APPENDIX 4-F

CLOSURE AND POST-CLOSURE CARE PLANS FOR THE ALOH LAND TREATMENT UNIT

CLOSURE AND POST-CLOSURE PLANS
FOR THE
AlOH LAND TREATMENT UNIT

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CLOSURE AND POST-CLOSURE PLANS FOR THE AlOH LAND TREATMENT UNIT

IE-1 CLOSURE PLAN

IE-1a Closure Objectives and Performance Standard

This plan identifies steps necessary to close the aluminum hydroxide (AlOH) Land Treatment Unit (also called the AlOH Sludge-Soil Mixing Area) located at the William L Bonnell Company, Inc. (Bonnell) plant in Newnan, Georgia (EPA I.D. No. GAD003273224). The site is shown in Figure IE-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 AlOH Land Treatment Unit is not and will not be a permitted operating land treatment unit, citations are made to 40 CFR 265, which will apply. For post closure care, citation are made to 40 CFR 264, which will apply.

This closure plan identifies the approach Bonnell will employ to close the AlOH sludge-soil mixing area as a land treatment unit. As defined in 40 CFR Section 260.10, a land treatment unit means "...a facility or part of a facility at which hazardous waste is applied onto or incorporated into the soil surface..." The AlOH sludge-soil mixing area meets this definition.

The AlOH Land Treatment Unit has immobilized, degraded, or transformed chromium, the constituent of listing, in the treatment zone. Appendix IE-A is a letter from Law Environmental, Inc. in which the technical aspects of chromium behavior are presented.

This closure plan for the AlOH Land Treatment Unit is designed to achieve the following goals:

1. Minimize potential threats to human health and the environment.
2. Avoid the escape of hazardous waste to land, groundwater, surface waters, and the atmosphere.
3. Minimize the need for maintenance and controls.

To accomplish this, the closure activities consist of establishing a vegetative cover, providing run-on and run-off control and maintaining the groundwater and soil monitoring system.

IE-1b Partial Closure and Final Activities

This partial closure plan describes the activities that will be performed to close the AlOH Land Treatment Unit. Closure of other hazardous waste management units will be addressed in separate closure plans. These activities are set out in detail in Section IE-1e.

The closure approach will consist of establishing a vegetative cover, providing run-on and run-off control, conducting soil monitoring, and maintaining the groundwater monitoring system. Additional details of the options considered are provided in Section IE-1f of this submittal and soil monitoring information is included in the AlOH Monitoring Plan, (Appendix IE-C).

IE-1c Maximum Waste Inventory

The maximum waste inventory for the AlOH Land Treatment Unit consists of a F019 sludge contained in soil. 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 and surrounding soil. 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 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 IE-D.

Approximately 2 tons per day of sludge (dry solids basis) is generated by the AlOH wastewater treatment system . This equates to an average monthly waste generation of approximately 60 tons, and an average annual generation of approximately 720 tons. The total weight of sludge applied is estimated to be 13,700 tons, based on 19 years of operating life. All weights are on a dry solids basis. The total volume of F019 sludge (including soil) contained in soil was calculated as follows:

area of land treatment unit:	5.6 ac	
nominal depth:	6 ft	
ac-ft of land treatment unit:		33.7 ac-ft
area of AlOH sand drying beds:	1.6 ac	
nominal depth:	3 ft	
ac-ft of AlOH sand drying beds:		4.8 ac-ft
TOTAL AC-FT:		38.5 ac-ft

IE-1d Schedule of Closure and Certification

The AlOH Land Treatment Unit is scheduled to be closed in calendar year 1992. In accordance with Georgia Rule 391-3-11-.10 (40 CFR 265.112(b)(6)), a schedule for each closure activity has been provided as Figure IE-2. As indicated on the schedule, completion of closure is not expected to extend beyond the regulatory limit of 180 days (40 CFR 265.113(b)) following initiation of closure activities. The Georgia EPD Director will be notified by Bonnell before beginning final closure of the AlOH Land Treatment Unit. The AlOH Land Treatment Unit closure activities will be initiated upon approval of the closure plan by EPD.

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 265.115). 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. A survey plat containing the information required by Georgia Rule 391-3-11-.10 (40 CFR 265.116) will also be submitted to the local land use authority and the Georgia EPD as part of the certification of closure. Bonnell will maintain an on-site copy of the approved closure plan and all revisions to the plan until the certification of closure completeness has been submitted and accepted by the Georgia EPD.

As previously indicated, the proposed schedule for closure of the AlOH Land Treatment Unit does not exceed a 180-day closure period. If unforeseen conditions are encountered and additional time is required to complete closure, the Georgia EPD will be notified

within 30 days prior to expiration of the scheduled completion time and an extension to the schedule to reflect the additional time required will be requested under Georgia Rule 391-3-11-.10 (40 CFR 265.113(b)(1)).

IE-1e Closure Procedures

As discussed in 40 CFR 265.280(c), three methods were considered as options for closure of the AlOH Land Treatment Unit. These include:

1. Removal and disposal of contaminated soil,
2. Placement of a cap (closure as a landfill), and
3. Establish and maintain a vegetative cover (closure as a land treatment unit.

Additional options, as outlined, as in Part 265 Land Treatment Closure/Post Closure Guidance (U.S. EPA, April 14, 1987), were also considered for the AlOH Land Treatment Unit closure. These options essentially consisted of combinations of the above listed three approaches. Continued in-place treatment was also presented as an option for consideration. The referenced guidance document (included as Appendix IE-E of this closure plan) also discusses factors to be considered in selection of a closure method.

Establishing and maintaining a vegetative cover meets the selection criteria described to minimize the potential for damage to human health and the environment, and also provides a cost-effective solution for closure.

IE-1f Background

IE-1f(1) Site Location, Topography and Land Use

A topographic map showing the Newnan facility and a distance of 1000 ft. around it is included on Figure IE-3. Figure IE-3 is primarily a topographic map showing Newnan facility property and surrounding area. It also shows the area included in the 100-year floodplain and flood/run-off control features. Other features included are the AlOH Land Treatment Unit and withdrawal wells in the area shown. No injection wells are known to exist on or near Bonnell property.

Figure IE-4 shows the Bonnell property and nearby property. Surrounding land uses, keyed to zoning restrictions are shown in Figure IE-4.

IE-1f(2) Site Climate

The Bonnell facility is located in western Georgia, approximately 30 miles southwest of Atlanta. Summer months are generally warm and humid, while winter months have relatively mild temperatures and conditions.

The normal mean temperature for the summer months of June, July, and August is 78°F, while the normal mean temperature for the winter months of December, January, and February is 44°F. The growing season averages 220 days, ordinarily extending from April through October.

The average annual rainfall is about 49 inches. Rain fall distribution is fairly uniform through out the year. Precipitation exceeds evapotranspiration by approximately 9 inches per year in

the area. Precipitation pH in the area is approximately 4.5. Precipitation frequency and pH and other weather data are included in Appendix IE-F in accordance with 40 CFR 265.280(b)(4).

IE-1f(3) Soils and Geology

a. Site Geology: The rock formations that underlie the site in descending order are the Clarkston Formation, the Stonewall Formation and Wahoo Creek formation of the Atlanta Group (McConnell and Abrams, 1984). The Clarkston Formation consists primarily of biotite-muscovite schist interlayered with hornblende-plagioclase amphibolite. the Stonewall Formation consists of interlayered fine-grained biotite gneiss, amphibolite and biotite schist. The Wahoo Creek formation contains medium-grained muscovite gneiss, amphibolite, mica schist and calc-silicate gneiss. Based on the available literature, thicknesses of the formations are currently unknown and are probably quite variable.

Numerous soil borings, three exploratory rock coreholes, and 85 monitoring wells have been installed on or around the site, as shown on Figure IE-1. The borings drilled at the site encountered fill soils, residual soil, and/or partially weathered rock (PWR) from the ground surface to depths ranging from about 10 to 75 feet below the ground surface. Near the ground surface, the residual soils typically consist of loose to firm, red-brown and tan, micaceous, silty fine to medium sands. The silty fine to medium sands extend from the ground surface to depths ranging from 4 to 15 feet below the ground surface. The red-brown sands encountered in the boring generally grade into a loose to very dense, brown, tan and greenish-gray, micaceous, silty fine to coarse sand. These

silty fine to coarse sands were encountered to depths of about 16 to 75 feet below the ground surface. The residual soils are underlain by PWR. The PWR is typically gray, tan and white micaceous silty fine to medium sand with rock fragments. PWR is defined as material having a Standard Penetration Test resistance greater than 100 blows per foot. Rock underlies the PWR. For the purposes of this report, the contact between PWR and rock is defined as drill refusal.

Approximately 50 to 70 feet of rock was cored in each of the three exploratory borings (C-1, C-2 and C-3). The rock encountered in these borings consisted primarily of soft to hard, gray, black and white garnet-quartz-plagioclase-biotite-muscovite gneiss. The rock generally had a well-defined foliation that dipped at a low to moderate angle from the horizontal. The rock was slightly to severely weathered and ranged from slightly to highly fractured. The fractures occurred primarily at low to moderated angles (from the horizontal).

The top of rock (drill refusal) surface at the site generally mimics the ground-surface topography in subdued relief and generally slopes toward the west and southwest. Apparent troughs in the top-of-rock surface are situated near tributaries and valleys. A top of rock surface contour map based on drill refusal elevations is provided on Figure IE-5.

Soil characteristics for the AlOH Land Treatment Unit were obtained according to the sampling and analysis plan included in the Appendix C-8 of Section C. The analytical results are included in the same Appendix and are summarized below.

SOIL CHARACTERISTICS

	Soil Sample Site No.						
Parameter	1	2	3	4	5	6	Avg.
Total Solids (%)	72.5	72.5	72.1	71.5	73.2	72.6	72.4
Specific Gravity	1.75	1.83	1.75	1.8	1.81	1.83	1.80
Specific Conductance (umhos/cm @ 25C)	420	720	530	800	710	610	632
$CaCO_3$ Alkalinity (mg/kg)	320	130	160	160	150	140	177
Total Organic Carbon (%)	0.33	0.23	0.20	0.22	0.27	0.25	0.25
pH	10.4	8.44	7.92	7.76	7.55	7.51	8.26
Cation Exchange Capacity (meq/100g)	22.5	30.7	34.3	53.2	40.0	39.5	36.7

In addition, soils in this unit were sampled in July 1990. See Appendix C-7 of Section C of the Part B Applicaion.

b. Site Hydrogeology: Due to hydraulic communication between the groundwater in the residual soils, PWR, and the weathered and fractured bedrock, the uppermost aquifer at the site extends from the groundwater surface down to competent rock. Competent rock is defined as drill core yielding greater than 90 percent recovery (REC) and greater than 80 percent rock quality designation (RQD). Hydrogeologic cross section locations are shown on Figure IE-6. The interrelationship of the various water-bearing units in the uppermost aquifer are shown on the hydrogeologic cross-sections A-A', B-B' and C-C' (Figure IE-7).

Groundwater occurs at the site under unconfined (water table) conditions at depths ranging from about 3 to 25 feet below the ground surface. Based on July 23, 1990, groundwater and surface water elevations, the direction of groundwater flow at the site is primarily toward the southwest. Figure IE-8 shows

the estimated groundwater surface elevation contours and groundwater flow directions in the residual soils of the uppermost aquifer.

The observed horizontal hydraulic gradients in the groundwater range from about 0.025 to 0.077 feet/feet. Both upward and downward vertical hydraulic gradients were observed in groundwater elevations measured in site monitoring well clusters. A downward hydraulic gradient was generally observed in well clusters located adjacent to the settling pond and polishing pond. Upward hydraulic gradient were observed in well clusters located adjacent to creeks.

The estimated flow velocities at the site were calculated using Darcy's equation:

$$V = Ki/n_e$$

where:

V = horizontal flow velocity;
K = hydraulic conductivity;
i = hydraulic gradient; and
n_e= effective porosity

The logarithmic average of in-situ hydraulic conductivity tests (slug tests) for the residual soils (silty sands) at the site is about 8.9×10^{-4} feet/minute. Using the range of measured hydraulic gradients and an estimated effective porosity for silty sands of about 0.25 (Fetter, 1981), the resulting groundwater flow velocities in the silty sands at the site are estimated to range from about 50 to 150 feet/year.

In-situ hydraulic conductivity tests (packer tests) were performed in the three rock coreholes to estimate the hydraulic conductivity of the rock. Hydraulic conductivities ranged from less than 2×10^{-7} to 1.6×10^{-3} feet/minute with a logarithmic average of about 1.1×10^{-5} feet/minute.

IE-1g Closure Plan Activities

During closure of the AlOH Land Treatment Unit, access control devices (fences, gates, etc.) will be maintained to prevent unauthorized access by non-Bonnell employees. See the perimeter fence inspection log, Table IE-1. Closure of the AlOH Land Treatment Unit will consist of establishing a vegetative cover, providing run-on and run-off control, and performing groundwater and soil monitoring. Support for this closure method is provided in the following paragraphs.

The goal for closure of a hazardous waste management unit is to control, minimize or eliminate any potential for damage to human health and the environment. Closure of a hazardous waste land treatment unit should consider and be concerned with the extent of degradation, transformation, and immobilization of hazardous constituents and control of pathways of migration of hazardous constituents into the environment including groundwater, surface water, atmosphere, and food chain crops.

As additional support for the closure method, Table 6.47 (included as Appendix IE-G) of the U.S. EPA Manual "Hazardous Waste Land Treatment" dated April 1983, lists suggested maximum metal accumulations where materials will be left in place at closure. This table lists acceptable chromium concentrations in soil to be 1000 mg/kg. Data obtained during a July 1990 sampling event

indicate that the maximum chromium concentration detected in the AlOH Land Treatment Unit was 61.7 mg/kg (Figure 18 in Appendix IE-G). This number is only 1/16th of the acceptable maximum suggested by U.S. EPA.

For these reasons, Bonnell believes that the elements described in the following sections will meet the closure performance standards outlined in Section IE-1a.

IE-1g(1) Detailed Design and Bidding

Upon final approval of the closure plan by Georgia EPD, preparation of plans and specifications will be initiated. Completion of these documents will allow Bonnell to obtain competitive bids for construction of the AlOH Land Treatment Unit vegetative cover and run-on/off control ditch systems.

IE-1g(2) AlOH Sand Bed Removal

The AlOH sand drying beds occupy approximately 1.6 acres in the northeastern portion of the AlOH Land Treatment Unit (see Figure IE-1). The AlOH sand drying beds are bermed and contain concrete strips bisecting each sand bed.

The contents of the AlOH sand drying beds will be excavated to a depth at which the drain and overflow piping can be removed. The excavated material (sand and soil) will be mixed with soil contained within the unit. After removal, all piping will be decontaminated by triple rinsing using a low-pressure water wash and visual determination that all soil has been removed as

described in Section IE-1i and disposed of as non-hazardous waste. Concrete will be disposed as a hazardous waste.

IE-1g(3) Mobility and Migration Control

In order to maintain a continuous vegetative cover in the AlOH Land Treatment Unit, fertilizer and lime will be applied as needed or at least annually. The addition of fertilizer and lime will promote biomass production and maintain the soil pH at 6.5 or greater.

Maintaining a soil pH in the slightly acidic to slightly basic range (pH 6.5 to 7.5) is conducive to metals immobilization and precipitation (EPA, 1981). In addition, proper pH and soil nutrient conditions promote a high level of soil organic matter through biomass production (Brady, 1974). Soil organic matter is an important sink for metals (Logan & Chaney, 1983). The metals are held immobile and converted to insoluble forms (Overcash & Pal, 1979). Data from published studies indicate that pH control is a major factor in the immobilization of metal contaminants over time (Logan & Chaney, 1983). Metals are precipitated as insoluble carbonates, phosphates and organic complexes (Overcash & Pal, 1979; Logan & Chaney, 1983; Leeper, 1978; EPA 1980).

IE-1g(4) Vegetative Cover

Prior to establishment of the vegetative cover, the surface of the AlOH Land Treatment Unit will be graded to conform to the surrounding grades and to allow for run-off control. A conceptual grading plan for this area is shown on Figure IE-9. Upon completion of the site grading, soil cores will be analyzed as outlined in the AlOH Monitoring Plan in Appendix IE-C. After

grading is completed, the upper six inches of the AlOH Land Treatment Unit will be disked in preparation for seeding. Soil samples will be collected and analyzed for pH, phosphorus, and potassium. These data will be used to formulate fertilizer and lime application rates to promote plant growth.

IE-1g(5) Erosion Control

Analysis of the conceptual grading of the AlOH Land Treatment Unit shows that an erosion of less than 0.36 tons per acre could occur each year. This value is small enough to be considered insignificant. The soil loss calculation considered an average cover slope of 5 percent and indicates that significant erosion should not occur. A copy of this calculation is included in Appendix IE-H. Site relief and a good vegetative cover contribute to a reduced potential for erosion. Movement of soil as airborne particles will be minimized by the combination of good vegetative cover and supplemental irrigation during dry periods.

IE-1g(6) Run-on/off Control System

Surface water run-on will be controlled by construction of a perimeter diversion ditch along the northern boundary of the AlOH Land Treatment Unit. This ditch will be designed to intercept and control the 25-year, 24-hour storm as determined by U.S. Weather Bureau Technical Paper No. 40. A background monitoring station will be established in the existing drainage ditch located north and west of the AlOH Land Treatment Unit. This monitoring station will be used to determine background concentrations of chromium in storm water run-off.

In addition, a run-off control ditch system will be constructed. The drainage ditches will be constructed within the AlOH Land Treatment Unit to reduce the potential for ponding and direct run-off to a single sampling point. The run-off monitoring station will be established in a drainage ditch downgradient of where the run-off collection ditches converge.

Figure IE-9 shows the location of the proposed drainage ditches. The drainage ditches will be sized and constructed to control run-off from the 25-year, 24-hour storm. Copies of the ditch sizing calculations are included in Appendix IE-I.

Storm water samples will be collected from one rainfall event each quarter for one year as run-off accumulates in the ditches and will be analyzed to verify that chromium, above background concentrations, is not leaving the site via surface water discharge. See Section 2.2 of the AlOH Monitoring Plan (Appendix IE-C) for a discussion about monitoring for chromium and compliance with 40 CFR 265.273 (a) and (b). Background concentration will be determined from the run-on control monitoring station. If the concentration of chromium is above background, a plan for remediating this situation will be developed and submitted to the Georgia EPD for approval.

IE-1g(7) Control of Wind Dispersion

Wind dispersion of particulate matter from the AlOH Land Treatment Unit will be controlled by maintaining a vegetative cover and sufficient soil moisture in the soil surface. The susceptibility of soil to wind erosion is related to soil moisture content. Moist soils are not easily moved by the wind. The moisture content is generally lowered to the wilting point or lower before wind erosion

takes place (Brady, 1974). Therefore, supplemental moisture applied to the AlOH Land Treatment Unit to maintain the health of the cover vegetation will also substantially reduce the potential for wind erosion of soil particulates by maintaining adequate soil moisture.

IE-1g(8) Food Chain Crops

The AlOH Land Treatment Unit will not be used for the cultivation of food-chain crops.

IE-1g(9) Criteria for Determination of Closure Completion

The AlOH Land Treatment Unit will be considered closed when the following criteria are met:

1. Completion of the activities described in the AlOH Monitoring Plan (Appendix IE-C) indicate that implementation of the closure plan will not allow the standards in Section IE-1a to be exceeded.
2. The run-off control ditches and storm water monitoring station are constructed.
3. The surface application of fertilizer and lime to promote and help establish a biomass production and adjust the soil pH to 6.5 or greater is completed.
4. Any bare areas exceeding one hundred square feet in size are vegetated.
5. The run-on control ditch and background surface water monitoring station are constructed.

IE-1g(10) Groundwater Monitoring

Groundwater quality monitoring activities will be performed as described in Sections E-5 and E-6 of the Part B Permit Application.

IE-1h DECONTAMINATION OF EQUIPMENT

Equipment, including earth-moving and transport vehicles that have been in contact with hazardous wastes during this closure of the AlOH Land Treatment Unit will be decontaminated, as per Georgia Rule 391-3-11-.10 (40 CFR 265.112(b)(4) and 265.114). 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 will be implemented as needed based on visual inspectios of the equipment to ensure that all contaminants have been removed. A list of these equipment items is provided in Table IE-2.

The existing concrete decontamination pad will be used until removed. The portable station will then be utilized as shown on Figures IE-9 and IE-10. This station will contain the rinse water used in cleaning equipment. At the end of closure activities, the station will be pressure washed. All rinse water will be pumped to the head of the Chromium Conversion Coating of Aluminum (CCCA) wastewater treatment system. Soil collected in the decontamination tank will be handled 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.

IE-2 POST-CLOSURE PLAN

IE-2a POST CLOSURE PLAN ACTIVITIES

A Post-Closure Plan describes in general, the maintenance activities and monitoring that will be performed to monitor the AlOH Land Treatment Unit throughout the post-closure period in accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.117-.119 and 264.280(c) or until Bonnell provides verification that the AlOH Land Treatment Unit does not pose a threat to human health and the environment, whichever is the shorter time. Post-closure care will maintain the AlOH Land Treatment Unit in a condition so that human health and the environment are protected. Property use during post-closure care will be restricted in accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.117(c)). 40 CFR 264.117(a)(1) establishes the post-closure care period as 30 years; however, the post-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 Environmental Manager 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. Terry D. Snell
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

The AlOH Land Treatment Unit will be maintained during the post-closure care period, with maintenance activities performed as determined by the results of periodic inspections. In addition, the sampling of groundwater quality monitoring wells and soil sampling will be regular activities of the post-closure care period.

IE-2a(1) Inspection Plan

The closed AlOH Land Treatment Unit will be monitored and maintained throughout the post-closure period by regular inspections and unsaturated zone soils and groundwater monitoring as per Georgia Rule 391-3-11-.10 (40 CFR 264.118(b)(1) and (2)). Inspection items include:

1. grass cover and surrounding area
2. groundwater monitoring wells
3. run-on and run-off diversion ditches
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 grass 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 IE-3. The purpose of this checklist is to assist the inspector in noticing particular items during the facility inspections including ground cover maintenance. The following sections describe the general procedures which will be followed during the post-closure care period.

Inspection and monitoring will continue for the 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 five years after the end of the post-closure care period.

IE-2a(2) Monitoring Plan

The purpose of post-closure monitoring is to verify the effectiveness of closure and/or alert Bonnell if chromium begins to migrate through the AlOH Land Treatment Unit subsoils at concentrations which may result in the standards described in Section IE-1a being exceeded at the Point of Compliance (POC). The AlOH Monitoring Plan is detailed in Appendix IE-C.

Post-closure monitoring will commence when closure has been completed. Closure will have been completed when Bonnell has demonstrated that the AlOH Land Treatment Unit will not endanger human health or the environment as described in Section IE-1g(9). Monitoring will occur according to a pre-determined schedule. Sampling and analyses will occur according to the schedule outlined

in Appendix IE-C for the post-closure care period. 40 CFR 264.117(a)(1) establishes the post-closure care period as 30 years; however, the post-closure period may be shortened or extended by the Georgia EPD under Georgia Rule 391-3-11-.10 (40 CFR 264.117(a)(2)).

If monitoring results indicates that the standards described in Section IE-1a might be exceeded in the near future, additional activities would be initiated (Appendix IE-C). The purpose of these activities would be to decrease the rate of infiltration of precipitation and/or decrease the mobility of the contaminants.

IE-2a(3) Maintenance Activities

This section addresses maintenance and repair of the closed AlOH Land Treatment Unit as per Georgia Rule 391-3-11-.10 (40 CFR 264.280) in the following areas:

a. Vegetative Cover: Post-closure care will include mowing the grass of the AlOH Land Treatment Unit at least four times per year. Clippings will be left in place to provide nutrients and organic matter and to promote erosion control. Less frequent mowing may result in mulching effects of the cuttings which may deter growth.

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

Grass will be replanted when any bare area exceeds one hundred square feet. The bare area will be seeded, mulched, watered (if necessary).

During post-closure care, Bonnell will inspect the grass cover quarterly and/or 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.

The inspection schedule is intended to help achieve proper monitoring of the closed facility. The AlOH Land Treatment Unit inspection checklist is presented in Table IE-3. The purpose of the checklist is to assist the inspector in noticing particular items during the facility's inspection.

b. Run-On/Run-Off Control System: Surface water run-on will be controlled by a perimeter diversion ditch to be constructed along the northern boundary of the AlOH Land Treatment Unit as part of the closure activities. This ditch will be designed to intercept and control the 25-year, 24-hour storm as determined by U.S. Weather Bureau Technical Paper No. 40. This ditch will be grassed.

In addition, run-off control, established during closure will be maintained. The drainage ditches are to be constructed within the AlOH Land Treatment Unit and directed to a single sampling point. These ditches will be grassed. The run-off monitoring station will be

established in a drainage ditch downgradient of where the run-off collection ditches converge.

Storm water samples will be collected from the first rainfall event each month for one year after closure is completed as run-off accumulates in the ditch and will be analyzed to verify that chromium, above background concentrations, is not leaving the site via surface water discharge. Background will be determined from the background monitoring station shown in Figure IE-9. If the concentration of chromium is above background, a plan for remediating this situation will be developed and submitted to the Georgia EPD for approval.

Post-closure care includes inspecting the drainage ditches and monitoring stations quarterly and after major rainfall events. Ditches will be repaired as needed for erosion control and seeded when necessary to maintain grass cover. Drainage control structures will be maintained/reconstructed to provide continued surface water run-off control for up to the 25-year, 24-hour precipitation event.

c. Control of Wind Dispersion: Wind dispersion of particulate matter from the AlOH Land Treatment Unit will be controlled by maintaining a vegetative cover. The susceptibility of soil to wind erosion is related to soil moisture content. Moist soils are not easily moved by the wind. The moisture content is generally lowered to the wilting point or lower before wind erosion takes place (Brady, 1974). If needed, Bonnell willl provide supplemental moisture. Therefore, supplemental moisture applied to the AlOH Land Treatment Unit to maintain the

health of the cover vegetation will also substantially reduce the potential for wind erosion of soil particulates by maintaining adequate soil moisture.

d. Food-Chain Crops: The AlOH Land Treatment Unit will not be used for the cultivation of food-chain crops.

e. Saturated Zone Monitoring Systems: 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.

f. Permanent Benchmarks: The permanent benchmarks will be inspected quarterly to check for any signs of disturbance.

g. Security Control Devices: All access to the closed AlOH Land Treatment Unit will be controlled by fences surrounding the Bonnell site. These fences will be inspected quarterly (see the inspection log Table IE-1) and repaired or replaced as necessary.

IE-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 AlOH Land Treatment 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 AlOH Land Treatment Unit has been used to manage hazardous wastes, (2) that its use is restricted under Georgia Rule 391-3-11-.10 (40 CFR 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.

IE-4 CLOSURE COST ESTIMATE

The closure cost information presented is submitted in accordance with requirements of Georgia Rule 391-3-11-.10 (40 CFR 265.142 and 265.143). An estimated $37,000 will be needed to close the AlOH Land Treatment Unit. The closure costs for the area are presented by activity in Table IE-4.

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 265.142(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 265.142(c)).

IE-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). An estimated $19,766 per year for 30 years, or $593,000 will be needed for post-closure inspections and maintenance procedures over the 30 year post-closure period. The post-closure costs are presented by activity in Table IE-5.

This primary 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)).

IE-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 IE-J. The documentation follows Georgia Rule 391-3-11-.05 (40 CFR 264.143, 264.145, and 264.147).

IE-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 IE-J. The documentation reflects liability coverage in the amount of $4 million per occurrence and an $8 million annual aggregate.

REFERENCES

Brady, N. C. 1974. The Nature and Properties of Soils. Macmilliam Publishing Co., New York.

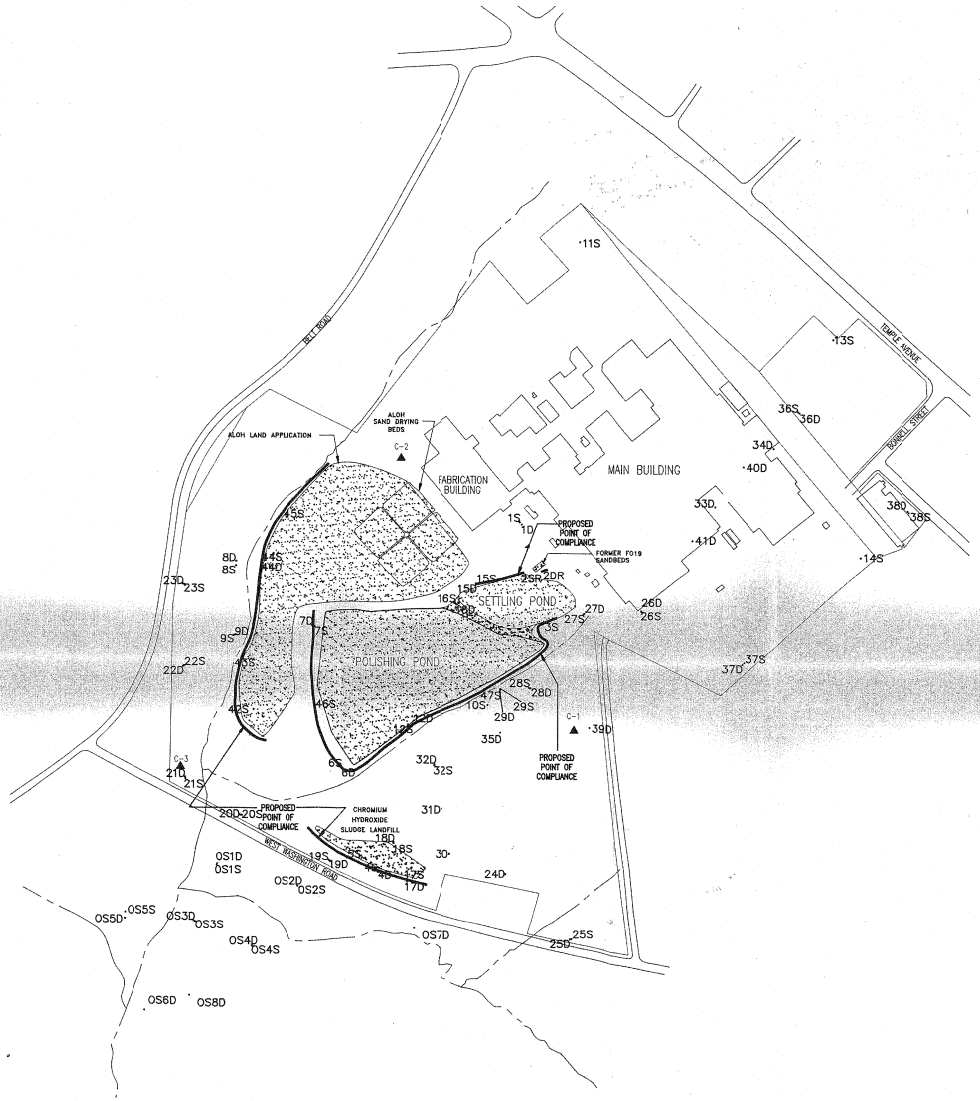
Leeper, G. W. 1978. Managing the Heavy Metals on the Land. Mariel Dekker, Inc., New York.

Logan, T. J. and R. L. Chaney, 1983. Utilization of municipal waste water and sludge on land--metals. pp. 225-323. In A. L. Page, Et at. (ed.). Utilization of Municipal Wastewater and Sludge on Land. University California, Riverside, CA.

Overcash, M. R. and D. Pal. 1979. Design of Land Treatment Systems for Industrial Wastes - Theory and Practice. Ann Arbor Science, Inc., Ann Arbor, Mich.

U. S. Environmental Protection Agency. 1980. Hazardous Waste Land Treatment. SW-874. Ofc. of Water and Waste Mgt., Wash., D.C.

U. S. Environmental Protection Agency. 1981. Process Design manual - Land Treatment of Municipal Wastewater, EPA 625/1-81-013. Center of Env. Res., Cinn., Ohio.



LEGEND:

- 22D: "D" DEEP MONITORING WELL (SCREEN GENEALLY INSTALLED TO AUGER REFUSAL DEPTH, TOP OF ROCK)
- 22S: "S" SHALLOW MONITORING WELL (SCREEN GEINERALLY SPANS THE GROUNDWATER SURFACE)
- C-1: ▲ BORING WHERE ROCK CORING PERFORMED
- HAZARDOUS WASTE MANAGEMENT UNIT
- PROPOSED POINT OF COMPLIANCE
- STREAMS

0 100 400
50 200 800

SCALE IN FEET
1" = 200'

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

EMCON SOUTHEAST

WILLIAM L. BONNELL COMPANY
ALUMINUM HYDROXIDE LAND TREATMENT UNIT CLOSURE PLAN

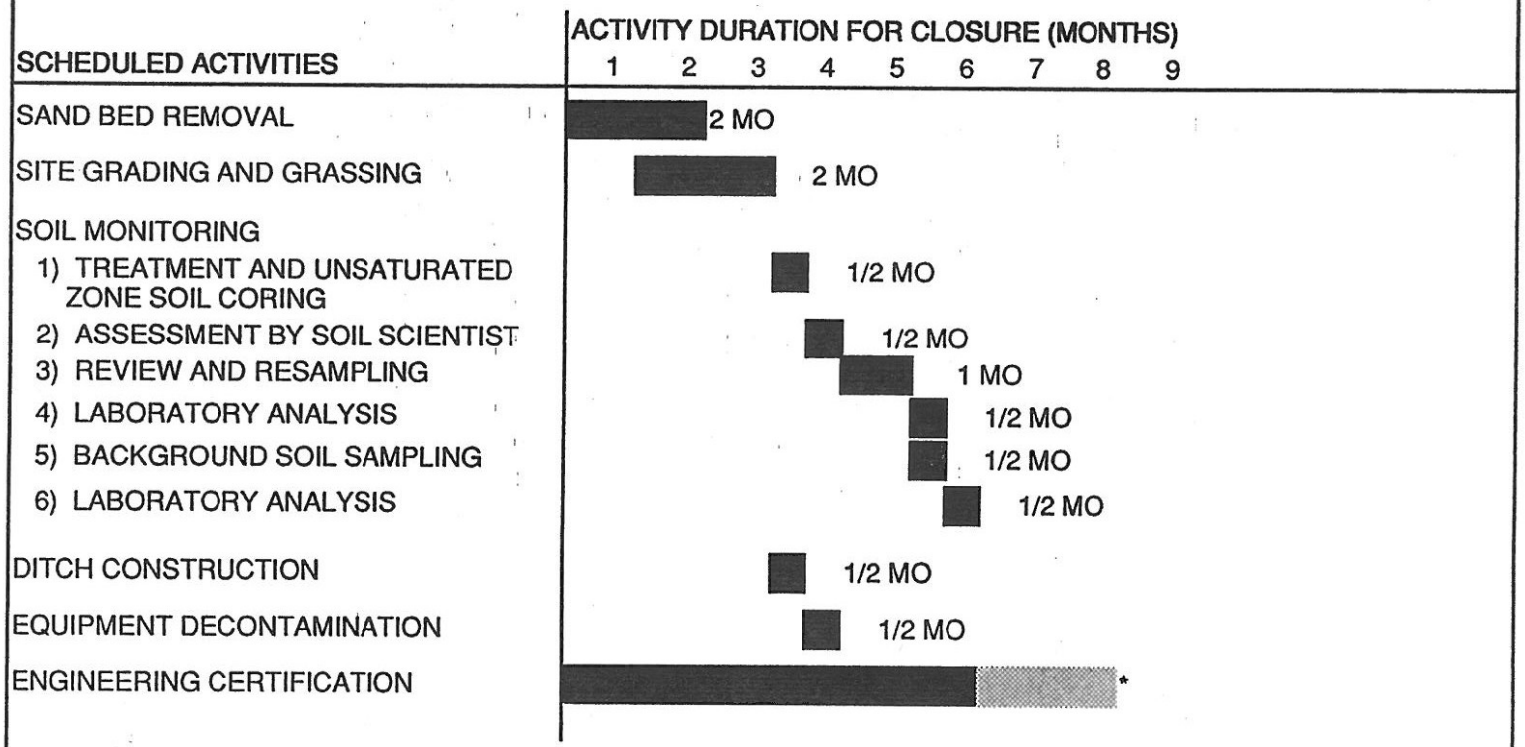
SITE PLAN

DRAWING NO. IE-1

PROJECT NO. 92013

M:\BONNELL\IE-1

ALOH LAND TREATMENT UNIT CLOSURE SCHEDULE



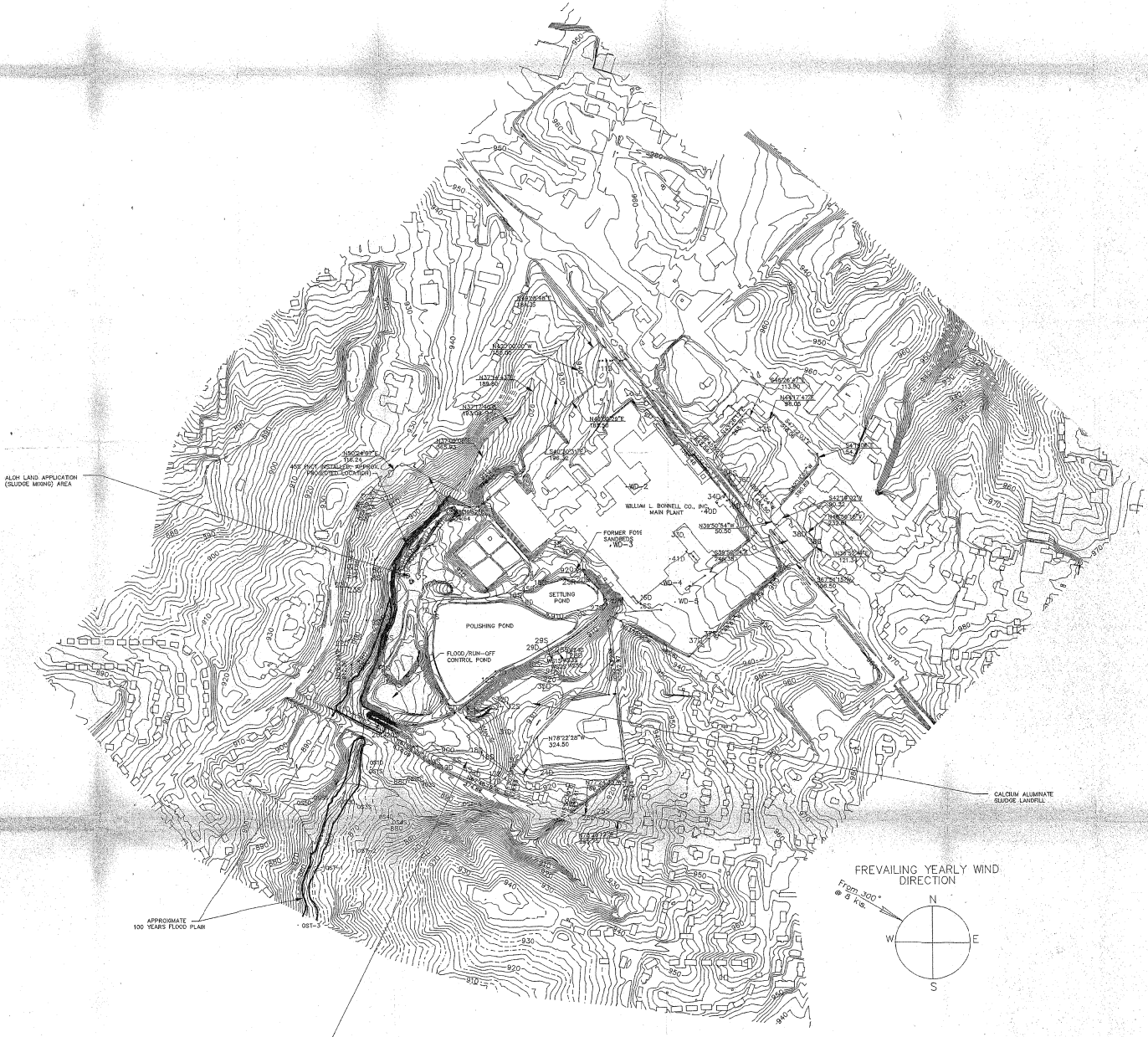
* CERTIFICATION TO BE SUBMITTED WITHIN 60 DAYS AFTER CLOSURE COMPLETION

NOTE: CLOSURE ACTIVITIES WILL BEGIN UPON APPROVAL OF CLOSURE PLAN BY EPD.

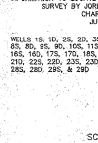
LEGEND

PROJECTED TIME LINE

WILLIAM L BONNELL COMPANY, INC NEWNAN, GEORGIA	FIGURE IE-2 4/30/92	ALOH LAND TREATMENT UNIT CLOSURE SCHEDULE



FREVAILING YEARLY WIND DIRECTION



NOTE:

INFORMATION TO LOCATE THESE WELLS WERE TAKEN FROM SURVEY BY JORDAN, JONES & GOULDING CHARLES R. HYER JULY 12,1990

WELLS 1S, 1D, 2S, 2D, 3S, 4S, 4D, 5S, 5D, 6S, 7S, 7D, 8S, 8D, 9S, 9D, 10S, 11S, 12S, 12D, 13S, 14S, 15S, 15D, 16S, 16D, 17S, 17D, 18S, 18D, 19S, 19D, 20S, 20D, 21S, 21D, 22S, 22D, 23S, 23D, 24D 25S, 26S, 26D 27S, 27D, 28S, 28D 29S, & 29D

SCALE IN FEET

200 0 200 400 600 800

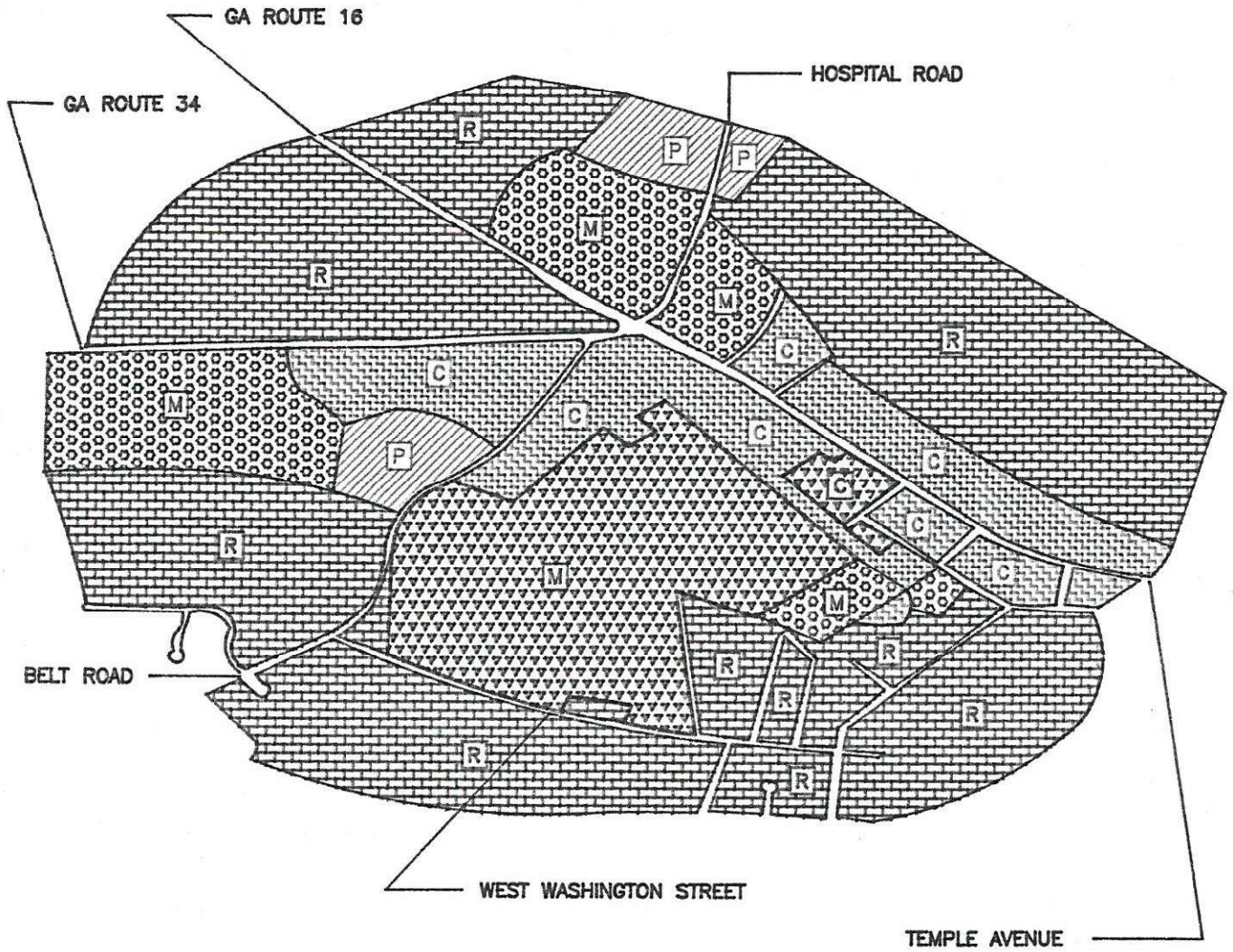
CONTOUR INTERVAL TWO FEET

Tredegar
ALUMINUM EXTRUSIONS

DRAWN BY: CAW	DATE: 8-14-90
CHECKED BY	DATE
SCALE	MAT'L

TITLE: WILLIAM L BONNELL CO., INC
PART B
PERMIT APPLICATION

SIZE	PLANT	NUMBER	REV.	E.C.
E	N.	[illegible]	[illegible]	150



SOURCE: CITY OF NEWNAN ZONING MAP JULY 1989

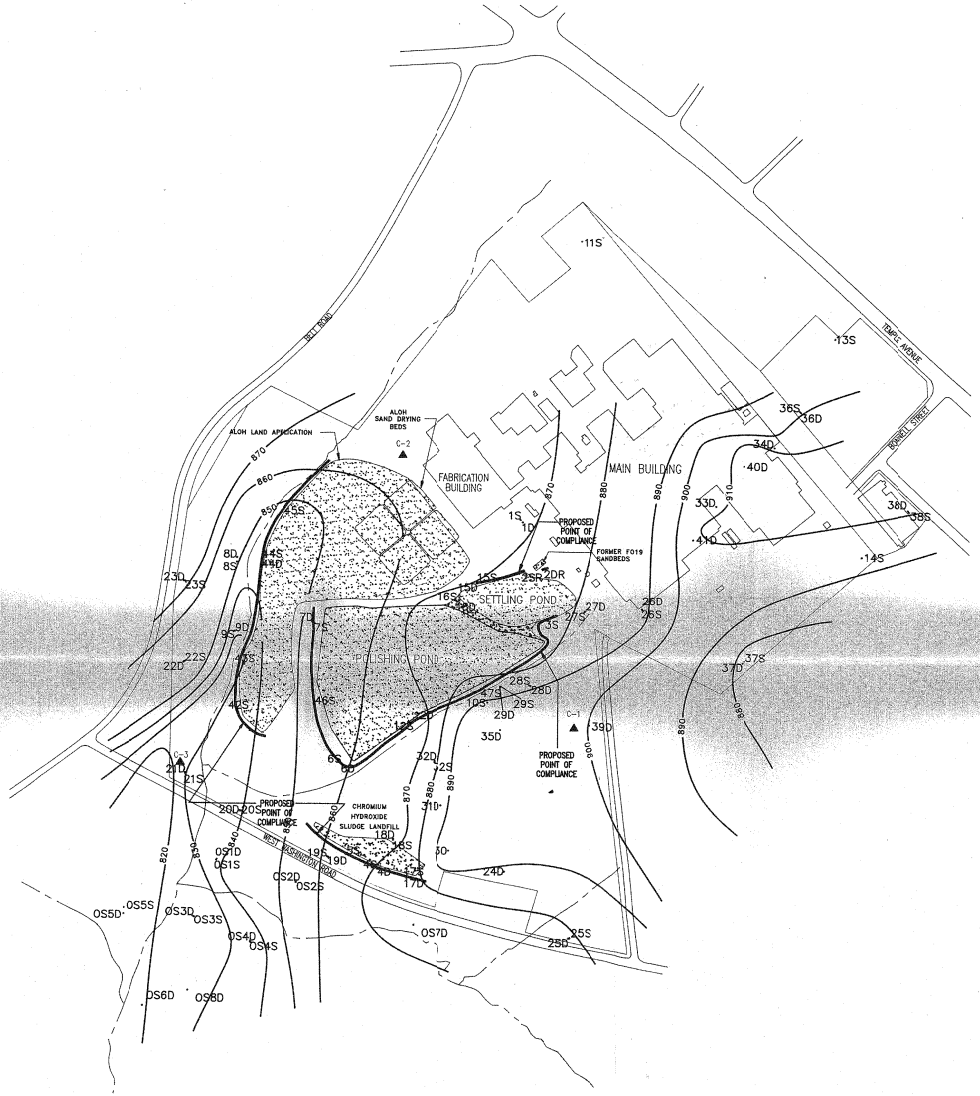
NOT TO SCALE

FIGURE 1E-4
LAND USE MAP

PART B PERMIT APPLICATION
FOR THE WILLIAM L. BONNELL CO
NEWNAN, GEORGIA

WELL ID NUMBER	DEPTH TO ROCK
1D	866.88
2DR	877.00
4D	872.81
6D	860.50
7D	853.17
8D	850.80
9D	831.77
12D	868.73
[redacted]	[redacted]
15D	869.97
16D	879.98
17D	876.46
18D	866.87
19D	863.71
20D	839.89
21D	831.49
22D	858.85
23D	872.85
24D	887.55
25D	880.13
26D	886.03
27D	881.69
28D	879.43
29D	881.81
30D	897.74
31D	866.57
32D	875.45
33D	906.78
34D	903.59
35D	895.97
36D	900.67
37D	869.23
38D	910.46
39D	892.52
40D	912.09
41D	910.10
44D	848.55
OS1D	839.11
OS2D	856.25
OS3D	821.45
OS4D	834.05
OS5D	806.89
OS6D	825.45
OS7D	875.63
OS8D	831.83
C-1	898.00
C-2	864.00
C-3	816.00

DEPTH TO ROCK MEASURED IN FEET MSL



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)
- C-1: BORING WHERE ROCK CORING PERFORMED
- HAZARDOUS WASTE MANAGEMENT UNIT
- PROPOSED POINT OF COMPLIANCE
- STREAMS
- 900 — TOP OF ROCK, AUGER REFUSAL CONTOUR (FEET, MSL)

0 100 400
50 200 800
SCALE IN FEET
1" = 200'

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

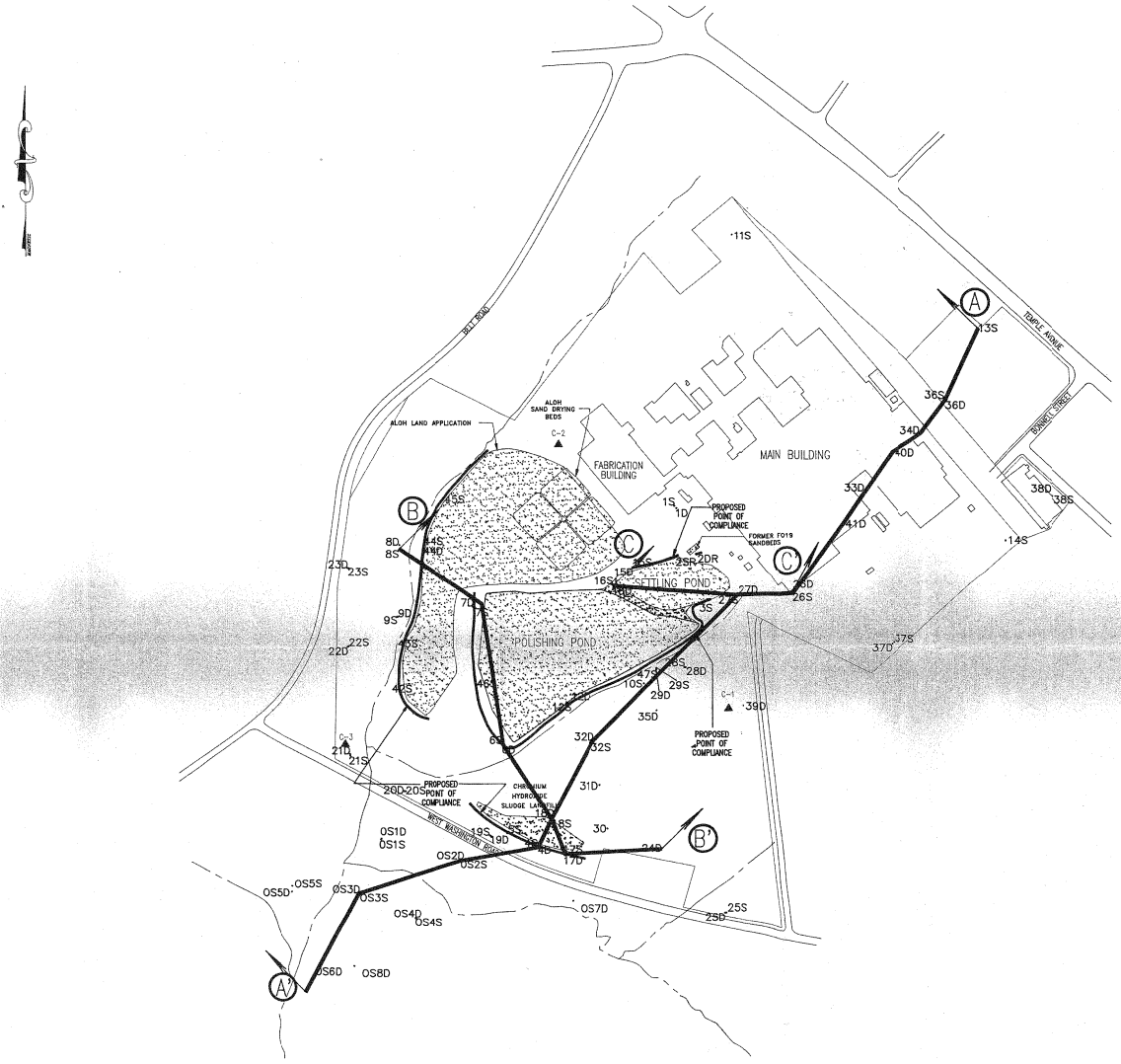
EMCON SOUTHEAST

WILLIAM L. BONNELL COMPANY
ALUMINUM HYDROXIDE LAND TREATMENT UNIT CLOSURE PLAN

TOP OF ROCK CONTOUR MAP

DRAWING NO. IE-5
PROJECT NO. 92013

M:\BONNELL\IE-5



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
- CROSS-SECTION LOCATION

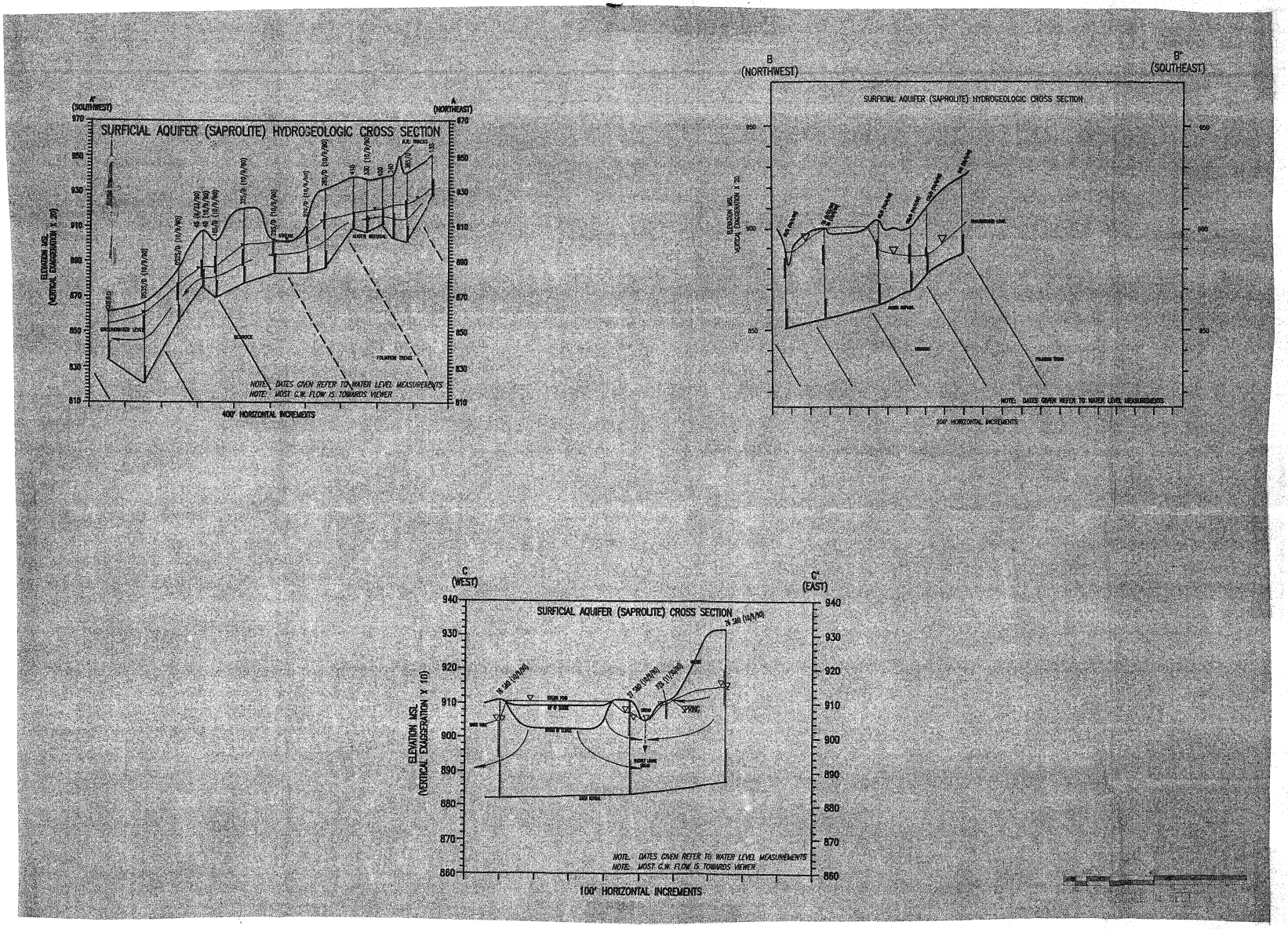
0 100 400
50 200 800
SCALE IN FEET
1" = 200'

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

EMCON SOUTHEAST

WILLIAM L. BONNELL COMPANY
ALUMINUM HYDROXIDE LAND TREATMENT UNIT CLOSURE PLAN
HYDROGEOLOGIC CROSS-SECTION LOCATION MAP

DRAWING NO. IE-6
PROJECT NO. 92013



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

EMCON SOUTHEAST

WILLIAM L. BONNELL COMPANY
ALUMINUM HYDROXIDE LAND TREATMENT UNIT CLOSURE PLAN

HYDROGEOLOGIC CROSS-SECTION
A-A B-B C-C

DRAWING NO. IE-7

PROJECT NO. 92013

Well	Water Level (MSL) (ft)	Well	Water Level (MSL) (ft)
1S	911.94	OS-1S	863.81
2SR	910.89	OS-2S	877.05
3S	907.39	OS-3S	860.91
4S	887.32	OS-4S	869.68
5S	886.57	OS-5S	859.13
6S	891.05	OS-6D	854.75
7S	893.03	OS-8D	860.69
8S	886.96	PZ2	913.65
9S	875.77	PZ3	911.40
10S	901.68	PZ4	912.19
11S	931.51	PZ5	910.91
12S	897.18	PZ6	909.14
13S	934.94	PZ7	902.09
14S	931.33	PZ8	909.14
15S	907.28	PZ9	908.28
16S	904.62	PZ10	909.05
17S	887.75	PZ11	890.32
18S	887.67	PZ12	901.66
19S	882.74	PZ13	898.85
20S	872.41	PZ14	900.05
21S	867.24	SETT P	910.21
22S	881.06	POP P	903.52
23S	891.24		
25S	908.50		
26S	915.37	Measured on 8/21/91	
27S	908.07		
28S	903.78		
29S	901.68		
32S	899.89		
33D	920.68		
34D	924.16		
35D	902.48		
36S	923.76		
37S	923.91		
38S	937.60		
39S	904.46		
40S	922.03		
41S	920.04		
42S	872.46		
43S	874.56		
44S	887.53		

LEGEND:

- 220: "D" DEEP MONITORING WELL (SCREEN GERNERALLY 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
- PIEZOMETER LOCATION

0 100 400
50 200 800

SCALE IN FEET
1" = 200'

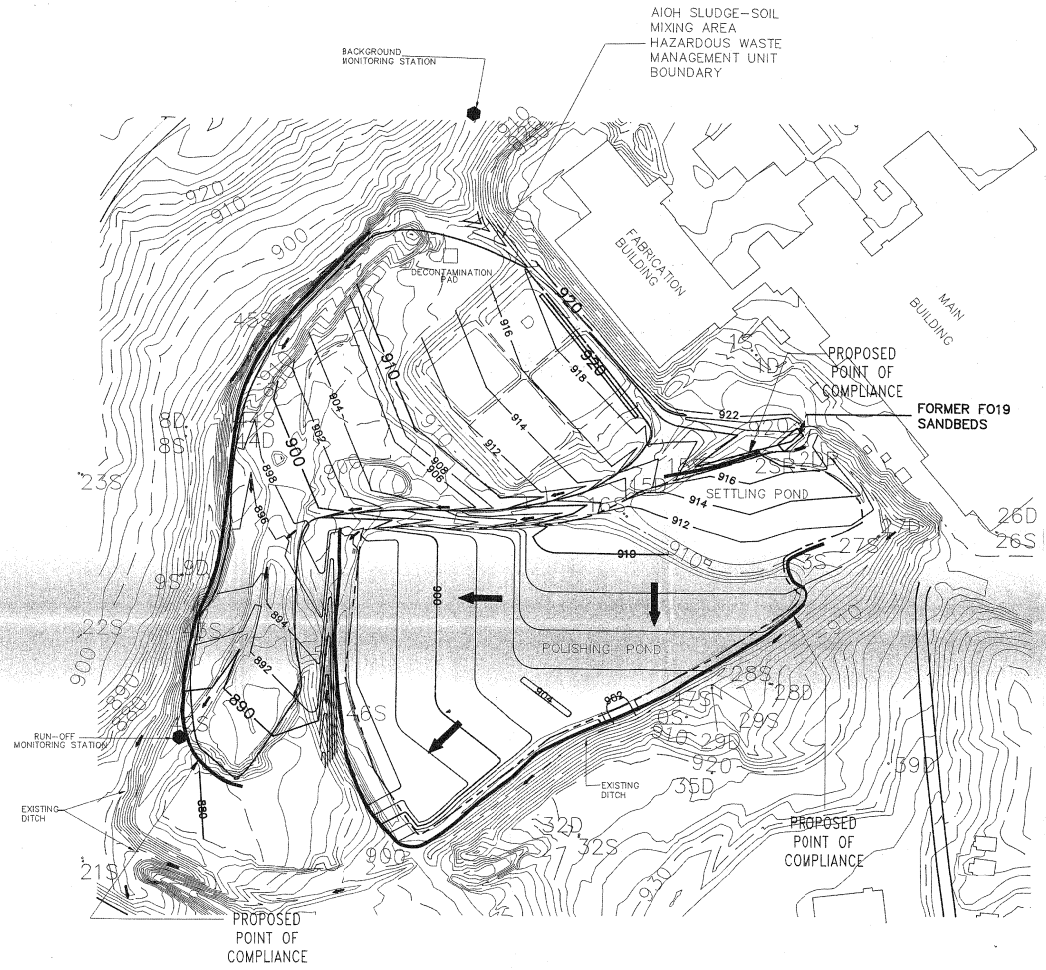
REV.	DATE	DESCRIPTION	DWN.BY:	DES.BY:	CHK.BY:	APP.BY:
DATE OF ISSUE:		DWN.BY:	CHK.BY:			
		DES.BY:	APP.BY:			

EMCON SOUTHEAST

WILLIAM L. BONNELL COMPANY
ALUMINUM HYDROXIDE LAND TREATMENT UNIT CLOSURE PLAN
GROUND-WATER SURFACE CONTOUR MAP

DRAWING NO. IE-8
PROJECT NO. 92013

M:\BONNELL\IE-8



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

EMCON SOUTHEAST

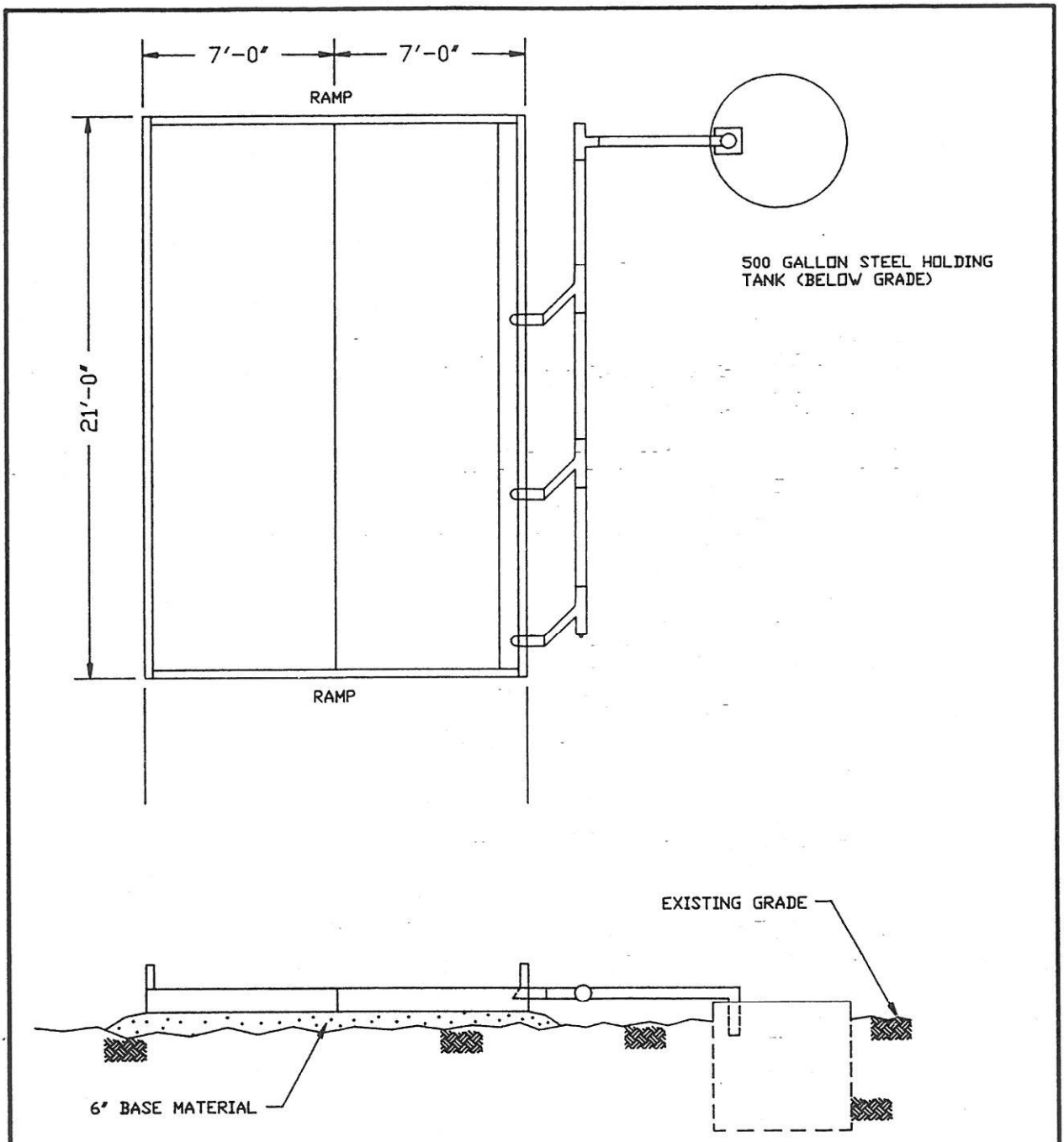
WILLIAM L BONNELL COMPANY
AIOH LAND TREATMENT UNIT

CONCEPTUAL GRADING PLAN

DRAWING NO. IE-9

PROJECT NO. 92013

M:\BONNELL\IE-9



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 IE-10

TABLE IE-1

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 IE-2

EQUIPMENT AND TOOLS WHICH MAY BECOME CONTAMINATED
DURING ALOH LAND TREATMENT UNIT CLOSURE ACTIVITIES

WILLIAM L BONNELL COMPANY, INC.
NEWNAN, GEORGIA

Tractor

Bulldozer

Front-end Loader

Pick-up or Dump Trucks

Compactors or Rollers

Shovels

Hoes

Rakes

Excavator/Backhoe

Boots

Protective Coverings

TABLE IE-3

POST-CLOSURE INSPECTION CHECKLIST
FOR AlOH SLUDGE-SOIL MIXING AREA
WILLIAM L BONNELL COMPANY, INC.
NEWNAN, GEORGIA

Date Inspected/Time _____

Reasons for Inspection
(routine/rainfall data) _____

Erosion (yes/no) _____

Vegetative Distress (yes/no) _____
- Insect Infestation _____
- Drought _____
- Woody Plant Infiltration _____
- Other _____

Ample Vegetative Ground-Cover (yes/no) _____
- Bare Areas, if so location and size _____

Drainage Ditches checked (yes/no) _____
- Erosion _____
- Bare Vegetative Areas _____

Surface Water Monitoring Stations checked (yes/no) _____
- Structure Integrity _____
- Identification _____

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

Comments (Note specifically any required corrective action or further investigation)

Date/Type of Corrective Action _____

Name of Inspector _____
(Signature)

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

TABLE IE-4

COST ESTIMATE FOR CLOSURE OF AIOH SLUDGE-SOIL MIXING AREA

WILLIAM L BONNELL COMPANY, INC.
NEWNAN, GEORGIA

ITEM	QUANTITY	UNIT COSTS	COST
1. EQUIPMENT MOBILIZATION	Lump Sum	$1,000.00	$1,000
2. SITE GRADING	Lump Sum	$5,000.00	$5,000
3. SEEDING AND FERTILIZING	7.7 acres	$350.00 per acre	$2,695
4. CONSTRUCTION OF RUN-ON/RUN-OFF CONTROL DITCHES AND MONITORING STATIONS			
a. Ditch Construction	600 l.f.	$3.00 per l.f.	$1,800
b. Monitoring Station Construction	2 stations	$1,500.00 per station	$3,000
5. IMPLEMENTATION OF SOIL MONITORING PLAN			
a. Soil Sampling	4 hours	$40.00 per hour	$160
b. Soil Laboratory Analyses	10 samples	$195.00 per sample	$1,950
c. Soil Scientist Evaluation	16 hours	$80.00 per hour	$1,280
6. CERTIFICATION			
a. Professional Engineer	80 hours	$80.00 per hour	$6,400
b. Technician	300 hours	$40.00 per hour	$12,000
c. Expenses	50 days	$25.00 per day	$1,250
		TOTAL COST	$37,000

* All costs are in 1992 dollars.

TABLE IE-5

COST ESTIMATE FOR POST-CLOSURE CARE OF
AIOH LAND TREATMENT UNIT

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) b. Fertilizing	30.0 acres 7.0 acres	$30.00 per acre $100.00 per acre	$900 $700
3. ROUTINE EROSION REPAIR * a. Soil excavating, hauling, spreading and compaction b. Seeding	50 c.y. 200 s.y.	$10.00 per c.y. $0.08 per s.y.	$500 $16
4. GROUND-WATER QUALITY MONITORING Detection Monitoring, per year	6 wells	$2,640.00 per well	$15,840
5. SOIL CORES a. Sampling and Analysis	6 samples	$195.00 per sample	$1,170
		TOTAL COST PER YEAR	$19,766
		POST-CLOSURE COST (30 years)	$593,000

* Includes labor cost
** All costs are in 1992 dollars