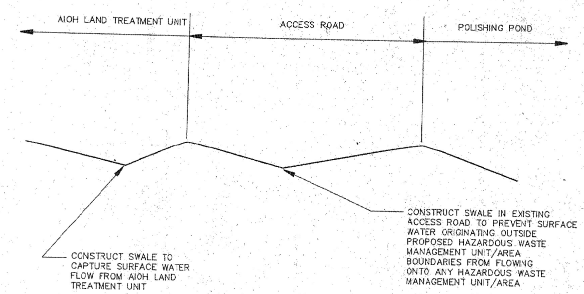
PRIMARY SURFACE IMPOUNDMENT
UNIT COVER

DRAWING NO. IC-3

PROJECT NO. 92013

M:\BONNELL\IC-3





TYPICAL GRADING TO PREVENT RUN-ON/ RUN-OFF BETWEEN AIOH LAND TREATMENT UNIT AND SURFACE IMPOUNDMENT

NTS

LEGEND

39D	MONITORING WELL LOCATION
900	PROPOSED CONTOUR
	PERIMETER OF AIOH SLUDGE-SOIL MIXING AREA
	PROPOSED POINT OF COMPLIANCE
	MONITORING STATION
	SURFACE WATER FLOW
	SURFACE IMPOUNDMENT/CROH SAND DRYING BED HAZARDOUS WASTE MANAGEMENT UNIT BOUNDARY
	AREA PROJECTED TO BE CAPPED

SCALE IN FEET

0 100 200 400

1" = 100'

REV.	DATE	DESCRIPTION	DWN.BY:	DES.BY:	CHK.BY:	APP.BY:
DATE OF ISSUE:		DWN.BY: DES.BY:	CHK.BY: APP.BY:			

EMCON SOUTHEAST

WILLIAM L BONNELL COMPANY
CLOSURE AND POST-CLOSURE PLANS
CONTINGENT SURFACE IMPOUNDMENT UNIT COVER

DRAWING NO. IC-4

PROJECT NO. 92013

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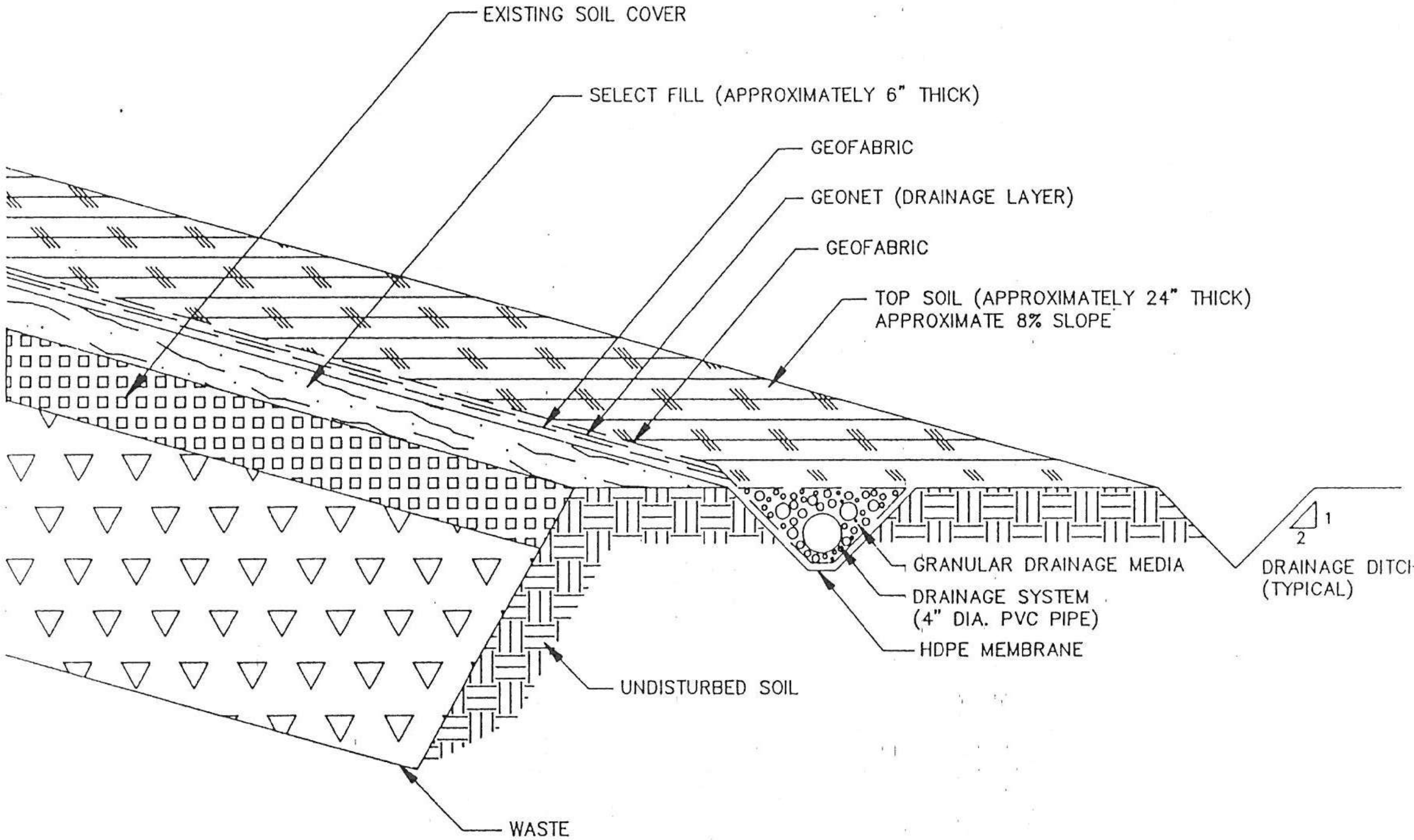
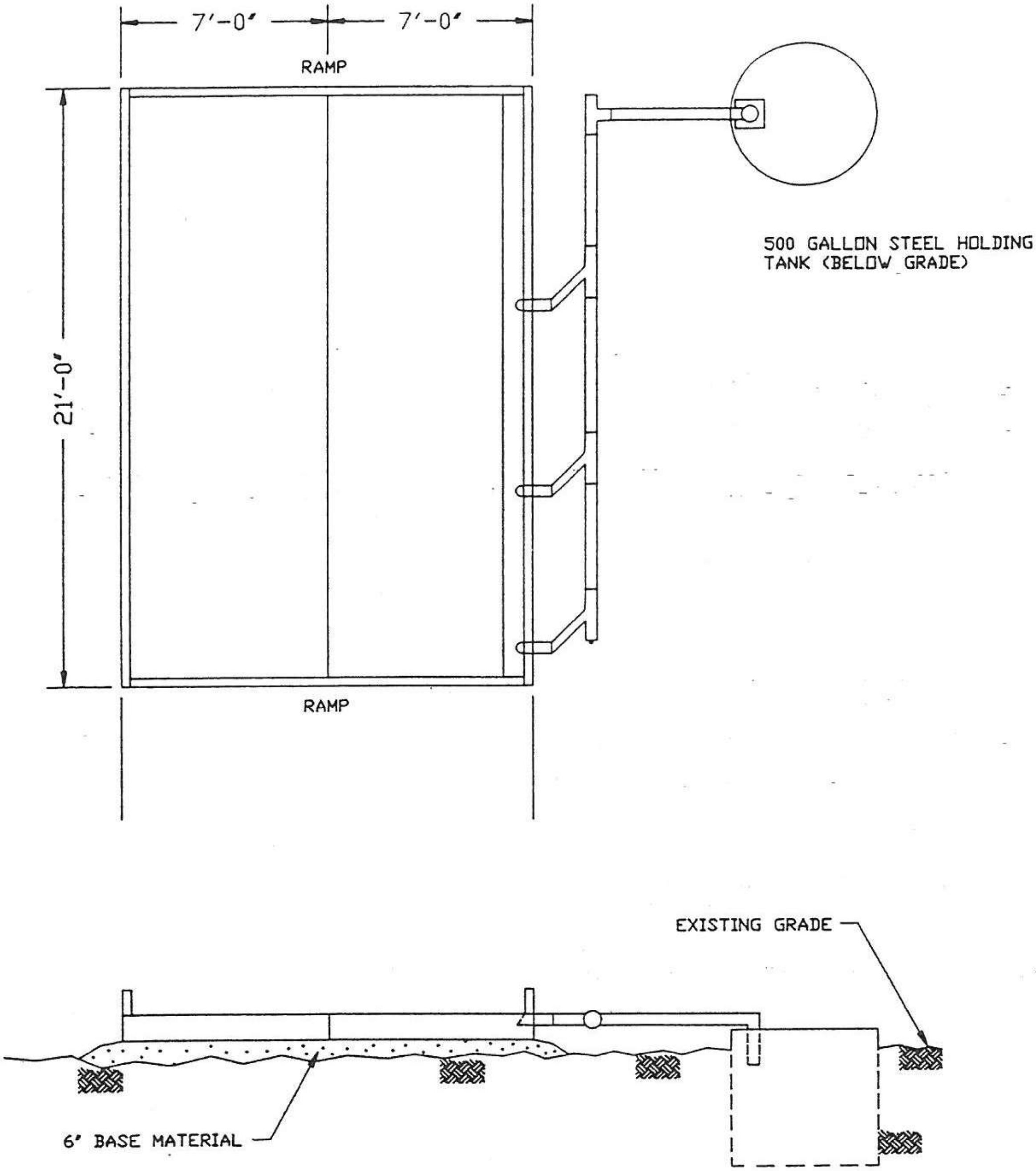


NOT TO SCALE

WILLIAM L BONNELL COMPANY, INC. NEWNAN, GEORGIA A-N-0006701	SURFACE IMPOUNDMENT CLOSURE PLAN	TYPICAL COVER SCHEMATIC IC-5



SOURCE: REVISED CLOSURE PLAN CHROMIUM HYDROXIDE SLUDGE SAND DRYING BEDS BY ATEC ENVIRONMENTAL DATED MARCH 7, 1990

SCALE: 1"=5'

WILLIAM L BONNELL COMPANY NEWNAN, GEORGIA	DECONTAMINATION WATER COLLECTION SYSYEM	DWG. No. FIGURE IC-6

TABLE IC-1
LIST OF CONSTITUENTS FOR ANALYSIS
SETTLING POND AND POLISHING POND
JULY 1990 SAMPLING EVENT

GENERAL:
Oil and Grease
Total Organic Carbon
Fluoride, Total and TCLP

METALS:
Arsenic, Total and TCLP
Barium, Total and TCLP
Cadmium, Total and TCLP
Chromium, Total and TCLP
Lead, Total and TCLP
Mercury, Total and TCLP
Selenium, Total and TCLP
Silver, Total and TCLP
Nickel, Total and TCLP

VOLATILE ORGANICS (METHOD 8260) (Totals Only)

Benzene
Bromobenzene
Bromochloromethane
Bromodichloromethane
Bromoform
Bromomethane
n-Butylbenzene
sec-Butylbenzene
tert-Butylbenzene
Carbon tetrachloride
Chlorobenzene
Chloroethane
Chloroform
Chloromethane
2-Chlorotoluene
4-Chlorotoluene
Dibromochloromethane
1,2-Dibromo-3-chloropropane
1,2-Dibromomethane
Dibromomethane
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Dichlorodifluoromethane
1,1-Dichloroethane
1,2-Dichloropropane
1,3-Dichloropropane
2,2-Dichloropropane
1,1-Dichloropropene
Ethylbenzene
Hexachlorobutadiene
Isopropylbenzene
p-Isopropyltoluene
Methylene chloride
Naphthalene
n-Propylbenzene
Styrene
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethene
Toluene
1,2,3-Trichlorobenzene
1,2,4-Trichlorobenzene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Trichlorofluoromethane
1,2,3-Trichloropropane
1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene

TABLE IC-1
LIST OF CONSTITUENTS FOR ANALYSIS
SETTLING POND AND POLISHING POND
JULY 1990 SAMPLING EVENT
(CONTINUED)

VOLATILE ORGANICS (METHOD 8260) (Totals Only) (Continued)

1,2-Dichloroethane	Vinyl chloride
1,1-Dichloroethene	o-Xylene
cis-1,2-Dichloroethene	m-Xylene
trans-1,2-Dichloroethene	p-Xylene

TABLE IC-2

CONSTITUENTS DETECTED IN POLISHING POND SLUDGE

CONSTITUENT	CONCENTRATION RANGE (mg/kg)	CONCENTRATION RANGE IN TCLP EXTRACT (mg/l)
Barium	2.77 to 57.7	0.01 to 0.22
Cadmium	BDL (0.1) to 0.50	BDL (0.01) to 0.02
Chromium	7.52 to 231	BDL (0.01) to 0.13
Lead	BDL (0.25) to 2.03	BDL (0.025) to 0.03
Nickel	8.47 to 56.6	BDL (0.01) to 0.67
Ethylbenzene	BDL (0.002) to 0.006	Not Analyzed (1)
Tetrachloroethene	BDL (0.002) to 0.018	Not Analyzed (2)
Toluene	BDL (0.002) to 0.015	Not Analyzed (1)
Trichloroethene	BDL (0.002) to 0.011	Not Analyzed (2)
Total Xylenes	BDL (0.010) to 0.012	Not Analyzed (1)

BDL = below detection limits (detection limit in parenthesis)

(1) No TCLP limit is available for these constituents

(2) Concentration in sludge (ppm) was below TCLP limit, therefore, any extraction concentrations would be below the TCLP limit

TABLE IC-3

IN-SITU HYDRAULIC CONDUCTIVITY MEASURMENTS FOR THE POLISHING POND

WILLIAM L BONNELL COMPANY, INC. NEWNAN, GEORGIA

WELL NO.	TOTAL REDEVELOP (gallons)	SATURATED THICKNESS (feet)	BOREHOLE DIAMETER (inches)	RECHARGE RATE (gpm)	CONSTANT DRAWDOWN (feet)	SPECIFIC CAPACITY (gpm/ft)	PRODUCTIVITY (gpm/ft-ft)	PERMEABILITY (cm/sec)
MW-16S	110.0	10.7	8.3	4.00	10.2	3.92E - 01	3.67E - 02	1.36E - 03
MW-16D	15.0	12.0	8.3	0.06	11.8	5.34E - 02	4.45E - 04	1.71E - 05

TABLE IC-4

HELP MODEL-DEFAULT UNVEGETATED, UNCOMPACTED SOIL CHARACTERISTICS

HELP	SOIL CLASSIFICATIONS USDA	SOIL CLASSIFICATIONS USCS	POROSITY (VOL/VOL)	FIELD CAPACITY (VOL/VOL)	WILTING POINT (VOL/VOL)	SAT. HYD. CONDUCTIVITY (CM/SEC)
1	CoS	GS	0.417	0.045	0.018	1.0E - 02
2	S	SW	0.437	0.062	0.024	5.8E - 03
3	FS	SM	0.457	0.083	0.033	3.1E - 03
4	LS	SM	0.437	0.105	0.047	1.7E - 03
5	LFS	SM	0.457	0.131	0.058	1.0E - 03
6	SL	SM	0.453	0.190	0.085	7.2E - 04
7	FSL	SM	0.473	0.222	0.104	5.2E - 04
8	L	ML	0.463	0.232	0.116	3.7E - 04
9	SiL	ML	0.501	0.284	0.135	1.9E - 04
10	SCL	SC	0.398	0.244	0.136	1.2E - 04
11	CL	CL	0.464	0.310	0.187	6.4E - 05
12	SiCL	CL	0.471	0.342	0.210	4.2E - 05
13	SC	CH	0.430	0.321	0.221	3.3E - 05
14	SiC	CH	0.479	0.371	0.251	2.5E - 05
15	C	CH	0.475	0.378	0.265	1.7E - 05
16	Liner Soil		0.430	0.366	0.280	1.0E - 07
17	Liner Soil		0.400	0.356	0.290	1.0E - 08
18	Mun. Waste		0.520	0.294	0.140	2.0E - 04
19	USER SPECIFIED SOIL CHARACTERISTICS					
20	USER SPECIFIED SOIL CHARACTERISTICS					

TABLE IC-5

EQUIPMENT AND TOOLS THAT MAY BECOME CONTAMINATED DURING POLISHING POND CLOSURE ACTIVITIES WILLIAM L BONNELL COMPANY, INC. NEWNAN, GEORGIA

Filter Press

Tractor

Bulldozer

Front-end Loader

Excavator/Backhoe

Pick-up or Dump Trucks

Pumps

Compactors or Rollers

Shovels

Hoes

Rakes

Protective Coverings

Boots

TABLE IC-6

POST-CLOSURE INSPECTION CHECKLIST
FOR POLISHING POND
WILLIAM L BONNELL COMPANY, INC.
NEWNAN, GEORGIA

Date Inspected/Time ______________________________

Reasons for Inspection
(routine/rainfall data) ______________________________

Erosion (yes/no) ______________________________

Ample Vegetative Ground-Cover (yes/no) ______________________________

Woody Plant Infiltration (yes/no) ______________________________

Security Barrier Intact (yes/no) ______________________________

Drainage Ditches checked (yes/no) ______________________________

Ground-water Monitoring Wells checked (yes/no)
- Locks
- Structure Integrity
- Identification
- Survey Benchmark ______________________________

Comments
____

Date/Type of Corrective Action ______________________________

Name of Inspector ______________________________
(Signature)

Name of Person responsible for Corrective Action or Further Investigation ______________________________
(Signature)

FIGURE IC-7

BONNELL PERIMETER FENCE

QUARTERLY INSPECTION LOG

INSPECTION DATE AND TIME:____

INSPECTOR'S NAME:____

DESCRIBE LOCATION AND TYPE OF DEFICIENCIES (Breaks, collapse, erosion, excessive rust):____

DESCRIBE REPAIRS MADE TO CORRECT DEFICIENCIES AND INDICATE DATE OF REPAIRS:____

TABLE IC-7

EQUIPMENT AND MATERIALS WHICH MAY BE UTILIZED FOR MAINTENANCE ACTIVITIES

WILLIAM L BONNELL COMPANY, INC.
NEWNAN, GEORGIA

Lawn Mower

Shovels

Hoes

Rakes

Excavator/Backhoe

Grass Seed/Fertilizer Distributor

Irrigation System (piping, water supply, etc.)

Aerator

Pesticide Distributor

Weed Eater

TABLE IC-8

COST ESTIMATE FOR PRIMARY CLOSURE OF SURFACE IMPOUNDMENT UNIT

WILLIAM L BONNELL COMPANY, INC.
NEWNAN, GEORGIA

ITEM	QUANTITY	UNIT COSTS	COST
1. DESIGN			
a. Professional Engineer	40 hours	$80.00 per hour	$3,200
b. Design Engineer	100 hours	$60.00 per hour	$6,000
c. Drafter	60 hours	$40.00 per hour	$2,400
2. SITE PREPARATION			
Mobilization/Demobilization and Equipment Set-up	Lump Sum	$5,000	$5,000
3. IMPOUNDMENT DRAINAGE			
a. Pumps/Hoses	Lump Sum	$6,000	$6,000
b. Labor	70 days	$100.00 per day	$7,000
c. Sampling and Analysis	70 samples	$35.00 per sample	$2,450
4. SLUDGE DEWATERING/HANDLING			
a. Pilot Operation	Lump Sum	$3,000.00	$3,000
b. Mobilization/Demobilization	Lump Sum	$5,000.00	$5,000
c. Holding Tank	Lump Sum	$3,000.00	$3,000
d. Press Operating	2965 dry tons	$250.00 per dry ton	$741,250
e. Additives for Sludge/Soil Stabilization	2600 c.y.	$50.00 per c.y.	$130,000
f. Sampling and Analysis of Pond Bottom			
1. Labor	8 hours	$40.00 per hour	$320
2. Testing	30 locations	$195.00 per location	$5,850
5. POINT OF COMPLIANCE WELLS			
a. Three New Wells	3 wells	$2,000.00 per c.y.	$6,000
6. BACKFILL & COVER CONSTRUCTION *			
a. Backfill	6600 c.y.	$3.00 per c.y.	$19,800
b. Cap Construction			
1. Fill Material (2 ft. topsoil)	4900 c.y.	$6.00 per c.y.	$29,400
2. Geofabric	6650 s.y.	$1.35 per s.y.	$8,978
3. Geonet	6650 s.y.	$2.43 per s.y.	$16,160
4. HDPE Membrane	6650 s.y.	$4.14 per s.y.	$27,531
c. Ditch Construction	Lump Sum	$1,000.00	$1,000
7. EQUIPMENT DECONTAMINATION			
a. Labor	20 hours	$10.00 per hour	$200
b. Equipment - High-pressure cleaning	2 days	$75.00 per day	$150
8. FINAL GRADE AND SEED	18800 s.y.	$1.70 per s.y.	$31,960
9. CONTRACTOR SUPERVISION			
a. Labor	800 hours	$50.00 per hour	$40,000
b. Expenses	100 days	$25.00 per day	$2,500
10. ENGRING. INSPECTION & CERTIFICATION			
a. Professional Engineer	100 hours	$80.00 per hour	$8,000
b. Technician	800 hours	$40.00 per hour	$32,000
c. Clerical	10 hours	$25.00 per hour	$250
d. Expenses, Travel and Per Diem	100 days	$25.00 per day	$2,500
		TOTAL COST	$1,147,000

* Includes labor cost

** All costs are in 1992 dollars.

TABLE IC-9

COST ESTIMATE FOR CONTINGENT CLOSURE OF SURFACE IMPOUNDMENT UNIT

WILLIAM L BONNELL COMPANY, INC.
NEWNAN, GEORGIA

ITEM	QUANTITY	UNIT COSTS	COST
1. DESIGN			
a. Professional Engineer	50 hours	$80.00 per hour	$4,000
b. Design Engineer	120 hours	$60.00 per hour	$7,200
c. Drafter	80 hours	$40.00 per hour	$3,200
2. SITE PREPARATION			
Mobilization/Demobilization and Equipment Set-up	Lump Sum	$5,000.00	$5,000
3. IMPOUNDMENT DRAINAGE			
a. Pumps/Hoses	Lump Sum	$6,000.00	$6,000
b. Labor	70 days	$100.00 per day	$7,000
c. Sampling and Analysis	70 samples	$35.00 per sample	$2,450
4. SLUDGE DEWATERING/HANDLING			
a. Pilot Operation	Lump Sum	$3,000.00	$3,000
b. Mobilization/Demobilization	Lump Sum	$5,000.00	$5,000
c. Holding Tank	Lump Sum	$3,000.00	$3,000
d. Press Operating	2965 dry tons	$250.00 per dry ton	$741,250
e. Additives for Sludge/Soil Stabilization	2600 c.y.	$50.00 per c.y.	$130,000
f. Sampling and Analysis of Pond Bottom			
1. Labor	8 hours	$40.00 per hour	$320
2. Testing	29 locations	$195.00 per location	$5,655
5. BACKFILL & COVER CONSTRUCTION *			
a. Backfill	16600 c.y.	$3.00 per c.y.	$49,800
b. Cap Construction			
1. Fill Material (2 ft. topsoil)	19360 c.y.	$6.00 per c.y.	$116,160
2. Geofabric	29000 s.y.	$1.35 per s.y.	$39,150
3. Geonet	29000 s.y.	$2.43 per s.y.	$70,470
4. HDPE Membrane	29000 s.y.	$4.14 per s.y.	$120,060
c. Ditch Construction	Lump Sum	$1,000.00	$1,000
6. EQUIPMENT DECONTAMINATION			
a. Labor	20 hours	$10.00 per hour	$200
b. Equipment - High-pressure cleaning	2 days	$75.00 per day	$150
7. FINAL GRADE AND SEED	18800 s.y.	$1.70 per s.y.	$31,960
8. CONTRACTOR SUPERVISION			
a. Labor	920 hours	$50.00 per hour	$46,000
b. Expenses	115 days	$25.00 per day	$2,875
9. ENGRING. INSPECTION & CERTIFICATION			
a. Professional Engineer	110 hours	$80.00 per hour	$8,800
b. Technician	920 hours	$40.00 per hour	$36,800
c. Clerical	15 hours	$33.00 per hour	$495
d. Expenses, Travel and Per Diem	115 days	$30.00 per day	$3,450
		TOTAL COST	$1,450,000

* Includes labor cost

** All costs are in 1992 dollars.

TABLE IC-10

COST ESTIMATE FOR POST-CLOSURE CARE OF SURFACE IMPOUNDMENT UNIT
PRIMARY CLOSURE

WILLIAM L BONNELL COMPANY, INC.
NEWNAN, GEORGIA

	ITEM	QUANTITY	UNIT COSTS	COST
1.	SITE INSPECTION (4 times/year)			
	a. Technician	16 hours	$40.00 per hour	$640
2.	MOWING AND FERTILIZING *			
	a. Mowing (4 times/year)	4.8 acres	$30.00 per acre	$144
	b. Fertilizing	1.2 acres	$100.00 per acre	$120
3.	ROUTINE EROSION REPAIR *			
	a. Soil excavating, hauling, spreading and compaction	20 c.y.	$10.00 per c.y.	$200
	b. Seeding	1,000 s.f.	$0.08 per s.f.	$80
4.	GROUND-WATER QUALITY MONITORING			
	a. Corrective Action Effectivenenss, per year	6 wells	$780.00 per well	$4,680
	b. Appendix IX Sampling & Analysis	1 well	$2,800.00 per well	$2,800
			TOTAL COST PER YEAR	$8,664
			POST-CLOSURE COST (30 years)	$260,000
	ADDITIONAL VOC PLUME MONITORING (21 wells, $240.00 per well, 14 years)			$71,000
			TOTAL POST-CLOSURE COST (30 years)	$331,000

* Includes labor cost

** All costs are in 1992 dollars

TABLE IC-11

COST ESTIMATE FOR POST-CLOSURE CARE OF SURFACE IMPOUNDMENT UNIT, CONTINGENT CLOSURE

WILLIAM L BONNELL COMPANY, INC.
NEWNAN, GEORGIA

ITEM	QUANTITY	UNIT COSTS	COST
1. SITE INSPECTION (4 times/year)			
a. Technician	16 hours	$40.00 per hour	$640
2. MOWING AND FERTILIZING *			
a. Mowing (4 times/year)	26.0 acres	$30.00 per acre	$780
b. Fertilizing	6.5 acres	$100.00 per acre	$650
3. ROUTINE EROSION REPAIR *			
a. Soil excavating, hauling, spreading and compaction	20 c.y.	$10.00 per c.y.	$200
b. Seeding	1,000 s.f.	$0.08 per s.f.	$80
4. GROUND-WATER QUALITY MONITORING			
a. Corrective Action Effectiveness, per year	9 wells	$780.00 per well	$7,020
b. Appendix IX Sampling and Analysis	2 wells	$2,800.00 per well	$5,600
TOTAL COST PER YEAR			$15,000
POST-CLOSURE COST (30 years)			$450,000
ADDITIONAL VOC PLUME MONITORING (21 wells, $240.00 per well, 14 years)			$71,000
TOTAL POST-CLOSURE COST (30 years)			$521,000

* Includes labor cost

** All cost are in 1992 dollars

CERTIFICATION
OF
SURFACE IMPOUNDMENT CLOSURE

The William L. Bonnell Company, Inc.
P.O. Box 428
Newnan, Georgia 30264

March 1996
Revised August 1996

VOLUME 1

Prepared by
EMCON
1560 Oakbrook Drive, Suite 100
Norcross, Georgia 30093

EMCON Project Number 72040.006.092

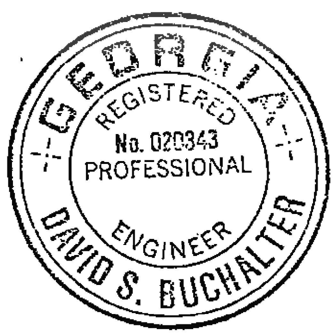
ENGINEER CERTIFICATION

I, David S. Buchalter, a registered professional engineer in the State of Georgia, hereby certify that I have made visual inspections of the Surface Impoundment Closure Area located at The WILLIAM L. BONNELL COMPANY, INC., 25 Bonnell Street, Newnan, Georgia 30263; and, to the best of my knowledge and belief, closure of the facility has been performed in accordance with the attached approved closure plan; and that the closure was substantially completed on the 23rd day of February, 1996.

3/22/96

David S. Buchalter, P.E.
EMCON
1560 Oakbrook Drive, Suite 100
Norcross, Georgia 30093
Georgia Professional Engineer License No. 020343

Date



CERTIFICATION OF SURFACE IMPOUNDMENT CLOSURE **March 1996**

OWNER CERTIFICATION

I, D.R. Monk, of THE WILLIAM L BONNELL COMPANY, INC., hereby state and certify that, to the best of my knowledge and belief, the Surface Impoundment Closure Area, located at THE WILLIAM L BONNELL COMPANY, INC., 25 Bonnell Street, Newnan, Georgia, 30263, has been closed in accordance with the attached approved closure plan, and that the closure was substantially completed by the 23rd day of February, 1996.

D R Monk 3/25/96

D.R. Monk
General Manager
THE WILLIAM L BONNELL COMPANY, INC.
25 Bonnell Street
Newnan, Georgia 30263
404-253-2020

CERTIFICATION OF SURFACE IMPOUNDMENT CLOSURE March 1996

OWNER CERTIFICATION

I, D.R. Monk, of THE WILLIAM L BONNELL COMPANY, INC., hereby state and certify that, to the best of my knowledge and belief, the Surface Impoundment Closure Area, located at THE WILLIAM L BONNELL COMPANY, INC., 25 Bonnell Street, Newnan, Georgia, 30263, has been closed in accordance with the attached approved closure plan, and that the closure was substantially completed by the 23rd day of February, 1996.

D R Monk 3/25/96

D.R. Monk
General Manager
THE WILLIAM L BONNELL COMPANY, INC.
25 Bonnell Street
Newnan, Georgia 30263
404-253-2020

CERTIFICATION OF SURFACE IMPOUNDMENT CLOSURE

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CERTIFICATION OF SURFACE IMPOUNDMENT CLOSURE

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SECTION 1

INTRODUCTION

1.1 GENERAL

The William L Bonnell Company, Inc. (Bonnell), owns and operates a facility at Newnan, Georgia, for the production of aluminum extrusions. The facility's address is:

The William L Bonnell Company, Inc.
25 Bonnell Street
Newnan, GA 30263

The mailing address is:

The William L Bonnell Company, Inc.
P.O. Box 428
Newnan, GA 30264

Bonnell operated a 1.4-acre settling pond and an approximately 5.2-acre polishing pond to treat wastewaters from the anodizing of aluminum. In addition, wastewaters from the chemical conversion coating wastewater treatment system clarifier were discharged to the settling pond until September 1989. Bonnell prepared a Closure and Post Closure Care Plan which identified the approach Bonnell would employ to close the Surface Impoundments. The Closure Plan was included as Section IC of the "RCRA PART B PERMIT APPLICATION FOR POST CLOSURE CARE" (the Post Closure

Care Permit) which was approved by the Environmental Protection Division (EPD) of the Georgia Department of Natural Resources on September 28, 1992. The Permit was amended on September 29, 1993, and July 19, 1995. The Post Closure Care Permit, as amended, is provided as Appendix A, Hazardous Waste Facility Permit as Amended.

During this Surface Impoundment closure activity, portions of the Settling Pond and the Polishing Pond were joined into one unit. This unit became the Surface Impoundments Closure Area (SICA). The unit is shown on Figure 1, Site Plan. The impoundment was designated as a Corrective Action Management Unit (CAMU) under the permit amendment dated July 19, 1995. All wastes encountered and addressed during closure activities were as specified in the Closure Plan, Section IC-1c. EMCON was retained by Bonnell to monitor closure activities at the Surface Impoundment and to certify closure in accordance with the approved Closure Plan.

1.2 PROJECT OVERVIEW

In general, the approved Closure Plan required dewatering of both ponds, stabilizing the sludges/sediments, placing these materials into the SICA, constructing an impervious cap, establishing a vegetative cover, providing surface water run-on and run-off control, conducting soil monitoring, and maintaining the groundwater monitoring system. Particular closure activities designated in the Closure Plan include:

1. pumping Settling Pond sludges to Polishing Pond,

2. stabilize bottom sediments in Settling Pond,

3. dewater Polishing Pond,

4. stabilize bottom sediment in Polishing Pond and transfer to Settling Pond,

5. evaluate Polishing Pond soils,

6. prepare final grading plan,

7. construct cover over SICA and place cover soil, and

8. decontaminate equipment.

1.3 PRINCIPAL PARTIES

Principal parties involved in the closure of the surface impoundments include:

Owner:

The William L Bonnell Company, Inc.
25 Bonnell Street
Newnan, GA 30264

Design Engineer:

EMCON
1560 Oakbrook Drive, Suite 100
Norcross, GA 30093

Sludge Removal and Stabilization:

Four Seasons Environmental, Inc.
3107 S. Elm-Eugene St.
Greensboro, NC 27406

Jones Sheet Metal
240 10041 Georgia Hwy 34
Franklin, GA 30217

Payton & Sons Construction Company,
240 Country Lane
Newnan, GA 30263

Earthwork Contractor:

Payton & Sons Construction Company
240 Country Lane
Newnan, Georgia 30263

Synthetic Liner Installation:

Serrot Corporation
125 Cassia Way
Henderson, Nevada 89014

Registered Surveyor:

Robert A. Moreland, RLS
P.O. Box 101
Woodbury, Georgia 30293

1.4 SCOPE OF SERVICES

The Certification of Surface Impoundment Closure was conducted and prepared under the direction of professional engineers registered in the State of Georgia. This report describes the management approach and field test methods employed during each of the steps outlined below to ensure that the Surface Impoundment closure was conducted in compliance with the EPD-approved Closure Plan. All provisions of the approved project-specific Health and Safety Plan were adhered to during closure activities.

1.5 PROJECT SCHEDULE

Construction activities commenced in April 1993, with the clearing activities on the dam between the Settling and Polishing Ponds. Completion of closure activities was accomplished in on February 23, 1996.

The following table presents the activities and associated time frames for the activities:

ACTIVITY	DATE
Begin clearing on dam	April 1993
Begin closure activities	May 1993
Mobilize dewatering contractor	August 1993
Construct work area and decon pad	August 1993
Stabilize bottom of Settling Pond	Aug.-Sept. 1993
Begin dewatering of Polishing Pond	September 1993
Start water treatment	January 1994

ACTIVITY	DATE
Stabilize additional impoundment area in Polishing Pond	June-July 1994
Finish dewatering of Polishing Pond	October 1994
Stabilize non-pumpable sludge in Polishing Pond	Nov.94-July 95
Incorporate SWMU waste into CAMU	July 1995
Test soils at former Polishing Pond	July 1995
Place clay cover at impoundment	Aug.-Sept. 1995
Place synthetic cover at impoundment	Sept.-Oct. 1995
Place soil cover/piping at impoundment	October 1995
Seed impoundment	January 1996
Construct erosion controls	January - Feb 1996
Closure substantially complete	Friday, February 23, 1996

SECTION 2
IMPOUNDMENT CLOSURE ACTIVITIES

2.1 BEGINNING ACTIVITIES

Closure activities began in April 1993. Although the Closure Plan called for the construction of ditches to intercept run-on during the closure activities, this was determined to be unnecessary. The configuration and slope of the closure area were such that no run-onto the closure area occurred. Fencing existed around the entire Bonnell to discourage unauthorized access. Protective equipment was worn at all times by personnel entering the closure area.

The existing scrub and trees on the dam between the Settling and Polishing Ponds were removed. At the same time, Bonnell pumped water and sludge from the Settling Pond into the Polishing Pond. In addition, a network of dewatering wells were installed around the Settling and Polishing Ponds to help reduce groundwater infiltration. The locations of these wells are shown on Figure 2; Recovery Well, Dewatering Well, and Sump Locations. Water from these wells was first routed to a carbon treatment system and then discharged to the permitted NPDES outfall.

In mid-August 1993, the first dewatering contractor, Four Seasons Environmental, mobilized to the site. Three 3.5-cubic-yard plate and frame dewatering presses, two mixing tanks, two P-tanks, and assorted other tankage were delivered to the site. This equipment remained within the confines of the impoundment at all times, in accordance with the Closure Plan. The appropriate electrical and water supplies were connected and the dewatering plant was operational by August 24, 1993.

EMCON began keeping daily project reports on August 18, 1993. These reports are included as Appendix B, Daily Project Reports.

2.2 SLUDGE REMOVAL FROM SETTLING POND

Prior to initiating removal of the sludge from the Settling Pond, a small filter press was brought to the impoundment. Pilot tests were then conducted to determine dewatering characteristics of the sludge, as specified in the Closure Plan. Pumpable Settling Pond sludge was then pumped from the Settling Pond to the Polishing Pond using a dredge. Approximately 7000 cubic yards of unprocessed sludge was transferred from the Settling Pond to the Polishing Pond.

2.3 STABILIZATION OF BOTTOM OF SETTLING POND

In accordance with the approved Closure Plan, all of the non-pumpable sludge and most of the bottom sediments were excavated from the Settling Pond and placed in a stockpile. The stockpile was later incorporated into the lifts of material placed in the SICA. The stockpile and filter cake being generated by the filter press operation were placed into lifts mixed together.

In accordance with the approved Closure Plan, not all the bottom sediments were excavated and placed in the stockpile. An excavator was used to mix the remaining bottom sediments and lime kiln dust (LKD) or cement kiln dust (CKD) (depending on which had been delivered to the site); thereby solidifying those remaining bottom sediments in place, which was as anticipated by the approved Closure Plan.

No compaction tests were conducted. The criteria used to verify compaction of the Settling Pond bottom sediments was ability to support machinery. Upon excavation and solidification of the remaining bottom sediments of the Settling Pond, it was determined that the stability of these bottom sediments was low. After considering several different strengthening options, Bonnell opted to install a pond bottom stabilization system consisting of a layer of woven geotextile, approximately two feet of surge stone, a layer of compacted graded aggregate base, another layer of woven geotextile, and a one-foot layer of clay. This method of bottom stabilization was sequenced to allow for the movement of stockpiles of solidified sludge from unstabilized to stabilized portions of the impoundment. The Settling Pond was excavated to an elevation of approximately 898 to 900 ft., MSL, before installing a stabilization system.

It is assumed that all the LKD and CKD delivered to the site before the Settling Pond bottom stabilization system was completed (approximately September 20, 1995) were used to stabilize the Settling Pond sediments. For LKD, this amount was 514 tons. For CKD, this amount was 849 tons. Assuming 10 percent of these amounts went into stabilizing sediments that were stabilized in-place during the Settling Pond bottom stabilization activities, approximately 51 tons of LKD and 85 tons of CKD were used to solidify sediments which remained below the stabilization system. These assumptions are based on interpretation of daily log entries.

The final volume of bottom sediments solidified using the excavator was estimated to be about 2000 cubic yards. This volume includes bottom sediments which were solidified in-place to provide a solid base upon which the impoundment would be constructed.

Approximately 4,553 tons of CKD and 5,008 tons of LKD were used by Four Seasons to solidify Settling Pond non-pumpable sludges and bottom sediments above the stabilization system. Therefore only about 1.8 percent of the total amounts CKD and 1.0 percent of the LKD were used to solidify portions of the Settling Pond below the stabilization system.

2.4 PLACEMENT OF SOLIDIFIED WASTE IN SICA

After the bottom of the Settling Pond was stabilized, filter cake and solidified sludge were placed into the SICA in 6-inch to 12-inch lifts. Cement kiln dust was disced into the filter cake and sediment in proportions that varied from 10 to 30 percent by weight. The percentage varied according to:

1. whether the material was sediment or filter cake,
2. the moisture content, and
3. the temperature.

The senior technician was responsible for collecting samples of filter cake which were analyzed at ASI laboratories in Atlanta for total solids using EPA Method 160.3. The average percent solids for the entire solidification project was approximately 33 percent. The laboratory results for the percent solids tests are included as Appendix C, Percent Solids Laboratory Test Results. There were no requirements specified in the Closure Plan for percent solids; however, this parameter was used to gauge the effectiveness of the filter presses and to calculate the total mass throughput of the system.

Although no strength number was specified in the Closure Plan, EPA recommends that "50 psi be used since this is the strength required to support typical construction and compaction equipment. The surface load is attenuated with depth so that bearing pressures are reduced to values on the order of 10 to 20 psi at a depth of 2 feet, and 3 to 7 psi at a depth of 5 feet below grade" (USEPA, 1989). Accordingly, a target of 50 psi unconfined compressive strength was used for this project. A minimum of two samples were collected from each lift and most were tested at 1-, 3-, and 7-day intervals. Some samples were also tested at 14 days after solidification. Samples were collected from completion of the first lift on September 30, 1993, to placement of the last lift on July 10, 1995.

Proctor Density Tests were performed on the solidified sludge and filter cake. The results of the tests are included in Appendix D, Results of Proctor Density Test. The unconfined compressive strength results are shown in Appendix E Results of Compaction Tests.

The Closure Plan specified that the solidified material placed in the impoundment must be compacted to 92 percent of the maximum dry density. Proctor Density Tests (ASTM Method D698) were run for percentages of cement kiln dust and lime kiln dust varying from 10 to 30 percent for both filter cake and solidified sludge. The first compaction tests were performed in September 1993, using a nuclear densitometer. Subsequently, a drive ring method (ASTM Method D698, Method A) was used due to the possible interference with hydroxide (OH) ions in the sludge. This method was used from September 1993, to June 1994. After comparing the densitometer and drive ring methods, the former method was used from June 1994, until the end of the project. The last tests were run on July 10, 1995. A minimum of one density test was performed for every 5,000 square feet of solidified material.

2.5 DEWATERING THE POLISHING POND

Concurrent with the stabilization of the bottom of the Settling Pond, sludge was dredged from the Polishing Pond. Approximately 12,000 cubic yards of sludge were removed and processed. The process involved first dredging the material and pumping the material through a screen into a holding tank. Solid materials such as twigs and rocks were caught on the screen and collected these materials were periodically incorporated into the solidified material.

Once the sludge was in the 10,000-gallon holding tank, it was mixed with approximately 2,000 pounds of lime kiln dust (LKD). This LKD was added to reduce the cycle times for filter pressing. From the mixing tank, the material was pumped to one of the three plate and frame filter presses.

Although each of the presses was rated as a 3.5-cubic-yard (94.5 cubic feet) press, the sizes of the filter presses ranged from 100 to 110 cubic feet. The filter press cycle times varied from about 25 minutes to about one hour depending on the solids content of the influent sludge and the amount of lime kiln dust added in the mixing tank.

Effluent from the filter presses was discharged back into the Polishing Pond during the early stages of the project to help maintain its water level. Starting in late January 1994, effluent was routed to a water treatment system which consisted of an equalization tank, pH adjustment and polymer addition tanks, clarifier, and filtration unit. The water was periodically tested for the parameters listed in Bonnell's NPDES permit. The water was then discharged through the permitted NPDES outfall.

Once the water level was reduced, the dredge was placed in the deepest part of the unit, the southwestern portion of the Polishing Pond. One sump was placed in the most downgradient section of the Polishing Pond and one was placed just outside the Polishing Pond to help dewater the Polishing Pond. This water was routed through the Polishing Pond water treatment system and the NPDES outfall. An additional sump was placed in the southeastern portion of the Polishing Pond to provide additional dewatering in this area of the pond. Dewatering was necessary due to the artificial head imposed by the pond.

2.6 SEDIMENT REMOVAL IN POLISHING POND

Once the water level in the Polishing Pond was reduced to a level where the dredge could no longer operate, the non-pumpable sludge and bottom sediments were removed and moved to the impoundment. The areas where the Polishing Pond still contained ponded water were solidified in place and the material was then moved to the SICA. Two and sometimes three sumps were used to help dewater the south and southwestern portions of the Polishing Pond. This water was then treated and discharged through the NPDES outfall. Non-pumpable sludge and bottom sediments having a higher solids content were excavated and placed into the SICA. Lime kiln dust was added and the material was compacted to meet the requirements in the Closure Plan. Approximately 25000 cubic yards of non-pumpable sludge and bottom sediments were removed from the Polishing Pond. The interface between non-pumpable sludge/bottom sediments and the clean soil remaining in the Polishing Pond was visually determined. After it was visually determined that all non-pumpable sludge and bottom sediments had been removed from the Polishing Pond, samples were collected from the Polishing Pond to ensure that the area was clean closed. The sampling is discussed in Section 4, Certification Sampling.

All the sludges (pumpable and non-pumpable), the bottom sediments, and the LKD were removed from the Polishing Pond and placed in the Surface Impoundment Closure Area. This was determined from visual inspection and analytical results as stated in the approved Closure Plan and the Certification report.

There was no CKD used to solidify the bottom sediments of the Polishing Pond. Approximately 11,000 tons of LKD were used to dewater sludge and to solidify non-pumpable sludge and bottom sediments of the Polishing Pond after Four Seasons left and local forces were used.

After the filter press operations ceased, the Polishing Pond was cleaned from the upper reaches toward the dam. The bottom sediments were cleaned along with the non-pumpable sludge. There was no distinguishing line between the bottom sediments and the non-pumpable sludge.

SECTION 3
PLACEMENT OF SWMUs REMEDIAL WASTES INTO IMPOUNDMENT

3.1 CORRECTIVE ACTION OVERVIEW

During the closure of the Surface Impoundment, an RFI was completed and several SWMUs were designated by EPD for remediation. These SWMUs were contaminated with a variety of Volatile Organic Compounds (VOCs), petroleum compounds, and metals at concentrations exceeding their respective background levels. In order to consolidate these wastes and to be protective of human health and environment, the contaminated soils in these SWMUs were excavated, and placed into the SICA. As previously discussed, the SICA was designated as a CAMU under the permit amendment effective July 19, 1995.

The remedial wastes from the following SWMUs were placed into the impoundment:

SWMU-13, Truck Shop Pipe Discharge;

SWMU-14, Truck Shop Parking Area;

SWMU-16, Storage Yard Behind Maintenance Building Plus Ditch and Drum Storage Area;

SWMU-17, Drum Crusher Area;

SWMU-19, Area West of Die Shop;

SWMU-23, Inactive Oil/Water Separator;

SWMU-29, Steam Cleaner Area;

SWMU-35, Sink Frame Building Area;

SWMU-42, Cooling Tower Areas; and

SWMU-47, Diesel Underground Storage Tank.

3.2 PLACEMENT OF REMEDIAL WASTE INTO IMPOUNDMENT

The corrective action for the impacted soils was mechanical excavation and disposal in Bonnell's permitted impoundment, the designated CAMU. Soils in the SWMUs were excavated by backhoe and loaded on trucks. The trucks transported the soils to the CAMU without leaving the property. Excavation in each of the ten SWMUs continued in this manner until background concentrations were attained, as verified by sampling.

A collective total of approximately 3,500 cubic yards was removed from the SWMUs with individual SWMU removal volumes ranging from about 20 cubic yards in SWMU-13 to over 1,500 cubic yards from SWMU-23. These soils were compacted to the same standards as the pond sludge and sediments.

3.3 FURTHER INFORMATION ON SWMU REMEDIATION

For further information on the SWMU remediation, refer to the Solid Waste Management Unit Corrective Action Plan prepared by Bonnell in October 1995.

SECTION 4
CERTIFICATION SAMPLING

4.1 SAMPLING OVERVIEW

After the filter cake and stabilized non-pumpable sludge/bottom sediments were removed and consolidated within the SICA, the bottom of the Polishing Pond was visually inspected to ensure that no F019 sludge was visible. The Polishing Pond was then sampled and the samples were analyzed for the VOCs and metals listed in Table IC-2 of the closure plan. The VOCs and metals were perchloroethylene, trichloroethylene, toluene, total xylenes, ethylbenzene, 1,1-dichloroethene, vinyl chloride, barium, cadmium, chromium, lead, and nickel. In addition, the samples were analyzed for total petroleum hydrocarbons (EPA Method 418.1).

4.2 SAMPLING PROCEDURES

As stated in the Closure Plan, the portion of the Polishing Pond which was undergoing clean closure was divided into a grid with the approximate dimensions of 100 feet by 100 feet. Based on the irregular outline of the pond, 22 blocks that are approximately 10,000 square feet each were established. Each block was further divided into 100 ten-square foot blocks, which were assigned a number 1 through 100. A random number generator was used to select four 10-square foot blocks from each of the groups of blocks. The grid and numbered blocks are shown in Figure 3, Certification Soil Sample Locations.

One sample for metals and TPH analysis and one sample for VOC analysis was collected from each block. For the metals and TPH samples, four aliquots from each block were collected and composited in a glass bowl and placed in appropriate sample containers. VOC samples were collected as grab samples (no compositing) from each block and placed into appropriate jars. Three were held and one was submitted to the lab for analysis. All samples and aliquots were collected with a stainless steel spoon as a surface grab sample. Samples were collected by qualified ASI sampling personnel.

All samples were labeled, immediately preserved on ice, and delivered under chain of custody to ASI. The metals samples were analyzed by EPA Method 6010 and the VOCs by Method 8260.

The clean closure standards for the site were the background concentrations calculated as shown in Appendix IC-F of the Application for Closure and Post Closure Care. Background concentrations for the metals were as follows:

Barium	318 mg/kg
Cadmium	1 mg/kg (detection limit)
Chromium	73 mg/kg
Lead	46 mg/kg
Nickel	66 mg/kg

The background levels for the VOCs were their respective detection limits since they are not naturally occurring at the site. A letter from EPD allowed Bonnell to use a limit of 500 ppm for TPH (Appendix F, Correspondence Related To Closure).

4.3 SAMPLE RESULTS

After the initial sampling on July 11, 1995, all the sample results were below the background concentrations stated above with the exception of cadmium and lead in block 11 and TPH in block 14. Additional soil was removed from these two blocks, and the areas were resampled on July 21 and 28, 1995. Sample results in block 11 were below detection limits (BDL) for cadmium and 16 mg/kg for lead. Sample results were BDL for TPH in block 14. Sampling and chain-of-custody forms, and analytical results are included in Appendix G, Polishing Pond Sampling Results.

SECTION 5
CLAY LAYER INSTALLATION

5.1 CLAY MATERIAL AND SUITABILITY TESTING

The approved Closure Plan required that the clay layer be a minimum of six inches thick, be compacted to a density equal to or greater than 92 percent of the material's maximum dry density according to the Proctor Density Test (ASTM D698), and have a compacted hydraulic conductivity on the order of 3.2×10^{-6} cm/sec.

Since the same borrow source that was used for the Chromium Hydroxide Landfill Closure as was used for the Surface Impoundment, and testing was previously done on the borrow source for the closure of the Chromium Hydroxide Landfill, no further testing was performed on the borrow source. The borrow source for this project was the Payton Property in Newnan, Georgia. Four samples from the previous study yielded an average permeability of 2.0×10^{-7} cm/sec (Certification of Liner System Construction, Chromium Hydroxide Landfill, EMCON, 1993).

5.2 COMPLIANCE TESTING

The clay material imported from the borrow site was stockpiled near the SICA due to construction sequencing. The geotechnical engineer performed compaction tests based on the previously established moisture density curves. The compaction exceeded the required 92 percent compaction at all locations tested. Results of the compaction tests are included in Appendix H, Six-Inch Clay Layer Compaction And Permeability Test Results. Water was added as needed to minimize the drying of the surface of the clay.

There were six permeability tests conducted on both the top and side slopes of the impoundment. The clay was compacted and the top and side slopes were tested to determine if permeability met the requirements outlined in the closure plan. Results of the compaction tests are included in Appendix H, Six-Inch Clay Layer Compaction And Permeability Test Results. Locations of the compaction and permeability tests are shown in Appendix I, Six-Inch Clay Layer Compaction and Permeability Test Locations.

A letter from Brian Dolihite, EMCON Project Manager, to Terry Snell, Bonnell, dated September 12, 1995, summarized the "..activities and findings for the construction and CQA testing of the 6[-inch] clay fill portion of the composite cover system..." The following statements concerning permeability are extracted from that letter:

> "Two Shelby tube samples (ST-1 and ST-2) were tested representing the top of the closure, and one Shelby tube sample (ST-3) was tested representing the slopes of the closure.
>
> ST-1 exhibited a permeability of 4.21×10^{-5}. The sample was found to have roots in it and the results determined to be not representative.
>
> One Shelby tube sample (ST-2A) was tested representing the area represented by ST-1. ST-2A exhibited a permeability of 9.4×10^{-6}.
>
> The area represented by ST-1 and ST-2A was hydrated and re-compacted and a Shelby tube sample (ST-2A-1) was tested. ST-2A-1 exhibited a permeability of 2.75×10^{-6}.
>
> ST-2 exhibited a permeability of 7.746×10^{-8}.
>
> ST-3 exhibited a permeability of 3.6×10^{-5}."

A copy of the letter is included in Appendix F, Correspondence Related to Closure.

A permeability goal of 3.2 x 10^{-6} cm/sec for the six-inch clay layers was based on a leakage rate computed using a previous version of the Hydrogeologic Evaluation of Landfill Performance (HELP) model. All Help Model Runs are included in Appendix J, Help Model Runs. A new model of HELP (Version 3) was run using the higher permeability value (9.4 x 10^{-6} cm/sec) on the top and 3.6 x 10^{-5} cm/sec on the side slopes. The results showed that the leakage would be 1.3 gallons per year. This was only 0.2 gallons per year higher than the leakage rate of 1.1 gal/year calculated using the 3.2 x 10^{-6} cm/sec goal used in the Closure Plan.

The leakage rate calculated in the Closure Plan using the older version of HELP was 59.8 gal/year. The newer calculation also used a thicker 60-mil liner versus a 40-mil liner, which had been used for the previous calculation. While there is no permeability difference for the two thicknesses of liner, the number of pinholes assumed by the new model is less (2 versus 3 pinholes per acre). This lowers the leakage rate slightly, and the thicker liner rate was subsequently used.

There are no standards for leakage rates in the Subtitle C regulations. The closure requirements only state "that the cover should minimize infiltration of water through the closed unit". A "standard RCRA cover" is specified in the EPA document "Seminars - Design and Construction of RCRA/CERCLA Final Covers, USEPA CERI 90-50, 1990." This system consists of (from top to bottom): two feet of soil, granular or geotextile filter, six inches of sand, a 20-mil High Density Polyethylene (HDPE) liner, and two feet of 1 x 10^{-7} cm/sec clay. This system was compared to the current system using the HELP Model. The model showed that, for the top area where most of the leakage would occur, the current system had a significantly lower leakage rate (1.2 versus 495 gallons per year) despite the clay's lower permeability and thickness. The difference is primarily attributed to the Geonet which drains infiltrated surface water much more efficiently than the sand layer in the standard cap. This allows more efficient lateral drainage and reduces the head on the HDPE and clay. Therefore, the most important part of the system is the lateral drainage layer. Based on this information, the cap satisfies the intent of the regulations stated in 40 CFR 264.228.

SECTION 6
GEOMEMBRANE INSTALLATION

6.1 GENERAL

A 40-mil HDPE cap was specified for the project. Bonnell, in an effort to ensure that an environmentally sound cap was installed, upgraded the liner to a textured, 60-mil cap. Bonnell contracted with Serrot Corporation (Serrot) to furnish and install the geomembrane. Prior to installing the HDPE/Geocomposite layer, Serrot inspected and accepted the SICA as being ready to install the system. A copy of the acceptance is included in Appendix K, Serrot Subgrade Acceptance Form.

6.2 GEOMEMBRANE MATERIAL PROPERTIES AND TESTING

Material properties were tested and certified by the manufacturer. In addition, Bonnell authorized the geosynthetics technician to take material samples from the rolls of HDPE liner and geonet delivered to the site in order to perform selected conformance tests to confirm the manufacturer's test data. These test results indicate that the HDPE material used to cap the landfill was in compliance with the project specifications. The rolls of textured 60-mil HDPE used on this project include the following roll numbers:

> 84045603, 84045606, 83125809, 84045613, 83125905, 83105913, 84045616, 83115806, 83125620, 83125740,83124411, 83125714, 83115803, and 84075013 through 84075018.

A material inventory is included in Appendix L, HDPE/Geocomposite Material Inventory. Certificates of quality assurance for each roll of HDPE from the manufacturer are included in Appendix M, HDPE Manufacturers Quality Control Certifications. Conformance tests from rolls numbered 83125620 and 84045603 are also included in Appendix N, EMCON Geomembrane Conformance Test Results.

6.3 DEPLOYMENT ACTIVITIES

Initial deployment activities began on September 29, 1995. A total of 88 panels were deployed between September 29 and October 9, 1995. Subgrade preparation was continually reviewed by the geotechnical engineer and the senior geosynthetics technician. Prior to deployment, a subgrade acceptance form was signed by the designated representative of Serrot. A copy of this form is included in Appendix K, Serrot Subgrade Acceptance Form.

All deployment activities were observed and recorded by EMCON personnel. These activities included aligning panels; overlapping adjacent panels; and labeling panels with unique identification numbers, deployment date, and source roll numbers. Once deployed, each panel was visually inspected to check for obvious manufacturing defects, deployment damage, and/or shipping damage. Any such areas were issued a defect number and repaired. The senior geosynthetics technician and the installer were both responsible for measuring the installed panel dimensions. At the end of each day, the unsecured edges of the liner were weighted down with sand bags to prevent uplift from the wind. The actual panel positions were recorded on the as-built survey of the top of the clay, and these positions are shown on the hand-drawn map labeled "Geomembrane Panel Layout" in Appendix O, Geomembrane Panel Layout and HDPE Deployment Logs.

6.4 SEAMING METHODS

The primary method of seaming for this project was automated double fusion welding with an air channel separation. Repair seams and sump connections were performed using a hand-held extrusion welder. Seam intersections were treated in the same manner as repairs by applying a cap strip using an extrusion welder. Each seaming machine and corresponding technician were tested at the beginning of each seaming period, at the direction of the senior geosynthetics technician, when seaming conditions changed and at least once every 8 hours of continuous operation. Based on the type (thickness and texture) of the materials being seamed, trial seams were made on fragment pieces of the same geomembrane liner materials to verify that seaming conditions, personnel, and equipment were adequate. Test results are included in Appendix P; Geomembrane Seam Shear Test Reports, Geomembrane Seam Peel Test Reports, Air Pressure Test Logs, and Vacuum Test Logs.

6.5 SEAM TESTING

Each trial seam sample was tested by the installer under observation of a geosynthetics technician. The installer supplied all necessary testing equipment and knowledgeable personnel. Four adjoining specimens of 25-mm (1-in) width each were die cut from the trial seam sample. These specimens were tested in the field with a tensiometer for both shear (specimen) and peel (3 specimens for each welding track or extrusion bead). A passing machine or hand-welded test seam was achieved when the specimens met minimum numerical values based on NSF standards. If a test seam failed, the entire operation was repeated. If the additional trial seam failed, the seaming apparatus or seamer was not accepted and was not used for seaming until the deficiencies were corrected and two consecutive successful test seams were achieved. Trial seam failure was defined as failure of any one of the specimens tested in shear or peel.

The senior geosynthetics technician or authorized representative observed all test seam procedures. The remainder of the successful test seam sample was assigned a number and marked accordingly by the geosynthetics technician, who also logged the date, hour, ambient temperature, machine temperature, welding speed, machine number, name of seamer, and pass or fail description. Copies of the trial seam logs are included in Appendix Q, Field Trial Seam Test Logs.

Production seams were performed only by the seaming machines and corresponding technicians qualified through passing trial seams. Production seams were tested by the installer continuously using non-destructive techniques and at intervals using destructive tests. Requirements for non-destructive and destructive testing were as follows:

1. Single Weld (Extrusion) Seams: The installer maintained equipment and personnel to perform continuous vacuum box testing on all single weld seams. This testing was observed by EMCON personnel. A soap and water solution was applied to the surface of the geomembrane, a vacuum of at least 5 psi was applied, and the vacuum was held for a minimum of 15 seconds for each section. Air bubbles resulting from this vacuum were considered to represent defects which were then repaired. In and near the anchor trenches, where irregularities in the grade of the subgrade soil layer prevented the use of the vacuum box, the seams were tested using a spark test. This testing involved placing a copper wire under the extrusion bead, inducing a high-voltage current through the wire, and then moving an electrical receptor along the length of the bead. The appearance of a spark between the copper wire and the receptor would indicate the presence of a hole in the seam.

2. Double Weld Seams: The installer maintained equipment and personnel to perform air pressure testing of all double weld seams. This testing was observed by EMCON personnel. The testing system applied a pressure of at least 30 psi for not less than 5 minutes. Pressure loss tests were conducted in accordance with the procedures outlined in "Pressurized Air Channel Test for Dual Seamed Geomembranes," Geosynthetic Research Institute Test Method GM-6. As outlined by the test method, a minimum 2-minute pressure stabilization period was observed and pressure losses over a period of 5 minutes were not allowed to exceed 3 psi. At the conclusion of pressure tests, the end of the seam opposite the pressure gauge was cut, if a decrease in gauge pressure was not observed, the air channel was considered to be "blocked" and the test was repeated until the blockage was located and repaired.

Destructive testing was performed at locations selected by the senior geosynthetics technician; test samples were cut at a frequency of at least 1 per 500 linear feet of seam. A total of 15 destructive samples were cut and tested under laboratory conditions, representing an average of one test for every 375 linear feet of production seam. The installer obtained samples of sufficient size to provide one sample to the archive and one sample to the QA manager for laboratory testing. Each sample was large enough to test five specimens in peel and five specimens in shear. These test results are included in Appendix P; Geomembrane Seam Shear Test Reports, Geomembrane Seam Peel Test Reports, Air Pressure Test Logs, and Vacuum Test Logs. The laboratory used to perform the destructive testing on the production seams was:

EMCON/Wehran
Sterling Forest
210 Route 17A
Tuxedo, New York 10987

Damaged areas, destructive test locations, and sample coupon locations on the geomembrane were repaired by the installer using a patch or cap strip. For consistency in tracking repairs, all of the aforementioned repairs were considered defects and, as such, were numbered, repaired, and tested accordingly. Repaired areas were vacuum tested for seam integrity. This testing was observed by EMCON personnel and the documentation regarding these repairs has been included in Appendix R, Defect Logs and Repair Logs.

SECTION 7

INSTALLATION OF GEOFABRICS, DRAINAGE NET, AND DRAINAGE PIPING

7.1 GENERAL

Once the geomembrane cap was installed, tested and accepted by the senior geosynthetics technician, a drainage system was constructed on top of the liner to minimize ponding of rainfall on top of the cap, diminishing the likelihood of infiltration of liquid into the landfill. This drainage system consists of two layers of geofabric material surrounding a drainage net and drainage piping constructed in a gravel trench on the down slope side of the landfill to convey rainwater safely away from the landfill.

7.2 GEOFABRICS AND DRAINAGE NET

The two layers of geofabric material were heat bonded to the drainage net, forming a single composite drainage medium. The lower geofabric material increases friction and reduces slippage between the drainage layer and the underlying HDPE. The drainage net (Geonet) provides a continuous, highly conductive pathway for the transmission of liquid off the liner HDPE cap. The top geofabric material reduces the potential for silt to enter and clog the drainage net. Conformance testing was performed on one sample of the Geonet to ensure that the material on-site met the manufacturer's specifications. A copy of this test is included in Appendix S, EMCON Geocomposite Test Results.

7.3 DRAINAGE PIPING

The drainage piping consists of perforated 8-inch, Schedule 40 PVC pipe, located along the down slope edges of the unit and is used to transport liquids conveyed by the drainage net away from the SICA. There are six cleanouts located along the length of the drainage piping. A detail of the drainage piping is shown in Figure 4, Cap and Drainage Piping Detail.

7.4 INSTALLATION

The Bonnell Construction Manager and several EMCON personnel observed the placement of the geofabrics, drainage net, and drainage piping to ensure that reasonable precautions were taken to avoid damage to the geomembrane liner. The pipe diameters, slopes, and locations were found to be in conformance with the plans and specifications.

After Serrot completed installation, the Serrot representative provided certification that the work was completed. The certification is contained in Appendix T, Serrot Project Completion Form.

SECTION 8
INSTALLATION OF SOIL COVER OVER CAP AND FINAL GRADING

8.1 SOIL COVER OVER CAP

Once the drainage system was installed and accepted by the Resident Construction Manager, a soil layer was placed over the drainage system in accordance with the Closure Plan. The purpose of this soil cover is to provide physical protection to the geomembrane cap and to provide a stabilized, low-maintenance means of shedding rainwater from the SICA.

The Closure Plan required that the soil cover be a minimum of 24 inches thick. To minimize erosion of the soil cover, the closure plan required a slope in the range of three to five percent. This is in accordance with EPA guidelines for closure. Survey results indicate that the slope ranges between three and five percent.

A drainage berm was built, starting at the northwestern corner of the unit before the long down slope extending to the southeastern corner of the unit. Three conveyance pipes were placed on the eastern edge of the impoundment to collect this bermed water in order to help minimize erosion of the soil cover. Figure 5, SICA Cross Section, contains an as-built diagram which portrays this grading and piping system.

The entire 24-inch soil cover layer was compacted using a Komatso D-4 and a John Deere Superpack 600 Compactor. The upper six inches of the soil was then disced and hydroseeded with a combination of grasses which grows well in the winter. In addition, love grass, which does not require cutting, was used on the western and southern slopes of the unit.

8.2 FINAL GRADING

Following completion of placement of the topsoil layer, a registered land surveyor established the final elevations and physical limits of the SICA. Figure 6, Final Grading Plan, depicts the final elevations, and a plat describing the extent of the SICA is included as Figure 7.

REFERENCES

EMCON. Certification of Closure Cap Construction, 1993.

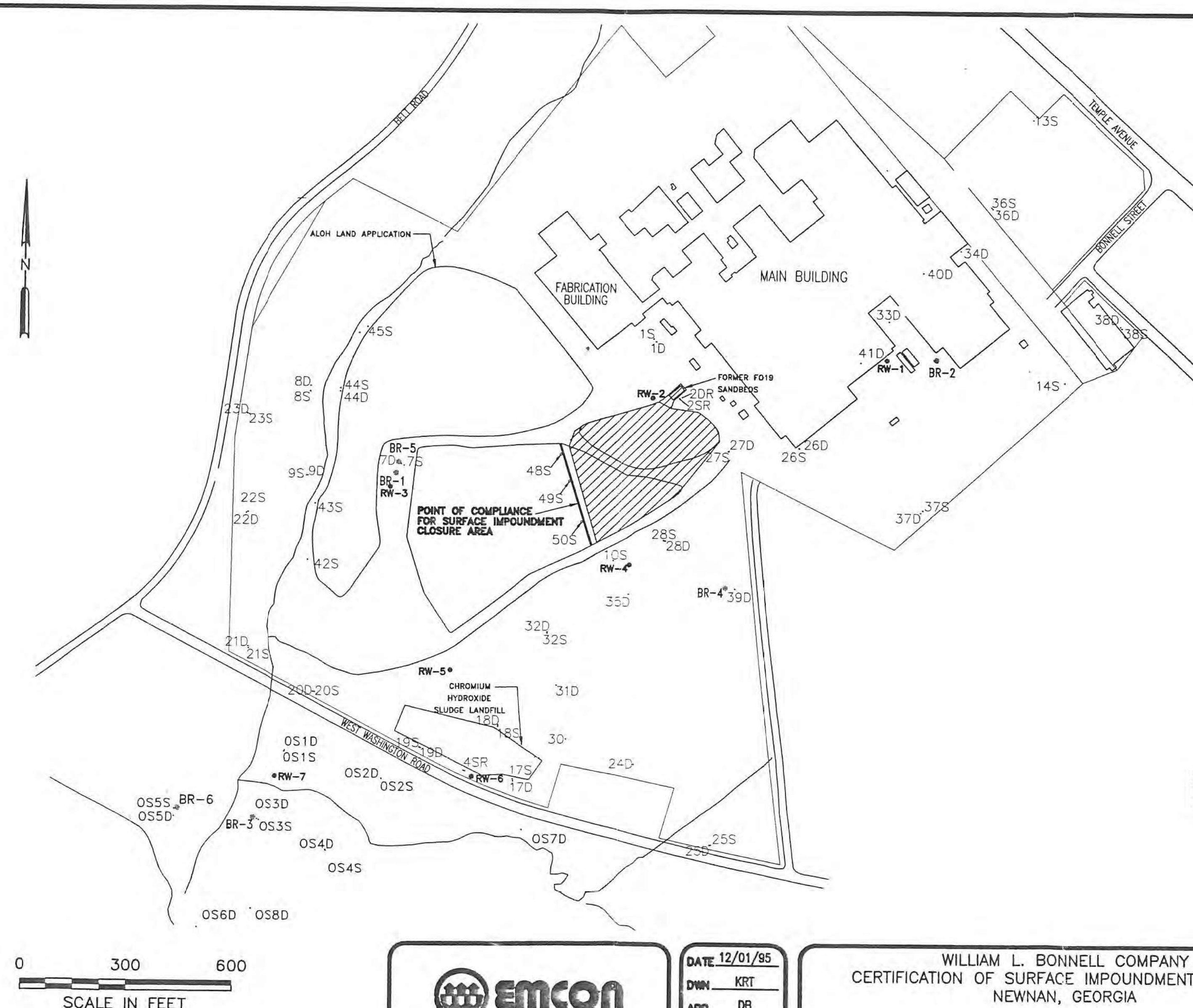
USEPA. Seminars - Design and Construction of RCRA/CERCLA Final Covers, CERI 90-50, 1990.

William L Bonnell Company. Closure and Post Closure Care Plans for the Surface Impoundment Unit, 1992.

USEPA. The Hydrologic Evaluation of Landfill Performance (HELP) Model, EPA/600/R-94/168b, September 1994.

USEPA. Stabilization/Solidification of CERCLA and RCRA Wastes, EPA/625/6-89/022, 1989.

FIGURES



LEGEND:

22D: "D" DEEP MONITORING WELL (SCREEN GENERALLY INSTALLED TO AUGER REFUSAL DEPTH, TOP OF ROCK)

22S: "S" SHALLOW MONITORING WELL (SCREEN GENERALLY SPANS THE GROUNDWATER SURFACE)

STREAMS AND PONDS

BR-2 BEDROCK MONITORING WELL

RW-7 RECOVERY WELL

SURFACE IMPOUNDMENT CLOSURE AREA

NOTE: BR-4 LOCATION IS APPROXIMATE

emcon

DATE 12/01/95
DWN KRT
APP DB
REV 3/18/96

WILLIAM L. BONNELL COMPANY
CERTIFICATION OF SURFACE IMPOUNDMENT CLOSURE
NEWNAN, GEORGIA

SITE PLAN

FIGURE
1

PROJECT NO.
72040.006.092

ES-NCR/CADD: N:\DWG\2040\006\92\FIG_1.dwg Xrefs: <NONE>
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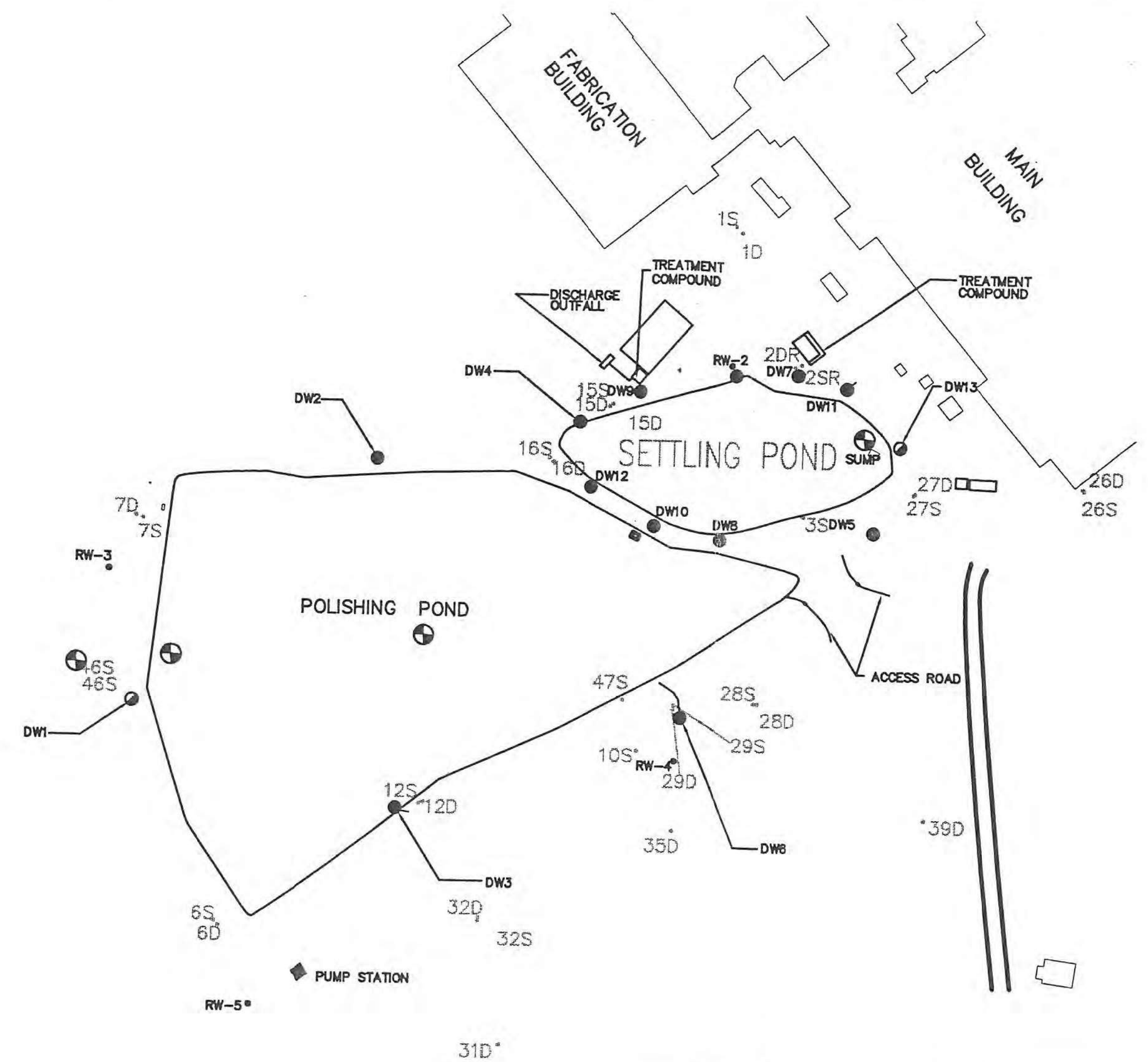

LEGEND

- DW6 — DEWATERING WELL
- RW3 — RECOVERY WELL
- RECOVERY SUMP
- GROUNDWATER MONITORING WELL

NOTES:
1. ALL DEWATERING WELLS AND SUMPS HAVE BEEN PROPERLY ABANDONED
2. FIGURE REPRESENTS IMPOUNDMENT AREA AS OF JUNE 1995.

0 150 300
SCALE IN FEET

emcon

DATE	12/01/95
DWN	KRT
APP	DB
REV	3/18/96

WILLIAM L. BONNELL COMPANY
CERTIFICATION OF SURFACE IMPOUNDMENT CLOSURE
NEWNAN, GEORGIA

RECOVERY WELL, DEWATERING WELL AND SUMP LOCATIONS

FIGURE 2

PROJECT NO. 72040.006.092

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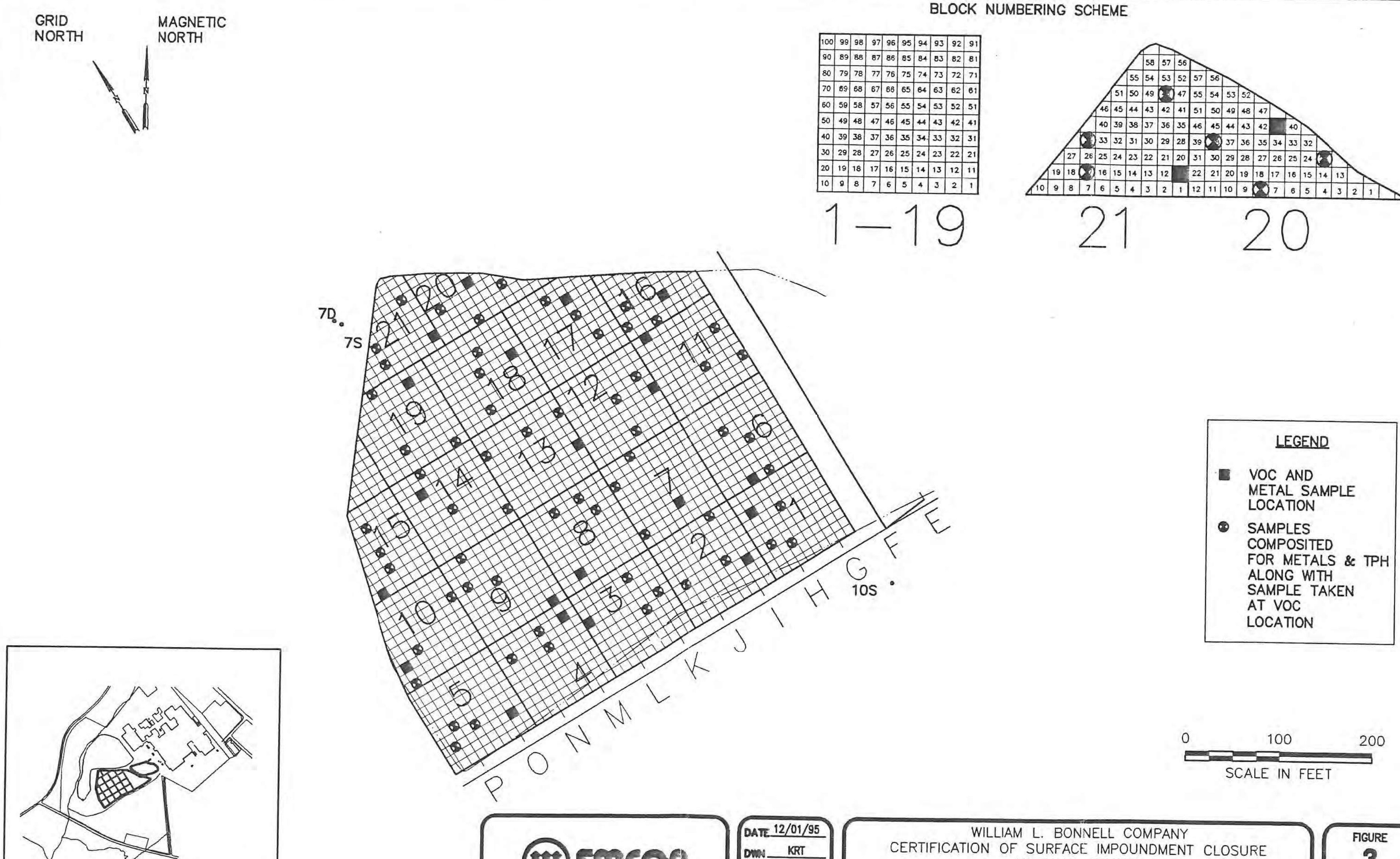

REFERENCE LOCATION

emcon

DATE 12/01/95
DWN KRT
APP DB
REV

WILLIAM L. BONNELL COMPANY
CERTIFICATION OF SURFACE IMPOUNDMENT CLOSURE
NEWNAN, GEORGIA

CERTIFICATION SOIL SAMPLE LOCATIONS

FIGURE
3

PROJECT NO.
72040.006.092

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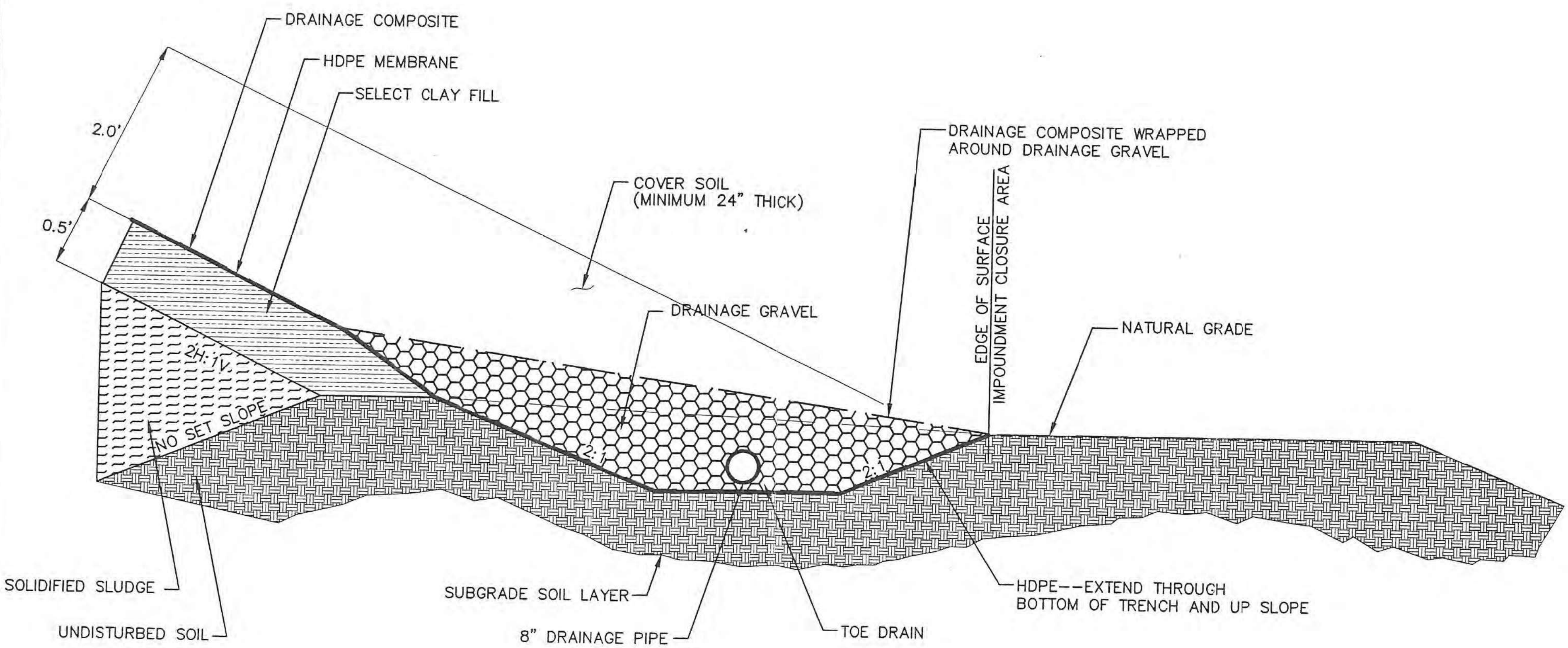

NOT TO SCALE

EMCON

DATE 12/01/95
DWN JWB
APP DB
REV 3/18/96

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NEWNAN, GEORGIA

CAP AND DRAINAGE PIPING DETAIL

FIGURE
4

PROJECT NO.
72040.006.092

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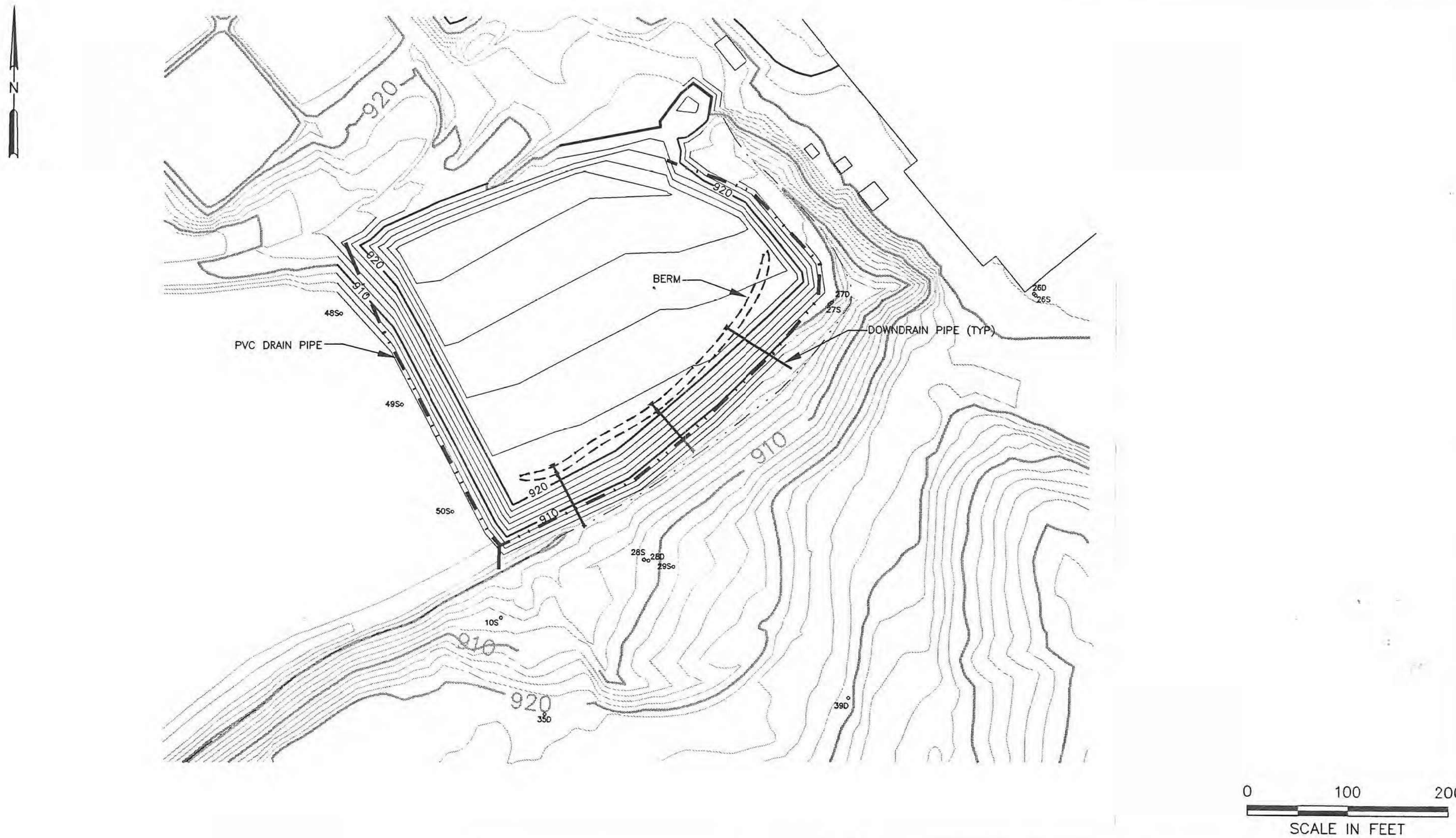

emcon

DATE 4/11/96
DWN DHJ
APP DB
REV

THE WILLIAM L. BONNELL COMPANY
CERTIFICATION OF SURFACE IMPOUNDMENT CLOSURE
NEWNAN, GEORGIA

FINAL GRADING PLAN

FIGURE
~~5~~ 6

PROJECT NO.
72040.006.092

ES-NCR/CADD: N:\DWG\2040\009\FIG-1C.dwg Xrefs: <NONE>
Scale: 1 = 100.00 Date: 4/15/96 Time: 4:58 PM Operator: JBRUCE

TABLES

TABLE 1: ANALYTICAL RESULTS OF BOTTOM SOIL SAMPLES - SURFACE IMPOUNDMENT CLEAN CLOSURE DETERMINATION

GRID NUMBER	SQUARE LOCATION	REPORT NUMBER	DATE SAMPLED	PARAMETER	ANALYTICAL RESULT
1	79	64014 - 1	07/11/95	Trichloroethene	BDL
1	79	64014 - 1	07/11/95	Toluene	BDL
1	79	64014 - 1	07/11/95	Xylenes	BDL
1	79	64014 - 1	07/11/95	Ethylbenzene	BDL
1	79	64014 - 1	07/11/95	Tetrachloroethene	BDL
1	79	64014 - 1	07/11/95	1,1-Dichloroethene	BDL
1	79	64014 - 1	07/11/95	Vinyl Chloride	BDL
1	Composite	64014 - 2	07/11/95	Total Barium	86
1	Composite	64014 - 2	07/11/95	Total Cadmimum	BDL
1	Composite	64014 - 2	07/11/95	Total Chromium	20
1	Composite	64014 - 2	07/11/95	Total Lead	15
1	Composite	64014 - 2	07/11/95	Total Nickel	11
1	Composite	64014 - 2	07/11/95	TPH	41
2	32	64014 - 3	07/11/95	Trichloroethene	BDL
2	32	64014 - 3	07/11/95	Toluene	BDL
2	32	64014 - 3	07/11/95	Xylenes	BDL
2	32	64014 - 3	07/11/95	Ethylbenzene	BDL
2	32	64014 - 3	07/11/95	Tetrachloroethene	BDL
2	32	64014 - 3	07/11/95	1,1-Dichloroethene	BDL
2	32	64014 - 3	07/11/95	Vinyl Chloride	BDL
2	Composite	64014 - 4	07/11/95	Total Barium	80
2	Composite	64014 - 4	07/11/95	Total Cadmimum	BDL
2	Composite	64014 - 4	07/11/95	Total Chromium	19
2	Composite	64014 - 4	07/11/95	Total Lead	15
2	Composite	64014 - 4	07/11/95	Total Nickel	9.8
2	Composite	64014 - 4	07/11/95	TPH	63
3	70	64014 - 5	07/11/95	Trichloroethene	BDL
3	70	64014 - 5	07/11/95	Toluene	BDL
3	70	64014 - 5	07/11/95	Xylenes	BDL
3	70	64014 - 5	07/11/95	Ethylbenzene	BDL
3	70	64014 - 5	07/11/95	Tetrachloroethene	BDL
3	70	64014 - 5	07/11/95	1,1-Dichloroethene	BDL
3	70	64014 - 5	07/11/95	Vinyl Chloride	BDL
3	Composite	64014 - 6	07/11/95	Total Barium	150
3	Composite	64014 - 6	07/11/95	Total Cadmimum	BDL
3	Composite	64014 - 6	07/11/95	Total Chromium	31
3	Composite	64014 - 6	07/11/95	Total Lead	21
3	Composite	64014 - 6	07/11/95	Total Nickel	22
3	Composite	64014 - 6	07/11/95	TPH	BDL
4	82	64014 - 7	07/11/95	Trichloroethene	BDL
4	82	64014 - 7	07/11/95	Toluene	BDL
4	82	64014 - 7	07/11/95	Xylenes	BDL
4	82	64014 - 7	07/11/95	Ethylbenzene	BDL
4	82	64014 - 7	07/11/95	Tetrachloroethene	BDL
4	82	64014 - 7	07/11/95	1,1-Dichloroethene	BDL
4	82	64014 - 7	07/11/95	Vinyl Chloride	BDL
4	Composite	64014 - 8	07/11/95	Total Barium	110
4	Composite	64014 - 8	07/11/95	Total Cadmimum	BDL
4	Composite	64014 - 8	07/11/95	Total Chromium	30
4	Composite	64014 - 8	07/11/95	Total Lead	20
4	Composite	64014 - 8	07/11/95	Total Nickel	18
4	Composite	64014 - 8	07/11/95	TPH	33

TABLE 1: ANALYTICAL RESULTS OF BOTTOM SOIL SAMPLES - SURFACE IMPOUNDMENT CLEAN CLOSURE DETERMINATION

GRID NUMBER	SQUARE LOCATION	REPORT NUMBER	DATE SAMPLED	PARAMETER	ANALYTICAL RESULT
5	22	64014 - 9	07/11/95	Trichloroethene	BDL
5	22	64014 - 9	07/11/95	Toluene	BDL
5	22	64014 - 9	07/11/95	Xylenes	BDL
5	22	64014 - 9	07/11/95	Ethylbenzene	BDL
5	22	64014 - 9	07/11/95	Tetrachloroethene	BDL
5	22	64014 - 9	07/11/95	1,1-Dichloroethene	BDL
5	22	64014 - 9	07/11/95	Vinyl Chloride	BDL
5	Composite	64014 - 10	07/11/95	Total Barium	100
5	Composite	64014 - 10	07/11/95	Total Cadmimum	BDL
5	Composite	64014 - 10	07/11/95	Total Chromium	32
5	Composite	64014 - 10	07/11/95	Total Lead	23
5	Composite	64014 - 10	07/11/95	Total Nickel	17
5	Composite	64014 - 10	07/11/95	TPH	53
6	7	64014 - 11	07/11/95	Trichloroethene	BDL
6	7	64014 - 11	07/11/95	Toluene	BDL
6	7	64014 - 11	07/11/95	Xylenes	BDL
6	7	64014 - 11	07/11/95	Ethylbenzene	BDL
6	7	64014 - 11	07/11/95	Tetrachloroethene	BDL
6	7	64014 - 11	07/11/95	1,1-Dichloroethene	BDL
6	7	64014 - 11	07/11/95	Vinyl Chloride	BDL
6	Composite	64014 - 12	07/11/95	Total Barium	33
6	Composite	64014 - 12	07/11/95	Total Cadmimum	BDL
6	Composite	64014 - 12	07/11/95	Total Chromium	18
6	Composite	64014 - 12	07/11/95	Total Lead	19
6	Composite	64014 - 12	07/11/95	Total Nickel	6.2
6	Composite	64014 - 12	07/11/95	TPH	25
7	25	64014 - 13	07/11/95	Trichloroethene	BDL
7	25	64014 - 13	07/11/95	Toluene	BDL
7	25	64014 - 13	07/11/95	Xylenes	BDL
7	25	64014 - 13	07/11/95	Ethylbenzene	BDL
7	25	64014 - 13	07/11/95	Tetrachloroethene	BDL
7	25	64014 - 13	07/11/95	1,1-Dichloroethene	BDL
7	25	64014 - 13	07/11/95	Vinyl Chloride	BDL
7	Composite	64014 - 14	07/11/95	Total Barium	130
7	Composite	64014 - 14	07/11/95	Total Cadmimum	BDL
7	Composite	64014 - 14	07/11/95	Total Chromium	24
7	Composite	64014 - 14	07/11/95	Total Lead	16
7	Composite	64014 - 14	07/11/95	Total Nickel	18
7	Composite	64014 - 14	07/11/95	TPH	BDL

TABLE 1: ANALYTICAL RESULTS OF BOTTOM SOIL SAMPLES - SURFACE IMPOUNDMENT CLEAN CLOSURE DETERMINATION

GRID NUMBER	SQUARE LOCATION	REPORT NUMBER	DATE SAMPLED	PARAMETER	ANALYTICAL RESULT
8	18	64014 - 15	07/11/95	Trichloroethene	BDL
8	18	64014 - 15	07/11/95	Tolulene	BDL
8	18	64014 - 15	07/11/95	Xylenes	BDL
8	18	64014 - 15	07/11/95	Ethylbenzene	BDL
8	18	64014 - 15	07/11/95	Tetrachloroethene	BDL
8	18	64014 - 15	07/11/95	1,1-Dichloroethene	BDL
8	18	64014 - 15	07/11/95	Vinyl Chloride	BDL
8	Composite	64014 - 16	07/11/95	Total Barium	120
8	Composite	64014 - 16	07/11/95	Total Cadmimum	BDL
8	Composite	64014 - 16	07/11/95	Total Chromium	17
8	Composite	64014 - 16	07/11/95	Total Lead	9
8	Composite	64014 - 16	07/11/95	Total Nickel	14
8	Composite	64014 - 16	07/11/95	TPH	BDL
9	2	64014 - 17	07/11/95	Trichloroethene	BDL
9	2	64014 - 17	07/11/95	Tolulene	BDL
9	2	64014 - 17	07/11/95	Xylenes	BDL
9	2	64014 - 17	07/11/95	Ethylbenzene	BDL
9	2	64014 - 17	07/11/95	Tetrachloroethene	BDL
9	2	64014 - 17	07/11/95	1,1-Dichloroethene	BDL
9	2	64014 - 17	07/11/95	Vinyl Chloride	BDL
9	Composite	64014 - 18	07/11/95	Total Barium	70
9	Composite	64014 - 18	07/11/95	Total Cadmimum	BDL
9	Composite	64014 - 18	07/11/95	Total Chromium	21
9	Composite	64014 - 18	07/11/95	Total Lead	17
9	Composite	64014 - 18	07/11/95	Total Nickel	8.1
9	Composite	64014 - 18	07/11/95	TPH	47
10	29	64014 - 19	07/11/95	Trichloroethene	BDL
10	29	64014 - 19	07/11/95	Tolulene	BDL
10	29	64014 - 19	07/11/95	Xylenes	BDL
10	29	64014 - 19	07/11/95	Ethylbenzene	BDL
10	29	64014 - 19	07/11/95	Tetrachloroethene	BDL
10	29	64014 - 19	07/11/95	1,1-Dichloroethene	BDL
10	29	64014 - 19	07/11/95	Vinyl Chloride	BDL
10	Composite	64014 - 20	07/11/95	Total Barium	91
10	Composite	64014 - 20	07/11/95	Total Cadmimum	BDL
10	Composite	64014 - 20	07/11/95	Total Chromium	33
10	Composite	64014 - 20	07/11/95	Total Lead	24
10	Composite	64014 - 20	07/11/95	Total Nickel	16
10	Composite	64014 - 20	07/11/95	TPH	36

TABLE 1: ANALYTICAL RESULTS OF BOTTOM SOIL SAMPLES - SURFACE IMPOUNDMENT CLEAN CLOSURE DETERMINATION

GRID NUMBER	SQUARE LOCATION	REPORT NUMBER	DATE SAMPLED	PARAMETER	ANALYTICAL RESULT
11	99	64014 - 21	07/11/95	Trichloroethene	BDL
11	99	64014 - 21	07/11/95	Toluene	BDL
11	99	64014 - 21	07/11/95	Xylenes	BDL
11	99	64014 - 21	07/11/95	Ethylbenzene	BDL
11	99	64014 - 21	07/11/95	Tetrachloroethene	BDL
11	99	64014 - 21	07/11/95	1,1-Dichloroethene	BDL
11	99	64014 - 21	07/11/95	Vinyl Chloride	BDL
11	Composite	64014 - 22	07/11/95	Total Barium	77
11	Composite	64014 - 22	07/11/95	Total Cadmimum	1.4
11	Composite	64014 - 22	07/11/95	Total Chromium	23
11	Composite	64014 - 22	07/11/95	Total Lead	49
11	Composite	64014 - 22	07/11/95	Total Nickel	20
11	Composite	64014 - 22	07/11/95	TPH	46
12	41	64014 - 23	07/11/95	Trichloroethene	BDL
12	41	64014 - 23	07/11/95	Toluene	BDL
12	41	64014 - 23	07/11/95	Xylenes	BDL
12	41	64014 - 23	07/11/95	Ethylbenzene	BDL
12	41	64014 - 23	07/11/95	Tetrachloroethene	BDL
12	41	64014 - 23	07/11/95	1,1-Dichloroethene	BDL
12	41	64014 - 23	07/11/95	Vinyl Chloride	BDL
12	Composite	64014 - 24	07/11/95	Total Barium	84
12	Composite	64014 - 24	07/11/95	Total Cadmimum	BDL
12	Composite	64014 - 24	07/11/95	Total Chromium	31
12	Composite	64014 - 24	07/11/95	Total Lead	15
12	Composite	64014 - 24	07/11/95	Total Nickel	11
12	Composite	64014 - 24	07/11/95	TPH	37
13	31	64014 - 25	07/11/95	Trichloroethene	BDL
13	31	64014 - 25	07/11/95	Toluene	BDL
13	31	64014 - 25	07/11/95	Xylenes	BDL
13	31	64014 - 25	07/11/95	Ethylbenzene	BDL
13	31	64014 - 25	07/11/95	Tetrachloroethene	BDL
13	31	64014 - 25	07/11/95	1,1-Dichloroethene	BDL
13	31	64014 - 25	07/11/95	Vinyl Chloride	BDL
13	Composite	64014 - 26	07/11/95	Total Barium	58
13	Composite	64014 - 26	07/11/95	Total Cadmimum	BDL
13	Composite	64014 - 26	07/11/95	Total Chromium	20
13	Composite	64014 - 26	07/11/95	Total Lead	11
13	Composite	64014 - 26	07/11/95	Total Nickel	7.2
13	Composite	64014 - 26	07/11/95	TPH	56

TABLE 1: ANALYTICAL RESULTS OF BOTTOM SOIL SAMPLES - SURFACE IMPOUNDMENT CLEAN CLOSURE DETERMINATION

GRID NUMBER	SQUARE LOCATION	REPORT NUMBER	DATE SAMPLED	PARAMETER	ANALYTICAL RESULT
14	78	64014 - 27	07/11/95	Trichloroethene	BDL
14	78	64014 - 27	07/11/95	Toluene	BDL
14	78	64014 - 27	07/11/95	Xylenes	BDL
14	78	64014 - 27	07/11/95	Ethylbenzene	BDL
14	78	64014 - 27	07/11/95	Tetrachloroethene	BDL
14	78	64014 - 27	07/11/95	1,1-Dichloroethene	BDL
14	78	64014 - 27	07/11/95	Vinyl Chloride	BDL
14	Composite	64014 - 28	07/11/95	Total Barium	84
14	Composite	64014 - 28	07/11/95	Total Cadmimum	BDL
14	Composite	64014 - 28	07/11/95	Total Chromium	45
14	Composite	64014 - 28	07/11/95	Total Lead	33
14	Composite	64014 - 28	07/11/95	Total Nickel	18
14	Composite	64014 - 28	07/11/95	TPH	550
15	7	64014 - 29	07/11/95	Trichloroethene	BDL
15	7	64014 - 29	07/11/95	Toluene	BDL
15	7	64014 - 29	07/11/95	Xylenes	BDL
15	7	64014 - 29	07/11/95	Ethylbenzene	BDL
15	7	64014 - 29	07/11/95	Tetrachloroethene	BDL
15	7	64014 - 29	07/11/95	1,1-Dichloroethene	BDL
15	7	64014 - 29	07/11/95	Vinyl Chloride	BDL
15	Composite	64014 - 30	07/11/95	Total Barium	82
15	Composite	64014 - 30	07/11/95	Total Cadmimum	BDL
15	Composite	64014 - 30	07/11/95	Total Chromium	30
15	Composite	64014 - 30	07/11/95	Total Lead	23
15	Composite	64014 - 30	07/11/95	Total Nickel	13
15	Composite	64014 - 30	07/11/95	TPH	BDL
16	25	64014 - 31	07/11/95	Trichloroethene	BDL
16	25	64014 - 31	07/11/95	Toluene	BDL
16	25	64014 - 31	07/11/95	Xylenes	BDL
16	25	64014 - 31	07/11/95	Ethylbenzene	BDL
16	25	64014 - 31	07/11/95	Tetrachloroethene	BDL
16	25	64014 - 31	07/11/95	1,1-Dichloroethene	BDL
16	25	64014 - 31	07/11/95	Vinyl Chloride	BDL
16	Composite	64014 - 32	07/11/95	Total Barium	180
16	Composite	64014 - 32	07/11/95	Total Cadmimum	BDL
16	Composite	64014 - 32	07/11/95	Total Chromium	35
16	Composite	64014 - 32	07/11/95	Total Lead	18
16	Composite	64014 - 32	07/11/95	Total Nickel	22
16	Composite	64014 - 32	07/11/95	TPH	32

TABLE 1: ANALYTICAL RESULTS OF BOTTOM SOIL SAMPLES - SURFACE IMPOUNDMENT CLEAN CLOSURE DETERMINATION

GRID NUMBER	SQUARE LOCATION	REPORT NUMBER	DATE SAMPLED	PARAMETER	ANALYTICAL RESULT
17	74	64014 - 33	07/11/95	Trichloroethene	BDL
17	74	64014 - 33	07/11/95	Tolulene	BDL
17	74	64014 - 33	07/11/95	Xylenes	BDL
17	74	64014 - 33	07/11/95	Ethylbenzene	BDL
17	74	64014 - 33	07/11/95	Tetrachloroethene	BDL
17	74	64014 - 33	07/11/95	1,1-Dichloroethene	BDL
17	74	64014 - 33	07/11/95	Vinyl Chloride	BDL
17	Composite	64014 - 34	07/11/95	Total Barium	230
17	Composite	64014 - 34	07/11/95	Total Cadmimum	BDL
17	Composite	64014 - 34	07/11/95	Total Chromium	54
17	Composite	64014 - 34	07/11/95	Total Lead	20
17	Composite	64014 - 34	07/11/95	Total Nickel	27
17	Composite	64014 - 34	07/11/95	TPH	BDL
18	52	64014 - 35	07/11/95	Trichloroethene	BDL
18	52	64014 - 35	07/11/95	Tolulene	BDL
18	52	64014 - 35	07/11/95	Xylenes	BDL
18	52	64014 - 35	07/11/95	Ethylbenzene	BDL
18	52	64014 - 35	07/11/95	Tetrachloroethene	BDL
18	52	64014 - 35	07/11/95	1,1-Dichloroethene	BDL
18	52	64014 - 35	07/11/95	Vinyl Chloride	BDL
18	Composite	64014 - 36	07/11/95	Total Barium	120
18	Composite	64014 - 36	07/11/95	Total Cadmimum	BDL
18	Composite	64014 - 36	07/11/95	Total Chromium	50
18	Composite	64014 - 36	07/11/95	Total Lead	22
18	Composite	64014 - 36	07/11/95	Total Nickel	16
18	Composite	64014 - 36	07/11/95	TPH	88
19	83	64014 - 37	07/11/95	Trichloroethene	BDL
19	83	64014 - 37	07/11/95	Tolulene	BDL
19	83	64014 - 37	07/11/95	Xylenes	BDL
19	83	64014 - 37	07/11/95	Ethylbenzene	BDL
19	83	64014 - 37	07/11/95	Tetrachloroethene	BDL
19	83	64014 - 37	07/11/95	1,1-Dichloroethene	BDL
19	83	64014 - 37	07/11/95	Vinyl Chloride	BDL
19	Composite	64014 - 38	07/11/95	Total Barium	140
19	Composite	64014 - 38	07/11/95	Total Cadmimum	BDL
19	Composite	64014 - 38	07/11/95	Total Chromium	41
19	Composite	64014 - 38	07/11/95	Total Lead	25
19	Composite	64014 - 38	07/11/95	Total Nickel	23
19	Composite	64014 - 38	07/11/95	TPH	BDL

TABLE 1: ANALYTICAL RESULTS OF BOTTOM SOIL SAMPLES - SURFACE IMPOUNDMENT CLEAN CLOSURE DETERMINATION

GRID NUMBER	SQUARE LOCATION	REPORT NUMBER	DATE SAMPLED	PARAMETER	ANALYTICAL RESULT
20	41	64014 - 39	07/11/95	Trichloroethene	BDL
20	41	64014 - 39	07/11/95	Tolulene	BDL
20	41	64014 - 39	07/11/95	Xylenes	BDL
20	41	64014 - 39	07/11/95	Ethylbenzene	BDL
20	41	64014 - 39	07/11/95	Tetrachloroethene	BDL
20	41	64014 - 39	07/11/95	1,1-Dichloroethene	BDL
20	41	64014 - 39	07/11/95	Vinyl Chloride	BDL
20	Composite	64014 - 40	07/11/95	Total Barium	87
20	Composite	64014 - 40	07/11/95	Total Cadmimum	BDL
20	Composite	64014 - 40	07/11/95	Total Chromium	49
20	Composite	64014 - 40	07/11/95	Total Lead	18
20	Composite	64014 - 40	07/11/95	Total Nickel	35
20	Composite	64014 - 40	07/11/95	TPH	180
21	11	64014 - 41	07/11/95	Trichloroethene	BDL
21	11	64014 - 41	07/11/95	Tolulene	BDL
21	11	64014 - 41	07/11/95	Xylenes	BDL
21	11	64014 - 41	07/11/95	Ethylbenzene	BDL
21	11	64014 - 41	07/11/95	Tetrachloroethene	BDL
21	11	64014 - 41	07/11/95	1,1-Dichloroethene	BDL
21	11	64014 - 41	07/11/95	Vinyl Chloride	BDL
21	Composite	64014 - 42	07/11/95	Total Barium	110
21	Composite	64014 - 42	07/11/95	Total Cadmimum	BDL
21	Composite	64014 - 42	07/11/95	Total Chromium	38
21	Composite	64014 - 42	07/11/95	Total Lead	21
21	Composite	64014 - 42	07/11/95	Total Nickel	15
21	Composite	64014 - 42	07/11/95	TPH	240
14	Composite	64597 - 2	07/28/95	TPH	BDL
14	Composite	64386 - 1	07/21/95	TPH	1300
11	Composite	64386 - 2	07/21/95	Total Cadmium	BDL